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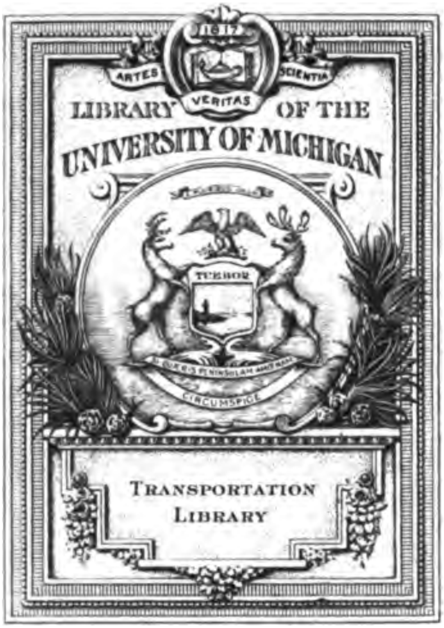
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THE
ENGINEERING INDEX

Vol. IV.—FIVE YEARS—1901-1905

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PREFACE

THIS Fourth Volume of THE ENGINEERING INDEX represents the continuation of the work originally started by the late Professor J. B. Johnson in the Journal of the Association of Engineering Societies in 1884, and turned over by that Association to THE ENGINEERING MAGAZINE at the close of 1895. The previous volumes, published respectively in 1892, 1896, and 1901, covered with increasing fullness and thoroughness the field of technical engineering periodical literature, and in the present volume every care has been taken to maintain and advance the standard set by its predecessors.

The classification used in this volume is substantially the same as that introduced in Volume III, this having found such general acceptance as to demonstrate its applicability to the purpose, and the only modifications introduced are those made necessary by the development of certain departments of applied science as explained in the instructions given for the use of the Index, in the pages which immediately follow. The use of cross-reference entries has been materially extended, so that every facility is afforded in the search for any article. This volume contains more than 50,000 entries, as against 40,000 for Volume III; an indication both of the natural growth of the Index and the increasing thoroughness with which the cross-referencing has been done.

The comprehensive extent of the Index will be seen by an examination of the list of periodicals indexed, these covering 250 technical and engineering journals, in six different languages, about one-fourth of the periodicals indexed being in languages other than English. In every case a brief abstract is given, showing the scope and purport of the article, and in many instances this is sufficient for the purposes of the investigator without further reference. In general, however, the Index is used as a guide to the vast mass of information otherwise practically buried in the numerous files of engineering publications in the reference libraries in all parts of the world, and the Engineering Index thus becomes the master-key by which these storehouses of information may be entered. Thus, the combination of the invaluable technical libraries of the American Institute of Mining Engineers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers in the new engineering building in New York City brings together sets of the leading technical journals of the world through which no individual can find the time or patience to search for all the information which he may desire, but to which he is guided directly and accurately by this volume and its predecessors.

The latest volume thus brings the investigator down to the close of the year 1905, placing in his hands information which has not yet had time to be incorporated in treatise or text book, while the earlier issues of the Index have, in many instances, enabled searches, such as occur in patent causes and the like, to be prosecuted with a minimum of cost and delay.

The editors desire to acknowledge, in the preparation of this volume, the valued services of Miss Louise Kingsley, Mr. C. H. Hunsdorfer, and Messrs. C. L. Baldwin, M.E., J. Day Flack, M.E., I. Benjamins, M.E., P. Leserman, Jr., M.E., and Howell Topping, M.E.

October, 1906.

A SHORT ACCOUNT OF THE ORIGIN OF THE ENGINEERING INDEX

AS PUBLISHED BY THE

Journal of the Association of Engineering Societies

(*Written by Prof. J. B. Johnson for Volume III of* THE ENGINEERING INDEX, *in 1901.*)

When I was elected Professor of Civil Engineering in Washington University, in the summer of 1883, I felt my greatest lack lay in my ignorance of engineering literature. I at once began to reinforce myself in these directions by going to the libraries and indexing the chief sources of such literature, which then consisted of the Engineering News, Van Nostrand's Engineering Magazine, the Journal of the Franklin Institute, the Transactions of the American Engineering Societies of Civil, Mechanical, and Mining Engineers, the English journals Engineering and The Engineer, and the Proceedings of the Institution of Civil Engineers. I began systematically to index the important articles in the various sources of engineering information in a book which I called an *Index Rerum.* At this time I was a member of the Board of Managers of the Association of Engineering Societies, representing the Engineers' Club of St. Louis. In the fall of 1883 this Board held a meeting in New York City in the office of Col. H. G. Prout, then a member of the firm of Atkin & Prout, now editor of the Railroad Gazette.* At this meeting I described the work that I was doing for myself and offered to do it, somewhat more elaborately and free of charge, for the Journal of the Association, if the Board would agree to publish it. This the Board consented to do, and the index was begun in the number of that Journal for January, 1884. All the exchanges of the Journal were sent to me at my office at Washington University, and I negotiated many additional ones for the purpose of indexing their contents. Such foreign journals as could not be obtained by exchange I indexed at the public library. At the end of the first year I secured an annual allotment of $175 for this work, which sum I thereafter paid to my assistant, who was usually an instructor under me in Washington University. These assistants thereafter largely aided me in the preparation of these notes, their names being as follows: C. V. Mersereau (C. E., Cornell), M. Am. Soc. C. E.; C. W. Melcher (M. E., Washington University), M. Am. Soc. M. E.; O. E. Hovey (C. E., Thayer), Instructor in Civil Eng., Washington University; F. E. Turneaure (C. E., Cornell), Instructor in Civil Eng., Washington University; C. W. Stewart (C. E., Cornell), and J. L. Van Ornum (C. E., University of Wisconsin), Instructor in Civil Eng. in Washington University, now Prof. Civ. Eng. in that University.

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*Now (1906) First Vice-President and General Manager of the Union Switch and Signal Company.

It will thus be seen that all the indexing was done by professional engineers of more or less practical experience. No merely clerical work was ever allowed on this indexing during the twelve years I had it in my charge, namely from 1884 to 1895, inclusive.

The theory of this index from the start has been:

(1) To index only articles of permanent value.

(2) To give such a short and concise, but adequate description of the article as would enable one seeking information on the given subject to determine whether or not it would be worth his while to obtain or consult the article.

The index immediately found many friends who appreciated it most highly, and two gentlemen in particular lent me great assistance for the first two years; these were Professor George F. Swain, of Mass. Inst. of Tech., and Mr. Clemens Herschel, both members of the American Society of Civil Engineers. Both of these gentlemen sent me many important notes, especially from the French and German.

When THE ENGINEERING MAGAZINE finally came to develop its index notes so as to make them descriptive, the Board of Managers of the Journal of the Association, of which I was then chairman, consented to abandon its publication and so gave the field entirely over to THE ENGINEERING MAGAZINE. Personally, of course, I was only too glad to be relieved of the burden, but I am free to say that the work has been far better performed by THE ENGINEERING MAGAZINE, both in scope and in thoroughness, than I was ever able to do. I believe, however, I was the author of this style of indexing, in so far as it required a perusal of the article and an estimate of its value named in the descriptive note.

J. B. JOHNSON.

TO THE USER

In order that The Engineering Index may be used conveniently and satisfactorily, it is desirable that the user should know something of the principles which have been followed in its preparation.

In the first place the Index is arranged alphabetically. This means that it is arranged according to the initial letters of certain "catch-words" which have been selected as indicating most nearly the true subjects of the articles indexed.

The choice of the proper catch-words has been by no means easy. Titles of articles frequently fail to indicate the principal subject treated, and hence it has often been necessary to choose some word which shall lead the searcher more clearly and directly to the matter sought. In this, as in all matters of arrangement, the controlling principle has been to assume the position of the searcher, and to inquire where he would be most apt to look for the desired information.

The users of such a work as the Index may be divided into two classes:

1. Those who are looking for a definite item or article, and who have a fairly clear idea of its subject and scope; and,

2. Those who are investigating a certain subject, and desire to be informed upon all the articles pertaining to that subject.

While it has been the aim to provide for the demands of both classes, the first class, consisting of searchers after definite articles, has been considered as the more important, but at the same time it has been found practicable to provide very fully for the second class. Both classes of searchers should, therefore, consider the word which most readily occurs in connection with the subject, and look for that word under its alphabetical position.

In so doing, the alphabetical order indicated by the catch-words at the tops of the successive pages should be followed, these words giving the first and last titles on the corresponding pages. The general location of the assumed catch-word having thus been found, the page should be examined, and *not before.*

The importance of this injunction will be seen when it is observed that, in the great majority of cases, there are numerous articles indexed under a single general catch-word, and that these articles are arranged alphabetically under sub-catch-words upon the pages. For example, on page 105 will be found the title **BRIDGE**, following which are nineteen pages of entries relating to bridges. These entries are arranged sub-alphabetically under **BRIDGE**, this main catch-word appearing at the top of every page, the sub-titles, in **bold-face** type, beginning with **Aber, Wales**, and ending with **Zanesville, O.**, being arranged in alphabetical order beneath, there being nearly 600 entries in all under the main catch-word **BRIDGE**. Immediately following the main catch-word **BRIDGE** are the main catch-words beginning with **BRIDGE ABUTMENT** and ending with **BRIDGE WORKS**, under which, grouped under appropriate sub-catch-words, are nearly 400 more entries relating to bridges, their design, construction and erection.

In many instances, however, there are but few entries under a single main catch-word, but in all cases the main catch-word is printed in capitals, and the sub-catch-words in bold-face upper and lower case letters. Where, as is often the case, several articles appear under the same sub-catch-word, these are arranged chronologically, according to their date of publication, except where it has been found desirable to bring very nearly related articles close together. In some cases, articles of a very general character have been placed directly under the main catch-words without any sub-catch-words, such articles being followed by those with sub-catch-words, if any. In every instance the full and exact title of the article finally appears in the actual entry, the catch-word and sub-catch-word having been used simply as guide posts to direct the seeker to his destination. In the case of articles in languages other than English there appears first a free translation of the title of the article, followed by the exact title in the original language, this enabling the text to be more readily found in its original place of publication.

It is in many cases impossible to select catch-words which shall lead all searchers immediately to the desired articles, and hence there has been an abundant use of cross-references, and since many articles are very broad in their treatment, and might readily be indexed under several catch-words, more than one examination may sometimes be necessary before the final entry is found. In all such cases, however, the cross-references will be found at every probable place, so that every possible assistance is given.

The arrangement of the cross-references is as follows:

The general cross-references under a principal title are placed immediately after the main catch-words. The cross-references under sub-titles are placed at the end of the sub-group. In both cases, the different cross-references are separated by semi-colons. When a cross-reference is given in upper and lower case letters only, it will be found under the same main heading; when it is in capitals it will, of course, be under the main title indicated. When the cross-reference consists of a word in capitals followed by one in upper and lower case letters, the latter indicates the sub-group under the given main reference.

Thus under **BRIDGE,** on page 105, will be found the general references **BRIDGE ACCIDENT; BRIDGE DESIGN; BRIDGE ERECTION; BRIDGE SPECIFICATION; CULVERT; FERRY BRIDGE; GIRDER; TRANSPORTATION—Maritime Channels; VIADUCT;** under which some of the articles relating to bridges will be found. Then at the end of the group under the sub-catch-word **East River, N. Y.,** on page 110, are the words: See also **Blackwell's Island; Brooklyn; Manhattan; Williamsburg;** meaning that other articles on East River bridges will be found under these sub-catch-words, all these being under the main catch-word **BRIDGE.** These references are followed by: **CABLE—Bridge, Manhattan; Bridge, Williamsburg; SURVEYING—Bridge;** turning to which on pages 143 and 1097, respectively, we find other articles relating to East River bridges.

Thus it will be seen that in every case the searcher will find at once either the entry he is looking for, or else a cross-reference directing him to the place where it will be found.

Suppose now, for instance, that it is desired to find references relating to the Diesel motor. The searcher may turn at once to "Diesel," and on page 279 he will find **DIESEL MOTOR:** See **OIL ENGINE—Diesel.** Turning, as directed, to **OIL ENGINE,** this main catch-word is found on the running head of page 817, and on this page, under the sub-catch-words **Diesel; Diesel in England; Diesel-Rothesay; Diesel-Sulzer;** and **Diesel Test,** will be found thirty-four different references to as many different articles on Diesel motors. Following the items under the sub-catch-word **Diesel**, will be found the cross-references: See also **Central Station**; **Marine**; **ALCOHOL MOTOR—Tests**; **ELECTRIC PLANT—Gas vs. Steam**; **ENGINE—Munich-Augsburg**; **GAS ENGINE—Paris Exposition**; **Speed Variations**; **GASOLINE ENGINE—Banki**; **POWER COST—Steam Engine vs. Diesel Motor**, under each of which will be found one or more references to articles relating to Diesel motors.

If, instead of originally looking under **DIESEL MOTOR**, the searcher looks under **MOTOR**, he will find on page 801, under **MOTOR**: **Diesel**.—See **OIL ENGINE**, and thus will be guided at once to the proper place.

A few general comments may be added:

In the arrangement of the entries under the sub-headings, the logical order has been followed when it conflicted with the position by date of publication, to the extent of placing papers upon identical subjects together, as well as translations and originals, original papers and discussions, etc. In no case, however, does this place entries more than a few lines away from their chronological position, and no confusion can arise from this cause. Catch-words have been given in the singular in all cases, so as to have compound titles follow simple titles in alphabetical order. In several cases the compound main catch-words are inverted, so as to bring closely related subjects together, the noun and the adjective being sometimes separated by a comma. Thus, **AUTOMOBILE, ELECTRIC**, is used instead of Electric Vehicle; **BOILER, WATER-TUBE**, instead of Water-Tube Boiler; **CONCRETE REINFORCED** instead of Reinforced Concrete; **LOCOMOTIVE, COMPOUND**, instead of Compound Locomotive, etc. In the subjects relating to Electricity, "Electric" has been used as a qualifying adjective for the main catch-words, instead of "Electrical." Small boats and launches, driven by electricity, gasoline, gas, or steam, will be found under **BOAT** and the compound main headings immediately following. Cars running on railways and driven by internal-combustion motors or steam engines are placed under the main catch-word **CAR, MOTOR-DRIVEN**. **ELECTRIC GENERATOR** is used instead of Dynamo; **SHIPPING** instead of Merchant Marine; **SPACE TELEGRAPHY** instead of Wireless Telegraphy; **STORAGE BATTERY** instead of Accumulator; and **STRAY CURRENTS** has been employed instead of Electrolysis to indicate the action of electric currents from electric railways upon gas and water pipes. **America** is generally used as a sub-catch-word instead of United States, and **British** for articles relating to England, Great Britain or the United Kingdom.

Serial articles are indexed upon the appearance of the first instalment only, this giving the searcher the clue by which the succeeding articles can be found. This rule has been waived in some instances of articles in two or three instalments, which are indexed entire.

This volume contains some articles appearing in journals issued in the latter part of the year 1900, which had to be omitted from Volume III, but it contains all the indexed articles which were published up to the close of 1905.

When the great number of subjects dealt with is considered, as well as the fact that many important articles include several subjects, it will be realized that the classification has in many instances necessarily been a compromise between conflicting conditions; but it is believed that the system, as a whole, will serve the great purpose which has always been kept in view, that of guiding the searcher to his destination with a minimum of labor or uncertainty.

REFERENCE LIST OF PERIODICALS

TITLES AND ABBREVIATIONS

In nearly every instance the abbreviated titles of periodicals indexed will be intelligible without further explanation, but in the following list all the titles are given, together with the addresses, in order that no possible difficulty may appear in the placing of references. The titles are arranged alphabetically in the order of the abbreviations, each being followed by the full title and place of publication. It is to be noted that *w*=weekly; *s.w*=semi-weekly; *m*=monthly; *s.m*=semi-monthly; *b.m*=bi-monthly; *q*=quarterly; *yr*=yearly.

Air Power—Air Power. *q.* New York.
Alliance Industrielle—Alliance Industrielle. *m.* Brussels.
Am Arch—American Architect. *w.* New York.
Am Elect'n—American Electrician. *m.* New York.
Am Engr & R R Jour—American Engineer and Railroad Journal. *m.* New York.
Am Gas Lgt Jour—American Gas Light Journal. *w.* New York.
Am Geol—American Geologist. *m.* South Bethlehem, Pa.
Am Jour Sci—American Journal of Science. *m.* New Haven, Conn.
Am Mach—American Machinist. *w.* New York.
Am Mfr—American Manufacturer and Iron World. *w.* Pittsburg, Pa.
Am Shipbuilder—American Shipbuilder. *w.* New York.
Am Tel Jour—American Telephone Journal. *w.* New York.
Ann d Ponts et Chauss—Annales des Ponts et Chaussées. *m.* Paris.
Ann della Societa d Ing e d Arch Ital—Annali della Società degli Ingegneri e degli Architetti Italiani. *w.* Rome.
Arch Rec—Architectural Record. *m.* New York.
Arch Rev—Architectural Review. *m.* Boston, Mass.
Arch't—Architect. *w.* London.
Arch't & Build's Mag—Architect's and Builder's Magazine. *m.* New York.
Aust Min Stand—Australian Mining Standard. *w.* Melbourne.
Autocar—Autocar. *w.* Coventry, England.
Auto Jour—Automotor and Horseless Vehicle Journal. *m.* London.
Auto Jour—Automotor Journal. *w.* London. (Successor to the preceding.)
Auto Mag—Automobile Magazine. *m.* New York.
Automobile—Automobile. *m.* New York.

Beton und Eisen—Beton und Eisen. *q.* Vienna.
Boiler Maker—Boiler Maker. *m.* New York.
Br Build—Brick Builder. *m.* Boston, Mass.

Bridges—Bridges. *m.* Chicago.
Brit Arch—British Architect. *w.* London
Brit Columbia Min Rec—British Columbia Mining Record. *m.* Victoria, B. C.
Builder—Builder. *w.* London.
Bull Am Ir & St Assn—Bulletin of the American Iron and Steel Association. *w.* Philadelphia, Pa.
Bull Dept Labor—Bulletin of Department of Labor. *b. m.* Washington, D. C.
Bull Inter Ry Cong—Bulletin of the International Railway Congress. *m.* Brussels.
Bull Sci—Bulletin Scientifique. *m.* Liége, Belgium.
Bull Soc d'Encour—Bulletin de la Société d'Encouragement. *m.* Paris.
Bull Soc Francaise d Ings Coloniaux—Bulletin de la Société Francaise des Ingenieurs Coloniaux. *q.* Paris.
Bull Soc Int d'Electriciens—Bulletin de la Société Internationale d'Electriciens. *m.* Paris.
Bull Tech d l Suisse Rom— Bulletin Technique de la Suisse Romande. *s. m.* Lausanne, Switzerland.
Bull Univ Kansas—Bulletin of the University of Kansas. *b. m.* Lawrence.
Bull Univ Wis—Bulletin of the University of Wisconsin. Madison, Wis

Cal Arch—California Architect. *m.* San Francisco.
Cal Jour of Tech—California Journal of Technology. *m.* Berkeley.
Can Arch—Canadian Architect. *m.* Toronto.
Can Elec News—Canadian Electrical News. *m.* Toronto.
Can Eng—Canadian Engineer. *m.* Toronto and Montreal.
Can Min Rev—Canadian Mining Review. *m.* Montreal.
Cassier's Mag—Cassier's Magazine. *m.* New York and London.
Cement—Cement. *b. m.* New York.
Cement Age—Cement Age. *m.* New York.
Central Sta—Central Station. *m.* New York.
Chem & Met Soc of S Africa—Chemical and Metallurgical Society of South Africa. *m.* Johannesburg.
Col Guard—Colliery Guardian. *w.* London.
Compressed Air—Compressed Air. *m.* New York.
Comptes Rendus—Comptes Rendus de l'Académie des Sciences. *w.* Paris.
Con Rev—Contemporary Review. *m.* London.
Cons Repts—Consular Reports. *m.* Washington, D. C.

Deutsche Bau—Deutsche Bauzeitung. *s. w.* Berlin.
Dom Eng—Domestic Engineering. *w.* Chicago.

Ecl Elec—Eclairage Electrique. *w.* Paris.
Economic Geol—Economic Geology. *m.* South Bethlehem, Pa.
Eisenbahntech Zeitschr—Eisenbahntechnische Zeitschrift. *b. m.* Berlin.
El Arte y la Ciencia—El Arte y la Ciencia. *m.* City of Mexico.
Elec—Electricity. *w.* New York.
Elec Club Jour—Electric Club Journal. *m.* Pittsburg, Pa.
Elec Eng Lond—Electrical Engineer. *w.* London.
Elec Engng—Electrical Engineering. *m.* Chicago.
Elec Jour—Electric Journal. *m.* Pittsburg, Pa.
Elec Lond—Electricity. *w.* London.
Elec Mag—Electrical Magazine. *m.* London.
Elec Paris—Electricien. *w.* Paris.
Elec Rev—Electrical Review. *w.* New York.

Minerva—Minerva. *w.* Rome.
Mines & Min—Mines and Minerals. *m.* Scranton, Pa.
Min Jour—Mining Journal. *w.* London.
Min Mag—Mining Magazine. *m.* New York.
Min Rept—Mining Reporter. *w.* Denver, Colo.
Mitt aus d Kgl Tech Versuchsanst—Mittheilungen aus der Königlich Technischen Versuchsanstalt. Berlin.
Mitt d Ver f d Förd d Local u Strassenbahnwesens—Mittheilungen des Vereines für die Förderung des Local- und Strassenbahnwesens. *m.* Vienna.
Mod Mach—Modern Machinery. *m.* Chicago.
Mon d Architectes—Moniteur des Architectes. *m.* Paris.
Monit Indust—Moniteur Industriel. *w.* Paris.
Motor Wagon—Motor Wagon. *w.* Cleveland, O.
Mouvement Maritime—Mouvement Maritime. *w.* Brussels.
Munic Engng—Municipal Engineering. *m.* Indianapolis, Ind.
Munic Jour & Eng—Municipal Journal and Engineer. *m.* New York.

N Am Rev—North American Review. *m.* New York.
Nat Bld—National Builder. *m.* Chicago.
Nature—Nature. *w.* London.
Naut Gaz—Nautical Gazette. *w.* New York.
N Z Mines Rec—New Zealand Mines Record. *m.* Wellington.
Nineteenth Cent—Nineteenth Century. *m.* London.

Oest Monatschr f d Oeff Baudienst—Oesterreichische Monatschrift für den öffentlichen Baudienst. *m.* Vienna.
Oest Wochenschr f d Oeff Baudienst—Oesterreichische Wochenschrift für den öffentlichen Baudienst. *w.* Vienna.
Oest Zeitschr f Berg- und Hüttenwesen—Oesterreichische Zeitschrift für Berg- und Hüttenwesen. *w.* Vienna.
Ores and Met—Ores and Metals. *w.* Denver, Colo.

Pacific Coast Min—Pacific Coast Miner. *w.* San Francisco, Cal.
Page's Mag—Page's Magazine. *m.* London.
Plumb & Dec—Plumber and Decorator. *m.* London.
Pop Sci M—Popular Science Monthly. *m.* New York.
Power—Power. *m.* New York.
Prac Eng—Practical Engineer. *w.* London.
Pro Age—Progressive Age. *s. m.* New York.
Pro Am Soc Civ Engs—Proceedings of the American Society of Civil Engineers. *m.* New York.
Pro Can Soc Civ Engs—Proceedings of the Canadian Society of Civil Engineers. *m.* Montreal.
Pro Engs Club of Phila—Proceedings Engineers' Club of Philadelphia. *q.* Philadelphia, Pa.
Pro Inst Civ Engs—Proceedings of the Institution of Civil Engineers. *q.* London.
Pro Inst Elec Engs—Proceedings of the Institution of Electrical Engineers. *q.* London.
Pro Inst Mech Engs—Proceedings of the Institution of Mechanical Engineers. London.
Pro Inst Min & Met—Proceedings of the Institution of Mining and Metallurgy. *m.* London.
Pro Pac Coast Ry Club—Proceedings Pacific Coast Railway Club. *m.* San Francisco, Cal.
Pro St. Louis Ry Club—Proceedings St. Louis Railway Club. *m.* St. Louis, Mo.

Pro U S Naval Inst—Proceedings United States Naval Institute. *q.* Annapolis, Md.
Pub Works—Public Works. *q.* London.

Quarry—Quarry. *m.* London.
Queensland Gov Min Jour—Queensland Government Mining Journal. *m.* Brisbane, Australia.

Rev de Mécanique—Revue de Mécanique. *m.* Paris.
Rev de Metallurgie—Revue de Metallurgie. *m.* Paris.
Rev d Obras Pub—Revista de Obras Publicas. *w.* Madrid.
Revist Tech Ind—Revista Tecnológico Industrial. *m.* Barcelona, Spain.
Rev of Revs—Review of Reviews. *m.* London and New York.
Rev Tech—Revue Technique. *s. m.* Paris.
Revue Gen des Chemin de Fer—Revue Générale des Chemins de Fer. *m.* Paris.
Revue Gen des Sci—Revue Générale des Sciences. *w.* Paris.
Revue Industrielle—Revue Industrielle. *w.* Paris.
Rev Univ des Mines—Revue Universelle des Mines. *m.* Liége, Belgium.
Rivista Gen d Ferrovie—Rivista Generale di Ferrovie. *w.* Florence.
R R Car Jour—Railroad Car Journal. *m.* New York.
R R Gaz—Railroad Gazette. *w.* New York.
Ry Age—Railway Age. *w.* Chicago.
Ry & Engng Rev—Railway and Engineering Review. *w.* Chicago.
Ry & Loc Engng—Railway and Locomotive Engineering. *m.* New York.
Ry Mag—Railway Magazine. *m.* New York.
Ry Mas Mech—Railway Master Mechanic. *m.* Chicago.

San Plumb—Sanitary Plumber. *s. m.* New York.
Schiffbau—Schiffbau. *s. m.* Berlin.
Schw Bauz—Schweizerische Bauzeitung. *w.* Zürich.
Sci Am—Scientific American. *w.* New York.
Sci Am Sup—Scientific American Supplement. *w.* New York.
Sib Jour Engng—Sibley Journal of Engineering. *m.* Ithaca, N. Y.
Stahl u Eisen—Stahl und Eisen. *s. m.* Düsseldorf, Germany.
Steam Engng—Steam Engineering. *m.* New York.
Stevens Ind—Stevens Institute Indicator. *q.* Hoboken, N. J.
Stone—Stone. *m.* New York.
St Ry Jour—Street Railway Journal. *w.* New York.
St Ry Rev—Street Railway Review. *m.* Chicago.

Tech Qr—Technology Quarterly. *q.* Boston, Mass.
Tech—Technograph. *yr.* Urbana, Ill.
Tel Mag—Telephone Magazine. *m.* Chicago.
Telephony—Telephony. *m.* Chicago.
Tijds v h Kljk Inst v Ing—Tijdschrift van het Koninklijk Instituut van Ingenieurs. *q.* Hague, Holland.
Tract & Transmission—Traction and Transmission. *m.* London.
Tram & Ry Wld—Tramway and Railway World. *m.* London.
Trans Am Inst Elec Engs—Transactions American Institute of Electrical Engineers. *m.* New York.
Trans Am Inst Min Engs—Transactions American Institute of Mining Engineers. *m.* New York.

Trans Am Soc Civ Engs—Transactions American Society of Civil Engineers. *m.* New York.

Trans Am Soc Heat & Ven Engs—Transactions American Society of Heating and Ventilating Engineers. New York.

Trans Am Soc Mech Engs—Transactions American Society of Mechanical Engineers. New York.

Trans Inst Eng & Ship in Scot—Transactions Institute of Engineers and Shipbuilders in Scotland. Glasgow.

Transport—Transport. *w.* London.

U S Cons Repts—Consular Reports. *m.* Washington, D. C.

W Elec—Western Electrician. *w.* Chicago.

W Min Wld—Western Mining World. *w.* Chicago.

Wiener Bauindust Zeit—Wiener Bauindustrie Zeitung. *w.* Vienna.

Wlds Work—World's Work. *m.* New York.

Wood Craft—Wood Craft. *m.* Cleveland, O.

Yacht—Le Yacht. *w.* Paris.

Zentralblatt d Bauverwaltung—Zentralblatt der Bauverwaltung. *w.* Berlin.

Zeitschr d Mit Motorwagen Ver—Zeitschrift des Mitteleuropäischen Motorwagen Vereines. *s. m.* Berlin.

Zeitschr d Oest Ing u Arch Ver—Zeitschrift des Oesterreichischen Ingenieur- und Architekten Vereines. *w.* Vienna.

Zeitschr d Ver Deutscher Ing—Zeitschrift des Vereines Deutscher Ingenieure. *w.* Berlin.

Zeitschr f Electrochem—Zeitschrift für Elektrochemie. *w.* Halle a-S., Germany.

Zeitschr f Elektrotech—Zeitschrift für Elektrotechnik. *w.* Vienna.

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THE ENGINEERING INDEX.

1901-1905, inclusive.

A

ABATTOIR.

Düsseldorf.—The New Abattoir at Düsseldorf (Les Nouveaux Abattoirs de Dusseldorf). Describing especially the sterilizing and refrigerating plant. 1500 w. 1 plate. Génie Civil—Nov. 30, 1901.

ABRASIVE.

See also **CARBORUNDUM; EMERY; EMERY WHEEL; GRINDING.**

Abrasive Materials. Joseph Hyde Pratt. Considers all the natural products used for abrasives: also the artificial products of carborundum and crushed steel. Serial. 1st part. 5700 w. Am Mfr—Aug. 1, 1901.

America.—Abrasive materials in the United States. Joseph Hyde Pratt. From advance sheets of Mineral Resources of the U. S., 1901. Information concerning the natural and artificial abrasives. 2300 w. Stone—May, 1902.

Corundum.—The Industry of Abrasives and Corundum (L'Industrie des Abrasifs et le Corindon). A. de Romeu. A general review of the use of abrasive material in mechanical operations, with especial reference to the exploitation of deposits of corundum. 6000 w. Rev Gen d Sciences—June 15, 1905.

Silverwood, Eng.—See **GRINDSTONE.**

Steel.—Crushed Steel and Steel Emery. M. M. Kann. Read before the Am. Assn. for the Adv. of Science. Brief history of these products, their manufacture and uses. 2200 w. Ir Age—Jan. 29, 1903.

Crushed Steel and Steel Emery. M. M. Kann. An account of an artificial abrasive produced from steel, and the uses to which it is applied. 2000 w. Sci Am Sup—March 14, 1903.

ABYSSINIA.

Exploration.—See **SUDAN.**

ACCELEROMETER.

A Portable Accelerometer for Railway Testing. F. B. Corey. Illustrated description of this instrument and its operation. It is of great practical value to the railway engineer. 2000 w. Trans Am Soc of Mech Engrs, No. 922—Dec., 1901.

An Electric Accelerometer. B. B. Owens. Describes a simple and reliable method of measuring acceleration of a railway car or other machine. Ills. 600 w. Can Soc of Civ Engrs—Nov 2, 1905.

ACCIDENT.

See under specific headings, such as **BOILER EXPLOSION, BRIDGE ACCIDENT,** etc.

ACCIDENT PREVENTION.

See **SAFETY APPLIANCE.**

ACCOUNTING.

See also **COST-KEEPING; ELECTRIC STATION MANAGEMENT; STREET RAILWAY MANAGEMENT; WORKS MANAGEMENT.**

Electric Railway.—See **STREET RAILWAY MANAGEMENT—Accounting.**

Mines.—See **MINE MANAGEMENT.**

Municipal.—See **MUNICIPAL ACCOUNTING.**

Power Plants.—See **POWER PLANT—Accounting.**

Railway Shop.—See **ELECTRIC RAILWAY SHOP—Accounting.**

Street Railway.—See **STREET RAILWAY MANAGEMENT—Accounting.**

U. S. Government.—Property Returns on Public Works. A. F. Bridgman. An outline of methods adopted by the U. S. and State governments and various commissions in charge of public works, for taking account of stock and making inventories of property. 1200 w. Eng Rec—Dec. 27, 1902.

ACCUMULATOR.

See **STORAGE BATTERY.**

ACCUMULATOR RAILWAY.

See **ELECTRIC LOCOMOTIVE—Storage Battery; ELECTRIC RAILWAY—Paris; Paris-Arpajon; STORAGE BATTERY RAILWAY.**

ACETYLENE.

See also **ACETYLENE GENERATOR; CALCIUM CARBIDE; CAR LIGHTING.**

Acetylene Gas. Harry C. Earle. On the progress as an illuminant, the claims made, the principle of the generators, &c. 1400 w. Sibley Jour of Engng—Nov, 1901.

Lighting by Acetylene. Frederick Dye. The present article gives an elementary outline of how acetylene is made and used. Serial. 1st part. 2300 w. Plumb & Dec—Aug. 1, 1901.

The Position of Calcium Carbide and Acetylene. Reviews an article by Dr. Münsterberg, recently published in the "Zeitschrift für Beleuchtungswesen. 2000 w. Engr, Lond—Sept. 13, 1901.

Acetylene Gas. A report of progress, 1200 w. Gas Wld—Feb. 1, 1902.

The Actual State of the Calcium Carbide and Acetylene Industries (L'Etat Actuel de l'Industrie du Carbure de Calcium et de l'Acetylène). Dr. Oscar Münsterberg. Translated from "Zeitschrift für Beleuchtungswesen." A general review of acetylene lighting, which the author believes is the best illuminating system for small cities and isolated buildings. 4500 w. Rev Gén des Sciences—June 15, 1902.

Acetylene. John W. Woodall and F. Windham. Read before the Soc. of Architects. Gives the history and chemical composition of carbide in calcium from which the gas acetylene is generated, and the system of generators, costs, installations, ets. 3200 w. Archt, Lond—Feb. 20, 1903.

Acetone.—See **Dissolved; CAR LIGHTING—Acetylene.**

Analysis.—See **Purification and Analysis; GAS ANALYSIS.**

Blowpipe.—See **WELDING.**

Burner.—See **Purification.**

Car Lighting.—See **Railway Lighting; CAR LIGHTING—Acetylene.**

Congress, Paris.—The Third International Acetylene Congress at Paris in 1900 (Der III. Internationale Acetylen Congress in Paris 1900). Heinrich Koechlin. A general account of the organization of the congress and abstract of the proceedings. 3500 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 21, 1901.

Development.—Development in Acetylene. J. H. Chewett. Read before the Engrs. Club of Toronto. Reviews the history of the development and discusses the advantages and value of the gas. 2800 w. Can Engr—Aug., 1903.

Dissolved.—Lighting with Dissolved Acetylene (Société Francaise de Physique). A paper before the above society on the present state of lighting with acetylene dissolved in acetone. 1500 w. Revue Technique—Jan. 10, 1902.

The Principal Properties of Acetylene Solutions (L' Acetylene Dissous et ses Principales Applications). A. Janet. A description of the success which has been attended in the practical use of acetylene dissolved in acetone, especially for illuminating purposes and for the oxy-acetylene blowpipe. 2000 w. Génie Civil—July 18, 1903.

Dissolved Acetylene and Its Applications (L'Acétylène Dissous et ses Principales Applications). F. Bourdil. Describing the Fouché modification of the method of Claude and Hess for dissolving acetylene in acetone and rendering it safe for transportation. Applications to train lighting, blowpipe, etc., are given. 2000 w. Mem Soc Ing Civ de France—Nov., 1903.

See also **CAR LIGHTING—Acetylene.**

Duurstede, Holland.—The First Acetylene Gas Works in the Netherlands (De Eerste Acetyleencentrale in Nederland). J. A. De La Porte. Illustrated description of the plant recently erected near Duurstede, Holland. 1500 w. De Ingenieur—June 15, 1901.

Electro-Chemistry.—The Electrochemical Behavior of Acetylene (Ueber das Elektrochemische Verhalten des Acetylens). Dr. H. von Steinwehr. A discussion of the possibilities of acetylene in organic synthesis. 1200 w. Zeitschr f Elektrochemie—June 6, 1901.

Explosion.—Some Disastrous Acetylene Gas Explosions. An account of two explosions, wrecking the houses in which they occurred, and causing loss of life. Ill. 500 w. Sci Am—March 22, 1902.

Explosive Power.—Experiments on the Explosive Power of Acetylene Gas. Robert H. Fenn. Condensed from a graduating thesis presented at the Clarkson School of Technology, Potsdam, N. Y. Illustrates and describes the apparatus used and the tests made. 1600 w. Eng News—Nov. 29, 1900.

Flame.—The Acetylene Flame. Edward L. Nichols. Reports the progress of investigations upon the properties of the acetylene flame, undertaken for the purpose of determining its usefulness in the physical laboratory. 7800 w. Jour Fr Inst—Nov., 1900.

Fouché Method.—See **Dissolved.**

Future.—The Future of Acetylene Lighting. George Landis Wilson. A copyrighted paper read before the meeting of the International Acetylene Assn., at Buffalo, N. Y. Discusses its advantages, uses and the outlook. 3800 w. Met Work—June 29, 1901.

Germany.—Acetylene in Germany. Reviews the report of Dr. Rose, British Consul at Stuttgart, concerning the use of Acetylene. 1800 w. Engr, Lond—Dec. 14, 1900.

See also **Village, German.**

Germany and Sweden.—Acetylene Gas in Germany and Sweden. Reports on the uses of acetylene in the countries named. 1200 w. U S Cons Repts—Oct. 31, 1901.

Headlights.—See **HEADLIGHT.**

Heratol.—See **Purification.**

High-Pressure.—Results of Practical Experiments with High-Pressure Acetylene Lighting. Harvey T. Hauer. Read before the International Acetylene Assn., at Buffalo. On the properties and the success in lighting railway coaches, harbor and buoy lighting, and other uses, giving interesting tests made. 4000 w Pro Age—July 15, 1901.

Impurities.—See **Purification.**

Incandescent and Carburetted.—Incandescent and Carburetted Acetylene. Reviews a paper presented by Dr. N. Caro, to the German Verein. Discusses the difficulties in the way of making a satisfactory burner, and the properties of acetylene. 1200 w. Engr, Lond—Dec. 18, 1901.

Lighthouse.—The Illumination of the Chassiron Lighthouse with Acetylene Incandescent Lights (Note sur l'Eclairage du Phare de Chassiron à l'Incandescence par l'Acétylène). M. de Joly. An illustrated description of a lighthouse in France, which is lighted with acetylene gas and Welsbach incandescent mantles, and the results of its operation. 3000 w. Ann des Ponts et Chaussees.—4 Trimestre, 1902.

Acetylene Gas in the Chassirôn Lighthous An illustrated description of experiments bein carried out in France which greatly increa the illuminating power. 1800 w. Engng—Oc 16, 1903.

Mine Lamps.—Acetylene Lighting in Mines (Ueb Versuche mit Acteylen-Beleuchtung in Bergwe ken). Abstracted from the "Zeitschrift für d Berg Hütten und Salinenwesen." An account trials of acetylene safety lamps and other lam in German mines. 3000 w. Glückauf—Jan. 1902.

Experiments with Acetylene Lamps for P Work. Abstract of a paper by G. Franke, Berlin, showing that at present these lamps r quire more careful usage than is given by t average miner. Reports of tests are given. I 1200 w. Col Guard—March 21, 1902.

The Stuchlik Safety Acetylene Mining Lam (Acetylen-Gruben-Sicherheitslampe System Stuc lik). Illustrating and describing an acetylene ge erating lamp for mine service. 1000 w. Oeste Zeitschr f Berg u Hüttenwesen—Jan. 10, 1903.

Experiments with the New Wolf Safety Lam Report presented to the French Committee Firedamp by G. Chesneau. Illustrated descri tion of the lamp with report of tests. The co mittee are of the opinion that the results sho it to be safe enough for use in fiery pits. 1500 Col Guard—May 2, 1902.

Tests of the Wolf Acetylene Safety Lamp (Ve suche mit der Wolfschen Azetylen Sicherheit lampe). H. Beyling. The lamp contains charge of carbide to which water is gradual fed; safety being attained by enclosing the flam in glass and wire gauze. 4000 w. Glückauf-July 8, 1905.

Oxygen Flame.—A Note on an Acetylene-in-Oxyg Flame. Clayton H. Sharp. Brief account of e perimental investigations on a flame produced the combustion of a mixture of equal parts acetylene and hydrogen in an atmosphere of ox gen. 800 w. Trans Am Inst of Elec Engrs—Dec 1901.

Purification.—Purification of Acetylene. Abstra of articles by Herr G. Keppeler published "Journal für Gasbeleuchtung." Investigations the value of purifying materials. Heratol said to be the most perfect in its action. 1800 Jour Gas Lgt—Dec. 30, 1902.

Impurities and Purification of Acetylene. Keppeler, in the "Jour. of Gasbeleucht." resume of the impurities which have been disco ered in acetylene, and the methods devised to i prove them. 2000 w. Sci Am Sup—Aug. 8, 190

Purification and Combustion of Acetylene. Fro "La Nature." Explains the process proposed Prof. Ullmann, in which "heratol" is used purify the acetylene, and describes the burne most successful. Ills. 1200 w. Sci Am Sup-June 18, 1904.

Purification and Analysis.—Analysis and Purific tion of Acetylene. Summary of an address, co piled by Herren A. Rossel and E. Landriset, d livered at the inauguration of the Swiss Carbi and Acetylene Association at Berne. 2500 Jour Gas Lgt—June 11, 1901.

Railway Lighting.—Railway Lighting by Acetyle Gas. John S. Seymour. Explains a system lighting cars, stations, etc., in which acetylene dissolved in acetone contained in tanks lined wi porous bricks. 2300 w. Ry & Engng Rev—Au 24, 1901.

The Economy of Compressed Acetylene Gas f Lighting Railway Cars, Stations and General Ra way Lighting. E. G. Fisher. An explanation this system and its advantages, with general di cussion. Ill. 6300 w. Pro Iowa Ry Club—No 17, 1903.

See also **ACETYLENE GENERATOR—St. Pau CAR LIGHTING—Acetylene.**

Safety Lamp.—See **Mine Lamp.**

Storage and Transportation.—Acetylene Stored an Transported in Safety. John S. Seymour. D scribes a system for the safe transportation an storage of acetylene in tanks of special equi ment, explaining the principle, and giving i formation of interest. 6500 w. Jour Fr Inst.-July, 1903.

Stoves.—Acetylene Stoves and Their Application. J. Murdock. Description of a heating burner f use with Acetylene gas. 1500 w. Met Work-July 6, 1901.

Sweden.—See Germany and Sweden.

Town Lighting.—Town Lighting by Acetylene. Augustine Davis. Considers it more economical and of better quality than by gas or electricity. 1500 w. Munic Jour & Engr—July, 1903.

Ullmann Process.—See Purification.

Village Plants.—Acetylene Lighting Plants for Villages. Information furnished by Russell C. Miller, as to the selection of apparatus and the cost of producing gas. 1600 w. Met Work—May 4, 1901.

Villages, German.—Acetylene in German Villages. Information concerning consumption, price, success, etc. 1200 w. Engr, Lond—May 13, 1904.

ACETYLENE GENERATOR.

See also ACETYLENE; CAR LIGHTING.

How to Fit Up a Complete Acetylene Plant. F. Dye. Gives information helpful in choosing a generator, and describes the arranging and fitting of the plant. 2400 w. Plumb & Dec—Oct. 1, 1902.

The Generation of Acetylene. J. M. Morehead. Considers the points of danger, and claims that the generators now used, if operated according to instruction, are safe. 2700 w. Elec-Chem Ind—Oct., 1903.

Fort McPherson, Ga.—Specifications for an Acetylene Gas Generating Apparatus for Fort McPherson, Ga. Gives specifications in full, omitting the "General Conditions." 1800 w. Eng News—Feb. 4, 1904.

Husson.—Simple Generation of Acetylene and Its Purity. Describes the Husson plant. 1500 w. Jour Gas Lgt.—July 2, 1901.

Locomotive Lighting.—See HEADLIGHT.

St. Paul, Minn.—Acetylene Gas Plant of the Great Northern at St. Paul. Brief illustrated description of a plant for producing and compressing this gas for train lighting. 800 w. R R Gaz—June 12, 1903.

ACETYLENE MOTOR.

Acetylene for Gas Engines. Reviews investigations made with this gas as a motive power, and also what has actually been done in everyday work. 3000 w. Engr, Lond—Jan. 17, 1902.

ACOUSTICS.

A Century of Progress in Acoustics. James Loudon. Read before the Am. Assn. for the Adv. of Science. Refers to the various experimental methods which have been employed in acoustical researches and traces the advances made. 4200 w. Sci Am Sup—Feb. 8, 1902.

Architectural—Acoustics of Halls of Audiences. C. H. Blackall. Discusses the effect of design giving results derived from personal experience. 3400 w. Technograph, No. 16—1901-2.

Architectural Acoustics. G. R. Anderson. Considers the problems of construction that relate to the regulation of sound. Discussion. 2500 w. Can Archt—March, 1905.

The Acoustics of Public Halls and an Instrument for Investigation (Ueber die Akustik von Hörsälen und ein Instrument sie zu Bestimmen). Sigm. Exner. A study of the distribution of sound and the production of echoes and interference in public auditoriums. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—March 10, 1905.

ADDING MACHINE.

See CALCULATING MACHINE.

AERIAL TRAMWAY.

See CABLEWAY.

AERONAUTICS.

See also RAILWAY—Electric vs. Steam.

Recent Progress in Aerial Navigation. Charles H. Cochrane. Reviews and illustrates attempts at aerial navigation, especially those not well-known. 1500 w. Pop Sci M—April, 1901.

The Engineer and the Problem of Aerial Navigation. George W. Melville. Considers that there is no basis for hoping the balloon or flying-machine will ever prove a commercial success. 4800 w. N Am Rev—Dec., 1901.

Aerial Navigation Problems. Carl E. Myers. A reply to the article of Rear Admiral Melville published in the Dec. "North American Review." 3.500 w. Sci Am Sup—Feb. 22, 1902.

The Progress of Aeronautics (Les Progrès de 'lAéronautique). G. Espitallier. A well illustrated comprehensive review, with account of the recent experiments of Santos Dumont and other aeronauts. Serial. 3 parts. 13000 w. Génie Civil—March 1, 8 and 15, 1902.

Aerial Navigation (Ueber die Frage der Luftschiffahrt). Prof. George Wellner. An illustrated review of navigable balloons and flying machines, with a plea for machines driven upward by a propeller with vertical shaft. Also illustrations of apparatus for showing stream lines in air. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—May 2, 1902.

Aerial Navigation; the Progressive Development of Air Ships. Carl E. Myers. Reviews the early history of aerial navigation, tracing the progress and giving illustrated descriptions of various machines. Also describes the rainfall experiments, and gives other interesting information. 5500 w. Sib Jour of Engng—June, 1902.

The Problem of Aerial Navigation (Ueber die Versuche zur Lösung des Problemes der Luftschiffahrt). Ferd. Gerstner. Paper discussing the problems of aerial navigation and the different classes of air ships and balloons. Diagrams and tables. 5000 w. Zeitschr d Oesterr Ing u Arch Vereines.—April 10, 1903.

Aeronautics (L'Aéronautique). Jean de Villethion. Various notes on aeronautics, with illustrations. Serial. 2 parts. 2000 w. Rev Technique—March 10 and 25, 1903.

The Flying Machine and Its Slow Development. A brief review of the development, discussing the various theories. 2500 w. Sci Am Sup—Sept. 12, 1903.

Aerial Navigation. O. Chanute. Read before the Am. Ass'n for the Adv. of Science. A review of the present status of the question, the prospects of its solution, and the probable uses of the hoped-for air ships. 4300 w. Pop Sci M—March, 1904.

Mechanical Flight. J. Emery Harriman, Jr. Considers, mainly flying machines heavier than the air displaced by them, referring to the machines of Lilienthal, Chanute, the Wright brothers, Harriman, and others. Ills. 4000 w. Jour Assn of Engng Socs—Aug., 1904.

Accident.—Recent Disasters in Aeronautics (Les Recentes Catastrophes en Aéronautique). G. Espitallier. A discussion of the Severo and de Bradsky accidents showing the necessity for triangular framing in the car suspension in dirigible balloons. 300 w. Génie Civil—Nov. 1, 1902.
See also De Bradsky; Severo.

Aerial Support.—See Propeller Sustaining.

Air Resistance.—See AIR RESISTANCE—Renard Dynamometer.

Anemometric Balloon.—The Julliot Anemometric Balloon. Translated from "La Nature." Illustrated description of an apparatus for measuring the direction and velocity of the wind at different heights. 800 w. Sci Am Sup—April 15, 1905.

Aeroplane.—The Aeroplane. M. Rudolphe Soreau. Translated from "La Vie Automobile." Extract from a lecture given before the French Soc. of Civ. Engrs., showing some of the difficulties met with in the construction of an aeroplane flying machine. 2200 w. Sci Am Sup—Aug. 27, 1904.

A Bird as a Model for the Aeroplane. Illustrated report of investigations by three British experimentalists, showing the apparatus used. 2000 w. Sci Am—July 1, 1905.

Aeroplane Dynamics.—The Dynamics of the Aeroplane (Notes sur la Dynamique de l'Aeroplane). M. Vallier. A mathematical study of the relations between the mechanics of the problem with the experimental laws of physics, taking into account the various speeds and powers of motors. 15000 w. Revue de Mécanique—July, 1904.

Archdeacon's Aeroplane.—M. Archdeacon's Aeroplane. Illustrations of this machine with brief description. 1000 w. Auto Jour—Feb. 27, 1904.

Automobile Motors.—By Motor Through the Air. Illustrated notes of recent developments in the adaptation of automobile motors to air navigation. 1200 w. Automobile—Nov. 28, 1903.

Baden-Powell.—Recent Aeronautical Progress, and Deductions to be Drawn Therefrom, Regarding the Future of Aerial Navigation. Major B. F. S. Baden-Powell. Presidential address before the Aeronautical Society of Great Britain. 5000 w. Sci Am Sup—Nov. 21, 1903.

Balloon.—The Use of Baloons in War. Eric H. Stuart Bruce. Reviews the work that has been accomplished by military balloons, discussing gold-beaters' skin balloons and their advantages, and the use of balloons in the South African campaign. Also discussion. 6900 w. Jour Soc of Arts—Feb. 21, 1902.

See also **Dirigible Balloon.**

Balloon Explosions.—The Spontaneous Combustion of Balloons Upon Landing (Sur l'Incendie Spontané de Ballons Pendant l'Atterrisage). W. de Fonveille. An account of explosions presumably caused by the balloon acquiring an electric charge and being discharged when the aeronaut steps on the ground and touches the valve rope. 600 w. Comptes Rendus—May 11, 1903.

Balloon Inflation.—The Cooling of Gas for Inflating Balloons. (Sur le Refroidissement Préalable des Gaz Employés au Gonflement des Ballons). Ch. Lambert. Showing that the removal of contained moisture and other impurities in the gas adds to the length of floating period. 1000 w. Revue Technique—Sept. 25, 1901.

Balloon Trip.—A balloon Trip Over the Alps. An Account of the recent trip made by Capt. Spelterini, accompanied by a party of aeronauts and scientists. 1000 w. Sci Am Sup—Oct. 24, 1903.

Barton.—A New Air Ship. Illustrated description of the Barton air ship now being built, and of the principles on which it is based. 1500 w. Engr, Lond—April 18, 1902.

The Barton Airship. An illustrated description of the construction. 1800 w. Auto Jour—Nov. 14, 1903.

The Barton 150 Horse-power Airship's Forthcoming Trial. Illustrates and describes novel features of the improved airships. 1800 w. Sci Am—Jan. 16, 1904.

The Barton Airships. Four views of this large airship, with information concerning its equipment. 500 w. Auto Jour—July 9, 1904.
See also **British War Office.**

Beedle.—The Beedle Airship. Illustrations with brief description. 800 w. Auto Jour—Nov. 7, 1903.

The Beedle Airship. Illustrated description of the novel features. The frame is arranged in the form of a triangle, within which is placed the motor, and the aeronaut's basket. 700 W. Sci Am—April 16, 1904.

Bird Flight.—Travel in Air. I. Lancaster. An examination of the action of birds with a view of discovering how their flight is controlled, and an explanation. 4500 w. Engr, Lond—Dec. 20, 1901.

The Action of a Bird's Wing and Its Bearing on the Problem of Mechanical Flight. Dr. T. Byard Collins. An illustrated article describing methods of obtaining records of the action, and what they seem to indicate. 1800 w. Sci Am—March 7, 1903.

The Disclosure of a Secret, and the Application to Aerial Navigation. Sidney Orville Brown. A study of soaring birds, with suggestions for applying the same principle to aeroplans. 1000 w. Sci Am Sup—Sept. 19, 1903.

The Flight of Birds Mechanically Studied. Emile Guarini. An illustrated study. 1200 w. Sci Am —Oct. 10, 1903.

A Device for the Application of Intermittent Efforts to the Propulsion of Masses in Elastic Media (Konstruction zur Ermöglichung der Intermittierenden Kraftausnützung bei Fortbewegung von Massen in Elastischen Mitteln). Victor Hänisch. Describing a mechanical movement for reproducing wing motion in flight. 4000 w. I plate. Zeitscher d Oesterr Ing u Arch Ver—Sept. 16, 1904.

Wing-Flight—Some Researches at Cambridge. An illustrated article giving interesting results of experiments. 2000 w. Auto Jour—May 27, 1905.

British War Office.—New Airships Under Construction for the British War Office. Illustration and and description of Dr. Barton's aeroplane airship. 1300 w. Sci Am—May 3, 1902.

Car Framing.—See **Accidents.**

Contour.—The Contour Aeronaut (L'Aéronat F. Contour). H. de Graffigny. Describing a new dirigible balloon, now being constructed in Paris. 1200 w. Revue Technique—Aug. 25, 1904.

Davidson.—A New Flying Machine. Illustrated description of an ingenious machine recently designed by G. L. O. Davidson, of Scotland. It resembles a large bird with wings extended. 800 w. Sci Am—Feb. 2, 1901.

De Bradsky—De Bradsky Airship Disaster. Brief account with illustrations. 700 w. Sci Am—Nov. 15, 1902.

De la Vaulx.—Count de la Vaulx's Balloon Trip Across the Mediterranean. An account of experimental voyages, especially the most recent one, with illustrations of the balloon. 1300 w. Sci Am —Oct. 26, 1901.

Count de la Vaulx's Balloon "Mediterranéen." A brief account, with illustrations, of the recent attempt to cross the Mediterranean in a balloon. 1100 w. Sci Am Sup—Nov. 23, 1901.

Dirigible Balloons.—Safety in Dirigible Balloons (La Securité dans les Ballons Dirigeables). Comm. P. Renard. An examination of recent disasters with dirigible balloons, showing their causes and discussing necessary precautions. 6000 w. Bull Soc d'Encour—Feb. 28, 1903.

The Dirigible Balloon "Ville de Paris" (Le Dirigeable "La Ville de Paris"). Col. G. Espitallier. A description of the large dirigible balloon recently built for M. Deutsch in Paris by M. Victor Tatin. The gas bag is 58 metres long and 8.20 metres diameter, and the motor is of 63 horse-power. 1800 w. Génie Civil—Dec. 26, 1903.

Recent Progress in the Construction of Air Ships (Die Neueren Versuche über die Fortbewegung von Luftschiffen). Col. Buchholtz. With special reference to the recent dirigible balloons of Santos-Dumont, Severo, Bradsky and Lebaudy. 3000 w. Glasers Annalen—Jan. 15, 1904.

The Critical Speed of Dirigible Balloons (Sur la Vitesse Critique des Ballons Dirigeables). Ch. Renard. An examination of the relation of speed to stability, showing the influence of the form and size of the balloon. 1500 w. Comptes Rendus—June 6, 1904.

The Equilibrating of Dirigible Balloons (Sur l'Empennage des Carènes des Ballons Dirigeables). Ch. Renard. A discussion of the proper form of gas bag to insure the maximum degree of stability in a balloon. 1200 w. Comptes Rendus—June 20, 1904.

The Stability of Dirigible Balloons (Sur la Stabilisation de Route des Ballons Dirigeables). Henri Hervé. A discussion of the form of balloon and arrangement of propeller and guide vanes to secure maximum stability. 1000 w. Comptes Rendus—July 4, 1904.

The Longitudinal Stability of Dirigible Balloons (Ballons Dirigeables, Stabilite Longitudinale). Ch. Renard. A communication to the French Academy, discussing the use of auxiliary inflated cylinders attached to a cylindro-conical balloon to increase its stability. 1800 w. Comptes Rendus—July 18, 1904.

The Stability of Dirigible Balloons (Sur la Stabilité des Dirigeables). G. A. Crocco. A mathematical examination of the different conditions of stability of a balloon when at rest and in motion. 800 w. Comptes Rendus—Dec. 26, 1904.

The Longitudinal Stability of Dirigible Balloons (Sur la Stabilité Longitudinale des Ballons Dirigeables). L. Torres. A review of the method suggested by Col. Renard, showing the disturbing effect of weight at the rear of balloon. 1200 w. Comptes Rendus—April 10. 1905.
See also **Accident; Lebaudy; Santos-Dumont.**

Dufaux.—The Dufaux Flying Machine. Illustrated description of a new apparatus able to rise in the air by the force of its propellers alone, driven by a gasoline motor. Recently tested at Paris. 1200 w. Sci Am—Oct. 21, 1905.

Dynamical Air Ships.—The Best Inclinations for the Surfaces and Propeller Shafts of Dynamical Air Ships. Excerpt of a paper read by T. W. K. Clarke before the Aeronautical Inst. The subject is treated from a mathematical and theoretical standpoint, with the object of showing the considerations affecting the efficiency. 2000 w. Auto Jour—June 11, 1904.

Electric Power.—Electricity as a Motive Power in Mechanical Flight. Dr. T. Byard Collins. Discusses progress in aerial navigation and the advantages and disadvantages of electricity as a motive power. Ill. 2500 w. Elec Wld & Engr—March 14, 1903.

Gillespie Aeroplane.—The Gillespie Aeroplane. Charles B. Hayward. Illustrates this aeroplane, and gives a brief description. 1700 w. Sci Am—June 24, 1905.

History.—The Development of the Air-Ship. John M. Bacon. An interesting review of attempts to navigate the air dating back hundreds of years, and considering the outlook hopeful. 4500 w. Nineteenth Cent—Sept., 1902.

Hofman.—Hofman's Flying Machine. Brief illustrated description. 500 w. Sci Am—May 4, 1901.

Julliot.—See Anemometric Balloon.

Kite.—The New Observation Kites Invented by S. F. Cody. An illustrated description of the apparatus which has proved practical and successful for general observation and meteorological experiments. 1100 w. Sci Am Sup—April 11, 1903.

Scientific Kite Flying. W. H. Dines. An illustrated account of experiments made in flying kites from the deck of a steam vessel stationed on the west coast of Scotland. 1800 w. Nature—June 18, 1903.

The Kite Principle in Aerial Navigation. Garrett P. Serviss, Jr. A discussion of the mechanical principles involved as shown by kites, and their application to aerial navigation. 1600 w. Sci Am—June 27, 1903.

See also Tetrahedral Kite.

Kress Aeroplane.—The Kress Aeroplane. Brief Illustrated account of the invention of W. Kress, a German engineer. 450 w. Sci Am—March 2, 1901.

Aerial Navigation (La Navigation Aérienne). E. Dieudonné. Giving an account of the experiments with the aeroplane of Kress recently made in the environs of Vienna. 2000 w. Revue Technique—March 25, 1901.

Dynamic Flying Machines. Herr W. Kress. Abstract of a paper read before the Aeronautical Congress. 1000 w. Autocar—Aug 1, 1903.

Lancaster.—See Bird Flight.

Langley Aerodrome.—The Langley Aerodrome. An illustrated article describing this flying machine. The present number is a reprint of papers from the Smithsonian report for 1900, and from McClure's Magazine. Serial 1st part. 4400 w. Sci Am Sup—Nov. 29, 1902.

The Failure of Langley's Aerodrome. A brief illustrated account of the last experiment with this machine, and its disaster, with explanations. 800 w. Sci Am—Oct. 17, 1903.

Lebaudy.—The Balloon "Lebaudy" (Le Ballon "Lebaudy"). Col. G. Espitallier. A well illustrated description of a long balloon with a flat under surface, rudders and propellers, which has made sucessful trips in France. 6000 w. Génie Civil—June 13, 1903.

The Lebaudy Airship. Describes the general principles on which the machine is built, with special details of its construction. Ill. 2000 w. Auto Jour—Aug. 29, 1903.

The Lebaudy Airship. A short illustrated description with account of preliminary experiments. 1700 w. Sci Am Sup—Oct. 10, 1903.

The Lebaudy Airship. Photographs, with description of interesting features. 1300 w. Auto Jour—Nov. 21, 1903.

The Autumn Campaign of the Lebaudy (La Campagne d'Automne du Lebaudy). Col. G. Espitallier. A brief account of the experimental work which has been done with the Lebaudy dirigible balloon. 1000 w. Géne Civil—Dec. 5, 1903.

The Lebaudy Airship. Illustrated description. 1500 w. Sci Am—Dec. 5, 1903.

Rosy Views on Airship Matters. An illustrated article telling the story of Lebaudy balloon's last trip. 1,000 w. Automobile—Dec. 19, 1903.

The 1904 Campaign of the Lebaudy Balloon (La Campagne de 1904 du Ballon Lebaudy). Col. G. Espitallier. With views of the latest Lebaudy dirigible balloon, and an account of the experimental trips of the year. 2000 w. Génie Civil—Oct. 1, 1904.

The Lebaudy Dirigible Balloon (Le Dirigeable Lebaudy). H. Julliot. A very complete account of the experiments made by Lebaudy with dirigible balloons since 1896, with detailed description of the 1904 model. 12000 w. Mem Soc Ing Civ de France—May, 1905.

Recent Experiments with the Lebaudy Balloon (Les Nouvelles Expériences du Lebaudy). Col. G. Espitallier. An illustrated account of the ascensions of the dirigible balloon of Lebaudy in 1904-1905, including the trip of 210 kilometres from Moisson to Mourmelon. 2000 w. Génie Civil—Dec. 9, 1905.

See also Progress.

Lebaudy II.—The "Lebaudy II." Emile Guarini. An illustrated article describing this airship and giving an account of its recent breaking from its moorings and upward flight. 1300 w. Sci Am—Sept. 24, 1904.

Léger Helicopter.—Lifting Experiments with a Helicopter (Expériences d'Enlevement d'un Hélicoptère). S. A. S. le Prince de Monaco. Describing tests with the Léger machine, having two propellers revolving in opposite directions on the same vertical axis. 1000 w. Comptes Rendus—May 15, 1905.

Recent Experiment with the Leger Helicopter (Nouvelles Expériences d'Enlèvement de l'Hélicoptère M. Leger). M. Léger. Experiment with lifting propellers, showing that a motor of 10 h. p. was capable of lifting 100 kg. in addition to its own weight. 1000 w. Comptes Rendus—June 5, 1905.

L'Hoste.—The Airship System of M. Frederick L'Hoste. Dr. T. Byard Collins. Brief illustrated description. 1200 w. Sci Am Sup—Feb. 14, 1903.

Lifting Propeller.—See Propeller Sustaining.

Ludlow.—A New Aeroplane. Israel Ludlow. Illustrated description of the writer's design. 1500 w. Sci Am—July 15, 1905.

Maritime.—Maritime Aeronautics (L'Aéronautique Maritime). E. Surcouf. An illustrated, long, comprehensive review of aerial navigation above the sea, with recent progress and apparatus. 1 plate. 1800 w. Mem d l Soc d Ing Civils de France—Jan., 1902.

Mechanical Principles.—The Mechanical Principles of Aeronautics (Die Mechanischen Grundgezetze der Flugtechnik). A. Budan. A general review of the mechanics of dirigible balloons and aeroplanes. Two articles, 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 16, 23, 1903.

"Mediterranean II."—Experiments with the Airship "Mediterranean II." F. Payrey. Translated from "La Vie Automobile." An account of experiments made, with the results. 1200 w. Sci Am Sup—Dec. 3, 1904.

"Mellin" Air Ship.—The "Mellin" Air Ship. Illustrations with brief description. 500 w. Auto Jour—July 19, 1902.

Montgomery Aeroplane.—The Montgomery Aeroplane. Illustrated description, with an account of the successful trial on April 29th. 1600 w. Sci Am—May 20, 1905.

Nemethy.—The New Nemethy Flying Machine and the Principle of Its Construction. Dr. Alfred Gradenwitz. States the rules followed, and gives an illustrated description. 1500 w. Sci Am—July 9, 1904.

Paris Exposition.—Aeronautics at the Paris Exposition (L'Aeronautique à l'Exposition de 1900). Com'd't P. Renard. An account of some remarkable balloon ascensions made in connection with the Exposition; and some very good photographs taken from balloons. 1600 w. Bull Soc d'Encour—March, 1901.

Path of Balloon.—The Path of the Balloon of Santos-Dumont on October 19 (La Trajectoire sur le Sol de l'Aerostat Dirigeable de M. Santos-Dumont dans l'Epreuve de 19 Octobre). J. Armengaud. An examination of the successful attempt for the Deutsch prize, with map of the route. 1200 w. Comptes Rendus—Dec. 9, 1901.

Graphical Method of Studying the Path of a Dirigible Balloon (Méthode Graphique Permettant d'Etudier la Marche d'un Aerostat Dirigeable). J. Armengaud. With diagrams showing the method of determining the path by the projection on the surface of the earth. 1200 w. Comptes Rendus—Nov. 25, 1901.

Progress.—Aerial Progress. Describes the trials of M. M. Lebaudy's navigable balloon, and M. Santos Dumont's No. 9 airship. Both were very successful. Ill. of the latter. 1200 w. Auto Jour—May 16, 1903.

A New Aerial Screw Propeller (Sur une Nouvelle Hélice Aérienne). H. Hervé and H. La Vaulx. Data and results of experiments with propellers, giving the elements of the type which showed the best results. 1200 w. Comptes Rendus—June 27, 1904.

A New Method of Constructing Aerial Screw Propellers (Sur un Nouveau Mode de Construction des Helices Aériennes). Ch. Renard. Describing a form of braced propeler of light weight and great stiffness; adapted for flying machines. 1500 w. Comptes Rendus—Nov. 7, 1904.

Propellers, Sustaining.—The Possibility of Sustaining a Flying Machine in the Air (Sur la Possibilité de

Souteneur enl'Air un Appareil Volant). Ch. Renard. A discussion of the practicability of using screw propellers to lift a machine in the air, using motors of existing weight and power. 1000 w. Comptes Rendus—Nov. 23, 1903.

The Properties of Self-Supporting Propellers (Sur la Qualité des Hélices Sustentatrices). Ch. Renard. A discussion of the design and proportions of screw propellers of aerial support and propulsion. 1200 w. Comptes Rendus—Dec. 7, 1903.

Sustaining Screw Propellers (Sur les Helices Sustentatrices). Edgar Taffoureau. An examination of the computations of Col. Renard, showing that the power required to sustain a weight has been underestimated. 1500 w. Comptes Rendus—Aug. 1, 1904.

Recent Experiments in Aerial Navigation. (Un Nouvel Essai de Navigation Aerienne). M. Léger. An illustrated description of the experiments with lifting screw-propellers, made by the author for the Prince of Monaco. 4000 w. Rev. Gen des Sciences—Nov. 15, 1905.

The Useful Coefficient of Screw Propellers (Sur le Coefficient d'Utilisation des Hélicoptères). Edgar Taffoureau. An examination of the best proportions of lifting screw propellers for use for aeronautical purposes, following the work of the late Col. Renard. 1200 w. Comptes Rendus—Nov. 27, 1905.

Renard.—See Dirigible Balloon; Propeller, Sustaining.

Roze "Aviator."—The Roze Dirigible Airships. Illustrated description of an interesting type being constructed in the vicinity of Paris. 1300 w. Sci Am—Dec. 22, 1900.

The Roze "Aviator." An illustrated description of the apparatus M. Roze is constructing. 1000 w. Sci Am Sup—Nov. 9, 1901.

Sahara Desert.—The Crossing of the Sahara (A Propos de la Traversée du Sahara). Leo Dex. An examination of the practicability of crossing the desert of Sahara by a balloon controlled by a guide rope and propelled by wind only. 2000 w. Revue Technique—March 25, 1902.

Project for a Balloon Capable of Crossing the Sahara (Projet d'Aerostats Capable de Traverser le Sahara). Leo Dex. A detailed description of a plan laid before the Minister of War for the construction of a balloon of 1000 cubic metres capacity, for crossing the Sahara desert. 8000 w. Revue Technique—July 25, 1902.

Experiments Preliminary to Crossing the Sahara Desert by Balloon (Récents Sondages de l'Atmosphère pour la Traversée du Sahara en Ballon). M. Dibos. Observations on the winds of the Sahara, and description of trial balloons and the flight of one from Gabes, in Tunis, to a point in Algeria, 600 kilometres distant. 4000 w. Mem Soc Ing Civils de France—April, 1903.

The Sahara Aeronautical Experiments at Gabes, Tunis (Les Experiences Aérostatiques Sahariennes de Gabes). Leo Dex. Illustrated account of the sending of an experimental balloon across part of the Sahara desert, from Gabes, Tunis. Serial Part I. 1300 w. Rev Technique—June 25, 1903.

Santos-Dumont.—Motor Ballooning. Illustrates the apparatus of M. Santos-Dumont giving particulars of the mechanism and remarks on other machines by the same inventor. 1600 w. Autocar—July 27, 1901.

The Santos-Dumont Navigable Balloon. Description, with an account of different trials and the encouraging results. 1500 w. Autocar—July 20, 1901.

The Santos-Dumont Navigable Balloon. Description, with an account of different trials and the encouraging results. 1500 w. Autocar—July 20, 1901.

The Santos-Dumont Navigable Balloon. An illustrated account of the work of M. Santos-Dumont in this field. 2500 w. Engr, Lond—July 26, 1901.

The Conquest of the Air. Brief illustrated account of the air-ship of M. Santos-Dumont, and his trip from St. Cloud around the Eiffel Tower. 500 w. Sci Am—July 27, 1901.

The Empire of the Air. Gives an illustrated description of the air ship used by M. Dumont in his last attempt to secure the Deutsch prize, with a review of the types of machines most likely to solve this problem. 2700 w. Auto Jour—Aug., 1901.

The Motor Balloonist's Escape. Concerning the accident to M. Santos-Dumont's air ship. 700 w. Autocar—Aug. 17, 1901.

The "Santos-Dumont No. 6," from "L'Illustration." Illustrates and describes some features of the air-ships recently tried. 1100 w. Sci Am—Oct.5, 1901.

The Santos-Dumont Motor Balloon. An illustrated account of the trial made on Oct. 11, when the breaking of the rudder made it necessary to abandon the trip around the Eiffel tower. 1400 w. Autocar—Oct. 19, 1901.

Santos-Dumont Wins the Deutsch Prize. Reviews the work of this aeronaut and his success. Ill. Sci Am—Nov. 16, 1901.

The Progress of Aerial Navigation and the Experiments of M. Santos-Dumont (Les Progrès de la Navigation Aérienne et les Expériences de M. Santos-Dumont). M. Armengaud, Jr. A well illustrated description of Santos-Dumont's experiments and a general review of the development of light-weight motors. 2 plates. 1100 w. Mem d l Soc d Ing Civils de France—Dec., 1901.

Air-Ships and Flying-Machines. A. Santos-Dumont. The author's views on the superiority of the air-ship to the flying-machine, and on the subject of aeronautics in general. 3400 w. N Am Rev—June, 1902.

The New Santos-Dumont Airships. An illustrated article reporting the performance of No. 9, and describing features of interest. 1200 w. Sci Am—July 11, 1903.

See also Path of Balloon; Progress; Speed Determination.

Severo.—The Severo Airship. Illustrated description of an airship being constructed in Paris. 1100 w. Sci Am—March 29, 1902.

The Severo Air Ship Catastrophe. An account of the accident in Paris, which resulted in the death of the Brazilian inventor Severo and his aid, Mr. Saché. 1300 w. Sci Am—June 7, 1902.

Soreau's Paper.—Aerial Navigation (Navigation Aérienne). Rodolphe Soreau. A critical study of the scientific principles involved in the resistance of the air, in balancing, supporting and the essentials of aerial navigation. An important paper. 20,000 w. Mem Soc Ing Civ de France—Oct., 1902.

Speed Determination.—The Determination of the Speed of Dirigible Balloons (Méthode Permettant de Determiner la Vitesse Propre des Aerostats Dirigeables). H. Deslandres. Developing a mathematical formula and applying it to the experiments of Santos-Dumont. 1200 w. Comptes Rendus—Dec. 9, 1901.

See also Path of Balloon.

Spencer.—The Spencer Airship for 1903. Frederick A. Talbot. An illustrated detailed description of the improved design. 1700 w. Sci Am—Sept. 5, 1903.

Tetrahedral Kite.—The Tetrahedral Principle in Kite Structure. Alexander Graham Bell. Reprinted from the "Nat. Geog. Mag." An illustrated account of work in this field, especially showing the advantages of the tetrahedral principle. 4500 w. Sci Am Sup—June 13, 1903.

The Tetrahedral Kites of Dr. Alexander Graham Bell. Gilbert H. Grosvenor. An illustrated article describing these kites and explaining the more important principles evolved. 4500 w. Pop Sci M—Dec., 1903.

Professor Bell and His Kites. Waldon Fawcett. An illustrated account of the experimental work of Prof. Alexander Graham Bell in the field of aerial navigation through the medium of kites. 900 w. Elec Rev, N Y.—May 21, 1904.

Torres.—Preliminary Project for a Dirigible Balloon (Avant-Projet de Ballon Dirigeable). M. Torres. A paper presented before the French Academy describing a spindle-shaped balloon with an interior keel. 2500 w. Comptes Rendus—July 21, 1902.

Villard.—The Villard Flying Machine. Illustrated description of the machine devised by M. Henri Villard. 900 w. Sci Am—March 8, 1902.

Wing Flight.—See Bird Flight.

Wright.—Some Aeronautical Experiments. Wilbur Wright. An interesting illustrated address reviewing the difficulties met and the work of various aeronauts, and giving an account of the experiments made by the writer. 8800 w. Jour W Soc of Engrs—Dec. 1, 1901.

Some Aeronautical Experiments. Wilbur Wright. Read before the Western Soc. of Engrs. Discusses mainly the subject of balancing and gives an account of personal work in this field. Serial 1st part. 4000 w. Auto Jour—Feb., 1902.

Experiments and Observations in Soaring Flight. Wilbur Wright. An illustrated account of experiments made by the writer. Also short discussion. 7000 w. Jour W Soc of Engrs—Aug., 1903.

Aeronautics in America (L'Aviation en Amerique). O. Chanute. A review of recent progress, with especial reference to the aeroplane experiments of the Wright brothers. 5000 w. Rev Gen des Sciences—Nov. 30, 1903.

Zeppelin.—The Zeppelin Air-Ship (Das Zeppelin'sche Ballonproblem). Captain Hermann Hoernes. A well illustrated and complete account of this large air-ship, its construction and its three flights above the Lake of Constance. Two articles. 8000 w. Zeitscher d Oesterr Ing u Arch Ver—March 22, 29, 1901.

The Zeppelin Air-Ship (Das Graf Zeppelin'sche Luftschiff). Col. Buchholtz. An illustrated description of the Zeppelin air-ship and some of its predecessors, with an account of the Zeppelin trials in the summer of 1900. 4000 w. Glasers Ann—April 1, 1901.

The Termination of the Trials of Count Von Zeppelin's Air-Ship. H. W. L. Moedebeck. Describes the technical improvements and the second and third trials, which have demonstrated that it will be possible to navigate the air. 2000 w. Sci Am Sup—April 13, 1901.

AESTHETIC ENGINEERING.

See also BRIDGE—Aesthetic; MACHINE—Art and Craft; MUNICIPAL ART.

Cement Blocks.—See CEMENT—Blocks, Decorative.

Concrete.—See CONCRETE—Decorative.

AFRICA.

South.—See SOUTH AFRICA.

AGING.

See also MAGNETIC TESTING.

Armature Core.—A Contribution to the Subject of Aging of Sheet Steel. Thomas S. Allen. An account of tests made to determine whether heating would cause any appreciative increase in the hysteresis loss of commercial sheet steel for armature construction. 1100 w. Elec Wld & Engr—June 20, 1903.

Dynamo Iron.—Experiments on the Ageing of Sheet Iron for Dynamos (Alterungsversuche an Dynamoblechen). J. Epstein, G. Stern, B. Soschinski. Tabulated results of experiments of several German manufacturers. 2000 w. Elektrotech Zeitschr—June 16, 1904.

Transformer Core.—The Aging of German Sheet Iron (Ueber das Altern Deutscher Eisenbleche). Dr. Georg Stern. An account of extensive experiments, made for several years at the works of the Union Electric Co., on the magnetic properties of sheet iron of German manufacture, suitable for transformer cores. Tables and diagrams. 2500 w. Elektrotech Zeitschr—May 28, 1903.

AGRICULTURAL ENGINEERING.

See also DRAINAGE; IRRIGATION.

Agricultural Engineering. Elwood Mead. Abstract of a paper before the Am. Assn. for the Adv. of Science. Showing the relation of engineering to the growth and prosperity of agriculture, and urging that schools of instruction be established. 2200 w. Eng News—Jan. 15, 1903.

Rural Engineering. Condensed report of the Committee on Rural Engineering of the Assn. of Am. Agri. Colleges and Ex. Stations. Deals with drainage, irrigation, farm requirements, etc. 3000 w. Eng News—Dec. 24, 1903.

Land Grant College.—See EDUCATION—Agricultural Engineering.

AGRICULTURAL EXHIBITION.

British Royal.—Carlisle Show. Illustrated description of some of the implements exhibited at this show of the Royal Agricultural Society of England. 9700 w. Engng—July 11, 1902.

The Royal Show. An account of the 64th annual exhibition of the Royal Agricultural Society, giving illustrated descriptions of interesting exhibits. Serial. First part. 3800 w. Engr, Lond—June 26, 1903.

See also AUTOMOBILE MACHINERY; OIL ENGINE—Cardiff Trials; TRACTION ENGINE.

AGRICULTURAL MACHINERY.

See also AGRICULTURAL ENGINEERING; AGRICULTURAL EXHIBITION; AGRICULTURE; AUTOMOBILE, Agriculture; OIL ENGINE—Cardiff Trials; TRACTION ENGINE.

The Agriculture of the Future (L'Agriculture de l'Avenir). A. Ronna. With especial reference to the use of hydraulically operated machinery. 10000 w. Bull Soc d'Encour—Jan., 1901.

Automobilism in Agriculture. Illustrates and describes several appliances shown at Paris, for plowing, mowing and other work. 1200 w. Sci Am Sup—March 16, 1901.

Motors in Agriculture. The first of a series of illustrated articles showing the applications made of motors. The present article deals with steam cultivation. Serial. 1st part. 800 w. Sci Am Sup—April 11, 1903.

The Automobile in Agricultural Service (Der Motorwagen im Dienste der Landwirtschaft). Julius Küster. An illustrated description of the employment of automobiles in various kinds of agricultural work. 2000 w. Zeitschr d Mitteleuropäischen Motorwagen-Ver—No. 7, 1903.

The Revolution of Farm Machinery. W. B. Thornton. An illustrated article showing the great progress made in farm machinery and the changes in agricultural methods. 3000 w. World's Work—Aug., 1903.

Agricultural Machinery in the Beginning of the Twentieth Century (Le Materiel Agricole au Debut du XX Siecle). Max Ringelmann. An exhaustive review of the application of engineering to the development of agriculture, including the development of agricultural machinery and appliances during the nineteenth century, and their influence upon the status of agricultural labor, and national economy. 15000 w. Bull Soc d'Encour—Oct., Nov., 1905.

The Agricultural Application of the Gasoline Automobile. Notes various applications recently made in England for agricultural purposes, illustrating the Noel motor used as a thresher and at work in a field. 900 w. Sci Am Sup—Oct. 21, 1905.

The Scott Gasoline-Motor-Propelled Agricultural Tractor. Illustrates and describes an interesting tractor and its ingenious atachments, shown at the show of the British Royal Agricultural Society. 1000 w. Sci Am Sup—Nov. 4, 1905.

British Colonies.—Agricultural Engineering. An extended illustrated description of British agricultural machinery for the colonies. Illustrates and describes in detail the various implements. 13500 w. Engr, Lond—June 12, 1903 (Supplement).

Canadian at Glasgow.—Agricultural Machinery in the Canadian Pavilion at the Glasgow International Exhibition, 1901. G. Harwood Frost. Illustrated descriptions of harrows, cultivators, harvesters, mowers, ets., etc. 7000 w. Inst of Mech Engrs—Glasgow Congress, 1901.

Cardiff Show.—See AGRICULTURAL EXHIBITION; OIL ENGINE.

Electric.—Electricity in Farming. George E. Walsh. On the progress made, and the room for further application, especially in irrigated regions. 1300 w. Am Elect'n—Dec., 1900.

The Relations of Agriculture to Electrotechnics (Was Hat die Elektrotechnik von der Landwirthschaft zu Erwarten). Dr. Robert Haas. A discussion of the possibilities of the application of electricity to agricultural districts, especially in connection with the distribution of light and power. 4500 w. Elektrotech Zeitschr—Aug. 28, 1902.

Electricity in the Service of Agriculture (Die Elektrizität im Dienste der Landwirtschaft). Hr. Budérus. An address before the Landwirtschaftlicher Verein at Frankfurt-on-the-Oder, giving a general review of the applications of electricity to agriculture. Serial. 2 Parts. 3000 w. Elektrotech Rundschau—July 1 and 15, 1903.

Applications of Electricity to Agriculture. Emile Guarini. A study based on Continental experience, describing various forms of meteorological instruments, but more particularly applications to ploughing, threshing, the felling of timber, hauling, and other heavy work. The examples and cost figures are from actual installations. Illustrated. 4800 w. The Engineering Magazine—June, 1903.

The Use of Electric Power in Plowing. Emile Guarini. Illustrated description of some new applications of electricity to the cultivating of farms. 2400 w. Elec Rev, N Y.—Aug. 8, 1903.

The Present State of Electricity in Agriculture (Etat Actuel du Labourage Electrique). E. Guarini. A review of the applications of electric power to agricultural operations, with illustrations of ploughs, thrashing machines, trucks, etc. 2500 w. Génie Civil—Aug. 22, 1903.

Electricity on the Farm. Emile Guarini. Illustrates and describes various agricultural machines worked by electricity. 1500 w. Elec Rev, Lond —Sept. 11, 1903.

The Application of Electricity to Agricultural Machinery (Les Machines Agricoles et l'Agriculture). E. Guarini. With illustrations of practical applications of electric motors to various agricultural operations. 3000 w. Rev Gen des Sciences—Nov. 30, 1903.

See also **Grazing Pen; AGRICULTURE; HYDRO-ELECTRIC PLANT.**

Grazing Pen.—An Electrically Moved Grazing Pen. A. D. McNair. Describes the application of electricity for the slow moving of a bottomless pen over the grazing field, thus avoiding the tramping of th alfalfa. Ill. 1400 w. Elec Wld & Engr—Jan. 19, 1901.

Lift.—See LIFT—Harvesting Machine.

Manufacture.—The Manufacture of Agricultural Machinery. Joseph V. Woodworth. Illustrated description of the work as carried on by the Walter A. Wood Mowing and Reaping Machine Co. of Hoosic Falls, N. Y. 4500 w. Mach, N Y—Aug., 1902.

Mowing Machine.—Motor-Driven Mowing Machine. Illustrated description of a design built in Chicago. 700 w. Engng—June 21, 1901.

Gasoline Motor Mowing Machine (Faucheuse Automobile à Pétrole). G. Coupan. Illustrated description of the Deering automobile mowing machine as exhibited at Plessis, near Chateauroux, France. 1200 w. 1 plate. Génie Civil—Aug. 31, 1901.

New Zealand.—Agricultural Machinery in New Zealand. An account of the progress in the use and also in the manufacture of agricultural machinery. 1800 w. Engr, Lond—June 12, 1903.

Oil Engines.—See OIL ENGINE—Cardiff Trials...

Paris Exposition.—Agricultural Machinery and Tools (Die Landwirtschaftlichen Maschinen und Geräthe). H. Grundke. An illustrated review of the agricultural machinery and appliances exhibited at the Paris exposition, 1900. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 30, 1901.

Plow, Cast and Chilled.—Cast and Chilled Plows. R. L. Ardrey. Reviews the history of this implement in America, giving an account of Juthro Wood's success with the cast plow, and James Oliver's with the chilled plow. 3000 w. Ir Age—Sept. 5, 1901.

Plow, Steam.—A Technical Study of Steam Plows (Ueber die Technische Untersuchung von Dampfpflügen). Josef Rezek. A account of practical tests made with a Fowler steam plow in northern Italy, showing the work accomplished for the fuel consumed. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—May 26, 1905.

Plow Steel.—The History of the Steel Plow. R. L. Ardrey. Reviews the history and the improvements since made. 2800 w. Ir Age—July 18, 1901.

AGRICULTURAL MACHINERY WORKS.

Hamilton, Ont.—The Plant of the International Harvester Company at Hamilton, Ontario. An illustrated description of large implement works showing many new features in design, equipment and construction. 4000 w. Ir Age—Sept. 1, 1904.

AGRICULTURE.

Alaska.—See ALASKA.

Electricity.—Electroculture. Emile Guarini. An examination of the recent experiments of investigators in this field, especially those of M. Sélim Lemstroem. 2200 w. Elec Wld & Engr—April 4, 1903.

Agricultural Electro-Chemistry. Abstract of a lecture by M. Guarini, on the different applications of electro-chemistry to agriculture and to the industries connected therewith. 2000 w. Sci Am Sup—July 22, 1905.

See also **AGRICULTURAL MACHINERY.**

Hydro-Electric Power.—See HYDRO-ELECTRIC PLANT.

AIR.

See also **AIR FLOW; AIR RESISTANCE.**

Cooling.—See AIR COOLING.

Electric Conductivity.—See ELECTRIC CONDUCTIVITY.

Expansion and Contraction.—See AIR BRAKE—Pressure Equalization.

Friction.—See AIR RESISTANCE.

Gas.—See GAS—Air.

Mechanical Transport.—See COMPRESSED AIR; VENTILATION.

AIR BLAST.

See **BLAST FURNACE; BLAST STOVE; FAN—Centrifugal; Cupola; MECHANICAL DRAFT; VENTILATION.**

AIR BRAKE.—See also BRAKE; BRAKE SHOE.

Brakes in Railroad and Street Car Service. F. M. Nellis. The paper is largely a narration of actual occurences seen by the writer while serving as traveling salesman and instructor for the Westinghouse Air Brake Co. Also general discussion. 30000 w. N Y R R Club—Sept. 26, 1901.

Brakes in Railroad and Street Car Service. General discussion of this subject. 23000 w. N Y R R Club—Oct. 17, 1901.

Air Brakes. Illustrates and describes the air-brake apparatus, and principles of operation. 1700 w. Sci Am—Dec. 13, 1902.

The Mechanics of Air-Brake Systems. H. G. Manning. Historical account showing that the systems in use differ only in small mechanical details, and discussing the points in which they differ. Ill. 2500 w. Trans Am Soc of Mech Engrs—June, 1903.

Belgian Locomotive.—Fitting the Westinghouse Brake to the Bogies of the Locomotives of the Belgian State Railways. F. Matthei. Describes an arrangement being tried as an experiment upon an express engine. 1600 w. Bull Internat Ry Cong—Oct., 1903.

Braking Power.—Basis of Unbraked Weight per Axle versus Ninety Per Cent. Plan for Passenger Equipment Cars. F. M. Nellis. Presented at the Buffalo Air Brake Convention. Discusses the inferiority of the 90 per cent. basis, and reports favorably on the uniform unbraked plan, as shown by an experimental train. 1600 w. Loc Engng—June, 1904.

Christensen.—The Christensen Air-Brake. Illustrated detailed description. 1400 w. Engng—Dec. 9, 1904.

Cleaning.—Proper Method of Cleaning Brake Cylinders and Triple Valves of Freight Cars. Otto Best. Directions for the cleaning and testing of triple valves and cylinders. Ill. 4400 w. Ry & Engng Rev—Aug 24, 1901.

Combined.—The Combined Straight Air and Automatic Engine and Tender Brake. F. B. Farmer. From a paper read before the Northwest Ry. Club. States the disadvantages of the automatic brake in switching, and the advantages of the straight air brakes and states their advantages. 3300 w. Ry is considered desirable. Ill. 3200 w. Ry Age—March 14, 1902.

The Combined Straight Air and Automatic Engine and Tender Brake. Extracts from a paper before the Traveling Engrs. Assn., by Frank P. Roesch. Some points in braking, discussing changes made necessary by new conditions, and setting forth the advantages of the brake named. 1000 w. R R Gaz—Sept. 18, 1903.

The Combined Automatic and Straight-Air Brake. R. H. Blackall. Read before the New England R. R. Club. Describes the operation of these brakes and states their advantages. 3200 w. Ry & Engng Rev—Aug. 12, 1905.

Corrington.—The Corrington Air Brake. Illustrated description of a system combining automatic and straight air apparatus in such a way as to maintain each at all times independent of the other. 1800 w. Am Engr & R R Jour—April, 1904.

Coupler.—The Forsyth Automatic Train Pipe Coupler. J. P. Kelly. Illustrated description of the device and its operation. 500 w. Ry & Loc Engng—Jan., 1905.

See also **CAR COUPLER—Westinghouse.**

Cylinder Lubricator.—Automatic Air-Cylinder Oil

Cup. Illustrated description of a device recently perfected by the Westinghouse Air Brake Co. 700 w. Loc Engng—July, 1904.

Automatic Lubricator for Air Cylinder of Air Pump. T. M. Henderson. Drawings and description of a lubricator for air brake pumps. 700 w. Ry. & Loc Engng—April, 1905.

Driver.—See Pressure Retainer.

Duplex.—Duplex Straight Air and Automatic Brake. J. P. Kelly. An explanation of the method of piping the New York Air Brake Co.'s Duplex Straight Air and Automatic Brake for switch engine and tender. 1500 w. Loc Engng—June, 1904.

Efficiency.—Air-Brake Efficiency. Continued discussion of this subject. 15300 w. Cent. Ry Club—March, 1901.

Report of Committe on Air Brake Efficiency. Followed by discussion by members. 10700 w. Cent Ry Club—Nov., 1900.

Increased Efficiency in Air-Brake System. Communications and discussion of this subject at January meeting. 13500 w. Cent Ry Club—Jan., 1901.

Electric Car.—Energy Required in Watt Hours When Braking with Air. Frank B. Rae. Urging the equipment of cars with air-brakes, and giving information concerning the determination of the proper size, application, cost, etc. 2500 w. St Ry Jour—Nov. 5, 1904.

The Efficiency of Power Braking in Street Railway Service, with Tests of Power Consumption of the Air Brake. Edward Taylor. An analysis of the conditions met with in the application of power brakes to electric equipment, with notes and facts in regard to tests made by the writer. 4000 w. St Ry Jour—Dec. 24, 1904.

See also Storage; BRAKE.

Electric, Siemens.—The Siemens Electric Control for Air-Brakes (Ueber die Elektrische Steuerung für Luftdruckbremsen). H. Wagner. A description of the electric control intended to give more rapid action than the triple valve, the apparatus is designed for use on the proposed military railway between Merlin and Jüterbog. Serial, Part I. 3,000 w. Glasers Annalen—July 15, 1901.

The Siemens Electro-Pneumatic Brake (Le Frein Electro-Pneumatic Siemens). A description of the Siemens electric apparatus for use in connection with air brakes to enable a more prompt setting to be obtained. 2500 w. Revue Technique—Sept. 25, 1901.

The Siemens System of Electrically Controlled Air Brakes (Electrische Steuerung für Luftdruckbremsen. Siemens-Bremse). An illustrated description of an improved system in use on German railroads, by which the air-brakes can be operated electrically from any part of the train, and which possesses, besides, all the usual advantageous features of air brakes. 2500 w. Glasers Annalen—May 1, 1903.

The Siemens System of Electrically Controlled Compressed Air Brakes. Abstract from "Glasers Annalen für Gewerbe und Bauwesen." A discussion of general considerations, with an illustrated description of the Siemens system and information concerning it. 5800 w. Bul Int Ry Cong—March, 1904.

Forsyth.—See Coupler.

Freight Train.—Recent Practice in Freight Train Braking. Editorial on the application of air-brakes to freight cars, the practice in making up trains where all cars are not fitted, points for improvement, etc. Eng News—July 4, 1901.

Higher Braking Power for Freight Cars. Robert H. Blackall. Shows that a greater braking power is much to be desired to meet present conditions, and that it can be increased. General discussion. 9000 w. Ry Club of Pittsburg—Jan., 1904.

Brake Control of Heavy Capacity. Freight-Cars on Grade. T. A. Hedendahl. Discusses the influences bearing on the subject, with recommendations. General discussion. 6000 w. Pro Rocky Mt Ry Club—Feb., 1904.

Air-Brakes in Freight Train Service. Abstract of the testimony recently presented at Washington by the representatives of various railway companies opposing the proposed increase in the number of air-brakes required on freight trains. 2200 w. Eng News—Nov. 9, 1905.

Percentages of Freight Cars Air Braked. Information in tabulated form showing how many cars are air-braked on the different roads, and how well the trains have ben air-braked during the past six months. 1000 w. R R Gas—Vol. XXXIX., No. 19.

See also Maintenance, Freight Car.

Frozen Pipes.—Frozen Train Pipes, Their Cause and Prevention. Parts of the discussion of the second report presented at the Air-Brake Convention at Pittsburg. 3500 w. R R Gaz—July 18, 1902.

Gottschalk Valve Handle.—See Valve Handle Control.

Hewitt and Rhodes.—Pneumatic Brake Trials. An account of tests made of the Hewitt and Rhodes pneumatic slipper brake. 900 w. Elec Rev., Lond—Nov. 21, 1902.

Hibbard Valve.—The Hibbard Valve for Braking Empty and Loaded Cars. An illustrated description of a device which has been in service for some time on the Burlington & Missouri River Ry. 2000 w. R R Gaz—Jan. 23, 1903.

High Pressure.—Higher Train Pipe Pressure for Passenger Service. J. P. Kelly. Comments on the tests of high pressure brakes conducted on the Central R. R. of New Jersey, and the results obtained, with other matters related to high-pressure service. 2800 w. R R Gaz—May 13, 1904.

High-Speed.—Report of Committee on High-Speed Brakes. Report, with illustrated description of automatic reducing valve and general dimension. 13500 w. Cent Ry Club—May, 1902.

High-Speed Brakes. The report of Mr. Nellis, with general discussion. 1200 w. Cent Ry Club—Sept. 12, 1902.

Braking High-Speed Trains. R. A. Parke. Claims that materially increased stopping efficiency may with propriety be employed in high-speed train service. Assumes the use of the automatic air brake. 2400 w. Int Elec Cong of St. Louis—Sept., 1904.

The Control of Fast Trains by Brakes. Editorial discussion of the safety in operation of high-speed trains. 1200 w. Ry Age—Aug. 4, 1905.

High Speed Brakes. Robert Burgess. Explains the action of high-speed brakes, the apparatus and the effects. General discussion. Ills. 8000 w. S & S-W Ry Club—Aug. 17, 1905.

See also Valve.

Hose Specifications.—Air Brake Hose Specifications. An account of foreign practice presented by J. Doyen at the International Ry. Congress. 1100 w. Am Engr & R R Jour—Dec., 1900.

Instruction.—Proper Air Brake Instructions to All Concerned to Prevent the Ruination of Wheels by Skidding, and Handling of Air on Freight Trains. Abstract of a committee report to the Traveling Engineers' Assn. with brief discussion. 2000 w. Ry Age—Sept. 19, 1902.

Proper Air-Brake Instructions, and Handling of Air-Brakes on Freight Trains. Extracts from a committee report to the annual meeting of the Traveling Engineers' Assn. 3000 w. Ry & Engng Rev—Oct. 4, 1902.

Handling the New York Engineers' Brake Valve. Considers the proper method of handling this mechanism. Serial. 1st part. 1500 w. Loc Engng—June, 1903.

Instruction Car.—Air Brake Instruction Car on the N. Y. C. & H. R. R. R. Illustrations showing details of construction and the general interior arrangement, with description. 700 w. Ry & Engng Rev—Aug. 9, 1902.

Leakage.—Train Pipe Leakage. C. C. Farmer. Discusses the causes and methods of preventing the troubles caused by it, &c. General discussion. 6000 w. W Ry Club—Nov. 17, 1903.

Train Pipe Leakage, and Speed of Air Pump. P. J. Langan. On the importance of maintaining the equipment, the effect of fast running on pumps, their need of inspection, etc. 2000 w. Loc Engng—Nov., 1904.

Leverage.—Brake Leverage. The first of a series of articles on this subject. The present number considers see-saw, force and direction, clockwise and counter-clockwise, equilibrium, lever arm, and movements. 2500 w. Loc Engng—May, 1901.

Lipkowski.—The Lipkowski Compressed Air Brake (Frein Automatique à Air Comprimé). F. Barbier. Illustrating and describing a modification of the Westinghouse brake, used in France and

Russia. 2000 w. 1 plate. Génie Civil—Dec. 5, 1903.

Maintenance.—Air Brake Maintenance. C. H. Quereau. Discusses the importance of having reports and a check inspection, suggesting a method. 1700 w. Ry & Engng Rev—Nov. 30, 1901.

I. Some Problems in Maintenance Arising from Rapid Increase in Air-Brake Equipment. E. M. Herr. II. What Shall Be Done to Maintain the Air-Brake Equipment on Our Freight Cars? T. W. Demarest. Two papers discussed together. 1300 w. W Ry Club—Nov., 1901.

Maintenance of Air Brakes Under Freight Cars. W. C. Hunter. Extracts from a paper read before the Canadian Ry. Club. Concerning the repairs and the methods of the Intercolonial Ry. 1200 w. R R Gaz—Oct. 16, 1903.

See also **SAFETY APPLIANCE—Railway.**

Maintenance, Freight Cars.—The Maintenance of Air Brakes on Freight Cars. G. W. Rhodes. Considers what methods should obtain to insure the cleaning of triplets at least once in every 12 months; and should there be few or many cleaning stations on a railroad or system of railroads. 1300 w. Am Engr & R R Jour—June, 1901.

Maximum Force.—Maximum Brake Force as Regards Foundation Brake for Passenger and Freight Cars. F. M. Nellis. Read before the Air Brake Assn., at New Orleans. Discusses the new system of unbraked weight per car axle. 2200 w. Ry & Engng Rev—June 10, 1905.

Morrison.—Test of an Automatic Air-Safety Valve by the Pennsylvania Lines. Illustrated report of a test of a recently devised mechanism for attachment in connection with existing air-brake systems. The invention of F. B. Morrison. 700 w. Ry & Engng Rev—Feb. 15, 1902.

Mountain Grades.—Air-Brakes on Mountain Grades. Ex-Interstate Commerce Commission, showing the diversity of practice on different roads. 1500 w. R R Gaz—Aug. 7, 1903.

Operation.—See **Instruction.**

Pipe Systems.—Arrangement of Piping and Main Reservoirs to Prevent Water in Brake System. T. L. Burton. An illustrated explanation of systems of piping in use on various roads. 1200 w. Ry & Loc Engng—Feb., 1905.

See also **Coupler; Leakage.**

Pressure.—See **Quirk Mechanism.**

Pressure Equalization.—Equalized Pressures. An explanation of the laws governing expansion and compression of gases, with diagrams. 1000 w. Ry & Loc Engng—Dec., 1905.

Pressure Retainer.—An automatic Pressure Retainer for Driver Brakes. J. E. Muhlfeld. Drawings and description of a device in use on the Grand Trunk Ry., with a statement of its advantages. 1200 w. R R Gaz—Aug. 16, 1901.

Pump Repair.—Economical Repairs to 9 1-2 Inch Air Pumps. Otto Best. An account of what the writer considers the best practice. 1200 w. Ry Age—June 12, 1903.

Pump Speed.—See **Leakage.**

Quirk Mechanism.—To Detect Fall of Pressure and Stoppages in Train Pipes. Thomas J. Quirk. An illustrated description of an air-brake mechanism intended to prevent loss of pressure from any cause. 1000 w. Loc Engng—Sept., 1904.

Records.—Recording Air Brake Operations. An illustrated article showing the apparatus in use by the railway department of the International Correspondence Schools of Scranton, Pa., and giving extracts from records obtained. 1400 w. Ry Age—Feb. 17, 1905.

Repairs.—Repairs on Air Brakes on Box Cars. H. H. Harvey. Read at Chicago meeting of the Car Foremen's Assn. Describes methods of handling triple valve repairs in the most economical way. Ill. 2000 w. Ry Mas Mech—Jan., 1901.

Air Brake Repairs. A letter from Godfrey W. Rhodes on the neglect and consequent delay of freight. 1800 w. Ry Mas Mech—Feb., 1901.

Seile Emergency.—The Seile Apparatus for Automatically Operating Air Brakes in Emergencies (Appareil pour la Commande Automatique des Freins de chemins de Fer, Système Seile). H. Clément. Illustrated description. Projecting pieces, attached to car springs, open a valve when there is an abnormal shock. 700 w. Revue Industrielle. May 9, 1903.

Siemens.—See **Electric, Siemens.**

Skipping Tests.—Skipping Tests of Air Brakes. Richard A. Smart. Describes tests made at Purdue University to secure information as to the conditions under which the emergency feature of the quick action air-brake will skip cut-out cars. 900 w. R R Digest—Jan., 1901.

Slack Adjuster.—Some Hints on Care of the Automatic Slack Adjuster. An illustrated explanation of important points in the proper management of the adjuster. 600 w. Loc Engng—April, 1904.

Stop Curve.—Brake Retardation at Different Periods of the Stop. A discussion of the stop curve and the fact that the rate of retardation is much greater at the finish of the stop and less at the beginning. 700 w. Loc Engng—Feb., 1904.

Stopping.—See **LOCOMOTIVE OPERATION.**

Storage.—Storage Air Brake System in St. Louis. Illustrates and describes the system adopted, considering the particulars and reasons for the choice of this type. 2500 w. St Ry Jour—Feb. 6, 1904.

A Storage Air Brake System Adopted at St. Louis. An illustrated description of this installation. 2400 w. Compressed Air—March, 1904.

Storage, Newark.—An Important Application of the Storage Air-Brake System at Newark, N. J. Illustrated detailed description of the car equipment, compressor station, equipment, design of the system, &c. 2800 w. St Ry Jour—June 25, 1904.

Test.—Best Method of Handling Air Brake Work in Conection with Yard Testing Plant. Report of the committee to the Air Brake Assn. 2500 w. Ry Age—May 9, 1902.

Air Brake Testing Department of the Armour Car Lines. Illustrated description of the triple valve testing department, giving rules governing the cleaning and repairs of air brakes on the Armour car lines. 1000 w. Ry Mas Mech—Dec., 1902.

Some Competitive High-Speed Brake Tests. Gives tabulated results of tests made by the Central Railroad of New Jersey. 800 w. Loc Engng—Oct., 1903.

How Air-Brake Tests Are Made. An illustrated article describing how modern brake trials are made and data secured. 6000 w. Loc Engng—Jan., 1904.

Special Fifty-Car Train Demonstrations at West Seneca, N. Y. A report of the tests made August 23, at West Seneca, N. Y. 1600 w. Ry & Loc Engng—Oct., 1905.

Tests of the Westinghouse Improved Quick-Service Triple Valves. A report of tests made at West Seneca, N. Y., showing the ability of modern brake apparatus and friction draft gear to meet the present severe service conditions of train operation. 1700 w. R R Gaz—Vol. XXXIX., No. 16.

See also **High-Pressure; AIR COMPRESSOR; BRAKE; BRAKE SHOE.**

Trains Parting.—See **TRAIN—Parting.**

Train Test.—See **Test.**

Valve.—Westinghouse Improved Brake Valves. Gives views of the automatic and straight air brake valves and an explanation of how they should be handled while operating the brakes. 500 w. Ry & Loc Engng—Dec., 1905.

Valve, Compensating.—New York Air Brake Co.'s Compensating Valve for High-Speed Brakes. Illustrated description of a 'compensating valve" recently designed by the New York Air Brake Co., to be used in high-speed brake service. 600 w. Loc Engng—March, 1904.

Valve Handle Control.—Automatic Valve Handle Returning Device. Illustrated description of a device invented by A. Gottschalk, for automatically returning the handle of the motorman's brake valve after the maximum train line pressure of 70 lbs. has been accumulated. 600 w. Loc Engng—Aug., 1904.

Valve, Hibbard.—See **Hibbard Valve.**

Valve, Intermediate.—Intermediate Valves as Applied to Straight Line Brake Systems. H. G. Westbrook. Explains the functions this valve must perform, and gives an illustrated description of a new design. 900 w. Compressed Air—June, 1905.

Valve, New York.—See **Instruction.**

Valve, Retaining.—The Pressure Retaining Valve; Its Value and Importance. F. H. Parke. An explanation of the results accomplished by this device, and an outline of the benefits when properly installed and maintained. 3800 w. R R Gas—Jan. 29, 1904.

The High and Low Pressure Retaining Valve. Illustrated description of a device for increasing the certainty of controlling heavily loaded trains. 1200 w. R R Gas—Vol. XXXVIII., No. 12.

Westinghouse.—See also **WESTINGHOUSE.**

AIR COMPRESSOR.

See also **COMPRESSED AIR; COMPRESSED-AIR PLANT.**

Types of Foreign Air Compressors. J. Walter Pearse. Illustrates and describes types from a number of foreign plants. 4000 w. Compressed Air—June, 1902.

Accident.—See **Cylinder Temperature; Explosion.**

Altitude.—See **COMPRSSED AIR.**

Bendigo.—Air Compressing Machinery. Johan Sarvaas. Read before the Australian Inst. of Min. Engrs. An account of its use in the Bendigo gold fields, and its many advantages as a power for underground work. Also notes defects of air compressors. 2800 w. Aust Min Stand—April 10, 1902.

Bland.—A Novel Air Compressor. Brief illustrated description of the invention of Henry Bland, of Sydney, Australia. 800 w. Sci Am—June 16, 1904.

Boston Transit Commission.—See **COMPRESSED-AIR PLANT.**

Brake Handle Control.—See **AIR BRAKE—Valve Handle Control.**

Butte, Mont.—Air Compressing Plant of the Never Sweat Mine of the Anaconda Copper Mining Co. at Butte, Montana. An illustrated detailed description of Ingersoll-Sergeant Corliss compressors. 1200 w. Compressed Air—July, 1901.

Classification.—Classification of Air Compressors. Robert Peele. Gives classification by characteristics purely as engines, by mode of dealing with heat produced, by types of valves and valve motions. 2500 w. Mines & Min—May, 1905.

Collmann.—The New Collmann Air Compressor at the Harpen Mines at Dortmund (Die Neuen Collmann Luft Kompressoren der Zechen "Caroline" und "Vollmond" der Harpener Bergbau Aktien Gesellschaft zu Dortmund). F. Schulte. With a full data of dimensions and performance, and reproductions of indicator diagrams. 1500 w. 1 plate. Glückauf—Nov. 9, 1901.

New Collman Air Compressors at German Collieries. F. Schulte in Glückauf. Illustrated description. 1200 w. Col Guard—Dec. 20, 1901.

Air Compressor for the Harpener Mining Company. An illustrated description of a compound air compressor, with Collman valves, made by Schüchtermann and Kremer, of Dortmund, and exhibited at Düsseldorf. 1 plate. 700 w. Engng—Dec. 12, 1902.

Compound.—Double Compound Compressor (Zwillings-Verbund Kompressor). Illustrated description and account of tests of air compressor at the Emscher pit of the Cologne Mining Company. Indicator diagrams from steam and air cylinders are given. 1200 w. 2 plates. Glückauf—May 25, 1901.

A New Type of Air Compressor. W. H. Booth. Illustrates and describes a compact, duplex, two-stage compressor, direct-driven by an electric motor, adapted to use in mines or shops. Made by an English company. 2200 w. Mines & Min—Nov., 1903.

Compound Compressor at the St. Pancras Mine at Nürschan (Verbund-Stufen-Kompressor der St. Pankrazzeche in Nürschan). Julius Divis. With diagrams from the steam and air cylinders, showing the action of the Riedler valve gear. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 13, 1904.

See also **Collman; Hoerbiger; Riedler; Three-Stage; Vertical.**

Compound vs. Simple.—Compound Air Compression. Frederick M. Hitchcock. Considers the temperatures attained, effects of cooling, power consumed, and saving by compound compared with simple compression. 2500 w. Mines & Min—May, 1905.

Cylinder Temperature.—Heat of Compression in Air Cylinders and the Relation to Explosion. E. Hill. Discusses the effects of leaks in cylinders on temperatures. 1200 w. Mines & Min—Aug., 1905.

Temperatures in Air and Ammonia Compressor Cylinders. Leicester Allen. A discussion of the indeterminate character of present information about compression temperatures. 3000 w. Engineering Magazine—August, 1905.

D'Auria.—The D'Auria Air-Compressor. Henry G. Morris. Illustrates and describes a new form of air-compressor, and stating its advantages. 1400 w. Trans Am Inst of Min Engs—April, 1901.

Daw.—The Daw Air-Compressor. Illustrates and describes these machines and their operation. The object of the invention is the economical production at speeds hitherto thought unattainable, securing greater output from smaller machines. 2400 w. Engng—Sept. 26, 1902.

Design.—The Air Compressor. R. H. Collingham. On the design of air compressors, indicating how theoretical facts and formulae may be made of use in the every-day practice of the drawing office and testing plate. Serial. 1st part. 1800 w. Engr, Lond—June 3, 1904.

Düsseldorf Exposition.—Air Compressors at the Düsseldorf Exposition (Der Bergbau auf der Düsseldorfer Ausstellung 1902. Die Luftkompressoren). Hr. Müller. An illustrated description of various kinds of air compressors, particularly of those used for mining purposes. 8 plates. 3500 w. Glückauf—June 21, 1902.

See also **Compound.**

Electric.—Compressed Air for Mining from Electric Power. John B. Tregloan. A record of results obtained with a 10 x 18-inch duplex, single-stage belt driven compressor. Ill. 1900 w. Min & Sci Pr—April 26, 1902.

Electrically Driven Air Compressors (Elektrisch Betriebene Luftkompressoren). A fully illustrated account of the application of electric driving to various forms of air compressors, with especial reference to their use in mining work. Two articles. 1 plate. 4000 w. Glückauf—Oct. 3, 10, 1903.

Electrically-Driven Underground Air-Compressors (Les Compresseurs d'Air à Commande Electrique pour les Installations Souterraines). H. Denis. Showing how the advantages of elctric transmission and pneumatic appliances may be combined in mining operations. Serial. Part I. 2000 w. Revue Technique—Aug. 25, 1904.

Electrical Compression of Air for Mining Purposes. Lucius I. Wightman. An illustrated article describing the electrical air compressor, and considering driving by belts, ropes, gears, silent chains, and direct connections, sizes of units, &c. 7400 w. Mines & Min—May, 1905.

A High Speed Electrically Driven Compressor for Colliery Work. W. Reavell. Read before the S. Wales Inst. of Engrs. Illustrated description of a machine which can be directly driven by an electric motor and can be made in small units when desired. 3800 words. Ir & Coal Trds Rev—July 14, 1905.

A High-Speed Electricaly Driven Compressor for Colliery Work. W. Reavell. Abstract of paper before the South Wales Institute of Engineers, giving an illustrated description of an air compressor with four cylinders disposed radially in a circular casing. 3000 w. Elect'n, Lond—Sept. 1, 1905.

See also **Two-Stage, Duplex.**

Electric vs. Steam.—Comparison of Costs of Compressing Air with Steam and Electricity at Rossland, British Columbia. William Thompson. Describes the steam and electric plants compared and records their performance. 2500 w. Min Rept—July 14, 1904.

Comparison of Costs of Compressing Air with Steam and Electricity at Rossland, B. C. William Thompson. Read before the Canadian Mining Inst. Describes the steam plant erected for the Le Roi Mining Co., and the electric plant erected by the Rossland Great Western Mines, Limited, comparing their economy and relative efficiency. 2200 w. Can Min Rev—Aug. 30, 1902.

Explosion.—Notes on Accidents Due to Combustion within Air Compressors. Albert R. Ledoux. Describes a casualty due to lack of judgment and care in the use of air compressors. 1000 w. Trans Am Inst of Min Engrs—Feb., 1903.

Accidents Due to Combustion Within Air-Compressors. E. Hill. Discussion of the paper of Dr. Albert R. Ledoux. A mathematical discussion of the heat of compression in air-cylinders. 1200 w. Trans Am Inst of Min Engrs—Feb., 1903.

Accidents Due to Combustion Within Air Compressors. Editorial discussion of points to be considered to avoid accidents. Called out by Dr. Ledoux's paper before the Am. Inst. of Min. Engrs. 600 w. Compressed Air—June, 1903.

Explosions in Air Compressors. E. Goffe. Read before the Mech. Engrs'. Assn. of the Witwatersrand. Describes conditions under which explosions occurred in South Africa, discussing the causes. 2400 w. Mech Engr—April 16, 1904.

Causes of Explosions in Air Compressors. Abstract of a paper by E. Goffe, and discussion, before the Mech Engr's. Assn. of the Witwatersrand, dealing with this subject. 1800 w. Engr, Lond —Nov. 11, 1904.

Ignitions and Explosions in the Discharge Pipes and Receivers of Air Compressors. Alex. M. Gow. A report of extensive investigation undertaken to ascertain what precautions should be taken to guard against such acidents. A valuable paper. 5700 w. Eng News—March 2, 1905.

See also Cylinder Temperatures; **COMPRESSED AIR.**

Field Riveting.—An Air Compressor Plant for Field Riveting. Illustrated description of a 2-stage compressor on top of a horizontal receiver, the whole carried on the same skids, that support the boiler. 500 w. Eng Rec—Dec. 1, 1900.

Four Stage.—Four-Stage Air Compressor for 850-lbs. Pressure. Illustrated description of an interesting machine recently installed at the Aragon mine at Norway, Mich., for the purpose of supplying compressed air for locomotives for the haulage system. 1700 w. Eng News—Nov. 26, 1903.

Franklin, Pa., Works.—A Modern Manufacturing Plant. Illustrated description of the new establishment of the Franklin Air Compressor Company, at Franklin, Pa. 1500 w. Ry Age—Feb. 22, 1901.

Gas Engine Starting.—High-Pressure Compound Air Compressors (Hochdruck Verbundkompressoren). Describing special forms of compressors for furnishing a supply of compressed air for starting large gas engines. 800 w. Stahl u Eisen—March 15, 1905.

German.—Some German Air-Compressors. Illustrations and particulars relating to the Humboldt compressor, and also the Dingler compressor. 1800 w. Quarry—June 1, 1901.

Governor.—See **GOVERNOR—Nordberg.**

High Speed.—High Speed Air Compressors (Ueber Kompressoren mit Erhöhten Umdrehzahlen). F. Harth. An examination of the action of air compressors operate at high rotative speeds, with especial reference to valve action and inertia forces. 3500 w. 1 plate. Glückauf—Feb. 14, 1903.

High-Speed Air Compressors (Ueber Kompressoren mith Erhöhten Umdrehzahlen). F. Harth. A discussion of the changes in steam-driven air compressors to give them higher speed, and of their efficiency. Diagrams. 1 Plate. 3500 w. Glückauf—Feb. 14, 1903.

Experiments with High-Speed Compressors (Versuche mit Raschlaufenden Kompressoren). A. Lebrecht. Data and results of tests upon balanced compressors adapted for direct connection to electric motors, and operating at rotative speeds of 800 to 1,200 revolutions per minute. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—Feb. 4, 1905.

The High-Speed Compressor. Joseph D. Cone. Explains its advantages for certain work, giving examples of compressors direct driven by electric motors, gas engines, and steam. Ills. 2400 w. Mines & Min—May, 1905.

Hoerbiger Valves.—A Compound Air Compressor with Hoerbiger Valves (Verbundkompressor mit Lenkerventilen, Bauart Hoerbiger). L. Walther. An illustrated description of an air compressor fitted with linked plate valves on the Hoerbiger system, built by the Dingler Machine Works in Zweibrücken. Indicator diagrams. 1 plate. 1500 w. Zeitschr d Ver Deutscher Ing—April 4, 1903.

Hydraulic.—The Hydraulic Compression of Air, William O. Webber. Briefly reviews the various devices used, especially describing the compressors on the Taylor principle. 1400 w. Power—Oct., 1901.

Water Power by Direct Air Compression. William O. Webber. Reviews some of the uses of compressed air and the old methods of mechanical compression, and also the methods of compressing air directly by falling water or under pressure. Ill. 3500 w. Jour Assn of Engng Socs—Jan., 1901.

See also Water-Wheel Driven; **AIR LIFT.**

Hydraulic, Magog.—Test of an Hydraulic Air Compressor. William O. Webber. A record of results obtained in some tests at the plant of the Dominion Cotton Mills Company, Limited, at Magog, P. Q., Canada. Ill. 1300 w. Trans Am. Soc of Mech Engrs., No. 889—May, 1901.

Hydraulic, Norwich, Conn.—The Norwich Hydraulic Compressed Air Plant. Illustrated detailed description of an interesting plant to furnish compressed air through 3 miles of 16-inch plain cast-iron pipe to power users in Norwich. 2000 w. Eng Rec—Aug 24, 1901.

The Hydraulic Air Compressor at Norwich, Conn. Herbert M. Knight. An illustrated description of this installation for the compression of air by what is known as the "Taylor System." 2800 w. Eng News—June 12, 1902.

Hydraulic Compressed Air in Connecticut. J. Herbert Shedd. Briefly reviews the early uses of compressed air and describes some of the features of an installation for the hydraulic compression of air of a plant in Connecticut. Ils. Discussion. 7000 w. Jour N Eng W-Wks Assn—March, 1905.

Hydraulic, Taylor.—The Taylor Hydraulic Air Compressor. William O. Webber. On the advantages of the system and its high efficiency, discussing some distinct features and peculiarities. 1300 w. Mines & Min—May, 1905.

Indicator Diagrams.—See **INDICATOR DIAGRAM—Air Cylinders.**

Inlet Valves.—See **Valve.**

Inlet Washer.—Air Washer for Compressor Inlets. An illustrated description of a device for removing the dust and cleaning the air. 400 w. Compressed Air—Nov., 1902.

King-Riedler.—A King-Riedler Air Compressor of 1,000 Horse-Power. Illustrated detailed description. 1200 w. Am Mach—Oct. 16, 1902.

Details of Vertical Air-Compressor (King-Riedler Type). An illustrated description. 1500 w. Plate. Engng—Nov 14, 1902.

Köster.—Tests of the Köster Air Compressor (Mitteilungen über Versuche an einem Luft Kompressor mit Köstersteuerung). H. Terbeck. Tests of a compressor with mechanically operated valves, with indicator diagrams showing the valve action and efficiency. 5000 w. 1 plate. Glückauf—Jan. 2, 1904.

Morning Mine, Idaho.—See **Water-Wheel Driven.**

Multiple Stage.—Multiple Stage Air Compression. John H. Barr. Read before the Cornell Soc. of Mech. Engs. Illustrates and describes single stage and three stage compression, and gives a comparison of the probable performances. 3000 w. Sib Jour of Engng—Jan., 1901.

See also **Riedler.**

Nordberg.—Efficiency Test of a Nordberg Air Compressor at the Burra Burra Mine of the Tennessee Copper Company. J. Parker Channing. Describes the conditions and the methods of testing, reporting results. 1500 w. Mines & Min—May, 1905.

Operating.—Suggestions for Running Air Compressors. M. W. Sherwood. Suggestions for setting and leveling, measuring and adjusting clearance, lubrication, etc. 12000 w. Mines & Min—July, 1905.

Packing.—See **PACKING—Compressor Piston.**

Performance.—Air Compressors (Luftkompressoren). E. W. Köster. A review of the performance of various arrangements of steam and air cylinders with diagrams showing the distribution of work, and the flow in the passages. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 23, 1904.

Phoenix, British Columbia.—The New Compressors of the Granby Company at Phoenix. George E. Cole. An illustrated detailed description of a recent installation in British Columbia. 1500 w. B C Min Rec—Aug., 1903.

Portable.—Three-Stage Air Compressor (Dreistufiger Luftkompressor). Julius Divis. Describing a convenient portable air compressor for mining use. 1800 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 3, 1904.

Pribram.—The New Air Compressors at Pribram (Die Neueren Luftcompressoren in Pribram). J. Divis. An examination of the advantages of compressed air in mining, with a review of recent practice in Bohemia. Serial. Part I. 1800 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—July 6, 1901.

Power.—See **COMPRESSED AIR—Work.**

Pump Operation.—See **COMPRESSED AIR.**

Ratio.—Safe Ratios in Air Compression. Fred v. D. Longacre. On the determination of the maximum ratio of compression that can be used in a single cylinder with safety. Also editorial. Ill. 3500 w. Compresed Air—Feb., 1903.

Reavell.—Quadruplex Two-Stage Air Compressors. Illustrated detailed description of the Reavell air compressor. 2000 w. Engr, Lond—Aug. 22, 1902.

Receiver.—See **COMPRESSED AIR.**

Reheater.—See **COMPRESSED AIR.**

Riedler.—A New Riedler Air Compressor. Illustrated description of a vertical engine with compound air and steam cylinders, and an unusual connection between the piston rods and fly-wheel shafts; the machine is rated at 6,860 cu. ft. of free air per minute at 80 lbs. pressure. 400 w. Eng Rec—Jan. 26, 1901.

Compound Multiple-Stage Air Compressor (Verbund-Stufenkrompressor). Julius Divis. Describing an improved Riedler compressor of 70 cubic metres per minute capacity, recently erected at Nurshan, Bohemia. 1500 w. 1 plate. Glückauf—Jan. 23, 1904.

Study of a Riedler Air Compressor. Arthur P. Hall. Explains the general working of the machine, and gives a series of cards taken under various conditions. 600 w. Compressed Air—July, 1905.

Tests of a Riedler Two-Stage Air Compressor. William D. Hamilton. A report of trials made to demonstrate the capacity and efficiency of a "Riedler" compressor. Ills. Serial. 1st part. 1000 w. Prac Engr—May 26, 1905.
See also **King-Riedler.**

Riedler-Stumpf.—See **Temperature; BLOWING ENGINE—Stumpf-Riedler.**

St. Louis Exposition.—See **COMPRESSED AIR; COMPRESSED-AIR PLANT; PUMP.**

Schütz.—The Volumetric Efficiency of Air Compressors and Tests of Schütz Compressors at the "Centrum" and Fröhliche Morgensonne Mines, Westphalia (Ueber den Volumetrischen Wirkungsgrad der Kompressoren und Versuchsergebnisse von Schütz'schen Kompressoren auf den Zechen "Centrum" und Fröhliche Morgensonne). R. Goetze. An illustrated description of experiments and results. 1500 w. Glückauf—Jan. 18, 1902.

Selection.—Notes on the Selection of an Air Compressor. Gives a list of standard types, with remarks. 1800 w. Compressed Air—July, 1901.

Specifications.—Specifications for an Air Compressor. Gives specifications for an air compressor for an air-lift pumping plant at Spring Lake, N. J. 1500 w. Eng News—March 2, 1905.

Straight Line.—The Development of the Straight Line Air Compressor. R. S. Carter. Three illustrations, with descriptions, of types showing the periods of development, and the history of the machines. 900 w. Compressed Air—Oct., 1903.

Temperatures.—Thermal Researches on Air Compressors (Thermische Untersuchung an Kompressoren). Fritz L. Richter. Data and results of an exhaustive series of experiments to ascertain the temperature at various stages of the process in a Riedler-Stumpf air compressor. Three articles. 7500 w. Zeitschr d Ver Deutscher Ing—July 8, 22, Aug. 5, 1905.
See also **Cylinder Temperature.**

Test.—Air Compressors for Mining Operations (Luftkompressoren im Zechenbetriebe). An account of tests of many air compressors made by the Boiler Inspection Association of the Mines in the Dortmund District, Germany, with many illustrations and diagrams. 6 plates. 8000 w. Glückauf—March 28, 1903.

Tests of Air Compressors (Versuche an Luftkompressoren). Data and results of tests of single and double stage air compressors built by Meyer of Mühlheim, with indicator diagrams, and valve details. 1200 w. Glückauf—May 28, 1904.

Air-Compressor Tests (Versuche an Luftkompressoren). Data and results of two air compressors in actual service. 2000 w. Glückauf—Nov. 12, 1904.

Test, Brake Service.—Method of Making Competitive Tests of Capacity, Power Consumption, and Efficiency of Motor-Driven Compressors for Brake Service. Edward H. Dawson. Describes method. 1700 w. St Ry Jour—Feb. 27, 1904.

Three Stage.—See **Portable.**

Underground.—See **Electric.**

Valves.—Inlet Valves and Their Relation to the Efficiency and Volumetric Capacity of Air Compressors. Fred. Brainard Corey. Calls attention to some of the peculiarities of inlet valves of the usual types with the object of aiding the designer and user in making an intelligent choice. 2300 w. Eng News—May 30, 1901.

Discussion of Mechanical Versus Poppet Valves for Air Compressors. J. A. Coombs. A letter giving the views of an English manufacturer of this class of machinery, with editorial. 1500 w. Compressed Air—Aug., 1901.

A Study of Air Compressor Valves. Arthur P. Hall. An account of a recent series of tests made to study the action of these valves and the usual velocity of the air through them. Ills. 2400 w. Compressed Air—Nov., 1904.

Progress in Valves for Air and Gas Compressors. Leicester Allen. Discussing the problems presented to the designer, the difficulties characteristic of various types of compressors, and the improbability of finding any completely satisfactory solution. 2600 w. The Engineering Magazine, July, 1905.

See also **AIR BRAKE; VALVE—Long Stroke.**

Valve Gear.—Air Compressors and Their Valve Gear. Charles Hurst. An illustrated article comparing the merits of automatic and positive valve-compressors. 2500 w. Engng Rev—Dec., 1904.

Valve Motion.—An Improvement in Valve-Motion of Duplex Air Compressors. Sterling H. Bunnell. Illustrates and describes the construction. 1000 w. Trans Am Soc of Mech Engrs, No. 06—Dec., 1903.

Vertical.—A Vertical Compound Air Compressor at the "Minister Stein" Mine, Westphalia (Stehender Verbund Kompressor auf Zeche "Minister Stein"). R. Goetze. A well illustrated description of this air compressor, and account of tests and operation. 1 plate. 3000 w. Zeitschr d Ver Deutscher Ing—Feb. 1, 1902.

Vertical Air Compressors. Brief Illustrated Descriptions of enclosed and open two-stage compound compressors as examples of recent English practice, giving a test record. 800 w. Mines & Min—May, 1905.

Volumetric Efficiency.—See **COMPRESSED AIR.**

Water-Wheel Driven.—A High Duty Air Compressor Driven by the Largest Pelton Wheel in the World. Describes arrangements at the Morning Mine, Idaho, for furnishing power for mining operations. Ill. 900 w. Am Mach—Sept. 26, 1901.

Air Compression by Water Power. The Instalation at the Belmont Gold Mine. D. G. Kerr. Brief illustrated description of this plant, with reasons for its choice in preference to electricity. 2400 w. Can Min Rev—March 31, 1903.

Compressed Air on the Pacific Coast. Edward A. Rix. Illustrated and describes compressors driven by direct-connected water-wheels, and the various methods of using and reheating air. 4000 w. Mines & Min—May, 1905.

Yield.—Yield of Air Compressors. J. Walter Pearse. Table and descriptive matter showing a general comparison of several of the prominent makes of compressors. Also editorial. 1400 w. Compressed Air—April, 1902.

AIR COOLING.

Cooling Power and Conductivity of Air (Pouvoir Refroidissant et Conductibilité de l'Air). P. Compan. Note of experiments on the cooling off of a copper ball in a glass globe filled with dry air. 500 w. Comptes Rendus—Dec. 23, 1901.

Automobiles.—See **AUTOMOBILE, GASOLINE—Air Cooling; CAR, MOTOR-DRIVEN—Gasoline-Electric.**

Gasoline Engine.—See **AUTOMOBILE, GASOLINE—Air Cooling.**

N. Y. Stock Exchange.—See **COOLING; HEATING AND VENTILATION.**

AIR CURRENT.

See also **AIR FLOW; ANEMOMETER; MINE VENTILATION.**

Changes in Velocity and Direction of Air Currents (Changements de Direction et de Vitesse d'un Courant d'Air). M. Marey. An examination of the influence of resisting bodies of various forms in the path of air currents. 1800 w. Comptes Rendus—June 3, 1901.

Electric Analogies.—Analogies of Electric Currents and Mine Air Currents. Some of the analogies that have been observed are noted, and another article will discuss the important differences. Serial. 1st part. 2000 w. Col Guard—Sept. 27, 1901.

AIR CUSHION.

Automobiles.—See **AUTOMOBILE—Pneumatic Hub. AUTOMOBILE, GASOLINE—Twombly Kerosene.**

AIR FLOW.

See also **AIR CURRENT; ANEMOMETER; COMPRESSED AIR—Transmission; GAS FLOW; STEAM FLOW.**

Circular Orifices.—On the Measurement of Air Flowing Into the Atmosphere Through Circular Orifices in Thin Plates and Under Small Differences of Pressure. R. J. Durley. Describes experiments made at McGill University. Ills. 5000 w. Trans Am Soc of Mech Engrs (No. 081)—Dec., 1905.

Discharge Coefficient.—An Experimental Determination of the Coefficient of Discharge of Air. Sanford A. Moss. Gives methods used in determining the co-efficient of discharge through an orifice under actual conditions of use, with results. 4800 w. Am Mach—Vol. 28, No. 32.

Measuring Instruments.—The Measurement of Air Flow (Ueber die Messung von Luftgeschwindigkeiten). Dr. A. Marx. An exhaustive study of the measurement of the velocity of the flow of air in ventilating passages and conduits, discussing anemometers, pressure gauges and other instruments. Serial. Part I. 4500 w. Gesundheits Ingenieur—Aug. 20, 1904.

Mine Workings.—See **AIR CURRENT; ANEMOMETERS.**

Pipes.—A Discussion of Ledoux' & Unwin's Formulae for the Flow of Air in Pipes, with Special Reference to Heating and Ventilating. H. Diederichs. 1300 w. Sib Jour of Engng—May, 1902.

Flow of Air in Pipes and the Transmission of Power by Compressed Air. Gives some theoretical considerations and calculations. 1200 w. Mines & Min—July, 1905.

Flow of Air in Metal Pipes. J. H. Kinealy. Gives formula and table with information. 2000 w. Am Soc of Heat & Ven Engrs—July, 1905.

Experimental Researches upon the Flow of Air in Pipes (Versuche über den Widerstand bei Bewegung der Luft in Rohrleitungen). H. Rietschel. An exhaustive report of tests made at the Government shipyards at Kiel. 12000 w. Gesundheits-Ingenieur.—July, 1905.

AIR GAP.

Reluctance.—See **RELUCTANCE.**

AIR GAS.

See **CARBURETTED AIR.**

AIR LIFT.

See also **COMPRESSED AIR; LIFT—Pneumatic.**

Pneumatic Pumping Appliances. W. C. Popplewell. The present article gives an illustrated description of various types of displacement pumps. Serial. 1st part. 2200 w. Mech Engr—June 14, 1902.

Raising Liquids from Shafts, Boreholes, etc., by Means of Compressed Air. Victor Petit, in "Petroleum Industrial and Technical Review." Illustrated descriptions of methods used. 1500 w. Compressed Air—July, 1902.

The Raising of Water by Compressed Air. Percy Griffith. Read before the Engng. Con. of the Inst. of Civ. Engrs. A brief summary of the principles governing the operation and of the essential details of construction in its application to the raising of water from wells and borings. 1800 w. Mech Engr—June 27, 1903.

Lifting Water by Compressed Air. Gustav C. H. Friedrich. Read before the Ohio Soc. of Mech., Elec. and Steam Engrs. Considers the air-lift pump and the well. 2000 w. Engr, U S. A—July 15, 1903.

Air-Lift Pumps. Extracts from a Paper by L. Darapsky, on "The Application of Compressed Air to the Raising of water," published in "Berg und Hüttenmännishe Zeitung, giving information concerning the history and progress of the air-lift system. Ill. 3500 w. Engr, Lond—Dec. 11, 1903.

The Direct Elevation of Liquids by Compressed Air (Elévation Directe des Liquides par l'Air Comprimé). E. Lemaire. Illustrating various devices, including the air lift of Siemens, Laurend and Pöhle, as well as the suctions systems of Jandin and Borsig, and the pressure elevator of Kestner. 2500 w. Génie Civil—March 19, 1904.

River Wells and the Horizontal Delivery of Water. G. C. H. Friederich. Calls attention to results obtained by the air-lift system of raising water. 1500 w. Engr, U S A—June 15, 1904.

Raising Water by Compressed Air. C. T. Alfred Hanssen. Explains the theory of the air-lift pump, the conditions of maximum efficiency, etc. Ills. 4000 w. Engng Rev—July, 1904.

The Air Lift. Illustrated description of method of raising water by compressed air. 1500 w. Engr, U S A—Aug. 15, 1904.

Air Lift Pumps. W. H. Booth. Gives a brief description of the principle on which the air lift pump works, discussing its advantages and disadvantages. 2200 w. Elec Rev, Lond—Sept. 23, 1904.

Arad, Hungary.—See **WATERWORKS.**

Birkenhead.—Air-Lift Pumping Plant at Birkenhead. J. W. M. Richardson. Abstract of a paper read before the British Assn. of Water-Works Engrs. and of the discussion thereon. Describes a plant put down to increase the water supply, giving particulars of the cost of working. 4200 w. Jour of Gas Light—July 19, 1904.

Croton Aqueduct, N. Y.—The Installation of a Pneumatic Pumping Plant. Arthur H. Diamant, Jr. Illustrating and describing the Harris pneumatic pumping plant for emptying the Harlem river siphon of the Croton Aqueduct, New York. 5800 w. Pro Am Soc of Civ Engrs—May, 1904.

The Installation of a Pneumatic Pumping Plant. Elmo G. Harris. Discussion of paper by Arthur H. Diamant, Jr. 2000 w. Pro Am Soc of Civ Engrs—Oct., 1904.

Air-Lift Pumping Machinery at the Inverted Siphon of the New Croton Aqueduct, New York City. Begins an illustrated detailed description of the pumping apparatus. Serial. 1st part. 3300 w. Eng Rec—May 28, 1904.

Harris.—The Harris System of Pumping by Compressed Air, as Applied at the Deloro Mine. J. P. Kirkgaard. Illustrates and describes the displacement method applied. 2500 w. Compressed Air—July, 1902.

The Harris System of Pumping with Com-Air, as Applied at the Deloro Mine. J. P. Kirkgaard. Describes this installation and states its advantages. 2700 w. Can Min Rev.—April 30, 1902.

The Harris System of Pumping with Compressed Air. Elmo G. Harris. Illustrated description of apparatus and principles governing its operation. 1800 w. Mines & Min—May, 1905. See also Croton Aqueduct, N. Y.

"Mammut."—Progress in the Applications of the Air-Lift Pump (Fortschritte im Bau von Mammut Pumpen). H. Steen. An illustrated description of recent installations of the "Mammut" system of air lift pumping for deep mine work in Germany. 3000 w. Glasers Annalen—Jan. 15, 1905.

Mexico City.—Air Lift Plant at the San Antonio Abad Cotton Mills in the City of Mexico. Juan Cuyas. Ilustrated description, with results of tests. 1000 w. Compressed Air—Aug., 1903.

Point Pleasant, Pa.—Moving Water Horizontally by Air-Lift Pumps at Point Pleasant, Pa. Condensed from the "Metal Worker." Clark Howell. An illustrated account of the plant. 2000 w. Eng. News—Nov. 22, 1900.

Pratt City, Ala.—See **WATERWORKS.**

Redlands, Cal.—Air-Lift Pumping Plant of the Redlands Water Co. An illustrated account of a test made in a plant in these irrigation works in California to determine its efficiency, with brief description of the plant. 1400 w. Eng Rec—Jan. 7, 1905.

Spring Lake, N. J.—See **AIR COMPRESSOR—Specifications.**

Starrett.—An Ingenious and Effective Air-Lift Pump. Illustration, with description, of pump invented by D. W. Starrett. 1500 w. Eng News—Nov. 24, 1904.

Tailings.—See **ELEVATOR.**

Test.—Efficiency Trials of Air-Lift Pumping Plant. J. W. M. Richardson. Abstract of a paper read before the British Assn. of W.-Wks Engrs. An illustrated description of the plant of the Birkenhead Corporation. 3000 w. Mech Engr—Aug. 20, 1904.

Theory.—The Theory of the Air Lift. An explanation to the theory of operation of this apparatus for lifting water from wells. 1100 w. Compressed Air—Oct., 1905.

Tunbridge Wells.—The Raising of Water from Deep Wells and Borings by Compressed Air. William H. Maxwell. Read at meeting of the British Assn. of Water-Wks. Engrs. The writer's views of the special circumstances to which this system is particularly applicable, reviewing the general principles governing the work, and giving details of the plant at Tunbridge Wells. 2700 w. Engr, Lond—Aug. 14, 1903.

Raising Water by Compressed Air. William H. Maxwell. Read before the British Assn. of Water-Works Engrs. Gives the working results of a plant on the "air-lift" system at Tunbridge Wells, with a general review of the conditions under which the system may be successfully applied. 3500 w. Engng—Nov. 13, 1903.

AIR LOCK.

See also **BRIDGE FOUNDATION; CAISSON.**

Harlem River Tunnel.—Special Pneumatic Lock for the Harlem River Tunnel. Illustrated description. 600 w. Eng Rec—Feb. 27, 1904.

Kiel Dry Dock.—An Air Valve for Regulating the Time of Passing Through an Air Lock; Used in the Kiel Dry-Dock Construction. Illustrated description of an apparatus to make it impossible for workmen to pass through the air lock in so short a time as to cause risk of injury. Also editorial. 1700 w. Eng News—Jan. 21, 1904.

AIR PUMP.

See also **CONDENSER.**

Condenser.—Capacity Test of a Unique Form of Air Pump. F. Meriam Wheeler. Describes a test made to ascertain the capacity of a new design of air pump for surface condensers, and especially intended for marine use. Ill. 2400 w. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

Condenser Air Pumps. W. H. Booth. On the importance of inspection and attention to small leaks. 1300 w. Am Mach—Jan. 31, 1901.

Air Pumps. W. H. Booth. Considers some of the defects of independent condenser plants. 2200 w. Power—Nov., 1904.

See also **CONDENSER**—**Jet.**

Design.—Some Notes on Air-Pump Design. C. L. Browne. Considers the important part borne by the condensing apparatus of a steam plant, and the weaknesses in the designs of condensers and air pumps. Serial. 1st part. 1800 w. Elec. Engr, Lond—Nov. 14, 1902.

Fuel Pressure.—Fuel Pressure Air Pumps. Charles F. Schaeffer. Working drawings and description of a pump designed for keeping up the air pressure in the gasoline tank of steam vehicles. 700 w. Horseless Age—May 29, 1901.

Marine Engine.—Direct Driven Air Pumps. Illustrates and describes the direct driven air pumps adopted for the engines of the Denver class of U. S. cruisers. 400 w. Marine Engng—July, 1901.

Air Pumps for Marine Engines (Luftpumpen für Schiffmaschinen). C. Strebel. A general study of air-pump design, with numerous examples of modern types, both connected to the engine and independently driven. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—Dec. 2, 1905.

See also **Watson.**

Mars.—The Mars Vertical Displacement Air Pump. An illustrated description of the Thomas and Marsland's patent condensing plant. 500 w. Engr, Lond—June 26, 1903.

Watson.—Watson's Independent Twin Air-Pumps. Illustrations, with description of a good example of the form of pumps usually adopted in battleships, cruisers and mail liners, in connection with large marine engines. 800 w. Engng—Sept. 8, 1905.

AIR RESISTANCE.

See also **AIR FLOW; TRAIN RESISTANCE; WIND PRESSURE.**

Modern Theories of Air Resistance (Die Luftwiderstandsgesetze in Neuster Zeit. F. R. v. Loessel. An examination of the laws of air resistance in connection with aeronautics. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 18, 1901.

Canovetti Experiments.—Experiments Upon Air Resistance (Expériences Relatives à la Résistance Opposée par l'Air). M. Barbel. The full report of the Committee of the Society for the Encouragement of National Industry upon the important experiments of Canovetti. 10,000 w. Bull Soc d'Encour—Feb. 28, 1903.

Car.—See **ELECTRIC CAR**—**Dynamometer.**

Dynamometer.—See **Renard; ELECTRIC CAR.**

Friction.—Preliminary Experiments on Air Friction. W. Odell. Read at Southport, before the British Assn. Gives an account of attempts to measure the power required to keep a plane circular disc rotating. 5000 w. Engng—Jan. 1, 1904.

Atmospheric Friction as an Obstacle in Locomotion. Dr. A. F. Zahn. An illustrated description of experiments made to determine laws governing air resistance in moving bodies. 1500 w. Sci Am—July 22, 1905.

Renard Dynamometer.—A comparison of the Resistance of the Air to Various Forms of Balloons (Comparaison des Résistances Directes de Diverse Carènes Aeriennes). Ch. Renard. An application of the author's dynamometer to the determination of the coefficients of atmospheric resistance. The law of the square of the velocity is verified. 1500 w. Comptes Rendus—May 24, 1904.

Experiments upon the Resistance of the Air (Recherches Relatives à la Resistance de l'Air). Ch. Renard. A description of the Renard dynamometric balance, and its application to the measurement of atmostpheric resistance. 1200 w. Comptes Rendus—May 16, 1904.

The Air Vane Dynamometer of Col. Ch. Renard (Das Windflügel-Dynamometer des Obersten Ch. Renard). F. Ross. An account of the use of the apparatus in testing automobile motors. 2000 w. Zeitschr f Elektrotechnik—May 29, 1904.

Trains.—See **Zossen Railway; TRAIN RESISTANCE**—**Air.**

Zossen Railway.—Results of Tests for Air Resistance on the Berlin-Zossen Experimental High Speed Line. Gives curves showing the relation between air pressure and speed, with account of tests. 1300 w. St Ry Jour—June 7, 1902.

See also **ELECTRIC RAILWAY.**

AIR SHIP.

See **AERONAUTICS.**

ALASKA.

See also **GOLD.**

The Opening of the Territory of Alaska. Harrington Emerson. An illustrated review of the mining and agricultural possibilities of Alaska and the development possible with the arrival of adequate transportation facilities. 3500 w. Engineering Magazine—February, 1903.

ALCOHOL.

See also **ALCOHOL MOTOR.**

Alcohol for Industrial Purposes. Reviews the results accomplished in the use of alcohol for heat, light and power. 2000 w. Mach, N. Y.—May, 1903.

Alcohol Considered as a Fuel (L'Alcohol Considéré comme Combustible). Edmond Brunet. General considerations and statistics of prices and production of alcohol in Germany and France and its use as a fuel. 2600 w. Rev Technique—July 10, 1903.

The Present Status of Alcohol in Technology (Ueber den Gegenwärtigen Stand der Technischen Spiritsverwertung). Dr. N. Wender. Giving statistics as to the production of alcohol in various parts of Europe, discussing its extending use as a fuel. Two articles. 5000 w. Zeitscher d Oesterr Ing u Arch Ver—April 8, 15, 1904.

Automobile.—See **ALCOHOL MOTOR; CARBURETTER; LIQUID FUEL.**

Carburetter—See **CARBURETTER**—**Alcohol.**

Classen Process.—See **Wood.**

Combustion.—Phenomena of Alcohol Combustion. C. C. Longridge. Describes a series of experiments which gave facts of interest bearing upon the chemical theory—that the descomposition of the fuel improved the combustion and efficiency. 1700 w. Engr, Lond—Oct. 2, 1903.

Duty-Free.—The Need of Duty-Free Spirit for Industrial Purposes. Thomas Tyrer. A vast amount of information in regard to the manufacture, use, and duty on alcohol. General discussion. Refers to England principally. 27000 w. Jour Soc. of Arts—April 29, 1904.

France.—See Paris Exhibition; **ALCOHOL MOTOR; GASOLINE.**

Germany.—The Manufacture and Technical Uses of Alcohol in Germany. An account of a special exposition being held in Berlin, with illustrated description of interesting exhibits of domestic and industrial uses of alcohol, including spirit engines and motors, flatirons heated, lamps, etc. 2200 w. U. S. Cons Rept, No. 1288—March 13, 1902.

The Potato as a Source of Wealth in Germany. Information relating to the culture and uses, especially as a producer of alcohol. Describes the proposed exhibits at this year's exposition at Berlin, showing the manufacture and many uses of alcohol for technical and industrial purposes. Ill. 3000 w. U S Cons Repts, No. 1599—March 20, 1903.

Lighting.—Progress in Alcohol Lighting '(Progrés Réalisés dans les Applications Industrielles de l'Alcool, Eclairage). Louis Denayrouze. A review of the great advance made in alcohol lighting in France in the last three years. 1500 w. Mem d'l Soc d Ing Civils de France—Dec., 1901.

Lighting by Alcohol. Abstract of a communication presented by M. Arachequesne at a meeting of the Société des Ingénieurs Civils de France. Gives illustrated descriptions of appliances for burning alcohol, and the conclusions. 2000 w. Jour Gas Lgt—Jan. 13, 1903.

Incadescent Lighting with Alcohol (L'Alcool Industriel-Eclairage par Incandescence). M. Luc. An illustrated description of various alcohol lamps with incandescent mantels. 2500 w. Rev Technique—March 25, 1903.

Lighting and Heating.—Lighting and Heating by Alcohol (L'Eclairage et le Chauffage par l'Alcool). M. Lindet. A discussion of the conference of the Société d'Encouragement, with tabulated results of the consumption of alcohol in lighting and heating. 3000 w. Rev Gen des Sciences—March 30, 1902.

Lighting and Heating Apparatus (Appareils d'Eclairage et de Chauffage). G. Arachequesne. An illustrated review of the devices for utilizing alcohol in incandescent burners, and in heating appliances. 7000 w. Mem Soc Ing Civ de France Aug., 1902.

Lighting and Heating by Alcohol (L'Eclairage et le Chauffage par l'Alcool). M. Lindet. Describing especially the various forms of lamps in which an incandescent mantle is heated by alcohol for the production of light. 10,000 w. Bull Soc d'Encour—Aug. 31, 1902.

See also **Paris Exhibition.**

Paris Exhibition.—Paris Exhibition of Alcohol-Consuming Apparatus. Concerning an exhibition in Paris of inventions for the use of alcohol for illuminating or heating purposes, or for motor power. 1000 w. U S Cons Repts, No. 1161—Oct. 14, 1901.

The Exposition of Apparatus for Utilizing Methylated Alcohol (L'Exposition des Appareils Utilisant l'Alcool Dénaturé). H. Pouleur. A review of the motors and the warming and lighting apparatus exhibited at Paris, Nov. 1901. 3500 w. Rev Univ des Mines—Nov., 1901.

Exposition of Motors and Apparatus for Utilising Methylated Alcohol (Concours et Exposition de Moteurs et Appareils Utilisant l'Alcool Dénaturé). G. Coupan. Describing the exhibits and giving fully tabulated data and results of tests of motors. 2500 w. Génie Civil—Nov. 30, 1901.

Competition and Exhibition of Alcohol Motors and Other Apparatus at Paris (Concours et Exposition de Moteurs et Appareils Utilisant l'Alcool Dénaturé). G. Coupan. Description of motors, automobiles and boats using alcohol, and account of competition held at Paris, 1902. Tables. 5000 w. Génie Civil—June 21, 1902.

Exposition of Motors and Appliances for Utilising Methylated Alcohol (Concours et Exposition de Moteurs et Appareils Utilisant l'Alcool Dénature). H. Guérin. An account of the exposition in Paris for the purpose of promoting the industrial applications of alcohol. Two articles. 4000 w. Génie Civil—Dec. 7, 14, 1901.

The International Competition of Alcohol Motors and Apparatus (Concours International des Moteurs et Appareils Utilisant l'Alcool Dénaturé). H. Guérin. An illustrated description of alcohol lamps and heaters, exhibited at Paris, 1902. 2400 w. Génie Civil—June 14, 1902.

Lighting and Heating with Alcohol at the Competition in Paris, 1901 (L'Eclairage et le Chauffage par l'Alcool au Concours de 1901). M. Lindet. A well illustrated comprehensive paper on lighting and heating with alcohol. 8000 w. Bull Soc d'Encouragement—Feb., 1902.

Lamps, Burners and Heating Apparatus at the Paris Alcohol Exposition. Illustrated description of exhibits. 3200 w. Sci Am Sup—May 17, 1902.

International Alcohol Exposition of Lighting and Heating Apparatus. Translated from "La Nature." Illustrates and describes apparatus for using alcohol as a means of heating and lighting. 1500 w. Sci Am Sup—Oct. 25, 1902.
See also **Lighting and Heating; ALCOHOL MOTOR.**

Wood.—The Manufacture of Ethyl Alcohol from Wood. Describes the Classen process for the economical commercial manufacture of ethyl alcohol from wood, and gives information concerning plants to be erected in the United States. Ill. 3000 w. Ir Age—Sept. 17, 1903.

ALCOHOL MOTOR.

See also **ALCOHOL.**

Alcohol Motors (Les Moteurs à Alcool). L. Périssé. An exhaustive study of the construction and operation of internal combustion motors using alcohol as fuel. 15000 w. Mem Soc Ing Civ de France—July, 1901.

Alcohol in Industry (L'Alcool per l'Industrie). The report of the commission of the Italian Government upon the proposed methods of using methylated and carburetted alcohol for heating and motive power. 2500 w. L'Industria—Jan. 5, 1902.

The Problem of Alcohol. Discussion of the applicability of alcohol to the operation of explosion engines, and the experiments made in France and other places. 2500 w. Auto Jour—Feb., 1902.

The Status of Alcohol as a Power Source. Marius C. Krarup. Discusses the results of the trials in Germany and France, and the interest of the question in the United States. 3300 w. Ir Age—July 10, 1902.

Alcohol for Motors. M. C. Krarup. Discusses the causes that have led to the use of alcohol in Europe, and also the merits of alcohol as a fuel, and its importance to engine builders. Serial. 1st part. 2000 w. Am Mach—Vol. 27, No. 41.

Motors, Boats and Automobiles Operated by Alcohol (Les Moteurs, les Automobiles et les Bateaux à Alcool). M. Ringelmann. A description of the testing plant by use of which the efficiency of the internal-combustion motors using alcohol as fuel can be found. 3500 w. Bull Soc d'Encour—Aug. 31, 1902.

Alcohol as a Source of Motive Power (L'Alcool et la Force Motrice). An examination of the availability of alcohol for use in internal combustion motors, showing its high efficiency. 2000 w. Revue Technique—Dec. 10, 1903.

Mechanical and Commercial Aspects of the Alcohol Motor. Henri Dupays. With numerous illustrations showing the use of alcohol in internal-combustion motors, and data and results of tests. 3500 w. Engineering Magazine—Feb., 1904.

Industrial Alcohol (Alcool Industriel). Octave Rochat. A study of the applications of alcohol as a source of energy in internal-combustion motors. Three articles. 7500 w. Bull Tech de la Suisse Romande—Sept. 25, Oct. 10, 25, 1904.

Alcohol as a Fuel for Motors. From a paper by Dr. Ormandy before the Western Sec. of the Scottish Auto. Club. The present article discusses the heat required to vaporize, the range of explosibility, and the boiling points. Serial 1st part. 1200 w. Automobile—June 15, 1905.

Automobile.—Alcohol Automobiles at the Paris Alcohol Exhibition. The present article gives an illustrated description of the Gobron-Brillié system. Serial. 1st part. 800 w. Sci Am—Dec. 28, 1901.

The Use of Alcohol in Motors for Automobiles (L'Emploi de l'Alcool dans les Moteurs d'Automobiles). A tabulated review of the performance of 30 different kinds of vehicles using alcohol in internal combustion motors. 2500 w. Génie Civil—June 29, 1901.

Alcohol Motor Car Trials in France. Concerning the trials being carried out by the Minister of Agriculture to open a source of consumption for alcohol. Ill. 3200 w. Engr, Lond—Nov. 8, 1901.

The French Alcohol Carriage Trials. Brief account of trials in the neighborhood of Paris for obtaining official data upon the economy of alcohol. and its utilisation. Ill. 1500 w. Autocar—Nov. 9, 1901.

Alcohol and Automobiles. From "The Motor World." Discusses the recent tests of this fluid in the neighborhood of Paris. 1400 w. Sci Am Sup—Jan. 25, 1902.

Alcohol for Automobiles. R. F. Collins. Discusses the headway made in France and Germany in the use of alcohol as a fuel for motor vehicles. 1200 w. Auto Mag—April, 1902.

The Spirit-Locomotive Wagon in Germany. Concerning competitive prizes offered for these vehicles, giving synopsis of specifications and points to be considered in the competition. 900 w. U S Cons Repts. No. 1322—April 22, 1902.

Trials of Alcohol Motors. Discusses the trials from Beauvais to Paris, and alcohol as compared with petrol. 2500 w. Engr, Lond—May 23, 1902.

The Northern Alcohol Race. An account of this race which proved that alcohol could be used with safety for vehicles running at high speeds. Ill. 4600 w Autocar—May 24, 1902.

The French Alcohol Tests (Circuit du Nord). An account of the racing tests and the results and the consumption trials and results. Also brief notice of the alcohol exhibition. 3000 w. Auto Jour—May 31, 1902.

Alcohol as a Motive Power. W. R. Ormandy. Arguments showing alcohol to be a suitable motor fuel, and in some respects the most suitable fuel, and giving proofs of its practical possibilities. 5000 w. Motor Car Jour—April 2, 1904.

Alcohol as a Fuel for Motor Cars. An interview with Dr. Ormandy, discussing why alcohol is not more generally used, its advantages, the working of the alcohol engine, &c. 2300 w. Auto car—Jan. 14, 1905.

See also **AUTOMOBILE; CARBURETTER; LIQUID FUEL.**

Berlin Experiments.—The Alcohol Motor. Ernst Neuberg. An account of experiments in connection with the competition for alcohol motors, carried out in the gas engine laboratory of the Technical High School of Berlin. 1700 w. Auto Jour—Feb., 1902.

Berlin Exposition.—The Alcohol Motors at the Berlin Exposition, 1902 (Die Spiritusmaschinen auf der Ausstellung für Spiritusindustrie in Berlin, 1902). R. Schöttler. With the details of internal combustion motors for use with methylated spirit; special reference being had to the carburetters. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 2, 1902.

Carburetters.—See **CARBURETTERS**—Alcohol.

Combustion.—The Phenomena of Combustion in Stationary Alcohol Motors (Sur les Phénomènes de la Combustion dans les Moteurs Fixes à l'Alcool). M. Sorel. An account of the laboratory investigations of the action of alcohol as a fuel in internal combustion motors at the exhibition at Paris in May, 1902. Serial. Part I. 6000 w. Revue de Mécanique—Jan. 31, 1903.

Electric Generation.—Alcohol Power Generating Set (Groupe Electrogène à l'Alcool). MM. Sartiaux & Cossman. Describing the convenient arrangement of alcohol motor and dynamo used for charging accumulators for operating winches at the small stations of the Northern Railway of France. 2000 w. Rev Gen des Chem de Fer—Sept., 1902.

Europe.—Use of Alcohol Engines in Europe. George E. Walsh. Remarks on the interest shown in these engines, and on some of the recent types. 1500 w. Ir Age—Oct. 22, 1903.

France and Germany.—French Spirit Motors. An account of the steps being taken in France and Germany to use alcohol for driving motors, and for lighting and heating purposes. Discusses also the construction of spirit motors. 2500 w. Engng—Jan. 10, 1902.

French Railway Stations.—See **Electric Generation.**

Gasoline Compared.—Carbureted Alcohol vs. Pure Gasoline in Automobiles. Marius C. Krarup. A comparison between results obtained with car- the United States. 2000 w. Ir Age—Aug. 28, 1902.

Alcohol as a Motive Power. From the French of M. O. Boudouard, in "Revue de Chimie Industrielle." Gives a study of alcohol motors, comparing with gasoline, and the results obtained. 1500 w. Sci Am Sup—Dec. 5, 1903.

Germany.—Alcohol Motors in Germany (Les Locomobiles à Alcool en Allemagne). Lucien Périssé. A review of an article in "Vie Scientifique," giving an account of applications of alcohol motors in agricultural and other work. 800 w. Revue Technique—Dec. 10, 1901.

See also **France and Germany.**

Competition of Alcohol Motors and Automobiles bureted alcohol in France, and with gasoline in (Concours Générale des Moteurs et Automobiles à Alcool). M. Ringelmann. A short review of an exhibition and competition of stationary and automobile alcohol motors held in Paris, 1901. 2000 w. Mem d l Soc d Ing Civils de France—Dec., 1901.

See also **Automobile; ALCOHOL; GAS ENGINE.**

Performance.—See **Test.**

Test.—Scientific Tests of Alcohol Motors. M. C. Krarup. Discusses the results of this year's tests in France, the necessity of guarding against corrosion, the defective combustion of all explosive motors, etc. 3300 w. Ir Age—July 24, 1902.

Comparative Tests of Benzine and Alcohol Motors (Vergleichende Versuche an einem Explosionsmotor mit Benzin und Spiritusbetrieb). A discussion of tests using the different fuels in the same engine under varying degrees of compression. 2500 w. Zeitschr d Ver Deutscher Ing—Jan. 10, 1903.

Alcohol Motors at the International Competition of 1902 (Les Moteurs d'Alcool au Concours International de 1902). Max Ringelmann. Data and results of tests made at the experimental station of the exhibition of 1902, at Paris, with illustrations of stationary and portable alcohol motors, and curves and tables showing their performance. 10000 w. Revue de Mécanique—March 31, 1903.

Tests of Alcohol Motors and Diesel Motors (Versuche an Spiritusmotoren und am Diesel-Motor). Eugen Meyer. A long, comprehensive article, with diagrams and tables, giving an account of tests of alcohol portable engines, under the auspices of the German Agricultural Society, and of Diesel motors. Serial. Part 1. 6000 w. Zeitschr d Ver Deutscher Ing—April 11, 1903.

French Research on Alcohol Motors. Capt. C. C. Longridge. Indicates the line of reasoning in the report of M. Sorel in regard to ecrtain points. Considers the fuel employed, effects of the fuel on the motor, analysis of the exhaust gases, quantity of air required for combustion, and carburation. 1700 w. Engr, Lond—June 5, 1903.

French Tests of Alcohol Motors. Capt. C. C. Longridge. Gives a table of the results with a view to indicating some method of comparison, and points of investigation. 1500 w. Engr, Lond—July 24, 1903.

Theory.—Theory of the Alcohol Motor. C. C. Longridge. Shows the advantages of the combined cool cycle and high compression, and the beneficial influence of water. 2000 w. Engr, Lond—Aug. 7, 1903.

Vienna Exhibition.—International Exposition of Alcohol (L'Exposition Internationale des Alcools). G. Coupan. An illustrated account of the exposition recently held at Vienna, including the trials of automobiles using alcohol as fuel. 3000 w. Génie Civil—Aug. 27, 1904.

A Comparative Technical Study of Denaturized Alcohols (Etude Technique Comparative des Alcools Dénaturés). Lucien Périssé. A report of the tests upon the internal-combustion motors at the Vienna exhibition of 1904, using alcohol as fuel. Methods of denaturizing are given. 10000 w. Mem Soc Ing Civ de France—Feb., 1905.

ALKALI.

See also **ELECTRO-CHEMISTRY.**

San Luis Valley.—The Alkali Lakes of the San Luis Valley. Prof. Herman Fleck. Read before the Western Assn. of Tech., Chem. & Met. Gives the location of these lakes, describing them and discussing their origin, general properties, &c. 1000 w. Min Rept—Dec. 15, 1904.

ALLOY.

See also **BRASS-FOUNDING; METALLOGRAPHY;** and under the different metals.

Metallic Alloys. J. E. Stead. Considers the constituents of alloys, the methods employed for studying the constiution and properties of alloys, classification of binary alloys, and alloy charts for representing the structural, constitutional and physical properties of alloys. Ill. 9000 w. Metallographist—April, 1902.

A Review on Alloys. Gustav Thurnauer. Considers combinations of metals, prepared in such a manner as to impart qualities not possessed by either constituent. Ill. 9000 w. Pro W Ry Club—April 18, 1902.

Alloys. Warner B. Bayley. Remarks on the increased consumption, improvement in manufacture, etc., with description of methods employed in their manufacture and in the making of tubing. 4200 w. Jour Am Soc of Nav Engrs—Feb., 1903.

Alloys as Revealed by Modern Research. Percy Longmuir. Discusses the tendency of present experiment and research and some of the causes affecting the properties. Ill. 3000 w. Feilden's Mag—March, 1903.

Some Hints on Metal Melting and Alloying. Walter J. May. Considers points which affect the condition of the metal, and the treatment necessary to secure sound castings. Serial. 1st part. 2300 w. Prac Engr—Jan. 27, 1905.

Practical Alloying. J. F. Buchanan. The present number considers ancient and modern methods of metal refining. Serial. 1st part. 5000 w. Foundry—Aug., 1905.

Alloys. Percy Longmuir. Considers briefly the preparation of alloys, the influence of oxygen, especially in alloys containing copper as a base, and other features. Ills. Serial. 1st part. 2200 w. Can Engr—Sept., 1905.

Aluminum.—See **ALUMINUM ALLOY.**

Aluminum Silver.—A Use ful Alloy of Copper, Zinc and Aluminum for Sand Casting. Erwin S. Sperry, in "Aluminum World." Describes an alloy known as "aluminum silver," noting the characteristics, good qualities, uses, etc. 3000 w. Foundry—May, 1902.

Annealing Effect.—See **Strain Effect.**

Antifriction.—Antifriction Alloys. John F. Buchanan. A general discussion of these alloys, and points to be observed in compounding. 3800 w. Foundry—April, 1904.
See also **Bearing; BEARING.**

Antimony and Tellurium.—The Alloys of Antimony and Tellurium. Henry Fay and Harrison Everett Ashley. An account of investigations made, describing the methods and apparatus used. Ill. 3300 w. Trans Am Inst of Min Engrs—Nov., 1901.

Bearings.—A Study of Alloys Suitable for Bearing Purposes. G. H. Clamer. Particularly a study of alloys suitable for railway journal bearings, considering composition, structure, friction, temperature of running, wear on bearing, wear on journal, compressive strength, and cost. Studies the combinations in present service. 7800 w. Jour Fr Inst—July, 1903.

See also **Antifriction; BEARING; CAR BEARING.**

Binary.—Upon the Constitution of Binary Alloys. John Alexander Mathews. Gives a résumé of the knowledge gained by the researches of metallurgists. Ill. Serial. 1st part. 5300 w. Jour Fr. Inst—Jan., 1902.

Upon the Constitution of Binary Alloys. John Alexander Mathews. Continued discussion. 3000 w. Jour Fr Inst—March, 1902.

The Freezing-Point Curve of Binary Alloys of Limited Reciprocal Solubility When Molten. H. M. Howe. Tests of curves showing that the very convenience of these graphical illustrations may cause them to mislead. 2000 w. Metallographist—April, 1902.

See also **Structure.**

Brass Foundries.—Typical Brassfounders' Alloys. John F. Buchanan. Discusses the causes that have led to the making of inferior metals, and recent innovations in the mixing of alloys. 2000 w. Foundry—Nov., 1902.

Notes on Engineering Alloys. Ernest A. Lewis. A discussion of alloys used in brass-foundries, giving general rules for the production of good castings. 2200 w. Engng—March 31, 1905.

See also **BRASS FOUNDRY.**

Bronze.—See **BRONZE.**

Car Bearings.—See **CAR BEARING.**

Casting.—Preparing Alloys for Casting. Walter J. May. Some points on the marking and handling of alloys. 1200 w. Prac Engr—Jan. 29, 1904.

Casting Temperature.—Influence of Casting Temperature on Properties of Alloys. Percy Longmuir. Abstract of a paper read before the Ir. and St. Inst. An account of researches with industrial brasses, describing methods and considering results. 2500 w. Mech Engr—May 30, 1903.

Chemistry.—The Chemistry of Alloys for Naval Use. Translated from the "Revue de Chimie Industrielle." Reviews various alloys used and the uses for which they are suitable. 1200 w. Stevens Ind—July, 1904.

Constitution.—The Constitution of Alloys (La Constitution des Alliages). Leon Guillet. A comprehensive study of alloys and their physical, chemical and electrical properties. Diagrams and tables. Serial. Part I. 3000 w. Genie Civil—June 28, 1902.

Metallic Conduction and the Constitution of Alloys. John Alexander Mathews. Reviews what has been accomplished by various investigators of the general applicability of the solution theory to the explanation of the properties of alloys. 3800 w. Elec Wld & Engr—Oct. 4, 1902.

Copper.—See **Copper-Iron; ALUMINUM ALLOY—Copper; COPPER ALLOY.**

Copper-Iron.—Notes on Alloys of Copper and Iron. J. E. Stead. Abstract of paper read before the Glasgow Congress. Report of researches made during the last year, giving results. 5500 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Notes on Alloys of Copper and Iron. J. E. Stead. Read before the Glasgow Congress. A report of research prosecuted during the last year, describing methods and giving results; also showing the influence of carbon in these alloys. Ill. 6000 w. Engng—Dec. 20, 1901.

Critical Point.—See **STEEL—Segregation.**

Durana Metal.—The Influence of Heat upon the Strength of Durana Metal (Warmzerreissversuche mit Durana Gussmetall). Prof. R. Stribeck. Data and results of tests upon an alloy of copper, zinc, tin and lead, showing the loss of strength with increased temperature. 3000 w. Zeitschr d Ver Deutscher Ing—June 11, 1904.

Egyptian Tombs.—New Researches on the Alloys of Gold, Silver, and Other Matter Found in the Egyptian Tombs. M. Berthelot. Results of examinations made. 1000 w. Sci Am Sup—Oct. 26, 1901.

Electro-Deposition.—See **ELECTRO-METALLURGY—Alloys.**

Engine-Shaft Bearings.—See **BEARING.**

Equilibrium.—Imperfect Equilibrium in Alloys. F. Osmond. An illustrated study. 1800 w. Ir & Steel Mag—May, 1904.

Experimental Study.—Some Neglected Details in the Experimental Study of Alloys. E. S. Shepherd. Points out several experimental details which have been neglected in some current researches, especially in pyrometric and metallographic work. Ills. 2500 w. Ir & Steel Mag—Sept., 1904.

Gold and Silver.—On Certain Properties of the Alloys of the Gold-Silver Series. Sir W. C. Roberts-Austen and T. K. Rose. Read before the Royal Soc. Gives results of experiments made to obtain homogeneous trial plates by which the standard of the coinage may be tested. 800 w. Metallographist—April, 1903.

Heat Effect.—See **Casting Temperature; Durana Metal.**

Heusler.—See **Magnetic.**

High Tensile Strength.—Alloys of High Tensile Strength.—Alloys of High Tensile Strength. Herbert E. Field. A reply to a correspondent who has had trouble in securing a strong composition by using Dr. R. H. Thurston's formula. 1800 w. Mach, N Y—Feb., 1904.

Howe.—Iron, Steel, and Other Alloys. First chapter of Prof. Henry M. Howe's new book on alloys. Ill. 4000 w. Metallographist—July, 1903.

An Introduction to the Study of Alloys. Prof. Henry M. Howe. A brief and very clear explanation of the modern theory of the constitution of metals, of its conclusions as affecting the materials of engineering construction, and of the methods of study and investigation by which the facts are established. Ill. Serial. 1st part. 4000 w. The Engineering Magazine—Aug., 1903.

Industrial.—Industrial Alloys. Percy Longmuir. The present article considers modern steels as alloys, indicating the processes by which they are made. Also begins a discussion of copper alloys. Serial. 1st part. 1500 w. Prac Engr—Jan. 2, 1903.

Invar.—Invar and Its Applications. Ch. Ed. Guillaume. Describes results obtained by this curious alloy, giving an account of its discovery, the applications made, and information of interest. Ills. 5500 w. Nature—Dec. 8, 1904.

Lead—Tellurium. Alloys of Lead and Tellurium. Henry Fay and C. B. Gillson. Concerning investigations carried out at the Inst. of Technology, Boston. Ill. 3500 w. Trans Am Inst of Min Engrs—Nov., 1901.

Magnalium.—Mechanical and Other Treatment of Alloys of Aluminum and Magnesium. Information relating to the manipulation of magnesium alloys of aluminum. 800 w. Am Mach—Jan. 24, 1901.

On Alloys (Ueber Legirungen). Prof. Klandy. An address before the Oesterr. Ing. und Arch. Verein on alloys in general and the aluminum-magnesium alloys in particular. 1200 w. Oesterr Zeitsch f Berg u Hüttenwesen—March 30, 1901.

Alloys of Aluminum and Magnesium (Les Alliages d'Aluminium et de Magnesium). O. Boudouard. A well illustrated account of investigation of these alloys with various proportions of the metals, giving melting points, microscopic examination, etc. 2000 w. Bull Soc d'Encour—Dec., 1901.

Magnetic.—Experiments upon the Heusler Ferromagnetic Alloy of Manganese, Aluminium, and Copper (Versuche mit Heuslerschen Ferromagnetischen Mangan-Aluminium-Kupfer Legierungen). E. Gumlich. A report of the tests made by the Reichsanstalt upon the magnetic properties of an alloy composed of non-magnetic metals. 5000 w. Elektrotech Zeitschr—March 2, 1905.

On the Magnetic Qualities of Some Alloys Not Containing Iron. J. A. Fleming and R. A. Hadfield. An account of preliminary results obtained in experimental investigations of magnetic alloys. 3000 w. Elect'n Lond—June 16, 1905.

Magnetic Alloys. V. Quittner. Translated from 'Prometheus.'' Information concerning recent studies of magnetic alloys and the results. 2000 w. Sci Am Sup—Nov. 4, 1905.

Melting.—Notes on the Practical Melting of Alloys. Percy Longmuir. Deals with practical methods of producing good examples of the alloys used in the industrial arts. 1800 w. Prac Engr—June 20, 1902.

Metallic Salts.—Alloying by Means of Metallic Salts. Walter J. May. Some points from the writer's experience showing the process is of some importance in practical working. 1000 w. Prac Engr—June 26, 1903.

Microstructure.—See **METALLOGRAPHY**—Alloys.

Naval Use.—See Chemistry.

Nickel Steel.—See **NICKEL STEEL.**

Research Committee.—The Reports of the Alloys Research Committee. T. K. Rose. Aims to sum up the work of the Committee and to bring forward the portions of the researches which now appear most valuable. Serial. 1st part. 2200 w. Engr, Lond—Feb. 19, 1904.

Appendix IV. to Sixth Report of the Alloys Research Committee. Dr. William Campbell. A summary of various papers by Sir William Roberts-Austen on the effects of strain and of annealing in aluminum, antimony, bismuth, cadmium, copper, lead, silver, tin and zinc. 8000 w. Ills. Trans Am Soc of Mech Engrs. No. 041—June, 1904.

Seventh Report to the Alloys Research Committee· On the Properties of a Series of Iron-Nickel-Manganese-Carbon Alloys. Dr. H. C. H. Carpenter, R. A. Hadfield, and Percy Longmuir. An account of the investigations made and results obtained. Ills. 22000 w. Inst Mech Engrs—Nov. 17, 1905.

Iron-Nickel-Manganese-Carbon Alloys. Abstract of the seventh report to the Alloys Research Committee on the properties of these alloys, by Dr. H. C. H. Carpenter, R. A. Hadfield and Percy Longmuir. 2500 w. Engr, Lond—Nov. 24, 1905.
See also **STEEL METALLURGY**—Heat Treatment.

Segregation.—See **STEEL.**

Solidification.—Change of Structure in the Solid State. W. Campbell. Gives a short account of the changes which occur during and after solidification in the alloys of copper and tin, iron and copper, steel and other alloys, with remarks on the importance of studying their effects. Ills. 5,000 w. Jour Fr Inst—Sept., 1904.

Solutions.—Alloys as Solutions. John Alexander Matthews. Historical review of metallurgy and the recent advances in alloys research, noting the general propertis of metals, pointing out the similarities between ordinary solutions and alloys. Serial. 1st part. 7200 w. Eng & Min Jour—Dec. 21, 1901.

Strain Effect.—See Research Committee.

Structure.—Upon the Structure of Metals and Binary Alloys. William Campbell. Discusses methods of obtaining a knowledge of the structure, the crystalline structure, the effects of strain and the effect of heat treatment. Ill. Serial. 1st part. 2900 w. Jour Fr Inst—July, 1902.
See also Constitution; **METALLOGRAPHY.**

Superheated Steam Effect.—Effect of Superheated Steam Upon the Tensile Strength of Alloys. J. L. Hall. An account of experimental investigations, describing methods employed and giving results obtained with two alloys of copper. Ill. 1400 w. Metallographist—Jan., 1903.

Tin-Copper.—See **COPPER ALLOY**—Tin.

Weight.—Obtaining the Approximate Weight of Alloys Before Making. Walter J. May. An explanation of a simple method. 1500 w. Prac Engr—June 14, 1901.

Zinc.—See **ALUMINUM ALLOY; ZINC**—Alloy.

ALTERNATING CURRENT.

See **ELECTRIC CURRENT, ALTERNATING.**

ALTERNATING-CURRENT CURVES.

See **ELECTRIC CURRENT, ALTERNATING**—Wave; **ELECTRIC INSTRUMENT.**

ALTERNATING-CURRENT MACHINERY.

See **DYNAMOTOR; ELECTRIC GENERATOR, ALTERNATING ELECTRIC MACHINERY; ELECTRIC MOTOR; MOTOR GENERATOR; ROTARY CONVERTOR.**

ALTERNATOR.

See **ELECTRIC GENERATOR, ALTERNATING.**

ALUMINA.

See also **BAUXITE; ALUMINIUM**—Bauxite.

A Method for the Direct Determination of Alumina. Charles E. Rueger. Gives comments on methods in general use and recent facts concerning their accuracy, and describes method used by the writer and the results. 2200 w. Eng & Min Jour—March 3, 1904.

ALUMINOTHERMY.

The Process of Aluminothermy (L'Industria Allumino-Termica). Giorgio Levy. An illustrated account of the working of the Goldschmidt process for welding metals by the heat produced by the combustion of aluminum. 2500 w. L'Elettricita—Dec. 15, 1900.

Aluminothermy (L'Aluminothermie). L. Guillet. A discussion of the application of the Goldschmidt process of combustion of aluminum for the reduction of metals to the pure state. 3000 w. Génie Civil—Oct. 20, 1900.

The Metallurgical Uses of Aluminum. From the "Revue Industrielle." Illustrates and describes some of the applications of the properties of aluminum as utilized in the Goldschmidt process. 4000 w. Sci Am Sup—Jan. 5, 1901.

Recent applications of the Goldschmidt Process (Neueste Anwendungen des Goldschmidt'schen Verfahrens). Dr. Hans Goldschmidt. Describing the use of the method of producing high temperatures by the combustion of aluminum, to welding, burning castings, and to the production of chromium and manganese. 5000 w. Stahl u Eisen—June 1, 1901.

The Welding of Defective or Worn Pieces (Ausschweissen Schadhafter oder Abgenutzter Werkstücke). Dr. H. Goldschmidt. A description of the Goldschmidt process of aluminothermy for welding new journals or rolls, or making other repairs. 1000 w. Stahl und Eisen—Jan. 1, 1901.

Aluminothermy (Die Aluminothermie). Dr. H. Goldschmidt. A review of the progress which has been made in the utilisation of the heat of combustion of aluminum in the industrial arts. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 1, 1902.

Aluminothermics. Dr. H. Goldschmidt. Chiefly considers the practical applications. Supplementary to an article by Dr. G. P. Scholl, in Jan. issue. Ill. 4500 w. Electro-Chem Ind—Nov., 1903.

Aluminothermics and Rail Welding. Dr Hans Goldschmidt. Abstract of a lecture before Columbia Univ. Chem. Soc. Describes the process of thermit welding, giving report of tests made on the strength of thermit joints. Ill. 1800 w. St Ry Jour—Nov. 14, 1903.

Goldschmidt's System of Alumino-Thermics. Report of the Committee on Science and the Arts on the invention of Dr. Hans Goldschmidt. Briefly explains the methods of thermit-welding and the applications, recommending the award of the Elliott-Cresson Medal. 1200 w. Jour Fr Inst—Sept., 1905.

Alumino-Thermics, or the Production of High Temperatures by Burning Aluminum. E. Stütz. An explanation of some of Dr. Hans Goldschmidt's remarkable discoveries in the creation of high temperatures by means of aluminum, and the applications made. 4800 w. Jour Fr Inst—April, 1904.

Aluminothermics. E. Stütz. Summary of a lecture before the Civ. Engrs. Club of Cleveland. Describes a few instances of the use of burning aluminum for the production of high temperatures. Ills. 1000 w. Jour Assn of Engng Socs—May, 1905.

Aluminothermics and Some of Its Applications. An illustrated description of the thermit welding process and some of its applications as given in a lecture by Dr. Goldschmidt before the Columbia Univ. Chem. Soc. 1700 w. Am Elect'n—Dec., 1903.

Metals as Fuel. Sir W. Roberts-Austen. Abstract of a discourse delivered at the Royal Inst. Shows that metals may be burnt for the sake of heat and light they produce. Ill. 5200 w. Nature—Aug. 8, 1901.

Aluminum as a Reducing and a Heat-Producing Agent. H. O. Hofman. Reviews the commercial application of aluminum as a reducing agent, describing the processes. 4000 w. Tech Qr—June, 1902.

Aluminum as a Reducing and Heat Producing Agent. H. O. Hofman. Discusses the action of aluminum as a reducing agent, giving a review of the early applications, and also the more recent, especially of the Goldschmidt process. 4000 w. Am Mfr—Sept. 25, 1902.

The Goldschmidt Aluminothermic Process and Its Applications (Das Goldschmidt'sche Aluminothermische Verfahren zur Erzeugung Hoher Temperaturen und seine Technischen Anwendungen). An illustrated account of applications of the thermite process in which high temperatures are evolved by the combustion of aluminum, to welding and mending. 1500 w. Glasers Annalen—June 15, 1902.

The Applications of Aluminothermy (L'Alumino-thermie et ses Applications). H. Bertin. A general account of the Goldschmidt process for producing high temperatures by the combustion of aluminum, and a discussion of its practical applications. 7000 w. Mem Soc Ing Civ de France—Aug., 1902.

Aluminum as a Reducing Agent in Metallurgy. George P. Scholl. Illustrated description of the Goldschmidt process, its theory and its applications. 3000 w. Electro-Chem Ind—Jan., 1903.

The Thermit Process. Frank C. Perkins. Illustrates and describes the process of repairing castings and welding with thermit, giving an account of a recent demonstration in Brooklyn, and of marine repairs abroad, etc. 3500 w. Mach, N Y—March, 1903.

Goldschmidt Method of Metallurgy and High Temperature Production by Means of Thermite. B. Palmer Caldwell. An explanation of thermite and its action. 2000 w. Jour Assn of Engng Socs—Aug., 1903.

The Aluminothermic Processes (Les Procédés Aluminothermiques). E. Dieudonné. Describing the practical applications of the Goldschmidt process to the welding of rails and similar operations. 2000 w. Revue Technique—Oct. 25, 1903.

Aluminothermy (L'Aluminothermie). C. Matignon. A description of the theory and practical applications of the Goldschmidt process of obtaining high temperatures by the combustion of metallic aluminum. 8000 w. Rev Gen des Sciences—Nov. 15, 1903.

Mechanical and Metallurgical Applications of Aluminothermics. E. Guarini. An illustrated account of the Goldschimdt process, with numerous examples of its practical applications to rail welding, and repairing of broken parts. 2000 w. Engineering Magazine—Jan., 1904.

Thermit: Its Application to Metallurgical Engineering. C. V. Boys. Calls attention to some peculiar properties of aluminum, shared also to some extent by magnesium, and gives the history and development of thermit. General discussion. 8800 w. Jour Soc of Arts—Feb. 12, 1904.

The Production of Pure Metals and Metal Alloys by Means of Thermite. Dr. Alfred Gradenwitz. An explanation of the alumino-thermic manufacture of metals and alloys. 1200 w. Min Rept—May 19, 1904.

Industrial Uses of Thermite. Notes, with illustrations, referring to rail welding, mending machinery, etc. 1400 w. U S Cons Repts—July, 1904.

Aluminothermics. An illustrated article describing what thermit is, the applications made of it, and the things to be observed to secure success. 1600 w. Foundry—Feb.., 1905.

America.—The Thermit Process in American Practice. Ernest Stütz. Read at the meeting of the Am. Soc. for Test. Materials. Some Applications and the methods are explained. 2300 w. Ry & Engng Rev—July 22, 1905.

Thermit Practice in America. E. Stütz. An account of the progress made within the past eighteen months, in the introduction in the United States of the Thermit process as applied in various engineering and mechanical arts. Ills. 5000 w. Jour Fr Inst—Oct., 1905.

"Apache."—See Stern Frame.

Castings.—The Use of Thermite for the Production of Sound Castings and Forgings (Herstellung von Poren- und Lunkenfreiem Grauguss, Stahlguss, und Schmiedestücken durch Anwendung von Thermit). W. Mathesius. Describing the methods of using a mixture of aluminum and iron oxide for effecting complete fusion and the production of steel and iron castings without blow holes. 2500 w. Stahl u Eisen—Aug. 15, 1903.

Manufacture of Sound Castings by Means of Thermit. J. B. Nau. Reviews statements made by W. Mathesius, in the Aug. 15 issue of "Stahl und Eisen," with which the writer fails to agree. 3300 w. Ir Age—Sept. 10, 1903.

Mending a Casting with Thermit. Patrick Redington. Facts from the writer's experience. 1000 w. Foundry—April, 1905.

Locomotive Frames.—Welding Locomotive Frames with Thermit. J. A. B. Gibson. Illustrated description of this method of welding as applied at the Boulton shops of the Richmond, Fredericksburg & Potomac R. R. 700 w. Am Engr & R R Jour—Sept., 1905.

1903.—See ELECTRO-METALLURGY.

Pure Metals.—The Production of Pure Metals Free from Carbon by the Alumino-thermic method. Hans Goldschmidt. Information on the production of pure metals by this method, and on the uses of such metals in metallurgy. 2000 w. Elec-Chem Ind—April, 1904.

1905.

Railway Shop.—The Use of Thermit in a Railroad Shop. Jas. F. Webb. Read before the Am. Found. Assn. Gives the writer's experiences in making repairs with thermit. Ills. 1200 w. Foundry—July, 1905.

Rail Welding.—Automatic Apparatus for Welding Rails by Aluminothermy (Aluminothermisches Schweissverfahren mit Hülfe Eines Automatisch Wirkenden Abstichs). Dr. H. Goldschmidt. Describing the latest appliances for welding rail joints by the heat produced by the combustion of aluminum. 2500 w. Stahl u Eisen—Nov. 1, 1901.

Rail Welding (Schienenschweissungen). Karl Beyer. A discussion of rail welding, and a table of results of experince with the Goldschmidt aluminothermic process on German and Danish street railways. 1400 w. Schweiz Bauzeitung—April 19, 1902.

Thermit Welding for Tram Rails. C. E. Masterman. Describes the thermit process and how it is carried out in practice. Ill. 1900 w. Tram & Ry Wld—Nov. 13, 1902.

Thermit Rail-Welding at Hartford, Conn. An illustrated account of results secured with the Goldschmidt thermit rail-welding process. 2200 w. St Ry Jour—Jan. 28, 1905.

Thermit Rail Joints. George E. Pellissier. Describes various devices used to join rails and their degree of success, discussing both the mechanical and electrical aspects, and reviews the history of the continuous rail and the methods applied. Especially describes the method of thermit welding, or the Goldschmidt aluminothermic process. 6000 w. Jour Worcester Poly Inst—May, 1905.

Rudder Post.—Welding in Place the Broken Rudder post of a 9000-Ton Screw Steamer. Robert Grimshaw. Brief illustrated description of the welding in place by use of "thermit." 500 w. Am Mach—April 9, 1903.

Stern Frame.—Welding Stern Frame of "Apache." Gives details and illustrations of the welding of the break on the shoe of this steamer by the use of thermit. 1000 w. Marine Rev—Sept. 14, 1905.

Interesting Repair Work on a German Steamship. Dr. Alfred Gradenwitz. Illustrates and describes repair work on the aluminothermic process on the sternpost of the "Frederick der Grosse." 600 w. Sci Am—Oct. 21, 1905.

ALUMINUM.

See also ALLOY; ALUMINUM ALLOY.

The Prospects of the Aluminum Industry. F. H. Leeds. Reviews the position of the aluminum trade, the method of winning it and the uses to which it is put, and how the industry is likely to develop. 3200 w. Elec Rev, Lond—Jan. 11, 1901.

The Progress of Aluminum. The first of a series of articles on the headway made by this metal during the last year. Serial 1st part. 2200 w. Engr, Lond—March 22, 1901.

The Methods and Results of the Study of Aluminum and Its Alloys (Methoden und Resultate der Untersuchung des Aluminums und Seiner Abkömmlinge). Abstract of an address of Prof. Tetmaier before the Association for Testing Materials at Zurich. 2000 w. Stahl und Eisen—Aug. 1, 1901.

The Commercial Importance of Aluminium. Ernest Wilson. Read before the British Assn. Deals with the progress in manufacture, alloys, uses, etc. 3500 w. Engng—Sept. 27, 1901.

Aluminium. Ernest Wilson. On the increase in the output, the progress in manufacture; showing how rapidly the electrolytic process has developed, alloys, as a conductor of electricity, uses, etc. Also discussion. 9000 w. Jour Soc of Arts—Dec. 13, 1901.

Aluminum. Notes on Its Production, Properties and Use. W. Murray Morrison. Abstract of a paper read before the Glasgow Sec. of the Inst. of Elec. Engrs. Considers the price, the reduction of the metal, leading properties, alloys, etc. 1800 w. Elec Engr Lond—Dec. 20, 1901.

Aluminum Properties and Reactions. From the French of M. J. Cavalier. A review of recent researches and their interesting results. 2500 w. Am Mfr—April 17, 1902.

Aluminum. The first of a series of articles on its history and metallurgy. Serial. 1st part. 1800 w. Aust Min Stand—July 24, 1902.

Process for Extracting Aluminum. Describes the process and gives information regarding the production, values, consumption, etc. 1200 w. Am Mfr—July 31, 1902.

The Present Position of the Aluminum Industry. John B. C. Kershaw. The present article reviews the production and price. Serial. 1st part. 1600 w. Elec Rev, Lond—March 20, 1903.

America, 1902.—Production of Aluminum in 1902. Joseph Struthers. From Mineral Resources of the United States, Calendar year 1902. Information relating to production, prices, imports, etc. 1800 w. Ir Trd Rev—June 18, 1903.

Anodes.—See **ELECTRODE—Aluminum Anodes.**

Automobile Bodies.—See **AUTOMOBILE—Aluminum Bodies.**

Bauxite.—Aluminum and Bauxite. Joseph Pratt Hyde. On the sources and uses of aluminum. 2000 w. Am Mfr—Oct. 31, 1901.

Aluminum and Bauxite. Charles C. Schnatterbeck. Extract from Mineral Resources of U. S. Geol. Surv. Information concerning the aluminum industry, the prices, chief alloys, uses, etc. Also the output of bauxite and its value. 2600 w. Min Wld—Oct. 14, 1905.

See also BAUXITE.

Castings.—Making Castings in Aluminum. Walter J. May. Calls attention to points that are of importance to ensure successful work. 1200 w. Prac Engr—July 15, 1904.

Makings Castings in Aluminum. Briefly considers points which need attention to insure successful work. 900 w. Sci Am Sup—Dec. 24, 1904.

Cored Work in Aluminum Casting. Walter J. May. Suggestions for the casting of aluminum and its alloys. Ills. 900 w. Prac. Engr—July 14, 1905.

Casting, Cores.—Cores for Aluminum Castings. Walter J. May. Reports satisfactory results with cores made of asbestic coated with steatite. 700 w. Prac Engr—Oct. 30, 1903.

Cell.—See **ELECTRIC-CURRENT RECTIFIER.**

Conductivity.—See **ELECTRIC CONDUCTOR.**

Corrosion.—The Corrosion of Aluminium and Its Prevention. William Roy Mott. A report of experimental investigations. 700 w. Elec Chem Ind—April, 1904.

Electric Conductivity.—See **ELECTRIC CONDUCTIVITY—Aluminum.**

Electric Conductor.—See **ELECTRIC CONDUCTOR—Aluminum.**

Electric Welding.—See **Welding.**

Electro-Deposition.—See **Electrolytic; Metallurgy; ELECTRODE—Aluminum Anodes.**

Electrolytic.—The Production of Aluminum (Ueber Aluminumdarstellung). Dr. F. Haber. An examination of the electrolytic reduction of aluminum from fused salts by the direct action of the electric arc in a carbon crucible. 4500 w. Zeitschr f Elektrochemie—Aug. 21, 1902.

The Electrolytic Production of Aluminum (Versuche über Aluminiumdarstellung). F. Haber and R. Geipert. An illustrated account of elaborate laboratory experiments to determine the processes in general use with scientific exactness. 2 parts. 7000 w. Zeitschr f Elektrochemie—Jan. 2, 9, 1902.

Gin Process.—Aluminum: A New Process of M. Gustave Gin. P. McN. Bennie. Concerning an aluminum process recently patented. 1500 w. Elec Chem Ind—April, 1904.

India.—Note on a Suggested New Source of Aluminum. Buena Pool. On the utilization of the laterite deposits of India, in which the aluminum is present in the hydrated form. 1200 w. Elec Engr, Lond—Oct. 28, 1904.

Laboratory Observations.—Some Laboratory Observations on Aluminum. Prof. C. F. Burgess and Carl Hambuechen. An article illustrated by diagrams, giving new information on soldering aluminum, plating on aluminum, the use of aluminum as electrodes, etc. 4000 w. Electro-Chem Ind—Jan., 1903.

Lithography.—Aluminography. Translated from the German of Weilandt, in "Der Stein der Weisen." Describes its use as a substitute for lithographic stone, and the production of printable designs. 5500 w. Sci Am Sup—March 7, 1903.

Magnetic Influence.—See **ALLOY; MAGNETISM—Aluminum.**

Metallurgy.—Improvement in the Metallurgy of Aluminum. Clinton Paul Townsend. Concerning the electric furnace methods for the purification of bauxite, which will probably reduce the cost of aluminum of certain grades. 1200 w. Elec Wld & Engr—July 6, 1901.

The Present Metallurgy of Aluminum. Joseph W. Richards. Historical notes on the work done by Hall and Heroult, discussing the scientific principles of their process. Ill. 4000 w. Electro-Chem Ind—Jan., 1903.

See also Electrolytic; Working.

Paris Exposition.—Aluminum at the Paris Exposition (1900). Joseph W. Richards. Remarks on the present position of the metal, and description of the exhibits. 2500 w. Jour Fr Inst—Feb., 1901.

Patterns.—See **PATTERN—Aluminum.**

Plating.—See **Laboratory Observations.**

Soldering.—See **Laboratory Observations.**

Steel.—See **ALUMINUM ALLOY.**

Welding.—Some Notes on the Welding of Aluminum. Sherard Cowper-Coles. Read before the Faraday Soc. An illustrated article reviewing various processes and apparatus, and describing the writer's process and the tests made. 1600 w. Elec Chem & Met—Nov., 1903.

Notes on Aluminum Welding. Sherard Cowper-Coles. Discussion of this paper which was read before the Faraday Society, Feb. 2, 1904. Ills. 2000 w. Elec Chem & Met—Feb., 1904.

A New English Aluminum Welding Machine. Illustrated description of the machine and process designed by Sherard Cowper-Coles. 1500 w. Sci Am—April 23, 1904.

Working.—Working Aluminum. H. Robinson. Considers the difficulties encountered, and how to avoid trouble. 900 w. Am Mach—Feb. 5, 1903.

Working Aluminum. Joseph V. Woodworth. Suggestions for the proper working of this metal. Ill. 2200 w. Am Mach—March 26, 1903.

See also **Laboratory Observations.**

ALUMINUM ALLOY.

See also **ALLOY; ALUMINUM.**

Contributions to the Study of the Alloys of Aluminum (Contributions à l'Etude des Alliages d'Aluminum). Léon Guillet. Discussing alloys with tungsten, molybdenum, copper, tin, titanium, iron, manganese, nickel, etc., and their chemical and physical properties. 15000 w. Bull Soc d'Encour—Aug. 31, 1902.

Some Aluminum Alloys and Their Uses. Walter J. May. Directions for the making of aluminum alloys with strengths equal to cast iron or steel, and at a cost no more expensive than brass. 600 w. Prac Engr—June 5, 1903.

Alloys of Aluminum. From a paper by Joseph W. Richards before the Am. Soc. of Test. Materials, on the qualities of the different alloys and their preparation. 600 w. Am Mach—Nov. 12, 1903.

Copper.—The Aluminum Bronzes. From the "Aluminum World." Some points on the making of this material and the uses for which it is adapted. 1700 w. Foundry—Dec., 1900.

A study of Copper-Aluminum Alloys (Contribution à la l'Etude des Alliages Cuivre-Aluminum). L. Guillet. A comparison of the theoretical formation of these alloys with the results attained in practice. 1200 w. Comptes Rendus—Oct. 28, 1901.

Aluminum Bronze for Small Work. Walter J. May. Suggestions for making alloys that will give good results. 1000 w. Prac Engr—Jan. 1, 1904.

A Special Constituent Obtained by Tempering Aluminum Bronze (Constituant Spécial Obtenu dans la trempe d'un Bronze d'Aluminum). Pierre Breuil. Describing an especial crystalline form occurring in alloys of copper and aluminum when tempered at 650 to 750 degrees C. 1000 w. Comptes Rendus—Feb. 27, 1905.

A Study of Copper-Aluminum Alloys (Etude Théorique et Industrielle des Alliages de Cuivre et d'Aluminium). L. Guillet. With diagrams and microphotographs showing the properties of the various copper-aluminum alloys, indicating those of industrial value. 5000 w. Revue de Métallurgie—Aug., 1905.

The Constitution of the Copper-Aluminum Alloys (Constitution des Alliages Cuivre-Aluminium). Leon Guillet. An examination of the various solid solutions existing in the industrial alloys of copper and aluminum, and a discussion of their properties. 1200 w. Comptes Rendus—September 4, 1905.

Copper-Zinc.—See **ALLOY—"Aluminum Silver."**

Electric Conductivity.—See **ELECTRIC CONDUCTIVITY.**

Iron and Manganese.—Alloys of Aluminum with Iron and with Manganese (Contribution à l'Etude des Alliages Aluminum-Fer et Aluminum-Manganèse). Leon Guillet. A record of chemical experiments. 600 w. Comptes Rendus—Jan. 27, 1902.

Light.—The Light Aluminum Alloys. Joseph W. Richards. Read before the Am. Soc. for Test. Materials. States the qualities of pure aluminum, and gives information in alloying with zinc, copper, nickel, magnesium, titanium, tungsten, chromium, manganese and silver. 5500 w. Ir Age—Aug. 13, 1903.

Light Aluminum Alloys. Editorial review of a paper by Joseph W. Richards, read before the Am. Soc. for Test. Mat., with general discussion of the work of other investigators. 1600 w. Engng—Nov. 20, 1903.

Magnesium.—See **ALLOY—Magnalium.**

Steels.—Aluminum Steels and Alloys. Gives results of various investigators of these materials. 1000 w. Engng—Sept. 1, 1905.

Zinc.—Aluminum-Zinc Alloys. Joseph W. Richards. Gives results of experiments made with these alloys and the proportions that give valuable results. 1000 w. Eng & Min Jour—Nov. 30, 1901.

ALUMINUM BRONZE.

See **ALUMINUM ALLOY—Copper.**

ALUMINUM SILVER.

See **ALLOY—Aluminum Silver.**

AMALGAM.

Amalgams: Their Composition. Properties. Preparation and Uses. From the French of Leon de Mortillet. Discusses the general properties of amalgams and applications made of them. 3500 w. Sci Am Sup—Dec. 23, 1905.

AMALGAMATION.

See also **GOLD METALLURGY; GOLD MILLING.**

Cyanide Process.—See **CYANIDE PROCESS.**

Transvaal.—See **GOLD MILLING.**

AMBER.

Santo Domingo.—Amber in Santo Domingo. Clarence C. Sample. Describes the island and the amber-bearing section, the rocks, and the varieties of amber. 1600 w. Eng & Min Jour—Aug. 12, 1905.

AMERICA.

See **UNITED STATES**; and under specific headings.

AMERICAN COMPETITION.

See **COMMERCE; ENGINEERING COMPETITION.**

AMMETER.

See **ELECTRIC METER.**

AMMONIA.

See also **COKE MANUFACTURE; COKE OVEN; GAS MANUFACTURE; GAS WORKS—Ammonia.**

Coke Ovens.—See **COKE MANUFACTURE; COKE OVEN.**

Cyanide Process—See **CYANIDE PROCESS—Cupriferous Ores.**

Gas Liquor.—The use of Lime in Liquor Distillation. E. Blum. The substance of a paper read before the Mid-Rhenish Assn of Gas & Water Engrs. Illustrates and describes the method and apparatus for preparing concentrated ammoniacal liquor. 1700 w. Jour of Gas Lgt—Jan. 7, 1902.

Gas Liquor Analysis.—Analysis of Leeds Gas Liquor. Arthur W. Cooke, in the "Journal of the Society of Chemical Industry." Explains methods of analysis. 1800 w. Gas Wld—April 20, 1901.

Gas Manufacture.—A Few Notes on Ammonia. F. E. Sheriff. Read before the Michigan Gas Assn. Considers the recovery from the gases obtained by the carbonization of bituminous coal. 2000 w. Am Gas Lgt Jour—Feb. 22, 1904.

Manure.—Ammoniacal Liquor as a manure. G. Abbey, in the "Journal of Horticulture." Its value and how to use it. 1300 w. Gas Engs' Mag—Nov. 10, 1900.

Sulphate Manufacture.—Manufacture of Sulphate of Ammonia. R. T. Stoddard. Read before the Manchester and District Junior Gas Assn. Describes, in a general way, the apparatus required and method of working. 4800 w. Jour Gas Lgt.—Oct. 7, 1902.

Sulphate of Ammonia Making by a New Process. J. Ballantyne. Read before the Inst of Gas Engrs. Gives interesting details of a plant at Hamilton, worked by vacuum instead of by pressure. Ill. Discussion. 5200 w. Gas Wld—June 13, 1903.

The Manufacture of Sulphate of Ammonia. George Keillor. Read before the N. British Assn. of Gas Mgrs. Discusses whether it is profitable to manufacture sulphate of ammonia in small gas-works, deciding in the affirmative and giving suggestions. 8500 w. Gas Wld—Aug. 1, 1903.

Valuation.—The Valuation of Gas Liquor. F. J. R. Carulla. Abstract of a paper read before the Soc. of Chem. Ind., England, giving a description of the method of testing ammoniacal liquor. 1800 w. Jour Gas Lgt—Dec. 4, 1900.

AMMONIA COMPRESSOR.

Cylinder Temperatures.—See **AIR COMPRESSOR.**

AMMONIA CONDENSER.

See **REFRIGERATION—Ammonia Condenser.**

AMMUNITION.

See **AMMUNITION WORKS; ARSENAL; ORDNANCE; SHELL.**

Cartridge Case.—See **AMMUNITION WORKS; HYDRAULIC PRESS.**

AMMUNITION WORKS.

See also **ARSENAL; ORDNANCE.**

Kynoch.—The Witton and Holford Works of Kynoch, Limited. Illustrated description of works for the manufacture of cartridges and ammunition, and the trades bearing upon this industry. 5000 w. Engng—May 20, 1904.

Trubia, Spain.—The Manufacture of Cartridge-Cases for Quick-Firing Guns. Col. Leandro Cubillo and Archibald P. Head. Illustrates and describes the new plant at the Royal Spanish Arsenal at Trubia, Spain, for the manufacture of brass cartridge-cases, stating the advantages of metal cases, and giving some of the mechanical properties which show brass to be best suited for this service. 9000 w. Inst of Mech Engrs—Oct. 20, 1905.

AMPHITHEATRE.

Concrete.—See **THEATRE—California University.**

ANALYSIS.

See also **ASSAYING; CHEMISTRY;** and under specific heads.

Combustion Apparatus.—See **COMBUSTION APPARATUS.**

Gravimetric.—The Sulphocyanides of Copper and Silver in Gravimetric Analysis. R. G. Van Name. Describes experimental investigations. 2400 w. Am Jour of Sci—Dec., 1900.

Qualitative.—A System of Qualitative Analysis Including Nearly All the Metallic Elements. Arthur A. Noyes. The aim of this investigation is to work out in detail a universally applicable scheme which shall include as nearly as practicable all the metallic elements, and make possible their detection even when present in quantity as small as one or two milligrams. Serial. 1st Part. Tech Quar—June, 1903.

Quantitative.—Notes on Quantitative Analysis for Mining Engineers. Edmund H. Miller. Notes representing the methods as at present taught, and showing what is required of mining students at Columbia University. 14500 w. Sch of Mines Qr—Nov., 1903.

Standardisation.—Analysis by Rote. Discussing the tendency of carrying mechanical standardisation too far; or the danger of standardising methods of testing, and of chemical analysis, as well as materials. 2000 w. Engr, Lond—Oct. 24, 1902.

ANCHOR.

Anchors. Comdr. A. S. Thompson. Abstract of a paper read before the London Chamber of Commerce. Reviews the history of anchors, the improvements made, etc., giving interesting information. 2000 w. Naut Gaz—Feb. 6, 1902.

Electric Wiring Poles.—See **POLE—Anchor.**

ANCHOR ICE.

See **ICE—Anchor.**

ANEMOMETER.

See also **AIR FLOW—Measuring Instruments.**

Balloon.—See **AERONAUTICS—Anemometric Balloon.**

Electric.—Electricity Anemometry in the Sea Coast Artillery Service. M. C. Sullivan. Describes the methods of determining wind velocities. 700 w. Elec Rev, N. Y.—March 19, 1904.

Electrically Registering. — Electrically-Registering Wind Vane and Anemometer for School Use. H. W. Harmon. Illustrated description of devices for weather work used in teaching physics. 1600 w. Sci Am Sup—May 14, 1904.

Mine Workings—Recording Devices for Measuring Velocity and Volume (Registrierende Geschwindigkeits-und Volumenmessung). E. Stach. Illustrating and describing anemometers for obtaining records of the flow of air in mine workings for successive weeks. 3500 w. Glückauf—Aug. 12, 1905.

See also **Testing; MINE VENTILATION.**

Sound Waves.—On a Miniature Anemometer for Stationary Sound Waves. Bergen Davis. Describes experiments undertaken to determine the relation between the amplitude of vibration and the rate of rotation, and also the influence of the size of the anemometer cups. 1000 w. Am Jour of Sci—Feb., 1902.

Testing.—The Determination of Air Currents in Testing Anemometers (Ueber Mitwindbestimmung bei Anemometer-Prüfungen). E. Stach. An examination of the method of testing anemometers by subjecting them to known air currents; showing the importance of correcting for the motion of the air in the room. 1000 w. Glükauf—March 19, 1904.

Testing Station.—The Anemometer Testing Station of the Westphalian Mining Bureau at Bochum (Die Anemometer-Prüfungsstation der Westfälischen Berggewerkschaftskasse in Bochum). E. Stach. With details of the construction and use of the whirling apparatus for testing the anemometers used in measuring ventilating current in mines. 2000 w. 1 plate. Glückauf—Nov. 22, 1902.

The Anemometer Testing Station of the Westphalian Mining Association at Bochum (Mitteilungen aus der Anemometer-Prüfungsstation der Westfälischen Berggewerkschaftkasse in Bochum). E. Stach. With illustrations of a variety of anemometers used in measuring air currents in mines and the methods used in calibrating them. 4000 w. Glückauf—Nov. 28, 1903.

ANGLEMETER.

See **GEAR—Anglemeter; SPEED VARIATION.**

ANKYLOSTOMIASIS.

Ankylostomiasis and Measures Taken to Combat It (Die Wurmkrankheit und die zu Ihrer Bekämpfung Getroffenen Massnahmen). Dr. Weidtman. A paper read before a Dortmund mining society, giving a description of this worm disease, which is prevalent among German miners, and of the measures taken to prevent it and stamp it out. 5500 w. Glückauf—June 6, 1903.

Ankylostomiasis. The first installment of a series of illustrated articles on the worm disease infecting mines of continental Europe. Serial. 1st part. 3200 w. Col Guard—Nov. 6, 1903.

Ankylostomiasis: A Forewarning. Walter C. C. Pakes. An interesting paper on this disease, which especially attacks miners, with discussion. 7500 w. Jour of Chem, Met, & Min Soc of S. Africa—Jan., 1904.

Discussion upon the Hook Worm Diseases (Verhandlungen über die Wurmkranheit). A report of the discussion in the Reichstag upon the hook worm disease in the German mines, from the official stenographic notes. Special supplement. 50000 w. Glückauf, Jan. 23, 1904.

Ankylostomiasis. Report of a recent debate in the German Reichstag on the hook worm disease of miners. Serial. 1st part. 3800 w. Col. Guard—Jan. 29, 1904.

Ankylostomiasis: A Critical Study. The present number is largely introductory; stating the serious nature of the disease, and reviewing the history of the Westphalian epidemic. Serial. 1st part. 2000 w. Col Guard—Oct. 20, 1905.

Belgium.—Ankylostomiasis in the Coal Mines of the Liége District, Belgium (Die Wurmkrankheit in den Kohlenbergwerken des Lütticher Reviers). Dr. Löbker, Hrn. Bingel, Lüthgen and G. A. Meyer. A report of a German commission sent to investigate the worm disease among the Belgian coal miners. 3000 w. Glückauf—June 27, 1903.

Germany.—The Extension of Ankylostomiasis in

German Coal Mines. A statement of the gravity of this disease among the underground workers, and what is being done to combat it. 1500 w. Col Guard—June 5, 1903.

Westphalia.—Ankylostomiasis in Westphalian Collieries. J. S. Haldane. From a report to the Sec. of State for the Home Dept. Considers the source of the infection, the conditions affecting the spread, measures taken to combat the disease, the results, prevention, etc. 6400 w. Ir & Coal Trds Rev—Nov. 13, 1903.

ANNEALING.

Annealing. E. R. Markham. Suggestions for properly heating and cooling to obtain success. 1000 w. Am Mach—Nov. 5, 1903.

Furnace.—See **POWDERED COAL.**

Iron Analysis.—See **IRON ANALYSIS—Annealing.**

Powdered Coal.—See **POWDERED COAL.**

Steel—See **POWDERED COAL; STEEL—Annealing Effect; STEEL CASTING.**

Temperature Gauge.—See **PYROMETRY—Morse Thermo Gauge.**

ANODE.

See **ELECTRIC CELL; ELECTRO-CHEMISTRY; ELECTRODE.**

ANTARCTICA.

Antarctica: A History of Antarctic Discovery. Edwin Swift Balch. A review of what has been accomplished in antarctic exploration. Serial. 1st part. 6200 w. Jour Fr Inst—April, 1901.

ANTIMONY.

The Mineralogy, Metallurgy and Commercial Application. Dr. J. Ohly. On the value and uses of antimony ore. 2000 w. Min Rept—Oct. 1, 1903.

Alloys.—See **ALLOY—Antimony and Tellurium.**

Electrolytic Production.—The Electrolytic Production of Antimony. Abstract of an article by J. Izart, in the "Industrie Eelectrique." A brief account of observations upon the electro-metallurgical treatment of minerals containing antimony, describing methods. 1200 w. Elect'n, Lond—April 10, 1903.

Electrolytic Process for Extracting Antimony from Its Sulphureted Ores. Translated from "La Revue des Produits Chimiques. Describes the process. 1500 w. Sci Am Sup—Nov. 14, 1903.

Nevada.—The Occurrence of Stibnite at Steamboat Springs, Nevada. Waldemar Lindgren. Believes that stibnite and pyrite were deposited by the hot waters which permeate the gravel. 1200 w. Am Inst of Min Engrs—March, 1905.

Nova Scotia.—The West Gore Antimony Deposits. W. R. Askwith. Brief description of the deposits in Nova Scotia. Ill. 1600 w. Can Min Rev—July 31, 1901.

Queensland.—See **GOLD.**

APARTMENT HOUSE.

Mechanical Plant.—See **MECHANICAL PLANT—Apartment House.**

APPRAISAL.

See **MINE VALUATION; VALUATION; WORKS MANAGEMENT.**

APPRENTICE.

See also **EDUCATION; LABOR; WORKS MANAGEMENT.**

Apprenticeship in Engineering Training. John Dewar Cormack. Read before the Engng. Con. of the Inst. of Civ. Engrs. The subject is confined to the training of youths destined for responsible positions, as employers, manufacturers, consulting engineers, etc. Also general discussion. 8000 w. Engng—June 26, 1903.

Apprenticeship in Engineering Training. Prof. John Dewar Cormack. A discussion of the best training and the conditions that should be fulfilled. 1800 w. R R Gaz—Sept. 11, 1903.

The Mechanic of the Future and His Training. E. P. Watson. A comparison of the modern manual-training methods with the older apprenticeship system, showing the necessity for experience in the commercial shop. 4000 w. Engineering Magazine—Feb., 1904.

Allis-Chalmers Co.—Apprenticeship Systems of the Allis-Chalmers Company. P. W. Gates. Describing a practical system, adjustable to widely diversified conditions. 2000 w. Engineering Magazine—April, 1904.

American.—The Apprenticeship Question. John E. Sweet. Read before the Mutual Trades Assn. of Syracuse, N. Y. Remarks on the changed conditions and the necessity of providing proper instruction for American boys who wish to become mechanics, suggesting ways. 2890 w. Am Mach—Oct. 22, 1903.

The Apprenticeship Question in America. Frank T. Carlton. Discusses briefly the sources from which skilled workers may be drawn; how they are to be trained; and what should be the proportion of apprentices to journeymen. 1600 w. Cassier's Mag—April, 1905.

Baldwin Locomotive Works.—A Systematic Plan of Apprenticeship. Describes the plan at the Baldwin Locomotive Works, with editorial comment. 2000 w. Am Engr & R R Jour—Oct., 1901.

The Apprenticeship Systems of the Baldwin Locomotive Works. S. M. Vauclain. An authoritative account of the successful apprentice systems of the great locomotive works in Philadelphia. 3000 w. Engineering Magazine—June, 1904.

Brown & Sharpe Co.—The Apprenticeship System at Brown & Sharpe's. William A. Viall. Read at meeting of Nat. Mach. Tool Bldrs. Assn. Explains the system in the shop named, with general remarks. 1800 w. Ir Age—July 2, 1903.

An Example of Modern Development of the Apprenticeship System. L. D. Burlingame. Describing the system in successful operation in the shops of the Brown & Sharpe Mfg. Co., at Providence. 3500 w. Engineering Magazine—Jan, 1904.

College Compared.—See **EDUCATION—College vs. Apprentice.**

Electrical Engineer.—Notes on What and How to Learn in an Electrical Engineering Works. G. Ralph. Calls attention to things an apprentice should look out for in the various departments. 2200 w. Elec Engr, Lond—Aug. 7, 1903.

Foundry.—The Problem of the Moulder. John G. Sadlier. The slow advancement in foundry practice is discussed and the importance of selecting the right apprentices and educating them. 1800 w. Jour Am Found Assn—June, 1901.

What Can Our Schools Do for Foundry Apprentices? P. Kreuzpointner. Discusses school training and what should be demanded of apprentices. 4800 w. Jour Am Found Assn.—Feb., 1902.

Apprentices in the Foundry. O. P. Briggs. Read before the New England Found Assn. Discusses the character and qualifications of the boy, the attitude of the foreman, methods of raising the standard, etc. 4000 w. Ir Trd Rev—June 23, 1904.

The Foundry Apprentice as Seen in One Shop. Charles H. Thomas. Read before the A. F. A. Convention. Discusses the question of apprenticeship in the foundry, and suggests ways of interesting and helping the boys. 1200 w. Foundry—Sept., 1904.

France.—Technical Training and the Apprenticeship Question (L'Enseignement Professionel et la Question de l'Apprentissage). M. Alfassa. A study of apprenticeship in France, in connection with technical instruction, giving a summary of the plan for the education of apprentices adopted in France by the Conseil Superieur du Travail. 8000 w. Bull Soc d'Encour—Nov., 1905.

Grand Trunk Ry.—Apprenticeship. Robert Patterson. A paper read before the Canadian Railway Club, describing the excellent system of training apprentices in use at the shops of the Grand Trunk Railway. 2500 w. R. R. Gaz—Oct. 2, 1903.

Hartlepool Engine Works.—Engineering Apprentices. D. B. Morison. Outlines a scheme for the advancement of apprentices to be given a trial at the Hartlepool Engine Works. Also editorial. 2400 w. Engng—Sept. 25, 1903.

Manchester, Eng.—What Manchester is Doing for Engineering Apprentices. F. Brocklehurst. An account of the work which is being done in the great electrical and mechanical trade school at Manchester. 3000 w. Engineering Magazine.—May, 1904.

Railway.—The Technical Graduate and the Machinery Department of Railroads. W. F. M. Goss. Outlines the development of the technical graduate, his training, etc., and considers some of the defects in the administration of special apprenticeship, and the remedy. General discussion. 12500 w. Pro W R Club—March 15, 1904.

Apprentice Schools on English Railways. An interesting acount of the instruction provided by English railways for apprentices. Serial. 1st part. 2500 w. Am Engr & R R Jour—May, 1904.

Railway, France.—See **EDUCATION.**

Westinghouse.—The Training of Apprentices in Engineering Works. C. E. Downton. A description of the system and methods of training apprentices in the works of the Westinghouse Electric and Manufacturing Co. 3500 w. Engineering Magazine—Dec., 1903.

AQUEDUCT.

See also **BRIDGE—Canal; BRIDGE RENEWAL—Kansas City; WATER SUPPLY; WATERWORKS.**

Avre, Paris.—See **WATERWORKS—Paris.**

Boston.—See **Weston.**

Cincinnati.—See **WATERWORKS.**

Croton, N. Y.—Repairs and Reconstruction on the Old Croton Aqueduct. Describes this aqueduct which was put into service in 1842, reviewing the repairs made at diffefent times, and those now being made to enable it to resist an external pressure of twenty pounds per square inch. 3000 w. Eng Rec—June 18, 1904.

Design.—Important Considerations in the Designing of Large Aqueducts. Extracts from Appendix III. of the report of the commission on an additional water supply for New York City, in regard to economies in construction and improvements in design of the proposed aqueduct. 2700 w. Eng Rec—May 21, 1904.

Jersey City Water Co.—See **TUNNEL—Hook Mountain.**

Lead Lining.—See **BRIDGE—Canal, Lippe River.**

Montreal.—See **WATERWORKS.**

Paris.—See **WATER SUPPLY; WATERWORKS.**

Pecos Valey.—The Pecos Valley Aqueduct. An illustrated detailed description of a perplexing piece of engineering work done in New Mexico. 1200 w. Ry Age—Oct 9, 1903.

Shrewsbury Canal.—See **CANAL.**

Staines.—See **WATERWORKS—London.**

Torresdale, Philadelphia.—The Torresdale Conduit at Philadelphia. Illustrated description of a 10 1-2-ft. aqueduct 13,815 ft. long, to discharge 300,000,000 gals. per day. 2000 w. Eng Rec—May 18, 1901.

Vyrnwy, Liverpool.—The Loss of capacity of the Vyrnwy Aqueduct, Liverpool, England. Describes the investigations which led to the discovery of a troublesome growth, and discusses means of overcoming the difficulty. 2000 w. Eng Rec—Aug. 2, 1902.

Weston, Mass.—The Weston Aqueduct of the Metropolitan Water-Works, Boston. Alfred D. Flinn. Illustrated description of aqueduct 13 1-2 miles long, with a daily capacity of 300,000,000 gals., and having a number of special features in concrete construction. 3800 w. Eng Rec—May 4, 1901.

The Weston Aqueduct of the Metropolitan Water Works for Boston and Vicinity. Details of the structure are given and information concerning the work. 500 w. Eng News—May 16, 1901.

The Weston Aqueduct of the Metropalitan Water-Works, Boston. Alfred D. Flinn. Illustrates and describes details of the construction of an aqueduct designed for a capacity of 300,000,000 gals per day, and nearly 13 1-2 miles long. Serial. 1st part. 4200 w. Eng Rec—Oct. 14, 1902.

Petrographical Notes on the Rocks of the Weston Aqueduct. C. H. Warren. Gives results of a microscopical study of some of the igneous rocks met with in the tunnels. Supplementary to paper of W. O. Crosby. 2600 w. Tech Qr—March, 1904.

Geology of the Weston Aqueduct of the Metropolitan Water Works in Southboro, Framingham, Wayland and Weston, Massachusetts. W. O. Crosby. A record of the character and structure of the hard rocks which were exposed during the construction; especially the geology of the tunnels. Ills. 7000 w. Tech Qr—March, 1904.

The Weston Aqueduct Pipe Arch Over the Sudbury River, Massachusetts. Illustrates and describes the construction of a pipe designed to span the river as a tubular arch to convey water across. 2000 w. Eng Rec—April 16, 1904.

ARBITRATION.

See **LABOR—Arbitration.**

ARC.

See **ARC LIGHT.**

ARCH.

See also **BRIDGE; BRIDGE DESIGN; CULVERT; VIADUCT.**

Aerial Circus Platform.—See **TRUSS.**

Bridge.—See **ARCH CENTER; BRIDGE—Arch; Concrete; Concrete Reinforced; BRIDGE DESIGN—Arch.**

Concrete Tests.—Weight Tests of Concrete Arches. Report of some recently conducted weight tests on various types of arches designed by Jacob Schratwieser which show remarkable results. Ill. 2200 w. Ins Engng—March, 1902.

Curvature.—The Proper Curvature for a Filled Arch. Daniel B. Luten. Discusses points in the construction and design. 2000 w. R R Gaz—Sept. 12, 1902.

Design.—Circular Arches Fixed at the Springings (Sur les Voutes en Arc de Cercle Encastrées aux Naissances). M. Ribière. A mathematical analysis, deriving formulas based upon the elastic theory. 1000 w. Comptes Rendus—Feb. 11, 1901.

Design.—The Determination of the Thrust in Masonry Arches (La Determination de la Poussée dans les Voutes en Maconnerie). M. Auric. Deducing formulas for the computation of the thrust for arches of various dimensions and loadings. 6000 w. Ann des Ponts et Chaussées—2 Trimestre, 1901.

The Theory of Arches (Beitrag zur Theorie der Gewölbe). Th. Landsberg. A mathematical discussion of the determination of the line of pressure in masonry arches. 3500 w. Zeitschr d Ver Deutscher Ing—Dec. 14, 1901.

The Design of Culverts and Other Masonry Arches (Note sur les Conditions d'Etablissement et de Stabilité des Ponts, Ponceaux et Aqueducs en Maconnerie, Murs de Soutenement). L. Lanave. An illustrated discussion of the design of masonry arches, particularly with reference to the amount of water flowing through them. Serial. 1st part. 3000 w. Rev Technique—Feb. 10, 1902.

See also **Sandstone Hinges; BRIDGE DESIGN—Arch; FRAMEWORK.**

Elastic.—The Elastic Arch (Sur la Voute Elastique). G. Poisson. A mathematical discussion of the general theory of the elastic arch subjected to a hydrostatic load. 1000 w. Comptes Rendus—Sept. 16, 1901.

A Graphical Investigation of the Elastic Circular Arch (Graphostatische Untersuchung des Elastichen Kreisbogengewölbes). Josef Schreier. An exhaustive study of the segmental arch according to the methods of graphostatics, with plate of diagrams. 4500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Feb. 6, 1903.

Floor.—See **FIREPROOF CONSTRUCTION; FLOOR—Arch.**

Framed.—See **BRIDGE DESIGN; FRAMEWORK.**

Girders.—See **BRIDGE DESIGN—Arch Girder.**

Luxemburg.—See **BRIDGE.**

Naval.—See **MUNICIPAL ART—New York Water Gate.**

Niagara.—See **BRIDGE.**

Plauen.—See **BRIDGE.**

Roof.—See **Armory. N. Y.; ROOF—Melan.**

Sandstone Hinges.—Experiments with Sandstone Blocks for the Hinge Joints of Arches (Versuche mit Sandsteinquadern zu Brückengelenken). C. Bach. Experimental researches upon the crushing of sandstone rocker-hinge blocks as used in masonry arches, with diagrams for arches of various radii. 1200 w. Zeitschr d Ver Deutscher Ing—Dec. 17, 1904.

Stone.—The Revival of the Stone Arch. Reviews the effect of using iron and steel in building construction, and the causes that are tending to a revival of the stone arch, the principal one being durability. 3000 w. Engr, Lond—June 21, 1901. See also **Sandstone; BRIDGE.**

Terra Cotta Reinforced.—See **TERRA COTTA—Reinforced.**

Test.—See **Standstone Hinges; CONCRETE REINFORCED.**

Viaur.—See **VIADUCT.**

WOODEN.

See **BRIDGE—Kintai.**

ARCH CENTER.

See also **BRIDGE ERECTION.**

Arch Centers. James W. Rollins, Jr. An illustrated discussion of methods of construction, and design, considering especially the structures described in Mr. Cheever's paper. 1500 w. Jour Assn Engng Socs—July, 1901.

Luxemburg.—The Construction of the Centers for the Luxemburg Arch Bridge. Illustrated detailed description of centers used for the main arch and for the shorter side arches. 1400 w. Eng News—March 5, 1903.

ARCH DESIGN.

Bridge.—See **BRIDGE DESIGN.**

ARCHITECT.

Building Construction.—See **BUILDING CONSTRUCTION—Engineer and Architect.**

Government Building.—See **BUILDING—Government.**

New Jersey Regulations.—The New Jersey Law Regulating Architectural Practice. The test of a law requiring all architects practicing in the State to be licensed by a State Commission. 1800 w. Eng Rec—April 26, 1902.

ARCHITECTURE.

See also **BUILDING CONSTRUCTION; IRON—Building Material;** and under specific structures and buildings.

Acoustics.—See **ACOUSTICS.**

Bridge, Manhattan.—See **BRIDGE—Manhattan.**

Ceramics.—See **CERAMICS.**

Competitions.—See **COMPETITION.**

Concrete.—See **CONCRETE.**

Factory.—Factory and Warehouse Architecture. A. K. Adler in Michigan "Technic." The present article deals with the general planning and construction. 2 parts. 2500 w. Ir Trd Rev—Aug. 13, 20, 1903.

Landscape.—See **LANDSCAPE ARCHITECTURE.**

Lead.—See **LEAD—Architecture.**

Mosaic.—See **MOSAIC.**

Railway Terminal.—See **RAILWAY TERMINAL—San Antonio, Tex...**

Sanitary.—Some Sanitary Aspects of House Construction. William Wallace. Read before the Congress of the San. Inst., at Glasgow. Discusses points in construction essential in securing pure, dry air for buildings. 2800 w. Dom Engng—Jan. 15, 1901.

Sanitary Architecture. A lecture on design, materials, buildings, workmanship and supervision at the Carpenters' Hall, London, by Mark H. Judge. 2800 w. Archt, Lond—Nov. 8, 1901.

See also **PLUMBING; SANITATION.**

Warehouse.—See **Factory.**

ARC LAMP.

See **ARC LIGHT.**

ARC LIGHT.

See also **ELECTRIC LAMP; ELECTRIC LIGHTING; LIGHTING; PHOTOMETRY; STREET LIGHTING.**

The Electric Arc. Prof. C. D. Child. An attempt to make plain the principles on which an explanation of the electric arc must be based, to consider the different views which are possible, show what facts can be explained and what questions must be answered. 2800 w. Int Elec naces and methods. 3500 w. Stahl u Eisen—Cong of St. Louis—Sept., 1904.

The Dynamics of the Electric Arc and Arc Hysteresis (Ueber die Dynamik der Lichtbogenvorgänge und über Lichtbogenhysteresis). Herm. Th. Simon. Reprint from the "Physikalische Zeitschrift," giving a comprehensive study of arc phenomena, with curves and diagrams. Serial. 2 parts. 9000 w. Elektrotech Zeitschr—Aug. 31, 1905.

Modern Arc Lamps. John Howatt. Discusses the requisites of the ideal arc lamp, and the changes and improvements during the last ten years, giving illustrated descriptions of different types. 3000 w. Am Elect'n—April, 1905.

Arc Lighting at the Beginning of the Twentieth Century. H. W. Hillman. Read before the Nat. Elec. Lgt Assn. Discusses the reasons for adopting the alternating system of street lighting at Atlanta, and the subject generally; the operation, cost and methods. Ill. 3700 w. Elec Rev, N Y—June 8, 1901.

Arc Lighting. C. M. Green. An able and interesting paper read before the Canadian Elec. Assn. Concludes that the enclosed arc is better and cheaper than the open arc; the direct constant-current-enclosed-arc system the best and most economical for plants which use large 40 to 125-cycle alternating-current generators. 4500 w. Can Engr—July 1902.

Recent Developments in Arc Lighting. George D. Shepardson. Reviews the history of arc lighting. 2100 w. Engs' Year Bk, Univ of Minn —1901.

A. E. G., Germany.—See **Flame.**

Alternating.—The Alternating Current Arc. C. H. Bedell. An illustrated article considering the behavior of the alternating arc when in a magnetic field. 700 w. Elec Wld & Engr—Sept. 13, 1902.

The Alternating-Current Arc. C. Wiler. Read explanation of phenomena observed in alternating current arcs. 1000 w. Elec. Wld & Engr—June 21, 1902.

The Alternating Current Arc. C. Wiler. Read before the Chicago Elec, Assn. An account of research work based on the study of the arc by means of the oscillograph. Also editorial. 2400 w. Elec Wld & Engr—Nov. 10, 1900.

Experiments upon Alternating Current Arcs at High Pressure (Untersuchungen über den Wechselstromlichtbogen bei Höhrer Spannung). Berthold Monasch. Giving curves, showing the results of experiments in dry air and in vacuo for arcs of various lengths. 1800 w. Elektrotech Zeitschr—Oct. 30, 1902.

The Relation Between Current and Voltage in the Alternating Arc. Abstract translation of an article by H. T. Simon. An illustrated study of the arc, showing the necessity of using the dynamic characteristic in considering alternating currents. 2500 w. Elec Engr, Lond—Oct. 20, 1905.

Stroboscopic Observations of Alternating Current Arcs. Gives photographs, and describes methods used by Messrs. L. Lombardi and G. Melazzo in an experimental study. 1200 w. Sci Am Sup—Sept. 9, 1905.

Alternating Current Arc Systems. Richard Fleming. Ilustrates and describes appliances used and the lamps of various types. 2000 w. Engr, U S A—June 1, 1904.

Points for Consideration When Purchasing Alternating-Current Arc Lamps. G. Brewer Griffin. Abstract of a paper read before the Ohio Elec Lgt Assn. Discusses the construction and performance, the effect upon the eye, etc. 4000 w. Elec Rev, N Y—Sept 3, 1904.
See also **Singing.**

Alternating, Power Factor.—Notes on the Power Factor of the Alternating of the Alternating-Current Arc. George D. Shepardson. Presents some results obtained by students at the University of Minnesota, in connection with the graduating thesis work. 1000 w. Am Inst of Elec Engrs—June 22, 1905.

Alternating Series.—Regulating Devices for Series Alternating Current Circuits. J. Henry Hallberg. Read before the Ohio Elec. Lgt. Assn. A general illustrated description of regulating apparatus and enclosed arc lamps for series alternating-current circuits, and a practical description of the series alternating-current enclosed arc system, using the reaction coil and shunt-wound arc lamp. 3500 w. Elec Rev, N Y—Nov. 23, 1901.

Series Alternating Current Arc Lighting Plant in the Union Stock Yards. Illustrates and describes the largest series enclosed arc lighting system installed in Chicago. 2200 w. Engr, U S A—June 1, 1904.

Series Alternating Arc Lighting. E. P. Warner. Read at the convention of the Northwestern Elec. Assn., at Milwaukee, Wis. Considers the requirements of a modern system of arc lighting, the desirable features in the series alternating lamp, and the results achieved. 3700 w. Elec Rev, N Y—Feb. 4, 1905.

Alternating vs. Direct.—Some Notes on Alternating and Direct Current Arcs. P. O. Butte. Read at Con. of Pacific Coast Elec. Trans. Assn. Discusses the action, the relative illumination, the character of illumination, favoring alternating-current enclosed arc, especially for interior illumination. 1700 w. Jour of Elec—July, 1903.

A. C. vs. D. C. Arc Systems. W. L. McFarlane. Read before the Can. Elec. Assn. Considers the relative costs and advantages of the different systems. 4800 w. Can Elec News—July, 1904.

Ayrton Research.—The Mechanism of the Electric Arc. (Mrs.) Hertha Ayrton. Abstract. The object of the paper is to show that by applying the ordinary laws of resistance all its principal phenomena can be accounted for, without the aid of a large back e. m. f., or of a 'negative resistance,'' or of any other unusual attribute. 2200 w. Elec Rev, Lond—Aug. 16, 1901.

Beck.—The Beck Lamp (Die Beck Lampe). Oskar Arendt. Describing an improved form of arc lamp with inclined carbons of the flame type. 1000 w. Elektrotech Zeitschr—June 8, 1905.

Blue Print.—See **BLUE PRINT—Electric Light.**

Bremer.—The Bremer Lamp. Siegmund Saubermann. Abstract of a paper read before the Elektrotechnischer Verein of Vienna. Illustrated detailed description with photometric measurements. 1800 w. Elect'n, Lond—June 20, 1902.

The Bremer Light (Bremer Licht). Ernst Wagmüller. A description of the Bremer arc light, in which the carbons are impregnated with metallic salts, and aranged in an inclined position, the arc being formed below. 1800 w. Zeitschr d Ver Deutscher Ing—July 2, 1904.

See also **Flame.**

Carbons.—See **Flame; CARBON.**

Chicago Boulevard.—The Lighting of Diversey Boulevard, Chicago. J. R. Cravath. Illustrates and describes one of the best recent examples of boulevard lighting in the United States. The lamps are series direct-current enclosed arcs, taking 6.2 amperes at 72 volts. 1200 w. Am Elect'n—April, 1902.

Comparison.—Comparison of Arc Lamps and Arc Lamp Systems in Relation to Economy (Vergleich der Verschiedenen Bogenlampenarten und Bogenlampenschaltungen in Bezug auf Ihre Wirtschaftlichkeit). Fritz Hoppe. Practical study of commercial types of arc lamps, with curves and tables. 3000 w. Elektrotech Zeitschr—Sept. 7, 1905.

Constant Potential.—The Economic Radius of Arc-Lamp Service from Constant-Pressure Dynamos. Alton D. Adams. Discusses the operation of arcs directly from constant pressure circuits, the advantages and disadvantages. 3500 w. Elec Rev, N. Y.—Feb. 23, 1901.

Creil.—The Creil Electric Company's Arc Lamps (Lampes à Arc de la Compagnie Générale d'Electricité de Creil). A. Bainville. An illustrated description of arc lamps and mechanism identical with those made by Schuckert. 500 w. Electricien—Dec. 28, 1901.

Current Rectifier.—See **ELECTRIC-CURRENT RECTIFIER; MERCURY VAPOR LAMP; SPEED INDICATOR—Electric.**

Direct Current.—A Contribution to the Study of the Electrical Arc. Dr. William S. Weedon. Read at Washington meeting of the Am. Elec. Chem. Soc. Considers only direct-current arcs. A report of experimental investigations. 4000 w. Elec Rev, N. Y.—April 23, 1904.

Dublin.—The City of Dublin Electric Lighting. An illustrated detailed description of the arc-lighting. 1100 w. Engng—Dec. 30, 1904.

Duddell.—See **Singing.**

Electrolytic.—A New Method of Producing Electric Light—(Ein Neues Verfahren zur Erzeugung von Elektrischem Licht). Ewald Rasch. Describing an arc lamp with electrodes of magnesia, lime, or other refractory substance, rendered conductors by heating. 2500 w. Elektrotech Zeitschr—Feb. 14, 1901.

Remarks on an Article by Herr Rasch on a New Method of Producing Electric Light (Bemerkung zur Notiz des Herrn Rasch "Ein Neues Verfahren zur Erzeugung von Elektrischem Licht"). Prof. W. Nernst. A criticism of some of the figures for the efficiency of arc lights and Nernst lamps given by Herr Rasch, and doubts as to the commercial practicability of the Rasch electrolytic arc lamp. 800 w. Elektrotech Zeitschr—March 21, 1901.

Arcs from Electrolytic Oxide Electrodes. Reviews an article by Mr. Ewald Rasch, appearing in the "Elektrotechnische Zeitschrift." 1600 w. Elec Rev, N Y—March 30, 1901.

The Rasch Electric Light. An account of the invention of Herr E. Rasch, of Potsdam, which consists in using the refractory materials used in the filament of the Nernst lamp to replace the carbons of the arc lamp, thus producing a beautiful, steady light equivalent to 75 per cent. of the energy applied. 1500 w. Elec Rev, Lond—July 26, 1901.

See also **LIGHT—Mechanical Equivalent.**

Enclosed.—Notes on Mechanical Details of Enclosed Arc Lamps. J. Pratt Sligh. Read before the Newcastle Local Sec. of the Inst. of Elec. Engrs. Gives an outline basis from which comparisons can be made of the suitability of any given lamp for the particular kind of work required. 4200 w. Elec Engr, Lond—March 20, 1903.

Construction of a Direct-Current Enclosed Arc Lamp. Illustrated detailed description. 2000 w. Am Elect'n—Oct., 1903.

Small Candle-Power Enclosed-Arc Lamps for City Street Lighting. J. H. Hallberg. Facts relating to these lamps and their success for street lighting. 3000 w. Am Elect'n—June, 1904.

See also **Heany; Hot Wire; Regina; Spectrum.**

Enclosed vs. Open.—Notes on the Enclosed Electric Arc. Elihu Thomson. Explanation of differences between the enclosed and open arc, particularly considering the enclosed arc and its working. 3000 w. Cent Sta—Jan., 1904.

Flame.—The Flaming Arc Light (Ueber Flammenbogenlicht). W. Wedding. With tables of photometric data for various lengths of arcs, and for specially prepared carbons. 4500 w. Elektrotech Zeitschr—Aug. 7, 1902.

Flame Arc Lamps and Intensive Flame Arc Lamps of the A. E. G. (Flammenbogenlampe und Intensivflammenbogenlampen der Allgemeinen Electrizitäts-Gesellschaft). J. Zeidler. A description of improved arc lamps of high efficiency, using impregnated carbons. 4000 w. Elektrotech Zeitschr—Feb. 26, 1903.

Flame Arc Lamps. J. Zeidler. Extracts from a paper before the Electrotechnische Verein of Berlin, describing two forms of lamp. 1200 w. Aust Min Stand—Nov. 5, 1903.

Intensive Flaming Arc Lamps (Mitteilungen ueber Intensivflammenbogen-Lampen). J. Zeidler. A description of recent lamps made by the A. E. G., using carbons impregnated with salts acting to increase the length of the arc. 1000 w. Glasers Annalen—Jan. 15, 1904.

The Light Emission from the Arcs of Intensive Arc Lamps (Ueber die Lichtausstrahlung von Lichtbögen in Intensivbogenlampen). Berthold Monasch. An examination of the distribution of illumination from arc lamps with impregnated carbons arranged in an inclined position. 5000 w. Elektrotech Zeitschr—Jan. 19, 1905.

See also **Beck; Bremer; Metallic Salts.**

Foster.—See **Hot Wire.**

Gas.—See **INCANDESCENT GAS LIGHTING—Arc Lamp.**

Gear.—Raising and Lowering Gear for Arc Lamps. Donald Smeaton Munro. States the points of a good gear, and describes an appliance which seems to meet the requirements. Ills. 1700 w. Elec Rev, Lond—Sept. 16, 1904.

Hausen.—The Hausen Arc Lamp (Lampe à Arc Hausen). Describing and illustrating three forms of improved arc lamps, for derived currents either continuous or alternating, and differential for continuous current. 1200 w. Electricien—Nov. 24, 1900.

Heany Enclosed.—The Heany Enclosed Arc Lamp. E. Trier. Illustrated description with a statement of the points of excellence claimed. 1400 w. Elec Wld & Engr—March 8, 1902.

High Voltage.—One Method of Dealing with the High Voltage Arc Lamp Trouble. J. G. Griffin. Describes a method that proved successful. 1800 w. Elec Rev, Lond—Jan. 4, 1901.

History.—Some Early Arc Lighting Experiences. George W. Stockly. 1000 w. Elec Rev, N. Y.—Jan. 12, 1901.

Development of Arc Lighting Apparatus from 1810 to 1902. W. D'A. Ryan. Read before the Canadian Elec. Assn. An illustrated review of the most important points in the development of arc lamps. 2800 w. Can Elec News—Sept., 1902.

Light and Illumination. E. Leavenworth Elliott. Reviews the history and development of the arc lamp. 3800 w. Cent Sta—Jan., 1903.

The Development of Arc Lamps. William Mayo Venable. Reviews briefly the development of both the open arc and the enclosed arc, with remarks on the direction of future improvements. 2500 w. Elec, N Y—Sept. 30, 1903.

Hot Wire.—Hot Wire Enclosed Arc Lamps. H. Tomlinson-Lee. An illustrated article describing the "hot-wire" lamp invented by C. E. Foster, with reports of its advantages. 1200 w. Elec Rev, Lond—July 31, 1903.

Intensive Flame.—See **Flame.**

Interrupter.—See **INTERRUPTER—Arc.**

Koerting and Matthiessen.—The Koerting and Matthiessen Arc Lamps (Lampes à Arc Koerting et Mathiesen). A. Bainville. An illustrated description of continuous and alternating current arc-lamp mechanism. 2 parts. 1200 w. Electricien—Dec. 7, 14, 1901.

Lewis.—A New Type of Continuous Current Arc Lamp. Frank Lewis. Illustrated description of a double-arc lamp on a 230-volt circuit. 900 w. Elec Rev, London—May 2, 1902.

Lupus Treatment.—The Treatment of Lupus by the Arc Light. An illustrated article explaining treatment which has met with marked success. 2300 w. Elec Rev, Lond—July 12, 1901.

Magnetite.—The Magnetite Arc Lamp. Charles Proteus Steinmetz. Illustrated description of this new illuminant, with explanation of the operation. 1200 w. Elec Wld & Engr—May 21, 1904.

Massachusetts.—See **ELECTRIC LIGHTING.**

Maximum Illumination.—See **PHOTOMETRY—Arc Light.**

Mercury.—See **ELECTRIC-CURRENT RECTIFIER; MERCURY VAPOR LAMP.**

Metallic.—The Metallic Arc. Isador Ladoff. Reports experiments made with titanium pencils, giving results. Also editorial. 3500 w. Elec Wld & Engr—April 22, 1905.

The Electrochemistry of the Metallic Arc. Isador Ladoff. The object of the article is to review the literature treating of the metallic arc, and to give the results of the writers' work in this field. Serial. 1st part. 1800 w. Elec-Chem & Met Ind—Aug., 1905.

Metallic Salts.—The Effect of Metallic Salts in the Electric Arc. G. W. Wilder. A quantitative study upon the effect of putting metallic salts into the core of the positive electrode and possibly to account for the large drop in potential at the electrodes. Ill. 3000 w. Wis Engr—May, 1902.

Photographing.—Photographing the Electric Arc. Prof. A. C. Stone. Notices briefly some points concerning arc light carbons in operation as indicated by direct photographs of the arc itself. 1200 w. Sci Am—Oct. 19, 1901.
See also **PHOTOGRAPHONE.**

Photometry.—See **Maximum Light; PHOTOMETRY.**

Rasch Electrolytic.—See **Electrolytic; LIGHT—Mechanical Equivalent.**

Rectified Current.—See **ELECTRIC-CURRENT RECTIFIER—Arc Lamp; MERCURY VAPOR LAMP; SPEED INDICATOR—Electric.**

Regina Enclosed.—The Theory of the Regina Enclosed Arc Lamp (Zur Theorie der Regina-Dauerbrand-Bogenlampe). Dr. B. Donath. An illustrated account of photometric and photographic investigations, with explanation of the high actinic power of this lamp. 800 w. Elektrotech Zeitschr—March 13, 1902.

Regulation.—Regulation and Adjustment of Arc Lamps. M. E. Chester. Describes the types of arc lamps in use, and the methods of regulation. 3000 w. Technograph, No. 15—1900-1901.

Searchlight.—See **SEARCHLIGHT.**

Series Alternating.—See **Alternating, Series.**

Singing.—On Rapid Variations in the Current Through the Direct-Current Arc. W. Duddell. An account of what occurs when the current is periodically varied more or less rapidly over a range which is very small compared with the mean value of the direct current. Serial. 1st part. 4800 w. Elect'n, Lond—Dec. 14, 1900.

On the Resistance and E. M. F.s of the Electric Arc. W. Duddell. Abstract of a paper before the Royal Soc., giving an account of experiments and a description of apparatus used. 2700 w. Elect'n, Lond—Oct. 4, 1901.

The Behaviour of Continuous Current Arcs (Neue Wirkungen des Gleichstromlichtbogens). W. Peukert. With especial reference to the musical arcs of Simon and of Duddell, giving computations of the periods of vibration. 2500 w. Elektrotech Zeitschr—June 6, 1901.

Sounding Flames and Flame Telephony (Tönende Flammen und Flammen-Telephonie). H. T. Simon. A discussion of the singing arc and its possible applications. 4000 w. Elektrotech Zeitschr—June 20, 1901.

The Theory of the Duddell Singing Arc (Quelques Remarques sur la Théorie de l'Arc Chantant de Duddell). Paul Janet. A mathematical discussion, with suggestion for obtaining alternating from continuous current by means of this arc. 300 w. Comptes Rendus—April 14, 1902.

The Voltaic Arc (L'Arc Voltaique). P. Janet. A general discussion of the physical properties of the electric arc, with especial reference to the recent investigations of Duddell, Simon, and others. 3500 w. Rev Gen des Sciences—May 15, 1902.

The Phenomena of the Singing Arc (Sur les Phénomènes de l'Arc Chantant). A. Blondel. An examination of oscillograph curves from various singing arcs. 1200 w. Comptes Rendus—June 26, 1905.

See also **LIGHT TELEPHONY; PHOTOGRAPHONE.**

Spectrum.—The Spectrum of the Enclosed Arc. Dr. Louis Bell. Describes a spectrum accidentally observed. 1200 w. Elec Wld & Engr—Feb. 1, 1902.

Note on the Spectrum of the Enclosed Arc. William Lincoln Smith. Comparisons showing the remarkable differences in light distribution between the light of the sky and that from the enclosed arc, and the Nernst lamp. 700 w. Elec Wld & Engr—Feb. 22, 1902.

Standardization.—See **PHOTOMETRY—Arc Light.**

Street.—Relative Merits of Open and Enclosed Arc Lights for Street Illumination. W. D'A. Ryan. Abstract of a paper read before the Ohio Elec. Lgt. Assn. Considers the peculiarities of different lamps, small vs. large units, etc., giving candle-power curves and curves showing street illumination. 1600 w. Am Elect'n—Nov., 1901.

Street Lighting. Discusses briefly the principal methods of arc lighting. 1800 w. Elec Rev, Lond—June 21, 1901.

Street Illumination and Units of Light. W. D'A. Ryan. An account of photometric comparisons made of open and enclosed arcs, giving curves. 2000 w. Trans Am Inst of Elec Engrs—Dec., 1901.

Improvements in Electric Arc Street Lighting. H. W. Hillman. From a paper read before the Am. Soc. of Munic. Imp. Illustrated descriptions of recent work, showing the great improvement in appearance. 1500 w. Munic Engng—April, 1904.

Systems of Electric Street Lighting. E. A. Fisher. Read before the Am. Soc. of Munic. Imp. Discusses only the arc lamps, considering the service, cost, &c., giving statistics of the systems in use. 3500 w. Munic Engng—Oct., 1905.

See also **Chicago; Dublin; Enclosed; ELECTRIC LIGHTING; LIGHTING; STREET LIGHTING.**

Stroboscopic Observations.—See **Alternating.**

Telephony.—See **Singing; LIGHT TELEPHONY; PHOTOGRAPHONE.**

Titanium.—See **Metallic.**

ARITHMETIC.

See **MATHEMATICS.**

ARITHMOGRAPH.

See **CALCULATING MACHINE—Arithmograph.**

ARMAMENT.

See **ARMORED CRUISER; BATTLESHIP; GUN; NAVY; ORDNANCE; WARSHIP.**

ARMATURE.

See also **ARMATURE WINDING; COMMUTATOR; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MOTOR.**

Action.—The Conditions of Transformation in the Continuous-Current Armature (Ueber die Transformationseigenschaften der Gleichstormarmatur). F. Eichberg. An examination of the action of the armature, with diagrams enabling the relations of the currents at any point to be determined. 1500 w. Elektrotech Zeitschr—July 11, 1901.

Alternator Winding.—See ARMATURE WINDING—Alternator.

Coil Design.—See ARMATURE WINDING.

Coil Forming Machine.—See ARMATURE WINDING—Formers.

Construction.—Some Practical Points in Armature Construction, Dealing Chiefly with Insulation. Hints of interest to those engaged in this class of work. Ill. 1800 w. Elec Engr, Lond—Jan. 22, 1904.

Core Aging.—See AGING—Armature Core.

Core Disc.—Armature Core Discs for Continuous-Current Machines. Fred W. Davies. Notes and formulae intended for assistance in designing a suitable core disc. Ill. 3000 w. Elec. Rev, Lond—Aug. 22, 1902.

Core Losses.—The Factors Which Affect the Energy Losses in Armature Cores. J. Walter Esterline and C. E. Reid. An account of investigations with illustrated description of apparatus used. Also discussion. 6000 w. Trans Am Inst of Elec Engrs—Oct., 1903.

See also **Heat Losses.**

Design.—The Calculation of Armatures. Reprint of a paper presented by Prof. Luigi Pasqualini at meeting of the Italian Assn of Elec. Engrs. Discusses the question of the design of dynamos by a series of formulae. Also editorial comment. 1500 w. Elec Wld & Engr—Oct. 18, 1902.

See also **Reaction; ARMATURE WINDING; ELECTRIC GENERATOR DESIGN.**

Disk Notching.—See NOTCHING MACHINE.

Double-Current.—The Phenomena in Double-Current Armatures (Ueber die Vorgänge in Wechselstromdurchflossenen Gleichstromankern). L. Fleischman and A. Orgler. An examination of the occurrences in ring armatures from which both continuous and alternating current are taken. 2000 w. Elektrotech Zeitschr—March 27, 1902.

Armature Losses in Double-Current Generators. Alfred Still. Gives diagrams showing what takes place in the armature windings of a double-current generator, with explanation. 1600 w. Elec Wld & Engr—Aug. 12, 1905.

See also **ELECTRIC GENERATOR.**

Faults.—Finding Faults in a Direct Current Armature. Adolph Shane, in "The Iowa Engineer." Explains methods of especial interest for small plants. 1000 w. Engr, U S A—Dec. 1, 1905.

Flux Distribution.—The Distribution of Lines of Force in Grooved Armatures (Die Vertheilung der Kraftlinien bei Nuthenankern von Gleich- und Wechselstrom-Maschinen). G. Dettman. An examination of the lines of force for continuous and for alternating current machines. The correctness of the conclusions is shown by the use of iron filings. 5000 w. Elektrotech Zeitschr—Nov. 15, 1900.

The Distribution of Lines of Force in Slotted Armatures (Ueber die Kraftlinienvertheilung in Nuthenankern). E. Dick. A mathematical investigation, taking into account the dimensions of the teeth and the magnitude of air-gaps. 4000 w. Elektrotech Zeitschr—July 25, 1901.

The Distribution of Magnetic Induction in Multipolar Armatures. W. M. Thornton. Read before the British Assn. A study of the effect of pole spacing, the length of the air-gap, the flux density within it, and the radial depth of the core upon the flux density in the core. Ills. 2200 w. Elect'n, Lond—Aug. 26, 1904.

Hydrodynamical and Electromagnetic Investigations Regarding the Magnetic-Flux Distribution in Toothed Armatures. Prof. H. S. Hele-Shaw, Alfred Hay and P. H. Powell. Read before the Inst. of Elec. Engrs. An illustrated account of investigations of air-gap reluctance, and reluctance of teeth in a slotted armature, with description of apparatus used, is given in the present number. Serial. 1st part. 3500 w. Elec Engr, Lond—Nov. 25, 1904.

Heat Losses.—The Heating of Toothed-Core Armatures. Fred W. Davies. Considers some of the causes of overheating. 1500 w. Elect'n, Lond—Sept. 12, 1902.

Joule Heat Losses in a Cage Armature (Verluste durch Joulesche Wärme in einem Käfiganker). F. Punga. Developing formulas for computing the heat losses in armatures of the squirrel-cage type. 1200 w. Zeitschr f Elektrotechnik—March 27, 1904.

Inductance.—See ARMATURE WINDING.

Insulation. — See Construction; INSULATION—Coils.

Lines of Force.—See Flux Distribution.

Reaction.—On Magnetic Reactions in Dynamos (Sur la Reaction Magnetique de l'Induit des Dynamos). N. Vasilesco-Karpen. A mathematical discussion of the effect of the induced currents in armature and armature windings. 600 w. Comptes Rendus—April 14, 1902.

Field Distortion and Armature Reaction (Feldverzerrung und Ankerrückwirkung). R. Bauch. A paper before the Verband Deutscher Elektrotechniker, giving a general discussion of armature reaction and the distortion of field in dynamo-electric machinery, with diagrams. Serial. 2 parts. 9000 w. Elektrotech Zeitschr—July 10, 17, 1902.

Some Effects of Armature Reaction in Alternating Current Machinery. W. M. Thornton. An account of investigations, with diagrams. 2600 w. Elect'n, Lond—Sept. 4, 1903.

The Reaction of Alternator Armatures (Réaction d' Induit des Alternateurs). C. F. Guilbert. A study of the counter electro-motive force of the armature, using both analytical and graphical methods. Two articles. 4500 w. Revue Technique—Sept. 25, Oct. 10, 1903.

Armature Reaction. Edward Eugene Brown. Read before the Newcastle Soc. of the Inst. of Elec. Engrs. A study, giving report of work of a number of investigators. 3500 w. Elec Engr, Lond—May 26, 1905.

See also **ELECTRIC GENERATOR, ALTERNATING—Short Circuit.**

Resistance.—The Resistance of Short-Circuited Armatures (Der Widerstand des Kurzschlussankers). J. Heubach. Deriving formulas for the computation of the resistance, with diagrams showing the relations of the sine curves. 3000 w. Elektrotech Zeitschr—May 23, 1901.

Measurement of the Armature Resistance of Continuous Current Machines (Messung des Ankerwiderstandes von Gleichstrommaschinen). A. Wettler. A description, with diagrams and formulae, of a method of measuring the resistance of various forms of armature windings. 800 w. Elektrotech Zeitschr—Jan. 2, 1902.

Siemens Alternator.—See ELECTRIC GENERATOR DESIGN.

Slot Insulation.—See INSULATION—Armature Slot.

Slotted.—The Construction of Slotted Armature Discs (Ueber die Herstellung Genutheter Ankerblechscheiben). R. Hundhausen. Illustrated description of the special tools used by Siemens & Halske at Charlottenburg. Two articles. 4000 w. Elektrotech Zeitschr—Dec. 18, 25, 1902.

The Best Dimensions for Armature Slots in Continuous-Current Dynamos (Ueber die Günstige Dimensionierung der Nuten von Gleichstromankern). A. Müller. A mathematical investigation, showing the best ratio the thickness of tooth to width of slot to be about 0.6. 1500 w. Zeitschr f Elektrotech—Nov. 29, 1903.

See also **Flux Distribution; Heating; ARMATURE WINDING.**

ARMATURE WINDING.

See also **ARMATURE; ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MOTOR.**

A Comparison of Dynamos with Surface-Wound and Slot-Wound Armatures. P. M. Heldt. Arguing that for small machines of given weight and angular velocity, at least 50 per cent. more output can be obtained if the armature is slot wound than if it is surface wound. 1000 w. Am Elect'n—March, 1901.

A Simple System for Armature Windings (Eine Sehr Einfache Darstellung Fortlaufender Geschlossener Wickelungen). W. Kübler. Giving a series of numerical tables for use with different kinds of windings. 1200 w. Elektrotech Zeitschr —July 17, 1902.

Winding of Direct-Current Armatures. A. C Jordan. A detailed description of the various operations performed by an armature winder. Ills. 2500 w. Elec Jour—Dec., 1905.

Alternator.—Armature Windings of Alternators. F. D. Newbury. A description of armature windings, explaining the characteristics of the unit electromotive forces, and also explaining how the single wires are connected together to form the various types of practical windings and the characteristics of the electromotive forces that result from these various connections. 1500 w. Elec Jour—June, 1905.

See also **ELECTRIC GENERATOR, ALTERNATING.**

Brush Position.—See **ELECTRIC GENERATOR—Regulation.**

Closed Circuit.—Armature Windings of the Closed Circuit Type. William Cramp. An illustrated series of articles examining re-entrant windings. Serial. 1st part. 1400 w. Elec. Engr, Lond—Jan. 20, 1905.

Closed Coil Drum.—The Winding of Closed Coil Drum Armatures. William Beckit Burnie. Explains how it is possible to get all the formulae commonly used for driven armatures from one single expression. 2300 w. Elect'n, Lond—May 31, 1901.

Coil Wound—Points to Be Observed in Rewinding Coil-Wound Armatures. Illustrated directions. 3300 w. Am Elect'n—July 1902.

Constant Potential.—Armature Winding for Constant Potential Direct-Current Machinery. Illustrates and describes the types of standard windings. 2500 w. Elec Club Jour—Feb., 1905.

Design.—The Design of Armature Coils. Gives formulas intended for use after the electrical design of the machine has been completed, except the final shaping of the core, so that they may properly overlap. 600 w. Elec Wld & Engr—Sept 17, 1904.

Eddy Currents.—See **EDDY CURRENT.**

Equalizing Connections.—The Theory of the Equipotential Connections of the Armatures of Direct Current Machines (Theorie der Aequipotential-Verbindungen der Anker von Gleichstrommaschinen). Prof. E. Arnold. Mathematical discussion. Diagrams. Serial. Part I. 3000 w. Elektrotech Zeitschr—March 13, 1902.

The Theory of Equalizing Connections on Continuous-Current Armatures. Abstract of an article by Prof. E. Arnold, in the "Elektrotechnische Zeitschrift." Mathematical discussion of the connection of the equipotential points of the armature winding. Ill. 2700 w. Elec Engr, Lond—June 13, 1902.

Formers—Universal Forming Machine for Armature Coils. H. Robinson. Illustrations showing a newly designed machine for forming armature coils to the required and proper shape for different sizes of armatures. 500 w. Am Mach—Aug. 20, 1903.

Formers and Former-Winding. F. W. Davies. On the construction and use of formers, giving a general classification of the principal types, method of winding, etc. Serial. 1st part. 2000 w. Elec Engr, Lond—May 9, 1902.

Inductance.—Calculation of the Apparent Inductance of Armature Coils. C. C. Hawkins. A résumé of the general principles of the calculation, supplemented by a consideration of the effect of different windings. Serial. 1st part. 2200 w. Elec Wld & Engr—Nov. 14, 1903.

Induction Motors.—Resistance, Current Distribution and Consumption of Energy in Short-Circuited Armatures (Widerstand, Stromvertheilung und Energieaufnahme von Kurzschlussankern). M. Osnos. An examination of the advantages of short-circuited armatures for induction motors, showing the saving in copper over phase armatures. 3000 w. Elektrotech Zeitschr—Feb. 21, 1901.

Machine.—See **Formers; MACHINE—Winding.**

Rotor.—Notes on the Winding of Polyphase Rotors. Leonard J. Pumphrey. Deals with the design of windings for three-phase motors. 1200 w. Elec Rev, Lond—July 14, 1905.

See also **ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MOTOR.**

Short-Circuited.—See **ELECTRIC GENERATOR, ALTERNATING.**

Slotted.—Modern Windings for Slotted Armatures (Moderne Wickelungen für Genuthete Gleichstromanker). Alexander Rothert. An illustrated description of various windings, with a discussion of the whole subject. 2400 w. Elekotrotech Zeitschr —April 11, 1901.

The Winding of Continuous-Current Slotted Armatures. Translation of an article by Alexander Rothert in the "Electrotechnische Zeitschrift." An illustrated discussion of points relating to the manufacture of continuous-current machines. 3800 w. Elec Engr, Lond—Aug. 23, 1901.

ARMOR.

See **ARMORED CRUISER; ARMOR PLATE; BATTLESHIP.**

ARMORED CONCRETE.

See **CONCRETE REINFORCED.**

ARMORED CRUISER.

See also **CRUISER; NAVY; SHIPBUILDING; WARSHIP.**

"Abdul Hamid."—See **"Hampshire."**

"Achilles."—H. M. First-Class Cruiser Achilles. Illustration, brief description, and remarks concerning this recently launched vessel. 700 w. Engr, Lond—June 23, 1905.

American.—The New Armored Cruisers. The majority and minority reports of the Board of Construction of the U. S. Navy Department. 2000 w. Naut Gaz—Nov. 6, 1902.

See also **CRUISER**; and under individual names.

"Antrim."—The Steam Trials of H. M. SS. "Antrim" and "Devonshire." Illustrations, reports of trials, and remarks on features of interest. 1500 w. Engng—April 28, 1905.

"Argyll."—See **MARINE ENGINE.**

"Bacchante."—See **"Good Hope."**

"Black Prince."—H. M. S. Black Prince. Illustration, with description, and comparison with the French Renan and the U. S. A. California. 800 w. Engr, Lond—Oct. 14, 1904.

H. M. Armored Cruiser Black Prince. Detailed Description. 1800 w. Engr, Lond—Nov. 11, 1904.

British.—British Armored Cruisers. Editorial discussion of recently launched battleships and cruisers. 2000 w. Engng—March 1, 1901.

See also under individual names.

"California."—See **"Maryland"; CRUISER—American.**

"Cardenal Cisneros."—The Spanish Armored Cruiser Cardenal Cisneros. Illustrations and descriptions of a re-designed ship, showing the changes made after the Spanish-American war. 700 w. Engr, Lond—June 5, 1903.

"Carnarvon."—Steam Trials of H. M. S. "Carnarvon." An illustrated description of this armored cruiser and report of the satisfactory results of the steam trials. 3500 w. Engng—March 17, 1905.

"Colorado."—United States Armored Cruiser Colorado. E. H. Scribner. Illustrated description of vessel, with report of the official trial. 6000 w. Jour Am Soc of Nav Engrs—Nov., 1904.

The U. S. Armored Cruiser Colorado. J. M. Powell. An illustrated description of this vessel and its performance. 5500 w. Soc. of Naval Archts & Marine Engrs, No. 17—Nov., 1904.

Conning Tower.—See **CONNING TOWER.**

County Class, British.—Some Notable Scottish Products. Illustration, with description of two cruisers of the County class, with their engines and machinery. 2600 w. Marine Rev—Sept. 19, 1901.

"Cumberland."—Steam Trials of H. M. S. "Cumberland." Reports satisfactory results of official trials on the Firth of Clyde. 600 w. Engng—Sept. 11, 1903.

"Devonshire."—See **"Antrim."**

"Duke of Edinburgh" Class.—Cruiser Design. . Editorial discussion of the new British armored cruisers of the Duke of Edinburgh class. 1700 w. Engng—Nov. 14, 1902.

"Edgard Quinet."—Armored Cruisers. Discusses the construction of the "Edgard Quinet" as an example, giving a comparative table of types, and considers its value in warfare. 2200 w. Engr, Lond—Feb. 3, 1905.

"Ernest Renan."—The French Armored Cruiser "Ernest Renan. Illustration, with brief description, and comparative table. 500 w. Engr, Lond—March 3, 1905.

"Good Hope."—The Armored Cruiser "Good Hope." Interesting illustrated description of this vessel which has just satisfactorily completed her official contract steam trials. 3800 w. Engng—Feb. 28, 1902.

The Latest British Armored Cruiser "Good Hope." Illustration and interesting comparisons of this first of a class of fast and powerful cruisers, with earlier vessels. 1000 w. Sci Am—Oct. 18, 1902.

"Good Hope" and "Bacchante."—H. M. S. "Good Hope" and "Bacchante." A general description with engraving showing the stern of the "Good Hope" and the arrangement of the balanced rudder and the cutting away of the dead wood. 1500 w. Engr, Lond—March 1, 1901.

"Hampshire."—Some New Warships. Illustrated descriptions of the Hampshire, a cruiser of the Devonshire class, and the new Turkish cruiser "Abdul Hamid." Also briefly notices other vessels. 900 w. Engr, Lond—Oct. 2, 1903.

"Jeanne d'Arc."—The Armored Cruiser "Jeanne d'Arc." Illustrated detailed description. 800 w. Sci Am Sup—Nov. 17, 1900.

"Jules Ferry."—See **"Leon Gambetta."**

"Kasuga."—The Japanese Cruisers "Kasuga" and "Nisshin." Illustrated description of the two cruisers purchased from the Argentine Government by Japan. 600 w. Engng—Jan. 22, 1904.

New Japanese Armored Cruisers "Kasuga" and "Nisshin." Illustrated description of two cruisers built for Argentina, but purchased by Japan. 1000 w. Sci Am—Jan. 23, 1904.

New Cruisers for the Japanese Navy. Information relative to two ships built for the Argentine Republic, but recently sold to Japan, and their official trials. Ill. 2800 w. Marine Engng—March, 1904.

The Japanese Armored Cruiser "Kasuga." Illustrations, with comments. 500 w. Engng—Oct 21, 1904.

The Japanese Cruisers Nisshin and Kasuga. Illustrations, with description. 1500 w. Engr, Lond—Nov. 4, 1904.

The Japanese Cruisers "Kasuga" and "Nisshin." Col. N. Soliani. A very complete illustrated description of details of construction. 5000 w. Engng—April 21, 1905.

"King Alfred.—H. M. Armored Cruiser "King Alfred." Illustrated description of one of the four vessels building for the British navy, and its equipment. 1200 w. Engng—Nov. 1, 1901.

Steam Trials of H. M. S. "King Alfred." Editorial on the performance of this armored cruiser, which was highly satisfactory. 1500 w. Engng—Sept. 5, 1902.

"Kleber."—The French Armored Cruiser "Kleber." Illustrated description of one of three 7700-ton cruisers of a novel type. 1000 w. Engr, Lond—Oct. 3, 1902.

"König Wilhelm Ersatz."—German Cruiser König Wilhelm Ersatz. Illustrated description of this armored cruiser and comparison with Prinz Heinrich and recent armored cruisers of different nations. Table. 1500 w. Engr, Lond—Dec. 27, 1901.

"Leon Gambetta."—New French Armored Cruisers "Leon Gambetta," "Jules Ferry," and "Victor Hugo." Particulars of these vessels as compared with the Drake class are given; the first installment dealing with the first-named vessel. Serial. 1st part. Ill. 1300 w. Engr, Lond—May 17, 1901.

The French Cruiser Leon Gambetta. Describes this first of three armored-cruisers for the French fleet. 700 w. Engr, Lond—July 7, 1905.

"Leviathan."—H. M. Cruiser Leviathan. Illustration and brief description. 1000 w. Engr, Lond—July 12, 1901.

The Steam Trials of H. M. S. "Leviathan." Gives particulars of the vessel and equipment with report of trials. 1200 w. Engng—May 23, 1902.

"Maryland."—The New Armored Cruisers of the "California" and "Maryland" Types. Illustrated description of the vessels and their equipment, with favorable comments. 1500 w. Sci Am—Dec. 1, 1900.

United States Cruisers West Virginia and Maryland. W. Strother Smith. Illustrated description of vessels with report of official trials. 7500 w. Jour Am Soc of Nav Engrs—Feb., 1905.

See also **CRUISER—American.**

"Messoudieh."—See **BATTLESHIP.**

"Monmouth."—H. M. First-Class Cruiser Monmouth. Illustration, with brief description of a recently launched vessel. 700 w. Engr, Lond—Nov. 22, 1901.

"Montana."—See **"North Carolina."**

"Moreno."—See **"Nisshin."**

"Nisshin."—Argentina Cruiser Moreno. Illustration and brief description of a vessel of the Garibaldi type, with comparison with other vessels of the size. She was sold to Japan and renamed "Nisshin." 800 w. Engr, Lond—March 6, 1903.

The Argentine Cruiser "Moreno." Illustrated description of a vessel of the Garibaldi class recently launched. She was sold to Japan and renamed "Nisshin." 800 w. Engng—April 10, 1903. See also **"Kasuga."**

"North Carolina."—The Machinery of the Armored Cruisers North Carolina and Montana. Illustrated description of the machinery. 1700 w. Marine Engng—May, 1905.

"Pennsylvania."—A United States Warship on Trial. An account of the government speed trial of the Pennsylvania, by a witness, with general remarks. 2000 w. Sci Am—Dec. 3, 1904.

The U. S. S. Pennsylvania. Lewis Hobart Kinney. Illustrated detailed description of the vessel and its equipment, with report of trial. 8500 w. Jour Am Soc of Nav Engrs—Feb., 1905.
See also **BATTLESHIP—Georgia.**

"Roxburgh," Launching.—See **LAUNCHING.**

Swedish.—See **CRUISER.**

"Tennessee."—See **"Washington."**

United States.—See **American; CRUISER;** and under individual names.

"Victor Hugo."—See **"Leon Gambetta."**

"Washington."—The New Armored Crinsers "Tennessee" and "Washington." Illustrations and descriptions of these vessels and their armament. 1600 w. Sci Am—Dec 27, 1902.

The New Armored Cruiser Washington. Illustrated Description of this new vessel, recently launched at Camden, N. J. 1600 w. Naut Gaz—March 30, 1905.

"West Virginia."—See **"Maryland."**

ARMORED TRAIN.

Military.—See **TRACTION ENGINE.**

ARMOR PLATE.

See also **ARMORED CRUISER; BATTLESHIP; COAST DEFENSE; GUN; GUNNERY; NAVY; ORDNANCE; WARSHIP—**Protection.

Artillery.—Artillery versus Armor, Tabular report, illustrations and editorial relating to the fact recently demonstrated, that armor plate manufactured according to the latest process, has been defeated by modern guns and projectiles. 8500 w. Engng—May 30, 1902.

The Theory and Practice of Armor-Attack. Describes the effect produced by capped and uncapped shot. 1500 w. Engr, Lond—July 17, 1903.

Bethlehem, Pa.—Gun Steel and Armor Plate. An illustrated description of the plant of the Bethlehem Steel Company and its processes. 3000 w. Sci Am—Dec. 12, 1903.

Bolt.—See **BOLT—Armor Plate.**

British Battleships—See **BATTLESHIP—British Armor.**

Beardmore.—Beardmore Armor Plates. An account of tests of these plates, made in Glasgow, with illustrations. 800 w. Engng—Jan. 31, 1902.

Contracts.—See **CONTRACT—Letting.**

Creusot Mill.—The New Armor-Plate Mill at Creusot. Two-page plate, illustrations, and description of a recently constructed mill at the Creusot Works, France, belonging to Schneider & Co., which makes it possible to roll armor-plates, commercially, weighing from 60 to 65 tons. 2800 w. Engng—May 1, 1903.

Düsseldorf Exposition.—Armor-Plate Exhibits at the Düsseldorf Exposition (Les Blindages a l'Exposition de Düsseldorf). L. Baclé. Discussing the exhibits, and giving a tabular view of the results of recent armor-plate tests. 2500 w. Génie Civil—Aug. 23, 1902.

Armor Plate at the Düsseldorf Exposition, 1902 (Der Panzer auf der Düsseldorfer Ausstellung 1902). J. Castner. A review of the exhibits at Düsseldorf, with data concerning recent trials of armor plate, by Krupp. 3000 w. Stahl und Eisen—Sept. 1, 1902.

Guerigny, France.—The Manufacture of Armor Plate (La Fabrication des Plaques de Blindage). A. Bizot. An illustrated description of the Chaussade mills at Guerigny, France, where the armor plate for the French navy is made. 2000 w. 1 plate. Génie Civil—July 23, 1904.

High Explosive Shells.—See **Artillery; Trials; SHELL.**

History.—Armor and Guns. Ira N. Hollis. Historical review of ordnance development. 3500 w. Jour Worcester Polytechnic Inst—Nov., 1900.

Jamison.—New Armor Plate Hardening Process. Describes an improved and economical method of hardening the face of the plates to any required depth, and toughening the face of the hardened portions. Patented by Benton Knott Jamison. 1700 w. Am Mfr—Feb. 6, 1902.

Japanese Battleship.—See **Trials.**

Krupp.—A New Krupp Armor. Gives illustrations of exhibition plates of this armor, and such information concerning it, as it now available. It is claimed to be hardly inferior to cemented plate, and applicable to any form or shape required. 500 w. Engr, Lond—May 16, 1902.

See also **Düsseldorf Exposition.**

Nut-Facing Machine.—See **MACHINE TOOL.**

Paris Exposition.—Armour-Plates at the Paris Exhibition. M. Baclé. A general review of the exhibits. Serial. 1st part. 2500 w. Engng—Jan. 18, 1901.

Armour Plate at the Paris Exposition. (Les Blindages à l'Exposition de 1900). L. Baclé. A comprehensive review of armor plate as shown at the Exposition, with detailed accounts of some of the plates. Serial. 1st part. 4500 w. Génie Civil—April 13, 1901.

Proving Ground.—See **Trials; NAVAL PROVING GROUND—Indian Head, Md.**

Sandy Hook Trials.—See **Trials.**

Tools.—Armor Plate Tools. Arthur Masters. Illustrates and describes the method of fitting armor and backing to warships. 1100 w. Mach, N. Y.—March, 1902.

Trials.—Recent Experiments in Attacking Armor with High Explosive Shell. E. B. Babbitt. An account of the investigations of the Board of Ordnance and Fortification, the tests made and results. 4000 w. Soc Nav Archts & Marine Engrs, No. 10—Nov., 1901.

Important Competitive Test of High Explosive Shells at Sandy Hook. Illustrated description of very important trials with discussion of the results. Also editorial. 3000 w. Sci Am—Nov. 30, 1901.

Armor Plate and High Explosive Shells. Illustrations of tests made at Sandy Hook Proving Ground on the powers of defense and attack. 1200 w. Sci Am—Dec. 14, 1901.

The Gathmann Gun Tests. Grahame H. Powell. Some explanatory notes concerning the recent test at Sandy Hook, showing the effect of outside explosion. Ill. 1300 w. Am Mach—Jan. 16, 1902.

Recent Trials of Armor Plates of Cemented Steel (Essais Récemment Pratiqués sur les Plaques en Acier Cémenté. L. Baclé. An account of recent tests in England and America upon surface hardened plates, including those with the Gathmann gun. 2500 w. Génie Civil—Aug. 30, 1902.

Armor, Projectiles, and Military Explosives. Charles C. Jamieson. A review of important experiments made with projectiles and armor, illustrating various devices, and giving an account of the experiments with Gathmann shell which won the victory for projectiles. Ill. 5800 w. Jour W Soc of Engrs—Oct., 1902.

Armor Plate and Projectile Trials. Gives illustrations and report of results of trials to show the resistance qualities of the latest type of armor forming the belt of the Japanese Battleship No. 1, now being built. 1200 w. Engng—April 28, 1905.

See also **Artillery.**

ARMORY.

Baltimore.—The Fifth Regiment Armory, Baltimore. Illustrated description of the interesting structural features, especially the drill-hall roof. 2400 w. Eng Rec—Mary 14, 1904.

New York.—The Sixty-ninth Regiment Armory Drill Hall, New York. Illustrated detailed description of a fine drill hall, 201 feet 11 1-2 in. long and about 188 ft. 10 in. wide, and nearly 130 feet in extreme height. 3900 w. Eng Rec—June 3, 1905.

The Seventy-first Regiment Armory Building, New York. Illustrated description of a brick, stone and steel structure about 96 feet high, with tower over 300 feet above the street. 3800 w. Eng Rec—July 2, 1904.

Roof.—See **ROOF—Steel.**

Scranton, Pa.—The Thirteenth Regiment Armory, Scranton, Pa. Floor plans and details of roof trusses are given with description. 3200 w. Eng Rec—Aug. 24, 1901.

ARMSTRONG.

See also **GUN WORKS.**

Lord Armstrong. Biographical sketch, with portrait, giving interesting information of his work. The Armstrong gun is described. 5300 w. Engr, Lond—Jan. 4, 1901.

ARMY.

Automobile.—See **AUTOMOBILE—Military.**

Japan.—See **NAVY—Russia.**

Russia.—See **NAVY.**

ARSENAL.

See also **GUN; GUN WORKS; ORDNANCE WORKS.**

Bizerta, Tunis.—See **HARBOR.**

Frankford, Philadelphia.—The United States Arsenal at Frankford. F. A. Stanley. Begins an illustrated detailed description of this arsenal, at Philadelphia, its equipment and manufactures. Serial. 1st part. 2300 w. Am Mach—Vol. 28, No. 50.

Rock Island.—The United States Arsenal at Rock Island. F. A. Stanley. Briefly outlines the history of the island and begins an illustrated description of the shops, their equipment, power plant, etc. 3500 w. Am Mach—Vol. 28, No. 5.

ARSENIC.

See also **SMELTING.**

Analysis.—A Rapid Method for the Determination of Arsenic in Arsenopyrite. J. L. Danziger and W. H. Buckhout. Results of a series of experiments are given. 1600 w. Sch of Mines Qr—April, 1903.

Coal and Coke.—See **COAL ANALYSIS; COKE—Arsenic.**

Copper Alloy.—See **COPPER ALLOY—Arsenic.**

Electrolytic Estimation.—The Electrolytic Estimation of Minute Quantities of Arsenic, More Especially in Brewing Materials. T. E. Thorpe. Illustrated description of apparatus and methods. 4000 w. Electro-Chem & Met—Sept., 1903.

Electro-Metallurgy.—Reduction of Arsenic Ores in the Electric Furnace. Carl Hering. An illustrated description of an electrical process which overcomes the objections to the usual metallurgical processes, enabling the arsenic to be extracted as a metal, and leaving the other metals concentrated in the resulting matte. 2500 w. Elec Wld & Engr—April 27, 1901.

Metallurgy.—The Recovery of Arsenic from Ores and Metallurgical By-Products. Herbert Haas. Illustrated description of a roasting furnace and its operation. 1000 w. Mining & Sci Pr—Sept. 6, 1902.

Virginia.—The Arsenic Mines at Brinton, Virginia. John L. Cowan. An illustrated account of these mines and their development. 1100 w. Eng & Min Jour—July 21, 1904.

ARTESIAN WELL.

See **GROUND WATER; WATER SUPPLY; WELL; WELL BORING.**

ARTILLERY.

See **ARMOR PLATE; AUTOMOBILE; GUN; GUNNERY; ORDNANCE; SHELL.**

ASBESTOS.

Asbestos—Where It Is Found. Joseph Hyde Pratt. Describes the two distinct minerals called asbestos, and their varieties, the location of deposits, especially the deposit in Vermont. 2700 w. Am Mfr—Dec. 12, 1901.

Asbestos. A. Leonard Summers. Considers the sources of supply, methods of mining, and processes used in manufacturing. 1800 w. Mines & Min—Nov., 1902.

Asbestos and Its Uses in Engineering. A. Leonard Summers. An illustrated article noting some of the more important uses made of this material in electrical and mechanical engineering. 1000 w. Prac Engr—May 13, 1904.

Asbestos and Its Uses. An illustrated description of asbestos from the raw material to the finished article, giving much information. 3000 w. Elec Rev, Lond—April 29, 1904.

Asbestos. E. B. Wilson. An illustrated article describing different varieties and their characteristics; the methods of milling and preparing the amphibole asbestos. 1000 w. Mines & Min—Sept., 1905.

Arizona.—Arizona Asbestos Deposits. Joseph Hyde Pratt. Describes the location and development of these deposits, the occurrence, etc. 1300 w. Min Wld—July 8, 1905.

Canada.—Asbestos and Its Production in Canada. W. Mollmann. Information concerning the localities, quality, methods of mining or quarrying, and the importance to Canada of the industry. 2500 w. Can Min Rev—June 30, 1902.

Mining Asbestos in Canada. W. Mollmann. States the principal localities giving information concerning the methods of mining, appliances used, treatment, etc. 900 w. Min & Sci Pr—July 26, 1902.

Asbestos in Canada. Abstract of a monograph recently published by the Mines Bureau of the Dominion, giving information concerning the valuable deposits in Quebec. Ills. 1400 w. Eng & Min Jour—Nov. 18, 1905.

1902.—The Production of Asbestos in 1902. Joseph Hyde Pratt. Condensed from a Bul. of the U. S. Geol. Survey. Concerning the sources of supply and the production. 1200 w. Eng News—Oct. 15, 1903.

1903.—Production of Asbestos During 1903. Joseph Hyde Pratt. On the uses of asbestos and the origin of the chrysotile variety. 4800 w. Min Wld—Sept. 17, 1904.

ASH.

See also **FUEL TEST.**

Fusibility.—A Study of the Fusibility of the Ashes of Combustibles (Etude sur la Fusibilité des Cendres des Combustibles). MM. H. Le Chatelier and Chantepie. An illustrated account of experiments to determine the temperature of fusion of ashes of coal and other combustibles, with results. 2000 w. Bull Soc d'Encouragement—Feb., 1902.

ASPHALT.

See also **ASPHALT PAVEMENT; ASPHALT PLANT; BITUMEN; PAVEMENT.**

Asphalts—Their Sources and Utilization. T. Hugh Boorman. Discusses the various kinds of asphalt and their adaptability for different methods of construction. Serial. 1st part. 1800 w. Archt's & Build's Mag—Nov., 1901.

Some Facts Relating to the Asphalt Paving Industry. P. W. Henry. Condensed from an address before the students of Rensselaer Polytechnic Inst. Reviews the development of this industry, especially in the United States, describing the foundation and the mixture, and the Pitch Lake of Trinidad and other deposits. 6400 w. Eng News—March 14, 1901.

Abruzzi, Italy.—The Asphalt Deposits of San Valentino in Italy (Die Asphalt Gruben von San Valentino in Italien). An account of the working of these important deposits in the Abruzzi, Italy. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 26, 1903.

Alcatraz, Cal.—Alcatraz Asphalt. Notes by P. W. Henry concerning the elaborate methods for dissolving in naphtha and piping 30 miles asphalt obtained by boiling asphaltic sand. 600 w. Eng Rec—March 23, 1901.

Analysis.—Asphalt. Thomas B. Stillman. Its occurrence, composition, adulterations, and commercial uses, with schemes for its analysis. 1200 w. Stevens Ind—Oct., 1904.

Arkansas.—The Asphalt Deposits of Pike County, Arkansas. C. W. Hayes. Describes those deposits which have been recently developed. 1500 w. Eng & Min Jour—Dec. 13, 1902.

California.—The California Asphaltum Industry. F. H. Minard. Outlines the occurrence and character of the deposits of crude oil in California, and the process of refining for asphaltum. Ill. 3500 w. Eng & Min Jour—Oct. 3, 1903.

See also **Alcatraz.**

Indian Territory.—Asphalt Mining and Refining in the Indian Territory. W. R. Crane. Describes the deposits, methods of prospecting, mining, milling and refining. 3500 w. Eng & Min Jour—Dec. 19, 1903.

Asphalt in the Indian Territory. W. R. Crane. Describes the deposits giving information concerning the cost of production, development, etc. 1500 w. Eng & Min Jour—Sept. 9, 1905.

Kentucky.—Asphalt Rock in Kentucky. William E. Burk. Locates and describes these deposits. Map. 1200 w. Eng & Min Jour—June 27, 1903.

Municipal Laboratory.—See **ASPHALT PLANT; LABORATORY—Municipal.**

Queen Charlotte Islands—See **COAL REGION.**

Refining.—Asphalt Refining. Prof. W. R. Crane. Illustrated article describing methods employed in the Tar Springs Asphalt Co.'s refinery, near Comanche, Ind. T. 4700 w. Mines & Min—March, 1903.

Rock.—Rock Asphalt and Asphalt Mastic. Henry Wiederhold. Gives brief review of the uses of asphalt, where found, and the quality, especially considering rock asphalt and its value as a building material. General discussion. 9200 w. Pro Engrs Club of Phila—April, 1903.

See also **Kentucky.**

Test.—See **Washington; CEMENT TEST.**

Texas.—See **MINERAL REGION.**

Trinidad.—The Pitch Lake and the Asphalt Industry of Trinidad. An illustrated description of the deposit and method of excavating, transporting, etc. 1800 w. Sci Am—March 16, 1901.

The Asphalt Industry of Trinidad. Abstract of the report of the Royal Commission concerning the asphalt industry at La Brea. 2000 w. Ir & Coal Trds Rev—Oct. 9, 1903.

United States.—The Asphalt and Bituminous Rock Deposits of the United States. Information from a very full report made by George H. Eldridge, and forming a part of the Annual Report of the U. S. Geol. Survey. 700 w. Eng News—June 5, 1902.

Asphalt and Bituminous Rock Deposits of the United States. Abstract by Prof. Arthur Lakes, from the U. S. Geological Survey. Describes the nature of the material and forms of veins. Ills. 3300 w. Mines & Min—June, 1905.

Utah.—See **PETROLEUM.**

Venezuela.—The Asphalt Deposits of Venezuela. From the "N. Y. Times." Map and description. 1000 w. Eng & Min Jour—March 9, 1901.

Washington. Experiments.—Asphalt Experiments at Washington. Abstract of the report made by A. W. Dow, concerning investigations on asphalt for paving purposes. 1500 w. Eng Rec—May 2, 1903.

Water.—Effect of Water Upon Asphalts. A. W. Dow. A criticism of statements in a paper by Mr. Andrew Rosewater. 2500 w. Munic Engng—Oct., 1905.

ASPHALT PAVEMENT.

See also **ASPHALT; ASPHALT PLANT; PAVEMENT.**

Asphaltum for a Modern Street. S. F. Peckham. Information concerning the deposits and varieties, their origin, refining, etc. Ill. 4300 w. Pop Sci M—Jan., 1901.

A Modern Street. S. F. Peckham. An illustrated article discussing the construction of asphalt pavements, the materials, proper foundations, etc. 3000 w. Pop Sci M—July, 1902.

Factors in Asphalt Paving Construction, Maintenance and Cost. Andrew Rosewater. Interesting statements in regard to the increase of this pavement, the cost, wearing capacity, construction, materials, maintenance, etc. 5000 w. Munic Engng —Sept., 1905.

Asphalt Paving. Andrew Rosewater. Condensed paper read before the Toledo convention of the League of Am. Munic. Discusses the construction, maintenance and cost. 3500 w. Munic Jour & Engr—Oct., 1905.

Baltimore.—See **PAVEMENT.**

Brick Compared.—See **BRICK PAVEMENT—Asphalt Compared.**

Brooklyn.—Some Unusual Experience With Asphalt Pavements. Describes the pavement of Clinton street, Brooklyn, where three distinct pavements were laid in successive layers. A new asphalt pavement is now being laid. 1000 w. Eng Rec—Aug. 5, 1905.

Buffalo, N. Y.—See **Repair; BRICK PAVEMENT.**

Cost.—The Cost of Asphalt Pavements. F. V. E. Bardol. A table giving itemized cost of base, binder and wearing surface of asphalt pavements in 1900 in 44 cities, with a reduction of the figures to a uniform basis for comparison. 900 w. Eng Rec—Feb. 23, 1901.

Granite.—See **PAVEMENT—Bituminous Macadam.**

Heat Effect.—Effect of Heat Upon Asphaltum in Paving Mixtures. F. O. Blake. Shows how easily asphalt may be ruined by overheating. 1000 w. Munic Engng—July, 1904.

La Fayette, Ind.—See **PAVEMENT.**

Macadam.—See **PAVEMENT—Bituminous Macadam; Tar.**

Maintenance.—The Maintenance of Asphalt Streets. Discussion of paper by James N. Hazlehurst. 8500 w. Pro Am Soc of Civ Engrs—Oct., 1902.

The Maintenance of Asphalt Streets. Continued discussion of paper by James N. Hazlehurst. 2000 w. Pro Am Soc of Civ Engrs—Nov., 1902.
See also **Washington.**

New York.—Asphalt Pavements in the Borough of Manhattan, New York. Edward P. North. A review of the statistics of asphalt laid in 10 years under different requirements, pointing to a 15-year guarantee as the most economical term to require. 2400 w. Eng Rec—Nov. 2, 1901.

N. Y. Specifications.—Proposed Changes in the New York Asphalt Paving Specifications. Report of Otto H. Klein submitted to the mayor of New York by the Commissioners of Accounts. It is mainly a comparison of the old and proposed new specifications. 6000 w. Eng News—Feb. 6, 1902.

Criticisms of the New York Asphalt Pavement Specifications. A. W. Dow. Discusses the proposed new specifications submitted by the Engineer of the Commissioners of Accounts. 5500 w. Eng News—Feb. 6, 1902.

The New Specifications for Asphalt Pavements in New York. Extracts from specifications intended to allow free competition while restricting the choice of materials to those suitable for such work. 2400 w. Eng Rec—May 17, 1902.

Railway.—See **PAVEMENT; TRACK—Street.**

Repair, Buffalo.—Repairs to Asphalt Pavements in Buffalo. Extracts from a report by City Engineer F. V. E. Bardol, describing the nature of the failures of asphalt, and methods of preventing and repairing them. 2400 w. Eng Rec—Jan. 5, 1901.

Repair, Chattanooga.—Repairing Asphalt Pavements in Chatanooga. Robert Hooke. Describes methods used and gives illustration of a portable heater designed by the writer. 1700 w. Munic Engng—March, 1901.

San Francisco Specifications.—Specifications for Laying Asphalt Pavements. Gives the new specifications for the laying of asphalt pavements in the city of San Francisco. 1600 w. Cal Jour of Tech—Feb., 1905.

Specification.—See **Cost; New York; San Francisco.**

Test.—See **ASPHALT—Washington; PAVEMENT—Bitumen-Testing.**

Washington, D. C.—Maintenance of Asphalt Pavements in Washington, D. C. Capt. H. C. Newcomer. An explanation of methods used for this work, the prices, etc. 1200 w. Eng News—Feb. 18, 1904.

ASPHALT PLANT.

Detroit.—See **Winnipeg.**

Kingston, Ont.—An Asphalt Plant for Walks and Crossings in Small Cities. H. B. R. Craig. Describes an asphalt plant operated by the city of Kingston, Ont., for the past twelve years. 1000 w. Can Soc of Civ Engrs—Dec. 14, 1905. (Adv. proof.)

Winnipeg.—The Municipal Asphalt Plant at Winnipeg, Man. Description with information concerning cost of plant, maintenance, material, labor, etc. 1400 w. Eng News—April 11, 1901.

The Municipal Asphalt Plant at Winnipeg, Manitoba. R. N. Ruttan. On the cost of the plant and its operation. 1500 w. Am Gas Lgt Jour—May 6, 1901.

Municipal Asphalt Plants. General description, with costs, of plants at Winnipeg and Detroit, visited by Andrew Rosewater, city engineer of Omaha, on a tour of inspection. 1000 w. Eng Rec—Aug. 20, 1904.

ASSAYING.

See also **ANALYSIS—Quantitative; SAMPLING;** and under specific metals.

A Rapid Assay for Silver and Gold in Metallic Copper. George L. Heath. Describes the method, giving results and related information. 2300 w. Trans Am Inst of Min Engrs—Feb., 1901.

"All Fire."—See **Fire.**

Bismuth.—See **BISMUTH.**

Bullion.—The Assaying of Silver-Gold Bullion. H. B. Kaeding. Describes a method adopted by the writer and found to give good results. 1400 w. Min & Sci Pr—Dec. 26, 1903.

Notes on the Assay of Gold Bullion. T. Kirke Rose. A brief account of the principal changes in the assay of gold bullion which have been introduced at the Royal Mint, London, during the last three years. 1800 w. Jour Chem, Met & Min Soc of S Africa.—Aug., 1905.

Chloridized Ores.—Analysis of Chloridised Ores. P. J. Thibault. Deals with a method of proximate analysis of chloridized ores, which are free from arsenic, antimony and lime. 3200 w. Aust Min Stand—Jan. 31, 1901.

Copper.—See **COPPER ASSAY.**

Copper Bullion.—The Assay of Copper Bullion. Thomas B. Swift. Gives details of a method for the determination of gold-silver in copper bullion. The essential point is the preliminary amalgamation of the copper to be assayed. 1200 w. Eng & Min Jour—Nov. 15, 1902.

Cramer's Book.—Cramer's Assaying. L. S. Austin. A review of an old work on assaying by the professor of metallurgy at the Michigan College of Mines. 2500 w. Eng & Min Jour—July 28, 1904.

Crude Oil.—Crude Oil for Fire Assaying. F. C. Bowman. Abstract of a paper read before the Colorado Sci. Soc. An account of experiments with crude oil, and the cost. 600 w. Eng & Min Jour —Feb. 2, 1905.

Cupelling.—The Losses of Silver in Cupelling with Varying Amounts of Lead and Silver. W. H. Kauffman. Reports results obtained in series of experiments made to determine losses. 600 w. Eng & Min Jour—June 14, 1902.

A New Form of Cupel. Joseph Voyle. Describes using a kaolin slab for the cupelling and estimation of minute beads of gold and silver. 900 w. Min & Sci Pr—July 19, 1902.

Cyanide Process.—Notes on the Assay of the Zincy Precipitates Obtained in the Cyanide Process. Charles H. Fulton and Charles H. Crawford. Describes work performed in the endeavor to evolve a short and accurate method which can be used in a custom assay office or mill. Tabulated information of assays made is given. 2700 w. Sch of Mines Quar—Jan., 1901.

Methods of Assaying Cyanide Solutions for Gold. T. Lane Carter. A compilation of methods for determining the gold contents of working cyanide solutions. 800 w. Eng & Min Jour—Nov. 15, 1902.

See also **CYANIDE PROCESS.**

Electrolytic.—See **COPPER ASSAY.**

Error Sources.—Sources of Error in the Fire Assay of Gold and Silver Ores. P. G. Morgan. Calls attention to the various sources of error, avoidable and unavoidable, discussing their probable amount and the remedies. 5800 w. N Z Mines Rec—Nov. 17, 1902.

Fine Crushing.—Note on the Influence of Fine Crushing on the Assay Value. A. Whitby. A report of the result of experiments, with short discussion. Oct., 1904.
1100 w. Jour Chem, Met & Min Soc of S Africa—

Fire.—An "All-Fire" Method for the Assay of Gold and Silver in Blister-Copper. Walter G. Perkins. Describes the process used and states the advantages of the method. 1500 w. Trans Am Inst of Min Engrs—Oct., 1902.

Fire Assaying. Evans W. Buskett. Describes the apparatus commonly used and the methods, the reagents, and some of the reactions. Ills. 2000 w. Mines & Min—Sept., 1904.

Correcting an Error in the Fire Assay. Charles Finley Easton. Discusses the unavoidable errors in fire assay, and describes an improvement which is based on the recovery of losses of gold by cupellation, giving results of some experiments. 2800 w. Min Rept—May 18, 1905.

Correcting an Error in the Fire Assay. Charles Finley Easton. Gives experiments and details of operations in the use of a method explained in detail in an earlier article. 2000 w. Min Rept—June 2, 1905.

Flux.—A System of Fusing Ores for Assaying. Arthur Lachman. Abstract from the "California Jour. Tech." Gives the writers's schemes for calculating in advance the best flux for any given ore. 2000 w. Min & Sci Pr—March 5, 1904.

Furnace.—See **FURNACE.**

Iodimetric.—The Iodimetric Determination of Gold in Dilute Solution. Ralph N. Maxson. Gives results of experimental investigations. 1800 w. Am Jour of Sci—Aug., 1903.
See also **COPPER ASSAY.**

Kansas Shales.—Tests for Gold and Silver in Shales from Western Kansas. Waldemar Lindgren. Abstract of a bulletin of the U. S. Geol. Survey. Gives an acount of the investigations, methods of testing, results, etc. 3000 w. Eng & Min Jour—July 26, 1902.

Lead.—The Determination of Lead in Ores by Fire Assay. W. Lay. Concerning the sources of error in the fire assay. 1700 w. Can Min Rev—May 31, 1901.

On the Determination of Lead in Ores. Irving C. Bull. A comparison of the best existing methods in order to select a method which may be recommended both because of its accuracy and rapidity. 4300 w. Sch of Mines Qr—July, 1902.

Volumetric Determination of Lead. W. W. Dods. A commentary on H. H. Alexander's method of standardizing in the volumetric determination of lead by ammonium molybdate solution. 2000 w. Aust Min Stand—Oct. 30, 1902.

The Chemical and Fire Methods of Determining Lead in Ores. R. F. McElvenny and G. A. Izett. Discusses various wet methods, aiming to determine their efficiency and defects, and to find one applicable to present needs. Serial. 1st part. 1800 w. Min Rept.—July 2, 1903.

The Commercial Assay of Lead Ores. A. W. Warwick. Read at meeting of the Colorado Sci. Soc. Also discussion. Briefly considers the fire assay, which the writer considers inaccurate; and the volumetric method, which he considers sufficiently accurate for all commercial purposes. 2200 w. Min Rept—July 9, 1903.

The Reduction of Lead from Litharge in Preliminary Assays, and the Advantages of an Oxide Slag. E. H. Miller, E. J. Hall, and M. J. Falk. A study of this subject, giving conclusions of the tests described. 3000 w. Trans Am Inst of Min Engrs—Oct., 1903.

The Commercial Wet Lead-Assay. H. A. Guess. Gives results of extensive laboratory experiments, during which a new method was developed, and tested with all kinds of pure and impure lead-ores and products. 4500 w. Trans Am Inst of Min Engrs—Sept., 1904.

The Commercial Wet Lead-Assay. Discussion of paper by H. A. Guess. 1200 w. Am Inst of Min Engrs—May, 1905.

See also **COPPER ASSAY—Electrolytic.**

Mercury.—See **MERCURY—Determination.**

Muffle Furnace.—See **FURNACE—Muffle.**

N. Y. Office.—See **ASSAY OFFICE.**

Resampled Ores.—Some Assay Results on Resampled Ores. Howard C. Parmelee. Read before the W. Assn. of Tech., Chem. & Met. Gives tabulated statement of results, and deductions drawn. Also discussion. 3000 w. Min Jour—Dec. 2, 1905.

Sampling.—See **SAMPLING.**

Sea Water.—The Detection and Estimation of Small Quantities of Gold and Silver. Luther Wagoner. A detailed account of method employed in measuring approximately the amount of gold and silver contained in one cubic centimeter of sea-water, and some of the results obtained. 4000 w. Trans Am Inst of Min Engrs—Nov., 1901.

Silver.—The Determination of Silver in the Sulphide Ores and Concentrates of the Slocan. D. Lay. A comparison of pot and scorification assays. 2000 w. B C Min Rec—Sept., 1904.

Determination of Silver in Ores in the Wet Way. F. Altneder. Describes an assay method for prospectors which dispenses with the heavy assay outfit and necessary accessories and with the expensive and delicate assay balances. 1200 w. Min & Sci Pr—Nov. 26, 1904.

Silver, Tin, Copper Alloy.—Assaying Argentiferous-Tin-Copper Alloys. P. J. Thibault. Report of an unsuccessful attempt to apply the method used for the dry determination of silver in tin-lead alloys and metallic tin, to the alloys named. 700 w. Aust Min Stand—Nov. 15, 1905.

Standard Form—A Standard Assay Certificate Form. Submits a form suggested for assay returns, discussing the deficiencies of the forms usually employed. 1800 w. Min & Sci Pr—Dec. 14, 1901.

Tin.—Determination of Tin in Tailings and Slimes. George L. Mackenzie. Read before the Inst. Min. & Met. Gives details of the scheme of assay employed by the writer. 2000 w. Min Rept—Feb. 4, 1904.

Determination of Tin in Tailings and Slimes. George L. Mackenzie. Abstract of a paper before the Inst. of Min. and Met. Describes the scheme of assay employed by the writer. 1300 w. Eng & Min Jour—June 9, 1904.

On the Assay of Tin. J. H. Collins. Abstract of a paper read before the Inst. of Min. and Met. Briefly describes recent experiments showing that some varieties are soluble. 600 w. Eng & Min Jour.—June 9, 1904.

The Assaying of Tin and Terne Drosses. George P. Maury. Brief description of the preparation of the samples, the assay, and the analysis of the button from the assay. 1300 w. Pro Engrs' Soc of W Penn—March, 1905.

Assaying Tin and Tin-Lead Compounds. P. J. Thibault. Gives results of experimental investigations of the dry determination of silver. 1800 w. Aust Min Stand—Aug. 9, 1905.

U. S. Mint—Assaying of Gold and Silver at the United States Mint. John W. Pack. An explanation of the methods employed. 3000 w. Min & Sci Pr—Nov. 14, 1903.

Volumetric Standard.—Volumetric Standards for Technical Work. W. J. Sharwood. Showing how limited is the number of fundamental substances which are actually required to standardize the more important solutions in ordinary use. 1200 w. Cal Jour of Tech—Oct., 1904.

Weights.—The Assay Weight and Its Relation to the Balance of Precision. A. Whitby. On the difficulty of obtaining weights of sufficient accuracy for the requirements of the more sensitive balance now used. General discussion. 5500 w. Jour Chem Met & Min Soc of S Africa—Aug., 1904.

Zinc.—The Determination of Lead, Iron, Lime, Sulphur, Cadmium and Copper in Commercial Zinc Ores. W. Geo. Waring. Description of analytical methods. 3000 w. Eng & Min Jour—Aug. 25, 1904.

The Volumetric Determination of Zinc. Reviews the paper of W. George Waring in the "Jour. of the Am. Chem. Soc," giving extracts. 1200 w. Eng & Min Jour—July 28, 1904.

A Crucible Charge for Gold and Silver in Zinc Ores. E. J. Hall and E. Popper. A report of investigations made to eliminate trouble in the scorification method of assaying zinc ores for the precious metals. 500 w. Sch for Mines Qr—July, 1904.

The Assaying of Zinc Ores as Carried On in the Joplin District, Missouri. E. W. Buskett. Describes the laboratory equipment and methods commonly used. 2500 w. Mines & Min—Oct., 1905.

Zinc Box Residue.—The Assay of Zinc-Box Residues from the Cyanide Process. Richard W. Lodge. Describes experiments made at the Massachusetts Institute of Technology. 5000 w. Trans Am Inst of Min Engrs—Oct., 1903.

ASSAY OFFICE.

New York.—The New York Assay Office. An illustrated article giving information concerning this interesting office and the methods in use there. 1200 w. Sci Am—Feb. 15, 1902.

Seattle, Wash.—The United States Government Assay Office at Seattle. A. W. Dee. Concerning the equipment of this office and its method of procedure. Ill. 1700 w. B C Min Rec—Nov., 1901.

Vancouver.—Dominion Assay Office in Vancouver. Alfred W. Dyer. Describes the office and the process; the operations are conducted in full view of the depositor of gold dust. 2300 w. B C. Min Rec—Aug., 1901.

ASTRONOMY.

Stereoscope.—See **SURVEYING—Photographic.**

ATHERMIC MOTOR.

See **MOTOR—Athermic.**

ATOM.

See **CHEMISTRY; ELECTRON; ELECTRO-PHYSICS; MATTER; PHYSICS; RADIOACTIVITY; RADIOGRAPHY.**

AUDITORIUM.

Acoustics.—See **ACOUSTICS.**

AUER LIGHT.

See **INCANDESCENT GAS LIGHTING.**

AURITE.

See **GOLD—Aurite.**

AUSTRALIA.

Australian Federation and the British Manufacturer. Stafford Ransome. Points out the difficulties of a satisfactory business with Australia, how some have been removed, and how those remaining may be. 4400 w. Engr, Lond—Oct. 18, 1901.

AUTOBOAT.

See **BOAT; BOAT, GASOLINE; BOAT RACE.**

AUTOMATIC STOKER.

See **MECHANICAL STOKING.**

AUTOMOBILE.

See also **AUTOMOBILE COMPETITION; AUTOMOBILE ELECTRIC; AUTOMOBILE EXHIBITION; AUTOMOBILE GASOLINE; AUTOMOBILE RACE; AUTOMOBILE, STEAM; AUTOMOBILE TOUR; AUTOMOBILE TROLLEY; MOTOR CYCLE.**

The Automobile. Harold H. Eames. Considers the future of this industry more likely to be determined by commercial considerations than by any mechanical advance. 4500 w. Elec Wld & Engr—Jan. 5, 1901.

Automobiles. Hiram Percy Maxim. Discusses four classes of city transportation where motor vehicles should prove more satisfactory than the horse. Also general discussion. 12400 w. Ill. Pro Engrs' Soc of W Penn—April, 1902.

Automobiles. Hiram Percy Maxim. Discusses the real field of the automobile, especially in urban or city transportation. 2200 w. Am Mfr —April 3, 1902.

Motor Cars. Alexander Govan. Deals with the various parts of the motor car from the time it commenced to be adopted for every day use, considering principally petrol-driven vehicles. 4 plates. 8500 w. Trans Inst of Engrs & Shipbldrs in Scotland—April 26, 1904.

Acceleration.—Acceleration of Automobiles. L. M. Aspinwall. Considers means of determining the power necessary to accelerate a vehicle of a given weight. 1300 w. Horseless Age—March 12, 1902.

Accidents.—The Causes of Automobile Accidents. M. C. Krarup. A presentation of the principal new factors introduced through automobilism, and affecting the safety of traffic on the highways. Serial. 1st part. 4200 w. Horseless Age —July 16, 1902.

See also **Legislation; Public Relations; Stability.**

Accumulator.—See **AUTOMOBILE, ELECTRIC; STORAGE BATTERY.**

Acetylene Searchlight.—See **HEADLIGHT—Acetylene.**

Agriculture.—Motor Carriers for Small Crops. G. Lacy Hillier. The advantages of these vehicles for handling small crops and supplies are discussed. 2000 w. Autocar—April 11, 1903.

See also **AGRICULTURAL MACHINERY; OIL ENGINE—Cardiff Trials; TRACTION ENGINE.**

Air Cooling.—See **AUTOMOBILE GASOLINE.**

Air Cushion.—See **Pneumatic Hub; Pneumatic Shock Absorber; AUTOMOBILE, GASOLINE—Twombly.**

Albion Lubricator.—See **LUBRICATION—Automobile.**

Alcohol.—See **ALCOHOL; ALCOHOL MOTOR; CARBURETTER.**

Alcohol vs. Gasoline.—See **ALCOHOL MOTOR—Gasoline Compared.**

Aluminum Bodies.—Rushing Metal Body Work on Show Cars. An illustrated article describing the rapid work done in some of the factories in making aluminum bodies for the cars to be on exhibition at Chicago and New York. 3000 w. Automobile—Jan. 16, 1904.

American.—The Automobile in America. Brief illustrated descriptions of several heavy vehicles. 2500 w. Auto Jour—April, 1901.

The Automobile Industry in the United States. A symposium describing its present condition, with descriptions and illustrations of various types of vehicles, and a brief review of the industry abroad. 11000 w. Elec Rev, N. Y.— April 13, 1901.

See also **Racing Types.**

American Touring.—Typical American Touring Cars for 1905. Illustrated descriptions of various types. 5700 w. Sci Am—Jan. 28, 1905.

Army.—See **Artillery; Military.**

Artillery.—A Motor Field Battery. Abstract of a paper read before the Royal Artillery Institution by Major H. A. Bethell. A discussion of the advantages and objections; giving also the details of a design for hauling guns by motor vehicles, which seems to promise well. 3000 w. Autocar— March 16, 1901.

A Motor Field Battery. H. A. Bethell. Discusses the advantages and objections to the steam car for military purposes. 4000 w. Auto Jour— April, 1901.

The Schneider-Canet du Bogage Automobile Battery of Quick-Firing Howitzers. Illustrations, with brief description. 600 w. Engng—Nov. 25, 1904.

Axle.—See **AXLE—Automobile.**

Baggage Car.—See **CAR—Automobile Carrying.**

Bakery.—See **Military Bakery.**

Balance Gear.—See **AUTOMOBILE GEAR.**

Battery.—See **Artillery; Military.**

Ball Bearings.—See **Bearings.**

Bearings.—Ball Bearings, Big Wheels, and Other Matters. A discussion of motor car development, comparing the experimental results of Prof. Vernon Boys with the results obtained by calculation by Dr. Luxenberg and drawing conclusions regarding the general aspects. 2500 w. Auto Jour—Feb., 1901.

Adjustable Bearings a Requisite of the Practical Automobile. Albert L. Clough. Gives the writer's views and also a brief editorial disagreeing with some points. 1500 w. Horseless Age—Sept. 17, 1902.

Belt Transmission.—Flexible Transmission for Motor Vehicles. Sidney Russell. An illustrated review of belt-driven vehicles is given in this article. 6000 w. Trac & Trans—Sept., 1904.

See also **AUTOMOBILE, GASOLINE—Benz.**

Body.—Touring Car Bodies. Leon Auscher. Read before the Automobile Congress at Dijon. Considers the touring vehicle with seats for three to five persons. Ill. Serial. 1st part. 2400 w. Horseless Age—June 11, 1902.

Features of Body Construction in Recent Foreign Machines. Hugh D. Meier. Notes on recent improvements tending to added comfort. Ill. 1200 w. Horseless Age—July 30, 1902.

Artistic Body Building Methods. An illustrated article describing methods of designing and finishing in a Chicago carriage-building factory. 2500 w. Automobile—Feb. 25, 1905.
See also Aluminum Body; Closed Body.

Brake.—See AUTOMOBILE COMPETITION—Stopping Tests; BRAKE—Automobile.

Brightmore.—See AUTOMOBILE—Steam.

British.—A New British Autocar. Illustrated description of a new design. 800 w. Autocar—Nov. 16, 1901.

British Industry.—Automobiles and Motor Boats. Extracts from an address by S. F. Edge on the conditions and prospects of the British automobile industry with a few words on motor boats. 3500 w. U. S. Cons Repts, No. 1829—Dec. 18, 1903.

Buckboard.—See AUTOMOBILE, ELECTRIC; AUTOMOBILE, GASOLINE.

Business.—See Delivery Wagon; France; Industrial; Truck; AUTOMOBILE, ELECTRIC; AUTOMOBILE, GASOLINE; AUTOMOBILE, STEAM.

Canada.—The Automobile Industry and Its Development in Canada. Briefly discusses the subject in general, and the progress in Canada. Ill. 3300 w. Can Elec News—March, 1901.

Canopies.—See Hoods.

Care.—How to Keep a Car in Idleness. Directions for the cleaning and care of a car which is to be out of use for several months. 1500 w. Automobile—Nov. 28, 1903.

The Cost, Care and Upkeep of a Motor Car. A paper by Dr. Gilpin, read before the Lincolnshire Auto. Club. 2000 w. Autocar—Feb. 6, 1904.
See also Cleaning; AUTOMOBILE, ELECTRIC.

Carriage Compared.—See Railway Compared.

Chair.—See CHAIR—Motor.

Chronograph.—See CHRONOGRAPH.

Classification.—The Rational Classification of Motor Vehicles. Albert L. Clough. Considers the only logical method of classification to be on the basis of the ratio of the actual maximum horse power capable of being continuously delivered by the motor to the total weight carried. 1200 w. Horseless Age—Jan. 1, 1902.

Classes in Competition and Races. Henry Sturmey. Considers the difficulties of classification, weight versus price, workable classification, and regulations for weighing. 2700 w. Autocar—April 15, 1905.

Cleaning.—The Automobilist's Spring Cleaning. Albert L. Clough. Suggestions relating to the preparation of motor vehicles which have been out of use, for their period of activity. 2500 w. Horseless Age—March 5, 1902.
See also Care.

Closed Bodies.—Closed Automobile Bodies.—Their Development and Present Styles. Illustrations and brief descriptions of interesting types. 2000 w. Automobile—Feb. 13, 1904.

Clutch.—See AUTOMOBILE GEAR.

Commercial.—See Delivery Wagon; France; Industrial; Truck; AUTOMOBILE, ELECTRIC; AUTOMOBILE, GASOLINE; AUTOMOBILE, STEAM.

Competition.—See AUTOMOBILE COMPETITION; AUTOMOBILE EXHIBITION; AUTOMOBILE RACE.

Compressed Air.—See Omnibus, Paris.

Construction.—International Automobile Construction. A review of the novel constructions exhibited recently in Paris. Ill. 1700 w. Auto Topics—Feb. 15, 1902.

Automobiles (Les Automobiles). M. Forestier. A general review of the present state of automobile construction based on the exhibits at the Paris Exposition of 1900. 15,000 w. Ann des Ponts et Chaussées—2 Trimestre, 1902.

Marching Toward Simplicity in Automobile Construction. A. R. Sennett. Extracts from an address to the Royal Auto. Clubs of Gr't Brit. and Ireland. Calling attention to the evolution which has taken place. 2500 w. Automobile—April 4, 1903.

Influence of Carriage Styles on the Construction of Automobiles. Marcus C. Krarup. A discussion of types and development in automobile design, with illustrations. 4700 w. Automobile—April 11, 1903.

Developments in Automobile Construction. T. Clarkson. Especially considers vehicles weighing from half a ton to two tons, the working conditions of commercial automobilism, &c. Serial. 1st part. 3000 w. Engr, Lond—Sept. 25, 1903.

Automobile Construction. Hugh Dolnar. The first article is introductory to a series describing methods and construction routine. 700 w. Am Mach—Oct. 8, 1903.

Developments in Automobile Construction. Thomas Clarkson. Read before the British Assn. Discusses details, especially in cars for express or passenger service, the various types of motor and their advantages, etc. Ill. 7500 w. Engng—Dec. 18, 1903.

Show Hints for Intending Buyers. Rene M. Petard. Begins an illustrated discussion of the vital parts of car construction. 2400 w. Automobile—Jan. 30, 1904.

Automobile Construction. F. C. Mason. The first of a series of articles which will give an illustrated description of a light gasolene touring car, and also a runabout which will be cheap and easy to build. Serial. 1st part. 600 w. Am Mach—Vol. 28, No. 51.

See also STEEL—Automobile Construction.

Controlling Mechanisms.—The Standardization of Controlling Mechanisms. Albert L. Clough. Urges the general adoption of that method which offers the most advantages. 1200 w. Horseless Age—Jan. 8, 1902.

Country Work.—Motor Cars for Country House Work. F. Strickland. A study of the requirements for such service. 2000 w. Autocar—July 15, 1905.

Crank Shafts.—See CRANK SHAFTS—Machine Work.

Curve Stability.—See Skidding; Stability.

Cylinder Cooling.—See AUTOMOBILE GASOLINE—Air Cooling; Cooling; Non-Freezing Liquids; Radiator.

Delivery Wagon.—See Industrial; AUTOMOBILE, ELECTRIC; AUTOMOBILE, GASOLINE.

Design.—Design and Workmanship. Albert L. Clough. Considers the failures due to design and to faulty material and workmanship in the progress of the automobile industry. 1100 w. Horseless Age—Aug. 27, 1902.

Comparison of Certain 1902 Design Automobiles with Others Made in 1901 and 1902. George Otis Draper. The writer having used both steam and gasoline machines notes the relative troubles and gives conclusions. 1300 w. Horseless Age—Nov. 12, 1902.

Some Problems of the Automobile. Frederic Remsen Hutton. A simple discussion of fundamental principles of car and motor design in locomotion on the highways. Serial. 1st part. 1800 w. Automobile—May 6, 1905.
See also Construction; Winter Use.

Devices.—Popular Motor Cars. Mervyn O'Gorman. Discusses devices used on motor cars, popular prejudices, &c., and urges that some discarded devices be considered. General discussion. 6000 w. Jour Soc of Arts—April 22, 1904.

Driving Power.—See Power.

Dust.—See DUST—Automobile; ROAD—Oil Sprinkling.

Economy.—The Prospects for Economical Automobiling. M. C. Krarup. Discusses the outlook, the difficulties involved, etc. 3500 w. Ir Age—April 25, 1901.

See also Fuel Economy.

Electric Railway Compared.—See ELECTRIC RAILWAY—Automobile Compared.

Electric Timing.—See CHRONOGRAPH.

Electric Transmission.—See AUTOMOBILE GEAR.

Electrogenia.—See AUTOMOBILE GEAR—Electric.

Engines.—Steam and Gas Engines in Automobiles. R. H. Thurston. A discussion of some of the difficulties met in self-propelled vehicles. 2700 w. Horseless Age—Nov. 7, 1900.

Equalizing Levers.—See **Six Wheeled.**

Europe.—Automobiles in Europe. Information relating to the roads, recent machines, accidents, associations, and special press. 2400 w. U. S. Cons. Repts, No. 1095—July 24, 1901.

Exhibition.—See **AUTOMOBILE EXHIBITION.**

Experience.—Commonplace Automobile Experience. An acount of troubles of various sorts, and some of the causes. 2200 w. Horseless Age—Nov. 6, 1901.

Some Automobile Experience by a Country Physician. Willets P. Haines. Gives experience with gasoline and steam vehicles. 2000 w. Horseless Age—Nov. 6, 1901.

Two Years' Experience with Two Gasoline Wagons. Dr. George P. Jesup. An account of things learned, cost, &c. Considers the automobile an ideal but rather expensive conveyance. 1500 w. Horseless Age—Nov. 6, 1901.

Practical Automobile Experience. Dr. Charles H. Lemar. Gives facts from a physician's experience, not very encouraging for doctors of moderate incomes. 1200 w. Horseless Age—Nov. 6, 1901.

The Troubles and Pleasures of an Inexperienced Beginner With a Gasoline Automobile. Harry B. Haines. A report of experiences while learning to manage the machine. 2800 w. Horseless Age—Jan. 22, 1902.

Suggestions to the Inexperienced. A D. River. A discussion of the principles of the gasoline car for the benefit of novices. Ills. Serial. 1st part. 2400 w. Automobile—May 14, 1904.

See also **Troubles; Winter Use.**

Feeder to Railways.—See **Railway Feeders.**

Fire Engine.—See **FIRE ENGINE—Automobile.**

Fischer.—The Fischer Omnibus. Illustrations, with description of a large vehicle in which a gasoline engine drives an electric generator, which in turn furnishes current to a storage battery and motors. Also account of a run. 2500 w. Auto Jour—June 14, 1902.

The Fischer Motor Vehicle Combination System. Illustrates and describes a system claiming the advantages of the electric and gasoline combined, while the disadvantages of each are practically eliminated. 900 w. Ir Age—Aug. 28, 1902.

A Forty-Passenger Automobile. Illustrated detailed description of a sightseeing automobile on the Fischer gasoline-electric system. 1200 w. Ir Age—Sept. 22, 1904.

See also **Gasoline-Electric.**

Five-Wheeled.—A Novel Five-Wheeled Automobile. Illustrates and describes a vehicle propelled by a drum-like fifth wheel under its center. 700 w. Sci Am—May 13, 1905.

Fore-Carriage.—A Novel Automobile Fore-Carriage. From "La Locomotion." An illustrated description of a novel mechanism which transforms the usual horse-drawn vehicles into motor machines, and is also used on automobiles giving great facility in steering and operation. 3800 w. Sci Am Sup—Oct. 11, 1902.

See also **AUTOMOBILE, ELECTRIC—Tractor; AUTOMOBILE, STEAM—Brightmore.**

France.—Heavy Motor Traffic in France. Georges Forestier. Address before the Liverpool Self-Propelled Traffic Assn. A general review of automobilism in France, and closely related topics. 11200 w. Auto Jour—Dec., 1900.

Motor Cars in Paris. Discusses the progress being made in motive power, in transmission gears and other details. 1300 w. Engr, Lond—March 8, 1901.

General Characteristics of French 1902 Models. L. D. Makes a classification of the pleasure vehicles and investigates each class. Serial. 1st part. Horseless Age—Dec. 4, 1901.

The Automobile in France To-day. Hart O. Berg. Abstract of a lecture, delivered at the Automobile Club of America. 4300 w. Auto Mag—Jan., 1902.

The Automobile in 1902 (L'Automobile en 1902). G. Lavergne. The first of a series of articles discussing in detail the latest improved forms of French automobiles. The first instalment treats of the elements of the internal combustion motor for automobiles. 6000 w. Rev Gen des Sciences—Sept. 15, 1902.

Motor Car Developments in France. A review of the progress during the year, as shown in the vehicles on exhibition at the Paris show of motor vehicles, with remarks on features of interest. Ill. Serial. 1st part. 2000 w. Engr, Lond—Dec. 19, 1902.

Autombilism in 1903 (L'Automobilisme en 1903). Gérard Lavergne. A review of automobile affairs in France during the current year, including the meetings, exhibitions, etc., and an account of improvements in details of vehicle and motor construction. 4000 w. Rev Gen des Sciences—Sept. 30, 1903.

Motor Car Progress in France. The present article discusses the perturbed condition of the French industry and its causes, comparing English with French progress. Serial. 1st part. 2000 w. Engr, Lond—Dec. 22, 1905.

See also **Industrial; Light; AUTOMOBILE EXHIBITION—Paris.**

Friction Clutch.—See **AUTOMOBILE GEAR.**

Friction Drive.—See **AUTOMOBILE GEAR.**

Fuel.—See **FUEL—Automobile; Coal Tar and Spirits; LIQUID FUEL—Automobile; Benzol.**

Fuel Economy.—Fuel Economy in Car Driving. E. W. Walford. Suggestions showing the good and bad methods. 2800 w. Autocar—May 27, 1905.

Fuel Tests.—See **AUTOMOBILE COMPETITION—French Fuel; LIQUID FUEL.**

Gasoline—Electric.—Improved Generating Set for Mixed Automobiles (Nouveau Groupe Electrogène pour Automobiles Mixtes). J. A. Montpellier. Describing a combination of de Dion-Bouton gasoline motor and an electric generator for use on an electric automobile. 1500 w. L'Electricien—Dec. 6, 1902.

Petrol-Electric Automobiles—The Mixed System. J. Sutherland Warner. The present article describes the advantages and disadvantages of the petrol car and also of the electric vehicle, as introductory to a description of a combined system. Serial. 1st part. 1800 w. Elec Times—Oct. 1, 1903.

Gaso-Electric Equipment for Fifth Avenue Bus. Illustrates and describes the motive power equipment of this thirty-passenger vehicle. 1500 w. St Ry Jour—Dec. 21, 1905.

See also **Fischer; Krieger; Lohner-Porsche; AUTOMOBILE GEAR—Electric; CAR, MOTOR-DRIVEN.**

Gear.—See **Steering Gear; AUTOMOBILE GEAR; GEAR; VARIABLE SPEED.**

Germany.—Automobilism in Prussia. Concerning the motor carriage exposition at Berlin, giving general description, and discussing progress made. 2000 w. U S Cons Repts—June 26, 1902.

Automobilism (Ueber Selbstfahrwesen). Captain Engels. A paper before the Verein für Eisenbahnkunde giving illustrated descriptions of various styles of gasoline and steam vehicles, and advocating their use instead of light railways in Germany and her colonies; with discussion. 10000 w. Glasers Annalen—July 1, 1902.

See also **Industrial.**

Halford.—See **Wheel, Spring.**

Headlight.—See **HEADLIGHT.**

Heavy.—Heavier Construction. Hugh D. Meier. Advocating the heavier construction of automobiles and explaining the advantages. 1300 w. Horseless Age—Oct. 16, 1901.

See also **France; Industrial; Road; Truck; AUTOMOBILE COMPETITION—Liverpool.**

Highway Law.—See **Legislation; Public Relations.**

Hill Climbing.—See **AUTOMOBILE COMPETITION.**

History.—Mechanical Road Vehicles. W. Worby Beaumont. A review of the achievements in this field, especially since 1896. Serial. Part I. 6400 w. Jour Soc of Arts—Oct. 16, 1903.

See also **AUTOMOBILE GEAR—Compensating; AUTOMOBILE, STEAM.**

Hoffman.—See **STEAM GENERATION.**

Hoods.—Hoods and Canopies. A. J. Wilson. Remarks on the comfort and convenience of these additions to motor vehicles, illustrating some designs. 1800 w. Autocar—Dec. 5, 1903.

Horse-Power.—See Power.

Housing.—See Winter Use; AUTOMOBILE GARAGE.

Hub Motor.—See Lohner-Porsche; AUTOMOBILE, ELECTRIC.

Ignition.—See AUTOMOBILE, GASOLINE—Exhaust Valve; IGNITION.

Industrial.—The Heavy Auto-Truck in Great Britain and the United States. Robert Bodman. Considers the methods in Gt. Britain and compares the conditions with those prevailing in the United States; the possibilities of its proving a paying investment, and gives the writer's views. 2000 w. Horseless Age—Nov. 7, 1900.

Commercial Automobile Vehicles. George E. Walsh. Reviews the present condition and future outlook for this class of vehicles. 1300 w. W Elect'n—Dec. 22, 1900.

Early Developments. William H. Maxwell, Jr. Showing the practicability of the commercial vehicle, and that it is cheaper than the horse. Illustrates three trucks. 3000 w. Auto Mag—Jan., 1901.

The Motor Wagon for Business and a New Power Transmission Device. A. H. Chadbourne. Discusses the requirements of the successful motor wagon, and describes some new devices. Ill. 2500 w. Auto Mag—Jan., 1901.

Automobiles in Business. R. H. Thurston. On the conditions to be met, the requirements, and principles demanded for success; with a comparison of various kinds of motive power. 3000 w. Horseless Age—Feb. 6, 1901.

Mechanically Driven Wagons for the Transportation of Merchandise. Henri G. Chatain. Classifies the merchandise to be transported, and discusses the motive powers best suited to the work, giving the first place to steam. 1400 w. Horseless Age—Feb. 6, 1901.

The Influence of Climate, Road and Load Conditions on Business Automobile Design. Walter L. Bodman. Considers the difficulties to be met in the manufacture of these vehicles, the cost of the work, etc. 5000 w. Horseless Age—Feb. 6, 1901.

Merchandise Transport by Automobile Trucks (Transport par Cannons Automobiles). M. Bret. An examination of the various types of motor trucks with regard to their availability for service in the streets of Paris. 10000 w. Ann des Ponts et Chaussées—2 Trimestre, 1901.

The Business Vehicle Problem. Robert G. Pilkington. Discusses the general form of delivery wagon, and the applications. 2000 w. Horseless Age—Jan. 1, 1902.

Industrial Motor Cars in France. An illustrated article explaining the development of the motor car industry in France, and giving much information in regard to places where successful service of heavy vehicles has been established, considering the types used, motive power, &c. 3800 w. Engr, Lond—Feb. 28, 1902.

Motor Delivery and Trucking in New York City. Harry E. Day. Reports of various users in Greater New York, not very favorable to their efficiency. 5000 w. Horseless Age—April 16, 1902.

Some Recent German Lurries. Illustrates and describes some modern heavy vehicles which present peculiarities of interest. 2000 w. Auto Jour—Aug. 9, 1902.

Industrial Motor Cars in France. The first of a series of articles on the progress shown in these vehicles as illustrated at the recent trials. Describes and illustrates some of the cars. Serial. 1st part. 2100 w. Engr, Lond—Dec. 5, 1902.

The Development of the Commercial Gasoline Automobile. Albert L. Clough. Discusses the fuel question, the tire problem, traction in snow, and intelligent operators. 2000 w. Horseless Age—Feb. 4, 1903.

Commercial Self-Propelled Vehicles. Walter L. Bodman. An illustrated article considering the advantages of the motor wagon over horse-drawn vehicles with details of a proposed type of steam commercial vehicle. 1500 w. Automobile—March 7, 1903.

Motor-Vans for Railway Companies. Brief illustrated descriptions of vehicles designed to replace horse-drawn vans for goods collection and delivery. 2000 w. Transport—April 3, 1903.

Motor Transport for Goods. Douglas Mackenzie. A report of the present condition of this field in England. Serial. 1st part. 3800 w. Prac Engr—Oct. 16, 1903.

Commercial Vehicles Practically Considered. Hiram Percy Maxim. Read before the Auto Club of America. A discussion of the present state of the art of construction and details of cost of operation. Serial. 1st part. 2000 w. Automobile—March 26, 1904.

The Inwardness of Automobilism. M. C. Krarup. An examination of the deficiencies of present machines, deprecating the fact that pleasure vehicles have turned attention away from permanent improvements. The importance of better tires and fuels is emphasized. 4000 w. Iron Age—May 5, 1904.

The Automobile in Business. J. A. Kingman. Considers these vehicles as used in New York City; the cost and the expense of running, and the general operation. Ill. 3800 w. Rev of Revs—June, 1904.

Recent English and French Merchandise and Passenger Wagons (Neuere Englische and Französische Motorwagen für Personen und Güter). A. Heller. Illustrating recent trucks, lurries, fire-engines and commercial vehicles. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—June 4, 1904.

The Latest Types of Industrial Motor Vehicles. Lucien Périssé. A review of Continental and British practice, with numerous illustrations of successful freight and passenger automobiles. 4500 w. Engineering Magazine—March, 1905.

Foreign Automobile Trucks. Emile Guarini. Illustrated descriptions of some of the trucks exhibited at the Belgian Automobile Exhibition in Brussels. 1500 w. Sci Am Sup—March 25, 1905.

Motor Vehicles for Industrial Use on Streets without Tracks (Motorisch Betriebene Fahrzeuge auf Schienenlosen Strassen für Industrielle Zwecke). Karl Rubricius. Illustrating numerous types of industrial vehicles with data concerning their performance. 3500 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—May 6, 1905.

Notes on the Use of Commercial Cars. Henri G. Chatain. Suggestions for the proper working of these cars, their care and operation. 2000 w. Automobile—Aug. 10, 1905.

Typical Commercial Vehicles on Sale. Gives information concerning the work of these cars, and illustrates and describes a number of types. 8000 w. Automobile—Aug. 10, 1905.

Industrial Automobiles. A. Frederick Collins. Illustrates and describes some interesting English vehicles of this class. 2000 w. Sci Am Sup—Oct. 14, 1905.

See also Construction; Municipal; Operating Costs; Quarry; AUTOMOBILE COMPETITION; AUTOMOBILE, ELECTRIC; AUTOMOBILE, GASOLINE; AUTOMOBILE, STEAM.

Japan.—Automobiles in Japan. An account of the vehicles seen, the facilities for securing supplies, the roads, repairs, etc. 1800 w. Horseless Age—June 12, 1901.

Jeantaud.—See AUTOMOBILE GEAR—Electric.

Journal Friction.—See Bearing; FRICTION.

Kerosene.—See AUTOMOBILE, GASOLINE; LIQUID FUEL—Automobile.

Krieger.—Electric Automobile—Krieger System. Illustrated description of one of the latest types. 600 w. Sci Am—June 8, 1901.

A Gasoline Electric Automobile. Emile Guarini. Illustrated detailed description of the Krieger 20 h.-p. gasoline-electric automobile with particulars. 1400 w. Sci Am Sup—Aug. 27, 1904.

Krieger Petrol Electric Motor-Car. Illustrated description of a car using a dynamo driven by a petrol motor, without any auxiliary battery for the supply of power. 1500 w. Engng—April 7, 1905.

Lamp.—See HEADLIGHT—Automobile.

Lawn Mower.—See LAWN MOWER.

Legislation.—Automobile Regulations in Europe. A synopsis of the laws governing automobile traffic in the various countries. 7800 w. U S Cons Repts, No. 1490—Nov. 8, 1902.

The Motor and the Birthright of the Highway. Walter B. Woodgate. Discusses the English common-law positions of motorists and the non-motoring public; the proposed legislation and relative matters. 5,500 w. Nineteenth Cent—July, 1903.

British Motor-Car Act. Abstracts of an editorial in the Birmingham "Daily Post," giving an idea of the scope and intentions of the act. 1500 w. U S Cons Repts, No. 1774—Oct. 14, 1903.

The Motor Car Act and Regulations. W. Valentine Ball. Deals with the provisions of the English Motor Car Act, 1903, and the regulations made under it, with a view to showing in what respects the law has been modified. 5000 w. Trac & Trans—Feb., 1904.

The Use of the Highway. A. Moresby White. Read at the British Auto. Club. A résumé of English law as affecting highways, and the rights of road users. Serial. 1st part. 1700 w. Auto Jour—March 26, 1904.

Provisions of New York Automobile Law. A summary of the new license requirements with the advantages claimed, and complete text of the Hill Automobile Law. 4800 w. Automobile—May 14, 1904.

The New British Regulations for the Use of Heavy Motor Vehicles. Gives rules limiting the weight of motor vehicles and fixing the weight of motor vehicles and fixing the width of tire in proportion to the weight and the wheel diameter. 3000 w. Eng News—April 20, 1905.

Pennsylvania's New Automobile Law. Full text of compromise automobile license and speed measure passed and signed by Governor Pennypacker on April 19. 1800 w. Automobile—April 22, 1905.

See also Public Relations.

Lessons.—Elementary Lessons on Motor Cars. K. D'Esterre-Hughes. The first of a series of six lectures which R. Sedgwick Currie gave before the Ladies' Automobile Club of Great Britain and Ireland. The subject of the present lecture is "The Engine." Serial. 1st part. 2500 w. Autocar—Dec. 9, 1905.

Light.—What a Light Touring Car Should Be. H. Ward Leonard. Lecture before the Long Is. Automobile Club. Considers nine important points that should be carefully investigated. 8400 w. Horseless Age—March 12, 1902.

Leading Types of 1902. French Light-Weight Automobiles. Illustrates and describes some of the cars that have found favor during the last year. 2000 w. Sci Am—Dec. 27, 1902.

The Progress of the Light Motor Car. From a paper by W. W. Beaumont, read before the Automobile Club. Discusses questions affecting the design and construction of motor cars and motors. 4000 w. Engr, Lond—Dec. 9, 1904.

See also **AUTOMOBILE, GASOLINE.**

Lightning.—See **LIGHTNING**—Automobiles.

Lindecker Suspension.—See Six-Wheeled.

Liquid Air.—Liquid Air Automobile. Brief illustrated description of a novelty exhibited at the Automobile Show in New York. 700 w. Sci Am—Dec. 1, 1900.

Lohner-Porsche.—A New Type of Gasoline-Electric Automobiles with Hub Motors. Illustrated description of new vehicles of the Lohner-Porsche firm. 1800 w. Sci Am Sup—Oct. 24, 1903.

Lorry.—See Industrial; Military; **AUTOMOBILE COMPETITION; AUTOMOBILE, ELECTRIC; AUTOMOBILE, GASOLINE; AUTOMOBILE, STEAM.**

Lubrication.—See **LUBRICATION**—Automobiles.

Machine Tool.—See Construction; **AUTOMOBILE WORKS; MACHINE TOOL.**

Mail.—His Majesty's Mail by Motor Van. Gives a copy of the general report concerning the service of postal vans between Manchester and Liverpool, with illustrations and remarks. 2000 w. Auto Jour—March 7, 1903.

Mail Delivery by Tractor Truck, with Use of Old Rolling Stock. Illustrated description of the system of motor traction which is having an eighteen months' test in Philadelphia. 800 w. Automobile—Dec. 19, 1903.

A Night with the Royal Motor Mail. R. G. Wells. An illustrated account of the Manchester-Liverpool motor mail service. 1500 w. Autocar—Nov. 12, 1904 .

Electric Mail Automobiles. Illustrated description of vehicles in use in Paris and in the United States. 1200 w. Sci Am—June 3, 1905.

See also **MAIL TRANSPORTATION.**

Manufacture.—See Construction; **AUTOMOBILE WORKS; MACHINE TOOL**—Automobile.

Maurer.—See **AUTOMOBILE GEAR**—Friction Drive.

Mechanism.—Existing Automobile Mechanism. Hiram Percy Maxim. A lecture before the Automobile Club of America. Especially considers the gasoline engine and the electric storage battery as applied to the automobile. 3700 w. Auto Mag—Feb., 1902.

Military.—Electric Lighting and Automobiles in Military Operations (Elektrische Beleuchtung und Maschinenfahrzeuge im Landkriege). Maj. Gen. F. Otto. An article showing the great advantage of electric lighting and steam vehicles for traction and power purposes in warfare. 2000 w. Zeitschr d Ver Deutscher Ing—March 8, 1902.

The Simms Motor War Car. Illustrated description of a car designed for coast and road defense. 1200 w. Autocar—April 12, 1902.

The War Office Committee's Report on Military Self-Propelled Lurries. Extracts from this report, with remarks. 3300 w. Auto Jour—Sept. 20, 1902.

The United States Army General Utility and Repair Automobile. Illustration, with detailed description. 600 w. Sci Am Sup—March 26, 1904.

See also Artillery; Wireless Telegraphy; **AUTOMOBILE COMPETITION, AUTOMOBILE GASOLINE**—Brillié Truck; Daimler; **CAR, MOTOR-DRIVEN**—Military; **TRACTION ENGINE.**

Military Bakery.—A Military Bakery Automobile. An illustrated description of a flour mill and bakery automobile designed to follow regiments and make fresh bread every hour from wheat obtained by requisition. 500 w. Sci Am Sup—Nov. 16, 1901.

Motive Power.—See Power.

Mowing Machine.—See **AGRICULTURAL MACHINERY; LAWN MOWER.**

Muffler.—Design of Silencers. Rudolph E. von Lengerke. Describes a silencer of the writer's design giving his theories. Ill. 2500 w. Autocar—May 14, 1904.

Municipal.—Municipal Motor Wagons. Archibald Sharp. Read at the Sanitary Inst. Cong., Manchester, England. On the types of vehicles for municipal service, such as the collection of refuse, water, sprinkling, street sweeping, removal of snow, etc., their cost and advantages. Ill. 4400 w. Mech Engr—Dec. 27, 1902.

The Use of Motor Vehicles for Municipal Purposes. Abstracts of two articles published in the "Contract Journal," of London, giving an account of experience in their use in England. 4000 w. Eng News—Aug. 13, 1903.

Municipal Vehicles in the City of Paris. Illustrated descriptions of various types used, with report of their success. Serial. 1st part. 1600 w. Automobile—June 8, 1905.

See also **STREET CLEANING; STREET SPRINKLER.**

Newman Gear.—See **VARIABLE SPEED.**

1902.—The Automobile Vehicle in 1902 (La Voiture Automobile en 1902). F. Drouin. An illustrated review of the exhibitions, trials, and constructive development of the automobile in 1902; with especial reference to French designs. Three articles. 8000 w. Génie Civil—Feb. 21, 28, March 6, 1902.

1903.—Nineteen Naught Three in Horoscope. Marius C. Krarup. An illustrated article discussing the tendency in the design of motor vehicles, new features, and popular vehicles. 5500 w. Auto Mag—Jan., 1903.

The Progress of Automobilism in 1903 (Les Progrès de l'Automobilisme en 1903). F. Drouin. A review of improvements in details of construction during the year, chiefly shown in the exhibitions. 3 articles. 6,000 w. Génie Civil—Jan. 16, 23, 30, 1904.

1904.—The Progress of Automobilism in 1904 (Les Progrès de l'Automobilisme en 1904) F. Drouin. Discussing especially the lessons of the various trials and races of the year on the Continent. 1800 w. Génie Civil—Feb. 25, 1904.

1905.—Some Leading Automobiles of the Present Year. Brief descriptions, with illustrations. 2200 w. Sci Am—Jan. 28, 1905.

Non-Freezing Liquid.—See **AUTOMOBILE, GASOLINE.**

Novelties.—Some Novelties in Vehicles and Accessories. Harry E. Dey. An illustrated article calling attention to recent designs and inventions. 2000 w. Horseless Age—Nov. 18, 1901.

Automobile Novelties (Les Nouveautés en Automobile). M. Miral. Describing details of machines shown at the Salon de l'Automobile of December, 1902, including an automobile fire engine, improved transmissions, etc. 2500 w. Revue Technique—Feb. 25, 1903.

Obstacle Resistance.—See **TRACTION—Automobile.**

Oil Motor.—See **AUTOMOBILE, GASOLINE; OIL ENGINE.**

Omnibus.—English Motor Omnibuses for City and Country Use. Information concerning the motor omnibus traffic and its advantages, with illustrated descriptions of some of the vehicles in use in England. Serial. 1st part. 4000 w. Sci Am Sup—July 29, 1905.

See also **AUTOMOBILE EXHIBITION—London Olympia; AUTOMOBILE, GASOLINE; AUTOMOBILE, STEAM; AUTOMOBILE TROLLEY; CAR, MOTOR-DRIVEN.**

Omnibus, London.—Motor Omnibuses in Great Britain. Martha L. Root. Illustrates the vehicles being put in service in London, and gives information of other systems. 1700 w. Automobile—Nov. 14, 1903.

Omnibus, N. Y.—See **Fischer; Gasoline—Electric.**

Omnibus, Paris.—The General Omnibus Company (La Compagnie Générale des Omnibus). A review of the exhibits of the Paris Company, including motor cars propelled by compressed air, electric accumulators, and steam. 8000 w. Rev Gen d Chemins d Fer—Jan., 1901.

The Automobile Omnibuses of the General Omnibus Company of Paris. (Les Omnibus Automobiles de la Compagnie Générale des Omnibus à Paris). Col. G. Espitallier. A fully illustrated description of several types of omnibus under practical test in the public service in Paris. 8000 w. Génie Civil—Dec. 30, 1905.

Omnibus vs. Electric Railway.—See **ELECTRIC RAILWAY—Automobile Compared.**

Operating Costs.—Some Data on the Cost of Operating Automobiles for Commercial Purposes. Hiram Percy Maxim. Read before the Auto Club of America. Tests of electric, gasoline, steam and gasoline-electric vehicles, giving much valuable information regarding storage battery maintenance and its cost. Serial. 1st part. 4500 w. Sci Am Sup—April 23, 1904.

Operation.—Convenience in Operation. Rene M. Petard. Calls attention to minor details appreciated by the users of cars. 2000 w. Automobile—Jan. 23, 1904.

See also **Care; Troubles; FLYWHEELS—Directional Tendency.**

Outfit.—See **AUTOMOBILE TOUR.**

Paris.—See **France.**

Parts.—The Accessories of a Motor Car. Lieut. W. Windham. Describes the different parts of a motor car which are essential to its complement, but which are usually left to the buyers' choice. Gives what the writer considers the best, with reasons. Serial. 1st part. 1300 w. Autocar—April 30, 1904.

See also **Devices; Novelties.**

Parts Trials.—Competitive Trials at Paris. Albert L. Clough. Suggests the testing of the various parts of motor vehicles, such as batteries, coils, spark plugs, sparking generators, radiators, lock-nuts, lamps, tires, etc. 1000 w. Horseless Age—July 9, 1902.

Pavements.—See **PAVEMENT—Automobile; TRACTION.**

Pedrail.—See **TRACTION ENGINE.**

Physician.—See **Experience.**

Pneumatic Hub.—The Middleton Pneumatic Hub. Illustrates and describes an invention for rendering solid-tired wheels more resilient. A pneumatic cushion surrounds the hub in much the same way that a pneumatic tire surrounds the felloe. 900 w. Auto Jour—Nov. 18, 1905.

See also **AUTOMOBILE GASOLINE—Twombly.**

Pneumatic Shock Absorber.—Pneumatic Shock Absorber for Vehicles (Amortisseur Pneumatique pour Voitures). H. Mamy. The Bernard & Patoureau device consists of an inflated cushion interposed between the spring and the body of the vehicle. 1000 w. Génie Civil—Oct. 28, 1905.

Power.—The Driving Power. E. J. Stoddard. Mathematical. 1500 w. Horseless Age—Dec. 5, 1900.

The Tractive Horse-Power of Vehicles. W. F. D. Crane. Tables for the calculation and comparisons of the horse-power required are given with explanatory notes. 3300 w. Elec Wld & Engr—June 1, 1901.

Horse Power at Various Speeds. Gives curves for seven weights of cars, showing power wanted for driving each at speeds above twelve miles per hour on the level and on grades. 700 w. Automobile—May 9, 1903.

Motive Power for Automobiles. Prof. R. C. Carpenter. From a paper read before the Am. Motor League, in New York. Reviews briefly the motive power at present used, considering the gas engine the most economical and convenient means of propulsion. 2200 w. Automobile—July 23, 1904.

See also **Acceleration.**

Power Diagram.—Power Diagram for Motor Vehicles. P. S. Bushnell. Gives diagram for solving problems in motor vehicle design, involving the relation of the speed of the vehicle to the traction, the percentage of gradient and power required under various conditions. 400 w. Am Mach—Vol. 27, No. 36.

Prussia.—See **Germany.**

Public Relations.—The Motor Car and the Public. A protest against the abuses which have sprung up in consequence of the development of the motor car and its use on the public highways. 2800 w. Trac & Trans—July, 1903.

Speed and Public Safety. Dr. Louis Bell. Considers problems in connection with the operation of automobiles and electric cars. 2500 w. Elec Rev, N. Y.—Aug. 15, 1903.

See also **Legislation.**

Pump.—See **PUMP—Automobile; TIRE.**

Quarry Transport.—Heavy Motor Vehicles for Quarry Transport. Discusses the economy of this kind of transport, and gives illustrated descriptions of the various forms of wagons that promise to be of service. Serial. 1st part. 5000 w. Quarry—Nov. 1, 1901.

Race.—See **AUTOMOBILE COMPETITION; AUTOMOBILE RACE.**

Racing.—Racing Automobiles at the Close of 1900 (La Voiture Automobile de Course à la Fin de 1900). Count G. de Chasseloup-Laubat and M. G. Forestier. A general review of racing automobiles, with accounts of some long-distance races. 6000 w. Mem d l Soc d Ing Civils—February, 1901.

Style in Automobiles. Hrolf Wisby. An illustrated article discussing the style developing in the racing automobile and criticising the lack of style in most other motor vehicles. 1500 w. Sci Am—Nov. 9, 1901.

Notes on a Gasoline Racer Design. F. D. Howe. Remarks on the kind of machine likely to be evolved for short races, with sketches. 1100 w. Horseless Age—Feb. 12, 1902.

Leading Types of American Racing Automobiles. Brief illustrated descriptions of electric, steam and gasoline machines that have made records during the past year. 1500 w. Sci Am—Jan. 17, 1903.

French Racing Motor Cars. Remarks on the effect of the accident at the recent meeting at Nice on the future of motor car racing, with discussion of the benefits from the races, and illustrated descriptions of the more remarkable of the cars entered. 2400 w. Engr, Lond—April 24, 1903.

See also **AUTOMOBILE, ELECTRIC—Baker; AUTOMOBILE, GASOLINE—Bolide; Christie; Napier; Renault; Peerless; Siddely; Simplex; Truffault; Winton; AUTOMOBILE RACE.**

Railway Car.—See **CAR, MOTOR-DRIVEN.**

Railway Compared.—Automobiles vs. Railways and Carriages. Translations from French papers and letters concerning the effect of automobiles on the carriage builders and the passenger business. 2000 w. U S Cons Repts, No. 1843—Jan. 6, 1904.

Railway Feeders.—Motor Cars as Feeders to Tramways and Otherwise. Henry Mozley. Illustrated description of a vehicle for carrying passengers either along country roads or in the city. 400 w. Tram & Ry Wld—Oct. 11, 1900.

Autocars and Railways. Norman D. Macdonald. Discussing the effect autocars will have on railways and the writer's opinion, with suggestions as to ways railways may use auto cars for traffic gaining. Serial. 1st part. 1600 w. Transport—July 8, 1903.

The Use of Motor Cars as Public Conveyances Acting as Feeders to Railways. A. Campiglio. Deals with steam automobiles and petrol automobiles, and their ability to meet such service, giving reports of applications, with costs. 4 tables. 8600 w. Bul Int Ry Cong—July, 1904.

Regulations.—See Legislation.

Renard Dynamometer.—See AIR RESISTANCE.

Renard Train.—The Continuous Automobile Train (Le Train Automobile à Propulsion Continue). Col. G. Espitallier. An illustrated description of the Renard train, in which the power is transmitted by shafting with universal points, through the whole train. 2500 w. 1 plate. Génie Civil—Dec. 19, 1903.

A New System of Continuously Propelled Road Trains (Sur un Nouveau Système de Train Routier Dit à Propulsion Continue). Ch. Renard. An account of the Renard system of automobile road trains, showing especially the method of steering. 1200 w. Comptes Rendus—Dec. 28, 1903.

The Renard Automobile Road Trains. An illustrated detailed description. 900 w. Automobile—April 9, 1904.

Continuously-Propelled Automobile Trains. Emile Guarini. An illustrated description of the Renard train and its operation. 1000 w. Sci Am Sup—May 14, 1904.

Automobile Road Trains. Daniel Bellet. Illustrations and brief description of trains devised by Charles Renard. 900 w. Trac & Trans—July, 1904.

Repairs.—The Item of Repairs. Dr. Daniel Longaker. Remarks on points in design that need attention. 1800 w. Horseless Age—Oct. 22, 1902.

Resistance.—See Power; TRACTION—Automobile.

Road.—See PAVEMENT—Automobile; ROAD—Automobile; Wear; TRACTION—Automobile; TRACTION ENGINE.

Rubber.—See RUBBER; TIRE.

Sail Propelled.—See SAIL VEHICLE.

Scotland.—Motor Vehicles in Scotland. More especially discussing the trade and manufacture of motor vehicles. 2200 w. U S Cons Repts—June, 1904.

Second-Hand.—The Examination of Second-Hand Cars. Gives some experiences of an expert examiner. Serial. 1st part. 2000 w. Autocar—Sept. 30, 1905.

Self-Steering.—See Fore-Carriage.

Shock Absorber.—See Pneumatic Shock Absorber; AUTOMOBILE, GASOLINE—Twombly Kerosene.

Side-Slip.—See Skidding.

Silencer.—See Muffler.

Six Wheeled.—Automobiles with Three Axles (Automobiles à Trois Essieux). Lt. Col. G. Espitallier. A description of the Lindecker system of suspension for heavy vehicles, using three axles and equalizing levers. 2000 w. Génie Civil—Dec. 31, 1904.

Vehicles with Six Wheels (Les Voitures à Six Roues). M. Le Gavrian. A description of the compensation suspension system of Capt. Lindecker for distributing the load upon three axles, especially adapted for heavy vehicles. 4000 w. Ann des Ponts et Chaussées—4 Trimestre, 1905.

Skidding.—Some Considerations Relating to Skidding Due to Changing the Direction of Motion. E. J. Stoddard. Considers the action of the wheels upon the roadbed, velocity of turning, forces created, etc. Ill. 2000 w. Horseless Age—Feb. 11, 1903.

Skidding on the Race Track Analyzed. Showing the importance of the driver's position. 1100 w. Automobile—Nov. 14, 1903.

Side-Slip in Motor Cars. Horace Darwin and C. V. Barton. An explanation of one of the causes of skidding of wheels on motor cars when on slippery roads. 3000 w. Autocar—Sept. 10, 1904.

See also Stability.

Speed.—How to Estimate the Speed of an Automobile. A. L. Clough. Gives a table corresponding to the time required to cover a mile, and considers methods of determining speed. 800 w. Horseless Age—May 7, 1902.
See also Power.

Speed Diagram.—Diagram for Motor Vehicle Problems. P. S. Bushnell. Chart for quickly converting revolutions per minute of various sized wheels into miles per hour. 500 w. Am Mach—Nov. 14, 1901.

Speed Indicator.—See CHRONOGRAPH; SPEED INDICATOR; SPEED RECORDER.

Springs.—See AXLE—Automobile; SPRING—Automobile; TIRE—Automobile.

Spring Wheel.—See Wheel, Spring.

Stability.—The Conditions of Stability for Automobiles on Curves (Sur les Conditions de Stabilité des Automobiles dans les Courbes). A. Petot. A mathematical discussion, with suggestions of causes of accidents to automobiles on curves. 600 w. Comptes Rendus—April 7, 1902.

Standardization.—Lines of Standardization. Albert L. Clough. On the control of gasoline carriages, the position of the operator, clutch levers position, &c. 800 w. Horseless Age—Jan. 29, 1902.

Standardization—Its Progress and What It Means to the Motorist. Considers its advantage to the owner and repairer, aid to repetition work, etc. 4000 w. Automobile—Aug. 8, 1903.

Steel.—See STEEL—Automobile Construction.

Steering Gear.—The Demand for Improved Wheel Steering Devices. Hugh D. Meier. Describes various devices in use, discussing their defects. 900 w. Horseless Age—Dec. 18, 1901.

Steering Gears for Automobiles. Herman Lemp. Shows the importance of a properly designed steering gear, its requirements, &c., with discussion of the lever and the wheel, and of the hydraulic steering check. 2000 w. Horseless Age—Feb. 25, 1902.

Improved Link Details of Locked Wheel Steering Devices. Hugh D. Meier. Illustrates and describes several devices that embody resilient members, discussing their advantages. 1000 w. Horseless Age—May 14, 1902.

Automobile Steering Mechanism. Brief illustrated descriptions of devices now used. 1600 w. Automobile—Sept. 19, 1903.

Steering Gears: Their Principles and Action. A critical discussion of the "single pivot" or "fifth wheel" type, showing that it is not suitable for motor vehicles. 1200 w. Autocar—Jan. 23, 1904.

Steering Gears for Motor Cars. C. H. Gale. On properly designing steering gear, giving tables, curves, and explanatory notes. 2000 w. Auto Jour—April 23, 1904.

Analysis of Steering-Knuckle Angles of Automobiles. Herbert L. Towle. Discusses the most suitable angles of inclination of the arms of the steering knuckles with respect to the wheel base and other conditions involved. 1800 w. Am Mach—Vol. 28, No. 23.

Klee's Tangential Steering Gear. Illustrates and describes an invention designed to overcome a slight inaccuracy in systems having their front wheels interconnected by one tie rod of invariable length. 600 w. Auto Jour—Nov. 11, 1905.
See also Controlling Mechanism; Five Wheeled; Fore Carriage; AUTOMOBILE, GASOLINE—Ryknield.

Storage Battery.—See AUTOMOBILE, ELECTRIC; STORAGE BATTERY—Automobile; Recharging.

Street Sprinkler.—See STREET SPRINKLER.

Street Sweeper.—See STREET CLEANING.

Style.—See Racing.

Testing.—Automobile Testing as Thesis Work. Albert L. Clough. Indicates work which the laboratories of educational institutions might take up. 1200 w. Horseless Age—March 12, 1902.
See also AUTOMOBILE COMPETITION.

Thesis.—See Testing.

Three-Axle.—See Six Wheeled.

Tire.—See Wheels and Tires; TIRE.

Tire Bands and Envelopes.—See TIRE.

Tire Pump.—See TIRE—Pump.

Tool.—See MACHINE TOOL; TOOL—Dalton Combination.

Tour.—See AUTOMOBILE COMPETITION; AUTOMOBILE TOUR.

Traction.—See TRACTION—Automobile.

Train.—See Renard Train; TRACTION ENGINE.

Tramway Feeders.—See Railway Feeders; ELECTRIC RAILWAY—Automobile Compared.

Trials.—See Testing; **AUTOMOBILE COMPETITION; AUTOMOBILE, ELECTRIC; AUTOMOBILE, GASOLINE; AUTOMOBILE RACE; AUTOMOBILE, STEAM; AUTOMOBILE TOUR.**

Trolley.—See **AUTOMOBILE, ELECTRIC; AUTOMOBILE TROLLEY.**

Troubles.—What to Do When the Motor Balks. A. D. River. The first of a series of articles giving practical suggestions for tracing up troubles on the road and directions for applying the proper remedies. Serial. 1st part. 1500 w. Automobile—July 13, 1905.

Petrol Motor Troubles and Their Location. Directions for the care of petrol motors, and for finding out the cause of troubles. 1500 w. Motor Car Jour—Aug. 23, 1902.

See also Experience.

Truck.—See Industrial; **AUTOMOBILE, ELECTRIC; AUTOMOBILE, GASOLINE; AUTOMOBILE, STEAM.**

Turbo-Electric.—A Turbo-Electric Wagon. From the "Horseless Age." Illustrates and describes a novel design of motor wagon propelled by means of a steam turbine and electric motors. 1400 w. Mech Engr—Feb. 20, 1904.

Two-Cycle Engine.—See **AUTOMOBILE, GASOLINE.**

Uses.—Varied Modern Uses of the Automobile. Information, with illustration of the use of these machines for labor purposes. 1200 w. Sci Am—Aug. 9, 1902.

See also Winter Use.

Van.—See Industrial.

Variable Speed Gear.—See **VARIABLE SPEED.**

Vibration.—The Vibration of Automobiles (Les Trépidations dans les Voitures Automobiles). F. Drouin. Discussing the effects of inertia and the arrangement of cylinders, showing how the vibration may be reduced to a minimum. Two articles. 4000 w. Génie Civil—Dec. 7, 14, 1901.

Vibration in Automobiles. F. Drouin. Translated from "Le Génie Civil." Considers means of diminishing the vibration due to the motor. Mathematical. Serial. 1st part. 3200 w. Auto Jour—Feb., 1902.

The Vibration of Automobile Motors (Die Erschütterungen bei Automobilmotoren). Th. Lembeck. An examination of the inertia forces acting to produce vibration, and a discussion of the disposition of cylinder action to minimize vibratory action. 4500 w. Zeitschr d Mitteleurop Motorwagen Ver—Sept. 30, 1905.

See also **GASOLINE ENGINE—Balancing.**

War Car.—See Military.

Wheel.—Automobile Wheels. C. C. Bramwell. Briefly states the writer's conclusions concerning the wire and the tubular wheels. 500 w. Horseless Age—June 26, 1901.

Wood and Wire Wheels. P. M. Heldt. Discusses the construction. Ill. 2300 w. Horseless Age—June 26, 1901.

The Wheels for Automobiles. Extract from a paper read by Commandant Ferrus at the Paris International Automobile Congress. Gives some points in regard to the manufacture of wheels. 800 w. Automobile—Nov. 14, 1903.

Motor Car Wheels. E. W. Walford. Discusses briefly the merits and demerits of each type. Ills. 1200 w. Autocar—Dec. 10, 1904.

Road Wheels for Mechanical Vehicles. R. G. L. Markham. Discusses the conditions necessary for a perfectly satisfactory wheel, illustrating and describing devices under trial. 3800 w. Cassier's Mag—April, 1905.

See also Bearings; **FLYWHEEL—Directional Tendency; TIRE.**

Wheel Diameter.—On the Influence of the Diameter of the Wheels on the Power Required for Propelling Automotors. W. A. T. Müller. An attempt to solve the question theoretically. Ill. Serial. 1st part. 2000 w. Auto Jour—April, 1901.

The Electric Motor-Car Problem. Reviews ideas advanced by Dr. Luxenberg for reducing the energy consumed by increasing the diameter of the wheels, in an article in "Centralblatt für Accumulatoren und Elementenkunde." 1400 w. Elec Rev, Lond—Nov. 30, 1900.

See also Bearing.

Wheels and Tires.—Experience of Users. Wheels and Tires. I. Dr. H. L. Stickney. II. Jules Junker. Communications from the authors named and from several others on the merits of wheels and tires. 6500 w. Horseless Age—June 26, 1901.

Some New Ideas in Wheels and Tires. Harry E. Dey. An illustrated discussion of design, and the power consumed. 1800 w. Horseless Age—June 26, 1901.

Wheels and Tires for Motor Trucks. Walter L. Bodman. Discusses the problem of economical maintenance and the obtaining of ample adhesion on all kinds of roads in all kinds of weather, giving results of experiments. 2500 w. Horseless Age—July 24, 1901.

Wheel, Spring.—Spring-Wheels for Motor Cars. Introductory remarks, and the commencement of an illustrated detailed description of the Halford spring-wheel is given in the present article. Serial. 1st part. 3300 w. Auto Jour—Jan. 21, 1905.

The Empire Spring Wheel. The present number explains the principle of the wheel. Ills. Serial. 1st part. 1300 w. Auto Jour—Oct. 7, 1905.

White Steam.—See **AUTOMOBILE, STEAM.**

Winter Use.—Winter Use and Housing of Automobiles. Albert L. Clough. Discusses care needed to secure these vehicles from damage from freezing temperatures. 1000 w. Horseless Age—Jan. 30, 1901.

Winter Use of Automobiles. A. L. Clough. States the technical difficulties of operating motor vehicles in cold weather, discussing each, and aiming to show that an all the year round usefulness is possible. 2200 w. Horseless Age—Nov. 19, 1902.

Practical Winter Use of Automobiles. Harry B. Haines. An account of some winter experiences in using a gasoline vehicle. 2400 w. Horseless Age—Dec. 17, 1902.

Automobiling in Winter (Automobilfahren im Winter). Dr. Karl Dieterich. A discussion of the details of automobile construction necessary for satisfactory operation in cold weather and through snow. 2500 w. Zeitschr d Mitteleurop Motorwagen Ver—Jan. 31, 1903.

Wireless Telegraphy.—Marconi's Wireless Telegraphy Automobile for Military Purposes. Illustrates and describes a portable installation specially adapted to military requirements. 800 w. Sci Am—July 20, 1901.

Works.—See **AUTOMOBILE WORKS.**

AUTOMOBILE BOAT.

See **BOAT.**

AUTOMOBILE COMPETITION.

See also **AUTOMOBILE, ELECTRIC; AUTOMOBILE EXHIBITION; AUTOMOBILE, GASOLINE; AUTOMOBILE RACE; AUTOMOBILE, STEAM; AUTOMOBILE TOUR.**

Alcohol Motor.—See **ALCOHOL; ALCOHOL MOTOR.**

A. C. A. Commercial.—A. C. A. Commercial Vehicle Contest. An account of the first official trial in America, under the auspices of the Automobile Club of America, of the capabilities of the commercial automobile, the motive powers being steam, gasoline and electricity. Ill. 3500 w. Automobile—May 30, 1903.

A. C. G. B. I.—The 1,200 Miles Trial. Mark Mayhew. Extracts from a paper read before the Automobile Club of Gt. Britain and Ireland. A discussion of where the trial should be held; the legal limit of speed in England, etc. 3000 w. Auto Jour—Feb., 1901.

The 650 Miles Reliability Trials of the A. C. G. B. I. An illustrated account of the trials of the Automobile Club of Great Britain and Ireland, with editorial. 7500 w. Auto Jour—Sept. 6, 1902.

Automobile Club's 650 Miles Reliability Trial. A continued illustrated description of each day's journey, with editorial remarks. 8000 w. Auto Jour—Sept. 13, 1902.

The Reliability Trial from a Technical Point of View. The present article gives illustrated brief descriptions of the competing vehicles, general criticisms, etc. Serial. 1st part. 7300 w. Auto Jour—Sept. 20, 1902.

The 650 Miles Reliability Trials. An explanation of how the marks were lost on the road, as far as now known; speeds and times accomplished on the test hills; with observations on the trials, by Henry Sturmey. 7000 w. Autocar—Sept. 20, 1902.

Some Mechanical Details Noted in the 650 Miles Trials. Comments with illustrations. 3800 w. Autocar—Sept. 13, 1902.

Reliability Trial Rules. Gives tabulated results showing the effect of a system of rules based upon speed, number of passengers, fuel consumption and cost of vehicle. Also editorial and report of the revised official marks and the judges' awards. 4400 w. Auto Jour—Oct. 11, 1902.

Berlin.—See Electric, Berlin.

Boston.—See Hill Climbing.

Boston Reliability.—Boston Reliability Run. Gives itinerary and road description of the New York-Boston reliability run which begins on Oct. 9, 1902. 2800 w. Auto Topics—Oct. 4, 1902.

The A. C. A. 500 Mile Reliability Run from New York to Boston and Return. An illustrated general report. 9000 w. Horseless Age—Oct. 15, 1902.

New York-Boston Reliability Run. An illustrated account of the recent test run. 3700 w. Auto Topics—Oct. 18, 1902.

Conclusions on the Reliability Contest. Albert L. Clough. Remarks on the New York-Boston run, unreliable parts, lubrication, etc. 1500 w. Horseless Age—Oct. 22, 1902.

Impressions Gained from the Run—Features of Construction. Hugh D. Meier. Remarks on springs, axles, wheels and tires, chains and transmissions, etc., of automobiles in the reliability tour from New York to Boston. 2200 w. Horseless Age—Oct. 22, 1902.

Reliability of Steam Cars in A. C. A. Contest. A comparison between the performances of steam and gasoline cars in the 500-mile reliability test from New York to Boston and return. 2000 w. Automobile—Feb. 14, 1903.

British Automobile Club.—See A. C. G. B. I.

British, 1903.—The Motor Car Trials. A review of the cost of these trials, giving particulars. 1700 w. Engr, Lond—Oct. 2, 1903.

The Motor Car Trials. Review of the recent 1000 miles reliability trials organised by the British Automobile Club. 3000 w. Engr, Lond—Sept. 25, 1903.

The 1903 Reliability Trials from a Technical Point of View. Considers the present state of the automobile industry, and compares the merits of the different cars. Deals first with the petrol engines, showing how they compare for size and output. Serial. 1st part. 2000 w. Auto Jour—Oct. 10, 1903.

See also **TIRE—Automobile Trial.**

British War Office.—See Military.

Chateau-Thierry.—See Hill Climbing.

Chicago Endurance.—The Chicago 100 Mile Endurance Contest. An illustrated report of the contest which took place Aug. 2, 1902. 2500 w. Horseless Age—Aug. 6, 1902.

Chicago Endurance Contest.—On a Rambler, No. 16. Thomas I. Stacey. An illustrated account of the run of this machine. 2500 w. Horseless Age Aug. 13, 1902.

Classification.—See **AUTOMOBILE.**

Dashwood Hill.—See Hill Climbing.

Dead Horn Hill.—See Hill Climbing.

Eagle Rock.—See Hill Climbing.

Deauville.—See **AUTOMOBILE RACE.**

Economy Test.—An Automobile Economy Test. An illustrated account of the recent test carried out by the N. Y. Motor Club, to demonstrate the efficiency of the American gasoline automobile. 1000 w. Sci Am—Nov. 18, 1905.

Electric, Berlin.—The Berlin Electromobile Trials. Gives the chief results of the 14 vehicles tested by Dr. M. Kallmann, with their leading characteristics. 1000 w. Auto Jour—Jan., 1901.

Electric, Chislehurst, Eng.—Electric Motor Car Trials. An account of the trials of electric motor cars made near London, Eng. Ill. 2200 w. Elec Rev, Lond—Nov. 16, 1900.

Notes on the Electric Auto Car Trial. Merwin O'Gorman. Remarks on facts developed by these trials, and information of interest. 3300 w. Elect'n, Lond, Nov. 23, 1900.

Electric Automobiles at Chislehurst. Review of the judges' report of trials made under the auspices of the Automobile Club of Great Britain and Ireland. 2000 w. Elec Rev, Lond—March 1, 1901.

See also **AUTOMOBILE, ELECTRIC—Dog Cart,**

France, 1901.—The Principal Automobile Trials of the Year (Les Principals Epreuves Automobiles de l'Année). A review with tabulated data and results of the principal automobile trials in France in the year 1901. 3500 w. Génie Civil—Dec. 14, 1901.

French Fuel.—Paris Fuel Consumption Trials Organised by "L'Auto." An account of this year's trials, with illustrations of the vehicles. 700 w. Auto Jour—Feb. 28, 1903.

French Fuel Consumption and Reliability Trials. Report of these trials, giving tabulated results and illustrations. 1500 w. Auto Jour—March 12, 1904.

See also **LIQUID FUEL—Automobile.**

French Industrial.—Industrial Motor Car Trials in France. Begins a report of the trial from Paris to Monte Carlo, a distance of about 700 miles to be covered in 11 days. Illustrates and describes the vehicles entered and reports their performance. Serial. 1st part. 2200 w. Engr, Lond—May 2, 1902.

Paris to Monte Carlo. An illustrated account of this 700 miles run, giving the performances of the industrial motor vehicles. Serial. 1st part. 2200 w. Autocar—May 3, 1902.

Industrial Car Trials in Paris. Remarks on these trials, the few vehicles entered, and lack of interest. 1600 w. Engr, Lond—Nov. 6, 1903.

The French Heavy Car Trials. An account of the trials of commercial vehicles. Serial. 1st part. 1500 w. Engr, Lond—Aug. 4, 1905.

Competition of Commercial Automobiles and Military Auto Trucks (Concours de Véhicules Industriels et de Fourgons Militaires). Ch. Dantin. Illustrated description of automobile trucks, omnibuses, delivery wagons, etc., in road competition under auspices of the Automobile Club of France and the French Department of War. Serial. 3 parts. 7000 w. Génie Civ—Sept. 2, 9 and 16, 1905.

Report on the International Exhibition of Industrial Vehicles of August, 1905 (Rapport sur le Concours Internationale de Vehicules Industriels en Aout 1905). Georges Lumet. A detailed report of the competitive trials of the Automobile Club de France, with tables and diagrams of the results. 7000 w. Mem Soc Ing Civ de France—Nov., 1905. See also **Paris Exposition.**

Fuel.—See **French Fuel; LIQUID FUEL.**

Gaillon.—See Hill Climbing.

German Industrial.—Requirements for Heavy Hauling. Gives the requirements specified in the competition instituted by the German Government. 2000 w. Auto Topics—April 12, 1902.

Glasgow.—Glasgow International Exhibition 500-Miles Trials. An account of the trials to take place from Sept. 2 to 6, the rules, regulations, etc. 6000 w. Auto Jour—July, 1901.

The Glasgow Autocar Trials. Particulars of the trials and competing vehicles, with illustrations. 2800 w. Autocar—Aug. 31, 1901.

The Motor Vehicle Durability Trials. Brief account of these trials, made with the object of testing the durability of the vehicles, with report of the results. 1800 w. Engr, Lond—Sept. 13, 1901.

Glasgow Exhibition Motor Trials. Illustrates and describes many of the competing vehicles. Also editorial. 14000 w. Auto Jour—Sept., 1901.

The Automobile Trials at Glasgow. Alexander F. Sinclair. An account of the five daily runs, the vehicles entered, etc. Ill. Serial. 1st part. 2500 w. Auto Mag—Oct., 1901.

Glasgow, London.—The Glasgow to London Non-Stop Trial. An account of the run, with some amusing incidents included. 3500 w. Auto Jour—April 26, 1902.

The Glasgow to London Non-Stop Trial. Short account of the arrival of the cars in London, with preliminary statements of the various vehicles. Ill. 1500 w. Motor Car Jour—May 23, 1903.

Gordon-Bennett.—See **AUTOMOBILE RACE.**

Hereford.—See Small Cars.

Hill Climbing.—Hill-Climbing at Boston, U. S. A. Hugh Dolnar. Brief account of the contest on Commonwealth Ave. hill on April 20th. 700 w. Autocar—May 23, 1903.

The Chateau-Thierry Hill Climb. An illustrated account of very successful trials. 1000 w. Autocar—Oct. 4, 1902.

Hill-Climbing and Consumption Trials. An illustrated account of the Automobile Club tests on the London-Oxford road and the scalings of Dashwood Hill, giving descriptions of vehicles. 4500 w. Autocar—May 17, 1902.

The Automobile Consumption and Hill Climbing Trials. An illustrated account of the performance of the vehicles, with tabulated results. 2400 w. Auto Jour—May 17, 1002.

Climbing Dead Horn Hill in Worcester. An illustrated account. 2200 w. Automobile—June 1, 1905.

The Eagle Rock Hill Climbing Trial. An account of the contest held by the New Jersey Automobile Club on Thanksgiving Day. Ill. 1700 w. Horseless—Dec. 3, 1902.

The Gaillon Hill-Climbing Trials. An account of the annual trials in France, where seventy vehicles competed. Ill. 1600 w. Autocar—Nov. 23, 1901.

The Gaillon Hill-Climbing Trials. An illustrated account. Also of the Mont Ventoux climb. 2800 w. Autocar—Sept. 27, 1902.

The Gaillon Hill-Climbing Trials. An illustrated account with report of results. 1800 w. Autocar—Oct. 18, 1902.

Gaillon Hill Climb. An illustrated description of this recent test. 1200 w. Auto Jour—Nov. 14, 1903.

The Laffrey Hill Climb. An illustrated account of the trials and results at Grenoble, France, giving details of interest. 3000w. Autocar—Aug 15, 1903.

An Alpine Automobile Reliability Trial. From "The Car." An account of a trip in a Martini car up and down Rochers de Naye, in Switzerland. Ill. 2000 w. Sci Am Sup—Dec. 26, 1903.

Automobiles Climb Mount Washington. Angus Sinclair. An illustrated account of the feat undertaken July 11, 1904. Also some information in regard to the Mt. Washington railway. 1300 w. Loc Engng—Aug., 1904.

Industrial.—See French; German; Liverpool; Paris Exposition.

Isle of Man.—The Isle of Man Eliminating Trials. An illustrated report with tabulated results. 4500 w. Auto Jour—June 3, 1905.

The Tourist Trophy Race Question. Gives a summary of the articles this paper has published relating to the race, and gives a report of the engine tests made. Serial. 1st part. 2000 w. Auto Jour—Oct. 14, 1905.

The Winning Cars in the Tourist Trophy Race. A description of the winning Arrol-Johnston car, and the second and third cars of this race on the Isle of Man. Ills. 2200 w. Sci Am Sup—Oct. 21, 1905.

See also AUTOMOBILE, GASOLINE—Arrol-Johnston.

Laffrey Hill.—See Hill Climbing.

Liverpool.—Liverpool Self-Propelled Traffic Association Third Trials of Motor Vehicles for Heavy Traffic. Descriptions and illustrations of the competing vehicles with report of trials. 13700 w. Auto Jour—June, 1901.

The Motor Lorries Which Will Compete in the Liverpool Trials. Illustrates and describes the vehicles which took part in the recent trials. All are steamers coke or oil fired, with the exception of two, which are driven by internal combustion engines, and consume motor spirit. 7400 w. Autocar—June 1, 1901.

The Liverpool Motor Wagon Trials. An account of these trials, with illustrations of some of the vehicles, and statement of the points taken into consideration by the judges in making the awards. 3000 w. Engr, Lond—June 7, 1901.

The Liverpool Trials of Heavy Motor Vehicles. An account of the trials in progress, the vehicles entered, and tabulated report of the first three days. Ill. 4500 w. Engng—June 7, 1901.

Trials of Motor Vehicles for Heavy Traffic. An account of the performances of the thirteen vehicles which took part in the Liverpool trials. Ill. 5000 w. Autocar—June 8, 1901.

The Liverpool Trials. Henri G. Chatain. Describes the conditions under which these trials are held, the purposes for which the vehicles are supposed to be used, their constructive details and performance. Serial. 1st part. 1500 w. Horseless Age—July 10, 1901.

London.—See Electric, Chislehurst.

Long Island.—See AUTOMOBILE RACE.

Lorry.—See Liverpool; Military.

Military.—Self-Propelled Lorry for Military Purposes. Particulars of an important competition being promoted by the Secretary of State for War with the object of introducing heavy automobiles for military purposes. 800 w. Engr, Lond—May 17, 1901.

Competition for Automatic Lorry in Great Britain. Conditions for a self-propelled lorry, or wagon, for military purposes. 800 w. U S. Cons Repts, No. 1067—June 20, 1901.

Competition of Military Motor Tractors Instituted by the British War Office. Gives the rules that are to govern the competition. 1800 w. Horseless Age—Nov. 20, 1901.

Military Lorries. An account of the opening proceedings of the trials of self-propelled lorries for military purposes, with illustrated description of the Thornycroft vehicles. 3800 w. Engng—Dec. 6, 1901.

Competition for Military Traction in Great Britain. A copy of the regulations governing a competition to be held in the spring of 1903. 2000 w. U S Cons Repts, No. 1211—Dec. 11, 1901.

The Military Self-Propelled Wagon Trials. Illustrates and describes the wagon and trailer of the Straker Steam Vehicle Co. and other vehicles. 700 w. Engng—Dec. 13, 1901.

War Office Heavy Motor Vehicle Trials. Gives details of specifications supplied by the manufacturers entering vehicles. Ill. 4500 w. Auto Jour—Dec., 1901.

The War Office Heavy Motor Vehicle Trials. Full illustrated description of the lurries and their performance in the British War Office Trials. 7000 w. Auto Jour—Jan., 1902.

Report on the War-Office Motor Lorry Trials. Report of a test made of self-propelled lorries to determine their capabilities for military purposes. 900 w. Engr, Lond—Sept. 5, 1902.

See also AUTOMOBILE.

Mount Washington.—See Hill Climbing.

New York.—The Vehicles of To-day and Yesterday. C. C. Bramwell. A comparison of the vehicles which took part in the first automobile run from New York, with those which participated in the Endurance Run. 1200 w. Horseless Age—Dec. 25, 1901.

New York-Boston.—See Boston Reliability.

New York-Buffalo.—Regulations for the First Long Distance International Automobile Test in America. Rules and regulations for the 500-mile New York-Buffalo endurance test to occur in Sept. 3000 w. Elec Wld & Engr—Aug. 3, 1901.

Road Description of the 500-Mile Endurance Test. Maps, road description and general instructions, as compiled by the committee having charge of this contest between New York and Buffalo. 6200 w. Auto Mag—Sept., 1901.

The New York-Buffalo Endurance Run. An account of the entries, the start, the first and second stages of the run, the hill climbing contest, and much matter of interest. Ill. 10800 w. Horseless Age—Sept. 11, 1901.

The New York-Buffalo Endurance Run. Detailed report of the third, fourth, fifth and sixth stages, with comments. 9500 w. Horseless Age—Sept. 18, 1901.

Impressions of the New York-Buffalo Endurance Contest. Albert L. Clough. A report of lessons learned from this recent trial concerning the weak points of the machines, and other matters of interest. Conclusions, remarks and editorial. 7400 w. Horseless Age—Sept. 18, 1901.

The Endurance Test.—Full illustrated account. 8000 w. Auto Mag—Oct., 1901.

Endurance Test Results. Extracts from the committee report. 2000 w. Auto Mag—Nov., 1901.

Lessons from the Automobile Endurance Contest. Prof. R. H. Thurston. Comments on the run which began at New York and terminated at Rochester, and the lessons of the test. 1800 w. Sci Am Sup—Feb. 1, 1902.

Nice.—The Automobile Meeting at Nice. An account of the meeting and illustrated descriptions of the new cars, and their trials and other matters of interest. 5500 w. Autocar—April 19, 1902.

The Principal Automobile Trials of 1902 (Les Principales Epreuves Automobiles de 1902). F. Drouin. Giving tables of data and results of the more important tests of automobile vehicles during the year 1902. Two articles. 3000 w. Génie Civil—Jan. 24, 1903.

1903.—The Progress of Automobilism in 1903 (Les Progrès de l'Automobilisme en 1903). F. Drouin. A review of the principal trials and races of the year. Two articles. 3000 w. Génie Civil—Feb. 13, 20, 1904.

Paris.—See **French Fuel; French Industrial; Paris Exposition.**

Paris Exposition.—The French Automobile Trials. G. A. Burls. An account of the trials at Vincennes, in connection with the Paris Exhibition. 2500 w. Auto Jour—Nov., 1900.

The Competition of Automobiles for Industrial Purposes (Compte Rendu des Concours d'Automobilisme Industriel). M. G. Forestier. A report on the trials of automobiles for cab and omnibus service, trucks and other heavy-weight vehicles, etc., held in connection with the Paris Exposition. Tables and diagrams. 10000 w. Mem d l Soc d Ing Civils—February, 1901.

The Competitions of Moto-Cycles, Voiturettes and Touring Automobiles (Compte Rendu des Concours de Motocycles, Voiturettes et Voitures de Tourisme). M. G. Forestier. A report on the trials of the above-named classes of vehicles, held in connection with the Paris Exposition. Tables. 7000 w. Mem d l Soc d Ing Civils—February, 1901.

See also **French Industrial.**

Rochers de Naye.—See **Hill Climbing.**

Small Cars.—Small Car Reliability Trials at Hereford. An illustrated account of trials of cars costing £200 or less. Also details of the cars entered. Serial. 1st part. 7700 w. Autocar—Sept. 3, 1904.

Stopping Tests.—A. C. A.'s Official Stopping Tests. An illustrated account of tests made on Riverside Drive, New York, by the Automobile Club of America. 2500 w. Auto Topics—May 10, 1902.

Sydney-Melbourne.—An Australian Reliability Trial. An illustrated detailed description of the run from Sydney to Melbourne, a distance of 572 miles. 2500 w. Auto Jour—April 15, 1905.

Tourist Trophy.—The Tourist Trophy, and Its Value to Car Owners. Discusses the subject in a general way, showing how far the rules will secure the desired result, giving suggestions. Serial. 1st part. 3800 w. Auto Jour—July 15, 1905.

Welbeck.—The Welbeck Trials. An illustrated account of these trials, with results of the various contests. 3700 w. Motor Car Jour—Aug. 16, 1902.

The Welbeck Speed Trials. An illustrated article giving an account of the gathering, the vehicles, results of contests, etc. 6300 w. Auto Jour—Aug. 16, 1902.

AUTOMOBILE CONGRESS.

Paris, 1903.—The Automobile Congress at Paris. The first of a series of articles reviewing the proceedings of these meetings and the questions discussed. Serial. 1st part. 3500 w. Engr, Lond—July 3, 1903.

AUTOMOBILE, ELECTRIC.

See also **AUTOMOBILE; AUTOMOBILE COMPETITION; AUTOMOBILE EXHIBITION; AUTOMOBILE, TROLLEY; STORAGE BATTERY; STORAGE BATTERY RAILWAY.**

Electric Automobiles. Henry F. Joel. Gives a brief criticism of the early attempts to produce successful electric carriages, outlining the defects that caused failures, and predicting future success. 4900 w. Elec Rev, Lond—Jan. 4, 1901.

Electromobile Evolution. W. H. Maxwell, Jr. What has been accomplished in this field, and the outlook. 3500 w. Elec Rev, N. Y.—Jan. 12, 1901.

Electric Pleasure Vehicles for All Purposes and Purses. Describes the ideal pleasure carriage, its construction and operation, giving points about the storage battery and illustrating styles of vehicles on the market and range of prices. 4000 w. Automobile—March 28, 1903.

A Novel Electric Carriage. Illustrated description of a vehicle aiming at long wheel base, and low center of gravity. 900 w. Motor Car Jour—April 25, 1903.

Electric Automobiles. H. F. Joel. Abstract of a paper read before the Inst of Civ. Engrs., England. Reviews this industry, and the progress made, giving information of interest. 2000 w. Sci Am Sup—Nov. 7, 1903.

Baker.—America's Swiftest Car, the Baker Electric Racer. Hugh Dolnar. Briefly reviews the rapid development in motor vehicles, and gives an illustrated description of this machine, which claims a speed of 85 miles an hour. 2800 w. Autocar—Jan. 31, 1903.

The Baker Electric Racing Automobile. Illustrated description of the electric racer that was the cause of a serious accident at the Staten Island speed trials. 800 w. Sci Am—June 14, 1902.

Battery Case.—See **STORAGE BATTERY—Automobile, Case.**

Berlin Exhibition.—See **AUTOMOBILE EXHIBITION.**

British.—Electrically-Propelled Motor Cars. Illustrates and describes some of the vehicles of the British Electromobile Company, and discusses some of the advantages and disadvantages of electric cars. 3000 w. Elect'n Lond—Sept. 19, 1902.

Buckboard.—How to Make an Electric Buckboard. J. C. Brocksmith. An illustrated article giving directions for the construction. 1700 w. Am Elect'n—Aug., 1905.

How to Make an Electric Buckboard. J. C. Brocksmith. An illustrated article giving directions for the construction. 1800 w. Am Elect'n June, 1905.

Care.—Electricity as a Motive Power for Automobiles. H. W. Alden. A lecture before the Boston Y. M. C. A. Discusses the importance of care and intelligent operation, cost, etc. 2000 w. Sci Am Sup—May 7, 1904.

Chicago Service.—New Electric-Vehicle Service Proposed for Chicago. Relating to a proposed service of 'buses and cabs at low rates. Ill. 800 w. W. Elect'n—Jan. 26, 1901.

Coal Wagon.—See **Industrial.**

Contal.—The Contal Electromobile. An illustrated description of a carriage having new features in the running gear and battery. 2500 w. Trac & Trans—June, 1903.

See also **STORAGE BATTERY—Automobile.**

De Dion-Bouton.—The De Dion-Bouton Electric Carriage. From "La France Automobile." An illustrated detailed description. 1000 w. Horseless Age—Feb. 2, 1902.

See also **AUTOMOBILE—Gasoline-Electric; AUTOMOBILE, GASOLINE.**

Dog-Cart.—The Electric Motive Power Company's Dog-Cart. Illustrates and describes the dog-cart which took part in the recent trials at Chislehurst. 1500 w. Auto Jour—Dec., 1900.

Efficiency.—See **Power.**

"Electricia."—The "Electricia" Carriages. From "La Nature." An illustrated description of interesting features of these vehicles. 1300 w. Sci Am Sup—Aug. 17, 1901.

Delivery Wagon.—See **Industrial.**

Future.—The Future of the Electric Automobile. S. G. Chambers. Abstract of a paper read before the London Automobile Club. Considers the commercial future of the electric carriage in its present form. Thinks the touring car will not be electrically driven, nor the omnibus, nor the hackney cab, but that there still remains a large field. 2000 w. Elec Rev, Lond—March 24. 1905.

Hewett-Lindstrom.—Electric Vehicle Design. H. M. Underwood. Discusses the defects in construction, and illustrates and describes the omnibus of the Hewett-Lindstrom Motor Co., 1800 w. Auto Mag—Jan., 1901.

Holson.—See **Hub Motor.**

Hub Motor.—Hub Motor Automobiles. Brief illustrated description of vehicle with motor built into the hub of the wheel, so that no gearing of any sort is visible. 350 w. Elect'n, Lond—Oct. 26, 1900.

Holson Two-Wheeled Electric Vehicle. Illustration and brief description of a vehicle consisting of a seat and carriage frame suspended between two large wheels, the electric motors being in the hubs of the wheels. 1200 w. W Elect'n—Feb. 23, 1901.

A New Four-Wheel Drive Freight Truck. Cornell Ridderhof. An illustrated description of an electric vehicle equipped with the Holson couple-gear motor, contained in the wheel or hub. 800 w. Mach., N. Y.—July, 1904.

Practical Test of a Hub-Motor Truck. An illustrated account of a demonstration made by the Holson electric truck on a steep hill in New York, with description of the steering and wheel construction. 2200 w. Automobile—Dec. 17, 1904.

New Type of Electric Truck. Illustrated description of a truck fitted with a single electric motor within each wheel. 1000 w. Sci Am—June 24, 1905.

The Couple Gear Electric Truck. Illustrated detailed description of these motor vehicles. There is a motor in each wheel and each motor carries two pinions at the end of its shaft, meshing with bevel gear racks on the interior of the wheel frame. 1200 w. Ir Age—Aug. 10, 1905.

See also AUTOMOBILE—Lohner-Porsche.

Industrial.—The Electric Delivery Equipment of a Large New York Store. Max Loewenthal. An illustrated account of the automobile delivery service of B. Altman & Co. 3200 w. Elec Wld & Engr—Dec. 29, 1900.

The Electric Automobile for Business Purposes. R. A. Fliess. Giving data of actual performance of electric delivery wagons, with numerous tables of mileage, demonstrating the success of electricity for light service. 5600 w. Horseless Age—Feb. 6, 1901.

Present Status of Electric Automobilism. Hayden Eames. An illustrated discussion of the advantages of electric delivery wagons, and a comparison with delivery wagons pulled by horses. 1200 w. Elec Wld & Engr—Jan. 10, 1903.

Coal Delivery in New York by an Electric Truck. Illustrates a vehicle in use in New York and vicinity, describing its working. 1000 w. Automobile—Oct. 10, 1903.

Commercial Possibilities of the Electric Industrial Wagon. Frederick J. Newman. Discusses some of the problems to be solved, and considers the outlook encouraging. 2200 w. Horseless Age—July 2, 1902.

See also Hub Motor; Pastel-Vinay.

Krieger.—See AUTOMOBILE.

Lombard-Guérin.—See AUTOMOBILE TROLLEY.

Long Run.—Electric Automobiles—Long Runs on One Charge. Henry F. Joel. An examination of some of the record or limit runs. 2000 w. Elec Rev, Lond—Nov. 22, 1901.

A 97-Mile Run by an Electromobile. An account of a run of ninety-seven miles on one charge, made by a British electric vehicle. 1400 w. Autocar—June 21, 1902.

Mail.—See AUTOMOBILE.

Motor Cycle.—See MOTOR CYCLE—Electric.

Motors.—Selection of Electric Motors. C. E. F. Ahlm. Treats of points in motor design which may be the cause of unusual drain on the battery of an electric vehicle. 1600 w. Horseless Age—April 17, 1901.

See also ELECTRIC MOTOR.

New York Exhibition.—See AUTOMOBILE EXHIBITION.

New York Stages.—Electric Automobile Stages in New York City. Illustrates and describes the vehicles in service on Fifth avenue, New York. 1800 w. Elec Wld & Engr—Dec. 14, 1901.

Omnibus.—Electric Omnibuses for London. J. Sutherland Warner. Aiming to show how properly designed electric vehicles, operated systematically, could be made profitable; outlining the scheme. 2800 w. Elec Times—March 5, 1903.

• Electric Automotor Omnibuses. H. E. P. Cottrell. An illustrated series of articles considering what has been accomplished on the Continent, especially in France, to supply facilities of transportation of this character, their efficiency and cost. Serial. 1st part. 3500 w. Engr, Lond—Sept. 1, 1905.

See also AUTOMOBILE; AUTOMOBILE EXHIBITION—London Olympia; AUTOMOBILE GASOLINE.

Operating.—Costs of Electric Automobilism. Robert H. Smith. A discussion of the cost of running these vehicles, giving experience in London, and giving the conclusions of the writer. 2300 w. Engr, Lond—Sept. 30, 1904.

Pastel—Vinay.—The Pastel-Vinay Electric Wagon. Details and drawings of a vehicle constructed for the Say Sugar Refinery in Paris. 900 w. Auto Jour—Dec., 1900.

Electric Truck (Chariot Electrique). A Bainville. Illustrated description of the heavy electric truck of 12 tons weight and 10 tons capacity used by the Say refinery of Paris. 1800 w. Electricien—Feb. 16, 1901.

Power.—Energy Consumption and Electric Automobile Performance. H. W. Alden. Calls attention to the importance of a high efficiency in the motors and gearing. 800 w. Elec Wld & Eng—Feb. 15 1902.

Power Calculations for Electric Vehicles. H. H. Kennedy. Suggestions for calculating the power equipment of a vehicle propelled by storage batteries and electric motors. 1200 w. Am Mach—Vol. 28, No. 2.

See also AUTOMOBILE.

Public Transport.—Electromobiles and Their Application to Public Transport (Ueber Elektromobilen und deren Verwendung als Oeffentliches Verkehrsmittel). K. Simons. An examination into the elements of operative costs under the conditions existing in German cities. 4500 w. Elektrotech Zeitschr—April 18, 1901.

Railway.—See ELECTRIC CAR; ELECTRIC LOCOMOTIVE.

Recuperative Braking.—Recuperative Braking on Electric Vehicles. W. A. Th. Mueller, in "Centralblatt fuer Accumulatoren Elementen und Automobilenkunde." A discussion of means of getting the greatest possible mileage out of a given battery, compound winding, general principles, etc. Serial. 1st part. 1500 w. Horseless Age—March 26, 1902.

Regenerative Control.—See Recuperative Braking; ELECTRIC RAILWAY.

Runabout.—Design for an Electric Runabout. J. C. Brocksmith, M. E. A complete design for vehicle, motors and battery, with many illustrations. 4000 w. Am Elect'n—Jan, 1903.

St. Louis Exposition.—See TRANSPORTATION.

Speed-Time Curves.—Speed-Time Curves for Automobile Motors. Frank B. Rae. Gives curves showing graphically the current input required for a given weight and rate of acceleration and for running at speed, with caluculations. 2,500 w. Elec Wld & Engr—Oct. 21, 1905.

Electromobiles. Henry F. Joel. A critical review of an article by Frank B. Rae on "Speed-Time Curves for Automobile Motors," published in the "Electrical World and Engineer." 1500 w. Elec Rev, Lond—Dec. 29, 1905.

Station.—See AUTOMOBILE GARAGE—Electric.

Storage Battery—See AUTOMOBILE GARAGE—Electric; STORAGE BATTERY—Automobile.

Test.—Electric Motor Cars and Tests. Rankin Kennedy. Considers the tests usually made of little value, and suggests methods of testing the battery. 1200 w. Elec Rev, Lond—July 19, 1901.

See also AUTOMOBILE COMPETITION—Electric.

Test Truck.—An Electric Truck Test. W. S. Timmis. Reports a test made of three electric trucks, extending over a period of four months, comparing cost with horse-drawn trucks. 1500 w. Am Mach—Vol. 27, No. 51.

Town Use.—Applications of Electricity to Driving Carriages in Towns. R. E. B. Crompton. Read before the Engng. Con. of the Inst of Civ Engrs. Remarks on the transmission, gear, storage batteries used, and tires. General discussion. 3400 w. Elec Engr, Lond—June 26, 1903.

Trackless.—See AUTOMOBILE, TROLLEY.

Tractors.—Power-Steered Electric Tractors for Commercial Vehicles. Illustrated description of a mechanism patented in Italy and soon to be put on the market in the United States. 600 w. Automobile—Oct. 31, 1903.

See also AUTOMOBILE—Fore-Carriage; TRACTION ENGINE.

Trials.—See AUTOMOBILE COMPETITION—Electric.

Trolley.—See AUTOMOBILE, TROLLEY.

Truck.—See Hub Motor; Industrial; Pastel-Vinay; Test; AUTOMOBILE.

Turbo.—See AUTOMOBILE.

Two-Wheeled.—See Hub Motor.

Voltage.—The Pressure to be Used on an Electromobile. Sydney F. Walker. Some remarks on the subject of the best voltage to be used and other matters concerning accumulators for motor vehicles. 900 w. Autocar—Jan. 25, 1902.

Washington, D. C.—The Washington, D. C., Electric Automobile Service. Illustrated description of the fine plant. 1700 w. Elec Wld & Engr—Jan. 26, 1901.

Waverley.—The Waverley Electromobiles. Illustrates and describes a number of these light electric vehicles. 3200 w. Auto Jour—April 25, 1903.

See also **STORAGE BATTERY—Sperry.**

Wheel Diameters.—See **AUTOMOBILE—Bearing; Wheel Diameters.**

AUTOMOBILE EXHIBITION.

See also **AUTOMOBILE COMPETITION.**

Agricultural Hall.—See **London, Islington.**

Berlin.—The German Automobile Exhibition at Berlin, 1902 (Die Deutsche Automobil-Ausstellung in Berlin, 1902). A general review of the automobiles exhibited, with some details. Ill. 1500 w. Zeitschr d Ver Deutscher Ing—June 14, 1902.

The German Automobile Exposition at Berlin, 1902 (Die Deutsche Automobil-Ausstellung zu Berlin, 1902). With illustrations of the various motor cycles and automobiles shown at the recent exhibition. Two articles, 3000 w. Glasers Annalen—Sept. 15, Oct. 1, 1902.

The German Automobile Exhibition (Von der Deutschen Automobilausstellung). An illustrated description of various automobiles and their parts shown at Berlin in 1903. Serial. Part I. 3000 w. Ill. Zeitschr f Klein u Strassenbahnen—April 16, 1903.

The German Automobile Exhibition at Berlin, 1903 (Deutsche Automobil-Ausstellung, Berlin, 1903). Julius Küster. An illustrated general description of the exhibition and some of the exhibits, including vehicles, motors, and details. Serial. 2 parts. 7000 w. Zeitschr d Mitteleuropäischen Motorwagen-Ver—Nos. 5 and 6, 1903.

The International Automobile Exhibition in Berlin (Die Internationale Automobil-Ausstellung in Berlin). F. Pflug. A general description of the various machines exhibited. Serial. Part I. 2500 w. Glasers Annalen—March 1, 1905.

Electricity at the Berlin Automobile Exposition (Die Electricität auf der Internationalen Automobilausstellung in Berlin). C. v. Groddeck. A general description of the exhibits, with especial reference to the accumulator electric automobiles. 2500 w. Elektrotech Zeitschr—March 2, 1905.

See also **AUTOMOBILE—Germany; MOTOR CYCLE.**

Boston.—New Cars at the Boston Show. Brief illustrated descriptions of some of the new cars shown. 3000 w. Automobile—March 18, 1905.

Steam Cars at the Boston Show. H. F. Donaldson. Descriptions and photographs of types displayed. 7500 w. Automobile—March 25, 1905.

Brussels.—See **AUTOMOBILE—Industrial.**

Chicago.—Exhibits at the Coliseum. Brief illustrated descriptions of automobiles and accessories at the automobile show in Chicago, March 1 to 8. 5400 w. Auto Topics—March 1, 1902.

Second Annual Automobile Show in Chicago. An illustrated account, with brief descriptions of new cars exhibited and features of interest. 9400 w. Automobile—Feb. 21, 1903.

Some Novel Western Cars Exhibited. Illustrates and describes interesting cars shown at Chicago. 3000 w. Automobile—Feb. 13, 1904.

Features of New Western Cars. Calls attention to new and interesting features as shown in the cars at the Chicago exhibition. 4000 w. Automobile—Feb. 20, 1904.

Crystal Palace.—See **London.**

England.—Technical Notes on Exhibits at Some Recent English Shows. J. S. V. Bickford. A summary of interesting points observed in late models of motor cycles and cars. Ill. 2800 w. Horseless Age—Feb. 25, 1903.

Islington.—See **London.**

Leipsic.—The Leipsic Automobile Show. Illustrations and descriptions of various types exhibited with general remarks. 1500 w. Sci Am Sup—April 26, 1902.

London.—The Cycle Shows. Comments on the exhibits, and the tendency toward mechanical propulsion. Describes some of the most interesting cycles. 2500 w. Engng—Dec. 6, 1901.

The Annual Cycle Shows.—The National and the Stanley. A brief report of the exhibits, with illustrations. 7000 w. Auto Jour—Nov. 28, 1903.

See also **MOTOR CYCLE.**

London, Crystal Palace.—Crystal Palace Show. An illustrated article giving particulars of the leading features, exhibits, and novelties. 5800 w. Auto Jour—March 15, 1902.

The Crystal Palace Motor Car Show. Editorial review of this London exhibition. 3200 w. Engng—Feb. 6, 1903.

The Crystal Palace Automobile Show. Illustrated descriptions of the steam, patrol, and electric cars exhibited. 10,000 w. Motor Car Jour—Feb. 7, 1903.

Society of Motor Manufacturers' Exhibition at the Crystal Palace. Illustrated descriptions of interesting exhibits. 3500 w. Auto Jour—Feb. 13, 1904.

The Crystal Palace Exhibition. Illustrations, with descriptions of interesting exhibits. 6000 w. Auto Jour—Feb. 20, 1904.

The Crystal Palace Exhibition. An illustrated article calling attention to novel features in the exhibits, and describing interesting vehicles. 9800 w. Auto Jour—Feb. 27, 1904.

London, Islington.—Motor Car Exhibition at Islington. Remarks on the notable features, with illustrated descriptions of some of the exhibits. 1700 w. Engr, Lond—May 10, 1901.

The Motor-Car Exhibition. A brief account of some of the exhibits at Islington, England, where an exhibition has recently been held. Also editorial. 5200 w. Engng—April 25, 1902.

Motor Car Exhibition at Islington. Report of a very successful exhibition, wih illustrated descriptions of exhibits. Serial. 1st part. 3500 w. Engr, Lond—April 25, 1902.

Petrol Cars. An illustrated review of the petrol cars shown at the exhibition in Islington. 7500 w. Autocar—March 28, 1903.

The Annual Agricultural Hall Exhibition. A report of this exhibition at Islington, with illustrated descriptions of exhibits. Serial. 1st part. 3200 w. Auto Jour—March 28, 1903.

Agricultural Hall Show. A review of the principal novelties, aiming to describe particularly things not previously exhibited or described. Ills. Serial. 1st part. 10300 w. Autocar—March 26, 1904.

Motor Car Show at Islington. A brief review of the more interesting exhibits. 2800 w. Engr, Lond—March 24, 1905.

Agricultural Hall Show. Illustrates and describes some of the vehicles shown at this London exhibition. Serial. 1st part. 2000 w. Auto Jour—March 25, 1905.

London, Olympia.—The Motor-Car Exhibition. An account of the third motor-car show promoted by the Society of Motor Manufacturers and Traders, held at Olympia, London. Describes many of the vehicles. Ills. Serial. 1st part. 5000 w. Engng—Feb. 17, 1905.

Types of Motor Omnibuses at the Olympia Exhibition. Descriptions, with illustrations, of various makes of motor omnibuses now on the market. 5700 w. Tram & Ry Wld—March 9, 1905.

Some Leading Cars at Olympia. Illustrates and describes new models of various makes exhibited. Serial. 1st part. 1500 w. Auto Jour—Nov. 18, 1905.

Motor Car Exhibition at Olympia. An illustrated review of this exhibition, its striking features and more interesting exhibits. Serial. 1st part. 3800 w. Engr, Lond—Nov. 24, 1905.

The Olympia Exhibition. A general account of this very successful automobile exhibition, with illustrations of many of the exhibits, and comments on the progress. 4500 w. Auto Jour—Nov. 25, 1905.

Motor Omnibuses at the Olympia Exhibition. An illustrated review of the exhibits, showing recent progress. 4500 w. Tram & Ry Wld—Dec. 7, 1905.

London, Stanley.—The National and Stanley Shows. Brief illustrated descriptions of special features in the exhibits of motor cars, motor bicycles and their accessories. 4400 w. Auto Jour—Dec., 1901.

The Stanley Automobile Exhibition. Illustrations and notes concerning the cars exhibited, tires, etc. 3200 w. Auto Jour—Jan. 24, 1903.

The Stanley Show. Illustrates and describes the "tricars" and other vehicles exhibited. 2800 w. Auto Jour—Nov. 26, 1904.

New York, 1900.—The Exhibition. E. J. Stoddard. A review of the exhibits at Madison Square Garden, New York. 2500 w. Horseless Age—Nov. 7, 1900.

The Loan Exhibition of the Automobile Club. R. I. Clegg. Brief comments on the vehicles shown in this department at Madison Sq. Garden. 2900 w. Horseless Age—Nov. 7, 1900.

Steam Vehicles at the Show. R. I. Clegg. A review of the exhibits at Madison Sq. Garden, with comments. 2800 w. Horseless Age—Nov. 7, 1900.

Exhibits at the Automobile Club's Show. Brief notice of the exhibits at Madison Sq. Garden, with illustrations. 3500 w. Horseless Age—Nov. 7, 1900.

Electric Vehicles at the Madison Square Garden Show. P. M. Heldt. Reviews features of interest in the exhibits, showing the progress made. 2800 w. Horseless Age—Nov. 7, 1900.

Critical Review of the Carriages and Engines of the So-Called "Explosive Type" shown in the recent Exhibition. Henry Power. 2500 w. Horseless Age—Nov. 14, 1900.

See also **AUTOMOBILE, GASOLINE—Air-Cooled.**

New York, 1901.—Steam Vehicles at the Automobile Show. Jos. W. Jones. The present article comments on the Lane automobile, the Morgan water-tube boiler, and other exhibits. Ill. Serial. 1st part. 1200 w. Horseless Age—Nov. 6, 1901.

The New Gasoline Exhibits. Albert L. Clough. Brief illustrated descriptions of recent carriages exhibited at the New York Show. 2200 w. Serial. 1st part. Horseless Age—Nov. 6, 1901.

Some Electric Vehicles at the Show. P. M. Heldt. Comments on the exhibits at the recent automobile show at Madison Sq. Garden, N. Y. 900 w. Horseless Age—Nov. 6, 1901.

Late Practice in Gasoline Vehicles as Indicated by the Show. Albert L. Clough. Discusses speed, prices, tires, driving chains, ignition, lubrication, steering, and brakes. 2500 w. Horseless Age—Nov. 13, 1901.

A Year's Development in the Gasoline Class. Perry B. Rawson. Reviews the exhibits at the recent exhibition at Madison Sq. Garden, New York. 3000 w. Horseless Age—Nov. 13, 1901.

Some Exhibits at the Automobile Show. Illustrations and descriptions of vehicles at the second annual automobile show at Madison Sq. Garden, N. Y. 1500 w. Sci Am—Nov. 16, 1901.

The Automobile Show. An illustrated account of the recent annual exhibition held at Madison Square Garden, New York. 2700 w. Auto Mag—Dec., 1901.

Résumé of the New York Automobile Show. Alex. Schwalbach. An illustrated article pointing out the most striking characteristics. 4000 w. Auto Mag—Jan., 1902.

New York, 1903.—The Madison Square Garden Show. An illustrated article describing this very successful exhibition, some of the exhibits, the steam vehicles, the electric vehicles, etc. 9500 w. Horseless Age—Jan. 21, 1903.

The Show and Its Lessons. Harry B. Haines. Notes improvements, types, sales, etc. 1900 w. Horseless Age—Jan. 28, 1903.

A Critical Review of the Show. Albert L. Clough. A review of the recent exhibition at Madison Sq. Garden. 3000 w. Horseless Age—Jan. 28, 1903.

Data on Gasoline Touring Cars. J. G. Perrin. A comparison of data in the leading types exhibited at the recent exhibition in New York. 1200 w. Horseless Age—Jan. 28, 1903.

The American Automobile. Hugh Dolnar. A brief review of the recent exhibition at Madison Square Garden, and what it means to the machine trade. 1200 w. Am Mach—Jan. 29, 1903.

New York, 1904.—The Show an Educational Treat. An illustrated account of the exhibits at the 1904 show in New York. 1500 w. Automobile—Jan. 23, 1904.

Tendencies Embodied in the Exhibits. Hugh Dolnar. Review of the 1904 New York Show, calling attention to the developments of the past year and noting the present tendencies. 3000 w. Automobile—Jan. 23, 1904.

Interesting and Novel Features of Car Construction at the Madison Square Show. H. L. Towle. Remarks on features of interest observed at the recent exhibition in New York. 2000 w. Automobile—Jan. 30, 1904.

Show Tendencies in Construction. Hugh Dolnar. A brief discussion of the recent exhibition in New York and the types predominating. 1700 w. Automobile—Jan. 30, 1904.

New York, 1905.—Fifth Annual Show in New York. An illustrated general description of the exhibits and interesting features. 6200 w. Automobile—Jan. 21, 1905.

N. Y. Salon, 1905.—Foreign Automobiles at the Importers' Salon. Illustrations, with brief descriptions, of cars exhibited at the Macy Building, in New York. 2000 w. Sci Am—Jan. 28, 1905.

Olympia.—See London.

Paris.—See also **AUTOMOBILE—Construction; France; Omnibus, Paris.**

Paris, 1900.—Automobiles at the Paris Exposition (Die Weltausstellung in Paris, 1900; die Automobilen). Dr. E. Müllendorff. A general review, noting the especial features of novelty among the exhibits. 2500 w. Glasers Annalen—Dec. 1, 1900.

Motor Cars in Paris. A discussion of the motor carriage industry, and the development as shown in the character of the exhibits at the annual show organized by the Automobile Club de France in the Grand Palais in Paris. 4000 w. Engr, Lond—Feb. 15, 1901.

See also **AUTOMOBILE—Omnibus, Paris.**

Paris, 1901.—The Paris Motor Car Show. An account of this annual exhibition of motor vehicles, the exhibits, and the changes noted. Ill. Serial. 1st part. 2500 w. Engr, Lond—Jan. 3, 1902.

The Paris Automobile Exhibition. Illustrates and describes some of the more important exhibits at what proved to be a most successful exhibition, the profits reaching about $20,000. 5500 w. Auto Jour—Jan., 1902.

The Paris Autocar Show. An illustrated description of some of the leading novelties exhibited. 13600 w. Autocar—Dec. 21, 1901.

The Automobile and Cycle Show at Paris. December, 1901 (Le Salon de l'Automobile et du Cycle). F. Drouin. Various illustrated notes on the automobiles and motors exhibited. 2500 w. Génie Civil—Jan. 25, 1902.

The Paris Automobile Show. Alex Schwalbach. An account of the recent very successful annual exhibitions, with illustrated description of the most interesting features in the exhibits. 6300 w. Auto Mag—Feb., 1902.

Some French Novelties. L. Berger. Illustrated review of automobiles shown at the recent exhibition in Paris. 900 w. Horseless Age—Feb. 26, 1902.

Paris, 1902.—The Annual A. C. F. Show in Paris. An illustrated report of exhibits and matters of interest. Serial. 1st part. 7800 w. Auto Jour—Dec. 20, 1902.

The Paris Autocar Show. An illustrated description of exhibits, special features, and matters of interest, 13700 w. Autocar—Dec. 20, 1902.

An American Impression of the Paris Show. Joseph Tracy. Notes the features that impressed the writer in the machines exhibited. 1800 w. Horseless Age—Dec. 31, 1902.

The Paris Salon in Text and Pictures. An illustrated account of things and incidents which bear upon the development of automobilism in the United States or illustrate the condition of the movement in France. 3500 w. Automobile—Jan. 3, 1903.

The Paris Exhibition of Automobiles. Begins an illustrated description of several of the interesting machines exhibited. Serial. 1st part. 2300 w. Engng—Jan. 23, 1903.

Paris, 1903.—The Paris Autocar Show. Preliminary description, with illustrations. 5700 w. Autocar—Dec. 12, 1903.

Motor Cars in Paris. Illustrates and describes interesting cars on exhibition at the sixth annual exhibition. Serial. 1st part. 2700 w. Engr, London—Dec. 18, 1903.

The Paris Autocar Show. An illustrated article giving a general description of the cars and accessories. 14000 w. Autocar—Dec. 19, 1903.

Automobilism at the Salon of December, 1903

(L'Automobilisme au Salon de Décembre, 1903). Gérard Lavergne. A brief review of the recent exhibition in Paris, showing broadly the progress there displayed. 2000 w. Rev Gen des Sciences—Jan. 15, 1904.

The International Automobile Exposition at Paris. Lucien Perissé. A general account of the exposition of December, 1903, with illustrated description of the leading mechanical features and special types exhibited. 4500 w. Engineering Magazine—April, 1904.

Paris, 1904.—Motor Cars in Paris. Survey of the progress in the motor-car industry, as judged by the exhibits at the Paris Show. Serial. 1st part. 3000 w. Engr, Lond—Dec. 16, 1904.

Paris Salon, 1904. Brief illustrated descriptions of some of the exhibits, and remarks on the interesting features of the exhibition. Serial. 1st part. 3500 w. Auto Jour—Dec. 17, 1904.

Features of Leading Cars at Paris Show. An illustrated article describing changes for the season of 1905 in the construction of frames, engines, clutches, carbureters, and control systems. 4500 w. Automobile—Dec. 31, 1904.

The Progress of Automobilism in 1904 (Les Progrès de l'Automobilisme en 1904). F. Drouin. Reviewing especially the developments of the year as shown in the exhibits at the recent Salon in Paris. Serial. Part I. 3000 w. Génie Civil—Jan. 28, 1905.

Paris, 1905.—1906 Models at the Paris Salon. Rene M. Petard. Begins an illustrated description of many of the new models shown. Serial. 1st part. 1700 w. Automobile—Dec. 28, 1905.

Paris Omnibus Co.—See **AUTOMOBILE—Omnibus, Paris.**

Stanley.—See **London.**

Vienna.—The Austrian Automobile Exhibition at Vienna, 1900 (Die Oesterreichishe Automobil-Austellung in Wien, 1900.) Prof. L. Czischek. A general description, with numerous illustrations, of the various vehicles exhibited. 2000 w. 3 plates. Zeitschr d Oesterr Ing u Arch Ver—Feb. 1, 1901.

Western Cars.—See **Chicago.**

AUTOMOBILE GARAGE.

Motor Car Houses. B. Wyand. Suggestions for erecting buildings suitable for small and large vehicles. Ills. 900 w. Autocar—June 18, 1904.

Electric, Denver.—New Electric Garage in Denver. Illustrated description of a new garage for the handling and storage of electric automobiles. 900 w. Elec Wld & Engr—May 27, 1905.

Electric, New York.—The New Station of the New York Electric Vehicle Transportation Company. R. A. Fliess. Reviews the history of this company, and begins an illustrated description of the building. Serial. 1st part. 5700 w. Elec Wld & Engr—Jan. 5, 1901.

The New York Electric Vehicle Transportation Company's New Station. Illustrated description of the new quarters and the numerous details of the service. 2000 w. Elec Rev, N. Y.—May 4, 1901.

Heating and Ventilation.—See **HEATING AND VENTILATION—Garages.**

New York.—Private Automobile Stables. Illustration, with description of buildings being erected in East 75th street, New York, with every convenience for the maintenance and care of steam, gasoline, or electric machines. 900 w. Horseless Age—Feb. 19, 1902.

Model Garage in Harlem. Illustrates and describes a new storage station in upper Manhattan Island, New York City. 1000 w. Automobile—Nov. 23, 1905.

New York, Electric.—See **Electric, New York.**

Paris.—Salesrooms and Garages in Paris. Brief illustrated descriptions of showrooms, stores, garages, and their equipment. Serial. 1st part. 4000 w. Automobile—April 15, 1905.

Washington, D. C.—See **AUTOMOBILE, ELECTRIC.**

Winter.—See **AUTOMOBILE—Winter Use.**

AUTOMOBILE, GASOLINE.

See also **AGRICULTURAL MACHINERY; AUTOMOBILE; AUTOMOBILE COMPETITION; AUTOMOBILE EXHIBITION; AUTOMOBILE RACE; AUTOMOBILE TOUR; GASOLINE ENGINE.**

Petrol Motor Cars. Frank Little. An illustrated article describing the details of a petrol car and the working, and discussing many designs and types. 12000 w. Trans N E Coast Inst of Engrs & Shipbldrs—April, 1905.

Achilles.—The 1904 Achilles Petrol Cars. Illustrates and describes these cars, built in English works, and intended for "men of moderate means." 2000 w. Auto Jour—Feb. 13, 1904.

Adams-Farwell.—Adams-Farwell Car with Rotating Motor. Illustrates and describes details of interest in a new gasoline automobile. 1100 w. Automobile—Oct. 29, 1904.

The Adams-Farwell Gasoline Motor. Illustrated description of an engine designed for automobile use in which the engine shaft remains stationary and the cylinders revolve around it. 2400 w. Ir Age—Nov. 3, 1904.

Air-Cooled.—Novelties in Air-Cooled Motors at the Automobile Club's Show. Clarence C. Bramwell. Brief notice of the new examples. 600 w. Horseless Age—Nov. 7, 1900.

Air-Cooled Motor Difficulties and How to Overcome Them. T. Parker Hall, Jr. An account of the writer's experiments and the lessons learned from them. 2000 w. Horseless Age—March 27, 1901.

Air-Cooled Motors in Principle and Practice. Herbert L. Towle. Discusses the details of this class of motors, the advantages, requirements, devices used, &c. Serial. 1st part. 1300 w. Automobile—July 20, 1905.

The Problem of Air Cooling. F. Reaugh. Considers some of the difficulties in the way of air-cooling and some possible ways of surmounting them. 1800 w. Automobile—April 29, 1905.

Handling of an Air-Cooled Gasoline Car. Harry B. Haines. Begins a detailed discussion of these cars and the care needed to handle them successfully. 1600 w. Automobile—Aug. 10, 1905.

Practical Experiences with Air-Cooled Cars. Harry B. Haines. Gives some personal experiences with air-cooled machines on varying road conditions. Serial. 1st part. 2800 w. Automobile—Nov. 2, 1905.

See also **Balzar; Frayer-Miller; Knox; GASOLINE ENGINE.**

Albany.—The Albany "Silent Safety" Petrol Car. Illustrated detailed description. 2800 w. Auto Jour—Feb. 20, 1904.

Albion.—The 16 H. P. Albion Car. An illustrated detailed description of an interesting car. Serial. 1st part. 900 w. Autocar—April 15, 1905.

American.—Average American Gasoline Vehicle Practice. Albert L. Clough. Information collected by the author from an examination of twelve vehicles. 1700 w. Horseless Age—July 17, 1901.

The Trend of American Gasoline Carriage Practice. Albert L. Clough. A review of recent changes and the present American practice. 2500 w. Horseless Age—June 11, 1902.

Ardsley.—The New Ardsley Touring Car. An illustrated detailed description of an "assembled" car which is reported superior to many "one shop" products. 3000 w. Automobile—Jan. 7, 1905.

Argyll.—The 6 H. P. Argyll Voiturette. Illustrated description of the construction and drive. 1500 w. Autocar—June 22, 1901.

The 1905 Argyll Cars. Information concerning these vehicles and their manufacture. Ill. Serial. 1st part. 2300 w. Auto Jour—Oct. 14, 1905.

Ariel.—The Ariel Petrol Cars. The first of a series of illustrated articles describing interesting vehicles made in Birmingham, England. Serial. 1st part. 900 w. Auto Jour—Sept. 20, 1902.

The Ariel Petrol Cars. Illustrates and describes the characteristic features. 1200 w. Auto Jour—Feb. 27, 1904.

Arrol-Johnston.—The Arrol-Johnston Motor Car. An illustrated detailed description of the car which won the Tourist Trophy Race in the Isle of Man. Serial. 1st part. 4000 w. Engng—Nov. 10, 1905.

See also **AUTOMOBILE COMPETITION—Isle of Man; AUTOMOBILE WORKS.**

Atlas Truck.—The Atlas Gasoline Commercial Truck. Illustrates and describes the constructional features of interest. 2300 w. Automobile—Aug. 31, 1905.

Automotor.—The 24-H. P. "Automotor" Petrol Car. Illustrated description of a fast touring car of the chain-driven type. 1500 w. Auto Jour—April 30, 1904.

Balzar Air-Cooled.—A Novel Air-Cooled Gasoline Motor. An illustrated description of the Balzar revolving cylinder air-cooled gasoline motor. 1200 w. Sci Am—March 1, 1902.

Beaufort.—The Beaufort Cars. Illustrates and describes the special features of these cars, such as the accessible magnets, igniters, ball-bearings to transmission and wheel axles, and three-point cantilever suspension to gear-box. 1000 w. Autocar—Aug. 26, 1905.

Beeston-Humber.—Two New Beeston-Humber Cars. Illustrated detailed descriptions of two new designs. 2000 w. Autocar—Feb. 11, 1905.

Belsize.—The 16-20-H. P. 3-Cylinder Belsize Car. Illustrated description of a car of English construction. 1800 w. Auto Jour—March 19, 1904.

The Belsize—All British—Petrol Cars. Begins an illustrated detailed description of models of these cars. Serial. 1st part. 1800 w. Auto Jour—Jan. 28, 1905.

Benz.—The Possibilities of the Belt-Driven Benz. R. W. Buttemer. Illustrates and describes some improvements made in these cars. 2000 w. Autocar—July 2, 1904.

Benzol.—See LIQUID FUEL.

Bianchi.—The Bianchi Petrol Car. Illustrates and describes these Italian cars of the chain-driven type, with four-cylinder engines and four-speed gear boxes. 700 w. Auto Jour—Nov. 18, 1905.

Bodies.—See AUTOMOBILE.

Bolide.—The Fastest Gasoline Automobile. Illustrates details of the Bolide gasoline racing carriage. 1100 w. Sci Am Sup—June 15, 1901.

Bollée.—The 24-H. P. Bollée Petrol Car. Illustrated detailed description of as nearly a noiseless vehicle as can be expected of one self-propelled. Serial. 1st part. 1700 w. Auto Jour—Dec. 12, 1903.

Braking.—Use of the Motor for Braking. Rene M. Petard. Explains the advantages to be gained by using the motor of a gasoline automobile as a brake, and the most advantageous method of obtaining a braking effect. 1800 w. Automobile—Nov. 9, 1905.

See also Omnibus; BRAKE.

Brillié.—Automobiles and Motors (Automobiles et Moteurs). Eugène Brillié. Describing the double-acting internal combustion motor of the author's design, and its applications to mechanically propelled vehicles. 5000 w. Bull Soc d'Encour—Aug. 31, 1902.

See also Gobron—Brillié.

Brillié Truck.—Automobiles for Military Transport (Transports Automobiles Militaires). Lt. Col. G. Espitallier. Describing the successful use of a Brillié petrol truck in hauling a train of artillery in the Portuguese army. 3000 w. 1 plate. Génie Civil—June 10, 1905.

B. A. C. S.—The 18-24 B. A. C. S. Car. Illustrations and general details of a new car, built in France, for the British Automobile Commercial Syndicate. 900 w. Autocar—July 8, 1905.

Brooke.—The 4-Cylinder 15-20-H. P. Brooke Petrol Car. Begins an illustrated detailed description of this car, which is on exhibition at Agricultural Hall. Serial. 1st part. 1700 w. Auto Jour—March 26, 1904.

Brotherhood.—The 20-H. P. Brotherhood Petrol Car—Another New All-British Vehicle. An illustrated detailed description. Serial. 1st part. 3000 w. Auto Jour—Feb. 4, 1905.

The "Brotherhood" Petrol Cars. Illustrated description of novel features introduced in the latest model. 700 w. Auto Jour—Nov. 18, 1905.

Brouhot.—The Brouhot Petrol Cars. Illustrates and describes the latest 4-cylinder models. 1400 w. Auto Jour—Jan. 16, 1904.

Cab.—London's Gasolene-Propelled Cabs. Illustration with brief description. 600 w. Sci Am—Oct. 3, 1903.

Cadillac.—The Cadillac Petrol Car. Begins an illustrated detailed description of a car of moderate power and cost. Serial. 1st part. 1800 w. Auto Jour—Oct. 17, 1903.

Canadian Rockies.—Gasoline Motor Car in the Canadian Rockies. Illustrates and describes an observation car built for use of guests in the Rocky and Selkirk mountains. 800 w. Loc Engng—Dec., 1902.

Chadwick.—Chadwick Touring Car, 1906 Model. Illustrations and detailed description of an interesting machine built in Philadelphia. 2700 w. Automobile—Nov. 2, 1905.

Chatel-Jeannin.—The Chatel-Jeannin Petrol Car. An illustrated description of its construction and action. 3300 w. Auto Jour—Aug. 16, 1902.

Chenard-Walcker.—The 15 H. P. Chenard-Walcker Car. Illustrated description of a British car remarkable for silent running, simplicity of control, and flexibility of engine. 1000 w. Autocar—Jan. 21, 1905.

The 1904 Chenard and Walcker Petrol Cars. An illustrated detailed description of these vehicles. 3000 w. Auto Jour—Jan. 23, 1904.

The 18 H. P. Chenard and Walcker Car. Illustrated description of the interesting features. 1400 w. Autocar—Jan. 23, 1904.

The Chenard and Walcker 14 H. P. Petrol Car. An illustrated detailed description. 2200 w. Auto Jour—April 11, 1903.

Christie Racer.—A New American Automobile. Illustrated description of the Christie racer. 1200 w. Sci Am—Jan. 28, 1905.

Clement.—The Eight Horse Power Clement Carriage. From "La Locomotion." Illustrated description of an 8-horse-power, double-cylindered light carriage. 4000 w. Horseless Age—March 19, 1902.

The 1904 Clement Petrol Cars. Illustrated description of these cars, built in Paris. Serial. 1st part. 1200 w. Auto Jour—May 28, 1904.

Clement-Talbot.—The Clement-Talbot Cars. Illustrated description of these light cars, remarkable for their silence and ease of control, great flexibility of engine and power in proportion to weight. 1200 w. Autocar—July 2, 1904.

The 8 H. P. and 12 H. P. Clement-Talbot Cars. An illustrated detailed description. Serial. 1st part. 1700 w. Autocar—March 18, 1905.

Cleveland.—Cleveland 30-35 Horse-Power Model F. Illustrated detailed description. 1200 w. Automobile—Dec. 28, 1905.

Climax.—The 14 H. P. Climax Car. Illustration and brief description of the principal features, and the working. 1400 w. Autocar—June 24, 1905.

Columbia.—New Columbia 28 H. P. Touring Car. Illustrated description of a new gasoline car to be known as Mark XLVI. Notes its interesting features. 2000 w. Automobile—Dec. 14, 1905.

Commercial.—See Daimler; Industrial; AUTOMOBILE—Industrial.

Compound Engine. See GASOLINE ENGINE.

Construction.—See AUTOMOBILE.

Continental.—The "Continental" Petrol Cars. Illustrates and describes these vehicles, which are made in Paris, and designed to be sold at a moderate price. 1100 w. Auto Jour—May 30, 1903.

Control.—Car Control by Spark and Throttle. Considers the various manipulations best suited to different types of cars. 2500 w. Automobiles—April 29, 1905.

Cooling.—The Cooling of Explosive Motors on Automobiles. J. Grouvelle and H. Arquembourg. States the causes that may increase or diminish the amount of heat absorbed by the cylinder wall, and discusses methods of getting rid of the heat. 2800 w. Mech Engr—April 30, 1904.

Water-Coolers for Motor-Cars. J. S. V. Bickford. An account of experimental investigations giving results at variance with those published by other investigators. 2200 w. Engng—March 31, 1905.

See also Air Cooling; Non-Freezing Liquid; Radiator.

Coronet.—The Coronet Cars. Illustrated description of a new English-built car. 1300 w. Autocar—March 19, 1904.

Cottereau.—The Cottereau Petrol Vehicles. Illustrates and describes the interesting features of the various sizes made, with details of engines and carburetter. 1800 w. Auto Jour—March 7, 1903.

The 5-H. P. Cottereau Voiturette. An illustrated detailed description. Serial. 1st part. 1200 w. Auto Jour—Oct. 3, 1903.

The 1904 Cottereau Petrol Cars. Illustrated detailed description of a 3-cylinder 12 to 16 h. p. vehicle with new features. 2000 w. Auto Jour—Jan. 16, 1904.

Craig-Dörwald.—See GASOLINE ENGINE.

Crestmobile.—The Automobile Carriage in Its Simplest Form. Brief illustrated description of a vehicle which aims at simplicity in design. 600 w. Auto & Motor Rev—Dec. 13, 1902.

Crossley.—The "Crossley" Petrol Motor Car. Illustrates and describes a car which aims to be second to none in quietness and steadiness or running, durability and reliability. 2200 w. Motor Car Jour—Jan. 30, 1904.

Some Further Details of the Crossley Petrol Car. Illustrations with description of features of interest. 1800 w. Auto Jour—Feb. 6, 1904.

See also **CARBURETTER—Automatic.**

Crouan.—The Crouan Petrol Car. An illustrated article describing the recent cars of this French firm. Serial. 1st part. 2000 w. Auto Jour—May 16, 1903.

Cupelle.—The Cupelle Petrol Cars. An illustrated article giving particulars of these cars. 1100 w. Auto Jour—May 6, 1905.

Cylinder Jacket.—See **Cooling; Non-Freezing Liquids.**

Daimler.—The Development of the Petroleum Automobile. Paul Daimler. A review of the life and work of Gottlieb Daimler, the "Father of the Automobile," and an account of the development of the Daimler motor vehicles. 2500 w. Engineering Magazine—Dec., 1901.

1902 Type Daimler Cars. Illustrated description of vehicles embodying the latest and best practice. Serial. 1st part. 3000 w. Auto Jour—July 26, 1902.

Le Chat Noir. Illustrates and describes what is considered the finest machine yet made by this company. 700 w. Autocar—March 1, 1902.

King Edward's Daimler. A. F. Sinclair. A brief account of Coventry, England, with history of the Daimler Company, and illustrated descriptions of cars made for King Edward VII. 4000 w. Auto Mag—May, 1902.

The 28 H. P. Daimler Car. An illustrated detailed description. Serial. 1st part. 1200 w. Autocar—July 30, 1904.

The Daimler Motor Company. An illustrated account of the work of this company in automobile construction, describing the methods. 4700 w. Trac & Trans—Feb., 1904.

The 1904 Daimler Petrol Cars. Illustrated detailed description of this new design, calling attention to the noticeable changes. 1800 w. Auto Jour—March 5, 1904.

English Daimlers for American Market. An illustrated description of the main features of these cars, which differ somewhat from the English form. 2000 w. Automobile—Nov. 30, 1905.

Automobiles for Industrial Service (Motorfahrzeuge für Nutzzwecke). Illustrated descriptions of Daimler vehicles for conveying merchandise, also description of the Daimler military wagon constructed for the German army. 1200 w. 1 plate. Zeitschr d Ver Deutscher Ing—Sept. 19, 1903.

The Milnes-Daimler Omnibuses and Commercial Vehicles. Begins an illustrated description of this class of vehicles, as designed by the company named. Serial. 1st part. 1100 w. Auto Jour—Sept. 24, 1904.

Darracq.—The Light Darracq Vehicle (Le Voiture Légère Darracq). An illustrated description of a modern gasoline vehicle of the Darracq type. 700 w. Rev Technique—May 10, 1903.

The 15-H. P. Darracq. Illustrated description of the latest pattern Darracq car. 1200 w. Autocar—Nov. 5, 1904.

Dawson.—The Dawson Car. Illustrated description. 1000 w. Autocar—April 6, 1901.

De Dietrich.—The New 16 h. p. De Dietrich Car. An illustrated description of new cars built under Turcat-Méry patents. 1200 w. Autocar—Oct. 4, 1902.

The 1905 De Dietrich Cars. Illustrates and describes the new models, of which there are four distinct types. Serial. 1st part. 1600 w. Auto Jour—July 1, 1905.

The New 12-15-H. P. De Dietrich Car. Illustrated detailed description of the new chassis, the engine, &c. Serial. 1st part. 800 w. Auto Jour—Nov. 25, 1905.

De Dietrich-Bugatte.—The Dietrich-Bugatte Petrol Cars. Illustrates a partly finished 24 H. P. chassis and the engine in position. Also gives a side elevation and plan of the car. Chiefly interesting because of the peculiar construction of the engine. 700 w. Auto Jour—April 18, 1903.

De Dion.—The 15-H. P. 4-cylinder De Dion Car. An illustrated detailed description of a new model. Serial. 1st part. 1100 w. Auto Jour—Nov. 12, 1904.

See also **AUTOMOBILE GEAR.**

De Dion-Bouton.—The Latest De Dion-Bouton Vehicles. An illustrated detailed description of a new light car with the motor placed in front under a bonnet. The mechanism is fully explained. Serial. 1st part. 3000 w. Autocar—Nov. 9, 1901.

The Latest De Dion-Bouton Petrol Car. An illustrated detailed description of a 10 h. p. car made by this Paris firm. Serial. 1st part. 3400 w. Auto Jour—March 19, 1904.

The 6-H. P. De Dion-Bouton Voiturette. An illustrated detailed description of a recent light car. 900 w. Autocar—Dec. 27, 1902.

See also **AUTOMOBILE — Gasoline — Electric; AUTOMOBILE ELECTRIC; AUTOMOBILE TOUR.**

Delaunay-Belleville.—The Delaunay-Belleville Cars. Illustrates and describes interesting details of these cars. 1000 w. Autocar—Jan. 28, 1905.

The Delaunay-Belleville Petrol Cars. Illustrated description of these cars. Serial. 1st part. 700 w. Auto Jour—Aug. 5, 1905.

Delivery Wagon.—See **Industrial; AUTOMOBILE; CAR, MOTOR-DRIVEN—Gasoline Inspection.**

Dennis.—The Dennis Petrol Cars. An illustrated detailed description, calling attention to their leading characteristics. 2500 w. Auto Jour—Aug. 29, 1903.

The Dennis Petrol Motor Cars. Begins an illustrated detailed description of these cars. Serial. 1st part. 700 w. Prac Engr—Oct. 23, 1903.

Dixi.—The "Dixi" Petrol Cars. Illustrates and describes these cars, particularly those having a tubular chassis construction. Serial. 1st part. 1000 w. Auto Jour—Sept. 17, 1904.

Driving.—See **Operation.**

Duryea.—A Chapter of History and an Interesting Car. An account of the struggle for success with an illustrated description of vehicles. 2000 w. Autocar—Nov. 16, 1901.

The Duryea Gasoline Carriage. Illustrated detailed description of the Duryea three-wheeled phaeton. 1300 w. Sci Am—March 1, 1902.

See also **Exhaust Valve; Stevens-Duryea.**

Earl.—The Earl Petrol Car. Brief illustrated description of a 9 h. p. petrol vehicle, weighing about 15 cwt., with photographs of the chassis, showing the driving mechanism. 1500 w. Auto Jour—Feb. 21, 1903.

Eastmead-Biggs.—The Eastmead-Biggs Voiturette. An illustrated description of a new light car of English manufacture. 1100 w. Autocar—Oct. 12, 1901.

Electric Ignition.—See **GASOLINE ENGINE; IGNITION.**

Electric Transmission.—See **AUTOMOBILE GEAR.**

Electric Vehicle Co.—See **Riker.**

Engine.—See **Motor; GASOLINE ENGINE.**

Exhaust Valve and Igniter.—A Combined Exhaust-Valve and Igniter for Gasoline Motors. Illustrated description of a novel arrangement fitted to the motors of the Duryea gasoline automobiles. 1000 w. Sci Am Sup—Aug. 15, 1903.

Experience.—See **AUTOMOBILE.**

Fiat.—The F. I. A. T. Petrol Cars. An illustrated description of these Italian vehicles. 2500 w. Auto Jour—Dec. 5, 1903.

The 1905 Fiat Cars. Illustrates and describes late models, noting the changes made. 1100 w. Auto Jour—July 22, 1905.

Ford.—The "Ford" Petrol Car. Illustrated detailed description of a light car built in Detroit. Serial. 1st part. 1800 w. Auto Jour—June 11, 1904.

Four-Wheel Drive.—A Gasoline Truck Driven by All Four Wheels. Illustrated description. 800 w. Sci Am—Jan. 28, 1905.

Frayer-Miller.—Frayer-Miller Air-Cooled Car. Illustrated detailed description. 1200 w. Automobile—Dec. 24, 1904.

Fuel.—See **FUEL—Coal Tar and Spirits; GASOLINE ENGINE; LIQUID FUEL—Automobiles.**

Gaillardet.—The Gaillardet Motor Car. Illustrates and describes these vehicles which differ in details from most other manufacturers. 900 w. Auto Jour—Aug., 1901.

Gauge.—See **Tank Gauge.**

Germain.—The Germain Standard Car. Illustrated detailed description. 1000 w. Autocar—Jan. 30, 1904.

The 1904 Germain Petrol Cars. An illustrated description of a 16-h. p. vehicle made by these Belgian manufacturers. 2500 w. Auto Jour—Feb. 13, 1904.

Gillet-Forest.—The Gillet-Forest Car. An illustrated description of one of the most interesting of recent French cars. The framework is built entirely of tubes. 2000 w. Auto Jour—May 10, 1902.

Gladiator.—The "Gladiator" Motor Car. An illustrated description of the mechanism of this car. 1200 w. Prac Engr—Nov. 27, 1903.

Gobron-Brillié.—The 25 h. p. Gobron-Brillié Petrol Car (1904 Type). Illustrated detailed description. 1000 w. Auto Jour—March 12, 1904.

The Gobron-Brillié Cars. Illustrates and describes these cars in which balanced petrol engines are used. Serial. 1st part. 3200 w. Auto Jour—Sept. 12, 1903.

The 1905 Gobron-Brillie Petrol Cars. Illustrated description. 1400 w. Auto Jour—March 4, 1905. See also **Brillié.**

Hallamshire.—The Hallamshire Cars. Illustrates and describes details of one of these cars. 1000 w. Autocar—Jan., 1904.

Hasbrouck.—The Hasbrouck Gasoline Carriage. Illustrated description of a motor carriage propelled by a twin cylinder 6 horse power motor. 900 w. Horseless Age—May 8, 1901.

Heatly.—A Simple Petrol Car. Illustrates and describes a design aiming to avoid complicated details liable to cause trouble. 1400 w. Engr, London—July 10, 1903.

Hornsby Military.—See **TRACTION ENGINE.**

Hotchkiss.—The Hotchkiss 20 H. P. Petrol Car. Illustrated description of a car exhibited in Paris. 800 w. Auto Jour—Jan. 9, 1904.

The Hotchkiss Cars. Illustrates and describes interesting details of these cars. 1800 w. Autocar—Oct. 29, 1904.

Humber.—The New Twelve Horse-Power Humber Car. Illustrates and describes the engine and transmission. 1800 w. Autocar—April 12, 1902.

The Humber 8 and 12-h. p. Petrol Cars. Illustrated detailed description of two different sized cars of a new type. Serial. 1st part. 2800 w. Auto Jour—June 14, 1902.

The Humber Volturette. Brief illustrated description of a small car, two-seated, to be sold for £150. 900 w. Autocar—June 13, 1903.

Hutton.—The Hutton Car. Description, drawings and illustrations of a car aiming to bring the least possible strain upon the driver, enabling concentration on the steering-wheel. 3600 w. Engng—June 24, 1904.

The Hutton 4-Cylinder Light Car. Illustrated description. 2500 w. Auto Jour—Nov. 5, 1904.

The 20-H. P. Hutton Petrol Car. An illustrated detailed description of a high-class car having many novel features. It is of English manufacture. Serial. 1st part. 4200 w. Auto Jour—March 26, 1904.

Industrial.—See **Atlas; Brillié; Daimler; Four-Wheel Drive; Knox; Mitchell; Napier; Packard; Thornycroft; Torbensen; Wolseley; AUTOMOBILE.**

Inspection.—The Inspection of Gasoline Vehicles. Albert L. Clough. Calls attention to the importance of inspection before starting, giving suggestions of such details as are of special consequence. 3300 w. Horseless Age—Feb. 13, 1901.

See also **CAR, MOTOR-DRIVEN.**

Iris.—Details of the "Iris" Touring Motor-Car. Many illustrations and descriptive notes. 2700 w. Engng—Nov. 17, 1905.

The 1906 Legros and Knowles "Iris" Cars. Illustrated detailed description of two touring models recently brought out. Serial. 1st part. 1500 w. Auto Jour—Nov. 11, 1905.

The "Iris" Cars. An illustrated article describing the leading features of cars recently redesigned. 1500 w. Motor Car Jour—Nov. 11, 1905.

See also **Legros & Knowles.**

Itala.—The 24-H. P. Itala Car. Illustrated description of a new car embodying features conducing to silent and smooth running, and ready accessibility for adjustment. 700 w. Autocar—Dec. 3, 1904.

James & Browne.—The 25-H. P. James and Browne Side-Drive Car. Gives an illustrated description of the design of a new side-drive car. 1200 w. Autocar—Nov. 18, 1905.

The New 12 H. P. James and Browne. Illustrates and describes some of the details of the engine design. 1000 w. Autocar—Feb. 27, 1904.

James and Browne Two-Cylinder Light Car. Illustrates and describes a motor car of British make, with combined engine crank chamber and gear box set below the floor level in the center of the frame. 1000 w. Autocar—July 1, 1905.

Jenatsky-Martini.—The Jenatsky-Martini Petrol Cars. Begins an illustrated detailed description of the novel features. Serial. 1st part. 2500 w. Auto Jour—June 27, 1903.

Johnson.—An interesting Car Built by an Amateur. An account of the experiences of C. H. Johnson, of Leeds, Eng., in gasoline vehicle construction. Ill. Serial. 1st part. 1700 w. Autocar — Jan. 18, 1902.

Knox.—Description of the Two-Cylinder Knox Car. Herbert L. Towle. Detailed account with illustrations. 3800 w. Automobile—Nov. 7, 1903.

Knox Air-Cooled Motor-in-Front Car. Illustrated description of a new high-powered touring car with a vertical air-cooled motor in front, known as Model G. 1600 w. Automobile—Dec. 28, 1905.

Knox Truck.—Knox 6,000 Pound Air-Cooled Truck. Brief illustrated description of a machine for a heavy class of work. 800 w. Automobile—Sept. 14, 1905.

Korte.—The 14 H. P. Two-Cylinder Korte Car. Drawings and description. 2000 w. Autocar—Oct. 24, 1903.

Krupkar.—The 16 H.-P. "Krupkar" Petrol Vehicle. Illustrated description. 2400 w. Auto Jour—June 20, 1903.

Kühlstein-Vollmer.—The Kühlstein-Vollmer Gasoline Vehicle. Illustrated description of a vehicle made by these German manufacturers. 1300 w. Horseless Age—Aug. 7, 1901.

The Kühlstein — Vollmer Motor. From "Der Motorwagen." Illustrated description. 700 w. Horseless Age—Aug. 28, 1901.

Lanchester.—The Lanchester Motor Car. Illustrated detailed description of a new gasoline vehicle having characteristic features of interest. 3000 w. Engng—Jan. 16, 1903.

Legros & Knowles.—The 20 H. P. Legros & Knowles Touring Car. Description and diagrams of an English made car. 900 w. Autocar—April 22, 1905.

See also **Iris.**

Light.—Design of a Light Gasoline Carriage. Illustrates and describes a design aiming to be as simple as is consistent with efficiency and strength. 2700 w. Horseless Age—March 13, 1901.

Light Oil-Motor Cars. C. C. Longridge. A series of articles intended for owners and users of pleasure vehicles who have had little acquaintance with the subject before purchasing a motor car. The present article considers slow combustion oil motors and explosion motors. Serial. 1st part. 1800 w. Engr, Lond—July 5, 1901.

Design for a Light Gasoline Car. J. C. Brocksmith. Working drawings and description of a gasoline automobile of light and simple construction. 2700 w. Am. Elect'n—July, 1904.

Locomobile.—The Locomobile Gasoline Touring Car. Illustrated description of designs of A. L. Riker. Serial. 1st part. 2800 w. Horseless Age—Feb. 18, 1903.

Features of Four-Cylinder Locomobile. Illustrates and describes details of this four-cylinder touring car, showing recent improvements. 2000 w. Automobile—Dec. 26, 1903.

London Exhibition. — See **AUTOMOBILE EXHIBITION.**

Lorry.—See **Napier; Thornycroft; AUTOMOBILE; AUTOMOBILE COMPETITION.**

Lubrication.—See **Smoke Prevention; LUBRICATION—Automobile.**

Mail.—See **AUTOMOBILE.**

Martini.—The 16-20 h. p. Martini. Illustrated description of one of the cars used by Captain Deady in his recent Alpine tour. 1500 w. Autocar—Oct. 8, 1904.

See also **AUTOMOBILE COMPETITION—Hill Climbing; AUTOMOBILE TOUR—Alps.**

Maudslay.—The Maudslay 20 H. P. Car. Begins an illustrated detailed description of a car containing new features. Serial. 1st part. 900 w. Autocar—Oct. 18, 1902.

The Maudslay 1903 Petrol Car. Illustrated description of characteristic features of a heavy and powerful car, with photographs of the engines and gearing. 4000 w. Auto Jour—March 14, 1903.

Maybach Carburetter Case.—See CARBURETTER.

Mercedes.—The Mercedes Carriage. Illustration and particulars of this powerful gasoline vehicle. 2700 w. Horseless Age—Aug. 21, 1901.

The 1903 Mercedes Models. An illustrated detailed description. Serial. 1st part. 2800 w. Auto Jour—Aug. 1, 1903.

The Latest Mercedes Model—The 28-32 H. P. Car. Illustrations and particulars of this type, showing the improvements in design. 2500 w. Auto Jour—July 9, 1904.

The 1904 Mercedes Models. Illustrations with descriptions of two new cars. 800 w. Auto Jour—Feb. 20, 1904.

The 1905 70 H. P. Mercedes Car. Illustrated description of the latest type of Mercedes car. 1200 w. Autocar—Dec. 24, 1904.

American Mercedes Automobiles. An illustrated article giving information concerning these cars and their manufacture. 1800 w. Automobile—March 11, 1905.

The 60 H. P. Mercedes. An illustrated article describing details of these cars. Serial. 1st part. 1000 w. Autocar—May 16, 1903.

A 1906 Mercedes Car—The New 70-H. P. Model. Begins an illustrated description of this new model, and the new features introduced. Serial. 1st part. 2000 w. Auto Jour—Sept. 30, 1905.

Mercedes—Simplex.—The 40-H. P. Mercedes-Simplex. An illustrated description of the general arrangement of the car, mentioning the special features. Serial. 1st part. 2000 w. Autocar—May 10, 1902.

Métallurgique.—The Métallurgique Petrol Cars. Illustrates and describes the interesting features of these cars. 1100 w. Auto Jour—May 13, 1905.

Mieusset.—The Mieusset Petrol Cars. Illustrated description of cars built in Lyons, France. 2500 w. Auto Jour—Feb. 6, 1904.

Military.—See Brillié Truck; Daimler; AUTOMOBILE; TRACTION ENGINE.

Milnes.—The Milnes Voiturette. Illustrated detailed description of a new car attracting attention in England. 2200 w. Auto Jour—Oct. 25, 1902.

Milnes—Daimler.—See Daimler.

Mitchell.—Mitchell 1,500-Pound Gasoline Truck. Illustration, with description, and remarks on novel features. 1300 w. Automobile—June 15, 1905.

Morgan.—A New All-British Car. An illustrated description of a 24 H. P. Morgan car. 1800 w. Autocar—Nov. 11, 1905.

Mors.—The New 15-Horse-Power Mors Carriage. Drawings of the latest production of this company with description of the novel fixtures. 900 w. Horseless Age—Feb. 5, 1902.

The 15-H. P. Mors. An illustrated description of the mechanism. 1200 w. Autocar—March 15, 1902.

Motobloc.—The Motobloc Petrol Car. Illustrated description of a 10-H. P. car. 1000 w. Auto Jour—Jan. 16, 1904.

Motor.—The Calculation of Explosion Motors for Vehicles (Le Calcul des Moteurs à Explosion pour Voitures). P. Colardeau. A discussion of the data upon which the power should be based, with tabulated information concerning existing standard vehicles. 2000 w. Génie Civil—Jan. 26, 1901.

Improvements in Explosive Motors. A review of the more recent developments, due largely to the automobile, especially considering French progress in motors. 3000 w. Ir Trd Rev—Jan. 30, 1902.

The Self-Contained Motor. Calls attention to the need of the self-contained gasoline motive power equipment, capable of being connected directly to the driving wheels, showing that it is possible. 700 w. Horseless Age—Feb. 5, 1902.

The Use of Petrol Motors for Locomotion. E. Sauvage. Read before the Engineering Conference of the Inst. of Civ. Engrs. Notes on the desirable qualities of these engines, and on things to be considered where economy is a consideration. 1500 w. Engng—June 26, 1903.

The Gasoline Engine as Applied to Automobiles. Albert L. Clough. Lecture before the Boston Y. M. C. A. Automobile School. Discusses the requirements. Ill. 4000 w. Mech Engr—May 14, 1904.

See also **GASOLINE ENGINE.**

Motor Manufacturing Co.—The Motor Manufacturing Company's Cars. Illustrates and describes three recently built types, of 8, 10, and 20 H. P. respectively. 1800 w. Auto Jour—Oct. 11, 1902.

Motor Speed.—Cylinder Dimensions and Engine Speeds Compared. J. W. Roebuck. Discusses the speed of motors, single cylinders, the ratio of bore to stroke, &c. 1400 w. Autocar—April 23, 1904.

Motor Suspension.—Suspension of Gasoline Motors. Hugh D. Meier. Criticises present practice and suggests improvements that will permit the use of tires having a longer lease of life. 900 w. Horseless Age—Nov. 6, 1901.

Mowing Machine.—See AGRICULTURAL MACHINERY.

Muffler.—See AUTOMOBILE.

Napier.—The 40-H. P. Gear-Driven Napier. Built for the Gordon-Bennett Race. Brief description with illustration. 600 w. Autocar—June 28, 1902.

Gordon-Bennett Racers for 1905. Mr. J. Hargreaves' 80-H. P. Napier. Illustrated description of the first of the new Napier racing cars for 1905. 600 w. Auto Jour—March 18, 1905.

The Napier Cars and Works. Illustrates and describes recent cars built by this company and the new works at Acton Vale. Serial. 1st part. 3000 w. Auto Jour—July 4, 1903.

The Six-Cylinder Napier Racer. Brief Illustrated description. 800 w. Auto Jour—June 18, 1904.

The 1904 Napier Model. Brief description of some of the novel features. Ill. 1200 w. Auto Jour—Oct. 24, 1903.

See also **AUTOMOBILE—British Industry; AUTOMOBILE WORKS; GASOLINE ENGINE.**

Napier Lorry.—A Napier Lorry. Illustrates and describes the construction of a petrol lorry. 1800 w. Auto Jour—May 17, 1902.

Napier-Parsons Van.—The Napier-Parsons Light Motor Van. Illustrates and describes a light delivery van of simple construction. 3300 w. Auto Jour—July 23, 1904.

See also **FUEL—Coal Tar and Spirits.**

National.—A 3-Cylinder "National" Petrol Car. Illustrated detailed description. 1500 w. Auto Jour—July 23, 1904.

The National Touring Car. Illustrated detailed description. 1800 w. Sci Am—Jan. 28, 1905.

Model C National Touring Car. An illustrated description of an attractive gasoline touring car of recent design. 1500 w. Automobile—Jan. 7, 1905.

New York Exhibition.—See Air-Cooled; AUTOMOBILE EXHIBITION—New York.

1902.—Gasoline Automobiles—1902 Models. Illustrations with brief descriptions of several of the recent designs. 2200 w. Sci Am—March 1, 1902.

Oil Motor Cars for 1902. C. C. Longridge. Considers points in the principles of construction of petrol cars as at present manufactured. Ill. 21,500 w. Inst of Mech Engrs—Oct. 17, 1902.

Noel.—See AGRICULTURAL MACHINERY.

Noise.—The Sources of Noise in Gasoline Vehicles. Albert L. Clough. Considers the engine noises, the transmission gear noises and running gear noises. 2500 w. Horseless Age—Dec. 3, 1902.

Non-Freezing Liquids.—Non-Freezing Liquids for Cylinder Jackets. E. E. Keller. A report of investigations made, giving curves of freezing and boiling points. 1500 w. Horseless Age—Feb. 12, 1902.

Non-Freezing Liquids for Cylinder Jackets. E. E. Keller. An account of experiments with calcium chloride solutions. 1700 w. Autocar—March 8, 1902.

Non-Freezing Liquids for Cylinder Jackets. E. E. Keller. An account of investigations made by the writer. 1500 w. Auto Mag—Dec., 1902.

Experiments with Non-Freezing Liquids—A New

Solution Proposed for Cylinder Jackets. E. Mallinckrodt, Jr. An account of experimental investigations made with a solution of calcium chloride under conditions similar to those obtaining in the circulation system of an automobile. 1500 w. Horseless Age—March 4, 1903.

Observation.—See Canadian Rockies.

Oldsmobile.—The 1903 Oldsmobile Petrol Car. Illustrated detailed description of a small powered car to be sold at a moderate price. Serial. 1st part. 8300 w. Auto Jour—Aug. 8, 1903.

The 1904 Oldsmobile. Illustrates and describes this car, which is simple in construction, easily managed and quiet running. 1200 w. Autocar—Feb. 6, 1904.

See also AUTOMOBILE WORKS.

Omnibus.—Gasoline Omnibuses in London. An account of the satisfactory service. 2000 w. Automobile—April 15, 1905.

The "S 41" Type Petrol Omnibus. Illustrates and describes a type notable for the manner in which the engine may be used as a brake. 1200 w. Auto Jour—Dec. 9, 1905.

See also Straker-Squire; Thornycroft; AUTOMOBILE.

Operation.—How to Operate a Gasoline Carriage. Albert L. Clough. Discusses important points in the handling of the machine. 2800 w. Horseless Age—July 2, 1902.

Hints on Driving Petrol Cars. General remarks on the handling of these vehicles. 1600 w. Motor Car Jour—April 18, 1903.

General Suggestions for the Operation of Gasoline Runabouts or Touring Cars. A. D. River. Aims to indicate the principles underlying all gasoline machines, and the general method of procedure in their management. Serial. 1st part. 8500 w. Automobile—March 11, 1905.

See also Air-Cooled; Rambler; Starting; AUTOMOBILE.

Orient.—Orient 16-20 H. P. Air-Cooled Model de Luxe. Illustrated description of the 1905 model of the Waltham Mfg. Co. 1400 w. Automobile—Sept. 21, 1905.

Orient Buckboard.—The Orient Buckboard. Hugh Dolnar. Brief illustrated description of the novel features of this vehicle exhibited at the Am. Auto Show. 1200 w. Autocar—July 11, 1903.

Overheating.—Why Gasoline Motors Stall by Overheating. A. M. Herring. Discusses this subject and the methods of overcoming the trouble. 1200 w. Horseless Age—Dec. 18, 1901.

Packard.—The Packard Carriage Single-Cylinder Motor. Hugh Dolnar. Illustrates and describes the leading features of Packard's general arrangement of driving and controlling elements, and the claims of the patent are explained. 4000 w. Auto Mag—Nov., 1901.

The Packard Single Cylinder Motor Wagon. Hugh Dolnar. A full illustrated description of the mechanical details of this new vehicle. 4800 w. Autocar—Dec. 28, 1901.

Packard "Model L" Four-Cylinder Car. Illustrated detailed description of a vertical, four-cylinder motor vehicle of entirely new design. 1500 w. Automobile—Dec. 5, 1903.

The Packard Gasoline Touring Car, illustrated detailed description. 2000 w. Sci Am—March 1, 1902.

The Packard 12-Horse Power Car. Herbert L. Towle. Illustrated description of this machine. 2800 w. Automobile—Jan. 17, 1903.
See also AUTOMOBILE GEAR.

Packard Truck.—Packard 8000-Pound Truck. Illustrates and describes a gasoline truck. 1000 w. Automobile—March 18, 1905.

Panhard.—The Panhard Voiturette. Illustrated description of the carriage and mechanism. 1200 w. Autocar—Feb. 23, 1901.
See also AUTOMOBILE GEAR.

Panhard-Levassor.—The New Light Panhard-Levassor Automobile. L. Baudryde Saunier, in "La Locomotion." An illustrated detailed description. 8000 w. Sci Am Sup—March 1, 1902.

The 1904 Panhard-Levassor Petrol Cars. An illustrated detailed description of the 1904 models, particularly the 4-cylinder 10-H. P. and the 8-cylinder, 8-H. P. types. Serial. 1st part. 2200 w. Auto Jour—Aug. 27, 1904.

See also AUTOMOBILE GEAR; AUTOMOBILE WORKS—France.

Paraffine.—See CARBURETTER; OIL ENGINE.

Peerless.—Peerless Racing Car. Illustrated detailed description of the 1903 model. 2200 w. Auto & Motor Rev—Oct. 11, 1902.

Peerless 35-Horsepower Touring Car. Illustrated detailed description. 2800 w. Automobile—April 29, 1905.

New Peerless Designs for 1906. Two new cars are to be placed on the market by this Cleveland, O., company, one of 30 H. P., the other 45 H. P. The 30 H. P. cars is illustrated and described. 2000 w. Automobile—Nov. 23, 1905.

Peugeot—First Peugeot Coupé Imported into the United States. Illustrates and describes a luxurious novel motor cab. 900 w. Auto & Motor Rev—Dec. 13, 1902.

The 6 1-2-H. P. Baby Peugeot. Illustrates and describes the 1904 model. 1600 w. Auto Jour—April 30, 1904.

Pierce.—Pierce Four-Cylinder Touring Car. Description of a modern multi-cylinder car with reproduction of factory blueprints. 2000 w. Automobile—Jan. 16, 1904.

Pierce 1906 Model Touring Cars. Illustrates and describes these cars. A feature is the liberal use of ball bearings. 1700 w. Automobile—Oct. 26, 1905.

Pipe.—The Pipe Petrol Car. An illustrated detailed description of a recent vehicle manufactured in Brussels. 1800 w. Auto Jour—Dec. 20, 1902.

Pivot.—The 1905 Pivot Cars. Illustrated description of this French car. 600 w. Auto Jour—April 22, 1905.

Pope-Toledo. — The 24 Horse-Power Pope-Toledo Touring Car. Illustrated detailed description of the 1904 model gasoline touring car. 1200 w. Sci Am—Jan. 30, 1904.

Pope-Tribune.—The Two-Cylinder 10 H. P. Pope-Tribune Car. Illustration, with detailed description of a light touring car. 1100 w. Autocar—Sept. 16, 1905.

Pope-Tribune 12-H. P. Light Touring Car. Illustrated detailed description of the Pope-Tribune Model IV. 1200 w. Automobile—June 29, 1905.

Prunel.—The 1905 Prunel Petrol Cars. An illustrated article describing the new features in this year's models. 1200 w. Auto Jour—April 8, 1905.

Radiator—Radiator Area per Horse Power in the Modern Gasoline Automobile. Herbert L. Towle. Gives results of a partial canvass of the more important machines at the Madison Sq. Garden show, showing the best machines have from 4 to 6 square feet of cooling surface per horse power. 2000 w. Automobile—Feb. 28, 1903.

Experiments Showing the Efficiency of Radiators for Gasoline Automobiles. Gives results of tests made under the supervision of William S. Conant and Benjamin Briscoe. 3500 w. Sci Am Sup—June 11, 1904.

Railway.—See CAR, MOTOR-DRIVEN; LOCOMOTIVE, GASOLINE.

Rambler.—How to Run a Rambler Touring Car. Extracts from a pamphlet, giving suggestions to the user of gasoline cars. Ill. Serial. 1st part. 2200 w. Automobile—Aug. 22, 1903.

"Rational."—The Rational Car. Illustrates and describes a car of moderate speed, combined with simplicity and reliability. 900 w. Autocar—July 23, 1904.

The 10-H. P. "Rational" Petrol Car. Begins an illustrated detailed description of this car. Serial. 1st part. 1200 w. Auto Jour—Nov. 19, 1904.

Rebuilding.—See Winton.

Regent.—The 18-H. P. Regent Car. Begins an illustrated detailed description of a moderate priced car. Serial. 1st part. 800 w. Auto Jour—Oct. 7, 1902.

Remodeling.—Remodeling a Gasoline Vehicle. Albert L. Clough. Describes changes made and reasons for making them. 1000 w. Horseless Age—Aug. 21, 1901.

Renault.—The New 14 H. P. Renault. Illustrated description dealing principally with a novel arrangement of the water-cooling system, in this case of the natural or thermo-syphon type. 600 w. Autocar—April 30, 1904.

The 1905 Renault Racing Car. An illustrated article giving particulars of these cars. 1500 w. Autocar—June 10, 1905.

The Renault Light Cars. An illustrated detailed description. 1000 w. Autocar—Aug. 1, 1903.

Reo Runabout.—Reo Runabout with Folding Rear Seat. Illustrated description of an 8-H. P. American light car. 1500 w. Automobile—Dec. 14, 1905.

Repairs.—Road Repairs Upon Gasoline Vehicles. Albert L. Clough. Suggestions concerning ways of temporarily remedying mishaps. 3200 w. Horseless Age—Feb. 20, 1901.

Rexette.—A Two-Cylinder Engined Rexette. Gives Plan and elevation view of the chassis of a new machine, with description. 700 w. Autocar—July 15, 1905.

Richard.—The Georges Richard Automobile. Illustrated description of a new type of light automobile of the voiturette class. 700 w. Sci Am Sup—Oct. 26, 1901.

The Georges Richard Light Carriage. Illustrated description. 1400 w. Auto Topics—June 21, 1902.

Richard-Brasier.—The 40-H. P. Georges-Richard-Brasier. Illustrated description of a chassis weighing 20 cwts. Completed entirely in accordance with Gordon Bennett practice. 700 w. Autocar—Aug. 19, 1905.

The 40-50-H. P. Richard-Brasier Car. Illustrated detailed description of an extremely powerful touring model. Serial. 1st part. 1600 w. Auto Jour—Aug. 26, 1905.

Georges Richard-Brasier Cars. Illustrates and describes a popular type of car made in four powers, of almost identical design. 1000 w. Autocar—Feb. 13, 1904.

Riker.—The New Riker Gasoline Carriage. Illustrates and describes a recently completed vehicle of the French type, with tonneau body and motor placed under a steel bonnet at the front. 2000 w. Horseless Age—July 3, 1901.

See also **Locomobile.**

Rochet.—The Rochet Touring Car. Illustrates and describes the latest type of touring car. 1500 w. Autocar—Sept. 27, 1902.

Rochet-Schneider.—The Rochet-Schneider Gasoline Vehicle. From "La France Automobile." Illustrated particulars concerning this machine. 1800 w. Horseless Age—Sept. 4, 1901.

The Rochet-Schneider 16-20-H. P. Petrol Car—1903 Type. Illustrated detailed description. 3300 w. Auto Jour—May 9, 1903.

Rolls-Royce.—The "Rolls-Royce" Petrol Cars. An illustrated description of a new car of British construction, to be exhibited at the Paris Salon. Serial. 1st part. 1000 w. Auto Jour—Dec. 3, 1904.

Multi-Cylinder Rolls-Royce Cars—Two 8-Cylinder Models. Illustrated description of a landaulet, and a touring car having features of interest. 1500 w. Auto Jour—Nov. 11, 1905.

Rover.—The New 8-H. P. Rover Car. Illustrates and describes this car, which is one of the new machines entered in the small car trials. Its striking features are the central box girder in place of the usual frame, the engine brake and disc clutch. 1800 w. Autocar—Aug. 27, 1904.

Runabout.—A Discussion of the Gasoline Runabout for the Novice. A. D. River. Considers the general features, giving hints of value. Serial. 1st part. 2500 w. Automobile—June 27, 1903.

Ryknield.—The Ryknield Cars. Illustrates and describes some of the leading features of these cars. 800 w. Autocar—Feb. 6, 1904.

The Ryknield Petrol Cars. English Cars which show new features are illustrated and described. 2000 w. Auto Jour—March 5, 1904.

St. Louis.—St. Louis Four-Cylinder Touring Car. Illustrates and describes a car built with a view to obtaining great motor flexibility. 1800 w. Automobile—June 8, 1905.

Schaudel.—The Schaudel Motor Vehicle. An illustrated detailed description, from "La France Automobile." 3200 w. Horseless Age—Dec. 19, 1900.

Scott Tractor.—See **AGRICULTURAL MACHINERY.**

Seabury.—Seabury 24-H. P. Gasoline Automobile. Describes a touring-car being built at the Morris Heights shops. 2200 w. Automobile—Nov. 26, 1904.

Searchmont.—The Searchmont Motor Company's Touring Vehicle for the Endurance Run. Illustrated detailed description. 1600 w. Horseless Age—Sept. 11, 1901.

Selden Patent.—The Selden Patent Suit. Particulars of an interesting suit for patent infringement that may have the effect, if sustained, of closing the shops of many automobile makers. Ill. 1800 w. Sci Am—Nov. 24, 1900.

Siddeley.—The Siddeley Petrol Cars. Brief illustrated description of the latest design built for this company. 800 w. Auto Jour—Feb. 13, 1904.

Mr. Lionel de Rothschild's Siddeley Racer. Illustrated detailed description of a fine example of automobile design and construction. The car is entered for the Gordon-Bennett race. 1800 w. Auto Jour—April 29, 1905.

The 12-H. P. Two-Cylinder Siddeley Car. Illustrated detailed description of a car which has recently started on a 5,000 miles officially observed tour. 1500 w. Autocar—Jan. 7, 1905.

The Siddeley 32-H. P. Motor-Car. Illustrated description of the chassis and mechanism of this car which was exhibited at Olympia. 3500 w. Engng—Dec. 8, 1905.

Side Drive.—See **James & Browne.**

Silencer.—See **AUTOMOBILE—Muffler.**

Simms War Car. — See **AUTOMOBILE — Military; CAR, MOTOR-DRIVEN—Military.**

Simms-Welbeck.—The Simms-Welbeck Cars. Drawings and descriptions showing the general design of three types of automobiles constructed by this company. 1000 w. Autocar—May 13, 1905.

The 1905 Simms-Welbeck Cars. Begins an illustrated description of these British built cars. Serial. 1st part. 500 w. Auto Jour—June 10, 1905.

Simplex.—Simplex 30-H. P. Touring Car. Illustrated detailed description of new cars built in design and construction like the 75-H. P. S. & M. Simplex special racing machine. 1500 w. Automobile—Dec. 10, 1904.

See also **Mercedes—Simplex.**

Smith.—Some Work in the Development of a Motor-Car. M. Holroyd Smith. A description of the work involved in the construction of the latest petrol car designed and built by the author, with deductions therefrom. 4 plates and other illustrations. 5500 w. Inst Mech Engrs—Aug., 1901.

Smoke Prevention.—The Cause and Prevention of Smoke on Motor Cars. Edward Butler. Considers the trouble due mainly to the faulty methods in use for lubricating the cylinders of the explosion motor. 900 w. Mech Engr—Sept. 9, 1905.

Soames.—The "Soames" Petrol Car. Full illustrated description of this car. Serial 1st part. 1500 w. Auto Jour—March 28, 1903.

Specifications.—General Specifications for a Gasoline Motor Car. H. Ward Leonard. Gives twenty requirements. 1000 w. Elec Rev, N. Y.—Oct. 5, 1901.

Spyker.—The Spyker Petrol Cars. Illustrates and describes recent designs of these touring cars. 1800 w. Auto Jour—Jan. 2, 1904.

The "Spyker" Petrol Car. Illustrates and describes a car exhibited at the recent exhibition at Agricultural Hall. These cars were made in Holland. 800 w. Motor Car Jour—May 9, 1903.

Standardization.—See **AUTOMOBILE.**

Starting.—The Starting of Gasoline Motors. Albert L. Clough. Notes improvements which have increased the popularity of gasoline vehicles, and offers some suggestions for self-starters. 1100 w. Horseless Age—March 19, 1902.

Stevens-Duryea.—Stevens-Duryea 20-H. P. Touring Car. Illustrated description. 1000 w. Automobile—May 18, 1905.

See also **Duryea.**

Stirling.—The Stirling 7-H. P. Motor Carriage. Illustrated description of a vehicle comparatively free from transmission mechanism and having a high-power motor. 1200 w. Auto Jour—May, 1901.

Stoddard-Dayton. — Stoddard-Dayton Four-Cylinder Touring Car. Illustrated detailed description of a car first shown at the Chicago exhibition. 1800 w. Automobile—April 8, 1905.

Straker-Squire.—The Straker-Squire Petrol Omnibuses and Commercial Vehicles. Illustrated description, giving full particulars of these vehicles. Serial. 1st part. 2500 w. Auto Jour—Jan. 14, 1905.

Studebaker.—Studebaker 20-H. P. Touring Car. Illustrated detailed description of a car built in South Bend, Ind. 2200 w. Automobile—May 25, 1905.

Sturtevant.—The Sturtevant: A Car with Automatic Change-Speed. Illustrated detailed description of a new gasoline automobile with novel features of exceptional interest. 2300 w. Automobile—Oct. 8, 1904.

Sunbeam.—The Sunbeam Car for 1906. Illustrated description of a new design with a 16 H. P. engine. The chains and brakes are arranged to operate continuously in oil baths. 2800 w. Autocar—Nov. 4, 1905.

The Sunbeam 12-H. P. Car. Illustrated description of a chain-driven car which has the whole of the transmission entirely protected. 1300 w. Autocar—Dec. 31, 1904.

Sutton Engine.—See **OIL ENGINE—Sutton.**

Swift.—The Swift Volturette. Illustrates and describes the distinctive features of this vehicle. Its weight is 8 1-2 cwt. 2500 w. Auto Jour—Oct. 18, 1902.

The Swift Petrol Cars. Illustrates and describes the two new types of vehicle being introduced by the Swift Company. Serial. 1st part. 500 w. Auto Jour—Feb. 25, 1905.

Talbot.—The Talbot Petrol Vehicles. Illustrates their 8 H. P. standard tonneau, and the engines on the 20 h. p., the 11 H. P., and the 8 H. P. vehicles, with remarks. 700 w. Auto Jour—March 19, 1904.

Tank Fitting.—Suggestion for a Gasoline Tank Fitting. Robert G. Pilkington. Calls attention to points needing to be improved. 1000 w. Horseless Age—March 5, 1902.

Tank Gauge.—The Murphy Petrol Gauge. Drawings and description of an apparatus for accurately indicating the amount of petrol in the tank of a motor vehicle. 900 w. Autocar—Sept. 16, 1904.

Test.—Laboratory Test of a Gasoline Automobile. F. A. Lockwood. An account of a test made in the Mech. Laboratory of Sibley College. Describes the vehicle and method of testing. 1500 w. Sib Jour of Engng—June, 1901.

See also **AUTOMOBILE COMPETITION.**

Thomas.—The Thomas Triple-Cylinder Touring Car. Illustrated detailed description. 2000 w. Sci Am—Jan. 30, 1904.

The Thomas 3-Cylinder Touring Car. Illustrated description of a new model. 1200 w. Automobile—Jan. 9, 1904.

Thomas 50-H. P. Flyer for 1906. An illustrated article describing the detail changes in designing the 1906 car. 1700 w. Automobile—Dec. 21, 1905.

Thornycroft.—The Thornycroft Self-Propelled Lurries. Illustrates and describes a lurry driven by an internal combustion engine using petroleum. Also record of mileage. 1200 w. Auto Jour—Oct. 17, 1903.

The Thoryncroft Lurries, Omnibuses, and Vans. The present article illustrates a new 24 H. P. double deck petrol omnibus for 34 passengers, and begins a description of the commercial vehicles of this company. Serial. 1st part. 700 w. Auto Jour—March 18, 1905.

The 20 H. P. Thornycroft Petrol Car (1904 model). Explains the alterations that have been made, giving an illustrated description of one of the latest cars. 1300 w. Auto Jour—March 5, 1904.

See also **AUTOMOBILE WORKS.**

Toledo.—The New Four Cylinder Toledo Car. Illustrated description of a 1904 model gasoline touring car. 1800 w. Automobile—Nov. 28, 1903. See also Pope-Toledo.

Torbensen.—The Torbensen Gear Gasoline Auto Truck. An illustrated description of a truck for business use. 1500 w. Ir Age—May 5, 1904. See also **AUTOMOBILE GEAR.**

Traveller.—The "Traveller" Volturette. Illustrated description of a machine that has proved itself reliable and durable. Its chief features are noted. 1800 w. Auto Jour—Nov. 22, 1902.

Troubles.—See Operation; **AUTOMOBILE.**

Truffault.—The Truffault Racer. From "La Locomotion." Brief illustrated description of an interesting experimental machine. 500 w. Sci Am—Oct. 4, 1902.

Two-Cycle.—Two-Cycle Automobile Engines. E. W. Roberts. On their adaptability to automobile propulsion. 1200 w. Sci Am—Nov. 29, 1902. See also **GASOLINE ENGINE.**

Twombly Kerosene.—Car Using Kerosene Oil as Fuel. Illustrates and describes a carburetter that will enable an ordinary explosion motor to run successfully on either gasoline or kerosene; and an air-cushion, which makes solid rubber tires as easy riding as pneumatic tires. 2200 w. Automobile—Nov. 9, 1905.

Tygard.—See **GASOLINE ENGINE.**

U. S. Long Distance Co.—The Gasoline Carriage of the United States Long Distance Automobile Company. Illustrated description of a carriage of the intermediate class, both as regards weight and engine speed. 900 w. Horseless Age—Aug. 14, 1901.

Variable Speed Gear.—See **VARIABLE SPEED.**

Vauxhall.—The 5 H. P. Vauxhall Light Car. Illustrated description of a light car propelled by mechanism of the simplest character, and easily controlled. 1800 w. Autocar—Oct. 31, 1903.

The Vauxhall Light Petrol Car. Illustrated description of an English vehicle, intended to be sold at a moderate price. Of simple construction. Serial. 1st part. 4200 w. Auto Jour—Nov. 21, 1903.

The Three-Cylinder Vauxhall Car. Begins an illustrated detailed description of this new car. Serial. 1st part. 1500 w. Autocar—Nov. 12, 1904.

Velox.—The Velox 12-H. P. Petrol Car. Begins an illustrated detailed description of an English car of recent design. Serial. 1st part. 2400 w. Auto Jour—Jan. 10, 1903.

Waltham.—See Orient.

War Car.—See **AUTOMOBILE—Military; CAR, MOTOR DRIVEN—Military.**

Ward Leonard.—Ward Leonard Gasoline Touring Car Discussed Critically. Herbert L. Towle. This machine is illustrated and discussed in detail. 2300 w. Auto & Motor Rev—Nov. 22, 1902.

Wartburg.—The Wartburg Light Petrol Cars. Illustrated descriptions of two private cars of strong construction with twin-cylinder engines. 2800 w. Auto Jour—Jan. 3, 1903.

Watsonia.—The "Watsonia" Petrol Cars. Illustration, with a description of these cars, which are said to rank among the best of their class. Serial. 1st part. 800 w. Auto Jour—Nov. 29, 1902.

Welch.—Welch Gasoline Touring Car. Illustrates and describes this year's design, noting the improved features. 800 w. Automobile—Sept. 10, 1904.

Weller.—The Weller Petrol Cars. Illustrates and describes the interesting features of these cars. Serial. 1st part. 2400 w. Auto Jour—June 13, 1903.

The Weller Twenty Horse Power Car. Illustrates and describes a British car that has attracted attention. Serial. 1st part. 900 w. Autocar—June 6, 1903.

White and Poppe.—The White and Poppe Petrol Engines. Describes the accurate working methods in the manufacture of this engine, the extent of the interchangeable system, etc. Ills. 1700 w. Autocar—July 1, 1905.

Wilson-Pilcher.—The Wilson-Pilcher Petrol Cars. Ennumerates the chief special features of these cars, and considers constructional details. Ills. Serial. 1st part. 4000 w. Auto Jour—April 16, 1904.

Winter Use.—See **AUTOMOBILE.**

Winton.—Rebuilding an Early Winton. A. Wilson Dods. An account of how the writer rebuilt Winton No. 61. Ills. 1200 w. Automobile—Oct. 1, 1904.

The Winton Petrol Cars. An illustrated description of the leading characteristics of the 20 H. P. model. Serial. 1st part. 2000 w. Auto Jour—Oct. 29, 1904.

Winton 1903 Model. An illustrated description of a 20 H. P. Machine and its equipment. 2800 w. Auto Topics. Dec. 27, 1902.

The 1906 Winton Cars. Begins an illustrated description of these cars in which the vertical type of engine has been adopted. Serial. 1st part. 900 w. Auto Jour—Nov. 25, 1905.

See also **AUTOMOBILE TOUR.**

Winton Racer.—Winton Tries His Cup Racer. An illustrated description of the "Bullet II," with account of the trial. 1800 w. Automobile—May 16, 1903.

Wolseley.—The Wolseley Car. Illustrates and describes the car and the motor, which is a single-cylinder water-cooled engine, using petroleum spirit. 600 w. Engr, Lond—Oct. 26, 1900.

A Successful and Interesting Automobile. Alexander F. Sinclair. An illustrated description of the Wolseley gasoline vehicle made in Birmingham, England. 2300 w. Auto Mag—March, 1902.

The Wolseley Motor Car. Alex. Richardson. Illustrated detailed description of a typical car manufactured in Birmingham, Eng., and the making. 4800 w. Trac & Trans—Sept., 1903.

The Wolseley Light Six-Horse-Power Motor Car. Illustrated detailed description. 1500 w. Engng—April 1, 1904.

The Wolseley 6-H. P. Voiturette. Illustrated detailed description. Serial. 1st part. 1200 w. Auto Jour—May 7, 1904.

The Wolseley Industrial Vehicles. Begins an illustrated description of commercial vehicles fitted with internal-combustion engines. Serial. 1st part. 700 w. Auto Jour—March 18, 1905.
See also **AUTOMOBILE WORKS; CAR, MOTOR-DRIVEN—Gasoline Electric; GASOLINE ENGINE.**

AUTOMOBILE GEAR.

See also **AUTOMOBILE—Steering Gear; AUTOMOBILE, GASOLINE; GEAR; VARIABLE SPEED.**

The Change Speed Question at the Automobile Club. Comments on the lack of progress in the devices used, and a discussion of the requirements. 1500 w. Horseless Age—Nov. 7, 1900.

American Tendencies in Automobile Running Gears. Herbert L. Towle. A review of present practice in America, and brief notice of European practice. Ill. 2000 w. Horseless Age—Nov. 7, 1900.

Gearing. E. C. Oliver. Information concerning the systems, strength of gears, etc., intended for those interested in the design and construction of automobiles. Ill. 2400 w. Horseless Age—Dec. 19, 1900.

The Transmission Gear of a Motor Carriage. Herbert Austin. Read before the Cycle Engrs. Inst., London. Gives a brief summary of what the writer considers the essential features of a perfect system, and examines the various leading systems, and sees how far they comply with the requirements set forth. Ill. 7800 w. Auto Jour—May, 1901.

Axle.—See **AXLE—Automobile.**

Balance.—See **Differential.**

Clutch.—New Clutches Exhibited at the Paris Automobile Salon, in December, 1904 (Les Embrayages Nouveaux Exposés au Salon de Decembre 1904). H. André. Illustrations and descriptions of automobile clutches and gears. Serial. Part I. 1200 w. Rev Tech—June 10, 1905.
See also **Friction Clutch.**

Compensating.—Compensating Gear for Motor Vehicles—Its History and Development. Sidney Russell. Reviews the earlier methods of driving, the present article bringing the history down to 1830-33. Ill. Serial. 1st part. Auto Jour—Feb., 1901.

De Dietrich.—See **Panhard; AUTOMOBILE, GASOLINE.**

De Dion.—The 8 H. P. De Dion Three-Speed Gear. Illustrated detailed description. 1300 w. Autocar—June 11, 1904.

The De Dion-Bouton Three-Speed Gear. Lettered drawing, illustrations and description of this method of obtaining three forward speeds and a reverse. 1200 w. Autocar—Dec. 13, 1902.

Differential.—The Balance Gear Explained. H. C. Clarke. An illustrated description of the balance gear. 2000 w. Autocar—June 4, 1904.

The Action of the Differential Gear of Automobiles (Sur le Mode de Frictionnement du Differential des Automobiles). A. Petot. A mathematical examination of the dynamics of differential transmission gears. 1000 w. Comptes Rendus—Feb. 20, 1905.

How a Differential Gear Works. Drawings and description explaining the action of a differential gear. 1500 w. Autocar—Aug. 5, 1905.

Electric.—Electric Transmission Devices for Automobiles; the Jeantaud and the Electrogenia Systems. Illustrates and describes two new devices recently brought out in Paris. 1500 w. Sci Am Sup—Nov. 26, 1904.

Electric, Germain.—The Germain Electric Change-Speed Gear. Remarks on the various petrol-electric systems, and gives detailed illustrated description of the Germain system, pointing out some of the advantages of devices of this kind. 2000 w. Auto Jour—Feb. 21, 1903.

Friction Clutch.—Friction Clutches on Automobiles. Reproduction from the "Horseless Age" of a translation from "La France Automobile," giving a review of French practice in this feature of automobile design. Ills. Serial. 1st part. 3000 w. Mech Engr—April 9, 1904.

Friction Drive.—New German Automobile. Describes a new invention of Ludwig Maurer which applies the principle of friction in the transfer of power. 600 w. U S Cons Repts, No. 1496—Nov. 15, 1902.

A Petrol Car Fitted with Variable Speed Friction Gear. An illustrated description of an experimental car fitted with the friction method of transmission. 800 w. Auto Jour—June 13, 1903.

Hitchon.—The Hitchon Change Speed Gears. Illustrated description of this gear which at the instant of changing is so arranged that the next higher or lower speed gear wheels must be in mesh before the other gear becomes disengaged. 1100 w. Autocar—June 10, 1905.

Howard.—The Howard Speed Change Gear. Illustrated description of a new speed gear of the planetary type. 1100 w. Horseless Age—Jan. 15, 1902.

Industrial.—See **AUTOMOBILE.**

Lloyd.—The Lloyd Change-Speed Gear. Illustrated description of this gear and its operation. 1400 w. Autocar—Oct. 28, 1905.

Packard.—The Packard Transmission. An illustrated description of this shifting gear transmission. 1600 w. Horseless Age—Aug. 20, 1902.

Panhard.—Transmission Gears of Some European Cars. Abstract from a paper by Herbert Austin before the Cycle Engr.'s Inst., London. Describes and compares the Panhard, the De Dietrich and Renault systems. Ill. 4700 w. Auto Mag—July, 1901.

The Panhard Gear. Brief illustrated description of the Panhard gear. 1400 w. Autocar—Aug. 2, 1902.

How a Change Speed Gear Works. Illustrates and describes the working of the gear fitted to the Panhard-Levassor cars. 1000 w. Autocar—Jan. 7, 1905.

Pfeffer.—Design for a Change-Speed Gear for Motor-Driven Vehicles. J. E. Pfeffer. Working drawings and description of a design used on various types of touring cars, varying from 20 to 30 horse-power. 2400 w. Am Elect'n—Aug., 1904.

Pilcher.—See **Wilson.**

Planetary.—See **Howard.**

Propeller Shaft Drives.—Points on Propeller Shaft Drive. Rene M. Petard. Gives some details concerning chain driven, and Cardan shaft transmission showing that the latter can be made as flexible as the chain. 1300 w. Automobile—May 13, 1905.

Sturtevant.—See **AUTOMOBILE, GASOLINE.**

Test.—Transmission Gearing Efficiency Test. Rene M. Petard. An illustrated report of experiments recently carried out in France to determine the efficiency of the transmission gearing of the modern automobile. 1200 w. Automobile—June 22, 1905.

Torbensen.—The Torbensen Transmission System. Herbert L. Towle. Illustrated description of the running gear designed by V. V. Torbensen. 2000 w. Automobile—May 9, 1903.
See also **AUTOMOBILE, GASOLINE.**

Variable Speed.—See **VARIABLE SPEED.**

Wilson.—The Wilson and Pilcher Change-Speed Gear. Description and drawing of the latest design and practice. 1600 w. Autocar—July 23, 1904.

See also **AUTOMOBILE, GASOLINE.**

AUTOMOBILE RACE.

See also **AUTOMOBILE—Racing; AUTOMOBILE COMPETITION; AUTOMOBILE TOUR.**

Alcohol.—See ALCOHOL MOTOR—Automobile.

Ardennes Circuit.—The Ardennes Circuit. An illustrated account of the circular race organized by the Automobile Club of Belgium. 3000 w. Autocar—Aug. 9, 1902.

Circuit des Ardennes. A brief account of this race, with illustrations of some of the vehicles, and table giving time record. 1500 w. Auto Jour—June 27, 1903.

Beauvais—Paris.—See ALCOHOL MOTOR—Automobile.

Belgium.—See Ardennes Circuit.

Bexhill, Eng.—Bexhill Speed Trials. An illustrated account of these trials which recently took place at Bexhill-on-Sea, in England. 7000 w. Auto Jour—May 24, 1902.

Brighton Beach, N. Y.—The Brighton Beach Races. An illustrated report of these races held under the auspices of the Automobile Club of Long Island. 1400 w. Horseless Age—Aug. 27, 1902.

Brooklyn.—New Automobile Speed Records. An account of the speed tests on Ocean Parkway, Brooklyn, on Nov. 16, 1901, with illustration of the automobile that made a mile in 63 seconds. 800 w. Sci Am—Nov. 30, 1901.

Chronograph—See CHRONOGRAPH.

Deauville.—The Meeting at Deauville. An illustrated account of speed tests, the most successful yet held. 4600 w. Autocar—Sept. 6, 1902.

The Deauville 500-Meter Competition. An illustrated account of the contest. 800 w. Auto Jour—Sept. 19, 1903.

France.—Motor Car Racing in France. Remarks on the importance French manufacturers attach to speed, and the improvements, with brief report of the races. 2000 w. Engr, Lond—June 7, 1901. See also **Gordon-Bennett; Paris.**

Glasgow-London.—See AUTOMOBILE COMPETITION; AUTOMOBILE TOUR—"Powerful."

Gordon-Bennett. — See also Paris-Bordeaux; Paris-Vienna.

Gordon-Bennett, 1903.—American Champions for the Gordon-Bennett Race. Hugh Dolnar. An illustrated account of the Long Island eliminating tests. 2800 w. Autocar—May 2, 1903.

The Eliminating Trials. An illustrated account of the trials in England for the selection of cars for the Gordon Bennett races. 1300 w. Autocar—May 2, 1903.

The American Gordon-Bennett Champions. Hugh Dolnar. An illustrated article giving details of the vehicles chosen and brief account of the final trials. 2000 w. Autocar—May 9, 1903.

The Gordon Bennett Cup Race. An account of preparations in Ireland, the arrival of the cars, and matters of related interest. Ill. 9,500 w. Motor-Car Jour—July 4, 1903.

Results of the Gordon Bennett Race. An account of this race which gave the "cup" to Germany. 1600 w. Automobile—July 4, 1903.

Previous Contests for Possession of the Gordon Bennett Trophy. A brief review of these annual contests which began in 1900. Ill. 1000 w. Automobile—July 4, 1903.

The Gordon Bennett Cup and Race. An illustrated article giving the history of the cup and of the series of international races which have taken place in connection with it. 2500 w. Autocar—July 6, 1903.

The Irish Fortnight—The Opening Days and the Gordon-Bennett. An illustrated account of the start, finish and incidents. 15000 w. Auto Jour—July 11, 1903.

The Gordon Bennett Cup Race. An illustrated detailed account of this interesting motor race. 3000 w. Motor Car Jour—July 11, 1903.

Narrative of the International Cup Contest. Edward Kenealy. Reports of the race and scenes and incidents on Irish soil, with photographs. 4500 w. Automobile—July 18, 1903.

The Gordon Bennett Automobile Cup Race. An illustrated account of this international motor-car race. 2800 w. Sci Am—July 25, 1903.

The Race as I Saw It. W. J. Morgan. An illustrated acount of the Gordon-Bennett race in Ireland. 3300 w. Auto Mag—Aug., 1903.

Gordon Bennett, 1904.—The Gordon-Bennett French Eliminating Trials. An illustrated account of the trials to find out the best drivers and cars. 3000 w. Auto Jour—May 21, 1904.

The Gordon-Bennett French Eliminating Trials. An illustrated account of trials in France. 1800 w. Auto Jour—May 28, 1904.

Gordon-Bennett, 1905.—The Gordon-Bennett Cup for 1905. States propositions of Marquis de Dion for changes in the rules for this international championship, with opinions of French and British. 2000 w. Autocar—Oct. 15, 1904.

The Gordon-Bennett Cup in 1905 (La Coupe Gordon Bennett in 1905). F. Drouin. Describing especially the machines entering in the French preliminary trials. 2500 w. Génie Civil—July 1, 1905.

The Gordon-Bennett Race. Statistics of this race, with revised times of the competitors, the average speeds, etc. Ills. 2000 w. Auto Jour—July 15, 1905.

Hill Climbing.—See AUTOMOBILE COMPETITION.

History.—Motor Racing and Motor Records. A Retrospect. Notes on the past history of motor car racing. 1800 w. Sci Am—June 6, 1903.

Isle of Man.—See AUTOMOBILE COMPETITION.

Long Island, N. Y.—The Long Island Automobile Club's One Hundred Mile Endurance Test. An account of the run made in very bad weather, with illustration. 3000 w. Horseless Age—April 24, 1901.

Rules and Regulations of the 100-Mile Endurance Contest of the A. C. A. A. statement of eighteen rules governing the contests. 2300 w. Horseless Age—March 12, 1902.

Long Island Endurance Contest. An illustrated report of the contest, the vehicles entered and their performance, etc. 22500 w. Horseless Age—April 30, 1902.

The Long Island Contest from the Standpoint of a Steam Carriage User. Eruest Duval. Remarks on the contest and vehicles tested. 1500 w. Horseless Age—May 7, 1902.

Long Island's Century. Francis P. Prial. An illustrated account. 1700 w. Auto Mag—June 1902.

See also—**Gordon-Bennett; Vanderbilt Cup.**

Newport, R. I.—The Newport Automobile Races. An illustrated account of the races at Newport, R. I. 600 w. Sci Am—Sept. 14, 1901.

The Newport Races. An illustrated account of the races on Aug. 30, 1901. 4500 w. Auto Mag—Oct., 1901.

Paris-Berlin.—Paris-Berlin Race. An account of this very successful race, with the official time of the racing vehicles. 3500 w. Auto Jour—July, 1901.

The Great Race from Paris to Berlin. Full illustrated account of this interesting race of over 744 miles. Serial. 2 parts. 13000 w. Auto Car—July 6, 13, 1901.

Paris-Berlin Motor Car Race. Illustrations of some of the vehicles which took part. 200 w. Engr, Lond—July 12, 1901.

The Paris-Berlin Motor Car Race. Remarks on the useful purpose served by racing, and on the performance of the vehicles in this race. 2700 w. Engr, Lond—July 19, 1901.

Paris-Bordeaux.—The Gordon-Bennett Cup and Paris-Bordeaux. An account of these events which were practically merged into one race. 2500 w. Auto Jour—June, 1901.

The Paris-Bordeaux Race. An account of the Gordon-Bennett cup competition and the open race, with illustrations. 4800 w. Autocar—June 8, 1901.

See also **Paris-Madrid.**

Paris-Madrid.—The Paris-Madrid Motor Car Race. A discussion of this race which ended in disaster, with remarks on the instructive features in the designs, and the ability to stand the strain of such speed and the effects upon the industry. 3000 w. Engr, Lond—May 29, 1903.

Paris-Madrid Race. An account of this race between Paris and Bordeaux, with editorial, and many illustrations of vehicles. 9000 w. Auto Jour—May 30, 1903.

Paris-Madrid. An illustrated article confined mostly to the vehicles used, the regulations, and details of interest to car users. 3000 w. Autocar—May 30, 1903.

The Paris-Madrid Race. An account of this race so far as run, its sad accidents, and the crowds in attendance. Illustrations of vehicles. 4000 w. Motor-Car Jour—May 30, 1903.

The Paris-Madrid Automobile Race, which was stopped at Bordeaux because of accidents, with illustrated descriptions of many of the cars. 2800 w. Sci Am—June 20, 1903.

Paris—Monte Carlo.—See **AUTOMOBILE COMPETITION—French Industrial.**

Paris-Vienna.—The Paris-Vienna Race. A full account of the race, with illustrations of the vehicles. 6500 w. Autocar—July 5, 1902.

The Paris-Vienna and Gordon-Bennett Races. An account of these interesting races, with illustrations of the vehicles. 6000 w. Auto Jour—July 5, 1902.

The Paris-Vienna Motor Car Race. Begins a review of these races, the race for the Gordon-Bennett cup having occurred at the same time, with interesting comments on the industry and illustrations of vehicles. Serial. 1st part. 2800 w. Engr, Lond—July 11, 1902.

The Paris-Vienna Motor Car Races. C. R. D'Esterre. A fully illustrated account of the races, the most important ordeal yet undertaken by motor vehicles. 3000 w. Engineering Magazine—September, 1902.

Skidding.—See **AUTOMOBILE.**

Speed Records.—Recent Automobile and Motor Boat Speed Records. A review of the speeds attained during the last racing season. Ills. 1200 w. Sci Am—Nov. 19, 1904.

Staten Island, N. Y.—American Speed Trials. An account of the Staten Island races on May 31, describing the track, vehicles and the unfortunate accident. Ill. 3000 w. Autocar—June 21, 1902.

Timing.—See **Chronograph.**

Tourist Trophy.—See **AUTOMOBILE COMPETITION—Isle of Man.**

Tuning Up.—How to Tune Up a Racing Automobile. Joseph Tracy. Gives practical suggestions for the guidance of entrants in races who drive medium or high-powered cars. Serial. 1st part. 2500 w. Automobile—March 5, 1904.

Vanderbilt Cup.—How the Vanderbilt Cup Race Was Won. A number of articles giving illustrated accounts of the first race for the Vanderbilt Cup, won by a Panhard racer for France. 30700 w. Automobile—Oct. 15, 1904.

First Competition for the Vanderbilt International Automobile Cup. An illustrated account of the recent race on Long Island. 2200 w. Sci Am—Oct. 22, 1904.

The Vanderbilt Cup Elimination Race. Illustrates eight of the ten machines which competed, giving brief descriptions and information of interest. 3500 w. Sci Am—Oct. 7, 1905.

France Wins the Vanderbilt Cup. A collection of illustrated articles describing the race on Long Island, New York, Oct. 14, 1905, and the performance of the cars, and giving information of interest. 24000 w. Automobile—Oct. 19, 1905.

AUTOMOBILE STATION.

See **AUTOMOBILE GARAGE.**

AUTOMOBILE, STEAM.

See also **AUTOMOBILE—Engines; AUTOMOBILE COMPETITION; AUTOMOBILE EXHIBITION; TRACTION ENGINE.**

Present Status of Steam Vehicles. Hugh Dolnar. An illustrated review of the use of the steam engine for wagon driving, considering it the most suitable motive agent now before the public. 2000 w. Automobile—Jan. 24, 1903.

Adams Express.—Adams Express Company's Steam Wagon. Illustrated description of a 2-ton wagon which has had two years' actual use. Also particulars of a heavier model recently designed. 1600 w. Ir Trd Rev—July 3, 1902.

Agriculture.—See **AUTOMOBILE; AGRICULTURAL MACHINERY.**

Air Pump.—See **AIR PUMP—Fuel Pressure.**

Artillery.—See **AUTOMOBILE.**

Aultman.—Aultman 4-Wheel Drive Steam Truck for Commercial Use. Herbert L. Towle. Drawings and description of a heavy truck designed to carry a load of 5 tons. 1400 w. Auto & Motor Rev—Nov. 1, 1902.

Automobile Mfg. Co.—The Automobile Manufacturing Company's New Steam Carriage. Illustrated description of an entirely different system from any hitherto on the market, and the latest design. 3000 w. Auto Jour—Dec., 1900.

Bodman.—Simple Form of Steam Engine for Self-propelled Commercial Vehicles. Walter L. Bodman. An illustrated description of the Simpson D. Bodman's three-cylinder vertical engine for superheated steam. 3000 w. Automobile—April 25, 1903.

Boiler.—See **BOILER TEST; BOILER, WATER-TUBE; CAR, MOTOR DRIVEN—steam.**

Boiler Test.—See **BOILER TEST—Automobile.**

Boston Exhibition.—See **AUTOMOBILE EXHIBITION.**

Brightmore.—Steam Motor Lorry. Illustrated detailed description of a lorry built from designs of Dr. A. W. Brightmore, and of its operation. 2000 w. Engr, Lond—Aug. 8, 1902.

Dr. Brightmore's Steam Lorry. Illustrated detailed description of this machine and its operation, describing a trial trip. 4600 w. Auto Jour—Aug. 23, 1902.

A New System of Motor Traction. A. W. Brightmore. Describes the writer's work in this field and the vehicle which is the final outcome. The front wheels are the driving wheels and also the steering. Ill. 5000 w. Mech Engr—Sept. 5, 1903.

British.—See **Industrial.**

Burners.—See **Clarkson; Gasoline Burner; LIQUID FUEL.**

Chaboche.—The Chaboche Steam Cars. An illustrated detailed description of the system and mechanism. Serial. 1st part. 1800 w. Auto Jour—March 28, 1903.

Chelmsford.—The Chelmsford Steam Car. Illustrates and describes the mechanical details of this vehicle. Serial. 1st part. 1200 w. Autocar—Nov. 29, 1902.

The Chelmsford Steam Car. An illustrated description of a new steam car, fitted as a private omnibus. 1600 w. Horseless Age—Dec. 6, 1902.

Clarkson.—The Clarkson Steam Carriage and Kerosene Burner. Illustrated description of a design by an English engineer showing considerable deviation from American practice. 2000 w. Horseless Age—Sept. 4, 1901.

A New Steam Motor Car. Illustrates and describes the Clarkson car. It is a substantial and roomy machine, in which paraffine oil can be used as a fuel. 1800 w. Engr, Lond—March 13, 1903.

Steam Omnibus for Torquay. Illustrates and describes a steam propelled vehicle for public service. 1000 w. Engr, Lond—Dec. 18, 1903.

Steam Cars for Public Service. Thomas Clarkson. Presents the necessity for superseding horse traction by mechanical means and discusses the principles of construction in such vehicles and the claims of the steam car. General discussion. 7400 w. Jour Soc of Arts—Feb. 5, 1904.

The Clarkson Steam Motor Omnibus. Illustrated detailed description of an English vehicle. 1800 w. Engng—Sept. 16, 1904.
See also Chelmsford.

Commercial.—See **Industrial.**

Condensers.—See **CONDENSER—Automobiles.**

Cost.—A Few Figures on Cost of Operating a Steam Automobile. George E. Greenleaf. Describes the carriage used and conditions under which it was run, giving a detailed statement of the cost of running. 1200 w. Auto Mag—April, 1901.
See also **AUTOMOBILE—Operating.**

Cremorne.—The Cremorne Steam Cars and Automobile Parts. Begins an illustrated detailed description. Serial. 1st part. 1800 w. Auto Jour—Nov. 14, 1903.

Cugnot.—See **History.**

Development.—The Recent Development in Light Steam Cars. Filson Young. Some remarks on the development in steam cars and the latest types. 1700 w. Autocar—March 14, 1903.

Economy.—Economy in Steam Vehicles. E. C. Oliver. The object of the paper is to point out certain lines along which improvement may be made. 3400 w. Horseless Age—Nov. 21, 1900.

Feed Regulation.—The Automatic Feed Regulation of Steam Vehicle Boilers. J. Edward Baldwin. Reviews the existing situation, showing what is desirable and undesirable in the construction and operation of these devices. 1000 w. Horseless Age—March 5, 1902.

Feed Water.—See Feed Regulation; FEED WATER—Automobiles.

Fire Engine.—See FIRE ENGINE—Automobile.

Flash Boiler.—See Gardner-Serpollet; Serpollet; BOILER, WATER-TUBE; CAR, MOTOR-DRIVEN—Steam, Serpollet.

Foden Wagon.—Some Foden Steam Wagons. Illustrations of a covered van, tipping wagons, and haulage wagon, with brief description. 800 w. Autocar—Nov. 22, 1902.

Freight.—See Industrial.

Gardner-Serpollet.—English Gardner-Serpollet Steam Cars and the British Power Traction and Lighting Company's Works. Illustrated detailed description of the system, and of the York works. Serial. 1st part. 5000 w. Auto Jour—June 28, 1902.

The Latest Steam Vehicles of the Gardner-Serpollet Works, Paris (Die Neuesten Dampfwagen von Gardner & Serpollet in Paris). Max Unger. With details of the flash boiler, pumps, valve gear, etc. 3000 w. Glasers Annalen—July 15, 1902.

The 1904 Gardner-Serpollet Cars. Illustrates and describes the 9 H. P. car called the "Simplex," remarkable for its simple construction, economy in fuel, and ease with which it may be driven. 900 w. Autocar—March 12, 1904.

Automobile Omnibus in Paris (Les Omnibus Automobile à Paris). Col. G. Espitallier. A detailed description of the Gardner-Serpollet steam omnibus now in successful operation in Paris. 2000 w. 1 plate. Génie Civil—May 20, 1905.

40-H. P. Gardner-Serpollet Motor-Omnibus. Illustrates and describes a vehicle carrying thirty passengers which is to be put on trial in Paris. 1200 w. Engng—Oct. 20, 1905.
See also Serpollet.

Gasoline Burner.—A Home Made Generator and Pilot Light. W. P. Haines. Illustrates and describes a successful arrangement of auxiliary gasoline burner for steam automobiles, devised by the writer and made at small cost. 2000 w. Horseless Age—Oct. 8, 1902.

Gillett.—See Waring's Gillett.

Grout.—New Grout Steam Car.—Illustrates and describes the latest model of Grout Brothers of Orange, Mass. 900 w. Automobile—Dec. 24, 1904.

History.—The Steam Coach in 1825. Robert I. Clagg. An illustrated account of an early vehicle taken from the "American Mechanics' Magazine" of Dec. 17, 1825. 1700 w. Ir Tr Rev—June 6, 1901.

The First Road Engine. Angus Sinclair. Illustrated description of Cugnot's engine built in the 18th century. 800 w. Auto Mag—June, 1902.

The First Steam Carriage. Angus Sinclair. Reviews the early history of steam engineering, and gives the credit of the first steam carriage to Robert Trevithick. 1200 w. Auto Mag—July, 1902.

A Retrospect of the Steam Vehicle. Hugh Dolnar. Reviews the history of the early attempts to propel vehicles by steam. 2200 w. Automobile—Jan. 31, 1903.

An Early Road Locomotive. Illustration, with historical account and description of a machine made about 1784. 1200 w. Sci Am—Oct. 17, 1903.
See also AUTOMOBILE GEAR—Compensating.

Hoffman.—See STEAM GENERATION.

Hyler White.—See White.

Industrial.—Steam Freight Wagons. Discusses the difficulties to be overcome and the requirements, showing that for loads of 1000 pounds and over, steam is the only power. 1400 w. Horseless Age—Feb. 6, 1901.

The Steam Motor Truck as a Portable Power House. J. G. Dudley. An analysis of the conditions of American service, and of the essential features of the type best adapted to them, with concise statement of conclusions. 4000 w. The Engineering Magazine—May, 1901.

A Novelty in Steam Trucks. Illustrates and describes a propelling mechanism which is intended to be applied to ordinary horse-drawn trucks. 1800 w. Automobile—March 28, 1903.

The Invaluable Steam Lorry. Brief illustrated descriptions of modern vehicles of English make. 1700 w. Auto Jour—July 25, 1903.

Steam Wagons for Commercial Use. R. G. L. Markham. A discussion of present practice, and use of these vehicles, especially considering those made in Great Britain. 8300 w. Cassier's Mag—Oct., 1903.

A New Steam Motor Wagon. Illustrated detailed description of a five-ton steam motor wagon made in England. 700 w. Engr, Lond—March 17, 1905.

Commercial Motor Vehicles. J. F. Gairns. The present article discusses steam motor vehicles adapted for the carriage of goods. Ills. Serial. 1st part. 4800 w. Cassier's Mag—July, 1905.

See also Adams Express; Aultman; Bodman; Brightmore; Foden; Morgan; Musker; Pioneer; Pyrodyen; Savage; Simpson; Thornycroft; Toledo; Waring; AUTOMOBILE; TRACTION ENGINE.

Keene—A 12-H. P. Steam Car. A lettered linear elevation and plan of a passenger car in which locomotive practice is followed to the extent of arranging for direct drive upon the cranked driving wheel axle. 1000 w. Auto Car—April 20, 1901.

Lane.—The Lane Steam Carriage. An illustrated description of a very successful carriage, especially noting its novel features. 1200 w. Sci Am—March 1, 1902.
See also AUTOMOBILE EXHIBITION—New York, 1901.

Liverpool Trials—See AUTOMOBILE COMPETITION.

"Locomobile."—A Steam Motor Carriage. Illustrates and describes a vehicle to carry four persons, and gives some facts regarding its operation. 1700 w. Engr, Lond—Nov. 9, 1900.

The Steam Motor Car. An illustrated article explaining the mechanism of one of the latest cars. 2500 w. Engr, Lond—Dec. 20, 1901.

The "Locomobile" Steam Carriage. Illustrated detailed description. 2000 w. Sci Am Sup—Jan. 25, 1902.

The Latest Locomobile Steam Cars. Illustrates and describes a brougham, dos-a-dos, and surrey; also the shops of the company. 3200 w. Auto Jour—Feb. 28, 1902.

Lorry.—See Industrial; AUTOMOBILE—Industrial; AUTOMOBILE COMPETITION; TRACTION ENGINE.

Military.—See AUTOMOBILE; AUTOMOBILE COMPETITION; TRACTION ENGINE.

Morgan Truck.—Steam Motor Trucks. Illustrated description of the steam trucks made by the Morgan Motor Co., Worcester, Mass. 1500 w. Mach, N. Y.—Sept., 1902.

The Ten Ton Morgan Steam Truck. An illustrated detailed description. 1600 w. Horseless Age—Dec. 3, 1902.

Morgan Motor Truck. Illustrates and describes a 10-ton truck made in Worcester, Mass. The steam is generated by oil, the boiler of the water-tube type. 3300 w. Auto Topics—Dec. 13, 1902.

A New Power Truck. Illustrates and describes the Morgan motor trucks and gives comparison of the cost of haulage by horses and by motor trucks. 2500 w. Ir Trd Rev—Dec. 25, 1902.
See also AUTOMOBILE EXHIBITION—New York, 1901.

Musker.—The Musker Steam Wagon. Illustrates and describes an English vehicle, aiming at automatic control, and having the machinery carried on a separate under frame. 3000 w. Auto Jour—Jan., 1901.

The Coke and Oil-Fired Musker System. Illustrated descriptions of the steam wagons of this firm, which took part in the recent heavy wagon trials at Liverpool. 1200 w. Auto Jour—Aug., 1901.

The Musker Steam Motor-Wagon. Illustrated detailed description. 2200 w. Engng—Aug. 7, 1903.

New York Exhibition.—See AUTOMOBILE EXHIBITION.

Omnibus.—Steam Omnibuses at Westerly, U. S. A. Hugh Dolnar. Brief illustrated description of vehicles put in service for passenger transportation, and package delivery. 1500 w. Autocar—April 11, 1903.

See also Chelmsford; Clarkson; Gardner-Serpollet; Thornycroft; AUTOMOBILE; CAR, MOTOR-DRIVEN—Steam, Great Western.

Overman.—The Overman Steam Automobile. Illustrated detailed description. 1000 w. Sci Am—March 1, 1902.

Penney.—Construction and Operation of a Home-Made Steam Runabout. H. D. Penney. Illustrated description of a vehicle made by the writer, and its operation. 2800 w. Automobile—July 13, 1905.

Pioneer Power Co.—A Novel Type of Steam Lorry. Illustrated description of the type adopted by the Pioneer Power Co., of London, Limited. The platform extends almost the entire length, as little of the upper space as possible being taken for the driver's seat, or machinery. 2500 w. Auto Jour—Aug. 30, 1902.

Portable Power House.—See **Industrial.**

Prescott.—The Prescott Steam Carriage. Herbert L. Towle. Illustrated description of a vehicle representative of present practice in American steam carriages. 2300 w. Automobile—Jan. 10, 1903.

Pyrodyen.—The Pyrodyen Steam Wagon. Illustrated description of a steam wagon to carry a load of 7 1-2 tons. The fuel used is petroleum oil of the cheapest kind. 1000 w. Engr, Lond—Oct. 21, 1904.

Railway.—See **CAR, MOTOR-DRIVEN.**

Reading.—The Reading Steam Carriage. Illustrated detailed description of an interesting car. 1500 w. Autocar—Sept. 21, 1901.

Savage.—The Savage Steam Lorry. Illustrated detailed description. 1700 w. Auto Jour—Sept. 5, 1903.

Serpollet.—The Serpollet Steam Automobile. An illustrated description of this system and the mechanism employed. 1700 w. Sci Am—Dec. 8, 1900.

The Serpollet System. A brief description of the main features of these steam cars. Ills. 1200 w. Autocar—March 8, 1902.

The Serpollet Steam Automobile. Begins an illustrated detailed description. Serial. 1st part. 800 w. Sci Am Sup—May 16, 1903.

The Serpollet Steam Vehicles. Illustrated description of recently introduced features of these vehicles. 2200 w. Engr, Lond—Oct. 27, 1905.

See also **Gardner-Serpollet; CAR, MOTOR-DRIVEN.**

Simpson.—A Substantial Steam Car. Illustrated description of the Simpson cars. Pleasure vehicles of 6 or 12 H. P.; a simple type of engine, steam supplied by a flash generator heated by a paraffine burner. 1500 w. Autocar—Jan. 16, 1904.

A Simpson and Bibby Steam Lorry for West Africa. Illustration and description of a 5-ton steam wagon to be used for transporting mining material between the coast and gold fields. 600 w. Auto Jour—Dec. 13, 1902.

Small Engines.—Steam Autocar Notes: Small Steam Engines. J. S. V. Bickford. An illustrated description of experimental designs of the writer, their defects, and difficulties. 4600 w. Engr, Lond—Dec. 4, 1903.

Snow.—See **TRACTION ENGINE.**

Sprinkler.—See **STREET SPRINKLING—Automobile.**

Stanley.—The Stanley Brothers New Steam Carriage. A. L. Clough. Describes the interesting features, the chief of which is the watertube boiler. 1100 w. Horseless Age—Jan. 29, 1902.

Stearns Compound.—The Stearns Compound Engine. Sectional view and description of the engine used on carriages manufactured in Syracuse, N. Y. 700 w. Horseless Age—Nov. 27, 1901.

Straker.—Steam Wagon. Illustrates and describes a wagon exhibited at the recent Crystal Palace show by the Straker Steam Vehicle Co. 1200 w. Engng—Feb. 13, 1903.

See also **AUTOMOBILE COMPETITION—Military.**

Superheated.—The Superheated Steam Engine. Henri G. Chatain. Describes these engines and discusses their advantages for road locomotion. 1700 w. Horseless Age—Jan. 15, 1902.

See also **Bodman.**

Test.—See **Trial; AUTOMOBILE; AUTOMOBILE COMPETITION; BOILER TEST—Automobile.**

Thornycroft.—The Thornycroft Steam Wagon. Illustrates and describes the American built wagons for heavy duty, which possess many interesting features. 1400 w. Ir Age—March 28, 1901.

Steam Omnibuses. Illustrates and describes types of the Thornycroft omnibuses. 900 w. Tram & Ry Wld—March 13, 1902.

Thornycroft Steam Wagon and Patrol Car. Illustrated description of two interesting vehicles shown at the automobile exhibition in the Crystal Palace. 2500 w. Engng—Jan. 30, 1903.

See also **AUTOMOBILE WORKS.**

Toledo.—Some Features of the Toledo Steam Carriage. Illustrates and describes features of interest. Serial. 1st part. 2000 w. Horseless Age—April 16, 1902.

Toledo Truck.—The Toledo Four-Ton Steam Truck. Illustrated description of a vehicle for heavy duty which has given good results. 1100 w. Horseless Age—Nov. 20, 1901.

Trevithick.—See **History.**

Trial.—An Automobile Trial. J. L. Lucas. History of a trial run of an auto-carriage run by a kerosene burner using a flash boiler and an ordinary 4 1-2 H. P. engine. 1100 w. Am Mach—March 21, 1901.

See also **AUTOMOBILE COMPETITION.**

Truck.—See **Industrial.**

Turbo-Electric.—See **AUTOMOBILE.**

Turner-Miesse.—The Turner-Miesse Steam Car. Illustrated detailed description. Serial. 1st part. 1200 w. Motor Car Jour—May 28, 1904.

Waring's "Gillett" Van.—Waring's "Gillett" Motor Van. Illustrates and describes a steam delivery van. 2000 w. Auto Jour—Nov. 7, 1903.

Water-Tube Boiler.—See **BOILER, WATER-TUBE—Automobile; Flash.**

White.—Working Drawings of a Steam Carriage. T. Hyler White in "The English Mechanic." Begins the description of a carriage incorporating the latest ideas, and which may be built at a fairly low cost. Serial. 1st part. 2000 w. Horseless Age—July 31, 1901.

Patterns and Core Boxes for the Hyler-White Steam Engine. W. O. Anthony. Illustrates and describes the construction. 4000 w. Horseless Age—Jan. 22, 1902.

The White Steam Carriage. Illustrated detailed description of the 1902 model. 1800 w. Sci Am—March 1, 1902.

The Hyler White Carriage. J. S. V. Bickford. General high praise of the design with criticism of a few details. 1600 w. Horseless Age—May 14, 1902.

The White Steam Carriage. Illustrated detailed description. 2700 w. Horseless Age—Jan. 29, 1902.

The 1903 White Steam Car. Illustrates and describes the interesting features of the present type of these cars. Serial. 1st part. 3000 w. Auto Jour—July 4, 1903.

The White Steam Car. Begins an illustrated detailed description of a vehicle which can be driven 100 miles without replenishment of fuel or water. Serial. 1st part. 1200 w. Autocar—April 9, 1904.

A Successful Steam Touring Car, and the Reasons of Its Success. Gives reasons why most steam cars are undesirable, and why the White Steam Car has retained its popularity. Ills. Serial. 1st part. 1500 w. Auto Jour—Aug. 20, 1904.

The New 15-H. P. White Steam Car. Illustrated description of a new car, noting its improvements. 2000 w. Autocar—Dec. 3, 1904.

An 18-H. P. White Steam Car—The 1906 Model. Illustrates and describes this new model, dealing with the novel features which have been embodied. 1700 w. Auto Jour—Sept. 30, 1905.

White Compound.—Compound Engine of the White Steam Car. Illustrated detailed description. 1000 w. Am Mach—May 26, 1904.

AUTOMOBILE TOUR.

See also **AUTOMOBILE COMPETITION; AUTOMOBILE RACE.**

Alps.—3,000 Kilometres by Motor Car Over the Alps. An illustrated account of an interesting trip made in a Martini car. 2800 w. Auto Jour—July 16, 1904.

See also **St. Gothard.**

New York-Buffalo.—A Preliminary New York to Buffalo Tour. S. W. Rushmore. An illustrated account of the run. 2500 w. Auto Mag—Nov., 1901.

See also **AUTOMOBILE RACE.**

Outfit.—A Practical Automobile Touring Outfit. Hrolf Wisby. An article suggesting what should be, and should not be included. 2300 w. Sci Am—March 1, 1902.

Pacific-Atlantic.—Overland Trip from the Pacific Ocean. Marius C. Krarup. An illustrated series of articles giving particulars of trip. The present number describes the crossing of the Sierras by way of Placerville to Slippery Ford. Serial. 1st part. 2000 w. Automobile—July 18, 1902.

"Powerful."—The 1,000-Mile Tour of "The Powerful." A detailed account of the run made by the "Powerful" electric car from London to Glasgow and Edinburgh. 2500 w. Auto Jour—Oct., 1901.

St. Gothard.—The Passage of the St. Gothard in an Automobile(Le Passage du Saint-Gothard en Voiturette Automobile). I. Arraou. An account of a trip of nearly 2000 miles from France to Italy and return, in a de Dion-Bouton carriage. 2000 w. Génie Civil—June 15, 1901.

Southsea.—The Celebrated Run to Southsea. An illustrated account of the run made to celebrate the sixth anniversary of the passing of the Locomotive on Highways Act, 1896, in England. 5800 w. Autocar—Nov. 23, 1901.

Trans-Continental.—See **Pacific-Atlantic; Winton.**

Winton.—Automobiling in the West. Charles B. Shanks. An illustrated acount of experiences encountered during the attempt made by Alexander Winton to cross the North American continent in an automobile. 3800 w. Sci Am Sup—Aug 3, 1901.

AUTOMOBILE TROLLEY.

Motor Vehicles with Overhead Trolley and Without Track (Gleislose Motorbahnen mit Elektrischem Oberleitungsantrieb). Max Schiemann. An illustrated description of a motor omnibus system suitable for small villages as a preliminary to the establishment of tramways. 2000 w. Elektrotech Zeitschr—Nov. 21, 1901.

A Novel Method of Motor Traction. Illustrated description of a system described by Herr Max Schiemann in the "Elektrotechnische Zeitschrift." The novelty consists in supplying energy to the motor cars from trolley wires, though no tracks are provided. 900 w. Elec Engr., Lond—Dec. 13, 1901.

Trackless Electric Traction (Gleislose Elektrische Bahnen). Max Schiemann. A review of the recent progress in the use of overhead electric trolley system for use on common roads. 3000 w. Elektrotech Zeitschr—July 6, 1905.

Traction by Trolley Automobile (Traction par Trolley Autometeur). Jean Loubat. An illustrated account of omnibus lines in which the vehicle runs on ordinary roads and is operated by an electric motor which gets its current from double trolley wires overhead, on which a small automotor trolley travels. 2800 w. Rev Technique—Feb. 25, 1902.

Electric Trolley Wagons and Omnibuses. Frank C. Perkins. Illustrates and describes a system of transportation gaining favor in French and German cities in streets where it is impossible to install tramways. 700 w. Sci Am—Jan. 3, 1903.

Electric-Trolley Omnibuses. Illustrated description of the most recent designs and their equipment. 1000 w. Elect'n, Lond—Aug. 21, 1903.

Trackless Tramways (Ueber Gleislose Bahnen). Max Strobrawa. A discussion of the commercial possibilities of electric traction without rails, using the overhead trolley and motor omnibuses upon ordinary highways. 6000 w. Elektrotech Zeitschr—Aug. 27, 1903.

Electric Trolley Vehicles without Rails. Emile Guarini. An illustrated account of the application of trolley traction to ordinary highways, and its adaptability to lines of light traffic density. 4000 w. Engineering Magazine—Oct., 1903.

Trackless Trolleys (Gleislose Bahnen). W. Butz. Illustrating recent progress in electric traction on common roads with overhead trolleys for the supply of current. Illustrations are given of omnibus equipment and of trains of trailers for merchandise. 3500 w. Eisenbahntech Zeitschr—Sept. 6, 1905.

Electric Vehicles for Semi-Public Service. Illustrated description of express wagons equipped with trolley pole and special electric motor, for using current from the over-head feed wires of street railway companies. 1800 w. Automobile—Dec. 14, 1905.

Lombard-Guérin.—Traction by Overhead Motor Trolley. From "La Revue Technique." Illustrated description of the leading features of the Lombard-Guérin system, in which the electric energy is supplied to the vehicle from two aerial wires. 1500 w. Engr, London—March 14, 1902.

The Lombard-Guérin Trolley Omnibus. Illustrates and describes briefly a type where the connection between the car and overhead wires is by a flexible cable. 1500 w. Elec Times—Sept. 10, 1903.

The Trolley Omnibus. Illustrates and describes a type of trolley with self-contained electric motor, invented by Mr. Lombard-Guérin. 2200 w. Trac & Trans—Oct., 1903.

Nice-Monte Carlo.—Trolley Omnibus Line Between Nice and Upper Monte Carlo. Presents the advantages of the auto-trolley system in many places, and gives an illustrated description of the system to be installed on this line. 3000 w. St Ry Jour—Aug. 2, 1902.

Scranton, Pa.—Trackless Trolley in Scranton. An illustrated description of an experimental line recently constructed and under operation. 1700 w. St Ry Jour—Nov. 14, 1903.

Stoll.—Overhead Traction for Road Vehicles. An illustrated description of the Stoll electric omnibus system. 1600 w. Elec Rev, Lond—Sept. 11, 1903.

Westphalia.—The Trackless Electric Car Line at Grevenbrück, Westphalia (Die Gleislose Elektrische Bahn bei Grevenbrück in Westf.) Hr. Volges. An illustrated description of line with double trolley wire and no track. A light electric locomotive hauls two trailers filled with limestone from a quarry to a railway station. 1200 w. Deutsche Bauzeitung—April 18, 1903.

AUTOMOBILE WORKS.

Arrol-Johnston, Paisley.—The Works of the New Arrol-Johnston Car Co., Ltd., Paisley. Illustrates and describes these works near Glasgow in detail. They are exceptionally well equipped for the manufacture of gasoline automobiles. 2500 w. Engng—Dec. 22, 1905.

British.—See **Arrol-Johnston; Napier; Thornycroft; Wolseley.**

British Power Traction and Lighting Co.—See **AUTOMOBILE, STEAM—Gardner-Serpollet.**

France.—Some French Motor Car Works. The present number gives an illustrated description of the Panhard and Levassor works at Paris, reviewing their history. Serial. 1st part. 4000 w. Engr, Lond—Aug. 4, 1905.

Napier.—The Napier Motor Car Works. Illustrated description of the works at Acton. 1400 w. Engng—April 8, 1904.

Olds.—The Manufacture of Automobiles. An illustrated description of interesting features of manufacture as carried out in the plants at Detroit and Lansing, Mich., of the Olds Motor Works. 1400 w. Sci Am—Jan. 9, 1904.

Thornycroft.—Some Motor Car Works. Begins an illustrated review of the English works for the building of motor vehicles, commenting on the rapid development of the industry. The present article describes the Thornycroft Works. 3600 w. Engr, Lond—Nov. 28, 1902.

Wolseley.—The Wolseley Works and Cars. An illustrated description of works for gasoline motor carriage building and some of the latest types of vehicles. Serial. 1st part. 3500 w. Auto Jour—May 17, 1902.

AUTOMOTRICE.

See **CAR, MOTOR-DRIVEN.**

AUTOPLATE.

See **STEREOTYPING—Automatic.**

AUTOTELEGRAPH.

See **TELAUTOGRAPH.**

AXLE.

Automobile.—A New Driving Axle for Automobiles. Sectional view, with description. 800 w. Sci Am—Sept. 21, 1901.

Axles and Springs. F. Gaillardet, in "La France Automobile." Describes the method of manufacturing hollow axles, and discusses spring suspension in its relation to motor vehicles. 2000 w. Horseless Age—Aug. 13, 1902.

Dust Guard.—See **DUST GUARD.**

Failures, Germany—Axle Failures in Germany. Figures taken from an article by M. E. Biard in the "Revue Generale des Chemins de Fer," which gives an analysis of failures for the years 1888 to 1900. 1200 w. R R Gaz Oct. 9, 1903.

Limit Diameters.—Graphical Method of Finding Diameters for Car and Tender Axles. R. B. Kendig. Gives a diagram and explains its use. 800 w. Am Engr & R R Jour—Sept., 1902.

Locomotive.—See **CRANK AXLE—Oblique Type; LOCOMOTIVE DESIGN—Axle Loads.**

Manufacture.—See **Pressed; TIRE.**

Mercader Process.—See **Pressed.**

Pressed.—A New Method of Making Railway Axles (Eine Neue Herstellung von Eisenbahnachsen). Prof. Reuleaux. An illustrated paper before the "Verein für Eisenbahnkunde" in Camille Mercader's method of forming steel axles by punching a heated bar axially and forcing the metal into a die. With discussion. 2000 w. Glasers Annalen—April 1, 1903.

Holland Pressed Axles. Camille Mercader. Extracts from a paper read at meeting of the Iron and Steel Inst. Describes the method proposed by the writer for making by pressure, axles having varying diameters. Also reports experiments made regarding material for the punches, and other details of the work. Ill. 2500 w. Can Engr—May, 1903.

Hollow Pressed Axles. Camille Mercader. Read at meeting of the Iron and Steel Inst. Gives the method proposed by the writer, reporting experiments, tests, etc., and describing the hydraulic axle forging machine. Gives advantages claimed. Ill. Serial. 2 parts. 4200 w. Ir Age—May 7 and 14, 1903.

Specification.—See **Steel.**

Steel.—Specifications for Steel Axles Proposed by American Section of International Association for Testing Materials. Comments and discussion by M. H. Wickhorst, engineer of test, C. B. & Q. R. R., Aurora, Ill., with communications and general discussion. 7800 w. Pro W Ry Club—March, 1901.

The Chemical Composition of Steel Freight Axles. William Forsyth. Remarks showing that the steel manufacturers favor an axle steel which is higher in carbon than the present M. C. B. limits. 700 w. R R Gaz—June 14, 1901.

The Chemistry and Manufacture of Steel Axles. C. E. Middleton. Considers the chemical composition and the improved methods of manufacture which have greatly reduced the sources of trouble. 1300 w. R R Gaz—June 14, 1901.

Steel Axles. J. L. Replogle. Considers the method of manufacture, discusses the best specification, suggesting changes in the M. C. B. specifications and the causes of broken axles. General discussion. 6000 w. Pro W Ry Club—May 17, 1904.

See also **STEEL—Axle.**

Stresses.—Reports Upon an Investigation into the Stresses and Strains in Axles and Wheels in Service. F. B. Bissell. Shows the principal stresses and strains in axles and wheels, and how to so design that they may be taken safely. General discussion. Diagrams. 9000 w. Pro N Y R R Club—Jan. 15, 1904.

AXLE LIGHTING.

See **CAR LIGHTING—Electric.**

BACK FILLING.

Trenches.—See **TRENCH.**

BAGGAGE HANDLING.

See **MECHANICAL HANDLING—Baggage.**

BALATA.

Balata and Its Employment. Editorial on this material, which is so generally confused with gutta percha and rubber that statistics are not reliable. 2000 w. Engng—Oct. 17, 1902.

Notes on Balata. H. L. Terry. Remarks on its origin, collection, and employment. 1700 w. Elect'n, Lond—July 10, 1903.

BALCONY.

See **BEAM—Curved Balcony.**

BALDWIN.

See **LOCOMOTIVE WORKS.**

BALING COTTON.

A Method of Preparing and Baling Cotton in Round Bales of Uniform Lap. John R. Fordyce. Illustrated description of machine and method, and related matter. 3800 w. Trans Am Soc of Mech Engrs, No. 908—May, 1901.

BALL.

Steel.—A New System for the Manufacture of Steel Balls. Illustrated description of the system used by the Steel Ball Company, of Chicago, for producing balls of any required size. 3300 w. Am Mach—Nov. 1, 1900.

See also **BALL BEARINGS.**

BALLAST.

See **BRIDGE FLOOR; RAILWAY PERMANENT WAY; SHIP STABILITY.**

BALL BEARINGS.

See also **BALL; ROLLER BEARINGS.**

Ball Bearings for Given Loads (Kugellager für Beliebige Belastungen). R. Stribeck. An account of tests made upon steel balls to ascertain deformation under pressure; with applications of the results to the design of ball bearings. Two articles, 10000 w. Zeitschr d Ver Deutscher Ing—Jan. 19, 26, 1901.

A Study of Balls for Ball Bearings (Etude sur les Billes pour Roulements). A translation of the recent paper presented before the "Verein Deutscher Ingenieure." 5000 w. Revue de Mécanique—April, 1901.

Steel Ball Bearings. An illustrated account of the investigations of R. Stribeck, on behalf of the German Arms and Ammunition Works of Berlin. An important contribution to the solution of difficult mechanical problems. 4000 w. Engng—April 12, 1901.

Ball Bearings (Kugellager). R. Stribeck. A study of ball bearings with especial reference to the pressure upon the balls and the reduction of friction in various constructions. 4000 w. Glasers Ann—July 1, 1901.

The Design of Ball Bearings (Beitrag zur Beurteilung von Kugellagern). R. Stribeck. An examination of the paper form of ball race in order to avoid sliding friction. 1000 w. Zeitschr d Ver Deutscher Ing—Oct. 5, 1901.

Ball Bearings (Kugellager). F. Heerwagen. An examination of the rolling conditions in various forms of ball bearings, with especial reference to the pressure and wear. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 30, 1901.

Steel Ball Bearings. Gives illustrated descriptions of these bearings with theoretical deductions by F. Heerwagen to ascertain the distribution of the load upon the different balls of a bearing. 3400 w. Engng—Dec. 26, 1902.

Automobile.—See **AUTOMOBILE—Bearings.**

Chapman.—Test of a Ball-Bearing Car Journal on the Fitchburg Electric Ry. Illustrates and describes the Chapman double ball bearing and gives report of comparative test between this and a car fitted with the ordinary journal bearing. 1500 w. Ry & Engng Rev—Feb. 22, 1902.

Diameter.—Diagram for Finding the Diameter of Ball Bearings. P. S. Bushnell. With explanatory notes. 500 w. Am Mach—Nov. 12, 1903.

Efficiency.—Experiments upon the Efficiency of Ball Bearings. (Expériences sur le Rendement des Roulements à Billes). Describing the experiments of M. Gégauff at Mulhouse, Alsace, with a special form of dynamometer, upon the resistance of various designs of ball bearings. 1500 w. Génie Civil—May 20, 1905.

Electric Machinery.—See **ELECTRIC MACHINERY—Construction.**

Hoffmann.—The Hoffmann Manufacturing Co.'s Patent Ball Bearings and Steel Balls. An illustrated description of the construction and application of their patent ball bearings. 1500 w. Prac Engr—Dec. 1, 1905.

Step.—Some Experiments on Ball Step-Bearings. C. H. Benjamin. An account of experimental investigations made at the Case School of Applied Science, describing apparatus used. Ill. 1500 w. Trans Am Soc of Mech Engrs, No. 896—May, 1901.

Strength.—Experiments on the Permissible Pressure on Ball Bearings (Versuche über die Zulässige Belastung von Kugeln und Kugellagern). Dr. W. Schwinning. Experiments to determine the deformation and crushing resistance of balls under the conditions of use for bearings. 3000 w. Zeitschr d Ver Deutscher Ing—March 9, 1901.

Theory.—The Theory of Ball Bearings (Sur les Roulements à Billes). L. Lecornu. An examination of the formulas of Léauté and Boussinesq for computing the frictional resistance of ball bearings. 2000 w. Revue de Mécanique—May 31, 1904.

BALLISTICS.

See **ARMOR PLATE; GUN; GUNNERY; SHELL.**

BALL JOINT.

Column.—See **COLUMN—Ball Joint.**

BALLOON.

See **AERONAUTICS.**

BAND SAW.

See **SAW—Band.**

BANK.

See **BUILDING CONSTRUCTION—Bank.**

BARGE.

See also **BOAT; CANAL; COALING BARGE; COAL TRANSPORTATION; TOWBOAT.**

Coal.—See **COALING BARGE; COAL TRANSPORTATION.**

Coaling and Weighing.—See **COALING BARGE.**

Gas Power.—See **BOAT, GAS POWER.**

Ocean.—Tow Barges as General Freight Carriers. Edwin B. Sadtler. Considers sea-towing, giving a sketch of a barge suitable for handling freight of a miscellaneous character. 1500 w. Marine Engng—Feb., 1902.

See also **COAL TRANSPORTATION.**

Oil Carrying.—Barges Nos. 94 and 95, for the Standard Oil Company. Brief illustrated description of two of the largest bulk oil-carrying vessels ever built in the United States. 1100 w. Marine Engng—Aug., 1904.

Screw.—Screw Barges. From "La Vie Scientifique." Illustrates and describes an interesting arrangement devised by H. Barcroft, of Newry, England, and adopted on some of the waterways of the United Kingdom. 1000 w. Sci Am Sup—May 4, 1901.

Tow.—See **COAL TRANSPORTATION; TOWBOAT—Barge.**

Wooden.—Large Wooden Barges. Illustrated description of two big barges being built at Taunton, Mass. 700 w. Marine Engng—June, 1902.

BARKENTINE.

"Gauss."—See **STEAMSHIP.**

BAROMETER.

Aneroid.—The Construction of an Indicating or Recording Tin Plate Aneroid Barometer. N. Monroe Hopkins. Illustrates and describes the construction of a very successful aneroid barometer out of simple tin plates. 2700 w. Sci Am Sup—Oct. 1, 1904.

Coal Mining.—See **FIRE DAMP—Barometer; MINE VENTILATION.**

Périllat.—A Portable Recording Barometer (Baromèter Altimétrique Enregistreur de Poche). An illustrated description of the Périllat recording barometer, which enables a profile of the country traversed to be made. 900 w. Génie Civil—July 16, 1904.

BARRAGE.

See **DAM; RIVER IMPROVEMENT; RIVER REGULATION; WEIR.**

BARREL.

Automatic Counting.—See **COUNTING APPARATUS.**

BASALT.

See also **ROAD; ROAD MATERIALS; STONE.**

Basalt and Its Uses in Engineering Construction. An illustrated article describing this material and the uses to which it has been successfully applied. 2800 w. Quarry—April 1, 1902.

BASKET-MAKING.

The Mergentaler-Horton Basket-Making Machinery. Illustrates and describes a machine for making fruit baskets which accomplishes in an hour more than is possible for 12 skilled basket makers, and at a cost less than the wages of a single workman. A description of the three types of machines now in use. 1700 w. Sci Am—March 15, 1902.

BATH.

Austrian Salt Works.—The Bathing Arrangements at the Austrian Government Salt Works (Ueber Badeeinrichtungen bei den K. K. Salinen). Anton Schnabel. An illustrated description of the baths and washing arrangements for the workmen of the Austrian salt mines. 3 plates. 3000 w. Oesterr Wochenschr f d Oeffent Baudienst—June 28, 1902.

Brookline, Mass.—The Brookline Baths. Waldon Fawcett. A description of these public baths, the first municipal bath of its kind in the United States, with information relating to their use, cost, etc. 2000 w. Munic Engng—Oct., 1902.

Munich.—The Karl Müller Public Baths (Les Bains Publics Karl Müller). An illustrated description of handsome new public bath buildings at Munich, Bavaria. 1500 w. 1 plate. Génie Civil—July 18, 1903.

New York Public.—See **GYMNASIUM.**

Paris Exposition.—Public Baths at the Paris Exposition (Ueber Arbeiter und Volksbäder, Waschvorrichtungen und Aborte auf der Weltausstellung Paris, 1900). Anton Schnabel. Abstract of an illustrated report to the Austrian Government on public baths and washing facilities shown at the Paris Exposition, and account of a large public bath at Brussels. 3 plates. 3000 w. Oesterr Wochenschr f d Oeffent Baudienst—June 7, 1902.

Racquet Club, N. Y.—The Racquet Club Swimming Bath. Illustrated description of the details of a 15x22-ft. plunge bath with special features of waterproofing at the sides and bottom. 700 w. Eng Rec—Nov. 3, 1900.

Reichenberg, Bohemia.—The Emperor Francis Joseph Bath at Reichenberg. Illustrates and describes a public bath of strong construction and well equipped. 1000 w. Eng Rec—July 6, 1901.

BATTERY.

See **ELECTRIC CELL; GUN; NAVAL BATTERY; STORAGE BATTERY.**

BATTLESHIP.

See also **NAVY; SHIPBUILDING; WARSHIP.**

"Alabama."—Contract Trial of the United States Sea-Going Battleship "Alabama." H. Hall. Illustrated detailed description of the vessel and its equipment, with report of the trial. 6500 w. Jour Am Soc of Nav Engs—Nov., 1900.

Progressive Trials of U. S. Battleships. Report concerning the progressive trials of the "Alabama," "Massachusetts," and "Kearsage," held on the Barren Island course, in Chesapeake Bay. 4800 w. Jour Am Soc of Naval Engrs—Feb., 1902.

See also **American; "Wisconsin."**

American.—The New Battleships. Illustration, with description of the characteristic features of five powerful vessels which are to be built for the U. S. Navy. 2200 w. Naut Gaz—Nov. 22, 1900.

The New Battleship Design Controversy. Gives a sheer plan and deck plan of each design, with a diagram showing the maximum concentration of fire possible from the intermediate and secondary batteries of each vessel, with discussion of the arguments. 2200 w. Sci Am—Aug. 10, 1901.

Our Latest Design for Battleships. An illustrated description of plans recommended by the Naval Board on Construction. 1200 w. Sci Am—Nov. 30, 1901.

I. Battleships "Kearsarge" and "Kentucky." II. Alabama Class—First-Class Battleship "Wisconsin." III. Maine Class—First-Class Battleship "Maine." Illustrated detailed descriptions, with discussion of novel features. 5800 w. Sci Am—Dec. 14, 1901.

Battleship Circular. Description of a vessel for the U. S. Navy, for which bids are invited. 2000 w. Marine Rev—July 31, 1902.

Size and Character of American Battleships. George W. Melville, in "American Industries." Shows that decreasing the size of battleships is not desirable. 2400 w. Marine Rev—Sept. 3, 1903.

American Congress.—Launching a Battleship from the Congressional Ways. William M'Adoo. Traces the steps necessary before a warship may be built. 7800 w. N Am Rev—Feb., 1902.

Armament.—The Distribution of Guns in Battleships. John Leyland. A discussion of the armament of battleships, with plans of some of the latest vessels of this class. 4000 w. Page's Mag—Jan., 1903.

The Gun-Power of Battleships. A comparison of the new battleship built for the Chilian Navy with others of approximately the same size, with a view of showing the armament, the principal protection and the speed given for the displacement tonnage allowed. 2000 w. Engng—Jan. 9, 1903.

On the Offensive Powers of Recent Battleships. Sidney Graves Koon. A study and a comparison. 2500 w. Sib Jour of Engng—Feb., 1904.

See also **GUN; NAVY; WARSHIP.**

Armor.—See British; **ARMOR PLATE.**

Atlantic Speed Trial.—See "Kearsarge."

"Babenburg."—The Austrian Battleship Babenburg. Illustration and description of the last of a trio of vessels building, with comparison with modern vessels of about the same size. 1700 w. Engr, Lond—Nov. 7, 1902.

"Benedetto Brin."—The Italian First-Class Battleship "Benedetto Brin." Illustrations, tabulated particulars and comparisons, with descriptive notes. 1500 w. Engr, Lond—April 17, 1903.

"Borodino" Class.—Russian First-Class Battleships "Borodino" Class. Illustrates and describes a vessel as a type of Russia's standard battleship. 1100 w. Engr, Lond—Nov. 30, 1900.

British Armor.—The Disposition of British Battleship Armor. Editorial on the recently launched new class battleships, which are remarkable for their high speed, and for the greater distribution of their broadside armor. 2200 w. Engng—Feb. 15, 1901.

"Centurion."—H. M. S. Centurion Reconstructed. Illustration, with description of changes made. 800 w. Engr, Lond—June 19, 1903.

"Charlemagne."—French First-Class Battleship "Charlemagne." Illustration and description of this French battleship and the novel method of mounting the main battery. 1100 w. Sci Am—Nov. 16, 1901.

Chilian for British Navy.—The Chilian Battleship "Libertad." Gives the general dimensions of the vessel; its armor and armament, and illustrated description of the engines. 1100 w. Engng—Jan. 16, 1903.

The Chilian Battleship "Constitucion." Illustration with detailed descriptions of this new vessel, with a comparative table. 1700 w. Engr, Lond—Jan. 23, 1903.

The British Admiralty and Warship Design. Editorial discussion of the Libertad and Constitucion, designed for the Chilian Navy, but recently purchased by the British Admiralty. 2800 w. Engng—Dec. 11, 1903.

The Chilian Battleship "Libertad." A full illustrated description of this battleship, which was recently purchased by the British Government, including the equipment, armament and report of trials. 20500 w. Engng—Jan. 15, 1904.

The Battleships "Triumph" and "Swiftsure," late 'Libertad" and "Constitucion." Sir Edward J. Reed. Read at the Inst. of Naval Archts. Explains the steps that led to the construction of these ships, giving particulars, and describing design, armament, etc. 5000 w. Engng—March 25, 1904.

H. M. First-Class Battleship "Triumph." Engravings and description of the vessel and its equipment. 1200 w. Engr, Lond—Nov. 25, 1904. See also Armament.

Coast Defense.—See Requin; **NAVAL BATTERY.**

"Commonwealth."—H. M. S. "Commonwealth." Illustration and particulars of this first-class battleship. 1500 w. Engr, Lond—May 22, 1903.

Comparison.—Comparison of the Battleships of the World. Gives a diagram, prepared in the Bureau of Naval Intelligence for the purpose of giving a graphic representation of the comparative homogeneity of the different classes of battleships of the principal naval powers. 1000 w. Sci Am Sup—Jan. 17, 1903.

Results of a Naval Inquiry as to Which is the Most Powerful Armor-Clad Afloat. Translated from the French of J. Delaporte, in "L'Illustration." Determines the best armor-clad in each navy, then compares the types. Ill. 3500 w. Sci Am Sup—April 18, 1903.

A Brief Comparison of Recent Battleship Design. H. G. Gillmor. Compares the most recent designs of the several principal naval powers, in regard to armament, protection, speed, and coal supply. 3800 w. Soc Nav Archts & Marine Engrs, No. 7—Nov., 1901.

An Ideal Battleship for the British Fleet. Vittorio Cuniberti. Reprinted from "All the World's Fighting Ships." 2800 w. Marine Rev—June 15, 1905.

A Comparison of Recent Battleships. H. G. Gillmor. A comparison from the point of view of the designer and builder of the latest battleships of Gt. Britain, France, United States, Germany, Italy, and Japan. 3000 w. (No. 6.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

"Connecticut."—The Battleships "Connecticut" and "Louisiana." Illustrated detailed description. 2500 w. Sci Am—Aug. 23, 1902.

United States Battleships Connecticut and Louisiana. Describes and illustrates these recently authorized vessels and their equipment. 2500 w. Engr, Lond—Aug. 29, 1902.

Remarks on the New Designs of Naval Vessels. Francis T. Bowles. Remarks on time required to construct naval vessels, the size, offensive and defensive power, with comparisons. Also particulars of U. S. battleships Nos. 18 & 19, Connecticut and Louisiana. 2 plates. 2500 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 11—Nov., 1902.

Launch of Battleships "Connecticut" and "Louisiana." Illustrations, with brief descriptions and information of interest. 700 w. Marine Engng—Oct., 1904.

The Launching of the United States Battleship "Connecticut." Illustrated description of this vessel and her equipment, with details of the contest between the work in the government navy yard and on a sister ship in a private shipbuilding establishment. 3700 w. Ir Age—Oct. 6, 1904.

A Government-Built Battleship. Illustration of the "Connecticut," now under construction at the Brooklyn navy yard, with a report of the creditable work, and the influence on private shipyards. 1000 w. Sci Am—Sept. 23, 1905.
See also "Louisiana;" **LAUNCHING.**

Conning Tower.—See **CONNING TOWER.**

"Constitucion."—See **Chilian for British Navy.**

"Courbet."—The French Reconstructed Battleship "Courbet." Illustrated description of the modifications introduced in the vessel and armament. 350 w. Engr, Lond—April 11, 1902.

Design.—The Tendency of Battleship Design. Discusses recent changes and the characteristics of a proposed battleship to meet present conditions. 1600 w. Engr, Lond—June 10, 1904.

"Deutschland."—The Battleship "Deutschland." Describes this first ship of a new class, commenting on the improvements introduced. 2000 w. Engr, Lond—Nov. 25, 1904.

Docking.—The Docking of Battleships. M. Asaoka. Paper read at meeting of the Soc. of Nav. Archts. of Japan. Gives an outline description of the different operations. Interesting because of the comparison possible between Japanese and English methods. 2000 w. Engng—June 13, 1902.

"Dominion."—Steam Trials of H. M. S. "Dominion." Illustrations, description and report of trials. 1400 w. Engng—Nov. 4, 1904.

The Latest British Battleship. Illustrated description of the first-class battleship Dominion. 1200 w. Naut Gaz—Dec. 15, 1904.

Electric Equipment.—See **ELECTRIC EQUIPMENT—Battleship; Navy.**

Future.—Louis Nixon on the Battleship of the Future. Extracts from a recent article concerning the things that may affect the types of battleships. 2500 w. Marine Rev—June 19, 1902.

The Battleships of the Future. Lewis Nixon. Discusses probable changes, the influence of the submarine boat, &c. 2700 w. World's Work—Jan., 1903.

"Georgia."—The New Battleships. Illustration, with description of ships to carry superposed turrets, bearing the names "Georgia," "New Jersey," and "Pennsylvania." 1800 w. Sci Am—Nov. 17, 1900.

Gun Distribution.—See **Armament.**

"Hindustan."—H. M. S. Hindustan. Illustration, with description of vessel and equipment. 1000 w. Engr, Lond—Jan. 1, 1904.

Hovgaard Paper.—The Sea-Going Battleship. Commander William Hovgaard. An attempt on basis of general principles, to arrive at the type and size of warship best suited to secure command of the ocean. Ills. 11000 w. Soc Naval Archts & Marine Engrs, No. 3—Nov., 1904.

"Idaho."—See **"Mississippi."**

"Illinois."—Contract Trial of the United States Sea-Going Battleship "Illinois." James M. Pickrell. Illustrated detailed description of the vessel and its equipment with report of trial. 7200 w. Jour Am Soc of Nav Engrs—Aug., 1901.

"Kaiser Friedrich III.," Grounding.—The Grounding of the German Battleship "Kaiser Friederich III." Translated from "Marine Rundschau." An account of the circumstances attending the grounding of this vessel on the 2nd of April, 1901, causing considerable damage, and the lessons taught by the accident. Ill. 5300 w. Jour Am Soc of Nav Engrs—Aug., 1901.

"Kashima."—A New Japanese Battleship. Particulars of a vessel now building at Elswick Shipyard for the Imperial Japanese Navy. Ills. 3800 w. Engr, Lond—April 8, 1904.

The First-Class Japanese Battleship Kashima. Gives eight pictures, showing the different stages of progress in the building of the ship, with information in regard to it. 2000 w. Engr, Lond—March 24, 1905.

"Katori."—The Japanese Battleship "Katori." Gives a description of this vessel, being built in England, and of its equipment. 1500 w. Engng—June 30, 1905.

"Kearsarge."—Remarkable Run of the Kearsarge Across the Atlantic. An account of the run of the U. S. battleship "Kearsarge" from Portsmouth, Eng., to the coast of Maine, covering 2,885 nautical miles in 219 hours, 30 minutes. Ill. 1100 w. Marine Engng—Sept., 1903.
See also "Alabama;" American.

"Kentucky."—See American.

"King Edward VII."—The New English Battleship Type "King Edward VII." From "Illustrirte Zeitung." Illustrated description of a new type of warship, and its equipment. 800 w. Sci Am Sup—March 15, 1902.

H. M. S. King Edward VII. Illustration, with brief description. 800 w. Engr, Lond—Nov. 4, 1904.

See also "Queen."

"Knias Potemkin Tavritschesky."—Russian Battleship Knias Potemkin Tavritschesky. Illustrated description of the vessel and its armament. 1400 w. Engr, Lond—Nov. 29, 1901.

"Libertad."—See Chilian for British Navy.

"Louisiana."—The Latest Battleship for the United States Navy. Illustration, with brief description of the design of the "Louisiana" class. 900 w. Sci Am—Oct. 17, 1903.
See also "Connecticut."

"Maine."—U. S. Battleship "Maine." D. S. Mahony. Illustration with detailed description of the vessel and its equipment, and report of trial. 5000 w. Jour Am Soc of Nav Engrs—Nov., 1902.

The Preliminary Official Trial of the U. S. Battleship "Maine." J. W. Powell. A description of the vessel with report of tests. Illustrated by 12 plates. 3500 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 4—Nov., 1902.
See also American; "Missouri."

"Maine" vs. "Wettin."—A Comparison of the German Battleship "Wettin" with the "Maine." Fred T. Jane. Illustrates the two designs and gives tabulated details with notes. 2000 w. Sci Am—June 13, 1903.

"Massachusetts."—See "Alabama."

"Messoudieh."—The Reconstruction of the Turkish Battleship "Messoudieh." Illustrates and describes interesting work being carried out at Genoa. 600 w. Engng—Oct. 11, 1901.

The Reconstructed Turkish Battleship "Messoudieh." Illustration and brief description of an old battleship converted into an armored cruiser. 500 w. Engr, Lond—Jan. 16, 1903.

"Mikasa."—The Japanese Battleship "Mikasa." An illustrated description of this recently launched vessel. 1400 w. Engng—Nov. 16, 1900.

The Japanese Battleship "Mikasa." Illustration, with plan and section, and full description. 2200 w. Engr, Lond—Jan. 10, 1902.

Japanese Battleship "Mikasa." An outline of the six battleships built in England for the Japanese Government, with full description of the latest. Ill. 3700 w. Engng—Feb. 7, 1902.

"Mississippi."—New 13,000-Ton Battleships "Mississippi" and "Idaho," Nos. 23 and 24. W. F. Sicard. Compares some of the principal characteristics of these vessels with the "Kearsarge" and "Alabama," and gives a detailed description. 4000 w. Jour Am Soc of Nav Engrs—Feb., 1904.

Latest Battleships "Mississippi" and "Idaho." W. F. Sicard. Information concerning two new battleships to be built for the United States. Ills. 2200 w. Marine Rev—March 10, 1904.

"Missouri."—The Launch of the Battleship "Missouri." Illustrated description of this vessel, the last of the three of the "Maine" class, launched Dec. 28, 1901. 1200 w. Sci Am—Jan. 11, 1902.

U. S. Battleship "Missouri." Lieut.-Com. F. C. Bieg. Description of the vessel, giving report of official trial performance, and illustrations of boiler. 7500 w. Jour Am Soc of Nav Engrs—Nov., 1903.

Modernizing.—Modernizing Ironclads. S. Eardley-Wilmot. Discusses what is to be done with out-of-date ships of this class. 1800 w. Engr, Lond—Aug. 2, 1901.

Modernizing Battleships. S. Eardley-Wilmot. Discusses the reconstruction of these vessels, alluding to the practice of France, and Austria, and the course that should be taken by England. 2000 w. Naut Gaz—Aug. 22, 1901.

See also "Centurion;" "Requin;" **SHIPBUILDING—Reconstruction.**

"Nebraska."—Laying the Keel of the New Battleship "Nebraska" at the Works of Moran Bros.' Company, Seattle, Wash., July 4, 1902. An illustrated article more particularly describing the plant where this vessel is under construction. 1500 w. Sci Am Sup—Aug. 30, 1902.

Launching of the United States Battleship "Nebraska." An illustrated article giving information of the launch and particulars relating to the vessel. 2000 w. Marine Engng—June, 1905.

"New Jersey."—See **"Georgia.'**

"Ohio."—Launch of the Battleship "Ohio." An illustrated description of the vessel, with some account of the yards in which it was built. 1800 w. Sci Am—June 8, 1901.

The Great Battleship "Ohio." Illustration and brief description and history of other U. S. naval vessels bearing same name. 1200 w. Marine Rev—Aug. 18, 1904.

U. S. Battleship "Ohio." Lieut. J. F. Babcock. Illustrated description of the vessel, with report of official trial performance. 10700 w. Jour Am Soc of Nav Engrs—Nov., 1904.

"Oregon."—Repairs to the Battleship "Oregon" at the Puget Sound Navy Yard. Illustrates and describes the method of making of extensive repairs to the keel and bottom of this heavy vessel, which was damaged by striking an uncharted rock in Chinese waters. 2000 w. Eng News—March 13, 1902.

The Work of the Oregon During the Spanish-American War. Lieut. C. N. Offley. Reviews the work done below the protective deck during the journey of 14,000 miles, showing the importance of maintaining the motive machinery of battleships in the highest state of efficiency. 7000 w. Jour Am Soc of Nav Engrs—Nov., 1903.

"Pobieda."—The Russian Battleship "Pobieda." Compares this vessel with some other ships of her displacement, giving the principal details of the vessel, and remarks on the class to which she really belongs. Ill. 1800 w. Engr, Lond—Feb. 28, 1902.

"Prince of Wales."—See **"Queen."**

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Our New Battleships. Editorial on the new British battleships "Queen," "Prince of Wales" and "King Edward VII." 1700 w. Engng—March 7, 1902.

Rapid Building.—See **SHIPBUILDING—Battleships.**

"Regina Margherita."—Machinery of the Italian Battleship "Regina Margherita." Describes the machinery of an Italian warship which has just satisfactorily completed her official contract steam trials. Ills. 2000 w. Marine Rev—Sept. 15, 1904.

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"Requin."—The French Coast Defense Battleship "Requin." An illustrated description of this reconstructed battleship which has been brought well up to date in construction and equipment. 800 w. Engr, Lond—March 21, 1902.

"Retvizan."—Trial of Great Battleships. An account of the trial of the "Retvizan," built for the Russian government. The builder's tests made in the Atlantic, off Delaware capes. 1200 w. Naut. Gaz—Sept. 19, 1901.

"Russell."—The New Battleship "Russell." Describes one of the largest battleships of the British navy recently launched; the first of six, known as the Duncan class, which are also the fastest battleships of the navy. 2600 w. Engng—Feb. 22, 1901.

Russian Baltic.—Some Vessels of the Russian Baltic Fleet. Engravings of seven of the vessels belonging to this fleet, noting their leading features, and giving brief descriptions. 350 w. Engr, Lond—Jan. 20, 1905.

"Suffren."—The New French Battleship "Suffren." Illustrations with description. 1000 w. Engr, Lond—May 9, 1902.

"Swiftsure."—See **Chilian for British Navy.**

13,000-Ton.—The 13,000-Ton Battleship Problem. Gives extracts from a letter by Admiral Bradford, protesting against the adoption of the plans submitted by the Board of Construction. Also Admiral Melville's indorsement of the protest. 2200 w. Ir Age—July 30, 1903.

"Triumph."—See **Chilian for British Navy.**

Turret.—See **TURRET—Battleship.**

United States.—See **American.**

"Virginia."—The United States Battleship "Virginia." Illustrations, plans and detailed descriptions of this recently launched vessel. 3000 w. Marine Engng—June, 1904.

U. S. Battleship "Virginia." C. A. Gardiner. Description of the vessel, armament, machinery, &c. 5500 w. Jour Am Soc of Nav Engrs—Nov., 1905.

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"Wettin" vs. "Maine."—See **"Maine" vs. "Wettin."**

"Wisconsin."—Contract Trial of the United States Battleship "Wisconsin." J. K. Robison. Illustration and description of the vessel and its equipment, with full report of the official trial. 2400 w. Jour Am Soc of Nav Engs—Nov., 1900.

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See also **American.**

"Wittelsbach."—German Battleship "Wittelsbach." Criticism of the German type, and particulars of the vessel named. Ill. 1800 w. Engr, Lond—Dec. 28, 1900.

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BAUXITE.

See also **ALUMINA; ALUMINUM—Bauxite.**

Arkansas.—Bauxite in Arkansas. W. F. B. Berger. Illustrates and describes the deposits, with information concerning the uses of this mineral. 1200 w. Eng & Min Jour—April 14, 1904.

Colorado and Wyoming.—The Occurrence of Bauxite in Colorado and Wyoming and Its Utilization. J. Ohly. Information concerning these valuable deposits. Serial. 1st part. 1100 w. Min Rept—Sept. 12, 1901.

Georgia.—Bauxite Mining in Georgia. A. W. Evans. Description of methods employed in mining, washing and drying the ores. Also analyses of Georgia and French ores. 1700 w. Mines & Min—June, 1902.

New South Wales.—Bauxite in New South Wales. A report of the known deposits with analysis. 350 w. U. S. Cons Repts, No. 1100—July 30, 1901.

BEACON.

See **LIGHTHOUSE.**

BEAM.

See also **BRIDGE DESIGN; CONCRETE REINFORCED; FIREPROOF CONSTRUCTION; GIRDER; MATERIALS' STRENGTH; TESTING.**

Bending Machine.—See **BENDING MACHINE.**

Bending Tests.—See **TESTING—Beams.**

Cantilever.—Kinematic-Statical Treatment of Cantilever Beams (Kinematisch-Statische Untersuchung eines Balkonträgers). G. Ramisch. A mathematical investigation of the forces acting upon projecting and cantiliver beams. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 11, 1904.

Cantilever, Semicircular.—See **Curved Balcony.**

Concrete and Mortar.—See **CONCRETE—Beams.**

Concrete Reinforced.—See **CONCRETE REINFORCED—Beam; Beam Strength.**

Concrete Reinforced vs. Steel I.—See **CONCRETE REINFORCED—Steel Construction Compared.**

Curved Balcony.—The Theory of the Semi-circular Cantilever (Zur Theorie der Halbringförmigen Balkontrager). Johann Stutz. A mathematical analysis of the forces in a projecting beam for the support of a semi-circular balcony. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 2, 1904.

The Computations for a Half-Ring Balcony (Berechnung Halbringförmiger Balkonträger). Dr. Leopold Pfeffer. A graphical and analytical examination of the stresses in a projecting balcony of semi-circular or semi-elliptical form. 5000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Nov. 26, 1904.

Semicircular Symmetrically Loaded Balcony Beams (Der Halbkreisförmige und Symmetrisch Belastete Balkonträger). G. Ramisch. A mathematical treatment of the forces acting upon a semi-circular beam with ends built into a wall, forming a balcony. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—April 7, 1905.

The Theory of Laterally Curved Beams (Zur Theorie der Seitlich Gekrümmten Träger). A mathematical study of the forces acting upon curbed beams such as are employed in balconies and similar structures. 2500 w. Deutsche Bauzeitung—July 26, 1905.

See also **BRIDGE DESIGN.**

Deep-Section.—Deep-Section Rolled Beams. An illustrated description of rolled steel I girders for structural work, made at the Differdange Steel Works in a newly invented mill which permits the production of I beams as much as 29 1-2 in. deep by 12 in. wide. 900 w. Engr, Lond—Feb. 27, 1903.

Deflection.—See **Flexure.**

Design.—Diagrams for Laying Out Beams of Uniform Strength. E. Kallberg. Gives diagrams of special use in the design of stakes for steam and hydraulic riveting machines, with directions for the method of using. 500 w. Am Mach—Feb. 21, 1901.

Elastic Resistance.—See **MATERIALS' STRENGTH.**

Flexure.—Experiments on the Flexure of Beams—Discovery of New Laws. Albert E. Guy. Describes experiments undertaken by the writer in which he discovered some laws which had escaped investigation. Serial. 1st part. 2500 w. Am Mach—Dec. 12, 1901.

The Deflection of Beams by Graphics. Willibald Trinks. An argument for the design of machinery on the basis of deflection permissible rather than strength, and for the use of graphical methods for determining the amount of deflection. 4800 w. Trans Am Soc of Mech Engrs, No. 0961—Dec., 1902.

The Deflection of Beams when Unsymmetrically Loaded. P. P. Bredsten. Gives a time-saving diagram with brief explanation of its use. 200 w. Am Mach—April 30, 1903.

The Flexure of Beams. An account of experiments given in a recent work by Albert E. Guy. 3500 w. Builder—Aug. 29, 1903.

Flexure of Long Beams. H. Reissner. A criticism of a paper by Albert E. Guy, with a reply from Mr. Guy. 2000 w. Am Mach—March 10, 1904.

See also **BENDING MACHINE.**

Least Work Principle.—Some Applications of the Principles of Least Work. (Einige Anwendungen des Satzes der Kleinsten Formänderungsarbeit). Charles Abeles. A mathematical investigation of the distribution of stresses for various loadings of beams. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 30, 1903.

Loading.—See **BRIDGE DESIGN.**

Moment of Inertia.—See **Variable Moments of Inertia; MOMENT OF INERTIA.**

Shearing.—Shearing Forces Due to a Uniform Advancing Load on Beams and Braced Girders. Prof. W. E. Lilly. A solution of the maximum shearing stresses in the bracing of girders under a uniform advancing load equal in length to the span. 500 w. Engng—Nov. 10, 1905.

Siegwart.—See **CONCRETE REINFORCED.**

Stresses.—See **Least Work Principle; CONCRETE REINFORCED—Beam Stresses.**

Submerged.—Bending Moments on Beams Partially or Wholly Submerged. Fred. W. Honens. Gives the solutions for the maximum bending moments on beams which are inclined to the horizontal plane and which are either wholly or partly submerged. 1500 w. Technograph, No. 16—1901-2.

T-Shaped.—See **CONCRETE REINFORCED—Beam.**

Variable Moments of Inertia.—Deflections of Beams with Variable Moments of Inertia. C. W. Hudson. Gives a general method for determining the deflections of solid-webbed girders under flexure, illustrating its application to the forms of girders most frequently met in practical bridge construction. 3800 w. Pro Am Soc of Civ Engrs—March, 1903.

Deflections of Beams with Variable Moments of Inertia. Discussion of paper on this subject by C. W. Hudson, continued from May, 1903. 3800 w. Pro Am Soc of Civ Engrs—Aug., 1903.

BEARING.

See also **ALLOY; BALL BEARING; CAR BEARING; FRICTION; LUBRICATION; ROLLER BEARING.**

Bearings. A Topical discussion. 3800 w. Pro Engrs' Soc of W Penn—Dec., 1905.

Anti-Friction.—Anti-Friction Bearings. Illustrated examples of devices for reducing frictional resistances. 4200 w. Mach, N. Y.—June, 1901.

Anti-Friction Bearings. Henry R. Lordly. Gives facts relating to this subject obtained in an investigation lasting nearly one year. Ill. 5200 w. Trans Assn of Civ Engrs of Cornell Univ—1902. See also **ALLOY.**

Automobile Adjustable. See **AUTOMOBILE—Bearings.**

Ball.—See **AUTOMOBILE—Bearing; BALL BEARINGS.**

Bridge.—See **BRIDGE BEARING.**

Car.—See **High-Speed; CAR BEARING.**

Casting.—See **CASTING—Journal Bearing.**

Crank Shaft.—See **Engine Shaft.**

Electric Resistance.—The Electrical Resistance of Bearings. A. E. Kennelly and C. A. Adams. Gives results of experimental study of this subject. 800 w. Elec Wld & Engr—Feb. 7, 1903.

Engine Shaft—The Determination of the Length of a Crank Shaft Bearing (Die Bestimmung der Länge eines Kurbellagers). Prof. O. Grove. An examination of the distribution of pressures upon the main bearing adjacent to an engine crank. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 19, 1904.

Engine-Shaft Bearings. William Turner. Abstract of a paper read before the Manchester Assn. of Engrs. A criticism of views advanced in a paper by "A Naval Engineer," with discussion of the proper adjustment of bearings, and related subjects. Serial 1st part. 2500 w. Mech Engr—Dec. 3, 1904.

Adjustment and Alloys for Engine Shaft Bearings. William Turner. Abstract of a paper read before the Manchester (Eng.) Assn. of Engrs. 1800 w. Engr, U. S. A.—March 15, 1905.

Friction.—See **High-Speed; FRICTION; LUBRICATION.**

Glass.—Glass Bearings and Modern Machinery. An illustrated outline of the process of making these bearings for both experimental and practical purposes. 1200 w. Mod Mach—Jan., 1905.

High Speed.—Friction in High Speed Bearings (Die Reibungsverhältnisse in Lagern mit Hoher Umfangsgeschwindigkeit). O. Lasche. A review of early and recent experiments, with data and results of tests at the A. E. G., confirming the investigations of Beauchamp Tower. Serial. Part I. 4500 w. Zeitschr d Ver Detuscher Ing—Dec. 13, 1902.

On Bearings for High Speeds. O. Lasche. A translation of a paper in the "Zeitschrift des Vereines Deutscher" Ingenieure, giving the results of experiments on journal bearings made by the Allgemeine Elektricitäts-Gesellschaft, Berlin. 20,000 w. 8 plates. Trac & Trans—Jan., 1903.

Link Belt.—Experimental Determination of the Relative Value of Short Bearings. Reports some experiments made by H. E. Hayward for the Link Belt Engng Co., which show that, under the conditions of chain links, the usual assumption that the value of a bearing increases with its length is not correct. Ills. 1000 w. Am Mach—Vol. 28, No. 52.

Lubrication.—The Lubrication and Formation of Surfaces for Bearings. John Dewrance. An illustrated article dealing with lubrication, reciprocating bearings, bearing surfaces, &c. 3000 w. Mech Engr—March 22, 1902.

See also **LUBRICATION.**

Marine Engines.—The Bearings of Naval Engines. Suggestions, based on experience. on the lubrications, adjustment, etc. 1800 w. Engr, Lond Oct. 16, 1903.

Microstructure.—The Microstructure and Frictional Characteristics in Bearing Metals. Melvin Price. A record of investigations carried out in the laboratories of Columbia University. Considers the law of variation of the amount of friction with the velocity of sliding, and the theories of Charpy and Prof. Goodman. Ills. 10000 w. Trans Am Soc of Mech Engrs, No. 1088—June, 1905.

See also **ALLOY—Bearings; METALLOGRAPHY.**

Propeller Shaft.—Improvements in Propeller Shaft Bearings. A Scott Younger. Read before the British Inst of Nav Archts. A record of some experiments made and the results, with a description of some improvements. Ill. 800 w. Naut Gaz—June 18, 1903.

Radial Machine.—Radial Machine Bearings. J. Richards. An illustrated article discussing the influence of design upon their wearing qualities. 1500 w. Mach, N. Y.—Dec., 1901.

Roller.—See **ROLLER BEARINGS.**

Tests.—Transmission Bearings with Automatic Lubrication (Transmissionslager mit Selbsttätiger Schmierung). R. Kablitz. With descriptions of various forms of bearings, pillow blocks, and hangers; also data and results of efficiency tests. 3000 w. Zeitschr d Ver Deutscher Ing—Dec. 6, 1902.

BEET SUGAR.

See **SUGAR.**

BELL.

Hanging, Toronto.—Method of Hoisting a Set of Large Bells. E. J. Lennox. A description of method of hoisting the large bells to the tower of the new city buildings in Toronto, Can. Ill. 800 w. Can Archt—Nov., 1900.

BELT.

Testing Machine.—See **TESTING MACHINE—Belt and Pulley.**

BELTING.

See also **POWER TRANSMISSION; PULLEY; ROPE TRANSMISSION; SHAFTING.**

Power Transmission by Belts. Forrest R. Jones. Illustrated discussion of the different methods of making belt connections, and the advantage of a large angle of wrap and high speed, as compared with a smal angle of wrap and low speed. Serial. 1st part. 3500 w. Mach, N. Y.—July, 1901.

Belting for Power Transmission (Organes de la Transmission: Notes sur la Courroie). L. Tourneux. A discussion of belts and belting for the transmission of motion and power, with table of best speeds and horse-power. 2500 w. Revue Technique—May 10, 1902.

Belting. W. D. Spooner. Considers the essentials of a good belt, the materials used, the placing in position and other points. 2800 w. Engr, U S A—Feb. 16, 1903.

Hints on Leather Belting. W. H. Kritzer. Gives suggestions for arrangement and location of belts, and rules for finding length of belt needed, horse-power, speed, and width. Ill. 1200 w. Min & Sci Pr—April 25, 1903.

Practical Belt Driving. John Tullis. Abstract of a paper read before the Aberdeen Mech. Soc. Discusses points of importance in belt driving, the power transmitted, slipping, compounding, high speed, kinds of belts, jointing, dressing, etc. 5800 w. Mech Engr—July 11, 1903.

Belts and Belt Driving (Ueber Riemen und Riementriebe). Fritz Krull. With tables of power transmitted, and illustrations of methods of driving. The construction and care of belts are discussed. Two articles. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 3, 10, 1905.

Notes on Belt and Rope Drives. James Stormouth. Suggestions for efficient driving. 2200 Engr, Lond—Dec. 22, 1905.

Calculation.—Belt Problems. Shows how to overcome the difficulties met in making calculations where belts are employed. 2500 w. Prac Engr—June 27, 1902.

A New Rule for Belt Calculations. States rule, illustrating by examples. 2400 w. Elec Engr, Lond—July, 1904.

See also **Diagram.**

Care.—The Care and Management of Leather Belts. Walter E. Dixon. On the selection, care and management of belts. 2000 w. Power—May, 1904.

Chart.—See **Diagram.**

Creep.—See **Slip.**

Diagram.—A Diagram for the Solution of Problems in Belting. Frank A. Kleinhans. Diagram is given and applications shown. 350 w. Am Mach—July 10, 1902.

Belting and Pulley Chart. A. G. Holman. Gives the chart and rules explaining its use. 1200 w. Power—April, 1903.
See also **Length; Power; Width.**

Dynamo Driving.—Belt-Drives for Dynamos. W. H. Wakeman On the location of belts, illustrating defective arrangements and showing where improvements could be made. 1900 w Engr, U S A—Aug. 15, 1902.

Electric Analogy.—See **ELECTRIC TRANSMISSION—Belt Drive Analogy.**

Factory.—See **BELTING FACTORY.**

High-Speed.—High-Speed Belt Transmission. A report of statements by C. O. Gehrckens on experiments with very high speed belts, claimed to disprove the theories of Rankine and others on this subject. 1600 w. Eng Rec—March 30, 1901.

The Efficiency of High Speed Belts (Die Arbeitsleistung Schnellaufender Riemen). Dr. H. Abbes. An examination of the influence of speed on belt efficiency with a view of determining the best belt speed. 1800 w. Zeitschr d Ver Deutscher Ing—Nov. 16, 1901.

Belt Speeds and Journal Pressures. Letter from Forrest R. Jones on the common assumption that high speed belts result in increased pressure and friction at the journal bearings. 800 w. Eng Rec—March 15, 1902.

High Speed for Shafting and Belting. Charles A. Hague. Describes a large system of transmission, where unusually high belt speeds are employed. 2400 w. Eng Rec—April 19, 1902.

History.—Belt-Driving. Its History and Advantages. John Tullis. Read before the West of Scotland Tech. Col. Sci Soc. Reviews the history, and gives information concerning the care and management of the belts, and various systems of driving. Ill. 3500 w. Am Mfr—Jan. 31, 1901.

Horse Power.—See **Power.**

Length.—Estimating Length of Driving Belts. Gives a graphical method and chart, either of which can be applied to the solution of these problems, with a formula for the length of crossed belts. 1200 w. Am Mach—Dec. 18, 1902.

Manufacture.—See **BELTING FACTORY.**

Power.—Horse Power Transmitted by Belts and Gears, and Diagrams for Obtaining Belt Dimensions. Robert A. Bruce. Gives a diagram for showing graphically the relations which exist between the horse power, the linear speed, and the effective tension or pressure on teeth, in the case of belt or gear transmissions, with directions for the use of the diagram. Serial. 1st part. 1800 w. Prac Engr—Nov. 29, 1901.

Horse-Power of Belting and Pulleys. E. O. De Wolfe. Diagram with explanation of its use. 2200 w. Power—March, 1902.

Power Transmission by Leather Belting (Transmissions par Courroies en Cuir). M. Gruffe. A mathematical analysis, with graphical diagrams enabling the capacity for various speeds and tensions to be seen. 1800 w. Revue Technique—Dec. 25, 1902.

Horse-Power of Belting. N. A. Carle. Diagram for computing the horse-power, with explanation of its use. 700 w. Power—June, 1905.
See also **Slack.**

Pulley.—See **Three Pulleys; PULLEY.**

Right Angle.—See **Three Pulleys.**

Rubber.—Hints on Rubber Belting. W. H. Kritzer. Suggestions for the selection, care, and running of these belts. 700 w. Min & Sci Pr—May 30, 1903.

Safe Management.—The Safe Management of Belts. An illustrated article giving hints based on a pamphlet issued by the "Association des Industriels de France contre les Accidents du Travail." 2500 w. Quarry—March 1, 1902.
See also **BELT SHIFTER; SAFETY APPLIANCE.**

Slack.—Greater Power for Belt-Driven Plants. Frank Jordan. Claims that "the slacker the belt, the greater the power transmittable.' 1800 w. Prac Engr—May 5, 1905.

Slip.—The Slip of Belts. J. Stormonth. A consideration of this subject, showing how slip or creep takes place, and the benefit of pulleys, large in diameter, for belt driving. 2700 w. Engr, Lond—April 3, 1903.

Belt Creep. William W. Bird. Gives a report of investigations of the minimum amount of slip of a belt in transmitting power, concluding that for the common leather belt running under ordinary conditions the creep should not exceed one per cent. 1000 w. Ills. Trans Am Soc of Mech Engrs, No. 073—June, 1905.

Splicing.—Splicing Leather Belts. W. E. Dixon. Describes the best and most convenient method of repairing and splicing belts of all ordinary kinds. Ill. 3200 w. Power—Sept., 1904.

Stitching Machine.—See **STITCHING MACHINE.**

Testing Machine.—See **TESTING MACHINE—Belt and Pulley.**

Tests.—See **LEATHER.**

Three Pulleys.—Belt Drive for Three Pulleys. Forrest R. Jones. Calculations where two pulleys are driven with a single belt by a third pulley. 2000 w. Mach, N. Y.—March, 1901.

Belt Drive for Shafts at Right Angles. Forrest R. Jones. Illustrates and describes a graphical method of laying out a reversible, three-pulley drive. 4400 w. Mach, N Y—June, 1902.

Tightening Pulley.—See **PULLEY.**

Width.—Rules Governing the Width of Leather Belting. J. J. Flather. A discussion of the considerations which determine the size of belts, with information relating to strength, care, cost, etc. 3500 w. Engs' Year Bk, Univ of Minn.—1901.

Graphical Diagrams for Determining Belt Widths (Graphische Tabelle zur Bestimmung der Riemenbreite). Prof. Rudolf Escher. Deriving curves which enable the power transmitted by belts to be determined by inspection, for various speeds and pulley diameters. 1200 w. Schweizerische Bauzeitung—March 19, 1904.

BELTING FACTORY.

Ladew.—The Edward R. Ladew Leather Belting Factory. Brief, illustrated description of this factory at Glen Cove, L. I., and the methods of manufacture. 1400 w. Am Mach—Vol. 27. No. 51

Schieren.—The New Belting Factory of Charles A. Schieren & Company. Describes the details in the manufacture of belts, and gives an illustrated description of this New York factory. 1200 w. Am Mach—Vol. 28, No. 29.

BELT SHIFTER.

See also **BELTING—Safe Management; SAFETY APPLIANCE.**

New Belt Shifters (Nouveaux Monte-Courroies Fixes pour Transmissions). Henry Mamy. A well illustrated description of apparatus for placing belts on pulleys in motion, without danger to workmen. 700 w. Génie Civil—Feb. 15, 1902.

BENDING.

See **DIE.**

BENDING MACHINE.

Beam.—Beam Bending Machine. E. O. Thulin. An illustrated description of a machine used in the construction of small cars, but applicable to other uses. 700 w. Am Mach—Oct. 23, 1902.

BENZINE.

Decomposition.—The Decomposition of Benzine at High Temperatures. G. W. McKee. Read before the Canadian Sec. of the Soc. of Chem. Ind. An account of experiments made to obtain light on the effect of transition temperatures. 1000 w. Gas Wld—May 21, 1904.

BENZINE LOCOMOTIVE.

Mine.—See **Oberursel; Otto; ELECTRIC LOCOMOTIVE.**

Oberursel.—The Work of the Oberursel Benzine Locomotive at the Karawanka Tunnel (Die Oberurseler Spiritus-Benzin-Lokomotive beim Bau des Karawankentunnels). An illustrated account of the use of locomotives using benzine motors, as applied to contractors' work on the Karawanka tunnel in the Tyrol. 1800 w. Glasers Annalen—April 1, 1905.

Otto.—Benzine Locomotives for Gaseous Mines Benzinlocomotive für Schlagwettergruben). L. Volf. Describing a convenient form of mine locomotive operated by an Otto benzine motor for use in localities in which electric sparking might be dangerous. 2000 w. 1 plate. Oesterr Zeitscher f Berg u Hüttenwesen—Oct. 4, 1902.

BENZINE MOTOR.

Tests.—See **ALCOHOL MOTOR.**

BENZOL.

See also **GAS MANUFACTURE—Benzol; LIQUID FUEL.**

Composition, Examination, and Application of Benzols. Dr. F. Frank, in "Chemische Industrie." Abstract from the "Journal of the Society of Chemical Industry." Explains methods of testing commercial benzols. 1500 w. Jour Gas Lgt—Aug. 6, 1901.

Commercial Benzol. Dr. Fritz Frank. Abstract translation from "Die Chemische Industrie." Reviews its history, describes methods of testing, and enumerates its uses. 3000 w. Gas Wld—Feb. 1, 1902.

BESSEMER PROCESS.

See also **STEEL METALLURGY; STEEL WORKS.**

Bessemer Steel, Basic and Acid Process, with Analysis and Physical Tests. Robert H. Probert. Read at meeting of Ohio Soc. of Mech., Elec., and Steam Engrs. Discusses the manufacture of Bessemer steel. 4000 w. Engr, U S A—March 16, 1903.

The Synthesis of Bessemer Steel. F. J. R. Carulla. A discussion of the value of the Bessemer process, urging its restoration to the confidence it deserves. 4400 w. Eng News—July 7, 1904.

Baby.—See **Small Converters; FOUNDRY—Gruson.**

Barrow-in-Furness.—See **STEEL WORKS.**

History.—The Genesis of the Bessemer Process. From Sir Henry Bessemer's recently published autobiography. An account of the writer's researches. Ills. 4500 w. Ir & St Mag—Dec., 1905.

Mixer Patent.—See **STEEL METALLURGY.**

Small Converters.—The Value of the Small Bessemer Plant in the Machine Works (Die Bedeutung der Kleinbessemerei für die Eisenhüttenindustrie und den Maschinenbau). Hans van Gendt. A discussion of the extent to which a small Bessemer converter may be economically employed in the ordinary foundry. 3000 w. Stahl u Eisen—Dec. 15, 1905.

See also **STEEL CASTING.**

Spectra of Flames.—An Investigation of the Spectra of Flames at Different Periods During the Basic Bessemer Blow. W. N. Hartley and Hugh Ramage. Abstract of a paper read before the Glasgow Congress. Gives description of the blow and over-blow, the spectrum of the over-blow, and conclusions. 4500 w. Ir & Coal Trds Rev—Sept. 6, 1901.

BEVEL GEAR.

See **GEAR—Bevel.**

BEVELING MACHINE.

Beveling Machine. Illustrates and describes a machine for use by shipbuilders. 1400 w. Engr, Lond—March 14, 1902.

BIBLIOGRAPHY.

See also **INDEX; WORKS MANAGEMENT.**

Industrial Bibliography (La Bibliographie Industrielle). Jules Garcon. An article calling attention to the necessity for indexes, dictionaries and bibliographies in industrial and scientific work, with a notice of some of the technical catalogues and dictionaries. 4000 w. Bull Soc d'Encour—March, 1901.

BICYCLE.

See also **AUTOMOBILE EXHIBITION; MOTOR CYCLE.**

Gear.—Bicycle Differential Gears. From "La Nature." Illustrated description of various systems. 1800 w. Sci Am Sup—Dec. 21, 1901.

A Change Speed Gear for Bicycles (Rapport sur le Changement de Vitesse pour Bicyclette). M. Dilligeon. An illustrated description of J. M. Roullot's change-speed gear for bicycles, in which different sized spur gears on the crank axle are made to engage with teeth on the interior of the sprocket wheel. 600 w. Bull Soc d'Encouragement—March 31, 1903.

The Columbia Bicycle Two-Speed Gear. Illustrated description of a combined free-wheel, brake and speed-changing mechanism. 1700 w. Mach, N Y.—June, 1904.

See also **VARIABLE SPEED.**

Gears and Brakes.—Bicycle Construction (Les Bicyclettes). C. Bourlet. The first of a series discussing "free' wheels, brakes and variable speed gears for bicycles. Serial. Part I. 1500 w. Génie Civil—Sept. 7, 1901.

Motor.—See **MOTOR CYCLE.**

Operation.—The Resistance and Efficiency of Bicycles on Roads (Das Fahrrad im Strassenbaudienste mit Besonderer Berücksichtigung der Oekonomie von Kraft und Zeit). R. Iskowski. A full discussion of the resistance and operation of bicycles at various speeds and on various grades on different kinds of roads and streets. Tables. Serial. Part I. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—April 6, 1901.

Dynamic Studies upon Bicycles (Recherches Dynamiques sur les Bicyclettes). Max Ringelmann. Showing the influence of the load, the tire, and the general condition of the machine, upon its efficiency. 3000 w. Revue de Mécanique—Sept. 30, 1902.

Touring.—Bicycles for Touring (Les Bicyclettes. Le Concours de Bicyclettes de Tourisme). Carlo Bourlet. An illustrated account of a road competition for bicycles in France and descriptions of brakes and other details. 2500 w. Génie Civil—March 14, 1903.

BICYCLE EXHIBITION.

London.—See **AUTOMOBILE EXHIBITION.**

Paris.—See **AUTOMOBILE EXHIBITION.**

BICYCLE MANUFACTURE.

See also **BICYCLE.**

Machine Tools.—See **MACHINE TOOL—Bicycle Manufacture.**

Spoke Machinery.—Bicycle-Spoke-Making Machinery. Illustrates and describes a set of ingenious automatic machines for stretching, straightening, cutting, screwing, heading and bending. 1700 w. Engr, Lond—Nov. 15, 1901.

BIN.

See **COAL BIN, GRAIN BIN; TANK.**

BINARY ENGINE.

See also **MOTOR—Josse Review.**

The Josse Waste Heat Engine. Illustrated description of an engine whose purpose is to utilize the waste heat of a steam engine. Editorial comments. 3300 w. Elec Wld & Engr—Aug. 10, 1901.

The Waste-Heat Auxiliary Engine. Illustrates this engine that has been in service during the past three months at the central station of the Berlin Electrical Works, reporting the results of the tests and its standing as an economic factor in the generation of power. 2300 w. U. S. Cons Repts, No. 1189—Sept. 14, 1901.

The Waste Heat Engne (Die Abwärme Kraftmaschinen). H. Baum. A description of the Josse and Zimmermann binary engines, using the heat in the exhaust of a steam engine to vaporize sulphur dioxide for use in a second motor. 2000 w. 5 plates. Glückauf—Sept. 7, 1901.

Combined Vapor Engines (Les Machines à Vapeurs Combinées). A description of the Josse form of binary engine in which the heat of the exhaust steam is used to vaporize sulphur dioxide for use in a second engine. 1200 w. Génie Civil—Sept. 14, 1901.

Waste-Heat Auxiliary Engine. A series of pictures showing the latest developments in this engine, with information and report of results. 2000 w. Sci Am—Nov. 2, 1901.

The "Latent Heat" Fallacy. R. H. Thurston. Discusses the false ideas advanced in relation to the new ether vapor engines. 2000 w. Sci Am Sup—Jan. 25, 1902.

The "Series-Vapor" and "Heat Waste" Engines, as Supplementary to Single-Vapor Engines. R. H. Thurston. A study of the problem of how to secure the largest amount of energy with the least waste. Serial. 1st part. 7000 w. Jour Fr Inst—Oct., 1902.

The Binary Steam Engine (Die Abwärme-Dampfmaschine). H. Behrend. A discussion of the thermodynamic principles involved in the design of binary vapor engines with curves of specific volumes of various substances available for use in the second cylinder. 1500 w. Zeitschr d Ver Deutscher Ing—Oct. 4, 1902.

Waste Heat Engines. Prof. Edward F. Miller. Discusses recent attempts to increase the efficiency of an engine by reducing the temperature of the exhaust heat, describing the invention of Prof. E. Josse and the working of the engine. 2000 w. Jour N Eng W-Wks Assn—March, 1903.

Large Waste Heat Engines. Frans Wels. Illustrates and describes the general scheme of such instalations and discusses the advantages and disadvantages. 1800 w. Engr, U. S. A.—Aug. 1, 1903.

Development.—See **MOTOR—Josse Review**

Ether Vapor.—An Ether-Vapor Generator. From "La Nature." Gives an account of the early attempts to apply this liquid for the production of motive power and gives an illustrated description of the seeming solution in the invention of Desvignes de Malapert. 2000 w. Sci Am—Jan. 4, 1902.

See also **Thermodynamics.**

Petroleum Spirit.—Petroleum Spirit or Hexane. J. S. Fowler and B. T. McCormick. Reports an investigation made of the action of petroleum in a heat engine. 1200 w. Sib Jour of Engng—Oct., 1903.

Sulphur-Dioxide.—Sulphur-Dioxide and the Binary Engine. R. H. Thurston. A study of the physical properties of sulphur-dioxide and the economical advance claimed for the series-vapor engine of Prof. Josse. 2700 w. Jour Fr Inst—June, 1903.

Test.—Recent Experience and Tests with Waste Heat Engines. John H. Barr. An explanation of the operation of the binary vapor engines with a statement of certain properties of the working fluids employed. 1500 w. Sib Jour of Engng—March, 1902.

Waste Heat Engines (Abwärmekraftmaschine). H. Schröter. Data and results of tests upon two binary-vapor engines of the Josse sulphurous acid type, showing the gain by utilizing the heat in the exhaust steam. 1800 w. Zeitschr d Ver Deutscher Ing—May 6, 1905.

Thermodynamics.—Some Forms of Vapor Heat Maps with Vapor Table and Curves for Ether ($C_4H_{10}O$). Thomas M. Gardner. A discussion of the conditions under which the vapor of ether may be used in binary-vapor engines. 2500 w. Sib Jour of Engng—Nov., 1904.

BIOLOGY.

Engineering.—See **ENGINEERING—Living Structure.**

BISMUTH.

The Metallurgy, Mineralogy and Utilization of Bismuth. Dr. J. Only. Describes processes for the extraction of bismuth, giving information of its occurrence, etc. Serial. 1st part. 1200 w. Min Rept—Nov. 5, 1903.

Assay.—Bismuth Assay. A. W. Warwick and T. D. Kyle. Discusses the inaccuracies of the usual methods of assaying bismuth, and recommends a modification of the process devised by Pattison Muir. 1800 w. Eng & Min Jour—April 13, 1901.

Queensland.—See **WOLFRAM.**

BITUMEN.

See also **ASPHALT; URALITE.**

Bitumen and Oil Rocks. G. C. Broadhead. Gives theories regarding oil formation, and considers prospecting, oil zones, and some of the remarkable districts. 3000 w. Am Geol—Jan., 1904.

The Origin of Bitumen. W. C. Morgan. Reviews the theories that have been advanced, and claims that it has been proven that bitumen is derived from animal sources, though it does not deny that there may also be other sources. 1300 w. Cal Jour of Tech—Sept., 1904.

Bitumen: Its Consumption in the United Kingdom and Its Production in Trinidad. W. Pollard Digby. Shows the volume and source of the United Kingdom's import of bitumen for the last 15 years. 1000 w. Elec Engr, Lond—Oct. 28, 1904.

Cuba.—Bitumen in Cuba. T. Wayland Vaughan. Account of occurrences of bitumen in Cuba obtained partly during geological research, and partly from existing literature. Ill. 5800 w. Eng & Min Jour—March 8, 1902.

Electric Insulation.—Bitumen in Insulating Compositions. D. A. Sutherland. A digest of known data, and a contribution to the study of bitumen, its sources, properties and uses for electrical purposes. Serial. 1st part. 8000 w. Electro-Chem & Met—Dec., 1903.

Bitumen in Insulating Compositions. Discussion of a paper by D. A. Sutherland on this subject. 2000 w. Electro-Chem & Met—Jan., 1904.

Pavement.—See **ASPHALT PAVEMENT; PAVEMENT.**

BITUMINOUS ROCK.

United States.—See **ASPHALT; BITUMEN.**

BITUMINOUS SHALE.

See **SHALE OIL.**

BLACKSMITH SHOP.

Railway.—See **RAILWAY SHOP—Blacksmith; Montreal, Angus.**

BLAST FURNACE.

See also **BLAST FURNACE GAS; BLAST STOVE; BLOWING ENGINE; FURNACE; IRON METALLURGY; IRON WORKS; STEEL WORKS.**

Recent Blast-Furnace Practice. Brierly Denham Healey. Read before the Soc. of Engrs. A comparison between old and new methods, with some results of recent working and illustrated description of furnace. Serial. 1st part. 2700 w. Mech Engr—May 17, 1902.

Air, Gayley Process.—See **Dry Air Blast.**

Alliance, Ohio.—The Oldest Iron Furnace West of the Allegheny Mountains. Brief account, with illustration, of the "Alliance Furnace," built in 1789. 700 w. Eng News—Nov. 20, 1902.

American.—A Decade in American Blast Furnace Practice. F. Louis Grammer. Discusses briefly the tendencies in the methods of administration as well as the conditions governing supremacy as affecting the aims of the manager, and considers the advances made during the last ten years. 6500 w. Trans Am Inst of Min Engrs—Feb., 1904.

See also **Russia; IRON METALLURGY.**

American vs. European.—Modern Blast-Furnace Construction (Gesichtspunkte beim Bau Moderner Hochöfen). E. Lamoureux. A review of modern furnace construction, comparing European and American practice. 3000 w. Stahl u Eisen April 1, 1904.

American vs. German.—Notes on American Blast-Furnace Practice (Betrachtungen über den Amerikanischen Hochofenbetrieb). Bernhard Osann. A comparison between American and German furnaces and methods. 3500 w. Stahl und Eisen—Oct. 15, 1905.

Anthracite.—See **Russia.**

Askam, England.—Tests of the New Blast Furnace at Askam. A report of tests made of this furnace in Cumberland which is designed on what are popularly known as "American lines," although various modifications were introduced to meet the conditions. 900 w. Ir & Coal Trds Rev—June 6, 1902.

Asphyxiation.—Accidents due to the Asphyxiation of Blast Furnace Workmen. R. H. Thwaite. Read before the Iron & Steel Inst. A discussion of the dangers, giving suggestions with a view to securing comparative immunity from fatalities. 2800 w. Ir & Coal Trds Rev—May 12, 1905.

Audan-le-Tiche, Lorraine.—See. **Electric Equipment.**

Belgian-Ougree.—The Belgian-Ougree Blast Furnaces and Steel Works and Modern Electrically-Operated Plant. Frank C. Perkins. An illustrated article describing the electric power plant. The waste gases from the blast furnaces are utilized at a central power plant and the energy transmitted electricaly for about three-quarters of a mile. 2500 w. Sci Am Sup—Sept. 27, 1902.

Bell-Top Lift.—See **Electric Lift.**

Blowing Engine.—See **BLOWING ENGINE.**

By-Products.—Blast-Furnace By-Products and Their Possible Recovery. Horace Allen. Gives a list of the by-products, the profitable recovery of which has been demonstrated, and considers them seriatum. Ill. 3500 w. Feilden's Mag—July, 1903.

Notes on the Evolution of Blast Furnace Recovery Plant. J. Gillespie. Presents some of the steps in the evolution of the blast furnace recovery plant, describing details. Ills. 6500 w. Jour of W of Scot Ir & Steel Inst—Jan., 1905.

See also **BLAST-FURNACE GAS.**

Calculations.—Blast-Furnace Calculations. J. L. Stevenson. Gives the methods by which to arrive at the shape and size of furnace and the necessary equipment for the production of the output decided upon. Ills. 2800 w. Engr, Lond—Aug. 25, 1905.

Capacity.—Blast Furnace Capacity Rapidly Increasing. Information given by the American Iron & Steel Assn., showing that blast furnaces are to be increased 2,000,000 tons the present year, and 2,500,000 tons next year. 2000 w. Ir Age—Aug. 27, 1903.

Carbon-Deposition.—The Theory of Carbon-Deposition in the Blast Furnace. A. D. Elbero. An explanation of a new theory. 2000 w. Am Mfr & Ir Wld—Dec. 29, 1904.

Carbon Properties.—The Chemical and Physical Properties of Carbon in the Hearth of the Blast Furnace. W. J. Foster. Gives results obtained by various experimenters, and the investigations of the writer. 2800 w. Ir & Coal Trds Rev—May 9, 1902.

Casting Direct.—See **CASTING—Blast Furnace; CASTING MACHINE.**

Cette, France.—A Modern French Blast Furnace. Illustrated description of a plant at Cette, on the Mediterranean. 1500 w. Ir Age—Nov. 6, 1902.

Blast Furnace and Iron Work at Cette. Translated from "Le Génie Civil." Illustrated description of these works, especially the blast furnace construction. 2200 w. Engr, Lond—March 27, 1903.

The Blast Furnaces of Schneider & Co., at Cette (Les Haut Fourneaux Schneider et Cie. de Cette). An illustrated description of the large iron works at Cette, operated in connection with the other establishments of Schneider & Co. 5000 w. Revue Technique—Oct. 25, 1903.

Charcoal.—The Largest Charcoal Blast Furnace in the World (Der Grösste Holzkohlen-Hochofen der Welt). An illustrated description of a blast furnace 70 ft. high, with a maximum production of 115 tons of iron per day, using charcoal fuel, at Vares, Bosnia. 1200 w. Stahl u Eisen—May 1, 1902.

See also **Sweden.**

Charcoal, Charge.—The Use of High Percentages of Fine Ore in a Charcoal Blast-Furnace. Harry R. Hall. An account of successful work under adverse conditions. 1500 w. Am Inst of Min Engrs—Sept., 1905.

Charcoal, Mexico.—Some Mexican Charcoal Blast-Furnaces. John Birkinbine. An illustrated article giving information of some of the older plants which depend upon charcoal as fuel. 1400 w. Cassier's Mag—Nov., 1905.

Charge.—Stock Distribution and Its Relation to the Life of a Blast Furnace Lining. David Baker. Discusses mechanical handling and its difficulties, the need of careful handling of coke, and attempts made to reduce the tuyere destruction. Ills. 2500 w. Trans Am Inst of Min Engrs—Feb., 1904.

Stock-Distribution and Its Relation to the Life of a Blast-Furnace Lining. Discussion of Mr. Baker's paper. 2700 w. Am Inst of Mining Engrs May, 1905.

Stock Distribution and Its Relation to the Life of a Blast-Furnace Lining. David Baker. The results of mechanical charging are discussed and compared with the hand-barrow system, and an illustrated report of the writer's experience. 2200 w. Eng News—March 24, 1904.

Stock Distribution and Its Relation to the Life of a Blast-Furnace Lining. David Baker. A discussion of difficulties due to mechanical handling and the efforts made to remedy the troubles, with partial success. Ills. 2000 w. Ir & Coal Trds Rev—April 8, 1904.

Stock Distribution in the Blast Furnace. Joseph E. Raysor and John J. Porter. Discusses troubles that arise and their causes, and illustrates some filling devices. 1700 w. Ir Age—Jan 12, 1905.

See also **Mixtures; Plats.**

Charging Apparatus.—A New Blast Furnace Top. Axel Sahlin. Read before the Iron and Steel Inst. An illustrated description of the Julian Kennedy furnace top and hoist, stating the assumptions on which the design is based, and the advantages claimed. 3500 w. Ir Age—May 14 1903.

A Furnace Charging and Distributing Apparatus. Frank C. Roberts. Illustrated description of apparatus designed by the writer with statement of its advantages. 1700 w. Ir Age—June 23, 1904.

Improvements in the Mechanical Charging of the Modern Blast-Furnace. David Baker. An illustrated account of skiphoist experiments, and the conclusions. 4000 w. Trans Am Inst of Min Engrs—Sept., 1904.

Special Forms of Blast-Furnace Charging-Apparatus. T. F. Witherbee. Illustrated description of various forms of charging apparatus, suggesting that better results in running may be had by charging nearer to the center. 1800 w. Trans Am Inst of Min Engrs—Sept, 1904.

Inclined Cable Lifts for Blast Furnaces (Gichtseilbahnen). Rudolph Brennecke. Illustrating and describing a variety of inclined converging devices for delivering the charge to blast furnaces. 2500 w. 2 plates. Stahl u Eisen —Oct 1, 1904.

A New Blast Furnace Charging Device. An illustrated description of the Backlund & Burman furnace charging apparatus and its operation. 1700 w. Ir Age—Dec. 29, 1904.

The Backlund-Burman Traveling Charging Machine for Blast Furnaces. Illustrated detailed description of this apparatus and its working. 1800 w. Ir Age—April 13, 1905.

Charging Apparatus, Electric.—Improved Method of Operating Charging Cones of Blast Furnaces Electrically (Neuer Elektrischer Antrieb für Gichtglocken). A Schwarz. A device to replace steam by electric power, for use upon furnaces in which the gas is used in gas engines for the generation of electricity. 1000 w. Stahl und Eisen—May 15, 1901.

Electrically Operated Furnace Feed Cones (Elektrisch Betriebene Gichtglockenaufzüge). F. Janssen. Illustrating and describing applications of electric motors to the operation of the cone valves used on blast furnaces to admit the charge and retain the gases. 3000 w. Stahl u Eisen—Dec. 15, 1901.

On Electric Lifts for Blast Furnace Bell-Tops. F. Janssen. Illustrates and describes a blast-furnace bell-top lift which has been in operation about one year, stating the advantages from the employment of electricity. 2500 w. Ir & Coal Trds Rev—March 14, 1902.

Electric Lifts for Furnace Bell-Tops. F. Janssen, in "Stahl und Eisen." Illustrates and describes a bell-top lift that has been in operation for about a year, and considers the advantages derived from the use of electricity for working the bell-top. 2000 w. Am Mfr—April 3, 1902.

Electric Elevators for Blast Furnaces (Elektrische Antriebe von Hochofenaufzügen). C. Schiebeler. With illustrations of details of electrically operated charging devices. 1800 w. Stahl u Eisen—April 15, 1904.

Electrically-Driven Furnace Hoist (Elektrisch Betriebener Gichtaufzug). F. Collischonn. Illustrating and describing an inclined hoist, electrically driven, for automatically charging blast furnaces. 2000 w. Stahl u Eisen—June 15, 1905.

Electrical Blast Furnace Hoist. Illustrates and describes a plant at work in Germany. 1600 w. Engr, Lond—Nov. 10, 1905.

See also Electric Equipment.

Charging Apparatus, Pneumatic.—Pneumatic Cone Mechanism (Pneumatischer Gichtglocken Aufzug). E. Nümker. An illustrated description of the application of a pneumatic cylinder for operating the feed cone of a blast furnace. 600 w. Stahl u Eisen—July 15, 1901.

Chemical Reactions.—The Influence of Carbon, Carbonic Oxide and Carbonic Acid on Iron and Iron Oxides (Ueber die Einwirkung von Kohlenstoff, Kohlenoxyd und Kohlensäure auf das Eisen und seine Oxyde). E Baur and A. Glaessner. An analytical-chemical investigation of the processes in the blast furnaces, and the reduction of the different oxides of iron. Diagrams. 3500 w. Stahl u Eisen—May 1, 1903.

Experimental Studies of the Reactions in the Blast Furnace (Experimentelle Studien über die Vorgänge im Hochofen). Dr. F. Zimmermann. Describing studies in the analysis of gases drawn from various zones in the blast furnace, and conclusions therefrom. 2000 w. Stahl u Eisen—July 1, 1905.

Clairton, Pa.—See **STEEL WORKS.**

Cleveland, O.—The New Cleveland Furnace. Brief illustrated description of the plant of the Cleveland Furnace Company. 2400 w. Ir Age—Dec. 22, 1904.

Coke.—See **SULPHUR—Coke.**

Composition of Iron.—See **IRON—Chemistry.**

Construction.—See **Design.**

Continuous Process.—See **OPEN-HEARTH PROCESS; STEEL METALLURGY.**

Cooling Jacket.—See **Water Cooling.**

Copper.—See **COPPER METALLURGY.**

Couillet, Belgium.—The New Blast Furnace of the Marcinelle & Couillet Company (Le Nouveau Haut-Fourneau de la Société Anonyme de Marcinelle et Couillet). J. Smeysters. An account of two fine furnaces of 16.5 meters height and 160 metric tons capacity each, recently erected in Belgium, these being among the largest and finest on the Continent. 2000 w. Rev Univ des Mines—Nov., 1900.

New Blast Furnace at Couillet (Belgium). Illustrated description. The special feature consists in the special arrangement of shaft and charging appliances. 2000 w. Col Guard—Jan. 25, 1901.

Design.—The Designing and Equipment of Blast Furnaces. Jno. L. Stevenson. The first of a series of papers aiming to set forth the practice and necessary methods, to arrive at the right size, shape, and proportions of any furnace adapted and suitable for the work it is intended to perform. Ill Serial. 1st part. 1800 w. Engr, Lond—Sept. 12, 1902.

Modern Blast Furnace Construction. I. G. Bayley. A list of requirements from the drawing-office point of view. 6000 w. Ir Age—Sept. 29, 1904.

Direct Casting.—See **CASTING; CASTING MACHINE.**

Distributing Apparatus.—See **Charging Apparatus.**

Dry Air Blast.—The Application of Dry-Air Blast to the Manufacture of Iron. James Gayley. An account of the application of the dry-air blast at the Isabella Furnaces of the Carnegie Steel Co., at Etna, Pa., and the economies resulting. Ills. 5400 w. Iron & Steel Inst—Oct., 1904.

The Application of the Dry-Air Blast to Blast Furnace Operation (Die Verwendung von Trockenem Gebläsewind im Hochofenbetrieb). A full account of the Gayley dry-air blast as applied at the Isabelle furnace. 3500 w. Stahl u Eisen—Nov. 15, 1904.

The Dry Air Freezing Process at the Isabella Furnace (Congélation de l'Humidité d l'Air Soufflé aux Hauts Fourneaux Isabella, pres Pittsburgh). MM. Picard & Heurteau. A brief account of the Gayley process of drying the air blast by freezing out the moisture. 1000 w. Comptes Rendus—Nov. 21, 1904.

The Use of Dry Air in Blast Furnaces (Sur l'Emploi de l'Air Sec dans les Hauts Fourneaux). Henri Le Chatelier. An examination of the Gayley dry air process, showing that the economy may be due to the operation at a lower temperature. 1000 w. Comptes Rendus. Nov. 28, 1904.

The Influence of Drying the Blast on Blast-Furnace Performance (Influence Exercée par la Desiccation du Vent sur la Marche des Hauts Fourneaux). A. Lodin. A discussion of the Gayley dry air blast process, indicating that the reported economy may be due to other causes. 1200 w. Comptes Rendus—Nov. 28, 1904.

Dry-Air Blast for Blast Furnaces (La Dessication de l'Air dans le Soufflage des Hauts-Fourneaux). G. Chesneau. A review of the criticisms of the Gayley process, urging caution in repeating the experiment. 1200 w. L'Electrochimie—Jan., 1905.

The Drying of Furnace Blast by Refrigeration (Trocknung des Hochofenwindes mittels Kältemaschinen). Dr. C. von Linde. A discussion of the Gayley process for drying the air supplied to blast furnaces, with an estimate of the cost of the operation. 4000 w. Stahl u Eisen—Jan. 1, 1905.

Is it Advantageous to Dry the Air for Blast Furnaces? (Ist es Vorteilhaft den Hochofengebläsewind zu Trocknen?). Bernhard Osann. An examination of the Gayley dry-air blast system, maintaining that the possible gain is overbalanced by the additional cost. 5000 w. Stahl u Eisen—Jan. 15, 1905.

The Application of the Dry-Air Process to Blast Furnaces (Die Verwendung von Trockenem Gebläsewind im Hochofenbetriebe). An account of the Gayley dry-air blast system emphasizing the advantages of independence of meteorological conditions and changes. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 21, 1905.

The Gayley Dry Air Blast. Brief reports of some of the theories advanced to account for the facts given in paper by James Gayley. 2500 w. Ir Age—Feb. 9, 1905.

Dry Blast and Turbo-Blowers (Windtrocknung und Turbogebläse). Prof. W. Mathesius. A study of the removal of moisture from air blast by the use of chemical absorbents. 1800 w. Stahl u Eisen—March 1, 1905.

Dry Air Blast and Turbine Blowing Engines. Abstract translation of an article by Prof. Mathesius, in "Stahl und Eisen," describing a new method of drying the blast. 2000 w. Ir Age—June 1, 1905.

The Use of Dried Air in the Blast Furnace. A. Pourcel, in the "Revue de Metallurgie." A discussion of the Gayley dry blast. 1800 w. Ir & Coal Trds Rev—March 3, 1905.

Gayley's Dry Air Blast. F. A. Willcox. Gives results obtained in working out the heat balance of the Isabella and the Lucy furnaces with dry and normal blast, with explanatory remarks. 2800 w. Ir & Coal Trds Rev—March 31, 1905.

Dry Air in the Blast Furnace. A collection of comments from technical papers on the experiments of Mr. Gayley. 7000 w. Ir & Steel Mag April, 1905.

The Gayley Dry-Air Blast Process (Das Gayleysche Verfahren der Trocknung des Gebläsewindes für den Hochofen). Alfred Lindner. A critical review of the Gayley process, claiming that the method is incapable of producing the results. 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 29, 1905.

The Application of Dry-Air Blast to the Manufacture of Iron. Discussions of Mr. Gayley's paper. 8200 w. Am Inst of Min Engrs—May, 1905.

The Gayley Dry Air Blast. James Gayley. Supplementary data to the paper on this subject presented to the Iron and Steel Inst. 2000 w. Ir Age—May 11, 1905.

The Application of Dry-Air Blast. (Supplementary Paper). James Gayley. Read before the Iron & Steel Inst. Gives in detail the record of operations of the Isabella furnaces from Nov., 1904, to March, 1905, inclusive. 8000 w. Ir & Coal Trds Rev—May 12, 1905.

The Use of Dry Air in Blast Furnaces. Articles by A. Pourcel and O. Boudouard, translated from "Revue de Metallurgie." 1800 w. Ir & Steel Mag—June, 1905.

The Application of Dry-Air Blast to the Manufacture of Iron. Joseph W. Richards. A discussion of the paper by Mr. Gayley presented at the Lake Superior meeting. 3700 w. Am Inst. of Min Engrs—July, 1905.

The Application of Dry-Air Blast to the Manufacture of Iron. T. W. Robinson. Discussion of paper which Mr. Gayley presented at the Lake Superior meeting and also at the New York meeting of the Iron and Steel Institute. 2500 w. Am Inst of Min Engrs—July, 1905.

Dry Air for Blast Furnaces. Abstracts of unpublished papers presented at the Liége Mining and Metallurgical Congress. 3000 w. Ir Age—Nov. 16, 1905.

Duluth, Minn.—The Zenith Furnace at Duluth. Dwight E. Woodbridge. Description, with illustrations, of a coke-oven gas plant, blast furnace and coal dock of the most modern kind. 1500 w. Eng & Min Jour—Aug. 11, 1904.

Blast Furnace and By-Product Coke Plant of the Zenith Furnace Co. Illustrated description of a remodeled plant at Duluth, Minn. 2500 w. Ir Trd Rev—Aug. 11, 1904.

Dust Chamber—Dust Chamber Design. Max J. Welch. Illustrations, with descriptions of types of dust chamber construction for collecting flue dust and condensing fumes. 1200 w. Eng & Min Jour—Sept. 1, 1904.

Efficiency.—The Thermal Efficiency of the Blast Furnace. W. J. Foster. Read before the Iron & Steel Inst. An examination of the furnace at Dorlaston; the materials used were chiefly silicates of iron, in the form of flue and tap cinders, and a small quantity of ferric oxide. Experiments and results. 5000 w. Ir & Coal Trds Rev—May 6, 1904.

Elba.—Blast-Furnace Plant on the Island of Elba. (Hochofenanlage auf der Insel Elba). J. Nebelung. An illustrated account of the working of the extensive iron ore deposits on the island, with details of the furnaces and machinery of the new works at Portoferraio. Serial. 2 parts. 6000 w. Zeitschr d Ver Deutscher Ing—Oct. 24, Nov. 7, 1903.

Blast-Furnace Plant of the "Elba" Societa Anonima di Miniere e di Alti Forni at Portoferraio, Elba. Carlo Massa. Illustrated detailed description of the plant. 2800 w. Am Inst of Min Engrs—March, 1905.

See also BLAST-FURNACE GAS; IRON INDUSTRY; IRON ORE HANDLING.

Electric Burner.—See Obstruction Removal.

Electric Equipment.—The Use of the Electric Motor in Modern Blast Furnace Plants. Andrew Ellicott Maccoun. Considers the applications made and the advantages gained. 2000 w. Pro Engrs' Soc of W Penn—May, 1902.

Blast Furnace with Electric Power Plant at Audun-le-Tiche, Lorraine. Frank C. Perkins. Illustrated detailed description. 1000 w. Am Mach—April 17, 1902.

Electric Power for Blast Furnaces and Coke Ovens (Emploi de l'Electricité pour le Service des Fours à Coke et des Hauts Fourneaux). J. Bratman. Describing the electric handling machinery at Newport, near Middlesbrough, England. 2000 w. Génie Civil—Jan. 3, 1903.

See also Belgian-Ougree; Charging Apparatus, Electric; BLAST-FURNACE GAS; ELECTRIC PLANT.

Electric Lift.—See Charging Apparatus, Electric.

Elevator.—See Charging Apparatus; Electric Equipment.

Eliza, Pittsburg.—See Pittsburg.

El Paso.—See New El Paso.

Explosion.—Blast Furnace Explosions Due to the Hanging of the Charge (Ueber die Durch das Hängen der Gichten Veranlassten Hochofenexplosionen). Director Schilling. A paper before the Verein Deutscher Eisenhüttenleute on blast-furnace explosions and their causes, and upon the sticking of the charge, and the consequent abnormal reactions. Discussion. 3000 w. Stahl u Eisen—May 15, 1903.

Blast-Furnace Explosions With Falling Charges (Hochofenexplosionen beim Stürzen der Gichten). Bernhard Osann. A discussion of the causes of blast-furnace explosions. 2800 w. Stahl u Eisen—July 1, 1903.

The Cause of Some Blast Furnace Explosions. Extract from a paper by Director Schilling at meeting of the Verein Deutscher Eisenhuettenleute. Explains his view as to the cause of explosions following "hanging." 1500 w. Ir Age—July 2, 1903.

Explosions Caused by Obstructions in Blast Furnaces (Ueber die durch das Hängen der Gichten Veranlassten Hochofenexplosionen). Adalbert Nath. A discussion of the causes of gas explosions in blast furnaces, including the effects of increased temperatures upon dissociation of the gases. 1800 w. Stahl u Eisen—Aug. 15, 1903.

Furnace Top Explosions. Frank C. Roberts. A discussion of the theories most generally accepted in explanation of these "slips" in blast furnaces burdened with a high percentage of fine ore. 3000 w. Ir Age—May 5, 1904.

Faber du Faur.—See BLAST-FURNACE GAS.

Flue Dirt.—Flue-Dirt and Top-Pressure in Iron Blast Furnaces: A Study of the Influences Controlling Them. F. Louis Grammer. A study of flue dirt and influences controlling it, based on observations of about thirty furnaces. 4000 w. Trans Am Inst of Min Engrs—Feb., 1903.
See also BLAST-FURNACE GAS; BLAST STOVE.

Foster Cooling.—See Water Cooling.

Freezing Blast—See Dry Air Blast.

"Frozen."—See Explosion; Obstruction Removal.

Gas Valves.—Double Gas Valves (Ueber Doppelte Gichtverschlüsse). K. Stähler. Describing especially the Buderus double-cone valve for blast furnaces, enabling the gas to be drawn off continuously without interfering with the charging of the furnace. 1800 w. Stahl u Eisen—Feb. 15, 1905.

Gate Valve.—See also VALVE—Gate.

Gayley Dry-Air Blast.—See Dry-Air Blast.

Hanging Charge.—See Explosion; Obstruction Removal.

See also FURNACE.

Height.—The Height of Blast Furnaces. F. L. Grammer. A discussion of this subject with the conclusion that high furnaces have been overestimated and have had their day. 2000 w. Ir Tr Rev—Feb. 20, 1902.

History.—A Century of Blast Furnace Practice. Walter Kennedy. A brief description of the three classes of furnaces used in the United States and the methods employed in each; also reviewing the Chinese system of producing iron, which is the most ancient practice known. Ill. 4000 w. Am Mfr—Jan. 3, 1901.

Hoist.—See Charging Apparatus; Electric Equipment.

Hot Blast.—See Dry-Air Blast; BLAST-FURNACE GAS—Faber du Faur; BLAST STOVE; BLOWING ENGINE; COPPER METALLURGY.

Hot-Blast Equalization.—Results Obtained in Equalizing the Temperature of Hot Blast. Lawrence F. Gjers and Joseph H. Harrison. Read at Düsseldorf meeting of the Iron & Steel Inst. Illustrated description of an equalizer with report of its work. 2000 w. Ir & Steel Trds Jour—Sept. 27, 1902.

Process for Equalising the Temperature of Hot Gases (Verfahren zum Ausgleichen der Temperatur Heisser Gase). Walter Daelen. A brief, illustrated account of the Gjers and Harrison method of equalizing the temperature of the hot gases in blast-furnace work, and temperature records of the hot blast taken by the Uehling-Steinbart pyrometer. 600 w. Stahl u Eisen. April 1, 1903.

The Equalization of Hot-Blast Temperature for Blast-Furnaces. Joseph Hutchinson Harrison. Read at the Engng. Con. of the Inst. of Civ. Engrs. Describes an apparatus known as an "equalizer" and its action. 900 w. Engng—June 19, 1903.

Isabella, Etna, Pa.—See **Dry Air Blast.**

Laboratory.—The Modern Blast Furnace Laboratory and Its Work. W. Dixon Craig. A non-technical paper considering the work of the laboratory itself, with notes on some of the methods of chemical analysis used. 1600 w. Can Min Rev—March 31, 1903.

Lift.—See **Charging Apparatus; Electric Equipment.**

Lining Erosion.—The Injurious Action of Fine Ores upon the Blast Furnace (Feinerze als Ursache von Hochofenstörungen). Dr. Aloys Weiskopf. An examination of the manner in which fine ores erode the interior of the furnace and affect the working. 3500 w. Stahl u Eisen—Nov. 1, 1904.

Effect of the Oxides of Carbon Upon Iron and Its Oxides. A review of investigations of the destruction of blast-furnace linings, giving results obtained from various sources. Serial. 1st part. 2500 w. Engng—Sept. 15, 1905.

Lorain, Ohio.—A Modern American Blast Furnace—Its Construction and Equipment. Arthur C. Johnston. Describes the construction of a modern furnace, its equipment and the appliances for concentrating and handling the enormous amount of material required, drawing conclusions based on the operation. Ill. 7 plates. 4700 w. Jour Assn of Engng Socs—Jan., 1901.

Management.—Notes on the Blast-Furnace. John M. Hartman. Suggestions for the management of blast-furnaces. 3000 w. Ir Trd Rev—Nov. 10, 1904.

See also **Operation.**

Marcinelle & Couillet.—See **Couillet, Belgium.**

Mariupol.—See **Russia.**

Materials' Valuation.—See **IRON ORE—Valuation.**

Mathesius Dry Air.—See **Dry Air Blast.**

Meehan Devices.—The Meehan Furnace Devices. Diagrams and descriptions of the furnace top down comer and explosion pipe. 1300 w. Am Mfr—Nov. 13, 1902.

Menne Process.—See **Obstruction Removal.**

Mixtures.—The Use of High Percentages of Mesabi Iron-Ores in Coke Blast-Furnace Practice. W. A. Barrows, Jr. Gives the writer's experience in handling furnaces with mixtures containing large portions of Mesabi ores. Also discussion by Edward A. Uehling and others. 5800 w. Trans Am Inst of Min Engrs—Feb., 1904.

Modern Practice.—Modern Iron Blast-Furnace Practice. F. H. Crockard. With special reference to the methods and appliances which have developed as the result of the demand for intensified production. 3000 w. Engineering Magazine—Jan., 1902.

Neville Island, Pittsburg.—American Steel and Wire Company's New Blast Furnace at Neville Island. Christian Larsen. An illustrated description of a modern blast furnace plant being erected near Pittsburg, with a capacity greater than any furnace in existence. 1800 w. Am Mfr—Feb. 28, 1901.

New El Paso, Texas.—New El Paso, Texas, Oil-Burning Blast-Furnace Plant. C. W. Clapp. Illustrated description of a new plant, interesting because of its labor-saving devices and its successful use of oil as a power developer. 1500 w. Sci Am Sup—Nov. 22, 1902.

Obstruction Removal.—The Electrical Burner for Blast-Furnaces. F. L. Grammer. Describes the device and its success in burning open tuyeres and cinder holes which have become "frozen." 700 w. Trans Am Inst of Min Engrs—Nov., 1901.

A New Process for Removing "Frozen" Masses in Furnaces (Ein Neues Verfahren zum Schnellen Beseitigen von Ofenansätzen und Dergleichen und zum Beseitigen Hinderlicher Metallmassen). Dr. Weeren. A description of a process, due to Dr. Ernst Menne, for removing solidified masses of metal, slag, etc., from blast furnaces, etc., by burning and melting with oxygen and other gases. 2500 w. Stahl u Eisen—April 15, 1903.

The Menne Process for Removing Obstructions in Blast Furnaces and Elsewhere (Mitteilungen über ein Verfahren zum Beseitigen von Hochofenansätzen und Dergleichen). Dr. Menne. A paper before the Verein Deutschr Eisenhüttenleute, describing a process for removing metallic and other solidified obstructions in blast and other furnaces by melting them with their own heat of oxidation. Discussion. 1500 w. Stahl u Eisen—May 15, 1903.

The Menne Process for Removing Metallic Obstructions. Translated from "Stahl und Eisen." Describes this process, the principle of which is to use the heat of combustion of the material which has to be removed. Gives examples of work carried out. 2000 w. Ir Age—May 21, 1903.

The "Freezing" of Blast-Furnaces and the Remedies Therefor (Das Auftreten von Rohgängen und Ihre Beseitigung). E. Jagsch. An illustrated account of the way the contents of blast furnaces become solidified, partly or wholly, and of the methods for removing the obstructions and restoring normal working. 2500 w. Stahl u Eisen—July 15, 1903.

Oil-Burning Plant.—See **New El Paso, Texas.**

Open-Hearth Combined.—The Combined Blast-Furnace and Open-Hearth Furnace. P. Eyermann. Illustrated description of the furnace and its working, with an account of the evolution of the process. 7500 w. Ir & Coal Trds Rev—May 9, 1902.

Operation.—Difficulties in Blast Furnace Operation (Ueber Störungen im Hochofengang). B. Osann. A study of the reactions occurring in blast furnace operation, with reference to the irregularities occurring in practical experience. 4000 w. Stahl u Eisen—Dec. 1, 1901.

Operation of Blast Furnaces (Bedingungen eines Guten Hochofenganges). G. Teichgräber. Practical points on blast furnace working, advocating the periodic changing of the blast pres sure. 800 w. Stahl u Eisen—Jan. 15, 1902.

The Operation of Blast Furnaces (Interessante Erscheinungen beim Hochofengange und ihre Erklarung). Bernhard Osann. A paper before the Verein Deutscher Eisenhüttenleute discussing various interesting phenomena in blast furnace practice and their explanation. 6000 w. Stahl u Eisen March 1, 1902.

The Elimination of Blast-Furnace Variables. F. L. Grammer. Some conclusions in regard to the management of blast furnaces. 3000 w. Ir Trd Rev—April 10, 1902.

Hearth-Areas and the Number of Tuyeres in Iron Blast-Furnace Practice. F. L. Grammer. Discusses blast-furnace practice, the means of determining the number of tuyeres required, etc. 3400 w. Trans Am Inst of Min Engrs—Oct., 1903.

Fundamental Principles Involved in Blast Furnace Practice. Edward A. Uehling. Considers the raw materials used, the preparation of the ores, fuel, charging, etc. 9500 w. Jour Fr. Inst—Feb., 1905.

Practical Results in the Operation of the Blast Furnaces of Ekaterinoslav, Russia (Résultats Pratiques de la Marche des Haut Fourneaux d'Ekaterinoslaw). M. Pierronne. Data and results of the action of furnaces of various sizes and forms, with sketches and discussion. 10,000 w. Revue de Métallurgie—Sept., 1904.

Philippines.—Iron Making in the Philippines. Extract from the report of H. D. McCaskey. Gives an illustrated description of a primitive blast-furnace in the Angat iron region, Bulacan, with information concerning the industry. 6000 w. Ir Age—March 3, 1904.

Physical Action.—Notes on the Physical Action of the Blast Furnace. J. E. Johnson, Jr. Discusses some of the physical and mechanical aspects of the blast-furnace process, pointing out its dependence in these respects on well-known laws. 12500 w. Am Inst of Min Engrs—Sept., 1905.

Pittsburg.—The Eliza Furnace Plant. Illustrated detailed description of this fine plant in Pittsburg. 3800 w. Ir Age—Oct. 31, 1901.

The Eliza Blast Furnaces (Die Eliza-Hochofenanlage). Fritz W. Lürmann. Review of an article in the "Iron Age," giving an illustrated description of the Jones and Laughlin's blast furnaces near Pittsburg. 2200 w. Stahl u Eisen—Jan. 15, 1902.

Platz Method.—The Platz Method of Calculating Furnace Burdens. J. B. Nau. An explanation of the method of B. Platz, based on observations extending over several years. 3300 w. Ir Age—Jan. 28, 1904.

Pneumatic Cone Mechanism.—See **Charging Apparatus, Pneumatic.**

Porto Vecchio.—The Blast-Furnace Plant at Porto Vecchio, Italy (Die Hochofenanlage von Portovecchio). George Martin. An illustrated description of a blast furnace and pipe casting works on the west coast of Italy, using ore from Elba. 1600 w. Stahl u Eisen—Jan. 15, 1902.

Preheating Zone.—The Preheating Zone of the Blast Furnace (Die Vorwärmzone des Hochofens). Fr. Schraml. Discussing methods of utilizing the heat of the waste gases for warming the charge before it is delivered into the shaft of the furnace. 3000 w. Stahl u Eisen—May 15, 1905.

Pyrometer.—See **PYROMETER—Blast Furnace.**

Rader.—The Rader Blast Furnace. Illustrates the construction of a recently patented furnace. 900 w. Am Mfr—April 17, 1902.

Reactions.—See **Chemical Reactions; Temperature Reactions.**

Recovery Plant.—See **By-Products.**

Russia.—Blast Furnaces of American Design at Mariupolsk (Hochofen Amerikanischer Construction auf dem Hüttenwerk zu Mariupolsk). A. Brezgunow. A full account of the extensive iron works on the Sea of Azov, Russia, where the plant is closely modeled after that at Duquesne, Pennsylvania. Two articles. 5000 w. Stahl und Eisen.—Sept. 1, 15, 1901.

Experience with an American Blast Furnace Erected at Mariupol. A Brezgunow. Condensed translation from "Stahl und Eisen." Illustrated description with criticisms. 1900 w. Ir & Coal Trds Rev.—Oct. 25, 1901.

Anthracite Blast Furnaces in Southern Russia (Die Anthracithochöfen in Südrussland). O. Simmersbach. Giving comparisons of the constitution of American and Russian anthracite, and profiles of furnaces. 1800 w. Stahl u Eisen—Oct. 15, 1901.

See also **Operation; Ural.**

Schneider & Co.—See **Cette.**

Siegerland, Germany.—See **IRON INDUSTRY.**

Silver-Lead.—See **SILVER METALLURGY—Furnace Feeding.**

Slag.—See **SLAG.**

Slag, Copper.—See **SLAG—Copper, Blast Furnace.**

Stock Distribution.—See **Charge.**

Stock Line Recorder.—An Automatic Stock-Line Recorder for Iron Blast-Furnaces. J. E. Johnson, Jr. Describes a simple, durable, and inexpensive apparatus which gives by its continuous and automatic action, accurate information concerning the stock-line for every minute of the day. Ills. 3000 w. Am Inst of Min Engrs—Feb., 1905.

Stoves.—See **BLAST STOVE.**

Sulphur.—See **COKE.**

Sulphur Fuel.—The Use of Sulphur-Bearing Fuel in the Blast Furnace (Ueber die Verwendung Schwefelreicher Brennstoffe im Hochofen). Oskar Simmersbach. With tables showing the influence of sulphur in the fuel upon the iron for various ores. 1500 w. Stahl u Eisen.—Feb. 1, 1903.

The use of High Sulphur Fuels in Blast Furnaces. Oskar Simmersbach, in "Stahl und Eisen." Abstract translation showing the influence of sulphur on the various ores, and that high-sulphur fuel can be used under certain conditions. 1500 w. Ir Age—March 12, 1903.

Sweden.—Blast Furnace Dimensions (Einiges über das Hochofenprofil). F. Stille. From "Werml. Annaler." Notes on blast-furnace practice in Sweden, principally with charcoal fuel. 800 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan 4, 1902.

Temperature Reactions.—Temperature Reactions in the Blast Furnace. Horace Allen. Gives diagram showing the variations which occur, with notes. 800 w. Engr, Lond—July 24, 1903.

Temperatures.—See **PYROMETER—Thermo-Electric.**

Toledo, Ohio.—New Blast Furnace Plant of the Toledo Furnace Co., at Toledo, Ohio. Illustrates and describes a well equipped plant for the production of foundry iron. 2800 w. Ir Trd Rev—Nov. 5, 1903.

Top Lift.—See **Charging Apparatus.**

Top Pressure.—See **Flue Dirt.**

Ural, Russia.—Blast Furnaces in the Ural. J. Bicheroux. Abstract from a paper in the "Revue Universelle des Mines." Describes prevailing conditions, the smelting plants, ores, etc. 1800 w. Eng & Min Jour—Aug. 4, 1904.

Valve.—See **Gas Valves; VALVE—Gate.**

Vares, Bosnia.—See **Charcoal.**

Water-Cooled Bosh.—A Water-Cooled Blast Furnace Bosh. Axel Sahlin. Illustrated description of an arrangement designed by the writer. 3000 w. Ir & Coal Trds Rev—May 10, 1901.

A Water-Cooled Blast-Furnace Bosh. Axel Sahlin. Read before the Iron & Steel Inst. Illustrates and describes a device which consists of a plate shell in the shape of an inverted frustrum. 1800 w. Engng—July 12, 1901.

Water Cooling.—An Improved Method of Supplying Water to Blast Furnace Tuyeres and Coolers. W. J. Foster. Illustrates and describes a method that has been in use more than twelve months with very satisfactory results. 2200 w. Ir & Coal Trds Rev—April 11, 1902.

Method of Supplying Water to Furnace Tuyeres and Coolers. W. J. Foster. Describes improvements introduced in a plant at Darlaston, England. 2200 w. Am Mfr—May 1, 1902.

A New System of Cooling Tuyeres for Blast Furnaces. Horace Allen. Deals with the Foster System, bringing forward some new facts. 1800 w. Ir & Coal Trds Rev—May 9, 1902.

An Improvement in Cooling Jackets for Blast Furnaces. David Baker. Describes a jacket designed by the writer, where the water collecting trough is outside of the furnace. Ills. 400 w. Ir & Steel Mag—May, 1905.

Zenith.—See **Duluth.**

Zinc.—Notes on the Behavior of Zinc in the Blast Furnace. John J. Porter. Deals with ores containing zinc, describing the reactions of zinc in the blast furnace, and the influence of the zinc upon the working of the furnace. 3000 w. Ir Age—March 24, 1904.

Zug Island, Mich.—The Zug Island Furnace of the Detroit Iron and Steel Co. Illustrated detailed description of the blast furnace especially designed for the production of foundry pig iron. 2500 w. Ir Trd Rev—June 1, 1905.

The Detroit Iron and Steel Company's Blast Furnace Plant. Illustrated description of these works and their equipment. 1400 w. Ir Age—June 1, 1905.

BLAST-FURNACE GAS.

See also **BLAST FURNACE; BLAST STOVE; BLOWING ENGINE; FUEL GAS; GAS ENGINE; GAS POWER.**

Notes on the Question of Power-Gas Application (Beiträge zur Frage der Kraftgasverwerthung). A. Wagener. With special reference to the most recent utilization of furnace gases. 4000 w. 1 plate. Stahl u Eisen—Nov. 1, 1900.

Power-Gas Development (Beiträge zur Frage der Kraftgasverwertung). A Wagener. A general review of the utilization of lean gases for power, with special reference to the large engines of the Oechelhaüser type recently built by the Deutsche Kraftgas-Gesellschaft. Two articles. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 10, 17, 1900.

Motive Power from High Furnace Gases. Bryan Donkin. A critical review of the development of the use of furnace gases for power generation, showing the probable great future of the method. 3500 w. Engineering Magazine—Dec., 1900.

The Use of Blast Furnace Gases in Gas Engines. Joseph W. Richards. A discussion of the great economy that may be made by applying this improvement, citing many cases, and reviewing the history of investigations made. 4500 w. Jour Fr Inst—Dec., 1900.

The Utilisation of Gas from Blast Furnaces and Coke Ovens (Utilisation des Gas de Hauts Fourneaux et de Fours à Coke). J. Deschamps. The first installment of a serial discussing the subject of the utilisation of furnace gases in gas engines. Serial. Part 1. 4000 w. Rev de Mécanique—Jan., 1901.

Progress in the Utilisation of Blast-Furnace Gases (Weitere Fortschritte in der Verwendung der Hochofengase zur Unmittelbaren Krafterzeugung). Fritz W. Lürmann. Abstract of a paper before the Verein Deutscher Eisenhüttenleute giving an account of the recent extensive use of blast-furnace gases in gas engines in various countries. 2000 w. Zeitschr d Ver Deutscher Ing April 13, 1901.

The Utilization of Blast Furnace Gases. A review of an address by J. Deschamps and the discussion that followed. 1400 w. Engr, Lond—June 7, 1901.

The Utilisation of Blast Furnace Gases (L'Utilisation des Gaz de Haut Fourneau). J. Deschamps. A general review of the development of power by the use of furnace gases in internal combustion motors, from the first experiments of Thwaite to the present time. Mem Soc Ing Civ de France—July, 1901.

The Direct Utilisation of Blast Furnace Gas (Utilisation des Gaz des Hauts Fourneaux). A Dutreux. A very full review of the progress which has been made in the direct use of waste furnace gases in internal combustion motors. Four articles. 7500 w. Génie Civil—June 22, 29, July 6, 13, 1901.

Use of Blast-Furnace Gas in Explosion Motors. From "Le Génie Civil." Summary and discussion of the important work of Herr Lürmann. Ill. 3000 w. Sci Am Sup—Oct. 5, 1901.

The Use of Blast-Furnace Gases in Gas Engines (Verwendung der Hochofengase in Gasmaschinen). F. W. Lürmann. With tabulated analyses of the gases from furnaces in various districts, showing a mean calorific power of 877 calories per cubic metre. 1000 w. Stahl u Eisen—Nov. 1, 1901.

Blast Furnace Gas Power. Horace Allen. Discusses this gas as an important source of cheap power. 2500 w. Elec Rev, Lond—Sept. 12, 1902.

The Utilization of Blast-Furnace Gases for Power Purposes. Charles Kirchhoff. Traces the development of the gas engine and discusses the use of waste furnace gas, presenting some of the principal engine designs. Ill. 4000 w. Jour Fr Inst—Aug., 1903.

Blast Furnace Gas as the Sole Motive Power of a Modern Iron Works (Hochofengas als Alleinige Betriebskraftquelle eines Modernen Hüttenwerks). Karl Gruber. Showing the amount of power available in waste furnace gases, and the practicability of its use. Two articles. 7000 w. Stahl u Eisen—Jan. 1, 15, 1904.

The Blast Furnace as the Sole Source of Power in a Modern Steel Works. Abstract of an article by Karl Gruber, translated from "Stahl und Eisen." Describes an imaginary plant. 2800 w. Ir Age—March 17, 1904.

Analysis.—The Analysis of Blast Furnace and Producer Gas (Analyse der Hochofen- und Generatorgase). A Wencelius. An illustrated account of apparatus, methods and results. 2000 w. Stahl u Eisen—May 1, 1902.

The Analysis of Blast-Furnace and Generator Gases (Analyse der Hochofen- und Generatorgase). A. Wencelius. A supplement to a previous article, giving an illustrated description of apparatus for gas analysis and its manipulation. 2000 w. Stahl u Eisen—June 15, 1902.

Gas Analysis Calculation of a German Blast Furnace Producing Grey Foundry Iron (Gasanalytische Durchrechnung eines Deutschen Hochofens auf Graues Giessereiroheisen). Dr. C. Waldeck. An analytical investigation of the raw materials entering into and the gases and other products coming from a blast furnace. 2000 w. Stahl u Eisen—June 1, 1903.

Blast-Furnace Gases. John Herman, in "Western Chemist and Metallurgist." Gives analyses made of gases in several places, discussing the fuel and blast. 1200 w. Eng & Min Jour—Oct. 21, 1905.

See also **Composition; Dust Analysis.**

Belgian-Ougree.—See **BLAST FURNACE.**

Blowing Engine.—See **BLOWING ENGINE.**

Calcium Carbide Manufacture.—See **CALCIUM CARBIDE—Blast-Furnace Gas Power.**

Cleaning.—See **Purification; Washer.**

Comparative Experiments.—Comparison of Cost of Operating an Iron Smelting Plant by Gas Engines Using Waste Blast Furnace Gas, and by Gas Fired Boilers and Steam Engines. William M. Chatard, Henry J. Botchford and Emley M. Holcombe. Graduation thesis. A report of experimental investigations with results. 2500 w. Stevens Ind—Jan., 1902.

Composition.—The Composition of Blast Furnace Gases (Berechnung der Zusammensetzung der Hochofengase). Bernhard Osann. An examination of the chemical composition and thermal value of blast furnace gases, and their relations to the blast and fuel. 3000 w. Stahl and Eisen—Sept. 1, 1901.

See also **Analysis.**

Dust.—Dust in Blast-Furnace Gases. Adolphe Greiner. Read before the Iron & Steel Inst. Information of use to those using this gas in gas-engines. Also discussion. 4800 w. Ir & Coal Trds Rev—May 10, 1901.

See also **Purification.**

Dust Analysis.—A New Process for the Quantitative Determination of Dust in Gases (Ein Neues Verfahren zur Quantitativen Bestimmung von Staub in Gasen). Leo Martius. An illustrated description of apparatus and methods for analysing dust, particularly that in blast-furnace gases. 1400 w. Stahl u Eisen—June 15, 1903.

Elba.—Power Installation at the Isle of Elba for the Utilization of Blast Furnace Gas. Emile Guarini. Illustrated description of an interesting example of the utilization of blast furnace gas for the production of power by means of gas engines and dynamos. 800 w. Power—Aug., 1904.

Electric Installation of the Elba Iron Works (Installation Electrique des Hauts Fourneaux de la Société Elba). Describing the power station, electric pumps, and general arrangement. Gas engines using waste furnace gases are used. 2000 w. Génie Civil—Oct. 24, 1903.

Electric Furnace.—Electric Smelting and Blast Furnace Gases. Auguste J. Rossi. The first part of an article on the utilization of blast furnace gases for the generation of electrical energy for use in the electric furnace. Serial. 1st part. 2000 w. Elec-Chem & Met Ind—April, 1905.

Electric Power.—The Importance of Furnace Gases for Electric Traction (Die Bedeutung des Gichtgases für die Elektrische Traktion). O. Peter. A discussion of the availability of power from blast furnace gases for operating electric traction in the vicinity of iron works. Serial. Part I. 4000 w. Glasers Annalen—Oct. 1, 1904.

Commercial Possibilities of Blast Furnace Gas for the Development of Electric Power. F. du P. Thomson. Presents the advantages and disadvantages of the blast furnace gas power plant, giving details of estimated cost based on experience. Ills. 4800 w. Elec-Chem & Met Ind—March, 1905.

Electric Power from Blast Furnace Gas. H. Freyn. From a paper read before the W. Soc of Engrs. Notes the quantity of gas used for the various purposes of the blast furnace plant, showing that a little less than 50 per cent. is available for use outside the plant. Discusses the cost of the electric power station and installation, operation, &c. 4000 w. Ir Age—Dec. 28, 1905.

Faber du Faur.—The Work of Faber du Faur in the Utilization of Furnace Gases (Faber du Faur und die Verwendung der Gichtgase). Ernst Baur. An historical review of the introduction of the hot blast into German blast furnaces. 2500 w. Stahl u Eisen—May 15, 1904.

Gas Engine.—See **BLOWING ENGINE; GAS ENGINE—Blast Furnace Gas.**

Ilseder, Westphalia.—The Blast-Furnace Gas-Power Plant at the Ilseder Iron and Steel Works. G. Hooghwinkel. Illustrates and describes the equipment and working of this plant in Westphalia, from which electric current is distributed to works several miles apart. 1200 w. Elec Engr, Lond—May 12, 1905.

Ilsenburg.—See **GAS ENGINE—Blast Furnace Gas.**

Laar, Germany.—See **GAS POWER PLANT.**

Oechelhäuser Engine.—See **GAS ENGINE.**

Open-Hearth Steel.—The Cost of Open-Hearth Steel as Affected by Using Blast Furnace Gas in Gas Engines, and Remarks on the Latest Improvements. Peter Eyermann. Gives some important points in relation to gas engines, and calculations, indicating how great economy may be affected. 6400 w. Jour Assn of Engng Soc—Sept., 1903.

Open-Hearth Steel Making and Blast Furnace Gas in Gas Engines. Peter Eyermann. From a paper read before the Civ. Engrs. Club of Cleveland. Illustrates types of gas engines suited for the use of blast-furnace gas, and discusses the economies to be effected in the consumption of coal, etc. 5000 w. Ir Trd Rev—Oct. 22, 1903.

See also **OPEN-HEARTH PROCESS—Blast-Furnace Gas.**

Purification.—Progress in the Application of Blast-Furnace Gases to Power Generation. (Weitere Fortschritte in der Verwendung der Hochofengase zur Unmittelbaren Krafterzeugung). F. W. Lürmann. Discussing especially the purification of the gas; also describing recent large engines. A paper before the Verein Deutscher Eisenhüttenleute. Two articles. 10000 w. Stahl und Eisen—May 1, 15, 1901.

The Purification of Blast-Furnace Gas. F. W. Lürmann, in "Stahl und Eisen." Illustrated account of the arrangements in use at several large plants in Germany. 1200 w. Col Guard—May 24, 1901.

The Purification of Blast-Furnace Gases (Die Reinigung der Hochofengase). F. W. Lürmann. A response to comments upon the author's recent paper on the same subject, with additional data as to the preparation of furnace gases for use in internal-combustion motors. 1800 w. Stahl u Eisen—June 15, 1901.

The Purification of Blast Furnace Gases (L'Epuration des Gas de Haut-Fourneau). Jules Deschamps. An examination of the impurities found in blast furnace gases, and a discussion of the methods for preparing the gas for use in internal combustion motors. Serial. Part I. 5000 w. Revue de Mécanique—June 30, 1901.

Utilisation of Blast-Furnace Gases for the Production of Power. Summary of a paper by Herr Lürmann read at a meeting of the German Iron Works Assn., and published in "Stahl und Eisen." Considers the purification, utilization and appliances. Serial. 2 parts. 7200 w. Engr, Lond—July 5 and 12, 1901.

The Purification of Blast-Furnace Gas (Beiträge zur Frage der Gichtgasreinigung). Bernhard Osann. A description of methods of cleansing blast-furnace gas, with estimates of the cost. 6500 w. Stahl u Eisen—Feb. 1, 1902.

The Purification of Blast Furnace Gas. The first of a series of articles describing apparatus for purifying this gas. Serial. 1st part. 1600 w. Ir & Coal Trds Rev—Jan. 9, 1903.

The Cleaning of Blast-Furnace Gas. Axel Sahlin. Read before the Iron and Steel Inst. Considers the process of cleaning as regards the degree of purity reached, and the cost of reaching it. 4000 w. Ir & Coal Trds Rev—May 12, 1905.

Cleansing Blast-Furnace Gas. Axel Sahlin. An illustrated article showing the advantages and importance of cleaning the gas, and the methods of cleaning; describing apparatus used. 4500 w. Cassier's Mag—Oct., 1905.

The Bian Apparatus for Purifying and Cooling Blast-Furnace Gases (Reinigungs und Kühlapparat für Hochofengase, System Bian). Frits Krull. The gas is passed through disks of wire netting partly immersed in water. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 14, 1905.

An Improved Device for Cleaning and Cooling Blast Furnace Gas (Ein Neuer Reinigungs-und Kühlapparat für Hochofengase). F. Krull. A description of the Bian apparatus, in which the gas is passed through perforated discs revolving in a closed cylindrical tank containing water. 1200 w. Glückauf—Oct. 28, 1905.

See also **Washer.**

Recording Apparatus.—Apparatus for Recording the Gas Produced by a Blast Furnace (Registrirapparat zur Ueberwachung der Begichtung der Hochöfen). Dr. Neumark. Describing a form of recording device for indicating the rate of gas discharge from a furnace; thus giving a valuable indication of the combustion performance. 1200 w. Stahl u Eisen—Aug. 1, 1902.

Tar and Ammonia.—Progress in the Production of Tar and Ammonia from the Gases of Blast Furnaces and Producers (Fortschritte in der Gewinnung von Theer und Ammoniak aus den Gasen der Hochöfen und Generatoren). A review of methods and results in gaining these by-products. 4500 w. Stahl u Eisen—May 1, 1902.

Tests.—See **CALORIMETER—Junkers.**

Thwaite.—Blast Furnace Gas as a Source of Power. An account, with illustrations, of the system developed by B. H. Thwaite, with letters in regard to reliability of the apparatus. 3000 w. Power—Jan., 1904.

The Profitable Utilisation of Power From Blast-Furnace Gases. B. H. Thwaite. An explanation of the system and a statement of its advantages. 1100 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Thwaite-Gardner. — Blast-Furnace Gas and the Thwaite Gardner Blowing Engine (L'Utilisation des Gaz de Hauts Fourneaux. Machine Soufflante Thwaite-Gardner). Jules Deschamps. A discussion of the utilization of blast-furnace gas, and an illustrated description of the Thwaite-Gardner blowing engine of the Otto type. 2500 w. Rev de Mécanique—April, 1902.

Washer.—Theisen's Centrifugal Gas-Washer. Illustrates this machine, explaining the working principle of the system. 800 w. Engng—July 15, 1904.

BLASTING.

See also **COAL DUST; COAL MINE EXPLOSION; EXPLOSIVE—Ignition.**

The Ignition of Explosives. A discussion of the advantages and costs of the various methods. 2100 w. Col Guard—March 8, 1901.

Precautions to be Observed in Blasting (Emplois des Explosifs). H. Ramu. A discussion of the causes of blasting accidents in mining and quarrying due to delayed shots, etc., and recommendation of precautions to be observed. 1600 w. Bull Soc d'Encouragement—April, 1902.

Ahnapee Harbor, Wis.—See **RIVER REGULATION.**

Bituminous Mines.—See **Coal Mine; Electric.**

Boulders.—Methods and Cost of Blasting and Handling Boulders. Daniel J. Hauer. Explains the different methods of handling and breaking up both large and small boulders, giving some data as to the cost. 6500 w. Eng News—Jan. 5, 1905.

Coal Mine.—The Management of Shot-Firing in Coal Mines. Suggests rules which, if enforced, the writer believes would reduce accidents from this cause to a minimum. 2000 w. Col Guard—Feb. 6, 1903.

Some Suggestions on Shot-firing. Suggestions made by A. L. Hayden to the Kansas Commission on accidents in coal mines. 1200 w. Eng & Min Jour—June 15, 1905.

Blasting Coal in Bituminous Mines. J. T. Beard. States the conditions that have led to the excessive use of powder, and discusses the placing of shot, the location of the charge, the direction and depth of the hole, and the manner of firing. Ills. Serial. 1st part. 3000 w. Eng & Min Jour—Sept. 28, 1905.

Electric.—Electric Shot-Firing in Quarries. Gives some reasons for adopting it. 2800 w. Quarry—April, 1901.

Induction Spark Igniter for Mining (Funken-inductions-Minenzündung). Johann von Lauer. Illustrating and describing a convenient form of igniter for mining explosives. 1800 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 15, 1900.

Firing Blasting Charges by Induction Sparks. J. von Lauer. Translated from "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrated description of apparatus designed by the writer, and the results of experiments made. 1500 w. Col Guard—Dec. 28, 1900.

Improved Electric Mining Igniter (Neue dynamoelektrische Minenzündmaschine). L. Volf. A description of the Tirmann apparatus, in which the current from a portable hand-dynamo raises a platinum wire in the fuse to redness. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—April 27, 1901.

The New Tirmann Igniter and Delayed Shots. L. Volf, in "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Illustrated description of a dynamo-electric igniter and the method of working. 1200 w. Col Guard—May 3, 1901.

The Prevention of Defective Firing with Electrical Igniters (Die Beseitigung der Versager bei der Elektrischen Schusszündung). G. A. Meyer. A full review of the methods of electrical ignition of blasting charges in mining, with an examination of the causes of defective ignition. 5000 w. Glückauf—Sept. 28, 1901.

Many Advantages of Blasting by Electricity. George A. Allen. An illustrated article explainconnecting the wires, and giving information :n regard to fuses, the blasting machine, &c. 3600 ing the usual way of arranging the blast and w. Min Wld—Feb. 11, 1905.

See also Oil Wells; Wiring.

Electric Accumulators.—The Ignition of Mining Blasts by Accumulators (Accumulator-Minenzündung). J. von Lauer. A description of the use of the accumulator for igniting blasts in gaseous mines with a minimum of danger of firedamp explosions. 1200 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 20, 1900,

Fuse.—Notes on Safety Fuse: Its Manufacture, Testing and Use. James Thomas. A discussion of points named. 5000 w. Jour Chem, Met & Min Soc of S Africa—Nov., 1904.

Gold Placer.—See **GOLD DREDGING—Blasting.**

Henderson's Point, Me.—Destruction of Henderson's Point. Charles B. Morse. An illustrated description of the methods used in removing this rocky point at Kittery, Maine, made necessary in the widening of the channel of the Piscataqua River, so that large warships might reach the new drydock. 1400 w. Compressed Air—Aug., 1905.

The Great Blast at Henderson's Point, Portsmouth Navy Yard. Illustrates and describes the explosion of 38 tons of dynamite, in a submarine blast. The method used was of unusual interest. 1400 w. Eng News—Aug. 3, 1905.

Misfire.—The Causes of Misfire. A. W. Warwick and J. H. Henley. Gives an account of investigations made, with the conclusion that the fault lies in the fuse, and explains some causes. Ill. 1200 w. Min Rept—June 20, 1901.

The Theory of Misfires and Some Conclusions of Practical Value. Continued discussion of paper by E. H. Weiskopf. 1700 w. Jour Chem & Met Soc of S Africa—Dec., 1902.

Oil Wells.—Electrical Engineering at Oil Wells. On the use of electrical facilities in connection with blasting. Ill. 1300 .w. Min Rept—Nov. 14, 1901.

Passgrub Quarry.—Explosion of a Triple Mine at the Passgrub Quarry near Greifenstein (Sprengung einer Dreikammermine im Passgrubsteinbruche nächst Greifenstein). Hugo Münch. Describing the method employed for the breaking down of a large quantity of stone by chamber mines. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—April 7, 1905.

Portsmouth Navy Yard.—See **Henderson's Point.**

Sand Bar.—Final Report of the Dynamiting of the Brunswick Outer Bar, Ga. Information concerning the work and the cost. 1400 w. Eng News—April 18, 1901.

Dynamiting Sand Bars. Reviews a report on an attempt to blast a channel through a sand bar at Brunswick, Ga., the work costing twelve times as much as dredging. 1600 w. Eng Rec—June 8, 1901.

Slate Quarries, Wales.—Remarkable Blasting Operations in Slate Quarries. Describes interesting blasting operations in Wales. Ill. 900 w. Sci Am—Sept. 6, 1902.

Large Blasting Operations in Slate Quarries. Illustrates and describes some unusually large blasts carried out in North Wales. 2200 w. Ir & Coal Trds Rev—Sept. 30, 1904.

Stemming Shot-Holes.—Stemming Shot-Holes. From "Annales des Mines." Report by the French committee on explosives, on experiments made. Ill. 1700 w. Col Guard—Oct. 25, 1901.

Tamping.—The Value of Tamping. A. W. Warwick. The writer favors the use of tamping and gives arguments supporting his conclusions. 1200 w. Min Rept—Dec. 5, 1901.

Notes on Recent Experiments with Mechanical Tamps. W. R. Crane. An illustrated description of successful experiments in blasting, in which were used mechanical tamps consisting of a standard and two cylindrical wedges with serrated faces. 2500 w. Eng & Min Jour—Dec. 20, 1902.

Tirmann Igniter.—See **Electric.**

Wiring.—The Wiring Circuits for Electric Blasting (Die Schaltung der Sprengschüsse bei Elektrischer Zündung). Hr. Heise. A discussion of series, parallel, and combined systems of wiring where more than one shot are to be exploded. Diagram. 2000 w. Glückauf—April 12, 1902.

BLAST STOVE.

See also **BLAST FURNACE; BLAST-FURNACE GAS; BLOWING ENGINE; COPPER METALLURGY.**

Brick Blast-Heating Stoves (Steinerne Winderhitzer). F. W. Lürmann. A discussion of the construction, the behavior of bricks used in the checkerwork of hot blast stoves with data of tests, showing the importance of using high-grade material. 3500 w. Stahl und Eisen—Aug. 1, 1901.

Hot Blast Stoves (Ueber Winderhitzer). G. Teichgräber. A discussion of recent designs for stoves for heating the wind for blast furnaces, with especial reference to the improvement in the combustion of the gases. 1800 w. Stahl u Eisen—March 15, 1902.

Copper Smelting.—See **COPPER METALLURGY—Hot Blast.**

Flue Dust.—The Effect of Flue Dust upon the Thermal Efficiency of Hot-Blast Stoves. B. H. Thwaite. Investigation made to determine whether it is possible with a given heating capacity to raise the efficiency of the hot-blast stove and sustain it as near to that possessed by any well-designed recuperator of a gas-fired open-hearth furnace. 4300 w. Ir & Coal Trds Rev—May 8, 1903.

Hartman-Kennedy.—The Hartman-Kennedy Fire-Brick Stove. John M. Hartman and John S. Kennedy. Illustrated description of three hot-blast stoves and equaliser for the blast-furnace plant of the Musconetcong Iron Works, Stanhope, N. J. 500 w. Ir Age—Aug. 18, 1904.

BLEACHING.

Electrolytic.—See **ELECTRO-CHEMISTRY—Bleaching.**

BLEACHING POWDER.

Acker Process.—See **ELECTRO-CHEMISTRY.**

Rhodin Process.—See **ELECTRO-CHEMISTRY—Sault Ste Marie.**

BLOCK.

Tests.—See **HOISTING TACKLE.**

BLOCK SIGNAL.

See **ELECTRIC RAILWAY SIGNAL; RAILWAY SIGNAL.**

BLOWER.

See also **FAN; HEATING AND VENTILATION; MECHANICAL DRAFT; MINE VENTILATION; PUMP—Centrifugal; VENTILATION.**

Centrifugal.—See **FAN.**

Cupola.—See **FAN.**

Earthenware.—See **EARTHENWARE.**

Rateau.—See **PUMP—Centrifugal, Rateau.**

Sirocco Test.—See **PUMP—Centrifugal Testing.**

Steam Turbine.—See **STEAM TURBINE—Fan Blower.**

Testing.—See **FAN.**

BLOWING ENGINE.

See also **BLAST FURNACE; BLAST-FURNACE GAS; BLAST STOVE; GAS ENGINE.**

Some Recent Types of Blowing Engines and Valves. Illustrated detailed description of the latest developments. 1400 w. Ir & Coal Trds Rev—March 22, 1901.

Allis Russian.—New Blowing Engine for the Pastuchoff Anthracite Blast Furnaces at Sulin, South Russia (Neue Gebläsemaschine für die Pastuchoffschen Anthracithochöfen in Sulin, Südrussland). Oscar Simmersbach. An illustrated description of a blowing engine built by the Allis Co. of Milwaukee, U. S. A. 1 plate. 800 w. Stahl u Eisen—May 1, 1902.

Askam Iron Works.—Compound Blowing Engine at the Askam Iron Works. Illustrates and describes the engine and its operation. 1200 w. Engng—Sept. 13, 1901.

Blast Furnace Gas.—See **Gas-Driven; BLAST-FURNACE GAS.**

Compounding.—The Compounding of Two Simple Blowing Engines. John H. Barr. An account of the scheme for converting two simple blowing engines of different make into a connected compound engine with duplex air cylinders. 1000 w. Sib Jour of Engng—March, 1903.

Danowitz Works, Austria.—Blast Furnace Blowing Engines at Danowitz Works, Austria (Hochofengebläse des Hüttenwerkes Danowitz). Description and illustrations of double vertical blowing engine delivering 1000 cubic metres of air per minute at a pressure of 0.7 atmosphere. 1000 w. Zeitschr d Ver Deutscher Ing—Aug. 23, 1902.

Gas-Driven.—Gas-Driven Blowing Engine (Delamere-Deboutteville & Cockerill System). Illustrated description of 750 H. P. blowing engines driven by blast-furnace gas, and of the working. 1800 w. Engng—May 22, 1903.

Gas-Driven Blowing Engine with Sliding Air-Valves. Two-page plate, with brief description. 300 w. Engng—March 4, 1904.

Gas Blowing Engines. T. Westgarth. Gives 15 figures, with brief descriptions, and charts showing the running. 2400 w. Jour W of Scot Ir & Steel Inst—Feb., 1905.

Gas Blowing Engines. Tom Westgarth. Abstract of a paper before the West of Scotland Iron and Steel Inst. Gives illustrations of various types, with brief descriptions, and information in regard to the running and the care and cost. 2000 w. Engr, Lond—May 5, 1905.

Blast Furnace Gas Blowers. Dr. Alfred Gradenwitz. Illustrates and briefly describes examples of gas-driven blowing engines made in Germany. 600 w. Ir Trd Rev—Aug. 17, 1905.

See also **BLAST-FURNACE GAS.**

Gas vs. Steam.—Notes on Steam-Driven and Gas-Driven Blowing-Engines. Tom Westgarth. Read before the Engng Con. of the Inst. of Civ. Engrs. Considers these engines individually, and also the question as to which type is more economical and more suitable for the work. 1500 w. Engng—June 19, 1903.

Blast-Furnace Gas Engines and Steam Engines. H. G. Scott. Facts given in connection with the discussion of a paper by Cecil A. Cochrane, at a meeting of the Cleveland Inst. of Engrs. Compares the efficiency. 3000 w. Engng—May 22, 1903.

History.—Blowing Engines. William B. Snyder. Historical sketch of blowing machines used for iron smelting and for the Bessemer process. Ill. 10000 w. Pro Engrs' Soc of W Penna—Sept., 1900.

Kennedy Valves.—Kennedy's Piston Inlet and Outlet Air-Valves for Blowing-Engines. Illustrates and describes four recently installed engines with air-valves of the Kennedy patent horizontal piston type. 900 w. Engng—April 14, 1905.

Mackinac.—The Mackinac Blowing Engine at the Calumet and Hecla Mines. Joseph S. Soddy. Illustrates and describes a four-cylinder, triple-expansion condensing engine, rated at 7000 H. P. capacity, and to be the largest of this type in the world. 1000 w. Power—Feb., 1904.

Pressure Loss.—The Loss of Pressure in Blowing-Engine Valves (Druckverluste in Gebläseventilen). Prof. L. Klein. Describing experiments upon the relation of lift to pressure loss in air valves of blowing engines operated at high speeds. 1000 w. Zeitschr d Ver Deutscher Ing—Nov. 12, 1904.

Quarter Crank.—Quarter-Crank Blowing Engines. Illustrations, with an explanation of the general design and scope of these engines. 1500 w. Engr, Lond—July 24, 1903.

Stumpf-Riedler. — Blowing Engine Construction (Ueber Gebläsemaschinen). H. Braunne. Describing the improved Stumpf-Riedler machine, with especial reference to the valve construction. 1200 w. Oesten Zeitschr f Berg u Hüttenwesen—Oct. 26, 1901.

Suspended Valves.—Horizontal Blowing Engine with Suspended Valves (Liegende Hochofen-Gebläsemaschine mit Lenkerventilen). H. Hoerbiger. Illustrated description of engine for blast furnace service. The air valves are supported on spring links. 4500 w. 2 plates. Zeitschr d Ver Deutsch Ing—Feb. 16, 1901.

Thwaite-Gardner.—See **BLAST-FURNACE GAS.**

Vertical.—Blowing Engines at the Priors Lee Furnaces. Illustration and drawings of a set of vertical compound blowing engines recently erected, the first, in England, fitted with positive valve gear and blowing at high pressure. Brief description. 500 w. Engr, Lond—Feb. 13, 1903.

Blast-Furnace Vertical Blowing-Engines. Illustrated detailed description of new blowing-engines at the North-Eastern Steel Company's works, England. 1700 w. Engng—Jan. 6, 1905.

Westinghouse.—The Westinghouse Blowing Engine. Illustrated detailed description of the construction. 2700 w. Ir Age—Dec. 3, 1903.

The Westinghouse Blowing-Engine. Illustrated detailed description of a new design of the long cross-head type. 2500 w. Engng—Dec. 11, 1903.

Work.—See **COMPRESSED AIR.**

BLOW-OFF TANK.

Blow-Off Tanks for Steam Boilers. Harold W. Barker. Discusses the damage to sewers from the hot water from boilers, and gives an illustrated description of a tank for cooling the water to a safe temperature before it enters the sewers. 600 w. Prac Engr—Aug. 16, 1901.

BLOWPIPE.

Acetylene.—See **WELDING—Blowpipe.**

Oxy-Hydrogen.—See **WELDING—Blowpipe.**

BLUE PRINT.

See also **DRAWING-ROOM.**

The Reproduction of Drawings of Great Length or Number. L. F. Rondinella. A review of the methods for making long blue prints, giving illustrated descriptions of several continuous-printing machines and their working. Also general discussion. 5800 w. Pro Engrs' Club of Phila—Oct., 1905.

Electric Light.—Blue-Printing by Electric Light. H. G. Reist. An illustrated description of an arrangement for printing which gives satisfactory results. 1000 w. Trans Am Inst of Mech Engrs, No. 900—May, 1901.

Blue Printing by Electric Light. S. B. Whinery. Gives illustrated descriptions of the two types of machines for this purpose now on the market, discussing the advantages of each. 4000 w. Pro Engrs' Club of W. Penn—Oct., 1901.

Electric Blue-Print Making. George J. Jones. An illustrated description of the blue-print making machine, in which the electric light is used. 700 w. Sci Am—July 18, 1903.

Frame.—A Rapid Blueprint Frame. John Randol. Illustrates and describes the blueprint frame invented by Charles H. Wills. 1200 w. Am Mach —Aug. 13, 1903.

BOAT.

See also **BOAT, ELECTRIC; BOAT, GASOLINE; BOAT, STEAM; FERRY BOAT; FIRE BOAT; ICE YACHT; LIFE-BOAT; SAIL BOAT; STEAMBOAT; SUBMARINE BOAT; TORPEDO BOAT; TOW BOAT; YACHT.**

Collapsible.—See **Folding.**

Construction.—The Construction of Motor Launches. W. F. Durand. Considers the purpose the builders must keep in view and gives hints regarding the construction. Ill. 3800 w. Marine Engng—Feb., 1903.

de Lambert.—See **Gliding.**

Design.—The Design of Motor Lauches. W. F. Durand. Considers briefly the design of form and of its relation to resistance, stability, capacity, and safety. 7500 w. Marine Engng—Jan., 1903.

See also **BOAT, GASOLINE.**

Fire.—See **BOAT, GASOLINE; FIRE BOAT.**

Fishing.—See also **BOAT, GASOLINE; STEAMBOAT.**

Fishing, San Francisco.—Foreign Types of Fishing Boats in San Francisco Bay. E. N. Percy. Brief illustrated descriptions of unique types, including a Chinese junk, and an Italian fishing boat. 600 w. Marine Engng—Aug., 1905.

Folding.—Folding Canoes and Jointed Oars. Emile Guarini. Illustrates and describes a portable, collapsible boat exhibited at Brussels. 1000 w. Sci Am—July 8, 1905.

See also **LIFE BOAT—Engelhardt.**

Gliding.—Gliding Boats. The Navigation of the Future. Prof. Daniel Bellet. Gives an illustrated description of Count de Lambert's boat, explaining its principle, and mentioning some other attempts to glide over the water. 1600 w. Sci Am—Oct. 7, 1905.

Hospital.—See **BOAT, ELECTRIC—Hospital.**

Houseboat.—The Houseboat for Summer Outings. Illustrated descriptions of recent types, some self-propelled. 1500 w. Marine Engng—Aug., 1903.

James Folding.—See **LIFEBOAT.**

Lowering Gear.—See **LIFEBOAT.**

Malay Peninsula.—Boats and Boat Building in the Malay Peninsula. H. Warington Smythe. An illustrated article describing the types of boats and the conditions they were to meet, methods of building, etc., with list of boats and tabulated information. Also discussion. 9600 w. Jour Soc of Arts—May 16, 1902.

Motor.—The Application of Oil Motors to Marine Work. The first of a series of articles, discussing the advantages and disadvantages of these motors. The present number considers the application to launches. Serial. 1st part. 3400 w. Prac Engr—Aug. 23, 1901.

Motive Powers for the Modern Launch. E. W. Roberts. A fully illustrated study of the marine applications of electrical, gasoline, and oil motors, especially for the propulsion of launches and small boats. 5000 w. Engineering Magazine—June, 1902.

Modern American Launch Motors. W. P. Stephens. Reviews the history of the propulsion of small boats by steam, and the later developments resulting in the naphtha launch, the gas engines of various types, and the electric motor. Ill. 6000 w. Cassier's Mag—Aug., 1903.

See also **BOAT, ELECTRIC; BOAT, GASOLINE; BOAT, STEAM; GAS ENGINE—Dunlop; OIL ENGINE—Marine.**

Naphtha, "John Chamberlin."—Remarkable Naphtha Boat John Chamberlin. Brief description, with illustrations, of a novel experimental boat. 700 w. Marine Rev—July 21, 1904.

Nile.—The Passenger Boat Service on the Nile. A résumé of the service carried on, with a sketch of the very earliest and the latest type of boat used. 4000 w. Engr, Lond—Nov. 27, 1903.

Philippines.—Queer Craft Seen on My Travels in the Philippines, China and South America. E. O. Rost. Brief illustrated descriptions of strange boats. 1200 w. Sci Am—Sept. 13, 1902.

Propulsion.—The Powering and Propulsion of Small Boats. W. F. Durand. A general discussion of methods for determining the amount of power required for the propulsion of small boats and of their propellers. 3800 w. Marine Engng—March, 1903.

See also **Motor; BOAT, GASOLINE—Motor.**

Self-Bailing.—See **LIFE BOAT.**

Torpedo.—See **TORPEDO BOAT; TORPEDO-BOAT DESTROYER.**

BOATBUILDING.

See **SHIPBUILDING—Small Vessels.**

BOAT, ELECTRIC.

See also **BOAT—Motors; BOAT EXHIBITION.**

German, English and American Electric Launches. Frank C. Perkins. Illustration, with brief descriptions of some of these interesting vessels. 1000 w. Marine Engng—July, 1903.

Bullock.—A Bullock Electric Launch. Illustrated description of a boat representing the latest practice in electric propulsion for small pleasure craft. 700 w. Marine Engng—Jan., 1901.

Canal Haulage.—See **CANAL HAULAGE—Electric.**

Hospital.—Hospital Electric Launch. Illustration and description of a novel vessel to be used for the St. John's Guild, New York, for transferring sick children between the floating hospitals and the Seaside Hospital. 600 w. Marine Engng—Sept., 1902.

Russian Oil Boat.—Electricity as Motive Power for 1,100-Ton Cargo-Boat. J. W. H. Hamilton. Interesting facts relating to the "Vandal," a Russian boat for transportation of oil. Also of a second boat of different design for the same service. 1800 w. Elec Wld & Engr—April 15, 1905.

St. Louis Exposition.—See **TRANSPORTATION.**

"Vandal."—See **Russian Oil Boat.**

Watt-Accumulator.—An Experimental Electric Launch. Prof. Oswald Flamm. Translated from "Schiffbau." Illustrates and describes a boat built by the Watt-Accumulator Works in Zehdenick, on the Havel. Serial. 1st part. 900 w. Marine Engng—July, 1902.

BOAT EXHIBITION.

Berlin.—An International Motor-Boat Exhibition at Berlin. An account of an exposition to be opened June first, near Berlin, which contemplates a display of the best that has been achieved in all countries in respect to the construction, care and use of boats, launches, yachts, and craft propelled by gas, gasoline, electrical or steam motors. 800 w. U S Cons Repts, No. 1290—March 15, 1902.

London.—Marine Petrol Motors at the Boating Exhibition, Earl's Court, London. Brief illustrated descriptions of some of the more important exhibits. 3000 w. Engrs' Gaz—April, 1903.

New York.—First National Motor Boat Show. Illustrations and descriptive notes on the gasoline launches and engines displayed at Herald Square Exhibition Hall, New York. 2000 w. Automobile—Feb. 20, 1904.

Motor Boat Engines at the Sportsmen's Show. Illustrated descriptions of several noteworthy engines exhibited. 1400 w. Sci Am—March 4, 1905.

Paris Automobile Show.—Motor-Boats at the Paris Automobile Show. An illustrated article describing hulls, gasoline engines and other characteristics of the exhibits. 2400 w. Engng—Jan. 27, 1905.

French Auto Boats and Motors. Brief descriptions, with illustrations, of recent models shown at the Paris show. 2200 w. Automobile—Feb. 25, 1905.

BOAT, GASOLINE.

See also **BOAT—Motors; BOAT EXHIBITION; BOAT RACE.**

Power Launches. An illustrated article giving general information of the material used, the construction, dimensions, &c. 2500 w. Naut Gaz—Sept. 24, 1903.

Motor Vehicles of the Waterways. Illustrates some of these motor boats, calling attention to points in the construction. 1700 w. Automobile—Dec. 12, 1903.

New Power Boats. C. D. Mower. An illustrated article giving much information in regard to these boats, the different designs, &c. 3800 w. Rudder—May, 1904.

High-Speed Motor Boats (Les Canots Automobiles à Grande Vitesse). A. Tellier fils. Details of speed trials of a number of boats propelled by petrol motors at speeds up to 40 kilometers per hour. 4000 w. 1 plate. Mem Soc Ing Civ de France—Oct., 1904.

Speed and Power of Recent Motor Boats of Several Types. Alpheus A. Packard. Illustrates and describes various types of gasoline boats, giving actual results as to speed and power. 2500 w. Soc of Naval Archts & Marine Engrs, No. 13—Nov., 1904.

Internal-Combustion-Engine Launches. Illustrations and brief descriptions of boats of this class and their equipment. 1500 w. Engng—Feb. 3, 1905.

Motor Boats. Dr. William F. Durand. States the problems of this class of boats, especially considering the motive power plant, its design, character and installation. Ills. Serial. 1st part. 3000 w. Marine Engng—July, 1905.

Recent Motor Boats with Internal-Combustion Engines (Neuere Motorboote mit Verbrennungskraftmaschinen). W. Kammerer. Describing recent motor boats in England, France, and Germany. 3500 w. Zeitschr d Ver Deutscher Ing—Nov. 11, 1905.

Problems in Connection with High-Speed Launches. Clinton H. Crane. Discusses the shape of the under water form; the skimming idea, and other points in design. Ills. 1500 w. Rudder—Dec., 1905.

American & Swiss.—Modern Motor Boats (Moderne Motorboote). Photographs and details of some recent motor boats of American and Swiss design. 1800 w. Schweiz Bauzeitung—May 27, 1905.

British War Office.—Launch with Daimler Motor for the British War Office. Illustrated description of a launch built for the British War Office, intended for use in towing targets to and from their stations during artillery practice. 700 w. Engng—May 23, 1902.

Brooke.—A Six-Cylinder 400-Horse-Power Racing Gasoline Power Boat. Illustrates and describes a racing boat built by the Brooke Motor Co. of Gt. Britain. 900 w. Sci Am—Nov. 11, 1905.

Canal Boat.—Successful Motor-Driven Canal Boat. Brief illustrated description of a boat propelled by a three cylinder gasoline engine of 21 H. P., which drives a 28-in. 3-bladed propeller. The design and construction of the hull and arrangement of the propeller are quite new. 500 w. Naut Gaz—Feb. 2, 1905.

"City of Fort Pierre."—See **Missouri River.**

Design.—Problem of the Auto Boat. William F.

Durand. Discusses elements of successful hull design in the present number. Serial. 1st part. 1800 w. Automobile—Sept. 8, 1904.

Notes on Power-Boat Design. N. L. Skene. A discussion of some of the important features of their design, such as form, especially of the underbody, outlining a practical method. 2200 w. Rudder—May, 1905.

Problems in Connection with High-Speed Launches. Clinton H. Crane. Discusses points in design of boats driven by gasolene engines, especially the form of hull. 6 plates. 1500 w. (No. 15.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

See also **BOAT.**

Dory.—How to Build a Power Dory. C. D. Mower. Drawings and description. 2200 w. Rudder—May, 1904.

"Durendal."—The Racing Petrol Launch "Durendal." Illustrated description of the boat and her performance. 1500. Auto Jour—Dec. 12, 1903.

Exhibition.—See **BOAT EXHIBITION.**

Fire Boat.—A Petrol Motor Fire Boat. Brief illustrated description. 500 w. Auto Jour—April 2, 1904.

See also **FIRE ENGINE**—Gasoline.

Fishing Boat.—Explosion Motors on Sailing Boats (Les Moteurs à Explosion à Bord des Bateaux de Pêche à Voiles). G. Soé. A description of the manner in which auxiliary gasoline motors have been successfully used on French fishing boats. 2000 w. Le Yacht—Feb. 7, 1903.

Petroleum Motors on Fishing Boats (Les Moteurs à Pétrole à Bord des Voiliers de Pêche). C. Birault. Describing the installation of small internal-combustion motors as auxiliaries on sailing vessels. 2500 w. Génie Civil—Oct. 31, 1903.

Gasoline Engines for Fishing Boats (De l'Emploi des Moteurs à Pétrole à Bord des Bateaux de Pêche). J. Pérard. An illustrated account of the use of gasoline engines for propelling fishing vessels. 4000 w. Mem Soc Ing Civils de France—March, 1903.

French.—French Launches and Launch Engines of 1905. W. P. Stephens. An illustrated article describing interesting features, and types, and commenting on the remarkable development of the launch industry. 2000 w. Rudder—May, 1905.

See also **BOAT EXHIBITION; BOAT RACE.**

Gear.—See **VARIABLE SPEED**—Julien Gear.

Herreshoff.—The C. F. Herreshoff Speed Launch. Illustrates and describes a handsome launch on exhibition in New York. 600 w. Automobile—Feb. 27, 1904.

"Hilda."—The Automobile Boat Hilda. L. Ramakers. Illustrated detailed description of a boat designed for use in the study of the application of internal combustion motors to the propulsion of rapid boats. 1000 w. Marine Engng—April, 1905.

"Iris."—The Sea-Going Motor Launch "Iris." Dimensions and illustrated description of the vessel and its equipment. 1500 w. Engng—Nov. 3, 1905.

King of England's.—The King's Petrol Motor Launch. Illustrations with brief description. 350 w. Auto Jour—June 13, 1903.

The King's New Launch. Illustrated description of a petrol launch built for the King of England. 1000 w. Engng—June 19, 1903.

Lake Victoria.—Oil-Motor Boat for the Uganda Railway Company. Illustrated description of a boat to be used on Lake Victoria, Africa. 1400 w. Engng—Nov. 6, 1903.

Lifeboat.—See **LIFEBOAT**—Gasoline.

Lord Howard de Walden.—Motor Boating. Illustrates and describes the powerful petrol racing launch being built for Lord Howard de Walden. 1200 w. Auto Jour—July 16, 1904.

"Ludo."—Progressive Speed Trials of the Gasoline Launch Ludo. George Crouse Cook. Gives particulars and data of speed and power obtained on a well designed launch. 1600 w. 4 plates. (No. 16.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

Missouri River.—Light-Draft Gasoline-Propelled Western River Boat. Brief illustrated description of the sternwheeler City of Fort Pierre, operating on the Upper Missouri River. It is equipped with an 80-H. P. Otto engine. 500 w. Naut Gaz—May 4, 1905.

Motor.—Care and Management of the Marine Gasoline Engine. E. W. Roberts. Describes briefly the two types in use for marine purposes, the points bearing upon efficient working, ignition, exhaust, etc., in the present article. Serial. 1st part. 2000 w. Marine Engng—June, 1902.

Applications of Petroleum Motors to Navigation (Application des Moteurs à Pétrole à la Navigation). A. Bochet. Describing numerous applications, especially as an auxiliary to sailing vessels and for driving auxiliary machinery. 6000 w. 1 plate. Mem Soc Ing Civ de France—June, 1903.

Gasoline Engines for Marine Propulsion. D. H. Cox. Presents facts showing progress and development of these engines, drawing conclusions therefrom. Ills. 6000 w. Trans Am Soc Nav Archts & Marine Engrs, No. 4—Nov., 1903.

Engineering a High-Speed Launch. Herbert L. Towle. A non-technical explanation of the process by which motors of unusual power have been developed for boat use. 2000 w. Automobile—Jan. 2, 1904.

Petrol Motors for Marine Purposes. Remarks on the growing use of these motors, the leading forms, and reliability, with information from a paper by Orlando Sumner before the Inst. of Marine Engrs. (England). 1500 w. Engng—Feb. 26, 1904.

Gasoline Engines for Fast Boats. Herbert L. Towle. Discusses the principles governing the construction of the high-power launch, and problems related. 2000 w. Am Mach—April 21, 1904.

Design of a 6-Horse-Power, Two-Cycle Motor. H. B. Maxwell. A set of working drawings for a 4 1-4 by 5 inch two-cycle motor that will develop 6 brake horse-power. Serial. 1st part. 800 w. Marine Engng—May, 1904.

The Internal-Combustion Engine as a Means of Propelling Small Vessels. Arthur F. Evans. Read before the Inst. of Naval Archts. Reviews the various applications of motors to the propulsion of small vessels, and discusses the designs and development. 5700 w. Prac Engr—May 13, 1904.

A Two-Stroke Marine Motor. Illustrates and describes the Webster and Bickerton four-cylinder two-cycle marine motor, with open type cranks, and magneto high-tension ignition. It can be used for other purposes and will work on paraffin. 1600 w. Autocar—Jan. 14, 1905.

A Twelve-Cylinder 150-B. H. P. Racing Marine Gasoline Motor. Illustration, with detailed description. 1500 w. Sci Am Sup—Jan. 28, 1905.

Internal-Combustion Motors for Marine Service (Der Gasmotor im Dienste der Schiffahrt). O. Stein. A fully illustrated account of recent liquid-fuel motors and their accompanying mechanism for boat propulsion. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—Oct. 28, Nov. 4, 1905.

See also **BOAT; GASOLINE ENGINE**—Fuel Mixing; Napier; Test.

Motor, Detachable.—Detachable Petrol Motor for Boat Propulsion. Brief illustrated description of a type of motor used in France. 500 w. Engng—Oct. 16, 1903.

Motor, Howard.—The Howard Gasoline Launch Engine. Herbert L. Towle. Illustrated description of the Howard marine motor, exhibited at Madison Sq. Garden, N. Y., from Nov. 3 to 10, 1900. 1300 w. Am Mach—Jan. 24, 1901.

"Napier."—The Petrol Racing Launch "Napier." Illustrated description. 2400 w. Auto Jour—Aug. 15, 1903.

Napier.—Motor-Boat Hull Experiments. Illustrated account of a series of tests made with full-sized models for Napier boats. 700 w. Auto Jour—April 23, 1904.
See also Navy; **GASOLINE ENGINE.**

"Napier Major."—The Deep-Sea Cruiser "Napier Major." Illustrated detailed description. 1200 w. Auto Jour—April 8, 1905.

The Cruise of "Napier Major." Extracts from A. F. Evans' report of his recent voyage in this petrol cruising boat. 2000 w. Autocar—May 20, 1905.

"Napier II."—Napier II.—The Yarrow-Napier Racing Launch. Illustrated description of a rebuilt English boat which is to take part in the British International Cup Race, and in other events. 1600 w. Auto Jour—March 11, 1905.

Navy.—A Gasoline Warship Launch. Illustrated description of an interesting Napier launch. 1200 w. Sci Am Sup—Feb. 1, 1905.

1905.—The Power Boat in 1905. W. P. Stephens. A review of the year, and the progress in the field of design. Ills. 3800 w. Rudder—Dec., 1905.

Nock.—Long Trial Trip with Fast Motor Boat. Describes a trip from Rhode Island to Michigan in a sixty-foot gasoline boat of 80 H. P. in two engines, built by F. S. Nock and owned by S. B. Kitchell. 1000 w. Automobile—Oct. 31, 1903.

Oil Engine.—See **OIL ENGINE—Diagonal; Marine.**

Paris Automobile Show.—See **BOAT EXHIBITION.**

Saunderson.—See **Weed.**

Stern Wheel.—A Motor Paddlewheel for Small Boats. Translated from "La Vie Automobile." Illustrates and describes a new stern wheel for propelling gasoline motor boats, recently experimented with in the Seine. 700 w. Sci Am Sup—Dec. 2, 1905.

Sutphin.—The Development of the High-Speed Launch or Automobile Boat. Shows two new motor-boat hulls designed by Mr. Sutphin Sutphin, and reviews the recent boats that have been built in the United States. 1700 w. Sci Am—March 12, 1904.

Swiss & American.—See **American & Swiss.**

Uganda.—See **Lake Victoria.**

"Veritas."—The New Auto-Boat Veritas. Illustrated description of 56-foot boat, with 8-cylinder gasoline engine of 175 horse power. 1500 w. Marine Engng—Sept., 1905.

"Vingt-et un II."—High Speed Gasoline Launches. Clinton H. Crane. Illustrated description of the performance of the Vingt-et un II, and information. Julius Küster. Translated from "Zeit-Archts & Marine Engrs, No. 12—Nov., 1904.

Weed Clearing.—A Novel Power Launch for Clearing Weed-Infested Waterways. Illustrates and describes a motor launch equipped with a novel cutting appliance—the Saunderson gasoline power weed-cutting launch. 900 w. Sci Am—May 27, 1905.

BOAT, GAS POWER..

See also **GAS ENGINE—Locomotive and Steamship.**

The Deuts Boat Motors (Deutser Bootsmotoren). Julius Küster. Illustrated descriptions of gas generators and engines and their application to canal boats. 1500 w. Zeitschr d Mitteleuropäischen Motorwagen Ver—Nov. 10, 1903.

Internal-Combustion Motors for Canal-Boat Traction. Julius Küster. Translated from "Zeitschrift des Mitteleuropäischen Motorwagen-Vereins." Reviews the methods attempted for the mechanical propulsion of canal boats, and describes the Deutz boat motor. 2000 w. Marine Engng—Jan., 1904.

A Suction Gas Plant Boat. From "Zeit. d. Ver. Deut. Ing." Illustrates and describes the boat Lotte, used in the carrying trade between Cologne, Antwerp, and Rotterdam. 800 w. Engr, Lond—Dec. 1, 1905.

The Gas Engine for Marine Motive Power. Alfred Gradenwitz. Describing successful installations of producers and engines on boats, showing the practical advantages. 3000 w. Engineering Magazine—June, 1905.

Dunlop.—See **GAS ENGINE.**

BOAT RACE.

Calais-Dover.—Calais-Dover Motor-Boat Race. Illustrated description of race and of boats which took part. 2000 w. Auto Jour—Aug. 13, 1904.

French Rules.—1904 Rating of French Motor Boats. A résumeé of rules controlling motor boat-racing in French waters. 1000 w. Auto Jour—March 26, 1904.

Monaco,1904.—Motor Boat Races in France. Remarks on the races at Monaco Bay, with illustrations of boats. 1500 w. Engr, Lond—April 15, 1904.

Monaco, 1905.—Engine Details of New Auto Boats tion of general interest. 1700 w. Soc of Naval Entered for Monaco (Mediterranean) Races. René M. Petard. Illustrations, with descriptions of special engines. 2000 w. Automobile—March 25, 1905.

Monaco Motor Boat Meeting. A list of the entered boats, with their characteristics and racing numbers, with illustrated account of the races. 2000 w. Auto Jour—April 15, 1905.

Motor Boats at Monaco. Begins a review of the racing boats, discussing their design and construction. Serial. 1st part. 2200 w. Engr, Lond—April 21, 1905.

Paris—Trouville.—Motor Boat Race. Paris-Rouen-Trouville. An illustrated article giving an account of the race. 1300 w. Auto Jour—Sept. 5, 1903.

Solent, Isle of Wight.—The British International Cup. Illustrated description of race in the Solent, near Isle of Wight, and of the motor boats which took part in it. 2200 w. Auto Jour—Aug. 6, 1904.

Southampton, 1904.—Motor Boat Reliability Trials. Illustrated descriptions of the entered boats. 3000 w. Auto Jour—July 30, 1904.

Motor Boating. Results of the Reliability Trials. Judges report and description of motor boat trials held in Southampton Water, England, with illustrations. 2000 w. Auto Jour—Aug. 13, 1904.

Southampton, 1905.—Motor Yacht Club's Reliability Trials, 1905. Tabulated results, illustrations and interesting report of the second annual reliability trial for motor boats in Southampton Water and the Solent. 4800 w. Auto Jour—Aug. 12, 1905.

Speed Records.—See **AUTOMOBILE RACE.**

BOAT, STEAM.

See also **BOAT—Motor; STEAMBOAT; STEAM YACHT.**

Lifeboat.—See **LIFEBOAT—Steam.**

"Moguntia."—Coaching Steam Launch Moguntia with Petroleum Fuel. Translated from "Zeitschrift des Mitteleuropäischen Motorwagen Vereins." An illustrated account of a high-speed pleasure launch. 1400 w. Marine Engng—Nov., 1903.

The Launch "Moguntia" of the Mainzer Ruder-Verein. Illustrated description of a fast German launch built of galvanized mild steel. 900 w. Sci Am Sup—March 5, 1904.

The Coaching Steam Launch "Moguntia" (Trainier-Dampf-Schnellboot "Moguntia"). An illustrated description of a launch built for a rowing club by Escher Wyss & Co., of "tetrahedral" shape, about 35 feet long and 14 knots speed, and using oil fuel for boilers. 800 w. Zeitschr d Mitteleuropäischen Motorwagen-Ver—Nov. 5, 1903.

Navy.—The Steamboat Equipment of Warships. E. C. Carnt. Read before the Glasgow Congress. Briefly reviews the history of the application of steam for warship purposes. Engng—Sept. 20, 1901.

Navy, German.—Steam Pinnace (Dampfpinasse). Detailed description of steam pinnace built for the German navy, with sections of hull and machinery, and indicator diagrams taken during trial run. 1200 w. Schiffbau—Jan. 23. 1901.

Steam Cutter Constructed by the Firm Sachsenberg Bros., Rosslau on the Elbe. Reprinted from "Schiffbau." Illustrated description. 1000 w. Marine Engng—May, 1901.

Navy, U.S.—Standard Steam-Cutter Machinery for the U. S. Navy. A. M. P. Maschmeyer. Describes the fixed types, gives particulars of a trial, with indicator diagrams, with tables of dimensions of engines, boilers, &c., and their weights. 1100 w. Jour Am Soc of Naval Engrs—Feb., 1902.

See also **U. S. War Department.**

Police.—Design of German Police Launch Built at Howaldtswerke, Kiel, Germany. George Crouse Cook. An illustrated description of a high-powered steam launch. 1200 w. Marine Engng—Nov., 1901.

U. S. War Department.—Steam Launches for the War Department. Illustrated detailed description of two 45-foot steam launches recently finished. 1800 w. Marine Engng—March, 1903.

See also **Navy, U. S.**

BOILER.

See also **BOILER, MARINE; BOILER PLANT; BOILER TEST; BOILER, WATER-TUBE; FEED WATER; HEATING; HOT WATER; MARINE ENGINE; MARINE ENGINEERING; LOCOMOTIVE BOILER; STEAM PLANT; STEAM ENGINEERING.**

The Boiler and Boiler-Room. W. J. Ranton. On recent improvements in boilers and boiler construction, their care, etc. 2200 w. Power—May, 1901.

Modern Boiler Problems. E. D. Meier. Abstract from a paper presented to the N. Eng. Cotton Mfrs. Assn. on the modification of boiler plants for special services. 2100 w. Eng Rec—Oct. 12, 1901.

Design, Construction and Operation of the Steam Boiler. W. H. Wakeman. Discusses problems concerning the theoretical and practical strength, durability, installation, care and operation of boilers now in actual service. Serial. 1st part. 1700 w. Ill. Mod Mach—Jan., 1902.

Accessories.—See BOILER SETTINGS; BOILER, WATER-TUBE—Auxiliary Appliances.

Automobile.—See AUTOMOBILE, STEAM; BOILER TEST; BOILER, WATER-TUBE—Automobile, Flash; CAR, MOTOR-DRIVEN—Steam.

Auxiliary Appliances.—See BOILER, WATER-TUBE.

Babcock and Wilcox.—See BOILER, MARINE; BOILER TEST; BOILER, WATER-TUBE.

Bases.—See CASTING—Boiler Bases.

Belleville.—See BOILER MANUFACTURE; BOILER, MARINE; BOILER, WATER-TUBE.

Blow-Off Piping.—See PIPING—Feed-Water and Blow-Off.

Blow-Off Tank.—See BLOW-OFF TANK.

Brace Pin.—See BRACE PIN.

Bracing.—See BOILER MANUFACTURE; STAY-BOLT.

British Electric Station.—See STEAM PLANT.

Butt Strap Joints.—Butt Strap Joints for Boilers. R. S. Hale. Discusses the width and thickness of the straps. 700 w. Power—July, 1904.

Capacity.—See BOILER TEST.

Cast-Iron Sectional.—The Capacity of Cast-Iron Sectional Steam Boilers. J. J. Blackmore. Paper presented at meeting of the Am. Soc. of Heat. & Ven. Engrs. Proposes a basis for establishing a standard rating for sectional cast-iron heaters in such terms as to enable the engineer to compare the performance of various makes. 1200 w. Eng Rec—Jan. 24, 1903.

Choice.—See Selection.

Circulation.—Effect of Circulation on the Capacity of Fire-Box Heating Surface. Résumé of experiments under the direction of R. C. Carpenter, giving the effect of velocity of circulation on heat absorption. 700 w. Eng Rec—July 20, 1901.

Circulation in Shell Boilers. William Thomson. Read before the Inst. of Mech. Engrs. Considers the circulation of all fluids connected with shell boilers, as well as the heat which goes to produce the final result. 5000 w. Naut Gaz—May 21, 1903.

The Circulation of Water in Steam Boilers (La Circulation de l'Eau dans les Chaudières à Vapeur). A. Montupet. An exhaustive analysis of the nature and effect of circulation in boilers, and the extent to which it can be controlled and regulated. 15000 w. 1 plate. Mem Soc Ing Civ de France—June, 1903.

Circulation of Water in Steam Boilers. Egbert P. Watson. Considers the evils of poor circulation; the natural, artificial and forced circulation, &c. 2500 w. Cassier's Mag—Jan., 1905.

See also BOILER, WATER-TUBE; HOT WATER—Flow.

Cleaning.—See BOILER CLEANING.

Connections.—See STEAM PIPE.

Corrugated Furnace.—Corrugated Furnaces. W. C. Eaton. Description and report of tests made of Brown's improved type. Ill. 3500 w. Jour Am Soc of Nav Engrs—Feb., 1903.

The Relative Elasticity of the Fox and Morison Corrugated Boiler Furnaces (Versuche über die Verschiedenheit der Elastizität von Fox und Morison Wellröhren). C. Bach. Data and results of experimental tests, giving the longitudinal elasticity of both types under various stresses. 1500 w. Zeitschr d Ver Deutscher Ing—Aug. 13, 1904.

Tests on the Elasticity of Furnace Flues with Single Corrugations. (Versuche über die Elastizität von Flammrohren mit einzelnen Wellen). C. Bach. Data and results of tests on the Pommée type of flue, containing two deep corrugations in a length of about a metre. 1200 w. Zeitschr d Ver Deutscher Ing—Dec. 23, 1905.,

Defects.—Steam Boiler and Elevator Defects. An illustrated review of the exhibit made by the Fidelity & Casualty Company of New York at the convention recently held by the Nat. Assn. of Stationary Engrs. in Rochester, of defects found by inspectors. 3600 w. Ins Engng—Oct., 1901.

Design.—Legal Complications Over Boiler Design. Reprint of a decision rendered in the Supreme Court of Errors of Connecticut which shows in an interesting way the relations between engineer and supply man. 2000 w. Eng Rec—Aug. 5, 1905.

See also Flat Surfaces; BOILER EXPLOSION—Causes; BOILER MANUFACTURE; BOILER, MARINE; LIQUID FUEL—Marine Boilers; LOCOMOTIVE BOILER.

Design, Vertical.—Notes on the Design of Vertical Boilers. Considers important points in design, the neglect of which often causes defects and sources of trouble. Ill. Serial. 1st part. 3000 w. Mech Engr—Dec. 5, 1903.

Domestic.—See Heating.

Dortmund.—See STEAM PIPE—Connections.

Double-Drum.—See Robb-Mumford.

Double Tube.—See BOILER, MARINE.

Düsseldorf Exposition.—The Boilers at the Düsseldorf Exposition of 1902 (Die Industrie und Gewerbeausstellung in Düsseldorf 1902. Die Dampfkessel). H. Dubbel. A well illustrated, comprehensive review of the boilers and accessories exhibited at this large German exposition. Serial. 1st part. 4000 w. Zeitschr d Ver Deutscher Ing—May 3, 1902.

Steam Boilers at the Düsseldorf Exposition (Der Bergbau auf der Düsseldorfer Ausstellung 1902. Die Dampfkessel.) Illustrated descriptions of boilers and auxiliary apparatus, particularly those used for mining purposes. Serial. Part I. 1 plate. 1000 w. Glückauf—June 21, 1902.

Steam Boilers and Engines at the Düsseldorf Exposition (Les Chaudières et les Machines à Vapeur à l'Exposition de Düsseldorf). Ch. Compère. A comprehensive review of the steam machinery at Düsseldorf, showing the progress made since 1900. 12000 w. 2 plates. Mem Soc Ing Civ de France—Nov., 1902.

Efficiency.—Steam Boiler Efficiency. William Kent. Abstract of a lecture delivered before the Engng College, Univ of Illinois. Considers the factors of greatest importance. 600 w. R R Gaz—April 19, 1901.

Steam Boiler Economy. William Kent. Abstract of a lecture delivered before Sibley College. Discusses the design of the plant and points affecting the economy. 1500 w. Sib Jour of Engng—June, 1901.

The Working Economy of the Steam Boiler. Charles Arthur Hague. A discussion of the disagreement of expert tests and service conditions. 4000 w. The Engineering Magazine—Oct., 1901.

The Efficiency of Boiler Furnaces. Extracts from a memorandum recently issued by C. E. Stromeyer, dealing with matters relating to the working of steam boilers. 3500 w. Mech Engr—Feb. 14, 1903.

The Betterment of Steam-Boiler Economy. E. S. Farwell. An analysis of efficiency losses in steam generation, with suggestions for possible improvement. 2500 w. Engineering Magazine—March, 1903.

The Boiler Furnace and Its Relation to the Fuel. Robert S. Hale. Considers the furnace and the grate in the present article, showing how some of the methods for improving them may result injuriously to the economy of the boiler. States the principles involved in attaining good economy and discusses their application as the grades of coal used in the boiler furnace differ. 5400 w. Engr, U S A—April 1, 1903.

Boiler and Furnace Efficiencies. A. Bement. Read before the Nat. Elec. Lgt. Assn. Discussing some features of the performance of modern standard apparatus, concerning two types of boilers, two furnaces, and one stoker. 5000 w. Elec Rev, N. Y.—June 13, 1903.

More Exact Methods for Determining the Efficiency of Steam Generating Apparatus. A. Bement. The author's views on the best method of determining the efficiency of boilers and the performance of steam generating apparatus. 2500 w. Trans Am Soc of Mech Engrs. No. 053—Dec., 1904.

Notes on Efficiency of Steam Generating Apparatus. A. Bement. A paper suggested by the discussion of a previous paper on "More Exact Methods for Determining the Efficiency of Steam Generating Apparatus." Considers the efficiency of the boiler and of the furnace, and gives experimental results. Ills. 4000 w. Trans Am Soc of Mech Engrs, No. 074—June, 1905.

The Real Efficiency of Steam Boilers. W. H. Booth. Calls attention to errors in the customary method of calculating the efficiency. 1000 w. Elec Rev, Lond—May 26, 1905.

See also **BOILER PLANT—Economy; BOILER, MARINE; BOILER TEST.**

Electric Plant.—Boiler Power for Lighting and Power Plants. Charles L. Hubbard. Gives a method of estimating quickly the boiler power required for heating, lighting or power purposes, giving results of sufficient accuracy for all practical purposes. 2000 w. Am Elect'n—Dec., 1905.

Steam Boilers and Electric Stations. Discusses points concerning the choice of a type of boiler for a given pressure of steam, the working principles, and other matters of importance. 2300 w. Elec Rev, Lond—Feb. 15, 1901.

See also **BOILER PLANT; ELECTRIC PLANT; ELECTRIC STATION.**

Experimental.—The Experiment Boiler of the Ohio State University, with Results of Some Trials. E. A. Hitchcock. Outlines the details and installation of an experimental boiler with its accessories, and gives results of various trial running. Ill. 9000 w. Trans Am Soc of Mech Engrs—June, 1903.

Externally Fired.—See **Firing, External.**

Feeders.—Oil and Compound Feeders for Boilers. James F. Hobart. Illustrated discussion of appliances for feeding evenly. 1400 w. Am Electn—Feb., 1903.

Feeding.—See **FEED WATER.**

Firing.—See also **Waste Heat Fired; FIRING.**

Firing, External.—Externally-Fired Boilers. William H. Fowler. States the advantages of external firing, considering two types of boilers. Ill. 1500 w. Mech Engr—Feb. 7, 1903.

Flash.—See **AUTOMOBILE, STEAM—Gardner-Serpollet; Serpollet; BOILER, WATER TUBE; CAR, MOTOR-DRIVEN—Steam Serpollet.**

Flat Surfaces.—Staybolts, Braces and Flat Surfaces. R. S. Hale. A discussion of various rules and formulae bearing upon the support of the flat surfaces of boilers. 3300 w. Trans Am Soc of Mech Engrs, No. 049—Dec., 1904.

Forcing Capacity.—See **BOILER TEST.**

Fuel Economy.—See **Efficiency; BOILER PLANT—Economy; FUEL—Economy; STEAM PLANT.**

Furnace.—See also **Corrugated Furnace; Efficiency; Repairs; BOILER, MARINE; FURNACE.**

Furnace Fittings.—Furnace Fittings for Steam Boilers. R. T. Strohm. Considers the materials composing the furnace, the grates, and the appliances for aiding the process of combustion. Ills. 2800 w. Am Elect'n—June, 1904.

Furnace Iron.—Iron Furnace Boilers. William H. Fowler. Illustrations, with brief descriptions of various types. 1200 w. Mech Engr—Feb. 28, 1903.

Gas Firing.—See **NATURAL GAS—Boiler Firing.**

Görlitz Exposition.—See **STEAM ENGINEERING.**

Heads.—See **BOILER MANUFACTURE—Turning Mill.**

Heat Distortion.—Distortion in Boilers Due to Overheating. C. E. Stromeyer. Paper read before the Inst. of Naval Archts., with discussion. Considers the nature and difficulties of the problem and suggests possible cause. 9800 w. Engng—April 4, 1902.

Unequal Temperature Effects in Boilers—Causes of Ripping, Grooving, Pitting, &c. W. H. Booth. Discusses expansion effects discovered in the inspection of boilers. 1200 w. Power—Jan., 1905.

Heat Distribution.—The Distribution of Heat in Boilers. Editorial, calling attention to points overlooked and facts seemingly misunderstood. 2200 w. Engr, Lond—May 10, 1901.

Heating.—European Heating Boilers. Charles F. Hauss. An article in three parts, describing and illustrating the European heating boilers. Serial. 1st part. 1800 w. Met Work—Nov. 23, 1901.

Boilers: Old and New. Louis F. Pearson. Read before the Inst. of Heat. & Ven. Engrs (England). Deals with hot water boilers only, giving illustrations of English boilers and discussing their merits. Also general discussion. 5000 w. Plumb & Dec—Oct. 1, 1902.

Heating Boiler Development. H. J. Barron. Discusses heating boilers their merits and drawbacks. Ill. 1500 w. Engng Rev—Jan., 1903.

Elements of Commercial Value in Household Boilers. J. M. W. Kitchen. Discusses the desirable requirements in a household water or steam heater. 2000 w. Met Work—Dec. 9, 1905.

See also **Cast Iron Sectional; HEATING; HEATING & VENTILATION; HOT WATER.**

Heat Transmission.—See **HEAT TRANSMISSION—Boiler Plates.**

High Temperature.—See **Safety.**

History.—The Boiler. One of a series of articles on the evolution of apparatus for generating and utilizing power. An illustrated review of the various improvements. 4000 w. Engr, U. S. A.—Jan. 15, 1901.

Steam Boilers of the Past and Present. Egbert P. Watson. An historical review showing the evolution of modern types, with especial reference to boilers for marine service. 4500 w. Engineering Magazine—Nov., 1905.

Horse-Power.—The Horse Power of Boilers. W. H. Wakeman. A criticism of ideas expressed in an article appearing in this same paper, claiming that there is no such thing as the horse power of a boiler, when considered independently of the engine. 1500 w. Elec, N. Y.—May 22, 1901.

Boiler Horse-Power for Heating and Power. Charles L. Hubbard. Gives methods of computing, based on 15 sq. ft. per H. P. 1800 w. Mach, N Y—Feb., 1903.

Horse-Power of English and American Boilers, and Chimneys. George G. Bennett. Read before the Ohio Soc. of Mech., Elec. & Steam Engrs. Discusses past and present standards, boilers, efficiency of chimneys, and related subjects. 3800 w. Engr, U. S. A.—Aug. 15, 1903.

Household.—See **Heating.**

Instruction.—See **Maintenance.**

Iron Furnace.—See **Furnace, Iron.**

Körting Feeder.—See **FEED WATER, PURIFICATION.**

Lagosse.—The Lagosse Boiler (Les Chaudières Lagosse). With details of tests showing an evaporation of more than 10 pounds of water per pound of combustible. The device is a combined shell and water-tube boiler. 2000 w. Revue Technique—Aug. 25, 1901.

The Lagosse Semi-Multitubular Boiler (Le Générateur Semi-Multitibulaire Système Lagosse). A. Brüll. An illustrated description of a boiler having large water tanks above and below, connected by a great number of vertical water tubes. 1500 w. Bull Soc d'Encouragement—Jan., 1902.

Lancashire.—Colliery Engineering Progress. O. M. Percy. Describes the Lancashire boiler, its proportions and method of construction; discusses early practice in smoke prevention, etc. 3500 w. Mines & Min—May, 1902.

Specification for a Lancashire Boiler 30 ft. by 8 ft., for 200 lb. Working Pressure. Points out the main features to be kept in view and gives dimensions and details. Serial. 1st part. 1700 w. Prac Engr—Nov. 14, 1902.

See also **BOILER SETTING; BOILER TEST.**

Law.—See **Design.**

Leaky.—Leaky Boilers. Editorial discussion of the sources of weakness that cause these leaks. 1000 w. Loc. Engng—May, 1902.

Liége Exposition.—Steam Boilers at the Liége Exhibition. Describes the boilers exhibited by Messrs. Vve. L. de Naeyer & Co., illustrating one of the water-tube boilers. 500 w. Engng—May 26, 1905.

Boilers at the Liége Exhibition. Illustrations, with brief descriptions of the Solignac-Grille, the Jacques-Piedboeuf, and the Bailly-Mathot boilers. 1800 w. Engng—June 9, 1905.

Liquid Fuel.—See **BOILER, MARINE—Hohenstein; LIQUID FUEL.**

Locomotive.—See **LOCOMOTIVE BOILER.**

Low Water Alarms.—See **WATER GAUGE.**

Lukens Iron and Steel Co.—See **BOILER—Rolling Mill.**

Maintenance.—Instruction for Boiler Attendants. D. B. Dixon. Instructions applying more particularly to horizontal return tubular boilers, but in a general way applicable to all types of steam boilers. 2000 w. Am Mfr—Nov. 7, 1901.

The Care of Boilers. M. E. Wells. A discussion of the causes of leaks in boilers and the remedies. Ills. General discussion. 18000 w. Pro W Ry Club—Nov. 21, 1905.

Blowing Down Boilers. W. H. Wakeman. An illustrated article considering neglected points in the care and operation of boilers. 2000 w. Power —Dec., 1905.

Management.—The Management and Working of Steam Boilers. William H. Fowler. Treats of the arrangement, working and equipment of steam boilers and auxiliary appliances from the practical standpoint of the steam user, the superintending engineer, the boiler inspector, and the attendant. Ill. Serial. 1st part. 1800 w. Mech Engr—Nov. 22, 1902.

Modern Boiler Practice. Charles H. Benjamin. Reviews the lines along which improvements have been made, the types at present in favor, improvement in setting of boilers, the use of mechanical stokers, and other appliances, with the results obtained. 2200 w. Engr, U S A—Jan. 1, 1903.

The Management and Working of Boilers. Horace Boot. Abstract of a paper read at the convention of the Incor. Munic. Elec. Assns., on the cleaning, inspection and testing of boilers, repairs, attention and general management. Based on experience at Tunbridge Wells. 4000 w. Mech Engr—July 25, 1903.

Boiler Room Practice. W. W. Edwards. A discussion of various practices and things necessary to the safe management of boilers. 2500 w. Am Elect'n—Feb., 1904.

The Practical Management of Stationary Steam Boilers. R. T. Cooke. An account of the everyday management of steam boilers, with a view to maximum efficiency and a minimum production of smoke. 4000 w. Engr, Lond—April 15, 1904.

Boiler Room Management. Walter W. Edwards. Directions for preparing a battery of boilers for steaming. Ils. 3000 w. Am Elect'n—Sept., 1904.

See also **BOILER PLANT.**

Manholes.—Boiler Manholes and Handholes. R. T. Strohm. Considers the location, size, reinforcing rings, covers, &c. Ils. 2000 w. Am Elect'n—Feb., 1905.

See also **Strength.**

Marine.—See **BOILER, MARINE; BOILER TUBE.**

Material.—See **BOILER CORROSION; BOILER MANUFACTURE; BOILER MATERIALS.**

Mechanical Draft.—See **MECHANICAL DRAFT—Economy.**

Moore.—See **BOILER, WATER-TUBE.**

Ohio State University.—See **Experimental.**

Oil Fuel.—See **BOILER, MARINE—Hohenstein; LIQUID FUEL; OIL FUEL.**

Paris Exposition.—Boilers and Steam Engines at the Paris Exposition. (Les Chaudières et les Machines à l'Exposition de 1900). Ch. Compère. A general review, with details of many of the exhibits. Tables. 2 plates, 18000 w. Mem d l Soc d Ing Civils—January, 1901.

The Steam Boilers at the Paris Exposition (Die Dampfkessel der Pariser Weltausstellung). F. Krauss. A general review of the steam boilers exhibited at Paris, with details of arrangement and construction. Serial. Part I. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—March 8, 1901.

Boilers at the Paris Exhibition. Brief illustrated descriptions of exhibits, with comments. Serial. 1st part. 1500 w. Engr, Lond—March 22, 1901.

Boilers at the Paris Exposition. (Die Weltausstellung in Paris, 1900. Die Dampfkessel). Prof. M. F. Gutermuth. A well illustrated general review. Serial. Part I. 1800 w. Zeitschr d Ver Deutscher Ing—March 23, 1901.

Stationary Boilers and their Accessories at the Paris Exposition of 1900 (Exposition Universelle de Paris, 1900: Les Chaudières à Vapeur Fixes et Leurs Accessoires). E. Masson. A general review. Serial. Part I. 1 plate. 6500 w. Rev Universelle des Mines—May, 1902.

Paucksch.—Boiler with Three Large Fire Tubes (Der Dreiflammrohrkessel). Prof. L. Lewicki. An illustrated description of the Paucksch boiler, which has a third fire tube under the two main ones, with account of tests showing rapid heating and steam raising powers. 2500 w. Zeitschr d Ver Deutscher Ing—June 21, 1902.

Performance.—See **BOILER TEST; MECHANICAL STOKING—Chain Grate; LOCOMOTIVE PERFORMANCE.**

Portable.—See **Temperature.**

Pressure.—High vs. Low Boiler Pressure. Alfred Siebert. Advantages of low pressure for heating; the difference when used for power purposes; and the influence of cylinder condensation. 1700 w. Ice & Refrig—Dec., 1900.

The Safe Working Pressure of Steam Boilers. W. H. Wakeman. An explanation in full of rules for determining the safe working pressure. 2800 w. Engr, U S A—Nov. 1, 1902.

Range.—See **PLUMBING—Water Front.**

Regulation.—Regulations for Care and Test of Steam Boilers. A copy of the rules recently put into effect by the Erie Railroad Co. 2200 w. Boiler Maker—Sept., 1905.

Renard.—See **BOILER, WATER-TUBE.**

Repairs.—Boiler Repairs. W. J. Ranton. Considers the different types of boilers and the repairs generally needed. Ill. 2000 w. Power—April, 1902.

Repairing Partly Collapsed Cylindrical Furnaces. John P. Cosgro. Describes method of remedying an injury which may occur from overloading the boilers. Ills. 2000 w. Am Inst of Min Engrs—May, 1905.

See also **BOILER, MARINE.**

Return Tubular.—A Four-Hundred Horse-Power Horizontal Return Tubular Boiler. Illustrated detailed description. 1400 w. Power—July, 1902.

Rebb-Mumford.—A Double Drum Boiler. A brief illustrated description of the Robb-Mumford boiler. 1000 w. Eng Rec—May 9, 1903.

See also **BOILER, MARINE—Mumford.**

Rolling Mills.—Steam Generation for Large Rolling Mills. J. R. Bibbins. An illustrated description of a boiler plant embodying novel constructive features recently installed for the Lukens Iron & Steel Co., Coatesville, Pa. 2200 w. Ir Age—Sept. 25, 1902.

Safe Pressure.—See **Pressure.**

Safety.—Difficulty of Combining Efficiency of Boilers with Their Safe Working. C. E. Stromeyer. Read before the Leeds Univ. Engng. Soc. Discusses the troubles due to high temperatures and the possibility of remedying them. 2500 w. Prac Engr—Feb. 24, 1905.

Safety Valve.—See **SAFETY VALVE.**

Salt Deposit.—See **BOILER SCALE; FEED WATER—Test.**

Schütte.—See **BOILER, MARINE.**

Selection.—The Selection of a Steam Boiler. W. E. Snyder. Considers the generation of steam, the transference of the heat from the furnace to the boiler. Urging that the selection, construction and erection of the boilers be intrusted to a competent engineer of wide experience. 14400 w. Pro Engrs' Soc of W. Penn.—June, 1901.

The Choice of a Steam Boiler. C. E. Stromeyer. Abstract of a paper read before the Civ. & Mech. Engrs. Soc., England. A discussion of types, giving a tabulated comparison of boilers as regards evaporation per space occupied. 2000 w. Mech Engr—May 16, 1903.

Shell Chart.—See **LOCOMOTIVE BOILER.**

Size.—Size of Boilers. Charles L. Hubbard. Gives tables and data relating to the over-all dimensions of various types of boilers. Serial. 2 parts. 2200 w. Engr, U. S. A.—Aug. 1 & 15, 1903.

Specification.—Specification for Horizontal Tubular Boiler and Boiler-Room Equipment. Charles L. Hubbard. Gives a "dummy" useful in making up specifications for tubular boilers and their settings. 4500 w. Power—Dec., 1905.

Steam Vehicle.—See **AUTOMOBILE, STEAM; BOILER, WATER-TUBE—Automobile; Flash; CAR, MOTOR-DRIVEN—Steam.**

Strength.—The Strength of Boiler Shells (Beitrag zur Festigkeitsberechnung der Kesselwände). W. Conrad. A theoretical investigation of the weakening effect of openings cut in boiler shells and the proper method of reinforcement. Two articles.

7000 w. Zeitschr d Oester Ing u Arch Ver—Oct. 26, Nov. 9, 1900.

Comparison of Rules for Calculating the Strength of Steam Boilers. H. de B. Parsons. Calls attention to variations in the rules now in use, in the hope of eliciting a full discussion of the desirability of preparing a set of standard rules. 900 w. Trans Am Soc of Mech Engs, No. 876—Dec., 1900.

Calculating the Strength of Steam Boilers. W. H. Wakeman. Some points concerning tensile strength, joints, and bursting pressure. 1000 w. Elec, N. Y.—June 12, 1901.

Safe Working Strength of Boilers. Discusses the method of determining a boiler's strength, giving rules and calculations. Ill. 2200 w. Power—Aug., 1902.

Computing the Strength of Tubular Boilers. Charles L. Hubbard. Directions for calculating the resistance of a boiler to internal pressure, illustrating by example. 1800 w. Am Elect'n—Dec., 1902.

See also **BOILER, MARINE—Thornycroft—Schulz.**

Temperature.—Investigations Into the Temperature Relations in the Interior of a Portable Boiler (Untersuchung über die Temperaturverhältnisse im Innern eines Lokomobilkessels). C. Bach. The readings of thermometers inserted at various points are tabulated and plotted as curves, with discussion. 1200 w. Zeitschr d Ver Deutscher Ing—Jan. 5, 1901.

Thermodynamics. — See **STEAM ENGINEERING; THERMODYNAMICS—Boiler.**

Troubles.—Troubles with Boilers. W. F. Durand. Considers some of the more frequent derangements and the measure available for their prevention or repair. 3400 w. Engr, U S A—Jan. 1, 1902. Special number.

Some Notes on Steam Boiler Troubles. Horace See. Shows how some of the troubles can be directly traced to bad design and points out the characteristics found responsible for their occurrence. 2 plates. 2000 w. (No. 10). Soc Nav Archts & Marine Engrs—Nov. 16, 1905.

See also **Maintenance; Management; BOILER PLANT.**

Tube Cleaners.—See **BOILER CLEANING.**

Tube Manufacture.—See **BOILER MANUFACTURE; BOILER TUBE; TUBE MANUFACTURE—Charcoal Iron; Steel Boiler.**

Valve.—See **SAFETY VALVE; VALVE.**

Vertical Design.—See **Design, Vertical.**

Waste Heat Fired.—Steam Boilers Worked by Waste Heat from Coal-Fired Reverberatory Furnaces. R. T. Cooke, and Percival Cooke. Illustrates and describes the proper arrangement for the economical working of the reverberatory furnace, and various types of boilers and their management. 4700 w. Cassier's Mag—Sept., 1905.

See also **COKE OVEN—Waste Heat; CEMENT KILN—Rotary.**

Water Gauge.—See **WATER GAUGE—Boiler.**

Water Legs.—On Circular, Stay-bolted Water Legs. A mathematical explanation of the method of deriving formulae used in a former article, which have been criticized. 1600 w. Locomotive—June, 1901.

Water Level.—The Water Level in a Battery of Boilers. W. H. Wakeman. Concerning the proper arrangement of feed pipes. Ill. 1100 w. Steam Engng—July, 1902.

Water Weight.—To Determine the Weight of Water in a Boiler. Lawford H. Fry. Gives an approximate method. 1000 w. Am Engr & R R Jour—Nov., 1901.

BOILER ACCIDENT.

See **BOILER EXPLOSION; MOTOR—Longridge Report.**

BOILER CIRCULATION.

See **BOILER—Circulation; BOILER, WATER-TUBE—Circulation.**

BOILER CLEANING.

See also **BOILER CORROSION; BOILER SCALE.**

Cleaning Steam Boiler Surfaces. R. T. Strohm. Describes methods used for cleaning shell and tubular boilers. Ills. 2500 w. Am Elect'n—April, 1904.

Methods and Apparatus for Cleaning Boiler Tubes (Procédés et Appareils de Nettoyage des Chaudières Tubulaires). Illustrated description of all kinds of brushes and scrapers for cleaning the inside and outside of boiler tubes. 3500 w. Rev de Mécanique—April, 1902.

Concerning Tube Cleaners. An illustrated article discussing the damage done by power cleaners for boiler tubes. 2800 w. Locomotive—Oct., 1904.

Cleaning Boilers. James T. Fennell. Gives suggestions for properly blowing off a boiler, and how to get a boiler ready for cleaning out. 1800 w. Power—May, 1905.

Misuse of Boiler Tube Cleaners. A. S. Atkinson. Discusses some of the causes of trouble and the ruin wrought by incompetent workmen, and the question of the kind of power used to operate the cleaners. 1800 w. Boiler Maker—Aug., 1905.

The Effects of Mechanical Tube Cleaners on the Tube. William A. Parsons. A report of an investigation of the effects resulting from the use of mechanical tube cleaners, describing the methods used. Ills. 1300 w. Power—Oct., 1905.

Boiler Tube Scrapers and Brushes. James F. Hobart. Brief illsutrated descriptions of various types. 1200 w. Am Elect'n—Dec., 1900.

Flue Rattler.—New Flue Rattler. Illustrates and describes a novel rattler which is giving good results in the boiler plant of the Chicago and Northwestern Railway at West Chicago. 500 w. Am Engr & R R Jour—Feb., 1902.

Solignac and Grille.—See **BOILER, WATER-TUBE.**

BOILER CONSTRUCTION.

See **BOILER; BOILER MANUFACTURE.**

BOILER CORROSION.

See also **BOILER CLEANING; BOILER SCALE; FEED WATER.**

Internal Corrosion in Steam Boilers. M. P. Bonet. Presented at Paris Congress. Discusses pitting, corrosion by hydrochloric acid or chlorides, by sulphuric acid, by tannic acid, by grease, by sugar, and by mechanical action. 6300 w. Power—Dec., 1900.

Boiler Corrosion. H. C. Lincoln. Discusses the causes, the feed water supply, incrustation and its prevention, &c. 2200 w. Am Elect'n—April, 1902.

Corrosion of Boiler Tubes. Prepared from a report made by Lieut. W. H. Chambers of a series of tests made to ascertain the relative corrodibility of lap-welded Bessemer steel, lap-welded iron, seamless cold-drawn steel and seamless hot-drawn steel boiler tubes. 4000 w. Ill. Jour Am Soc of Nav Engrs—May, 1902.

Boiler Corrosion. Explains what corrosion is, and the different causes and various means by which it may be remedied or prevented. 2700 w. Mines & Min—Sept., 1903.

Corrosion of Boiler Tubes. John D. Ford. A report of experimental tests to ascertain the relative corrodibility of lap-welded Bessemer steel, lap-welded, iron, seamless cold-drawn steel, and seamless hot-drawn steel boiler tubes. Ills. 4500 w. Jour Am Soc of Nav Engrs—May, 1904.

Magnesium Chloride.—Corrosion of Boilers by Magnesium Chloride. Editorial review of a paper by H. Ost in the "Chemiker Zeitung," giving an account of experimental investigations. 900 w. Engng—Oct. 10, 1902.

Material Influence.—Boiler Material and Boiler Corrosion (Kesselmaterial und Kesselcorrosionen). H. Rinne. A discussion of the influence of boiler material upon the nature and extent of corrosion. 4,000 w. Stahl u Eisen—Jan. 15, 1904.

Zinc.—On the Use of Zinc in Boilers. R. A. Douglass. Considers cases where zinc is useful and precautions to be taken when using it. 1000 w. Am Elect'n—Dec., 1901.

BOILER COVERING.

Locomotive.—See **LOCOMOTIVE BOILER—Coverings.**

BOILER ERECTION.

See **BOILER MANUFACTURE; BOILER SETTING.**

BOILER EXPLOSION.

See also **BOILER INSPECTION; LOCOMOTIVE EXPLOSION; SAFETY VALVE—Fournier.**

"Bennington."—Official Report of the Gunboat "Bennington" Explosion. Report of the court of inquiry which investigated the accident. Also editorial. 2500 w. Naut Gaz—Aug. 31, 1905.

Bilston.—The Bilston Boiler Explosion. An account of the explosion at the Bradley Bridge Iron Works, and the evidence brought out at the coroner's inquest. 3000 w. Engng—March 13, 1903.

Brockton.—The Brockton Boiler Explosion. A full illustrated account of the explosion in the factory of R. B. Grover & Co., manufacturers of the Emerson shoe. Also an explanation of the cause. 3000 w. Locomotive—April, 1905.

Causes.—Boiler Design and the Causes of Boiler Explosions. R. S. Hale. A study of government and insurance records, showing the controlling influence of sound design upon safety. 5000 w. Engineering Magazine—May, 1904.

Chicago.—Boiler Explosion at Swift & Co.'s Plant, Chicago. An illustrated acount of an accident involving great loss of life and destruction of property. 2300 w. Steam Engng—Dec. 10, 1902.

A Remarkable Boiler Explosion. A discussion of the cause of the explosion at Swift & Co.'s, in Chicago, Nov. 29, 1902. 3000 w. Engr, Lond—Jan. 9, 1903.

"City of Trenton."—The Construction and Inspection of Steam Boilers; with Especial Reference to the "City of Trenton" Disaster. Discussion of a marine boiler explosion and of boiler construction, with illustrations. Serial. 1st part. 5700 w. Jour Fr Inst—May, 1902.

Detroit.—See Penberthy, Detroit.

Dortmund.—Steam-Boiler Disasters (Unfälle aus dem Dampfkesselbetriebe). An abstract from a report of the Dortmund boiler inspection company, with illustrations and description of an explosion involving a collapsed flue. 1500 w. Glückauf—Oct. 7, 1905.

Essen, Germany.—Report on a Boiler Explosion (Bericht über eine Dampfkessel Explosion). An account of a boiler explosion at Essen, Germany, and the probable causes thereof. 1 plate. 900 w. Glückauf—Nov. 23, 1901.

France.—See **LOCOMOTIVE EXPLOSION.**

Germany.—Lessons from Recent Steam Boiler Explosions (Einige Hauptlehren aus Dampfkesselexplosion der Jüngsten Zeit). C. Bach. A discussion of recent boiler explosions in Germany, with an analysis of causes. 2500 w. Zeitschr d Ver Deutscher Ing—Jan. 31, 1903.

Accidents to Boilers and Engines (Schäden an Dampfkesseln und Maschinen). Notes concerning some recent boiler explosions in Germany, and an illustration of the disastrous effects of a flywheel explosion. 1200 w. Glückauf—March 25, 1905.

See also **BOILER INSPECTION.**

"Hermine."—Boiler Explosion in the Tow Boat Hermine (De Ontploffing van den Ketel in de Sleepboot Hermine). An account of a disastrous explosion of a cylindrical marine boiler, with photographs and detailed drawings. 2000 w. De Ingenieur—Dec. 13, 1902.

Locomotive.—See **LOCOMOTIVE EXPLOSION.**

London.—The Boiler Explosions at Sardinia Street Station. Substance of the Board of Trade report concerning these explosions which took place last winter. The boiler was of the water-tube type. Ill. 7500 w. Elect'n, Lond—Sept. 6, 1901.

Water-Tube Boiler Explosions in an English Electric Light Station. An account of two explosions at the Sardinia St. Station of Metropolitan Electric Supply Co. of London, with extracts from the Board of Trade report. Ill. 1800 w. Eng News—Nov. 21, 1901.

Oldham, England.—Boiler Explosion at Oldham. A report of the investigation with regard to the circumstances and cause of a boiler explosion which ocurred on Oct. 31, with editorial. 3200 w. Engng—Feb. 7, 1902.

Paris.—See **LOCOMOTIVE EXPLOSION.**

Penberthy, Detroit.—Boiler Explosion at the Penberthy Injector Co., Detroit, Mich. Illustrated account of the disaster. 900 w. Eng News—Dec. 19, 1901.

The Investigation of the Penberthy Boiler Explosion. Prof. R. C. Carpenter. Report of the explosion in Detroit which killed 30 people and seriously injured many more. Ill. 4400 w. Power—April, 1902.

The Penberthy Boiler Explosion. R. C. Carpenter. An account of the investigations which led to the discovery of the cause of this disastrous explosion in Detroit, Mich. 1200 w. Sib Jour of Engng—May, 1902.

Rosenthal.—An Instructive Boiler Explosion (Eine Lehrreiche Dampfkesselexplosion). C. Bach. A paper givng a fully illustrated account of a boiler explosion at Rosenthal-Blankenstein, Germany, with discussion of the causes and the lessons to be derived, with tables of tests of the boiler material. 6000 w. Zeitschr d Ver Deutschr Ing—Jan. 18, 1902.

St. Louis.—A Remarkable Boiler Explosion. An illustrated account of the explosion which occurred Dec. 21 at the Geyer Avenue Power Station of the St. Louis Transit Company. 2700 w. Power—Feb., 1904.

A Peculiar Explosion of Water-tube Boilers. John E. Higdon. An illustrated account of the wreck of the boiler house and boilers of the St. Louis Transit Company. 1800 w. Eng. Rec—Feb. 13, 1904.

A Disastrous Boiler Explosion. Illustrated description of the terrible explosion in St. Louis on the 21st of last December, when seven water-tube boilers exploded simultaneously. Discusses the cause. 2500 w. Locomotive—April, 1904.

Sardinia St. Station.—See London.

Steamboat Racing.—Racing Steamboats and Exploding Boilers. Editorial maintaining that steamboat racing is not dangerous, and giving some explanatory notes on the modern type of boiler. 1400 w. Eng News—Sept. 12, 1901.

Toledo, Ohio.—An Interesting Boiler Explosion. A. H. Smith. An illustrated account of the explosion at the Republic Iron & Steel Co.'s plant in Toledo, Ohio, which was probably due to the leaving of a 6-in. valve closed after cleaning, and its sudden opening. 1000 w. Eng News—May 7, 1903.

"Ventura" Steamship.—See **STEAM-PIPE EXPLOSION.**

BOILER FITTING.

See **BOILER SETTING; BOILER, WATER-TUBE Auxiliary Appliances; SAFETY VALVE.**

BOILER HOUSE.

See **BOILER PLANT.**

BOILER INSPECTION.

See also **BOILER EXPLOSION; BOILER TEST.**

The Inspection and Care of Steam Boilers. The first of a series of articles dealing with boiler inspector's work, defects, conditions of working, piping, etc. Serial. 1st part. 2200 w. Mech Engr—Jan. 2, 1904.

Boiler Inspection and Explosions. A. S. Atkinson. On some of the methods of inspection used by the steam boiler insurance companies. 2200 w. Boiler Maker—Dec., 1905.

Bavaria.—Technical Features of the Work of the Bavarian Boiler Inspection Society (Die Technischen Hauptergebnisse der Tätigkeit des Bayerischen Dampfkessel-Revisions-Vereines). J. Reischle & Chr. Eberle. A review of the society's reports, showing the influence of the data determined by boiler inspection upon steam boiler design. 8000 w. Zeitschr d Ver Deutscher Ing—July 18, 1903.

British Columbia.—The Formula Used in Rules for the Inspection of Steam Boilers in British Columbia. J. A. Crawford. A criticism of the formulae in these rules, pointing out inaccuracies. 1500 w. B C Min Rec—Jan., 1904.

Germany.—New Official Requirements for Steam-Boiler Installation (Neue Allgemeine Polizeiliche Bestimmungen über die Anlegung von Dampfkesseln). C. Bach. A review of boiler explosions in Germany, and a discussion of the new regulations framed by a commission of engineers. 3500 w. Zeitschr d Ver Deutscher Ing—Jan. 28, 1905.

Hartford Company.—The Growth of the Hartford Company. A graphical analysis, with notes, showing the work done by the Hartford Steam Boiler Inspection and Insurance Company. 1200 w. Locomotive—July, 1903.

Insurance.—Steam Boiler Insurance. A. D. Risteen. Extracts from a lecture in the Yale Insurance Course. Considers the cause and prevention of explosions, the risks, testing, &c. 6000 w. Ir Trd Rev—June 9, 1904.

Longridge Report.—See **MOTOR.**

BOILER MANUFACTURE.

See also **BOILER; BOILER, MARINE; BOILER MATERIALS; BOILER PLATE; BOILER,**

WATER-TUBE; PIPE MANUFACTURE; TUBE MANUFACTURE.

Boiler Construction. O. P. Hood. Digest of an address before the Copper Country Engng. Soc. on a neglected principle in boiler design. Serial. 1st part. 1700 w. Aust Min Stand—Jan. 22, 1903.

Experiment and Practice in the Construction of Steam Boilers. Egbert P. Watson. A practical dissertation upon boiler design, discussing numerous sources of misunderstanding between maker and buyer. 3500 w. Engineering Magazine—Dec., 1904.

Belleville.—Belleville Boiler-Making Machinery. Illustrated description of special machine tools. 800 w. Engr, Lond—Dec. 28, 1900.

See also **BOILER MARINE; BOILER, WATER-TUBE.**

Bracing.—Boiler Bracing. W. H. Wakeman. Discusses methods of bracing, and the principle upon which the theory of bracing rests. Serial. 1st part. 1200 w. Elec, N Y—July 16, 1902.

Boiler Bracing. Charles L. Hubbard. The first of a series of articles giving directions for internal stays above the tube line in fire-tube boilers. Serial. 1st part. 1200 w. Mach, N Y—Sept., 1903.

Bracing Flat Surfaces. William Horsley. Gives table showing the number of braces required on each head on return tubular boilers, with explanatory notes. 500 w. Boiler Maker—April, 1905.

Dürr.—The Dürr Water-Tube Boiler. S. J. Thompson. Abstract of a paper read before the So. Staffordshire Iron and Steel Inst. Illustrates and describes the construction of this land type of the Dürr boiler, its cleaning and the circulation. 1900 w. Ir & Coal Trds Rev—Feb. 21, 1902.

German Marine Boiler Construction. Frank C. Perkins. Illustrations, with description of the making of the Dürr water-tube marine boilers. 1700 w. Sci Am Sup—Nov. 14, 1903.

See also **BOILER, MARINE.**

Fatal Blue Heat.—The "Fatal Blue Heat" in Boiler Making. From "Motive Power." Explains the meaning of this term by experiment, and the results following the appearance. 600 w. Am Mach—March 17, 1904.

Flues.—See **Seamless.**

Niclausse.—The Manufacture of the Niclausse Boiler (Die Herstellung der Niclausse Kessel). Friedrich Geiseler. A very fully illustrated account of the special machinery and methods used in making the Niclausse water-tube boiler, both at the works of Willans and Robinson, and of J. & A. Niclausse. 2500 w. Zeitschr d Ver Deutscher Ing—Dec. 12, 1903.

Ferry Works, Queensferry. An illustrated article describing details of the Niclausse boilers as manufactured at their new works. 2800 w. Engr, Lond—July 1, 1904.

See also **BOILER, MARINE.**

Riveted Joints.—Riveted Joints for Steam Boilers. W. H. Wakeman. States facts showing the only safe way is to determine the strength of every joint, and endeavors to give plain rules for doing this. Serial. 1st part. 1600 w. Elec., N Y—Oct. 29, 1902.

See also **RIVET; RIVETING.**

Scamped Job.—Another Scamped Boiler Job. An illustrated article discussing errors of construction. 1700 w. Locomotive—March, 1902.

Seamless.—The Manufacture of Large Boiler Flues and Heavy Seamless Pipes (Ueber Herstellung Grosser Kesselschüsse und Schwerer Nahtloser Rohre). Hr. Ehrhardt. An illustrated paper before the Verein Deutscher Eisenhüttenleute giving a description of methods of rolling hollow cylinders into pipes; with discussion. 2500 w. Stahl u Eisen—March 1, 1902.

The Construction of Seamless Boilers. G. Lentz. Illustrated description of the apparatus for producing the hollow-tubular bodies by the Ehrhardt hydraulic pressing process. 1600 w. Am Engr & R R Jour—May, 1903.

See also **BOILER TUBE; PIPE MANUFACTURE; TUBE MANUFACTURE.**

Tubes.—See **BOILER TUBE; PIPE MANUFACTURE; TUBE MANUFACTURE.**

Turning Mill.—See **MACHINE TOOL.**

BOILER, MARINE.

See also **BOILER; BOILER MANUFACTURE; BOILER, WATER TUBE; MARINE ENGINE; MARINE ENGINEERING; NAVY; STEAMBOAT; STEAMSHIP; WARSHIP.**

The Marine Steam Boiler. William Frederick Durand. An elementary discussion of the principles controlling the generation of steam. 1600 w. Marine Engng—Jan., 1901.

Modern Marine Boilers. H. M. Rounthwaite. Read before the Jr. Inst. of Engrs. Considers three types of boilers; the ordinary cylindrical, the "express" type of water-tube boiler, and the "ordinary" water-tube. 7500 w. Engr, Lond—Jan. 9, 1903.

Modern Marine Boilers. A consideration of the Relative Advantages of Various Types. Discusses only those in use on at least a half-dozen steam vessels. Serial. 1st part. 3200 w. Engrs' Gaz—Feb., 1903.

"Arkansas."—See **Thornycroft.**

Babcock & Wilcox.—Babcock & Wilcox Boilers on the S. S. "Martello." Illustrated description of new boilers recently substituted for the return tube boilers. 1100 w. Engng—Feb. 22, 1901.

Actual Performance of Babcock and Wilcox Boilers as Installed in U. S. S. Marietta, with general Observations on Practical Requirements and the Successful Operation of Marine Water Tube Boilers. Henry C. Dinger. A detailed report of performance, advantages, defects, improvements, etc., with discussion of marine boiler design. Ill. 8400 w. Jour Am Soc of Nav Engrs—Feb., 1903.

Latest Type of Babcock & Wilcox Marine Boiler. R. K. Crank. Illustrates and describes details of the design and construction. 6500 w. Jour Am Soc of Nav Engrs—Nov., 1904.

See also **BOILER TEST; BOILER, WATER TUBE.**

Belleville.—The Belleville Boiler. Editorial discussion of two letters which M. Delaunay Belleville addressed to the secretary of the admiralty. 4000 w. Engng—April 12, 1901.

Navy Boilers. Editorial discussion of the letter from Mr. Delaunay Belleville, addressed to the Secretary of the British Admiralty, in defense of the Belleville boiler. 3500 w. Engng—July 26, 1901.

The Management of Belleville Boilers at Sea. E. F. Baker. Gives the experience gained with these boilers on H. M. S. "Good Hope," and the treatment arising out of his experience, showing that by suitable treatment the Belleville boiler is satisfactory and economical. 7000 w. Engng—April 29, 1904.

The Belleville Boilers. L. Fauveau. Translated from the French. Illustrates and describes the present Belleville boiler, and gives the history of the various stages through which it has passed. 3500 w. Jour Am Soc of Nav Engrs—May, 1904.

A Voyage with Belleville Boilers. Editorial on a voyage recently made by the first-class cruiser "Terrible," from England to Wei-hai-Wei, and back, showing the economy and steady working of the Belleville boilers. 1500 w. Engng—Nov. 18, 1904.

See also **British Navy; "Europa."**

British Navy.—Water-Tube Boilers in the Navy. Interim report of the committee appointed to examine into the suitability of various types of marine boilers for naval purposes, with editorial. 6000 w. Engng—March 15, 1901.

Water-Tube Boilers in the British Navy. A statement of the events which led to the appointment of an expert commission, and a copy of the report submitted. 2500 w. Eng News—April 4, 1901.

Water-Tube Boilers in the Navy. A letter from Marquis de Chasseloup Laubat, discussing the "interim report" of the Water-Tube Boiler Committee. 3800 w. Engng—May 24, 1901.

Report of the Committee on Naval Boilers. Full text of report of British Admiralty committee on water-tube boilers, with editorial comment. 7000 w. Engng—Aug. 5, 1904.

The Second Report of the Boiler Committee. A critical review of this report. 5500 w. Engr, Lond—March 7, 1902.

Report of the Committee on Naval Boilers. Begins the publication of the report of the committee appointed by the Admiralty to investigate the subject of navy boilers. Serial. 1st part. 4800 w. Engng—July 11, 1902.

Report of the British Admiralty Committee on Naval Boilers. Full report. 11600 w. Jour Am Soc of Nav Engrs—Aug., 1902.

Concerning Naval Boilers. Substance of the report of the committee appointed by the British Admiralty to investigate the matter of boilers for use in the British navy. Ill. 3500 w. Locomotive—Nov., 1902.

A New Departure in British Cruiser Machinery. The Question of Water-Tube Boilers. George Holliday. A well illustrated description of various types of marine boilers and of the ships, both British and of other nations in which they are fitted. 5500 w. Cassier's Mag—Jan., 1903.

Water-Tube Naval Boilers. Concerning the Admiralty trials of the gunboat "Sheldrake" and sloop "Espiegle," fitted with Babcock and Wilcox water-tube boilers; and the "Seagull" and "Fantome," fitted with the Nicausse water-tube boilers. 2200 w. Engrs' Gaz—Feb., 1903.

The Water-Tube Boiler in the British Fleet. Archibald S. Hurd. An account of the conditions under which this type of boiler was introduced, with remarks on the virtues of this type, and the future outlook. 3300 w. Sci Am Sup—Nov. 28, 1903.

The Water-Tube Boilers of H. M. S. S. "Medusa," "Media," and "Hermes." Discusses some of the leading facts set forth in the last report of the Admiralty Committee on Naval Boilers. Deals with the Dürr, Babcock & Wilcox, and Yarrow boilers. Ills. Serial. 1st part. 4000 w. Engng—Aug. 26, 1904.

Marine Type Water Tube Boilers. C. C. Thomas. A review of the investigations and report of the Boiler Committee appointed by the British Admiralty to examine the water-tube boiler question in all its details and make recommendaions regarding the boilers to be used on British ships of war. Ills. 2500 w. Sib Jour Engng—May, 1905.

See also Belleville; Dürr; "Europa" and "Spartiate"; "Minerva" and "Hyacinth"; Niclausse; Repairs; "Roxburgh"; Water-Tube.

Circulation.—See BOILER; BOILER, WATER-TUBE.

Coal Consumption Tests.—See BOILER TEST.

Collapse.—Gradual Collapses of Furnace Crowns. A Suggested Explanation. H. M. Roundthwaite. Read before the Inst. of Naval Archts. Describes the stresses and their tendency. 1500 w. Mech Engr—April 11, 1903.

See also BOILER EXPLOSION.

Design.—Boiler Design. H. K. Spencer. The first of a series of articles discussing things to be considered in determining the type of machinery to power a vessel, especially the design of the boiler. Ill. Serial. 1st part. 2500 w. Marine Engng—Dec., 1903.

Double-Tube.—On a Form of Double Tube Boiler. John Irving. Read before the Brit. Inst. of Naval Archts. Illustrated description of the construction and performance of a boiler designed for the mercantile marine. 2000 w. Engr, Lond—April 5, 1901.

On a Form of Double-Tube Boiler. John Irving. Read before the Inst. of Naval Architects. Illustrates and describes the construction and performance of these boilers. 1900 w. Prac Engr—Sept. 27, 1901.

Dürr.—The Constructive Development of the Dürr Boiler in the German Navy (Die Konstruktive Entwicklung der Dürr-Kessel in der Deutschen Kriegsmarine). An account of tests of the Dürr water-tube boiler, and illustrations of various installations in vessels of the German navy. Ill. Serial. Part I. 4000 w. 2 plates. Schiffbau. Feb. 8, 1901.

The Dürr Water-Tube Boiler. Illustrated description and general information of this boiler. H. M. S. "Medusa" is to be fitted with eight boilers of this type. Serial. 1st part. Engr, Lond—May 31, 1901.

The Constructive Development of the Dürr Boiler in the German Navy. Von Buchholtz. Translated from "Schiffbau." Illustrated description of these water-tube boilers as used in a number of German ships. Serial. 1st part. 1600 w. Engng—July 19, 1901.

The Dürr Water-Tube Marine Boiler (Wasserrohr-Schiffskessel, System Dürr). The design includes inclined water tubes, with interior circulating tubes, and overhead steam drum. 1800 w. Glasers Annalen—Oct. 1, 1904.

The Dürr Water-Tube Boiler in H. M. S. "Roxburgh." Illustrations with description and report of trials. 1600 w. Engng—Nov. 3, 1905.

See also BOILER MANUFACTURE; BOILER TEST.

Du Temple.—The Du Temple Water-Tube Boiler (Les Generateurs à Tubes d'Eau Système du Temple). H. Lassaux. Describing the general design of the du Temple small-tube boiler, with tabulated tests on French and Russian torpedo boats. 3500 w. Revue Technique—Nov. 10, 1905.

Efficiency.—On Some Attempts to Increase the Efficiency of Marine Boilers. G. M. Brown. Read before the North East Coast Inst. of Engs. & Shipbuilders. Discusses the utilization of the heat of waste gases, the experiments of Mr. Isherwood, the use of retarders, etc. Ill. 4500 w. Engs' Gaz—March, 1901.

Discussion on Mr. G. M. Brown's Paper on "Some Attempts to Increase the Efficiency of Marine Boilers." 7000 w. Trans of N. E. Coast Inst of Engrs & Shipbuilders—May, 1901.

Mr. G. M. Brown's Reply to the Discussion on His Paper on "Some Attempts to Increase the Efficiency of Marine Boilers." 1600 w. Trans of N.-E. Coast Inst of Engrs & Shipbuilders—July, 1901.

"Europa" and "Spartiate" Trials.—The War Conditions Trial of the "Europa" and "Spartiate." An account of the performance of these cruisers which, it is claimed, have rehabilitated the Belleville boiler. After a trip of 20,000 miles, under trying conditions, no defect of importance is found. 1500 w. Engr, Lond—July 10, 1903.

Explosion.—See BOILER EXPLOSION.

Firing.—See FIRING.

French Navy.—The Naval Boiler Question in France. Discussing the relative merits of large and small size tubes for boilers of cruisers and battleships. An official order of the French Minister of Marine. 3000 w. Jour Am Soc of Nav Engrs—May, 1903.

Furnace.—See Crown Collapse; Oil Effect.

German Navy.—The Water-Tube Boiler Question in the German Navy. Translated and condensed article by Mr. Koehn von Jaski, published in the "Marine Rundschau." Discusses the origin of the water-tube boiler question, reasons for their introduction, their disadvantages, choice of the systems, equipment of German vessels, experience, etc. 4000 w. Naut Gaz—Aug. 1, 1901.

The Water-Tube Boiler Question in the German Navy. Köhn von Jaski. Translated from "Marine Rundschau." A lengthy discussion of the reasons for the introduction of water-tube boilers, their disadvantages, choice of type, the fitting of German warships, economy of the various systems, efficiency, cost, etc. 15700 w. Jour Am. Soc. of Nav. Engrs.—Feb., 1902.

See also Dürr.

History.—See BOILER.

Hohenstein.—Naval Tests of a Water-Tube Boiler. An illustrated account of tests made at Washington, D. C., of a Hohenstein boiler, one series with coal and another with oil fuel. The trials were made by U. S. naval officers, in a steel house similar to the fire room of a cruiser, and are recorded in Admiral Melville's annual report. Tables. 1500 w. Eng Rec—Dec. 20, 1902.

The Naval Boiler Problem. John Halligan, Jr. Discusses its importance in determining naval strength, its endurance under forced draft conditions, giving an illustrated description and an extended series of tests of the Hohenstein boiler. 6800 w. Jour Am Soc of Nav Engrs—Feb., 1903.

See also LIQUID FUEL—Marine Boilers.

"Inchdune" and "Inchmarlo."—See MARINE ENGINE.

Induced Draft.—See MECHANICAL DRAFT—Ellis and Eaves.

Italian Navy.—Comparative Boiler Trials in Italy. Concerning the experiments recently made by the Italian Government on three large and precisely similar warships to determine the relative values of boilers of different types. Ill. 3000 w. Engng—May 16, 1902.

Leux Arrangement.—The Arrangement of Boilers for Screw Steamers (Anordnung der Betriebskessel für die Propeller bei Schiffen). A discussion of the Leux system of placing water-tube boilers in two tiers. Serial. Part I. 3000 w. Schiffbau—Nov. 8, 1902.

Liquid Fuel.—See **Hohenstein; Oil Effect; LIQUID FUEL.**

"Maine."—The Boiler Problem in the Navy. Discusses the cause of the trouble in the "Maine," believing the injuries due to the type of boiler. General discussion of the water-tube boiler problem. 2500 w. Ir Age—May 7, 1903.

Report of U. S. Naval Officers on Boilers of U. S. S. "Maine." 5400 w. Jour Am Soc of Nav Engrs—Nov., 1903.

"Martello."—See **Babcock & Wilcox.**

"Minerva' and "Hyacinth" Trials.—The "Minerva" and the "Hyacinth." Editorial discussion of the competitive trials of these cruisers. 1700 w. Engr, Lond—July 26, 1901.

The "Minerva" and "Hyacinth" Trials. Editorial on the trials of these cruisers, discussing the boilers as tested, with remarks on the ships, and their performance. 1100 w. Engng—July 26, 1901.

The Boiler Trials of H. M. S. "Hyacinth" and "Minerva." Official report and editorial discussion. 7300 w. Engng—Aug. 30, 1901.

Water-Tube Boilers. Report on trials of H. M. S. "Hyacinth," H. M. S. "Minerva," and H. M. S. "Saxonia," by the committee appointed by the Admiralty to inquire into the question of water-tube boilers for the British navy. Serial. 1st part. 9500 w. Engng—Feb. 28, 1902.

Multitubular.—Multitubular Marine Boilers and Their Features. William H. Fowler. An illustrated description of the "Scotch" type, with discussion of its working. 1200 w. Mech Engr—March 14, 1903.

Some Miscellaneous Types of Marine Boilers. William H. Fowler. The present article illustrates and describes the multitubular boiler with oval shell. Serial. 1st part. 800 w. Mech Engr—March 28, 1903.

Mumford.—The Mumford Water-Tube Boiler. Illustrated description of a water-tube boiler designed to meet the requirements of torpedo-boats, launches, and similar vessels. 1000 w. Engng—Aug. 19, 1904.

See also **BOILER—Robb-Mumford.**

Nickel-Steel Tubes.—See **BOILER TUBE.**

Niclausse.—Experiments on a Niclausse Water-Tube Boiler. Summarised by Bryan Donkin, from a paper read at the Paris Congress. Describes the results of tests giving the evaporation from each row of tubes in a Nicalusse generator, and at different rates of combustion, with heat efficiencies. 1400 w. Engr, oLnd—April 5, 1901.

The Niclausse Boiler (Niclausse Kessel). Carl Züblin. A review of the development of the Niclausse boiler, with special reference to the marine type, giving details of construction, automatic feed, etc. Serial. Part I. 4000 w. 1 plate. Schiffbau—Sept. 8, 1901.

A Defense of the Niclausse Boiler. J. & A. Niclausse. A statement correcting errors published in an earlier article concerning these boilers. 2800 w. Jour Am Soc of Nav Engrs—May, 1902.

The Niclausse Boiler. Charles M. Howe. A brief illustrated description of this boiler as designed and built in the United States, with data from official error. 9000 w. Jour Am Soc of Nav Engrs—Nov., 1903.

Recent Installations of Niclausse Boilers (Neuere Kesselanlagen mit Niclausse Kesseln). Carl Züblin. A general review of recent naval vessels equipped with Niclausse water-tube boilers, with details of installations. Serial. Part I. 1800 w. Schiffbau—July 12, 1905.

Experiences with Niclausse Boilers on the U. S. S. Nevada. A. M. Cook. Gives the writer's experience with these water-tube boilers, describing the troubles and ways of overcoming them. Ills. 5000 w. Jour Am Soc of Nav Engrs—Aug., 1905.

See also **BOILER MANUFACTURE; BOILER TEST.**

Normand.—Characteristics of the Normand Water-Tube Boiler. Augustin Normand, Jr. Illustrated detailed description. 3000 w. Jour Am Soc of Nav Engrs—Nov., 1903.

Oil Effect.—The Effect of Oil on Boiler Furnaces. D. B. Morison. Read before the N. E. Coast Inst. of Engrs. & Shipbulding. Discusses means of determining the ultimate strength of a boiler furnace and the effect of oil upon it, giving a report of investigations. Ills. Serial. 1st part. 3700 w. Engng—May 5, 1905.

Oil Fuel.—See **LIQUID FUEL.**

Repairs.—Navy Boiler Repairs. Editorial review of a report issued by the British Admiralty making a comparison between ships with shell boilers and those fitted with water-tube boilers. 1700 w. Engng—Nov. 14, 1902.

"Roxburgh."—The Boiler Plant of the British Armored Cruiser "Roxburgh" (Die Kesselanlage des Englischen Kreuzers "Roxburgh"). Carl Züblin. Illustrated description of plant consisting of 17 Dürr water-tube boilers and 6 cylindrical boilers, and of trial runs. 1200 w. Schiffau—Sept. 18, 1905.

See also **Dürr.**

Schichau.—The Improved Boiler of F. Schichau of Elbing (Ein Neuer Kesseltyp der Firma F. Schichau in Elbing). Describing an improved form of water-tube boiler, especially adpted for marine use. 1200 w. Schiffbau—July 23, 1901.

Schütte.—The Schütte Boilers of the Steam Yacht "Lensahn" (Die Kessel der Grossherzoglichen Dampfjacht "Lensahn." System Schütte). Hr. Benetsch. A well illustrated description of combined cylindrical and water-tube boilers installed on the yacht of the grand duke of Oldenburg. 3 articles. 1 plate. 3000 w. Schiffbau—Dec. 23, 1901. Jan. 8, 23, 1902.

A New Type of Water-Tube Boiler. Translation from an article on the "Water-Tube Boilers for Merchant Ships," by Constructing-Engineer Benetsch. An illustrated description of the Schütte combined Scotch and water-tube boiler. It is of the oval fire-tube type, with small-tube water-tubes behind the combustion chamber. 1800 w. Marine Engng—June, 1903.

The Schütte Boiler and its Application to River Boats (Der Schütte-Kessel und seine Verwendung auf Flussschiffen). H. Hildebrandt. Illustrating a combined fire-tube and water-tube boiler, suitable for small boats. 2000 w. Zeitsch d Ver Deutscher Ing—Oct. 10, 1903.

Scialpi.—A New Type of Marine Fire-Tube Boiler. Illustrated description of the Scialpi boiler, with report of trials, and general information. 2500 w. Engr, Lond—Oct. 6, 1905.

Scotch.—See **Multitubular.**

Shell.—Types of Shell Boilers. R. S. Rodie. Drawing and description of a marine shell boiler of the flue and return tubular type. Serial. 1st part. 1500 w. Boiler Maker—March, 1905.

Solignac and Grille.—See **BOILER, WATER-TUBE.**

Stirling.—The Stirling Marine Boiler. Illustrates and describes this boiler, stating its advantages and giving abstract of results of sea trials. 2500 w. Engr, Lond—Aug. 8, 1902.

Test.—See **British Navy; Hohenstein; Italian Navy; BOILER TEST.**

Thornycroft.—Notes on the Performance of the Thornycroft Boiler in a Monitor. W. T. Cluverius. An account of the performance of the boilers of the harbor-defence monitor Arkansas. 1500 w. Jour Am Soc of Nav Engrs—Nov., 1905.

See also **BOILER SETTING.**

Thornycroft-Marshall.—See **BOILER, WATER-TUBE.**

Thornycroft-Schulz.—The Schulz Water-Tube Boiler (Der Schulz Wasserrohrkessel). Carl Züblin. A general account of the Schulz modification of the Thornycroft water-tube boiler, with details of methods of manufacture, tests, and installation. Serial. Part I. 1800 w. Schiffbau—Oct. 12, 1904.

The Computation of the Strength of a Water-Tube Boiler (Festigkeits Berechnung eines Wasserrohrkessels). Detailed calculations for a water-tube boiler of the Thornycroft-Schulz type. 1500 w. Schiffbau—April 12, 1905.

Torpedo Boat.—A New Express Boiler. Illustrations with explanatory notes of new water-tube boilers for first-class torpedo boats. 800 w. Engr, Lond—Feb. 7, 1902.

Troubles.—See **BOILER.**

Water-Tube.—The Application of Water-Tube Steam Generators for Naval Service. B. H. Thwaite. Their comparative suitability, efficiency and convenience in warships. Ill. Serial. 1st part. 5400 w. Eng Mag—Nov., 1900.

Water Tube Steam Generators for Naval Service. B. H. Twaite. A very full discussion of the various types and their especial fitness for naval use. 6000 w. Engineering Magazine—Dec., 1900.

Water-Tube Boilers. Edwin Griffith. Read before the North-East Coast Inst. of Engs and Shipbuilders. Considers the present position of water-tube boilers from the point of view of the marine engineer. 6200 w. Engs' Gas—April, 1901.

Water-Tube Boilers. Edwin Griffith. Considers the present position of water-tube boilers from the point of view of the marine engineer. Also appendix, discussion and plates. 16000 w. Trans of N.-E. Coast Inst of Engrs & Shipbuilders—May, 1901.

Water-Tube Boilers. Edwin Griffith. Read before the North-East-Coast Inst. of Engrs. & Shipbuilders. The object of the paper is to consider the present position of water-tube boilers from the point of view of the marine engineer. 5500 w. Engr, Lond—May 17, 1901.

Resumed Discussion on Mr. E. Griffith's Paper on "Water-Tube Boilers." Also plates. 9600 w. Trans of N.-E. Coast Inst of Engrs & Shipbuilders—July, 1901.

The Marine Water-Tube Boiler. John Platt. Discusses their adaptability to large units and emergency service, and the excellent results obtained from their use in torpedo boats and destroyers where boilers are forced. Urges that more attention be paid to the possibilities of the express type of boiler. 2400 w. Engineering Magazine—September, 1901.

Review of Water-Tube Boilers Now Used for Marine Purposes, with a Comparative Reference to the Ordinary Cylindrical Type. Ernest N. Janson. Descriptive review, comparison and conclusions. 7000 w. Jour Am Soc of Nav Engrs—May, 1902.

Water-Tube Boiler Installations of the World's Navies. Compiled by Charles W. Dyson. A collection of all data concerning water-tube boilers that have been published, arranged in tabular form for reference. 2500 w. Jour Am Soc of Nav Engrs—May, 1902.

The Water-Tube Boiler in the American Mercantile Marine. William A. Fairburn. Briefly reviews the history of water tube boilers, and considers the features important in designing a boiler suitable for merchant vessels, the types in existence at present, the advantages, the operation, fuel, cost, etc. 19 plates. 26300 w. Trans Am Soc of Nav Archts & Marine Engrs. No. 5—Nov., 1902.

A Study of Marine Water-Tube Boilers (Etude sur les Générateurs Marins à Tubes d'Eau). E. Duchesne. Discussing especially the circulation in boilers constructed with internal circulating tubes, giving data and results of experiments with models. 6000 w. Mem Soc Ing Civ de France—Jan., 1904.

See also Babcock & Wilcox; Belleville; British Navy; Dürr; German Navy; Mumford; Niclausse; **BOILER MANUFACTURE; BOILER, WATER-TUBE.**

Water-Tube vs. Cylindrical.—Water-Tube vs. Cylindrical Boilers for Naval Vessels. W. Ledyard Cathcart. Reviews the history of the water-tube boiler in marine service, its efficiency, difficulties met, military value, etc., concluding that its advantages make the use of the cylindrical type a grave military error. 9000 w. Jour Am Soc of Nav Engrs—Nov., 1903.

Yarrow.—Yarrow Boilers (Generatori di Vapore Yarrow). Bruzzone Attilo. An illustrated description of the Yarrow express boilers on the first class torpedo boat "Condore," and an account of experience with them. 8000 w. Rivista Marittima—Feb., 1903.

The Development of the Yarrow Boiler for Use in Battleships. William Crush. An illustrated article tracing the growth and development from 1887 to the present time. 3500 w. Jour Am Soc of Nav Engrs—Aug., 1903.

See also **BOILER, WATER-TUBE.**

BOILER MATERIALS.

See also **BOILER; BOILER MANUFACTURE; BOILER PLATE; BOILER TUBE.**

Materials for Boilers. J. Rowland Brown. Read before the Ohio Soc. of Mech., Elec., and Steam Engrs. An examination of specifications of materials of boilers and their requirements. 6000 w. Engr, U. S. A.—Dec. 1, 1905.

BOILER PLANT.

See also **BOILER; ELECTRIC PLANT; ELECTRIC STATION; STEAM GENERATION; STEAM PLANT.**

Steam Boilers for Power Plants. W. D. Chester. Considers some of the properties and qualities of the natural elements as required for use in steam generating plants, and the relation of fire-tube and water-tube boilers to power plants. 4700 w. Pro Engrs. Soc of W Penn—Dec., 1903.

Modern Boiler House Equipment. Franz Koester. An illustrated comparative review of modern European and American practice. 3000 w. St. Ry Rev—Oct., 1905.

Apponaug, R. I.—An Interesting Boiler House at Apponaug, R. I. Illustrated detailed description of the Dunnell boiler house, which serves a bleachery works. 1200 w. Eng Rec—March 7, 1903.

Bleaching and Dyeing Mills.—Boiler Plants in Bleaching and Dyeing Mills. George I. Rockwood. Abstract of a paper read before the N. E. Cotton Mfrs. Assn. Suggestions for the arrangement and the economical working. 2500 w. Engr, U S A—June 1, 1905.

Economy.—Boiler Room Efficiencies. William D. Ennis. Discusses the losses and methods of securing a decrease in the waste. 3000 w. Am Elect'n—Aug., 1901.

Economy in Boiler Room. Paul McIntire. Briefly considers the conditions regulating boiler capacity, relation of grate surface to various fuels, scale and unclean boilers, etc. 1500 w. Ice & Refrig—May, 1902.

Boiler House Economies. Reginald S. Downe. Abstract of paper and discussion before the incorporated Municipal Electrical Ass'n, reviewing the whole subject of efficient steam generation. Diagrams and tables. 7000 w. Elect'n, Lond—Aug. 5, 1904.

Boiler House Economies. Abstract of a paper by Reginald S. Downe read at meeting of the Incor. Munic. Elec. Assn. Gives table showing coal consumption and fuel cost of British electric stations, and discusses means for improvement. 4000 w. Mech Engr—July 16, 1904.

Boiler Room Economics. F. A. Lankashier. Abstract of a paper presented before the Iowa Elec. Assn. Especially considers boilers and grates, discussing types. 2500 w. Engr, U S A—May 1, 1905.

Boiler-House Economy. A. W. Bennis. Abstract of a paper before the Engng. Soc., Huddersfield. Discusses points that require attention to prevent losses. 2800 w. Ir & Coal Trds Rev—Dec. 8, 1905.

See also **BOILER**—Efficiency; **BOILER TEST.**

Electric Stations.—The Central Station Boiler Room. William D. Ennis. A discussion of points essential to the securing of economical and satisfactory results. 3000 w. Am Elect'n—July, 1901.

See also **BOILER; ELECTRIC PLANT; ELECTRIC STATION.**

Emergencies.—Emergencies in the Boiler Room. R. A. Douglas. Calls attention to various emergencies and suggests what should be done to remedy the troubles. 4400 w. Am Elec'n—July, 1902.

Management.—See **BOILER.**

Pratt Mines, Alabama.—Underground Boiler Plants at Pratt Coal Mines in Alabama. Erskine Ramsay. Describes the method of installation and some of the advantages realized from the arrangement. Ills. 1800 w. Mines & Min—Sept., 1904.

Scranton, Pa.—Hampton Boiler Plant. Illustrated description of a new boiler plant of the D. L. & W. Coal Mining Department at Scranton, Pa. 3000 w. Mines & Min—March, 1902.

BOILER PLATE.

See also **BOILER; BOILER MANUFACTURE; BOILER MATERIALS.**

Thicker Boiler Plates. R. S. Hale. Discusses the old and the present limits and the reasons for them. 1000 w. Power—Feb., 1901.

Brittleness.—The Influence of Brittleness of Steel upon the Effects of Shearing, Punching and Drilling in Boiler Making (Influence de la Fragilité de l'Acier sur les Effets du Cisaillement, du Poinconnage et du Brochage dans la Chaudronnerie). Ch. Frémont. Data and results of tests upon a number of plates. 1000 w. Comptes Rendus—July 31, 1905.

Fractures.—Fractures in Large Steel Boiler Plates. J. T. Milton. Read before the Inst. of Naval Archts. Describes several cases, examining the causes of fracture, reporting tests made, discussing treatment, and investigating the subject generally. Serial. 1st part. 7000 w. Engng—Aug. 4, 1905.

Heat Transference.—See **HEAT TRANSMISSION—Boiler Plates.**

Tests.—The Study of Material for Boiler Construction (Beitrag zur Materialkenntnis für den Kesselbau). H. Otto. A comparison of tests taken from various portions of a boiler plate. 2000 w. Stahl u Eisen—Dec. 15, 1903.

Thickness.—Table for Finding the Thickness of Boiler plates. George F. Summers. Table with brief explanation of its use. 400 w. Am Mach—Jan 16, 1902.

Diagram for the Thickness of Boiler Plates. James A. Brown. Diagram, with explanatory notes. 500 w. Am Mach—Feb. 27, 1902.

Toughness.—The Modifications in the Toughness of Boiler Plate with Increase in Resistance (Die Aenderung der Zähigkeit von Kesselblechen mit Zunahme der Festigkeit). C. Bach. With tables and diagrams giving the results of numerous tests showing the reduction in elongation with increase in breaking resistance. 2000 w. Zeitschr d ver Deutscher Ing—May 13, 1905.

BOILER ROOM.

See **BOILER PLANT.**

BOILER SCALE.

See also **BOILER CLEANING; BOILER CORROSION; FEED WATER; FEED WATER PURIFICATION.**

The Chemistry of Deposits in Steam Boilers. W. E. Ridenour. Considers the physical appearance and vast amount of these accumulations, and discusses the chemical salts existing in these deposits. 1200 w. Jour Fr Inst—Aug., 1901.

Boiler Scale. William S. Bremner. Read before the Glasgow Branch of the Marine Engng. Assn. The treatment of the subject is almost altogether chemical. Serial. 1st part. 3200 w. Engrs' Gaz—July, 1902.

Heat Transmission.—See **HEAT TRANSMISSION—Boiler Scale.**

Solvents.—Boiler Scale Solvents. D. B. Dixon. On the best means to prevent incrustations and other points relating to the care of boilers. 2000 w. Am Mfr—April 10, 1902.

The Use of Boiler Compounds. William M. Booth. From "The Chemical Engineer." Considers the materials used, their effects, cost, and related matters. 1000 w. Eng News—July 27, 1905.

BOILER SETTING.

A Modified Boiler Setting. John E. Sweet. Illustrated description. 700 w. Power—Sept., 1903.

Boiler Settings. Charles L. Hubbard. An illustrated article considering the important requirements. 1800 w. Am Elect'n—Nov., 1903.

Accessories.—Steam Boiler Settings and Appurtenances. C. F. Swingle. The present article considers walls and furnaces, fittings and safety appliances, domes and mud drums, feed pipes, etc. Ill. Serial. 1st part. 3500 w. Steam Engng—Oct. 10, 1902.

Arch Bars.—See **FURNACE.**

Brick.—Brick Settings for Steam Boilers. From "Building News." Calls attention to details of importance in the flues, settings, foundations, design, etc. 1600 w. Prac Engr—May 23, 1902.

Gallows Frame.—Gallows Frame Supports for Tubular Boilers. C. G. Robbins. An illustrated article discussing details of such a setting. 3700 w. Engr, U S A—Aug. 15, 1902.

Lancashire.—The Seating of Lancashire Boilers. An illustrated article discussing points of importance in boiler setting. 1400 w. Prac Engr—Jan. 9, 1903.

Specification.—See **BOILER.**

Thornycroft.—Practical Points in the Erection of the Thornycroft Boiler. Description with diagrams. 1800 w. Marine Engng—March, 1902.

Tubes.—Setting Boiler Tubes. Illustrates and describes various tools used and methods devised. 1000 w. Am Mach—April 21, 1904.

BOILER TEST.

See also **BOILER; BOILER, MARINE; BOILER, WATER-TUBE; STEAM ENGINE TEST.**

Boiler Trials and Analyses of Fuel and Chimney Gases. Abstract translation of a communication by H. Bunte, in response to a request for a set of rules for carrying out efficiency trials of boilers and steam-engines. 4500 w. Jour Gas Lgt—Oct. 30, 1900.

A Few Points on Practical Boiler Testing. John W. Fletcher. On the proper method of testing any boiler, land or marine, new or old. 700 w. Sci Am—Aug. 31, 1901.

Boiler Tests. J. Rowland Brown. Considers the different kinds of boiler tests—for capacity, for efficiency, defects, fuel economy, design, operation, etc., and the importance of knowing the conditions under which the test was made. 4200 w. Engr, U. S. A.—Dec. 1, 1901.

Boiler Testing. Charles L. Hubbard. A brief description of how to carry on a test and make the necessary computations. 2600 w. Am Elect'n—April, 1902.

Engine and Boiler Testing. W. H. Booth. A discussion of methods of testing and their value. 2000 w. Mach, N Y—July, 1903.

Notes on Boiler Tests. J. E. Bell. Read before the Ohio Soc. of Mech., Elec., and Steam Engrs. Suggestions for making a complete boiler test in the right way, with remarks on tests made. 3500 w. Engr, U S A—Dec. 1, 1904.

Automobile.—Test of Capacity and Economy of Boiler of a Motor Carriage. Charles D. Chasteney. Abstract from graduation thesis describing a test made to determine the horse-power and general performance of the boiler. 1400 w. Stevens Ind—Oct., 1901.

Babcock & Wilcox.—Test of One of the Babcock & Wilcox Boilers for the "Cincinnati." Gives a description of the boiler and appurtenances and of the object of the tests and apparatus, with the results. Ill. 2000 w. Jour Am Soc of Nav Engs—Nov., 1900.

Investigations Upon Babcock & Wilcox Boilers (Versuche an Babcock und Wilcox Kesseln). C. Züblin. Comparing the results of tests upon Babcock & Wilcox marine boilers with those of other types. 4000 w. Schiffbau—Nov. 8, 1900.

Evaporative Test of a Babcock & Wilcox Boiler; Comparison of Closed Ash-Pit and Closed Fire-Room Systems of Forced Draft, with Notes on Water-Tube Boilers. Lieut.-Com. B. C. Bryan and Lieut. A. M. Proctor. Ills. 7600 w. Jour. Am. Soc of Nav Engrs—Feb., 1904.

See also **BOILER, MARINE.**

Babcock & Wilcox vs. Stirling.—Report of Competitive Tests Between Babcock & Wilcox and Stirling Boilers, made at Los Angeles, Cal., 1903. Full report covering every detail of the tests made of these water-tube boilers when burning oil, and giving a great amount of information. Ills. 10000 w. Jour of Elec—April, 1904.

Bessbrook Spinning Co., Ireland.—See **STEAM PLANT.**

British Navy.—See **BOILER, MARINE.**

Capacity.—The Value of the Capacity Test in Steam Plant Operation. George K. Hooper. A comparison of tests showing that the highest fuel economy does not always produce the cheapest steam. 3000 w. Engineering Magazine—Aug., 1901.

Comparative.—A Competitive Test of Steam Boilers. Reports of a competitive test at the power station of the Rapid Transit Co., in Philadelphia, of a Parker boiler and the regular Babcock & Wilcox boiler. 4000 w. Eng News—Nov. 27, 1902.

Dalbusch Mine, Westphalia.—Boiler Test at the Dalbusch Mine near Gelsenkirchen (Verdampfungs- und Indikatorversuch ausgeführt auf Schacht I der Bergewerksgesellschaft Dalbusch zu Gelsenkirchen). Data and results of tests of engines and boilers of a mine hoisting plant. 1200 w. Glückauf—Oct. 5, 1901.

Diagrammatic.—Diagrammatic Boiler Testing. W. H. Booth. Showing the advantage of a graphic record and the manner of preparing the diagram. 2000 w. Power—Oct., 1903.

Dürr.—Evaporation Test of Dürr Boilers (Verdampfungs-Versuch an Dürr Kesseln). Data and results of Dürr boilers fired with producer gas and provided with superheaters. 1000 w. Glückauf—May 18, 1901.

Forcing Capacity.—The Forcing Capacity of Fire Tube Boilers. F. W. Dean. Gives particulars of boiler tests upon different types of fire tube boilers, showing that the impression that these boilers have less capacity to be worked above the rated power than water-tubes, is incorrect. 2000 w. Trans Am Soc of Mech Engrs, No. 048—Dec., 1904.

Hydraulic.—Hydraulic Tests. William H. Fowler. Describes these tests for boilers and other vessels subject to steam pressure, giving hints for conducting them, and the information obtained. 1600 w. Mech Engr—Dec. 2, 1905.

Illinois Coals.—Boiler Tests with Illinois Coals. L. P. Breckenridge. A report of the results of these tests, with discussion. Ill. 7000 w. Jour W Soc of Engrs—June, 1901.

Internal vs. External.—Comparative Efficiency of Intenally and Externally-Fired Boilers. D. W. Robb. Discussing a pair of closely coresponding, independently conducted tests of boilers with external oven furnace and internal corrugated furnace. 3000 w. Engineering Magazine—April, 1904.

"John W. Gates."—Coal Consumption of S. S. "John W. Gates." B. C. Bryan. The object of the tests described was to note the action of and results obtained using the Crowe Patent Stoker. 2500 w. Jour Am Soc of Nav Eng—Nov., 1900.

Lancashire.—Evaporative Tests of Lancashire Boilers. William D. Hamilton. Describes tests carried out for the purpose of demonstrating a guarantee that each boiler would evaporate 10,000 lbs. of water per hour from a feed-water temperature of 240 deg Fah. with rough small steam coal after it had passed through a mesh 3-4 in. diameter. 3300 w. Prac Engr—Oct. 14, 1904.

Longridge.—See **MOTOR—Longridge Report.**

Low-Grade Coal.—Experiments in Steaming, with Low Grade Coals (Verdampfungs-Versuch mit Magerkohle). Results of tests made by the Dortmund Boiler Inspection Association, using ordinary draft and steam blast. 1500 w. Glückauf—Dec. 5, 1903.

Naval.—See **BOILER, MARINE; BOILER, WATER TUBE—Test, Naval.**

Niclausse.—Test of a Niclausse Boiler Under Forced Draft. W. M. Parks. A report of tests made to determine whether the proportions of the boiler were such that it could be forced to a high rate of coal combustion without injury. Ills. 3500 w. Jour Am Soc of Nav Engrs—Nov., 1904.

P. O. Dep't., Washington.—Tests of Shell Boilers Using the Roney Stoker. G. W. Baird. Report of a test made on the boilers of the Post-Office Department at Washington, D. C., to determine whether pea coal would furnish sufficient steam, its economic efficiency, and the quantity needed for a yearly supply. 900 w. Jour Am Soc of Nav Engrs—Nov., 1905.

Hohenstein.—See **BOILER, MARINE.**

BOILER TUBE.

See also **BOILER; BOILER CLEANING; BOILER MANUFACTURE; BOILER, MARINE; BOILER, WATER-TUBE; PIPE MANUFACTURE; TUBE MANUFACTURE.**

Flaring.—The Flaring of Boiler Tubes. Calls attention to precautions that should be taken in the flaring of water tubes, and explains the best practice. 1200 w. Locomotive—May, 1902.

Locomotive.—See **LOCOMOTIVE BOILER—Tube.**

Nickel Steel.—Non-Corrosive Nickel Steel Boiler Tubes. Albert Ladd Colby. Information concerning nickel-steel tubes as made in Europe and America, cost, properties, applications, etc. Ills. 5000 w. Trans Am Soc Nav Archts & Marine Engrs, No. 7—Nov., 1903.

Seamless.—Steamless Steel Boiler Tubes.—Their Limited Endurance a Menace to Naval Efficiency. Lieut. Newton Mansfield. Discusses the endurance of iron and mild-steel tubes, nickel steel tubes, and cold-drawn steel tubes, etc. Ill. 5000 w. Jour Am Soc of Nav Engrs—May, 1903.

See also **BOILER MANUFACTURE; PIPE MANUFACTURE; TUBE MANUFACTURE.**

Setting.—See **BOILER SETTING.**

Water-Tube Boiler.—See **BOILER, WATER-TUBE—Tubes.**

BOILER-TUBE CLEANER.

See **BOILER CLEANING.**

BOILER, WATER-TUBE.

See also **BOILER; BOILER MANUFACTURE; BOILER, MARINE; BOILER TEST; POWER PLANT; STEAM PLANT.**

Water-Tube Boilers. W. H. Booth. Discusses the drawbacks which in the writer's opinion condemn these boilers. 1600 w. Am Mach—April 11, 1901.

Water-Tube Boilers. Abstract of a paper by R. J. Worth, read at Middlesbrough meeting of the Cleveland Inst. of Engrs., condemning the Belleville boiler, and discussing other types. General discussion. 4000 w. Ir & Coal Trds Rev—May 3, 1901.

Water-Tube Boilers. William Fyvie. States the factors in favor of water-tubes for land purposes, discussing each, and also considering the weaknesses. Serial. 1st part. 2400 w. Aust Min Stand—Oct. 1, 1903.

Arrangement.—See **BOILER, MARINE—Leux.**

Auxiliary Appliances.—Auxiliary Steam and Water Appliances for Water-Tube Boilers. B. H. Thwaite. Especially discussing automatic feed supply and regulation devices, separators and similar apparatus for aiding in the steady and satisfactory operation of water-tube boilers. 2500 w. Engineering Magazine—Feb., 1901.

Automobile.—Automobile Boilers. Joseph W. Jones. States the principal requirements of a carriage Boiler, and discusses the design and recent improvements. 2300 w. Horseless Age—Dec. 18, 1901.

Steam Autocar Notes. J. S. V. Bickford. States a preference for water-tube boilers, and gives an account of experiments made both in the shop and on the road. Ill. 3300 w. Engr, Lond—July 17, 1903.

See also **Flash; AUTOMOBILE, STEAM; BOILER TEST; CAR, MOTOR-DRIVEN—Steam.**

Babcock and Wilcox.—Babcock and Wilcox boilers at the Glasgow Exhibition. Illustrated description of both land and marine types of these water-tube boilers. 900 w. Engng—June 21, 1901.

Water-Tube Boilers. Albert E. Lea. Read before the Engng. Assn. of N. S. W. Considers briefly the progress and development made in these boilers during the past thirty years, their advantages, etc., describing a Babcock & Wilcox boiler. Serial. 2 parts. 3000 w. Aust Min Stand—July 30 and Aug. 5, 1903.

See also **BOILER, MARINE; BOILER TEST.**

Belleville.—Water-Tube Boilers. An illustrated discussion of the Belleville boiler, the Thornycroft water-tube boiler and the Yarrow boiler. Serial. 2 parts. 8000 w. Sci Am Sup—Dec. 27, 1902, and Jan. 3, 1903.

See also **Circulation; BOILER, MARINE.**

Berry.—Water-Tube Boiler. Illustrated description of a new type designed by W. E. Berry, for land work, to deal with dirty feed-water. 1000 w. Engr, Lond—Feb. 26, 1904.

British Navy.—See **BOILER MARINE.**

Cahall.—The Cahall Water-Tube Boiler. States the 12 requirements that George H. Babcock considered necessary for a perfect steam boiler, and gives an illustrated description of this boiler which claims to fulfill them. 2200 w. Ir & Coal Trds Rev—June 14, 1901.

Circulation.—Water Tubes and Water Grates (Wasserröhren und Wasserroste). M. Grellert. A discussion of the circulation in water tubes, particularly those closed at one end, when subjected to heat, and the inclination they should have. Tables and illustrations. 2500 w. Gasundheits Ing—Jan. 15, 1902.

Circulation in Water-Tube Boilers. William H. Booth. A practical explanation of the principles and action. 3800 w. Elec Rev, Lond—April 4, 1902.

Circulation in Water-Tube Boilers. A. C. Elliott. Investigations of the Belleville boiler, with explanation of method. 4000 w. Engng—April 18, 1902.

Circulation in Water-Tube Boilers. Suggests a cause which it is believed will not only account for circulation, but for erratic performances which frequently cause disaster. 2800 w. Engr, Lond—Nov. 6, 1903.

See also **BOILER.**

Connections.—Water-Tube Boiler Connections (Les Assemblages des Chaudières à Tubes d'Eau). C. Walckenaer. An examination of the methods of connecting tubes in various forms of water-tube boilers, with a discussion of their merits and defects. 8000 w. Revue de Mécanique—June 30, 1901.

Dürr.—See BOILER MANUFACTURE; BOILER, MARINE; BOILER TEST.

Du Temple.—See BOILER, MARINE.

Explosion.—See BOILER EXPLOSION.

Flaring Tubes.—See BOILER TUBE.

Flash.—The Flash Boiler for Automobiles. Joseph W. Jones. Discusses the advantages of this boiler, and predicts great possibilities, especially in automobile work. 2000 w. Horseless Age—Oct. 2, 1901.

Flash Steam Generation. Charles F. Ruby. Considers points in the design of a successful flash boiler, materials to be used, construction, etc. Serial. 1st part. 1400 w. Horseless Age—April 2, 1902.

Flash Steam Generators. J. S. V. Bickford. Notes on the writer's experience in designing and using such generators. 3500 w. Horseless Age—Dec. 17, 1902.

The Action of Flash Generators in Use on a Motor Car. J. S. V. Bickford. A critical examination of their action and the points that affect their efficiency. 3000 w. Horseless Age—Dec. 24, 1902.

"Flash" Boilers for Steam-Cars. J. S. V. Bickford. An account of an extensive series of experiments on boilers for auto cars. 3800 w. Engng—March 10, 1905.

"Flash" Steam Generating Systems. An explanation of the principles of construction and operation and details of well-known types. Serial. 1st part. 3000 w. Automobile—April 30, 1904.

See also Automobile; Renard; AUTOMOBILE, STEAM—Gardner-Serpollet; Serpollet; CAR, MOTOR-DRIVEN—Steam, Serpollet.

Foaming.—A Bad Case of Discharge of Water with Steam from Water-Tube Boilers. A. Bement. An illustrated account of the investigations made to determine the cause and the remedies. 7000 w. Trans Am Soc of Mech Engrs, No. 020—Dec., 1904.

Garbe.—The Garbe Water-Tube Boiler with Large Water Space (Der Garbesche Grosswasserraum-Röhrenkessel). Fr. Geutsch. Describing a form of vertical water-tube boiler with large shells, with details of the forming of tube sheets, etc. 1500 w. Zeitschr d Ver Deutscher Ing—Aug. 13, 1904.

German Navy.—See BOILER, MARINE.

Hammond.—See Parker and Hammond.

Keeler.—A New Water-Tube Boiler. Illustrated description of the Keeler water-tube boiler and superheater. 1200 w. Engr, U S A—June 1, 1905.

Lagosse.—See BOILER.

Liquid Fuel.—See BOILER, MARINE—Hohenstein; LIQUID FUEL.

Locomotive.—See LOCOMOTIVE BOILER.

Marine.—See Thornycroft-Marshall; Yarrow; BOILER MANUFACTURE; BOILER, MARINE; BOILER TEST.

Miyabara.—See MARINE ENGINEERING—Japanese Navy.

Montupet.—The Montupet Boiler (La Chaudière Montupet). M. A. Barbet. An illustrated description of a modification of the Field water-tube boiler, remarkable for the simple and efficient manner of fixing the tubes. Tables. 1200 w. Bull Soc d' Encour—March, 1901.

Moore.—The Moore Vertical Water-Tube Boiler. States the considerations that led to the design of boiler and boiler furnace patented by Enos L. Moore, giving an illustrated description. 1600 w. Ir Age—June 25, 1903.

Morrin.—The Morrin Patent "Climax" Steam Boiler. Illustrated description of a water-tube boiler which has advantages of interest. Report of an extensive test. made by Bryan Donkin, is also given. 2500 w. Engng—March 14, 1902.

Mumford.—See BOILER, MARINE.

Naval.—See BOILER, MARINE; BOILER TEST.

Niclausse.—See BOILER MANUFACTURE; BOILER, MARINE; BOILER TEST.

Normand.—See BOILER, MARINE.

Objections.—Objections to Water-Tube Boilers. W. H. Wakeman. Gives reasons for disapproving of this type of generator. 1700 w. Elec, N Y—May 14, 1902.

Parker.—Test of Parker Water-Tube Boilers. Describes the installation in a power station of the Philadelphia Rapid Transit Co., reporting test. Ills. 1200 w. Eng Rec—June 24, 1905.

On the Science of Steam-Making. John C. Parker. States what the writer considers the principal conditions involved in the evolution of a satisfactory steam generating apparatus, and means of satisfying these conditions. 3600 w. Pro Engrs' Club of Phila—July, 1901.

The Parker Steam Generator. Henry G. Morris. Illustrated description of a straight tube boiler with a reversed circulation. 2000 w. Pro Engrs' Club of Phila—July, 1901.

Parker and Hammond.—Two New Water-Tube Boilers. Illustrates and describes the Parker water-tube boiler, and also the Hammond boiler. 1400 w. Eng News—Aug. 22, 1901.

Renard.—The Renard Boiler (La Chaudière du Colonel Renard). Describing a light weight flash steam boiler designed by the late Col Renard. 800 w. Génie Civil—April 22, 1905.

Robert.—See LOCOMOTIVE BOILER.

Schichau.—See BOILER, MARINE.

Schulz.—See BOILER, MARINE — Thornycroft — Schulz.

Schütte.—See BOILER; BOILER, MARINE.

Solignac.—The Solignac Boiler. W. H. Booth. Read at Belfast meeting of the Brit. Assn. An account of tests made of this water-tube boiler, with description of its important features. 2900 w. Mech Engr—Oct. 4, 1902.

Solignac and Grille.—The Solignac and Grille System of Instantaneous Boiler-Cleaning (Système de Nettoyage Instantané et sans Arrêt de leur Chaudière à Vapeur). MM. Solignac and Grille. Describing the method by which a powerful circulation is used to clean the tubes of the inventors' water-tube boiler. 2500 w. Coc Ing Civ de France—March, 1901.

The Solignac and Grille Marine Boiler (Chaudière Marine de MM. Solignac et Grille). J. Prouteau. Describing this improved form of water-tube boiler, with forced circulation and especial ease of access. 2000 w. Revue Technique—March 25, 1901.

The Solignac Water-Tube Boiler. Information concerning the boilers of Solignac, Grille and Cie, with estimated comparisons between what they can do and some other types of boilers. Illustrates the construction. Serial. 1st part. 2600 w. Engr, Lond—May 3, 1901.

Stirling at Glasgow.—Stirling Water-Tube Boiler at the Glasgow Exhibition. Illustrated description of two boilers in use at the Glasgow Exhibition for the generation of steam for driving the power plant, one of which is fitted with a Vickar's stoker, while in the other producer gas is used. Also report of trials, and illustrations of tube cleaners. 2800 w. Engng—May 17, 1901.

Sugden.—Sugden's Water-Tube Boiler. Illustrates and describes a new boiler possessing interesting features. 800 w. Engng—Jan. 2, 1903.

Test.—See BOILER TEST.

Thornycroft.—See Belleville; BOILER, MARINE; BOILER SETTING.

Thornycroft-Marshall. — The Thornycroft-Marshall Water-Tube Boiler. Illustrated description of a new form of water-tube boiler. 1700 w. Engng—March 15, 1901.

The Thornycroft-Marshall Water-Tube Boiler. Illustrated detailed description. 1700 w. Prac Engr—April 5, 1901.

The Thornycroft-Marshall Water-Tube Boiler. Illustrations, with a statement of the advantages claimed. 1500 w. Engr, Lond—May 3, 1901.

Thornycroft-Schulz.—See BOILER, MARINE.

Tubes.—On the Tubes of Water-Tube Boilers. A general reply to the question of how to calculate the force which tends to draw a tube, in a water-tube boiler, out of the header or tube sheet to which it is secured. Ill. 2000 w. Locomotive—Dec., 1900.

Vertical vs. Horizontal Tubes.—A Comparison of Vertical and Horizontal Tubes in Water-Tube Boilers. W. R. Cummins. Reviews the conditions necessary to make a commercially successful boiler, favoring the vertical tube. Discussion. 16 plates. 10000 w. Trans N-E Coast Inst of Engrs & Shipbuilders—Jan., 1905.

A Comparison of Vertical and Horizontal Tubes in Water-Tube-Boilers. W. R. Cummins. Abstract of a paper read before the North-East Coast Inst. of Engrs. Written to raise a discussion on the relative merits of vertical and horizontal tubes in water-tube boilers. Ills. 4000 w. Ir & Coal Trds Rev—Dec. 2, 1904.

Yarrow.—Why Use Yarrow Boilers? (Warum Yarrow Ketels?) A. D. F. W. Lichtenbelt. A study of water tube boilers with especial reference to small straight-tube boilers of the Yarrow type. 3500 w. De Ingenieur—Aug. 24, 1901.

See also **Belleville.**

BOILER WORKS.

Willans & Robinson.—See **BOILER MANUFACTURE—Niclausse.**

BOLT.

See also **NUT.**

Armor-Plate.—The Manufacture of Armour-Plate Bolts. An illustrated description of these bolts and their manufacture. 2000 w. Engng—July 10, 1903.

See also **MACHINE TOOL—Nut-Facing Machine.**

Crown.—See **STAYBOLT.**

Locomotive and Car.—Bolts, Nuts and Keys, and the Part They Play in Locomotive and Car Work. A topical discussion. Ill. 4500 w. Pro W Ry Club—Feb., 1901.

Rusty.—See **NUT.**

Stress.—The Stress on Bolts in Service. John H. Barr. Presents the results of some direct measurements of the initial load due to screwing up, and gives what is believed to be a rational treatment of the matter of the resultant load after the external load has been added. 2300 w. Sib Jour of Engng—Oct., 1902.

BOLT CUTTER.

Acme Automatic.—See **MACHINE TOOL—Bolt Cutter.**

BONUS SYSTEM.

See **WAGES; WORKS MANAGEMENT.**

BOOM.

Rudder.—See **RUDDER BOOM.**

BOOSTER.

See also **ELECTRIC DISTRIBUTION; STORAGE BATTERY.**

A Simple Alternating Current Booster. F. B. O'Hanlon. Explains the principle on which these boosters are designed. 3500 w. Am Elect'n—Oct., 1903.

Calculations.—Booster Calculations. William A. Del Mar. Considers the various conditions controlling the installation and use of boosters. 3000 w. Elec Wld & Engr—April 9, 1904.

Charging Storage Battery.—See **Storage Battery.**

Electric Railway.—The Use of Series Boosters in Connection with Street Railways. W. J. Davis, Jr. Read before the N. Y. State Ry. Assn. Explains the service where the series booster is of special value, explains its requirements, and the limitations of its economical use. 1400 w. St Ry Jour—Sept. 21, 1901.

The Booster Machine in Traction Service and Its Proper Regulation. Prof. Dr. Rasch. A discussion showing that the most suitable regulation of the buffer machine is to be effected by means of speed regulation. 3000 w. Int Elec Cong of St Louis—Sept., 1904.

See also **Negative.**

Field Control.—Booster Field Control.. Carl P. Nachod. Describes a convenient method of controlling a separately excited booster field. 700 w. Elec Wld & Engr—June 24, 1905.

Improvised.—Improvised Boosters. Walter M. Hollis. Discusses the use of a booster and an additional feeder, the conditions under which a series booster operates, and describes the construction of a booster. 2000 w. Am Elect'n—Nov., 1901.

Lead Mine, St. Francois, Mo.—See **STORAGE BATTERY.**

Negative.—A Method for Diminishing the Drop of Potential in Rails Carrying the Return Current (Ueber ein Neues Verfahren zur Verminderung des Schienenpotentialgefälles bei Elektrischen Bahnen mit Schienenrückleitung). Gisbert Kapp. A paper before the Elektrotechnische Verein, with diagrams, advocating the installation of booster dynamos at points along the railway, feeding into the rails. With discussion. 5000 w. Elektrotech Zeitschr—Jan. 2, 1902.

The Diminishing of Earth Currents on Alternating-Current Railways with Track Return Circuit (Verminderung der Erdströme bei mit Wechselstrom betriebenen Ueberlandbahnen mit Schienenrückleitung). Emil Ziehl. An illustrated account of experiments confirming Gisbert Kapp's method of using boosters at points along the railway. 2000 w. Elektrotech Zeitschr—Feb. 20, 1902.

Potential Drop on Tramway Rails. Gisbert Kapp. Read before the Electrotechnischer Verein. Describes a rail booster system, illustrating by an example. 3000 w. Elect'n, Lond—April 11, 1902.

The Use of Negative Boosters. Explains the action of these boosters, employed to prevent the potential difference exceeding the allowable maximum. Ill. 1900 w. Tram & Ry Wld—Jan. 15, 1903.

"Negative" Boosters. J. Stanley Richmond. Part first contains a theoretical and experimental discussion of the return current in electric railways, with diagrams. Serial. 2 parts. 3000 w. Elec Rev, N. Y.—Oct. 8 & 15, 1904.

See also **Electric Railway.**

Operation.—See **STORAGE BATTERY.**

Reversible.—See **Storage Battery.**

Storage Battery.—Storage Battery Auxiliaries. Lamar Lyndon. Describes the various booster systems in use and shows the conditions to which each is suited. 2000 w. Elec Wld & Engr—June 8, 1901.

On Boosters. G. Stephens. Considers the conditions under which batteries are worked, and the methods of connecting the booster, etc. Ill. 2000 w. Elec Engr, Lond—July 3, 1903.

The Advantages of Boosting. Frank Broadbent. Considers the use of boosters in charging accumulators. 1200 w. Elec Rev, Lond—Feb. 26, 1904.

On Batteries with Reversible Boosters. C. Turnbull. Read before the Newcastle Sec. of the Inst. of Elec. Engrs. Deals with some of the aspects of this solution of a very fluctuating traction load. 4500 w. Elec Engr, Lond—Dec. 23, 1904.

Accumulators with Reversible Boosters for Factory Installations. Ralph W. Birkett. An account of the writer's experience with a generating plant recently erected and managed by him in a large engineering works, showing that a battery thus equipped effects substantial economies in running expenses, and possesses other advantages. Serial. 2 parts. 4000 w. Elect Rev, Lond—Sept. 1, 1905.

Stray Currents.—See **Negative.**

BORAX.

Reconnaissance of the Borax Deposits of Death Valley and Mohave Desert. Marius R. Campbell. Describes these deposits, and their development. Ill. 2300 w. Eng & Min Jour—Oct. 18, 1902.

American Borax Mines. Don Maguire. An account of the discovery of this mineral in the deserts of California and Nevada, and the methods of transporting and preparing it. 3800 w. Mines & Min—Feb., 1903.

BORING.

See also **DRILL; DRILLING; MACHINE TOOL; PETROLEUM WELL; ROCK DRILL; SHAFT SINKING; WELL BORING.**

New Systems of Boring (Ueber Einige Neue Bohrsysteme). W. Wolski. The method includes the use of a reciprocating hydraulic motor operating the tool and capable of being lowered with the latter down the bore hole. 3000 w. Glückauf—Oct. 27, 1900.

Applications of Bore-Holes in Mining. Reviews some of the applications made of bore-holes. 2000 w. Eng & Min Jour—Dec. 15, 1900.

Bohio Dam.—See **DAM—Bohio.**

Cast Iron.—See **FOUNDRY—Borings.**

Coal.—Method of Drilling and Shutting Off Water in Experimental Boreholes. Bergassessor Jacob, in "Glückauf." Describes a method adopted to meet unusual conditions, which, with some alterations, is capable of being adapted to the boring to faults in the vicinity of old workings, etc. Ill. 1800 w. Col. Guard—Nov. 28, 1902.

See also Deep; Dutch Plant.

Coal Mine, France.—See COAL REGION—France...

Deep.—Deep Borings at the Rheinpreussen Mine (Tiefbohrverfahren der Zeche Rheinpreussen). H. Mentzel. With description of the machines and table of the borings at the Rheinpreussen mine, near Homberg. 1000 w. 1 plate. Glückauf—Aug. 31, 1901.

New Methods of Deep Boring. Illustrates and describes a method which consists in the employment of the flushing water as a medium for conveying motive power to the drilling tool. 2700 w. Ir & Coal Trds Rev—Aug. 15, 1902.

The Choice of Methods for Deep Boring (Die Wahl der Bohrmethode für Tiefe Schurfbohrungen). Paul Stein. Comparing the relative value of the diamond and the percussion drill and showing the conditions governing the selection of a method. Two articles, 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 21, June 4, 1904.

Methods and Appliances for Deep Boring (Kurze Uebersicht der Verfahren und Einrichtung zum Tiefbohren). Paul Stein. A general review of deep boring and prospecting practice in Germany, with illustrations of machinery and tools. Two articles. 4500 w. Glückauf—May 20, 27, 1905.

See also Dutch; Howarth; Rods; DRILLING-Deep; Diamond Crown Recovery.

Dutch Plant.—A Dutch Deep Boring Plant (Een Nederlandsche Diepboor Inrichting). C. J. Van-Loon. Illustrating and describing a well boring plant for explorations for coal and petroleum. 1800 w. De Ingenieur—Feb. 14, 1903.

Elliptical.—See BORING MACHINE; LATHE.

Engine Frames.—See BORING MACHINE.

Howarth System.—New Boring Methods (Ueber Einige Neue Bohrsysteme). W. Wolski. Especially discussing the Howarth system for deep boring, in which the impact boring tool is lowered into the hole. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 1, 1900.

Lathe.—See LATHE—Boring.

Liége Exposition.—Improved Boring Appliances Shown at the Liége Exposition (Neue Bohrapparate auf der Lütticher Weltausstellung). Frits Krull. Describing especially the Wolski hydraulic rock drill, and the Frieh & Nollenburg system for sinking shafts. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 21, 1905.

Mine Shaft.—See SHAFT SINKING.

Natural Gas.—Boring for Natural Inflammable Gas, Oil, etc. Illustrates modern tools and describes methods. 1300 w. Am Gas Lgt Jour—Aug. 5, 1901.
See also NATURAL GAS; PETROLEUM WELL.

New Zealand.—See GOLD MINING.

Pattberg Process.—See SHAFT SINKING.

Petroleum Well.—See Natural Gas; PETROLEUM WELL.

Rods.—Boring Rods (Ueber die Bohrstange). W. Wolski. An examination of the dimensions and strength of rods for making deep bore holes. 2000 w. Glückauf—March 9, 1901.

Stratameter.—See STRATAMETER.

BORING MACHINE.

See also BORING MILL; LATHE; MACHINE TOOL.

A Large Boring Machine. Illustrated description of a fine large machine for boring large engine beds, Corliss engine cylinders, frames for large pumping engines, and similar work. 5000 w. Engr, Lond—April 18, 1902.

A Large Horizontal Boring, Drilling and Milling Machine. An illustrated description of a machine of the heaviest type. 1500 w. Am Mach—Dec. 11, 1902.

Horizontal Boring Machines. Thomas R. Shaw. Gives a classification of these machines and begins an illustrated description of types of each class. Serial. 1st part. 2000 w. Mech Engr—Oct. 3, 1903.

Connecting Rods.—Boring and Milling Machine for Connecting Rods (Bohr- und Fräsmachine für Lenkstangen). H. Fischer. Illustrating and describing a special tool by which both ends of a rod are bored and finished at the same time. 1800 w. Zeitschr d Ver Deutscher Ing—July 19, 1902.

Cylinder.—Boring a Cylinder—A Shaper Used as a Milling Machine. An illustrated description of an ingenious modification of shop tools to arrange for work of a different character from that for which they were intended. 1000 w. Am Mach—June 25, 1903.

Electric Driven.—Foreign and American Types of Electrically-Operated Horizontal Boring-Machines. Frank C. Perkins. Illustrated detailed descriptions. 800 w. Sci Am Sup—March 5, 1904.

Elliptical.—Mechanism for Boring Elliptical Cylinders. C. W. MacCord. Showing how an elliptical cylinder of any length can be finished inside by the use of an ordinary boring bar, turning in fixed bearings with uniform velocity. 1200 w. Stevens Ind—Jan., 1901.

A New Elliptical Cutting Machine. C. W. MacCord. Illustrated description of the construction and mode of operation of a machine for cutting elliptical openings. 1400 w. Sci Am Sup—April 6, 1901.

Boring Elliptical Cylinders. Albert E. Guy. Describes a successful method for short cylinders. Ill. 1100 w. Am Mach—April 18, 1901.
See also LATHE.

Engine Frames.—Aligning and Boring Large Engine Frames. Illustrates and describes the methods used by a firm in Providence, R. I. 500 w. Am Mach—Nov. 5, 1903.

Feed Gear.—A Self-Acting Feed Gear for Horizontal Boring Bars. C. Patterson. Shows a self-acting feed gear as applied to the 2-inch boring bars on a special multiple spindle horizontal boring machine. Ill. 600 w. Am Mach—March 13, 1902.

Lathe.—See LATHE.

Portable Bar.—A Portable Boring Bar. Illustrated description of a machine designed for boring out stationary engine, locomotive, and pump cylinders without removing the cylinder from the frame or bed. 800 w. Am Mach—Jan. 1, 1903.

Spherical.—A Spherical Boring Tool for the Drill Press. Louis W. G. Flynt. Illustrated description of a tool designed for the purpose of boring spherical holes in the ends of connecting rods. 1200 w. Am Mach—Jan. 7, 1904.

Steam Turbine Casings.—A Machine for Steam-Turbine Casings (Barrow's Patent) at Clydebank Shipyard. Illustrated description. 400 w. Engng.—Nov. 11, 1904.

Valve Seats.—The Boring of Corliss Valve Seats (Alésage des Glaces Circulaires des Cylindres à Distribution Corliss). M. Chand. With illustrations of forms of valve seats, and details of portable machine for reboring them in position. 2500 w. Revue Technique—Nov. 25, 1902.

BORING MILL.

See also BORING MACHINE; MACHINE TOOL.

28-Ft. Boring and Turning Mill. Illustrated description of a large machine having novel features of interest. 800 w. Engng—Jan. 24, 1902.

A Notable Boring and Turning Mill. Illustrates and gives particulars of the 28-foot boring and turning mills installed in the Westinghouse shops in Pittsburg. 1100 w. Mach, N Y—Feb., 1902.

A Boring-Mill Job. An illustrated account of a specially fitted up boring and turning mill which enabled the time for finishing a gas-engine fly-wheel to be reduced from 2 hrs. 20 min. to 45 min., and the work was better done. 1000 w. Am Mach—Vol. 27, No. 49.

A New Boring Mill. Illustrates and describes a mill of the extension type. 800 w. Am. Mach—Vol. 28, No. 10.

Auxiliary Table.—A Worm Driven Auxiliary Table for a 16 by 24 Niles Boring Mill. H. G. Knoderer. Describes and illustrates the method used in the Westinghouse shops of extending a boring mill for large work. 700 w. Am Mach—Vol. 27, No. 45.

Bullard.—A New Bullard Boring Mill. Illustrated description of a new 54-inch rapid production boring and turning mill, noting its features of interest. 1500 w. Ir Age—Nov. 30, 1905.

Double.—Double Boring and Turning Mill. Illustrates and describes a vertical lathe suitable for turning pieces up to 14 in. diameter by 7 in. high. 500 w. Engr, Lond—Oct. 4, 1901.

Ducommun.—Boring Mill (Tours Verticaux). G. Nardin. A well illustrated description of machine tools constructed by the Ducommun works at Mulhouse, Alsace. 1200 w. Génie Civil—Feb. 22, 1902.

Floor Plate.—A Floor Plate Boring Mill at the Crocker-Wheeler Works. Illustrated detailed description of machinery used in the construction of heavy electrical apparatus. 2000 w. Mach, N Y—Nov, 1905.

Riddell.—Description of Sixty-Foot Vertical Boring and Turning Mill Designed by John Riddell for General Eelctric Co. John Riddell. Ill. 2300 w. Trans Am Soc of Mech Engrs—June, 1903.

BORNITE.

Yukon, B. C.—Bornite Ores of British Columbia and the Yukon Territory. William M. Brewer. Read before the Can. Min. Inst. Gives the history of the discovery of this ore, and a study of the geology and mineralogy of the deposits. 3300 w. Can Min Rev—April, 1905.

BOTTLE.

Compressed Gases.—Bottles for Compressed Air and Liquified Gases (Flaschen zur Aufnahme Verflüssigter und Verdichteter Gase). A. Martens. Data and results of tests of containers for gases under pressures up to 400 atmospheres, with comments on various materials for this service. 4000 w. Zeitschr d Ver Deutscher Ing—April 15, 1905.

BOTTLE MACHINERY.

Appert.—Making Bottles by Machinery (Fabrication Mécanique de Boutilles). H. Aurive. An illustrated description of the Appert system of making bottles, with a review of other mechanical methods. 3000 w. Rev Technique—Aug. 10, 1903.

Boucher.—The Mechanical Manufacture of Bottles (Fabrication Mécanique des Bouteilles). A description of the Boucher machine, by which more than 80 perfect glass bottles can be made per hour. 1000 w. Génie Civil—June 29, 1901.

BOULDER.

Blasting.—See **BLASTING.**

BOULEVARD.

See also **PARK; PAVEMENT; ROAD; STREET.**

Philadelphia.—See **FILTRATION.**

BOYCOTT.

See **LABOR; STRIKE.**

BRACE PIN.

See also **BOILER—Bracing; STAYBOLT.**

On the Strength of Brace Pins. Discusses the different modes of failure, and the way to compute the diameter of a brace pin for a boiler staybolt. Ill. 1500 w. Locomotive—Aug., 1901.

On the Strength of Brace Pins. Considers the different modes of failure, and gives a solution of a problem submitted. 2000 w. Prac Engr—Dec. 13, 1901.

BRAIDING MACHINE.

Schürmann.—The Schürmann Braiding Machine (Die Schürmannsche Flechtmaschine). Prof. Ernst Müller. A well illustrated description of a machine for simultaneously covering, braiding and stranding incandescent light cords, and other electrical conductors. 2000 w. Zeitschr d Ver Deutscher Ing—Jan. 25, 1902.

BRAKE.

See also **AIR BRAKE; BRAKE RIGGING; BRAKE SHOE; DYNAMOMETER.**

Automobile.—Report on Brakes, Presented at the International Automobile Congress. M. L. Bochet. A discussion of devices and methods used in the operation of automobiles. 4000 w. Horseless Age—Nov. 21, 1900.

Brakes. P. M. Heldt. Discusses how many to use, and how to make them effective for both directions of motion, as applied to motor vehicles. Ill. 1400 w. Horseless Age—Dec. 12, 1900.

New Brakes for Automobiles. From "La Locomotion." Illustrates and describes new braking apparatus exhibited at the recent Paris Automobile Show. 700 w. Sci Am Sup—March 1, 1902.

Brake Test Demonstrations in Philadelphia. An account of a series of braking demonstrations before the members of the city government, with results. 2300 w. Horseless Age—July 2, 1902.

Some Notes on Brakes. J. V. S. Bickford. Remarks the tendency to standardization, describes the plans of equalizing the strain of the brake wires, the double-acting brake, etc. 1100 w. Horseless Age—Feb. 11, 1903.

See also **AUTOMOBILE—Public Relations; AUTOMOBILE, ELECTRIC—Recuperative Braking; AUTOMOBILE, GASOLINE—Braking.**

Band.—Band Brakes. C. F. Blake. A diagram with directions for obtaining their proportions. 1200 w. Mach, N. Y.—Jan., 1901.

Band Brakes. J. S. V. Bickford. An explanation of what a double-acting band brake is, considering types. Ill. 1400 w. Engr, Lond—Nov. 27, 1903.

More Notes on Band Brake Design. C. F. Blake. Considers the holding power due to the wedging of the blocks in the V-grooved brake wheel. Diagrams. 1500 w. Mach, N. Y.—March, 1905.

Blosfeld's Hoisting Engine.—See **HOISTING—Safety Appliance.**

Control.—See **AIR BRAKE.**

Crane.—Brakes for Electric Cranes. Information concerning recent practice in electric brakes. 3400 w. Engr, Lond—Nov. 30, 1900.

Modern Lowering Brakes for Cranes (Kritik der Neueren Senksperrbremsen für Krane). Ad. Ernst. A description of the various forms of safety brakes for cranes and hoisting machinery by which the load may be lowered without danger. Two articles. 7500 w. Zeitschr d Ver Deutschr Ing—Aug. 3, 10, 1901.

Mechanical Crane Brakes. G. F. Dodge. Illustrations with description of a modified Weston brake, in which the shell remains stationary. 1000 w. Am Mach—Oct. 29, 1903.

See also **CRANE; ELECTROMAGNET.**

Efficiency.—See **BRAKE SHOE—Friction.**

Electric.—See **Crane; Electric Car; Magnetic; AIR BRAKE; CRANE.**

Electric Car.—Braking Apparatus for Electric Cars. A. L. C. Fell. Discusses car brakes under six heads; hand, friction, slipper, pneumatic, electromagnetic, and Newell electromagnetic brakes. 1500 w. Elec Engr, Lond—June 28, 1901.

Brakes for Electric Street Surface Cars. Charles R. Barnes. Read before N. Y. State St. Ry. Assn. Reviews the changed conditions in street car operation, and the need of an efficient brake. Comments on some of the recent improvements, and suggests what is needed is a perfect brake. 2500 w. St. Ry. Jour—Sept. 14, 1901.

Electric Brakes for Street Railway Cars (Die Elektrische Bremsung der Strassenbahnwagen). M. Müller. Giving a number of diagrams showing the action and advantages of electric brakes on tramways. 6000 w. Elektrotech Zeitschr—June 12, 1902.

Brakes for Tram Cars. C. J. Spencer. Read before the Assn. of Munic. Tram. Mgrs. Discusses the question of brakes, reporting tests made of the slipper brake. 2500 w. Tram & Ry Wld—Aug. 7, 1902.

Brakes for Electric Tram Cars. A discussion of the ways tramcars may be braked and the requirements of an ideal brake. 2300 w. Engng—Dec. 19, 1902.

Braking and Traction Brakes. Charles F. Scott. Introductory remarks to a series of papers on this subject. 800 w. Trans Am Inst of Elec Engrs—Jan., 1903.

Brakes for Electric Cars. W. Park. Outlines the principles governing the retardation of a moving car, describing and discussing the merits of the brakes in use, especially electric brakes. 3300 w. Tram & Ry Wld—Dec. 10, 1903.

The Development of Railroad Braking. R. A. Parke. Abstract of paper read before the New England St. Ry. Club. A review of the development. 4800 w. St Ry Jour—Jan. 2, 1904.

Brakes and Sand. Edward C. Boynton. Discusses arrangements for quickly stopping a car, and the value of sand properly applied. 1200 w. St. Ry Jour—Jan. 2, 1904

Electric Car and Train Brakes S. J. Kidder. Abstract of a paper before the Air-Brake Assn. Considers the various types of brakes brought out since the adoption of electric power for operating cars and trains. 3200 w. R R Gaz—May 18, 1904.

Electric Car and Train Brakes. S. J. Kidder. From a paper read before the Air Brake Ass'n. Reviews briefly the various systems that have been tried. 3000 w. St Ry Rev—May 20, 1904.

See also Electric Motor; Hydraulic; Magnetic; Power; Price; Siemens & Halske; Westinghouse-Newell; **AIR BRAKE**; **AUTOMOBILE—Public Relations.**

Electric Control.—See **AIR BRAKE—Electric, Siemens.**

Electric Motor—Motors as Emergency Brakes. Cale Gough. An explanation of the action that takes place. Ill. 900 w. St Ry Jour—Dec. 5, 1903.

Electric Vehicles.—See Automobile; **AUTOMOBILE, ELECTRIC—Recuperative Braking.**

Electro-Pneumatic.—See **AIR BRAKE—Electric.**

Emergency.—An Emergency Track Brake Used by the United Railroads of San Francisco. Describes the conditions in San Francisco which made necessary a brake that would stop cars on heavy grades, and gives an illustrated description of the brake designed by G. W. Douglas, now in successful use. 1800 w. St Ry Jour—July 4, 1903.

An Emergency Track Brake for Street Railways. F. F. Bodler. Illustrated description of the slipper track brake used on street railway cars in San Francisco, Cal. 1000 w. Eng News—Sept. 28, 1905.

An Emergency Track Brake. F. F. Bodler. Read before the Am. Ry., Mech. & Elec. Assn. Illustrates and describes this brake which is used on almost all of the cars in San Francisco. 1000 w. St Ry Jour—Sept. 30, 1905.

See also Electric Car; Electric Motor; Sand; Westinghouse-Newell.

Gasoline Vehicle.—See **AUTOMOBILE, GASOLINE—Braking.**

Hewitt and Rhodes.—See **AIR BRAKE.**

Hill's.—Edward Hill's Improved Either-Side Brake. An illustrated description of a brake claiming to combine cheapness and efficiency. 2000 w. Col Guard—Oct. 11, 1901.

Hill's Either-Side Brake. Illustrates and describes an improvement effected in the working parts of this brake, and also illustrates the Platt brake, the owners having brought suit for infringement. 800 w. Col Guard—Feb. 20, 1903.

Hoisting.—See **HOISTING—Safety Appliance.**

Hoisting Engine.—See **HOISTING ENGINE—Brakes.**

Hydraulic.—Hydraulic Electric-Car Brake. Illustrated description of what is known as the Neal-Duplex brake, which is operated on the hydraulic principle. 800 w. Sci Am—April 6, 1901.

Hydro-Electric.—A New Hydro-Electric Braking System. Illustrated detailed description of system designed by Charles A. Mudge. 1500 w. St Ry Jour—Jan. 28, 1905.

Leverage.—See **AIR BRAKE.**

Magnetic.—Brake Electromagnets for Continuous Currents (Ueber Bremselektromagnete für Gleichstrom). Max Vogelsang. Describing the solenoid magnets used by the Helios company for operating the brakes for electric cranes. 2500 w. Elektrotech Zeitschr—Feb. 21, 1901.

Magnetic Brakes. Gerald E. Flanagan. An illustrated explanation of the action of magnetically operated brakes as used on cranes and hoisting machinery. 700 w. Am Mach—April 10, 1902.

Electromagnetic Brakes for Street Cars (Elektromagnetische Strassenbahn-Bremsen). An illustrated description of disc and solenoid brakes made by Siemens and Halske. 1500 w. Elektrizität—Jan. 4, 1902.

The Construction of Tubular Magnets for Brakes (Beitrag zur Konstruktion von Mantelmagneten für Bremszwecke). R. Hellmund. A discussion of the form and winding of tubular magnets for the construction of solenoid brakes. 4000 w. Elektrotech Zeitschr—Sept. 3, 1903.

Magnetic Brake for Small Electric Motors. Illustrates and describes two types devised by Siemens & Halske, explaining the principle of their action. 900 w. Sci Am—Feb. 20, 1904.

Design for a Magnetic Brake for a 15 Horse-Power, 500-Volt Motor. R. A. Greene. Section, and description. 1200 w. Am Mach—Vol. 28, No. 8.

See also Electric Car; **BRAKE SHOE—Friction.**

Magnetic Westinghouse.—See **Westinghouse—Newell.**

Mechanical Action.—The Mechanical Action of Wheel-Block Car Brakes. Robert H. Smith. An explanation of Brake action on Railway and tramway cars. 2000 w. Engr, London—Jan. 27, 1905.

Mudge.—See Hydro-Electric.

Neal Duplex.—See Hydraulic.

Newell Electro-Magnetic.—See **Westinghouse—Newell.**

Outside Automatic.—Automatic Outside Brake for Trains. A brief technical description of an interesting apparatus which has been tested at a speed of 62 miles an hour. Ill. 1200 w. U S Cons Repts, No. 1516—Dec. 10, 1902.

Platt.—See Hill.

Power, St. Louis.—Power Brakes for Street Cars. Report prepared by a committee for the Board of Public Improvements in St. Louis. 1500 w. R R Gaz—Ang. 1, 1902.

Power Brakes in St. Louis. R. P. Garrett. Explains the condition in St. Louis which led to the requiring all street cars to be equipped with power brakes, and illustrates two of the makes approved by the Board of Public Improvements. 900 w. R R Gaz—July 24, 1903.

Price Friction.—The Price Patent Friction Brake. Illustrated description of a tramcar brake operated by means of a friction clutch on the car axle. 1000 w. Elec Rev, Lond—Feb. 22, 1901.

The Price Friction Brake. Illustrated detailed description of a device for tramcars operated by the energy of the moving car. 1100 w. Tram & Ry Wld—Jan. 9, 1902.

Prony.—See **DYNAMOMETER.**

Regulating Device.—Device for Regulating the Braking Power of Cars. Illustrated description of a device which regulates the retarding force applied to the wheels. 1800 w. Ry Mas Mech—Feb., 1905 .

Sand.—Sand Braking for Tramways (Sandbremse für Elektrische und andere Bahnen). Describing an electrically-operated sand box and distributor for tramway use. 1000 w. Glasers Annalen—Feb. 15, 1904.

See also Electric Car.

Siemens.—See **AIR BRAKE—Electric, Siemens.**

Siemens & Halske.—See Magnetic.

Tests.—Some Brake Tests and Deductions Therefrom. J. D. Keiley. A description of a method of making braker tests, and of a recording apparatus used in this method; also results from tests on varieties of brakes, and an empirical equation showing the operation of these brakes under different conditions. Ill. 2800 w. Trans Am Inst of Elec Engrs—Jan., 1903.

Theory and Design.—Theory and Design of Mechanical Brakes. E. R. Douglas. Mathematical demonstration. Serial. 1st part. 1500 w. Am Mach—Dec. 19, 1901.

Track.—See Electric Car; Emergency; Westinghouse-Newell.

Westinghouse.—See **AIR BRAKE.**

Westinghouse-Newell.—The Westinghouse Electric Brake and Heater. Illustrated description of the arrangement and construction of the apparatus, the method of attaching the brake rigging to the truck, &c., with a statement of the advantages. 1200 w. R R Gaz—June 28, 1901.

The Westinghouse Electromagnetic Brake (Frein Electromagnétique Westinghouse). M. Delas. A discussion of braking and an illustrated description of the Westingohuse-Newell brake for electric cars. 2500 w. Bull Soc Internat des Elect—April, 1903.

The Westinghouse Electro-Magnetic Brake. Georges Lesourd. An illustrated description with examination of the advantages claimed. 3800 w. Bul Int Ry Cong—Dec., 1903.

BRAKE RIGGING.

See also **AIR BRAKE; BRAKE.**

Foundation.—Foundation Brake Rigging. Henry Kolseth. Read at meeting of the New England R. R. Club. Discusses the design and construction of foundation brake gear in detail. 2800 w. R R Gaz—July 24, 1903.

Street Cars.—A Brake Rigging for Double Truck Cars. Myron Rounds. Gives diagram of brake levers, and points out the essential features and reasons for them in a design that has given satisfaction. 1000 w. St Ry Rev—Sept. 15, 1901.

BRAKE-SHOE.

See also **AIR BRAKE; BRAKE.**

The Structure and Service of Modern Brake-Shoes. F. W. Sargent. Considers the function of the brake-shoe, explaining the action of various shoes, the effect of heat on the different types, work, wear, etc. 4500 w. Pro Pacific Coast Ry Club—April 18, 1903.

A Study of Brakes (Etude sur les Freins). E. Billy and H. Noalhat. A discussion of shoe brakes for cars and other vehicles, from both theoretical and practical standpoints. Serial. Part I. 3500 w. Rev Tech—April 25, 1903.

Development.—Railroad-Car Braking. R. A. Parke. A sketch of the practical development of brakes in railroad service; an analysis of the results of investigations of brake-shoe friction; brake efficiency, etc. The peculiar characteristics of the magnetic brake are also briefly described. Ill. and discussion. 26,000 w. Trans Am Inst of Elec Engrs—Jan., 1903.

The Development of the Modern Brake Shoe. F. W. Sargent. Reviews the progress since the use of wooden shoes, previous to 1850, and especially the development of the cast-iron shoe to its present degree of perfection. Ills. 4000 w. R R Gaz—Vol. XXXVIII., No. 18.

Friction.—The Friction of Brake Shoes. R. A. Parke. Reviews experiments to date, and discusses the effect of pressure, speed, continued rubbing, temperature, etc. Serial. 1st part. R R Gaz—June 14, 1901.

Locomotive.—Locomotive Brake Shoes. W. H. Stocks. A report of a comparative brake shoe test recently made on the C. R. I. & P. Ry., with discussion. 9300 w. W Ry Club—Feb. 18, 1902.

Structure.—The Structure and Service of Modern Brakeshoes. F. W. Sargent. Read before the New England Air Brake Club. Considers the action of brake shoes, the effect of heat generated, the various types in general use, wear, etc. 4200 w. Ry Age—Feb. 27, 1903.

Test.—The Brake Shoe Tests. F. W. Sargent. Facts and theories from a study of the record of the Laboratory Tests of the M. C. B. Assn. Describes the material of the competing shoes, and their action under test. Diagrams. 3000 w. R R Gaz—July 12, 1901.

The M. C. B. Brake-Shoe Tests. F. W. Sargent. Diagrams giving records of tests arranged with the speed constant and the loads varying, with discussion of points of interest. 2400 w. R R Gaz—Aug. 9, 1901.

BRAKE TEST.

See **AIR BRAKE; BRAKE; BRAKE SHOE.**

BRASS.

See also **ALLOY; BEARING; BRASS CASTING; BRASS FOUNDRY; BRASS FURNACE; COPPER ALLOY.**

Brasses. Percy Longmuir. Gives interesting information concerning the varieties of brass, the composition, treatment, etc. 1800 w. Foundry—Sept., 1901.

Analysis.—Practical Methods of Analysis for Brasses and Bronzes. W. W. Corse. Explains methods of analysis and their importance in the brass foundry. 2000 w. Foundry—March, 1905.

Black Color.—The Production of a Black Color on Brass. Erwin S. Sperry, in the "Metal Industry." Describes the solution and method generally employed. 900 w. Ir Age—April 16, 1903.

Dead Dip.—The Dead, or Matt Dip for Brass. From the "Brass World." The dead dip is the dip used to impart a satiny finish to brass. The method of producing this finish is described. 1200 w. Am Mach—Vol. 28, No. 29.

Founding.—See **BRASS FOUNDRY.**

Hot Working.—The Working of Brass and Similar Alloys in the Hot State, and the Dick Squirting Process (Die Verarbeitung des Messings und Verwandter Legierungen auf Warmem Wege und das Warmpressverfahren von Alexander Dick). A. Hilpert. An illustrated paper on the working of brass, high in zinc and brass alloys while hot, and a description of the Dick process for squirting hot metal through dies. 2500 w. Zeitschr d Ver Deutscher Ing—June 6, 1903.

Rolling.—See **COPPER METALLURGY.**

Scrap.—The Use of Scrap Metals in Alloying. C. Vickers. Suggestions for the sorting and use of scrap. 1800 w. Am Mach—Nov. 1, 1900.

Yellow Brass Scrap. C. Vickers. Suggestions for making brass castings. 1700 w. Am Mach—Nov. 8, 1900.

Brass Scrap. C. Vickers. Suggestions for cleaning and using chips. 700 w. Am March—Jan. 31, 1901.

Brass Scrap. C. Vickers. Suggestions for the utilization of this material and its treatment. 700 w. Foundry—Oct., 1901.

See also **SCRAP.**

Special—See **COPPER ALLOY.**

Strength.—See **BRONZE.**

Tellurium.—The Effect of Tellurium on Brass. Erwin S. Sperry. Experimental investigations of the influence of tellurium on the properties of brass. In small amounts it does not seem injurious; in comparatively large amounts it appears to impart coldshortness to high-brass. 1400 w. Trans Am Inst of Min Engrs—Feb. & May, 1902.

BRASS CASTING.

See also **BRASS; BRASS FOUNDRY; BRASS FURNACE; CASTING—Non-Ferrous Metals.**

New and Sanitary Process of Pouring Brass in Casting. Illustrates and describes the apparatus devised by W. Lynes, which has proved successful in protecting the workmen from the noxious fumes and also saves a valuable by-product. 1000 w. Sci Am——June 13, 1903.

Gating and Molding.—Methods of Gating and Molding Brass Castings. C. Vickers. Illustrates and describes methods that have given good results. 1600 w. Am Mach—June 25, 1903.

Iron.—See **CASTING—Brass to Iron.**

Porous.—Porous Brass Castings. C. Vickers. Discusses the cause of leaky castings, and suggests means of remedying the trouble. 1700 w. Am Mach—Aug. 6, 1903.

Propeller Shaft Liners.—Casting Brass Liners on Propeller Shafting. A. Urquhart. Illustrates and describes the method of casting brass liners on propeller shafting. 800 w. Foundry—Oct., 1904.

Spongy.—Spongy Brass Castings. C. Vickers. Discusses the cause of the trouble. 2000 w. Am Mach—July 7, 1904.

Surfacing.—Getting a Fine Surface in Brass Castings. C. Vickers. Outlines a method the writer has used with success. 1500 w. Am Mach—March 17, 1904.

Temperature Influence.—See **ALLOY—Casting Temperature.**

Thin.—Thin Brass Castings. C. Vickers. Discusses the difficulties in this work, giving suggestions. 1000 w. Am Mach—Aug. 15, 1901.

BRASS FOUNDRY.

See also **BRASS; BRASS CASTING; BRASS FURNACE; FOUNDRY.**

Fitting Up a Brass Foundry. C. Vickers. Considers the internal arrangements of a brass foundry. 1600 w. Am Mach—Jan. 17, 1901.

Fitting Up a Brass Foundry. Illustrates and describes the fitting of a new brass foundry in connection with a plant making brass fittings for steam and gas. 1400 w. Am Mach—June 20, 1901.

Equipment of Brass Foundries. C. Vickers. Considers the equipment of each shop should be in accordance with the class of work to be done, and offers some suggestions. 1200 w. Am Mach—July 2, 1903.

Brass-Founding. A letter giving general information on alloys of copper. 1500 w. Am Mach—March 12, 1903.

Successful Brass Founding. John F. Buchanan. Read at the A. F. A. convention. A brief review of the history of brass-founding, with suggestions for producing successful work. 4000 w. Foundry—Dec., 1904.

Alloys.—See **ALLOY—Brass Foundries.**

Chicago.—The New Brass Foundry of the Chicago, Rock Island & Pacific Railway Company, Chicago. Illustrated detailed description. 2200 w. Foundry—June, 1902.

Flasks.—Flasks for Brass Foundries. C. Vickers. Read before the Am. Found. Assn. Gives an excellent shape for a flask for all kinds of brass work, discussing also the advantages of an overhead track in the foundry. 900 w. Ir Age—June 8, 1905.

Flux.—The Use of Plaster of Paris as a Brass Founders' Flux. Edwin S. Sperry, in "Aluminum World." Concerning the theory and uses of fluxes in general, with detailed description of the flux named. 1800 w. Foundry—Aug., 1902.

Melting.—Melting Brass. C. Vickers. Discusses some points in conection with the handling of crucibles. 1000 w. Jour Am Found Assn—June, 1901.

Brass Melting. Charles Vickers. Suggestions for economical melting with remarks on troubles and their remedies. 1100 w. Jour Am Found Assn—June, 1902.

Melting Rates in Brass Foundries. John F. Buchanan. A discussion of the best fuels, methods, the melting ratio, etc. 1700 w. Foundry—Sept., 1903.

Cost of Melting in an Oil Furnace. James F. Webb. Claims that there is a saving in melting brass in the rotary furnace. 700 w. Foundry—Oct., 1904.

Railroad. — Railroad Brass Founding—Driving Brasses. C. Vickers. Describes method of molding. Ill. 1300 w. Am Mach—Nov. 27, 1902.

Records and Costs.—See **COST-KEEPING.**

Siemens & Halske.—The New Brass Foundry of Siemens & Halske. Paul Wever. Illustrated description of the new foundry at Charlottenburg, Germany, and its equipment. 3000 w. Foundry—Feb., 1903.

Westinghouse.—See **FOUNDRY.**

BRASS FURNACE.

See also **BRASS; BRASS CASTING; BRASS FOUNDRY; FURNACE.**

Home-Made.—A Home-Made Brass Furnace. Millard F. Smith. Brief illustrated description. 600 w. Foundry—April, 1903.

Iron Tops.—Iron Tops for Brass Furnaces. Walter J. May. Suggestions for an improevd appliance. Ill. 400 w. Prac Engr—Dec. 18, 1903.

Oil.—See **Steele-Harvey; BRASS FOUNDRY—Melting; LIQUID FUEL.**

Steele-Harvey Tests.—Steele-Harvey Brass Furnace Tests. William T. Krause. Gives a report of tests made with this oil furnace. Also a brief illustrated description of this melting furnace. 2000 w. Ir Age—Sept. 21, 1905.

Wever.—The Wever Triplex Brass Furnace. Paul Wever. An illustrated description. 2000 w. Foundry—Jan., 1904.

See also **BRASS FOUNDRY—Siemens & Halske.**

BRAUN TUBE.

See **VACUUM TUBE.**

BRAZING.

Brockhaus and Enk Process for Brazing Interchangeable Calks for Horseshoes and for Making Brazed Plates (Procédé pour Braser des Crampons Interchangeables de Fers à Cheval et pour Fabriquer les Plaques à Braser par MM. Brockhaus et Enk). Illustrated description. 800 w. Métallurgie—May 6, 1903.

Cast-Iron.—Brazing Cast-Iron by a New Process. Illustrated description of this cast-iron brazing process patented by Friedrich Pich. 1000 w. Eng News—Oct. 16, 1902.

Solder.—See **SOLDER.**

Spelter.—See **SPELTER.**

BREAKDOWNS.

Engines.—See **MOTOR—Longridge Report.**

BREAKWATER.

See also **HARBOR; RIVER REGULATION; SHORE PROTECTION.**

Agate Bay, Minn.—Breakwaters and Plans for Breakwater Extension at Agate Bay, Two Harbors, Minn. S. M. White. Gives briefly the history of early examples, discussing the resistance to be overcome, manner of destruction, modern methods of construction, &c., the conditions at Agate Bay, and the work there. Ill. 9300 w. Jour Assn of Engng Socs—March, 1902.

Alicante, Spain.—Projected Breakwater at Alicante (El Dique de Abrigo Proyectado de Alicante). José Nicolau. A general review of the existing conditions of navigation and the proposed improvements at the port of Alicante, Spain. 2500 w. 2 plates. Revista de Obras Publicas—Sept. 4, 1902.

Bilbao and Zeebrugge.—Jetty Construction at Bilbao and Zeebrugge. Description of works, interesting because greatly facilitated by the novel method of constructing the piers by means of iron caissons filled with concrete. Ill. 1200 w. Engr, Lond—Nov. 2, 1900.

Bilbao, Spain.—See also **Palermo; HARBOR.**

Boulogne, France.—See **Palermo.**

Buffalo.—The Buffalo Breakwater. Thomas Symons. An outline of the development of Buffalo harbor, briefly describing some of the works now being built to provide for the accommodation of commerce. 7600 w. Trans Assn of Civ Engrs of Cornell Univ—1901.

The New Stone Breakwater at Buffalo, N. Y. Illustrates and describes a new form of breakwater now under construction, built of stone, with a gravel hearting; also the methods of working, machinery used, the material, etc. 6000 w. Eng News—May 16, 1901.

Concrete Breakwater Construction of Buffalo, New York. T. W. Symons. Illustrated detailed description of breakwater construction of the Great Lakes, especially the replacing of the wooden superstructure by concrete, and reasons why it cannot as well be so built at first. 7800 w. Eng News—May 29, 1902.

The New Buffalo Harbor Breakwater. Illustrations and particulars of this important engineering work. 1200 w. Sci Am—April 4, 1903.

The Buffalo Breakwater System. A brief history of Buffalo harbor and its protective works, with illustrated detailed description of the latest work. 4400 w. Eng Rec—April 4, 1903.

Final Completion of the Buffalo, N. Y., Breakwater Extension to Stony Point. Illustrations of what is claimed to be the longest breakwater system in the world, with facts concerning it. 350 w. Eng News—Oct. 1, 1903.

The Breakwater at Buffalo, New York. Emile Low. An illustrated detailed description of Breakwater. An illustrated account of the serious tory of the projects for the formation of a harbor, maps, &c. 36400 w. Pro Am Soc of Civ Engrs—Nov., 1903.

The Breakwater at Buffalo, New York. Discussion of the paper by Emile Low. 3000 w. Pro Am Soc of Civ Engrs—Jan., 1904.

The Breakwater at Buffalo, New York. G. H. Raymond and George E. Fell. Continued discussion of a paper on this subject by Emile Low. 2500 w. Pro Am Soc of Civ Engrs—March, 1904. See also **CONCRETE; HARBOR.**

Buffalo Accident.—The Accident to the Buffalo Breakwater. An illustrated acount of the serious settlement that occurred Dec. 10, 1902, describing the proposed method of repairing. 600 w. Eng News—March 19, 1903.

Concrete Blocks.—The Launching of Concrete and Masonry Blocks in Repairing Jetties (Note sur le Lancement des Blocs Artificiels Employés pour l'Entretien des Jetés). M. Chevalier. An illustrated description of a method of launching large and heavy blocks into place. 700 w. Rev Technique—March 10, 1902.

See also **WEIR.**

Constantinople.—See **HARBOR.**

Genoa.—The Break in the Genoa Breakwater (Der Durchbruch des Hafendammes von Genua). E. Bavier. An illustrated account of the injury done to the Genoa breakwater in Nov., 1898, and the manner in which it was repaired. Two articles. 3500 w. Schweiz Bauzeitung—Oct. 25, Nov. 1, 1902.

Groynes.—See SHORE PROTECTION.

Haupt.—Obstructions to Commerce and How to Re- the Franklin Institute through its Committee on Sciences and the Arts, on the invention of Prof. Lewis M. Haupt. 6500 w. Jour Fr Inst—July, the work in this field that has been accomplished in the United States, the cost, etc. 6800 w. Jour Fr Inst—Sept., 1901.

Single Curved vs. Double Straight Jetties. Lewis M. Haupt. An application of natural laws to the removal of bars. 1700 w. Jour Fr Inst—April, 1902.

Haupt's Reaction Breakwater. The report of the Franklin Institute through its Committee on Sciences and the Arts, on the invention of Prof. Lewis M. Haupt. 6500 w. Jour Fr Inst—July, 1902.

See also RIVER REGULATION—Mississippi Delta.

Mississippi Delta.—See RIVER REGULATION.

Palermo.—The Construction of Breakwaters (Sulla Costruzione die Moli) C. Verdinois. A comparison of the breakwaters at Bilboa, Boulogne sur Mer, and Palermo, with especial reference to the improvement works at the latter harbor. 4000 w. 3 plates. Revista Marittima—Dec., 1903.

Port Colborne.—The New Breakwater at Port Colborne, Ontario; Welland Canal Entrance. Describes extensive improvements being made by the Canadian government at the point where the Welland Canal leaves Lake Erie. Also gives briefly the history of the canal, with report of its traffic and existing works. Ill. 4500 w. Eng News—May 15, 1902.

Reaction.—See Haupt.

Stamboul.—See HARBOR—Constantinople.

Wave Action.—See WAVE ACTION.

Zeebrugge.—See Bilbao; HARBOR.

BRICK.

See also BRICK MANUFACTURE; BRICK PAVEMENT; BRICKWORK; BUILDING MATERIAL.

Argilo-Calcareous.—See Sand-Lime.

Babylonian.—The Evolution of the Babylonian Brick. Prof. Edgar James Banks. An account of the history as shown by the interesting discoveries made at Bismya, in Central Babylonia. Ills. 1200 w. Eng News—Sept. 7, 1905.

Baltimore Fire.—See FIRE—Baltimore.

Clinker.—The Manufacture of Bricks from Destructor Clinker. Illustrates and describes the process of manufacture in the plant installed by the Woolwich Town Council in conjunction with their refuse destructor. 1000 w. Engr, Lond—Aug. 26, 1904.

Concrete Reinforced.—See CONCRETE REINFORCED—Brick.

Efflorescence.—On the Saline Efflorescence of Bricks. Oscar Gerlach, in the "Brickbuilder." Discusses the causes leading to it, and the practical means of avoiding the same. Serial. 1st part. 3000 w. Stevens Ind—Oct., 1904.

Enameled.—A Method of Making Enameled Brick. Lawrence E. Barringer. Describes the work of making white enameled brick of good quality, as developed by experimental investigations, and notes facts of interest and value brought out. Serial. 1st part. 3000 w. Brick—Oct. 1, 1903.

Fire.—An Example of the Alteration of Fire-Brick by Furnace Gases. Frank Firmstone. Gives analysis with particulars. 1500 w. Trans Am Inst of Min Engrs—Oct., 1903.

A New Source of Economy for Gas Works: Firebrick Making at the Crystal Palace District Gas Company's Works. From "Jour of Gas Lgt." A short illustrated account of what is being done in this line at the works named. 1600 w. Am Gas Lgt Jour—Jan. 25, 1904.

Refractoriness of Some American Fire-Brick. R. F. Weber. Gives results obtained in testing a series of fire-brick from different parts of the country, in order to determine the relation of their chemical composition, refractoriness and texture. 3500 w. Trans Am Inst of Min Engrs—Sept., 1904.

See also Silica; FIREPROOF CONSTRUCTION; FURNACE LINING; REFRACTORY MATERIAL.

Garchey.—See Glass.

Glass.—Glass Paving Bricks. A. M. Thackara. Describes the processes used in making artificial stone, paving brick and other products from old glass, as manufactured in France under the Garchey patents. 1600 w. Eng Rec—May 20, 1905.

Glazed.—The Manufacture of Glazed Bricks. F. Walker. Discussing kiln firing, white and colored bricks, clay analyses, etc. Serial. 1st part. 1700 w. Brick—Jan. 1, 1901.

Quarzitol.—Quarzitol: New Brick in Germany. An account of a new brick made of flinty sand and some chemical binding material, water and fireproof and claiming many advantages. 1400 w. U S Cons Repts, No. 1476—Oct. 23, 1902.

Sand-Lime.—Manufacture of Silico-Calcareous Blocks (Fabrication des Agglomérés Silico-Calcaires). H. Cuenod. A description of the Schwartz process for forming artificial stone with lime and sand under the action of vapor of water at a high temperature. 1200 w. Génie Civil—Dec. 1, 1900.

The Industry of Sandstone Bricks (L'Industrie de la Brique de Grès). H. de Graffigny. A review of the various processes in practical use for making artificial stone bricks of lime and sand. 2500 w. Revue Technique—Feb. 25, 1901.

The Manufacture and Properties of Artificial Sandstone. Samuel V. Peppel. Abstracted from the "Trans. of the Am. Ceramic Soc., 1902." Describes the material, processes of manufacture, quality, and the mechanical equipment needed. 5000 w. Eng News—Jan. 22. 1903.

The Argilo-Calcareous or Sand-Lime Brick (Girard-Meurer Process). From "Stone Trades Journal." Describes these bricks and the process of manufacture. They are composed of sand, lime and clay, hardened by means of steam under pressure. Serial. 1st part. 2000 w. Am Archt—Aug. 1, 1903.

Sand-Cement and Sand-Lime Brick. Paul Tafel. Gives the early history of the industry. Considers it adapted to all kinds of building purposes. Serial. 1st part. 1200 w. Munic Jour & Engr—Sept., 1903.

Calcareous Brick and Stone Manufacture in Germany. A report concerning these industries, with illustrations of machines used, describing processes, etc. 3300 w. U S Cons Repts, No. 1765—Oct. 3, 1903.

Sand-Lime Brick from a Brickmaker's Point-of-View. Daniel P. De Long. Read at Cincinnati meeting of the Nat. Brick Mfrs. Assn. Discusses the value of this material. General discussion. 4400 w. Am Archt—April 16, 1904.

Sand Lime Bricks. H. Gerlings. Describes the methods of cementing the sand and lime, and other matters of interest in regard to their manufacture. 3000 w. Jour Chem, Met & Min Soc of S Africa—Nov., 1904.

The Manufacture of Sand-Lime Brick. Illustrated description of a manufacturing plant and its operation. 1300 w. Eng News—Aug. 31, 1905.

See also Silica; STONE.

Sand-Lime, Test.—Tests of Sand-Lime Brick. L. E. Curfman. Gives a report of tests made by the writer and the results. 3500 w. Technograph—No. 19, 1904-1905.

Tests of Sand-Lime and Sand-Cement Brick and Concrete Building Blocks. A. Marston. Abstract of a paper read at meeting of the Iowa Brick & Tile Mfrs. Assn. Results of tests are given with explanatory remarks. 800 w. Eng News—April 21, 1904.

Silica.—Silica Brick Making. F. O. Downing. An account of this industry in various countries, with description of the raw material, and method of manufacture. 4000 w. Brick—Oct., 1903.

Silica, Coke-Oven.—Silica Coke-Oven Brick. Discusses their action on heating and cooling, comparing their wearing and heat-resisting qualities with those of clay brick. 1600 w. Mines & Min—June, 1905.

Slag.—The Manufacture of Slag Bricks and Slag Blocks. Edwin C. Eckel. Describes these products in detail. 3300 w. Eng News—April 30, 1903.

Test, Cornell.—An Investigation of the Properties of

Brick Under Different Physical Conditions. Sherman M. Turrill. An illustrated account of tests conducted at Cornell University, giving the methods of procedure, the results of the tests, and an outline of the conclusions. 8000 w. Pro Am Soc of Civ Engrs—March, 1903.

Test, N. Y.—Results of Tests of Common Building Brick for the Bureau of Buildings, New York City. Ira H. Woolson. Describes experiments including tests of transverse and crushing strength, absorption, fire and freezing tests. 3000 w. Eng News—April 13, 1905.

Results of Tests of Common Building Brick for the Bureau of Buildings, New York City. Ira H. Woolson. Reports tests of transverse and crushing strength, also absorption, fire, and freezing tests. 2700 w. Clay Rec—April 29, 1905.

Test, Paving.—See **BRICK PAVEMENT.**

BRICKLAYING.

British Westinghouse Works.—See **BUILDING CONSTRUCTION.**

BRICK MANUFACTURE.

See also **BRICK; BRICK WORKS.**

Clay.—See **CLAY—Burning; Test.**

Coal Fuel.—The Use and Abuse of Coal. Discusses coal as a fuel for brick burning in particular. 3300 w. Brick—Aug., 1901.

Gas Works.—See **BRICK—Fire.**

Machinery.—The Elimination of Hand Labor in Brick Making. J. Parker B. Fiske. An illustrated description of a system which has been put in practical operation and is reported successful. 5000 w. Eng News—Jan. 15, 1903.

Producer Gas.—Notes on the Use of Producer Gas in Burning Bricks. Carl Geissen. Reprint from the Trans. of the Am. Ceramic Soc. Describes the method and its advantages. Also general discussion. 4400 w. Brick—Nov. 1, 1900.

Sand-Lime.—See **BRICK.**

BRICK PAVEMENT.

See also **BRICK; BRICK WORKS; PAVEMENT.**

Paving Brick and Brick Pavements. H. J. March. Excerpts from a lecture given before the Engrs.' Soc. of Western New York. 7500 w. Brick—Aug., 1901.

Brick Pavements and the Engineer. Taylor Gleaves. Concerning vitrified brick pavements, discussing the early mistakes, and suggesting specifications. 2500 w. Brick—Sept., 1901.

Vitrified Brick Pavements. William Pierson Judson. Describes the characteristics and construction of these pavements and their increasing use in the United States. 2000 w. Munic Jour & Engr—Aug., 1902.

Brick Pavements. George W. Tillson. First of a series of four articles. Describes their origin and qualities, imperviousness to moisture, etc. Serial. 1st part. 2800 w. Munic Jour & Engr—Sept., 1903.

Brick Pavement Construction. Ira O. Baker. Calls attention to neglected details, discussing the width of pavement, the sub-grade, foundations, brick, cushion, and joint filler. Serial. 1st part. 3000 w. Munic Jour & Engr—May, 1904.

Brick Pavements. John W. Fulwider. Read before the Indiana Engineering Soc. Gives the writer's views in regard to highway construction and describes the laying of brick pavements, sidewalk construction, &c. 800 w. Munic Engng—Feb., 1905.

Paving Brick, Testing and Inspection. Arthur N. Talbot. Read before the Illinois Clay Workers' Assn. Considers requirements and tests, some of the methods used for different grades of brick, &c. 2800 w. Munic Engng—March, 1905.

Brick Paving. Discusses present day methods and the details that will insure good construction, materials, &c. 3000 w. Munic Jour & Engr—Dec., 1905.

Akron, O.—Specifications for Brick Pavement. Gives the principal points in the new specifications for Akron, O. The pavements are of brick. 3000 w. Munic Jour & Engr—Aug., 1904.

America.—Brick Pavements in America. Ira O. Baker. Describes the making and testing of the bricks used, the road construction, filling, etc., and gives information as to their merits and cost. Ills. 4200 w. Public Works—Sept. 15, 1904.

Asphalt Compared.—Brick vs. Asphalt Pavements. An illustrated article showing cost of construction and repairs of the rival pavements in Syracuse, N. Y. 1000 w. Brick—Dec., 1905.

Asphalt Fillers.—See **Fillers.**

Buffalo, N. Y.—Comparison Between Asphalt and Brick Streets in Buffalo. Favoring the brick pavement. Ill. 2200 w. Brick—July, 1901.

Canandaigua.—Brick Pavements for Villages. Le Grand Brown. The first of a series of articles on street pavements in small towns. The present number gives an illustrated description of the street improvements in Canadaigua, N. Y. 1600 w. Munic Jour & Engr—March, 1905.

Cement Filler.—See **Concrete Foundation; Fillers.**

Columbus, O.—Construction and Maintenance of Brick Pavements. E. A. Kemmler. Facts concerning paving material used in Columbus, O. Estimates the average life of brick pavements on concrete foundation and with proper maintenance at from eighteen to twenty years. 4400 w. Brick—Nov. 1, 1900.

Concrete Foundation.—Concrete Foundation and Cement Filler for Brick Pavement. O. L. Gearheart. Read before the Illinois Soc. of Civ. Engrs and Survs. Discusses the economic relations between concrete foundations of different compositions and cement filler. 1800 w. Eng Rec—Feb. 13, 1904 .

Cuyahoga Co., O.—See **ROAD.**

Detail.—Neglected Details in Brick Pavement Construction. Ira O. Baker. Read before the N. B. M. A. Convention. Discusses the width of pavement, subgrade, foundations, cushion, brick, and joint filler. 5000 w. Brick—June, 1904.

Detroit.—Comparison of Brick Tests and Street Wear. Charles Carroll Brown. A report of tests and trials of a number of brands of paving brick made in Detroit in 1898. Also tests of paving materials in Maryland. 1900 w. Munic Engng—May, 1902.

Durability.—Durability of Brick Streets. W. Blair. Reports examination made, and considers that if the construction is good, the pavement will prove durable. 3000 w. Brick—May, 1901.

Expansion.—Expansion in Brick Pavements. Daniel B. Luten. Discusses the causes of the rumbling sounds produced by brick pavements under traffic, especially during the heat of summer; considers it due to expansion, and suggests the remedy. Ill. 800 w. Eng News—March 14, 1901.

The Expansion of Brick Pavements. Describes the phenomena noticed in several cities where grout filler is used. 1000 w. Eng Rec—Aug. 10, 1901.

Fillers.—What Are the Relative Merits of Cement and Asphalt Fillers for Brick Pavements. H. C. Innes. Read before the Nat. Brick Mfrs.' Assn. A discussion of the proper filler for brick and block pavements. 3700 w. Brick—Feb., 1905.

Joint Fillers for Brick Pavements. Ira O. Baker. Read before the Illinois Clay Workers' Assn. Considers sand, tar, asphalt, and cement as fillers, favoring the last. 2400 w. Munic Engng—March, 1905.

See also **Concrete Foundation.**

Iowa.—Brick Paving in Iowa. Abstract of a recent report of the Iowa Engineering Soc giving the importance of brick paving in Iowa, and giving some of the results of investigations. 2500 w. Eng Rec—June 13, 1903.

Ithaca, N. Y.—The Cost and Durability of Brick Pavements in Ithaca. Extracts from a paper by C. L. Crandall, presented to the League of Am. Municipalities, describing minutely the construction and durability of many brick pavements. 1700 w. Eng Rec—Sept. 7, 1901.

Laying.—Practice in Laying Brick Pavements. Calls attention to the care needed for the foundation, the choice of filler and its application, etc. Ill. 2200 w. Munic Jour & Engr—Feb., 1903.

How to Lay Brick Pavements. Ira O. Baker. An illustrated article considering details of construction, and the merits of this kind of pavement. 2700 w. Munic Jour & Engr—March, 1903. See also **Rochester, N. Y.**

Roads.—Paving a Country Road with Brick. Samuel Huston. Slightly condensed from a paper read before the Ohio Soc. of Civ. Engrs. & Surv. A statement of the conditions where the road is located with a description of the construction. 1700 w. Eng News—Sept. 25, 1902.

The Good Roads Movement and the Part Paving Brick Should Have in It. R. W. Richardson. Read before the Nat. Brick Mfrs.' Assn. Considers brick road building, the method of construction, cost, and maintenance and related matters. Ills. 2800 w. Brick—Feb., 1905.

Rochester, N. Y.—How to Lay Brick Pavements. A digest of the model specifications used in Rochester, N. Y., where many miles of brick pavements are in good condition after hard service. 3500 w. Munic Jour & Engr—May, 1903.

Specifications.—Requirements of Brick for Paving Purposes. H. E. Beasley. Read before the Illinois Clayworkers' Assn. Quotes from specifications for brick pavements to be used in Peoria, Ill., and discusses the value of the tests required. 1500 w. Brick—Feb. 1, 1901.

Paving Brick Specifications and Tests. A report of the standard specifications adopted by the Illinois Society of Engineers and Surveyors, with a discussion of the reasons for their choice. 2000 w. Eng Rec—Feb. 9, 1901.

Brick Pavement Specifications. Gives a specification designed to carry out the ideas of the writer, with remarks. 1600 w. Munic Engng—June, 1905.

Syracuse, N. Y.—Brick Pavements at Syracuse, N. Y. An illustrated article reporting the amount of brick pavement laid, its cost, and condition after ten years' wear. 2000 w. Brick—Aug., 1903.

See also **Asphalt Compared.**

Test.—Commercial Brick Testing. Outlines methods of brick testing, giving illustrations. 1800 w. Brick—Sept., 1901.

Tests for Paving Brick. A concise history of the rattler tests. 4800 w. Brick—Sept., 1901.

Toronto.—Brick Pavements in Toronto. Charles W. Dill. Reports them as well adapted to this northern climate and gives the method of construction. Ill. 1300 w. Munic Jour & Engr—April, 1903.

Wheeling, W. Va.—Specifications for Paving Brick for Use at Wheeling, W. Va. Reprint of specifications relating to quality, dimensions, test, inspection, etc. 800 w. Eng News—Feb. 27, 1902.

BRICKWORK.

Architectural.—Architectural Brickwork. From the Standpoint of a Constructing Engineer. John Stephen Sewell. Discusses the necessary features of good brick work, the heads of the bricks, the joints, including the mortar, and the bond. 7000 w. Arch Rev—May, 1901.

Reinforced.—See **CONCRETE REINFORCED—Brick.**

Test.—Experiments with a Division Wall (Versuch bezüglich der Standfestigkeit einer Scheidemauer). Karl Stigler. Illustrated description of experiments with a brick wall, where part was removed and part remained in place. 600 w. Zeitschr d Oesterr Ing u Arch Ver—May 2, 1902.

See also **CONCRETE.**

BRICK WORKS.

Cleveland, O.—The Equipment of a Modern Paving Brick Plant. Willard D. Richardson. A paper given in the "Transactions' of the American Ceramic Society. Plans and description of a plant near Cleveland, Ohio. 2000 w. Eng Rec—Nov. 15 1902.

Crystal Palace Gas Co.—See **BRICK—Fire.**

Danville, Ill.—Brick Making Plant of the Western Brick Co., Danville, Ill. Illustrated description of plant for the manufacture of building and paving brick. 2400 w. Eng News—Jan. 14, 1904.

Schernbeck, Germany.—Brick and Tile Works at Schernbeck, near Wesel (Thon und Falzziegelwerk der Gewerkschaft Union in Schernbeck bei Wesel). H. Seifert. With full plans of this modern plant, including pressing and molding machinery, drying and burning kilns, etc., etc. 1200 w. 1 plate. Zeitschr d Ver Deutscher Ing—Nov. 24, 1900.

Woolwich, Eng.—See **BRICK—Clinker.**

BRIDGE.

See also **BRIDGE ACCIDENT; BRIDGE DESIGN; BRIDGE ERECTION; BRIDGE SPECIFICATIONS; CULVERT; FERRY BRIDGE; GIRDER; TRANSPORTATION—Maritime Channels; VIADUCT.**

Aber, Wales.—Aber Swing Bridge, Carnarvon. Illustrated detailed description of the bridge over the river Seiont. 900 w. Engr, Lond—Aug. 2, 1901.

Adda, Italy.—The Adda Railway Bridge in Italy. Notes and illustrations from an article by William Wolff, in "Centralblatt der Bauverwaltung." An illustrated description of a large masonry arch having a single span of nearly 280 ft. on the line of the Colico-Sondrio Railway in Northern Italy. 1700 w. Eng Rec—Oct. 17, 1903.

The Great Railway Arch over the Adda in the Valtellina, Italy (Die Grosse Gewölbte Eisenbahnbrücke über die Adda im Veltelino in Italien) Rudolf Jaussner. With details of the centering and erection of the masonry arch of 70 metres span. 2000 w. Zeitschr d Oesterr Ing u Arch Ver —Jan. 1, 1904.

Adolphe.—See **Luxemburg.**

Aesthetic.—The Architectural Treatment of Bridges. Illustrated extracts from "The Builder," giving suggestions for designing piers and spandrel facings of flat masonry arches. 2200 w. Eng Rec—Nov. 2, 1901.

The Aesthetic Characteristics of European Bridges. Editorial, with the first of a series of views of notable bridges, selected by E. M. Wheelwright, who has made a study of this subject. 350 w. Eng Rec—Feb. 2, 1901.

Aesthetics in Bridge Building. Remarks on the work of various nations, suggested by a paper read before the British Inst. of Civ. Engs. 1800 w. Arch, Lond—March 15, 1901.

The Aesthetic Treatment of Bridges. Review of a paper read by an engineer, Mr. Husband, before the British Inst. of Civ. Engs. 2000 w. Builder—March 15, 1901.

Ornamental Bridges. H. G. Tyrrell. An illustrated article discussing a few examples of high-class bridge design and construction. 3 two-page plates. 1600 w. Am Arch't—Aug. 24, 1901.

Some Modern Types of Swiss and German Bridges. Gives illustrations of some artistic bridges, with descriptive notes. 900 w. Sci Am Sup—May 23, 1903.
See also **Deal, N. J.; Magdeburg; Manhattan; New York; Washington.**

Aisne River, France.—See **Soissons.**
Alaska.—See **White Pass.**

Albulu Ry., Switzerland.—The Arch Bridges on the Albula Railway (Die Gewölbten Brücken der Albulabahn). With details and photographs of the important masonry arches on the line of the new Engadine railway, in Switzerland. Three articles, 3000 w. Schweiz Bauzeitung—Jan. 16, 23, 30, 1904.

The Rhine Bridge on the Albula Railway at Thusis, Switzerland (Die Rheinbrücke der Albulabahn bei Thusis). A well illustrated account of a steel deck bridge, 269 ft. span, in Eastern Switzerland. Serial. 2 parts. 3000 w. Schweiz Bauzeitung—April 12 and 19, 1902.

The Bridge Over the Rhine at Thusis. Illustrated detailed description of a steel bridge on the Albula Railway having a clear span of 80 m., and on each side an approach viaduct. 1000 w. Engr, Lond—Nov. 25, 1904.

See also **RAILWAY.**

Alexandria, La.—See **Red River, La.**

American vs. British.—See **Atbara; BRIDGE CONSTRUCTION.**

Amou Daria River.—The New Bridge Over the Amou Daria River on the Trans-Caspian Railway. A. Zdiarski. Describes the temporary wooden bridge and the permanent structure which is 5,250 ft. long, having 25 through spans of 210 ft. Ill. 2500 w. Eng News—April 10, 1902.

Amsterdam.—The Operation of the New Bridge over the Amstel at Amsterdam (Bewegingsinrichtingen der Nieuwe Amstelbrug te Amsterdam). F. C. Dufour. With illustrations of the new arched bridge, and details of the operation of the double bascule draw span. 3500 w. De Ingenieur—June 11, 1904.

Amsterdam Canal.—See Velzen.

Anacostia.—See Washington, D. C.

Angola, N. Y.—See Willoughby, O.

Aqueduct.—See AQUEDUCT; BRIDGE RENEWAL —Kansas City.

Arch.—See ARCH; VIADUCT—Viaur; and under names and locations of bridges.

Arch Hinged.—See Ehingen; Las Segadas; Mansfield, O., Miltenberg; St. Petersburg; ARCH; BRIDGE DESIGN; FRAMEWORK.

Arch, Hyperbolic.—See Chic., Mil. & St. Paul Ry.

Architectural.—See Aesthetic; New York; Washington.

Arch Masonry.—See Albula Railway; Baden; Chic., Mil. & St. Paul Ry.; Fitchburg Ry.; Gignac, France; Hartford; Luxemburg; Mannheim; New Brunswick; Plauen, Saxony; Rockville; Trenton; Valence; Watertown, Wis.; ARCH; BRIDGE ACCIDENT—Munich: BRIDGE DESIGN; BRIDGE RENEWAL—Argental, France; CONCRETE.

Arch Melan.—See Concrete Reinforced; Dayton; Indianapolis; Jesenica; Laibach, Washington, D. C.; BRIDGE DESIGN—Arch Masonry; BRIDGE PIER; CONCRETE REINFORCED.

Arch Monier.—See Coblenz—Treves; Concrete Reinforced; BRIDGE DESIGN—Arch Masonry; CONCRETE REINFORCED.

Arch Parabolic.—See Washington, D. C.; BRIDGE DESIGN—Arch Masonry.

Arch Ribbed.—See Deer Park.

Argental, France.—See BRIDGE RENEWAL.

Atbara.—The Atbara River Bridge. Brief illustrated account of the awarding of this work, method of erection, &c. 1200 w. Sci Am—March 15, 1902.

Atch., Top. & Santa Fe Ry.—See Railway Standards.

Austerlitz.—See Paris.

Avelghem, Belgium.—See Vierendeel System.

Baden.—Great Stone Bridges in the Grand Duchy of Baden (Grosse Steinbrücken im Grossherzogtum Baden). R. Moser. A well illustrated description of two fine stone arches, with spans of 64 meters and 57 meters, respectively, on a railway in Southern Germany. 4000 w. Schweiz Bauzeitung—Dec. 21, 1901.

See also Plauen.

Ballasted Floor.—See BRIDGE FLOOR—Ballasted.

B. & O. R. R.—See Calumet River.

Bamberg, Germany.—Reinforced Concrete Girder Bridge at Bamberg (Balkenbrücke in Eisenbeton in Bamberg). Description of the construction and erection of highway girder bridge of 21 metres span. 1200 w. Deutsche Bauzeitung—Jan. 11, 1905.

Bangor, Me.—Concrete-Steel Bridge Across Kenduskeag Stream, at Bangor, Maine. Illustrated description of a recently built bridge on the Ransome system. 700 w. Eng News—March 20, 1902.

Barking Creek.—See Lift.

Barnegat Bay, N. J.—A 128-ft Wooden Swing Bridge Over Barnegat Bay, Mantoloking, Ocean County, N. J. Franklin Van Winkle. Brief description of a bridge having wooden draw span possessing novel features. 3300 w. Eng News—Nov. 27, 1902.

Bascule.—See Lift.

Basel.—The Competition for the Middle Bridge over the Rhine at Basel, Switzerland (Der Wettbewerb um den Neubau der Mittlern Rheinbrücke zu Basel). Carl Bernhard. A well illustrated review of the design which received the second prize, a steel cantilever with a single architectural pier in the center of the river. 2000 w. Zeitschr d Ver Deutscher Ing—April 19, 1902.

The Competition for the Middle Rhine Bridge at Basel, Switzerland (Wettbewerb für den Neubau der Mittleren Rheinbrücke zu Basel). A review of the designs submitted in the competition for a bridge to replace one which has stood for centuries, with illustrations of the prize winners. Serial. 5 parts. 3 plates. 7000 w. Schweiz Bauzeitung—Jan. 18, 25, Feb. 1, 8, 15, 1902.

Basel, Temporary.—The Temporary Bridge over the Rhine at Basel (Die Provisorische Rheinbrücke in Basel). Illustrating the wooden structure for use during the rebuilding of the middle bridge at Basel. 1500 w. Schweizerische Bauzeitung—Nov. 7, 1903.

Bellows Falls, Vt.—The Bellows Falls Highway Bridge. An illustrated description of a large highway arch span across the Connecticut River, the only long-span arch with suspended floor in the United States. 2500 w. Eng Rec—Nov. 5, 1904.

See also BRIDGE ERECTION.

Bendigo.—The Stresses on Skew Arches. W. C. Kernot. Read before the Victorian Inst of Engrs. An account of an investigation made of the cause of failure in an arch of this type, at Bendigo. Gives an interesting experiment carried out to determine where the stress became intense. 2000 w. Eng Nws—June 11, 1903.

Bengal.—See India.

Berlin.—See Oberschöneweide.

Bethlehem Junction.—The Bethlehem Junction Bridge. Illustration, with description, of a single-track plate-girder bridge with a clear span of 80 feet, carrying the C. R. R. of N. J. over the Lehigh Canal, recently built to replace an old skew-bridge. 2000 w. Eng Rec—Jan. 21, 1905.

Big Muddy River, Ill.—See Carbondale.

Big Rock Creek, Ill.—See Plano.

Billwil-Oberbüren.—The New Highway Bridge over the Thur at Billwil-Oberbüren (Die Neue Strassenbrücke über die Thur bei Billwil-Oberbüren). Describing a peculiar form of reinforced concrete bridge with two arches of 35 metres span each. 1200 w. Schweiz Bauzeitung—Oct. 1, 1904.

Biltmore, N. C.—An Enclosed Plate-Girder Park Bridge. Illustrated description of a steel bridge covered with concrete to give the appearance of masonry, built on the Vanderbilt estate of Biltmore from the plans of Richard M. Hunt. 800 w. Eng Rec—June 1, 1901.

Birmingham, O.—Steel Arch Electric Railway Bridge Over the Vermillion River at Birmingham, O. Illustrates a high-class construction for interurban electric railway service. 700 w. Eng News —Oct. 30, 1902.

Black Forest, Germany.—See Baden; Plauen.

Blackwell's Island, N. Y.—The Fourth East River Bridge, New York. Description of cantilever structure 8,231 ft. long between Manhattan and Queens. 800 w. Eng Rec—March 16, 1901.

East River Bridge, No. 4. Henry A. La Chicotte. Illustrated description of this fourth bridge to be constructed across the East River at New York, with remarks on the residence district it will make accessible. 1400 w. R R Gaz—Aug. 16, 1901.

The Blackwell's Island Bridge. Brief illustrated description of bridge No. 4, crossing from 59th & 60th streets, Borough of Manhattan, to the Borough of Queens. It will be the heaviest and most capacious long span bridge ever constructed, and, with one exception, the longest truss span ever built. 1500 w. Eng Rec—Feb. 28, 1903.

Blacwell's Island Bridge. Perspective view of the bridge as it will appear when completed, with brief description and general information. 1000 w. Sci Am—Sept. 19, 1903.

Why Steel and Its Erection Costs so Much. Editorial on the results of the bidding for about 40,000 tons of steel for the superstructure of the Blackwell's Island bridge over the East River at New York. 1400 w. R R Gaz—Oct. 2, 1903.

Details of Blackwell's Island Bridge Superstructure. An illustrated detailed description of this bridge from East Fifty-ninth street, Manhattan, across the East River and Blackwell's Island, New York, to Ravenswood. Serial. 1st part. 2000 w. Eng Rec—May 20, 1905.

See also East River; BRIDGE DESIGN; BRIDGE ERECTION; BRIDGE FOUNDATION; BRIDGE PIER; BRIDGE SPECIFICATION; SURVEYING —Bridge, Blackwell's Island.

Bonhomme, France.—The Bonhomme Suspension Bridge over the Blavet (Pont Suspendu du Bonhomme sur le Blavet). G. Leinekugel Le Cocq. Illustrated description of highway suspension bridge. Illustrated description of highway suspension bridge of 160 metres span, near Lorient, France, with details of construction and erection. Serial. Part I. 2000 w. 1 plate. Génie Civil—Feb. 4, 1905.

Boston.—See also **Cambridge; Charlestown.**

Boston Park.—The Ginn Field Foot-Bridge, Boston Metropolitan Park System. William T. Pierce. Illustrated description of a small wooden foot-bridge of pleasing design. 3000 w. Eng News—Sept. 14, 1905.

Boston, Summer St.—See **VIADUCT.**

Bout de L'Isle, Can.—The Bout de L'Isle Bridge. J. L. Morris. Illustrated description of a bridge crossing the east and west branches of the Ottawa River just above the junction with the St. Lawrence. 2000 w. Can Soc of Civ Engrs—April 20, 1905.

Branch Brook Park, N. J.—See **Newark Park.**

Brandenburg, Germany.—The Iron Railway Bridge over the Havel at Brandenburg (Die Eisenbahnbrücke über die Havel bei Brandenburg). Karl Bernhard. With details of construction and erection of a semiparabolic truss of 90 metres span, with a peculiar form of bracing. 3000 w. Zeitschr d Ver Deutscher Ing—Oct. 14, 1905.

Braunau, Austria.—Bridge over the Mattig at Braunau on the Inn (Brücke über den Mattigfluss bei Braunau a-I.). Gustav Hermann. Illustrating a highway truss bridge with middle span of 81.5 metres. 2500 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—April 1, 1905.

Bridgeport.—See **Lift.**

Brooklyn, N. Y.—The Official Report of the Condition of the Brooklyn Bridge. Editorial review of this report. 3200 w. Eng Rec—Jan. 4, 1902.

The Condition of the Brooklyn Bridge. Extracts from the Annual Report of the Commissioner of Bridges, from the special report of Messrs. Buck and La Chicotte. 6200 w. R R Gaz—Jan. 10, 1902.

A Study of the Brooklyn Bridge Problem. Edward Whitehead Curtiss. Illustrates a system of transportation for reducing the load on the bridge and distributing it more uniformly and overcoming the congestion at the terminal. 1500 w. Sci Am—March 18, 1905.

See also **East River; BRIDGE ACCIDENT; BRIDGE RENEWAL; BRIDGE TERMINAL.**

Brooklyn Arch.—A Concrete Arch Bridge with Bar and Stirrups Reinforcement. An illustrated description of the bridge which carries Seeley St. over Prospect Ave., in Brooklyn, New York. It is a skew structure in which small bars and metal netting are used for reinforcing the concrete arch. 1200 w. Eng News—Dec 31, 1903.

Brooklyn Drawbridge.—Wood Block Paving and Other Features in Connection with a Small Drawbridge in Brooklyn, N. Y. Illustrated description of a bridge for heavy traffic. 1000 w. Eng Rec—Feb. 7, 1903.

Brooklyn Lift.—See **Lift.**

Brugg, Switzerland.—The New Railway Bridge at Brugg, Switzerland (Die Neue Eisenbahn-Brücke bei Brugg, Aargau). An illustrated description of the present viaduct over the Aar, at Brugg, with lenticular trusses, and of proposed new designs, both in steel and in stone. 1000 w. Schweiz Bauzeitung—April 4, 1903.

Reconstruction of the Railway Bridge over the Aar, at Brugg, Switzerland (Reconstruction du Pont sur l'Aar, à Brugg. Ligne de Bötzberg). Illustrated description of lenticular-truss iron bridge and of new stone-arch viaduct to replace it. Serial. 2 parts. 2500 w. 3 plates. Bull Tech d l Suisse. Romande—April 25 and June 10, 1903.

Budapest.—The New Chain Bridge at Budapest. Illustrated description of a suspension bridge of 1,242 ft. total span, having chains of links machined from plates by means of special tools. 2400 w. Eng Rec—Nov. 10, 1900.

The Schwurplatz Bridge over the Danube at Budapest (Die Schwurplatz-Donaubrücke in Budapest). Alois Meissner. A brief account of the progress of work on this large ornamental chain bridge, with illustrations. 400 w. Oesterr Wochenschr f d Oeffent Baudienst—June 7, 1902.

The Elizabeth Bridge, Budapest. Begins an illustrated description of a suspension bridge presenting various novel engineering features, giving also historical sketch. Serial. 1st part. 1800 w. Engr, Lond—April 15, 1904.

The Elizabeth Suspension Bridge at Budapest (Die Elisabeth-Kettenbrücke in Budapest). Dr. Karl Rosenberg. With details of foundations, construction, and erection. Eye-bar cables are used for a span of 290 metres. Two articles. 3 plates. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—April 22, 1904.

The Elisabeth Suspension Bridge at Budapest (Le Pont Suspendu Elisabeth à Budapest). A. Bidault des Chaumes. A fully illustrated account of the new eyebar suspension bridge of 290 metres span across the Danube. 2500 w. 1 plate. Génie Civil—Oct. 15, 1904.

The Chain Suspension Bridge at Budapest, Hungary. An illustrated account of a large bridge of unusual construction, describing the methods of erection and features of interest. 4500 w. Eng News—Aug. 24, 1905.

The Elizabeth Bridge at Budapest. Illustrated description of a handsome bridge almost identical with the "eyebar" design proposed for the new East River bridge at New York. Editorial. 2500 w. Sci Am—Sept. 9, 1905.

Buffalo.—See **Pan American Exposition; BRIDGE RENEWAL.**

Buffalo Electric Ry.—New Bridge for the Buffalo, Springville & Cattaraugus Ry. Describes the design for what will be the longest and highest trolley bridge in the United States. Plan, elevation and section are given. 700 w. St. Ry Rev—June 20, 1902.

Cabe, Spain.—The Cabe Bridge (Puente del Cabe). José Maria Sáinz. Description in detail of a new bridge, 40-metre span, to carry the highway from Monforte to Lalin across the Cabe river at Chantada, northwest part of Spain. 2500 w. 2 plates. Revista de Obras Publicas—June 13, 1901.

Cairo.—New Bridges at Cairo. Particulars relating to three new bridges to span the Nile. 1400 w. Engr, Lond—May 13, 1904.

The New Bridges over the Nile at Cairo (Die Neuen Nilbrücken in Kairo). Josef Rosshändler. Discussing the plans for the proposed highway bridges, with details of the various projects submitted. 2500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—May 26, 1905.

Calumet River.—The Calumet River Drawbridge, Baltimore and Ohio R. R. Illustrated description. 1000 w. Eng Rec—Nov. 26, 1904.
See also **Little Calumet River.**

Cambridge-Boston.—The Substructure of the Cambridge Bridge, Boston. Describes the substructure of a bridge over the Charles River, which is to carry an important city street, and has been designed with a view to harmony with the surroundings. 3400 w. Eng Rec—Jan. 14, 1905.

The Cambridge Bridge. Illustration, with description of one of the finest structures of its kind in the United States, now being built across the Charles River, Boston. 1200 w. R R Gaz—Feb. 28, 1902.

See also **BRIDGE ERECTION; BRIDGE PIER.**

Canadian River, New Mexico.—Rock Island Bridge Over the Canadian River in New Mexico. Illustrates and describes the erection of a bridge 769 ft. in length, spanning the river at a height of 135 ft., in which some unusual methods were employed. 1200. Ry Age—Dec. 6, 1901.

Canal.—The Weight of Iron Bridges Carrying Canals (Ueber das Eigengewicht Eiserner Brückenkanäle). Victor Waniek. The calculation of the weights of the bridges which form part of canals, and some details of construction, with tables and curves. I plate. 1000 w. Oesterr Wochenschr f d Oeffent Baudienst—March 21, 1903.

See also **Aqueduct; Lift.**

Canal Drawbridge.—See **Drawbridge.**

Canal, Lippe River.—Canal Bridge Over the River Lippe. Illustrated description of one of the three masonry aqueducts carrying the Dortmund-Ems Canal over waterways. Especially describes the Eckelt, or lead-lining system which has been so successfully applied, rendering the stone work safe from all infiltration. 1500 w. Engr, Lond—July 11, 1902.

Cañon Diablo, Cal.—See **RAILWAY—Mt. Tamalpais.**

Cantilever.—Early and Curious Types of the Cantilever Bridge in New England and New Brunswick. Alfred W. Parker. Illustrated descriptions of bridges built previous to 1870, with particulars of their construction. Also discussion. 3800 w. Jour Assn of Engng Socs—July, 1903.

See also **Connel Ferry, Scotland; Pittsburg; Villefranche.**

Cantilever, Germany.—A German Long-Span Cantilever Highway Bridge. Drawing and brief description of the longest span in Germany. 700 w. Eng News—July 14, 1904.

Cantilever—Hinged-Arch.—See **St. Petersburg.**

Cantiliver vs. Suspension.—See **Suspension vs. Cantilever.**

Carbondale, Ill.—A Concrete Railway Bridge. Illustrated brief description of a bridge on the Illinois Central R. R., near Carbondale, Ill. 1000 w. Trac & Trans—July, 1904.

Concrete Bridge Over the Big Muddy River, Illinois Central Railroad. Illustrated detailed description of the new bridge at Carbondalé, Ill., consisting of three elliptical arches, and built almost entirely of concrete. 1800 w. Sci Am Sup —June 17, 1905.

Concrete Bridge Over the Big Muddy River; Illinois Central R. R. H. W. Parkhurst. Illustrated detailed description of a bridge having three elliptical arches, each of 140 ft. clear span and 30 ft. rise above the springing lines. 6000 w. Eng News—Nov. 12, 1903.

Cast Iron.—See **Stockton & Darlington Ry., Eng.**

Chain.—See **Budapest; Cologne; Manhattan; BRIDGE DESIGN—Suspension Stiffening; EYE BAR.**

Charleston, W. Va.—See **BRIDGE ACCIDENT.**

Charlestown, Boston. — The Charlestown Bridge, Boston. Illustrated description of a bridge for carriages, street railways, and a double-track elevated railway, having plate-girder approach spans and a 1,200-ton swing span 240 1-2 feet long and 100 ft. wide. The unusual swinging, braking and latching appliances are fully described. 2000 w. Eng Rec—Feb. 9, 1901.

The Charlestown Swing Bridge, Boston, Mass. Illustrated description of a recently completed bridge, particularly remarkable for its width of 100 ft., which is continuous over the swing span, for being a double-deck structure throughout, and for the heavy and solid character of its substructive and foundation work. 2500 w. Eng News —Jan. 24, 1901.

Chicago.—See **Lift, Chicago; Two-Truss Swing; BRIDGE MOVING.**

C., B. & Q. Ry.—See **Plano, Ill.**

Chicago, Drawbridge.—Bridges Over the Chicago Ship Canal. Diagram showing the position of the 28 drawbridges, with brief description of each. 800 w. R R Gaz—Feb. 20, 1903.

A Temporary Bridge with Pontoon Draw Span Over the Chicago River. Illustrates and describes an interesting temporary structure near 22nd St., Chicago. It is a pile trestle with a swing span having one end supported by pivot on the fixed work, and the other end supported by a fixed bearing when closed and by a pontoon when swinging. 900 w. Eng News—Dec. 28, 1905.

A Counterbalance Swing Bridge on the Chicago, Milwaukee & St. Paul. Illustrated description of a new bridge over the Ogden canal, at Cherry street, in Chicago, of the pin-connected truss type. Electricity will be used for operating the bridge. 500 w. Ry Age—March 7, 1902.

Chicago Lift.—See **Lift.**

Chic., Mil. & St. Paul Ry.—Masonry and Steel Arches on the Chicago, Milwaukee & St. Paul. Describes interesting bridge, and construction work on this line, including a masonry bridge, 360-ft. in length and a 207-ft. 3-hinged hyperbolic arch. 900 w. Ry Age—Aug. 8, 1902.

Arch Bridge Construction on the C. M. & St. P. Ry. Illustrates and describes some improvements on the La Crosse division, in Wisconsin, in the erection of stone and concrete bridges. 900 w. Ry & Engng Rev—March 14, 1903.

See also **BRIDGE FOUNDATION.**

Chicago Pontoon.—Pontoon Foot Bridge Over the Chicago River. Illustrated description of a temporary bridge for the convenience of the people while a new bridge is being built. 500 w. Eng. News—Aug. 21, 1902.

Chicago Terminal.—See **Girder.**

Chippewa Falls, Wis.—The Chippewa Falls Highway Bridge. Illustrated detailed description of a new through riveted-truss highway bridge, built to replace a narrower bridge, without interruption of traffic. 1600 w. Eng Rec—Jan. 25, 1902.

Chone River, Mexico.—See **Mexico.**

Cincinnati, O.—Mill Creek Bridge, Cincinnati, O. Illustrates and describes details of a plate-girder through bridge about 80 ft. high. The two main girders are 213 ft. long over all, giving a clear span of 199 ft. between abutments. 1000 w. Eng Rec—Sept. 28, 1901.

Clairton, Pa.—The Five-Hundred-Foot Channel Span of the Clairton Bridge. An illustrated sketch of a bridge at Clairton, Pa., of more than usual interest. 2500 w. Eng Rec—March 12, 1904.

See also **BRIDGE APPROACH.**

Cleveland, O.—New Overhead Bridge, Willett Street, Cleveland, O. D. M. Taylor. Side elevation line engraving, with photograph and brief description. 800 w. Ry & Engng Rev—Aug. 3, 1901.

Cleveland Cemetery.—The Riverside Cemetery Bridge, Cleveland. Illustrated description of a light two-hinge arch bridge of 142 ft. span, designed to harmonize with parklike surroundings. 700 w. Eng Rec—April 20, 1901.

Cleveland Lift.—See **Lift.**

Cluchagne.—See **Military Cluchagne.**

Coblenz-Treves Ry.—Monier Footbridge Over the Coblenz-Treves Railway (Fussweg Ueberführung in Monier Konstruktion auf der Linie Koblenz-Trier). Illustrated description of a light and effective arch bridge in reinforced concrete on the Monier system. 1000 w. Deutsche Bauzeitung—Jan. 14, 1903.

Cologne.—The Competition for a Second Fixed Bridge over the Rhine at Cologne (Der Entwurf zu ein Zweiten Festen Rheinbrücke in Köln). M. Foerstner. With illustrations of the proposed suspension truss bridge of 220 metres clear span. 1800 w. Schweizerische Bauzeitung—Sept. 27, 1902.

Comparative Eye-Bar and Wire Cable Designs for a Highway Bridge Over the Rhine at Cologne. Illustrates and describes two proposed designs for a suspension bridge. 1000 w. R R Gaz—Nov. 20, 1903.

Columbia.—See **Hamilton, O.**

Commerce Limitations.—See **RIVER.**

Como Park.—See **St. Paul.**

Concrete.—Some Concrete-Arch Bridge Construction on the Illinois Central R. R. Illustrations with brief description of interesting work. 1200 w. Ry & Engng Rev—March 12, 1904.

Highway Bridges of Concrete. Daniel B. Luten. Illustrates and describes the construction, and considers the adaptability of this material for bridge designs, and the cost. 1000 w. Munic Engng—Dec., 1900.

Heavy Concrete Arches. Describes a double 50-foot concrete arch bridge, having a greater thickness of arch width than is ordinarily used. 1000 w. Eng Rec—Aug. 30, 1902.

See also **Carbondale, Ill.; C., B. & Q. Ry.; Cuba; Ehingen; Forst; Tyrol; Gürbethal Ry.; Kinclaven; Lake Shore Ry.; Las Segadas; Maryborough, Queensland; Mechanicsville, N. Y.; Miltenberg; Neckarhausen; Niagara—Goat Island; Northampton, N. J.; Paterson, N. J.; Rhodes Creek; San Leandro; Schlitza, Austria; Sharpsville, Pa.; Washington, D. C.; West Hartford; Westvale; Willoughby, O.; Ypsilanti, Mich.; ARCH; BRIDGE PIER; CONCRETE; CULVERT; VIADUCT—Herkimer.**

Concrete Reinforced.—A New Type of Concrete-Steel Arch Culvert or Bridge. Daniel B. Luten. Illustrated description of a method of reinforcing with a single series of steel rods and steel ties. 1400 w. Ry & Engng Rev.—March 15, 1902.

Concrete-Steel Bridges for Interurban Railways. Daniel B. Luten. An illustrated article giving designs of this class of bridges and commending the material. 1400 w. St Ry Rev—March 15, 1902.

Design of a Concrete-Steel Arch Bridge. Daniel B. Luten. Explains in detail a method used by the writer during the past year in erecting 16 bridges, which is thought to eliminate some of the doubtful factors. 5600 w. Eng News—May 8, 1902.

Concrete-Steel Bridges. D. B. Luten. Considers the suitability of this material for bridge construction, giving illustrated descriptions of the method of design used. 1800 w. Munic Engng—Sept., 1902.

Crossing Bridge of Reinforced Concrete (Bahnübergangssteg aus Betoneisen). Ludwig Stuppacher. Illustrating a Monier arch foot bridge over double-track railway line, with details of construction. 6000 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—Oct. 15, 1904.

Steel Concrete Abutments and Solid Floors for Railroad Bridges. A. O. Cunningham. Illustrates and describes bridges showing new features of reinforced concrete construction. 1400 w. R R Gz—Jan. 8, 1904.

Reinforced-Concrete Bridges with Gravel Roadway (Betoneisenbrücken für Beschotterte Strassen). Anton Kraupa. Illustrating arrangements of structural beams imbedded in concrete and carrying highways. Computations for various loadings are given. 2000 w. Oesterr Wochenschr f d Oeffent Baudienst—Oct 28, 1905.

Reinforced-Concrete Bridges of Limited Height over Railways (Wegüberführungen in Armiertem Beton bei Beschränkter Konstructionhöhe). Hr. Mörsch. An illustrated description of two small reinforced concrete bridges for railway crossings in Germany. 1000 w. Beton und Eisen—2 Heft, 1903.

A Five Years' Test of an Experimental Reinforced Concrete Arch of Sixty-Six-Foot Span. From a lecture by Herr Hoch, describing the construction of an experimental concrete arch reinforced by iron and the results of observations for a period of five years, when it failed. Ils. 2200 w. Cement—Jan., 1905.

See also Aisne; Arch, Masonry; Bamberg; Bangor; Big Rock Creek; Billwil-Oberbüren; Biltmore; Brooklyn Arch; Dayton; Goat Island, Niagara; Grand Rapids; Herkimer; Hull, Eng.; Indianapolis; Jesenica, Austria; Jura; Kankakee; Kazarguene; Kinclaven, Scotland; Lamington, Queensland; Mans, France; Maryborough; Melan; Mières, Spain; Monier; Munich; Newark, N. J.; Newark Park; Paterson, N. J.; Plainwell, Mich.; Plano, Ill.; Porto Rico; Purfleet, Eng.; Ribbed Arch; St. Louis, Mo.; St. Paul; Soissons, France; South Bend, Ind.; Toulouse, France; Vulcanite, N. J.; Wabash Ry; Washington, D. C.; Yellowstone Park; Yorktown, Ind.; Zanesville, O.; ARCH; BRIDGE DESIGN; CONCRETE REINFORCED; CULVERT.

Concrete-Steel.—See Concrete Reinforced.

Coney Island.—See Lift.

Congo.—See Haut-Ogoone.

Connel Ferry, Scotland.—Cantilever Bridge at Connel Ferry. Illustrated description of a bridge in Scotland having a clear span of 500 ft. Gives also an account of the construction work. 3300 w. Engng—July 31, 1903.

Connel Ferry Railway Bridge. Illustrated detailed description of a bridge in Scotland, which has the second longest clear-span in Europe. 3300 w. Engr, Lond—Sept. 11, 1903.

Conway, Wales.—Conway Suspension Bridge. An account of the reconstruction of this historic bridge in Wales, designed by Telford nearly eighty years ago. 1800 w. Engr, Lond—May 20, 1904.

Conway River.—See Tal-y-Cafn, Wales.

Copenhagen.—A New Swing Bridge at Copenhagen, Denmark. H. C. V. Moeller. Illustrated detailed description of a combined highway and double-track railway bridge, consisting of one center-bearing draw span and six deck plate-girder spans, with one roadway and two sidewalks. 2500 w. Pro Am Soc of Civ Engrs—March, 1905.

Costa Rica.—The Rio Grande Braced Arch Bridge, Pacific Ry. of Costa Rica. Illustrated detailed description of a two-hinged steel braced arch structure 685 ft. long and 340 ft. high from the rails to the water. 2000 w. Ry & Engng Rev—Jan. 24, 1903.

The Rio Grande Bridge of the Pacific Railway of Costa Rica. An illustrated description of the construction and erection of this bridge on the Pacific Railway of Costa Rica, with information concerning the country, the engineering difficulties, etc. Serial. 1st part. 4400 w. Eng Rec—Oct. 25, 1902.

Counterbalance Swing.—See Drawbridge.

Croton Dam, N. Y.—The New Croton Dam Bridge. Illustrates and describes the steel arch span across the spillway of the Croton reservoir. 2200 w. Eng Rec—Oct. 21, 1905.

Croton Valley.—Highway Bridges in the Croton Valley. Illustrates and describes the bridges made necessary by the new Croton dam water supply for Greater New York. 4000 w. Eng Rec—April 23, 1904.

Crowds.—See CROWD—Weight.

Culvert.—See CULVERT.

Damodar.—See Bengal.

Danube.—See Budapest; Roumania.

Dayton, Ohio.—The Great Miami River Highway Bridge, Dayton, Ohio. Illustrated description of a reinforced concrete arch bridge, 56 1-2 ft. wide, and 588 ft. long. 1500 w. Eng Rec—Aug. 8, 1903.

Melan Concrete Steel Bridge at Dayton, Ohio. Illustrates and describes a seven-arch bridge to be built across the Great Miami River. 1600 w. R R Gaz—March 4, 1904.

Melan Concrete Steel Arch Bridge Across the Great Miami River, Dayton, Ohio. Illustrated detailed description of the bridge and its construction. 2800 w. Eng News—May 19, 1904.

Concrete-Steel Bridges at Dayton, O. Photographs and drawing with data showing the details of construction for two similar bridges. 2800 w. Munic Engng—Aug., 1904.

Deal, N. J.—Ornamental Bridges in a Private Park. Illustrations of two bridges on the private estate of Daniel O'Day at Deal, N. J., with description. 1300 w. Eng Rec—May 23, 1903.

Deer Park, La Salle, Ill.—Reinforced Concrete Ribbed Arch Bridge at Deer Park Gorge. J. B. Strauss. Illustrated description of an interesting foot-bridge and the methods of erection on the estate of F. W. Mathiessen, near La Salle; Illinois. The advantages of the ribbed bridge are said to be its economy, adjustability of the structure under settlement, and accessibility for inspection. 1600 w. Eng News—Sept. 21, 1905.

Delphos, Ohio.—Short Span Bascule Bridge on the Pittsburg, Fort Wayne & Chicago Ry. Illustrations, with brief description of a double-track, short-span, single leaf bascule bridge of peculiar design, at Delphos, Ohio. 600 w. Eng News—May 25, 1905.

Denver.—Lawrence Street Bridge, Denver. Illustrated description of a highway bridge 74 feet wide and 156 ft. long, consisting of two plate girder spans skewed 42 degrees 10 minutes with their abutments. 1000 w. Eng Rec—Dec. 2, 1905.

Des Moines River.—See VIADUCT.

Dortmund-Ems Canal.—See Canal, Lippe River.

Double Deck.—See Pittsburg.

Drawbridge.—A Novel Type of Drawbridge. Illustrates and describes a type of drawbridge adopted by the Miami & Erie Canal Transportation Co. This company has a charter for operating by electric towage, using trolley locomotives on a track along the towpath. Where the track crosses the canal drawbridges are used. 500 w. Eng News—Oct. 22, 1903.

An Electrically Operated Highway Drawbridge for Small Waterways. H. G. Tyrrell. Plan and description of a design prepared for a bridge to cross the Miami and Erie Canal at New Bremen, Ohio. 900 w. Elec Rev, N. Y.—Dec. 31, 1904.

The Non-Continuous Swing Bridge; Two Existing Structures of This Type. Illustrates details of two bridges of this type built about ten years ago. 1000 w. Eng News—April 3, 1902.

See also Chicago Drawbridge; Milwaukee; Worthington Swing; and under geographical subheadings.

Drawbridge, Electric.—See New Bremen, O.

Drawbridge, Two Truss.—See Two-Truss Swing.

Drawbridge, Wooden.—An Interesting Draw-Bridge

Built Mostly of Wood in Forty Working Days. Martin Schreiber. Description, with illustrations, of an interesting piece of engineering work on the White Line between Paterson and Hoboken, N. J. 1500 w. St Ry Rev—Sept. 20, 1904.

See also Barnegat Bay, N. J.

Dunsbach Ferry, N. Y.—The Dunsbach Ferry Bridge. Illustrated description of an unusual method of constructing bridge piers by means of cylinders with piles driven inside and heavy cribwork outside. 900 w. Eng Rec—July 20, 1901.

Easton, Pa.—See BRIDGE RENEWAL.

Easton Suspension.—A Curious Suspension Bridge. H. G. Tyrrell. Illustrations and brief description of a suspension foot-bridge recently completed at Easton, Pa. It is built with three towers, thus forming two spans. On account of the great difference in the elevation of the two ends the floor has a 7 per cent. grade, and four runs of stairs. 250 w. Sci Am Sup—Sept. 28, 1901.

A Footway Suspension Bridge with Three Towers, at Easton, Pa. H. G. Tyrrell. Drawings, description, and extracts from specifications. 1100 w. Eng News—Nov. 22, 1900.

Suspension Foot-Bridge, Easton, Pa. John McNeal, Jr. Brief illustrated description. 700 w. Eng Rec—Aug. 9, 1902.

East River, N. Y.—The Three Great Suspension Bridges Across the East River, New York. Illustrations and brief notes concerning the bridges completed, in process of construction, and planned. 1200 w. Sci Am—Aug. 3, 1901.

The New Bridges Over the East River at New York (Die Neuen, im Bau Begriffenen Brücken über den East River vor New York). Dr. F. Reuleaux. A general description of the Williamsburg, Manhattan and Blackwell's Island bridges, with photographs and bird's-eye view of New York. 2500 w. Glasers Annalen—March 1, 1904.

The Comparative Strength of East River Bridges; Existing and Proposed. Letter from W. Hildenbrand, with response from G. Lindenthal concerning the bridges across the East River at New York. Ill. 4500 w. Eng News—Oct. 1, 1903.

See also Blackwell's Island; Brooklyn; Manhattan; Williamsburg; CABLE—Bridge Manhattan; Bridge Williamsburg; SURVEYING—Bridge.

Ehingen.—A Three-Hinged Concrete Arch Bridge Over the Danube at Ehingen (Würtemberg). Illustrates and describes this engineering work which possesses points of interest. 1400 w. Eng News—Jan. 9, 1902.

Elbe-Trave Canal.—See Lift.

Electric Drawbridge.—See Drawbridge; St. Petersburg; Winnington.

Electric Railway.—Electric Railway Bridges. An editorial discussion of the new requirements of the Massachusetts Board of Railroad Commissioners for bridges supporting electric railways. 1000 w. Eng Rec—Dec. 29, 1900.

Electric Railway Bridges. Wilbur J. Watson. Remarks on the tendency of electric railways to approach steam railway conditions of loading and the effect of the many cars now operated upon existing bridges, discussing design, factor of safety, etc. 4000 w. Jour Assn Engng Socs—Jan., 1903.

See also Buffalo; Concrete Reinforced.

Elliptical.—A Curious Elliptical Bridge. Illustrates and describes a novel construction in the North of Ireland, erected to enable tourists to safely view the wild, picturesque scenery, and gain access to interesting caves. 800 w. Sci Am—March 21, 1903.

Engadine Ry., Switzerland.—See Albula Ry.

Engineering.—See BRIDGE ENGINEERING.

Exe, Eng.—The Exe Bridge. Briefly describes the earlier bridges on the same site, and gives an illustrated detailed description of the new structure, which is an exceptionally flat arch of 150 ft. span. 2000 w. Engng—March 24, 1905.

Expansion.—Methods of Expansion of Railway Bridges. Francis S. Rice. Outlines a few of the methods providing for temperature changes and expansion in railway bridges. Brief discussion. 2000 w. Pro Engrs' Soc of W Penn—March, 1905.

Eyebar Suspension.—See Budapest; Cologne; Manhattan; BRIDGE DESIGN—Suspension Stiffening; EYE BAR.

Factory Suspension.—A Factory Suspension Bridge. Describes a very light bridge of 250-ft. span, between two buildings. 1100 w. Eng Rec—July 20, 1901.

Fern Hollow, Pittsburg.—The Fern Hollow Highway Arch Bridge. Illustrated description of a structure near Pittsburg, 488 ft. long, of which the main feature is a 195-ft. span with two 3-hinge plate-girder arch ribs. Serial. 1st part. 2900 w. Eng Rec—Feb. 15, 1902.

Ferry.—See FERRY BRIDGE.

Fitchburg Railway.—Stone Arch Bridges Recently Constructed on the Fitchburg Railroad. Albert S. Cheever. Illustrated descriptions and acounts of the construction of five bridges recently built on the railroad named. 4 plates. 2200 w. Jour Assn of Engng Socs—July, 1901.

Floating.—See Military; Northwich, Eng.; BRIDGE MOVING—Hackensack River; Newark.

Floor.—See BRIDGE FLOOR; Concrete Reinforced; Wabash Ry.

Florence.—See BRIDGE RENEWAL.

Fore River, Mass.—An American Bridge Built of German Steel and Launched at a Shipyard. P. S. Hildreth. A statement of the conditions and explanation of interesting features involved in the construction of a swing bridge at Fore River, Mass. Ill. 800 w. Eng News—Nov. 19, 1903.

Forst, Tyrol.—The New Concrete Arch Bridge over the Etsch at Forst (Die Neue Gewölbte Betonbrücke über die Etsch bei Forst). O. Haberkalt. Describing a concrete arch with hinges at the springings, 31 metres span over the Etsch in the Tyrol. 2500 w. 2 plates. Oesterr Wochenschr f d Oeff Baudienst—July 2, 1904.

Fraser River, B. C.—See New Westminster.

Frost Action.—See RAILWAY PERMANENT WAY.

Gaundless, Eng.—Old Railway Bridge Over the River Gaundless. Illustration, with brief account of an old bridge in England, recently replaced by a modern structure. 600 w. Engng—Aug. 14, 1903.

German History.—See History.

Gignac, France.—The Bridge of Gignac on the Hérault River (Le Pont de Gignac sur l'Hérault). F. de Dartein). An illustrated description and history of a stone arch bridge in the south of France, built from 1774 to 1810, and comprising a central span of about 159 feet and two side spans of 85 feet. 5 plates. 16000 w. Ann des Ponts et Chaussées—4 Trimestre, 1902.

Girder.—A 100-Foot Plate-Girder Span with Unusual Bearings. Illustrated description of the new 100-ft. span at Ship Pond Stream, Me. 1500 w. Eng Rec—Jan. 14, 1905.

A 103-Ton Plate Girder. Illustrated description of a four-track plate-girder bridge, 111 ft. long and 12 ft. high, having unusual rocker bearings, web reinforcement and floor details. 1000 w. Eng Rec—Feb. 2, 1901.

A Solid-Floor Single-Track Plate-Girder Bridge. Brief description of bridge on the Lake Erie & Western R. R. 800 w. Eng Rec—Aug. 16, 1902.

Two Large Plate Girder Railway Bridges. Describes and illustrates two plate girder railway bridges of span exceeding 100 feet. 2500 w. Eng News—Feb. 18, 1904.

A Long-Span Double-Track Plate-Girder Bridge. Illustrated description of a bridge of the Chicago Terminal Transfer Company and the method of transporting. 800 w. Eng Rec—April 16, 1904.

The Pine Creek Long-Span, Plate-Girder Bridge. Illustrated description of a double-track skew deck bridge having three duplicate main spans of 127 ft. 10 in., and one 33 ft. 8 in. approach span. 1500 w. Eng Rec—May 6, 1905.

See also Bethlehem Junction; Hartford; Hubbard, O.; Janesville, Wis.; Newark, N. J.; Vierendeel; BRIDGE DESIGN; GIRDER.

Girder, N. Y., N. H. & H. Ry.—Some Through Plate-Girder Bridges, New York, New Haven & Hartford R. R. Gives brief illustrated descriptions of various types. 2000 w. Eng Rec.—Oct. 7, 1905.

Some Deck Plate Girder Bridges on the New

York, New Haven & Hartford R. R. Illustrations and information concerning these structures. 1600 w. Eng Rec—Sept. 30, 1905.

Girna.—See BRIDGE ERECTION—India.

Glasgow, Mo.—See BRIDGE RENEWAL.

Goat Island, Niagara.—The Concrete Bridge at Goat Island. Illustrated description of a concrete-steel bridge with spans from 50 to 110 ft. long, a stress diagram of the largest being given. The construction of the bridge was extremely difficult, owing to the current. 3000 w. Eng Rec—Feb. 16, 1901.

The Green and Goat Islands Concrete-Steel Bridges at Niagara Falls, N. Y. An illustrated account of the new bridges under construction at the points named, and the difficulties met. 2000 w. Eng News—Dec. 6, 1900.

New Concrete Arch Bridges at Niagara. Orrin E. Dunlap. Illustrated description of the bridges built at Niagara Falls to connect the mainland and Goat Island. 1000 w. Sci Am—Nov. 23, 1901.

See also BRIDGE DESIGN.

Gokteik.—See VIADUCT.

Grand Rapids, Mich.—Structural Details of the New Reinforced Concrete Bridge at Grand Rapids, Mich. William F. Tubesing. Illustrated description of details of construction. 2800 w. Eng News—Dec. 1, 1904.

Grand River Reinforced Concrete Bridge, Grand Rapids, Mich. Information concerning the design and construction as given in a paper before the Michigan Engng Soc, by P. M. Louwerse. 1200 w. Eng Rec—June 17, 1905.

See also BRIDGE ERECTION.

Grünwald, Munich.—See Munich.

Gürbethal Railway.—Concrete Bridge on the Gürbethal Railway, Switzerland (Betonbrücke der Gürbethalbahn). R. Moser. Illustrated description of a concrete arch, 23.4 meters span, for single track, near Bern. 600 w. Schweiz Bauzeitung—Dec. 14, 1901.

Guyandotte, W. Va.—An Interesting Old Suspension Bridge. Description of a 450 ft. bridge over 50 years old, with cables of straight wires spliced by being flattened, and then wrapped with fine wire. 600 w. Eng Rec—July 13, 1901.

Halle, Germany.—The Peissnitz Bridge at Halle-on-the Saale (Die Peissnitz-Brücke in Halle a. S.). M. Ziegler. Illustrated description of the handsome suspension truss bridge of 70 metres span over the Saale at Halle. 3000 w. Zeitschr d Ver Deutscher Ing—Aug. 17, 1901.

Hamilton, O.—Highway Bridge of 406-Ft. Span; Hamilton, O. Illustrated detailed description of the bridge known as the Columbia bridge, across the Miami River, notable not only for its length, but also in many points of its construction. 2000 w. Eng News—May 23, 1901.

Harburg.—See Worms and Harburg.

Harlem River.—See New York; Willis Avenue.

Harriman Railways.—Standard Bridges on the Harriman Lines. Complete specifications, plans, etc., with explanatory remarks. 4500 w. R R Gaz—Vol. XXXVIII., No. 11.

Hartford, Conn.—Stone Highway Bridge Over the Connecticut River at Hartford. Drawings and information concerning a new bridge 1,185 feet long and 80 feet wide between parapets, with a 100-foot Scherzer rolling lift double-draw span over the canal which is on the west bank of the river, and eight semi-elliptical granite-faced arches. 1500 w. R R Gaz—Feb. 19, 1904.

The Stone Bridge at Hartford, Conn. Illustrating and describing a masonry highway bridge of eight semi-elliptical arches with spans of 68 to 119 feet, now under construction. 4000 w. Eng Rec—Dec. 31, 1904.

Hartford, Plate Girder.—Improvement of a Plate-Girder Bridge at Hartford, Conn. Henry Robinson Buck. Read before the Conn. Soc. of Civ. Engrs. Illustrated description of changes made to remedy the dripping of greasy water on the sidewalks below. 1000 w. Eng News—March 24, 1904.

Hartford, Temporary.—Temporary Bridge Over the Conecticut River at Hartford, Conn. H. G. Tyrrell. Describes briefly the old bridge and the proposed new bridge; but especially the temporary bridge made necessary by the burning of the old structure. Ill. 1300 w. Ry & Engng Rev—Aug. 31, 1901.

Haut-Ogoône Co., French Congo.—The Bridges of the Haut-Ogoône Company in the French Congo (Les Ponts du Haut-Ogoône dans le Congo Français). Lieut. Col. Giselard. An account of the simple system of suspension bridges over the rivers on the route between Alembé and Lélédi. 3000 w. 1 plate. Génie Civil—Aug. 27, 1904.

Havre de Grace, Md.—The Havre de Grace Bridge of the Pennsylvania Railroad. Illustrated detailed description of an interesting bridge across the Susquehanna River, now under construction. It has a total length of 4,154 ft., with one drawspan of 280 ft. 1700 w. Ry Age—Oct. 6, 1905.

Herkimer, N. Y.—See VIADUCT.

Highway.—Highway Bridge Design and Construction. Extracts from a set of general specifications for highway bridges, prepared by C. C. Schneider, with editorial comments on their important features. 3500 w. Eng Rec—Sept. 7, 1901.

Highway Bridges. C. M. Canady. Considers some of the types and details which have claimed the attention of designers during the past twenty years. General discussion. 4500 w. Pro Engrs Soc of W Penn—June, 1904.

The Comparative Economy of Various Types of Highway Bridges. C. B. Wing. Outlines a method for determining the most economical bridge for a given location. 2000 w. Jour Assn of Engng Socs—Sept., 1904.

See also Concrete; Rye, N. Y.; Zanesville, O.; ARCH; VIADUCT.

Highway Contracting.—Contracting for Highway Bridges. A statement of the reasons for the inadequacy of many structures comparatively new, with suggestions on the best methods of securing new bridges. 1200 w. Eng Rec—April 27, 1901.

Highway Bridge Contracts. R. H. Phillips. A discussion of the reasons for poor highway bridge work, with suggestions for improvements in the award of contracts. 2100 w. Eng Rec—April 20, 1901.

History.—The Developments of the Nineteenth Century in Bridge Design and Construction. A brief historical review of bridge building and materials used, based on articles by Prof. G. C. Mehrtens, published in "Zeitschrift des Vereines Deutscher Ingenieure." 2000 w. Eng News—Dec. 13, 1900.

Metal Bridges (Les Ponts Métalliques). Paul Résal. A general review of the history, the present state and the future of bridges in iron and steel. 7500 w. Rev. Gén des Sciences—June 15, 1902.

See also Lift; New Brunswick; Mississippi River; Pittsburg; Stockton & Darlington Ry.; Suspension; BRIDGE RENEWAL—Glasgow, Mo.; Iron.

Hooghli River.—See India.

Housatonic River, Conn.—A Through-Truss Short-Span Double-Track Bridge. Illustrated description of a bridge over the Housatonic River, south of Shelton, Conn., typical of the standard construction for that class on the N. Y., N. H. & H. R. R. 1800 w. Eng Rec—Oct. 21, 1905.

Hubbard, O.—A Long Single-Track Plate-Girder Span. Illustrates and describes a single-track deck span on the Mahoning Division of the Erie R. R., with two plate girders 131 ft. 4 in. long, 9 ft. apart on centers, which carry a track with a curvature of 3 degrees 30 minutes, its construction and erection. 2000 w. Eng Rec—Sept. 16, 1905.

Hudson River.—The Problem of Providing an All-Rail Connection, across the Hudson River, between the City of New York and the Railroads Terminating on the Jersey Shore. C. W. Buchholz. A consideration of the various plans suggested, with general discussion. 8800 w. N. Y. R R Club—April 18, 1901.

The Problem of All-Rail Transportation Across the Hudson River at N. Y. City. C. W. Buchholz. Abstract of a paper read before the N. Y. R. R. Club, with editorial, and discussion. On the need and the problems connected with North River bridges and tunnels. 7900 w. Eng News—May 16, 1901.

Which Is the Best Site for a Hudson River Bridge at New York? A discussion of the conditions and locations, favoring the Fifty-ninth street site. 1800 w. R. R. Gaz—May 17, 1901.

See also **BRIDGE DESIGN—Suspension Stiffening.**

Hull, Eng.—Ferro-Concrete Bridge Over the Sutton Drain, Hull. Brief illustrated description of the first bridge of this material built in England. 700 w. Engng—Jan. 2, 1903.

Illinois.—See **VIADUCT.**

Illinois Central Ry.—See Carbondale; Rhodes Creek; **CONCRETE; CONCRETE REINFORCED—Bridge and Culvert.**

Incline.—See **TRANSFER BRIDGE—New Orleans.**

India.—Bridges of India. An illustration and brief description of the Jubilee (Hooghli) Bridge, East Indian Railway, is given in the present article. Serial. 1st part. 700 w. Ind & East Engr—Feb., 1901.

Bridge Over the Indus River at Kotri, North-Western Railway. Illustration with brief description. 800 w. Ind & East Engr—Nov., 1901.

The Railway Bridge Over the Godavari River at Rajahmundry, on the East Coast Railway in India. Two-page plate and other illustrations of a recently constructed bridge of 50-spans of 150 ft. each, its total length being 9096 ft. over all. Detailed description to appear later. Serial. Engng—Jan. 3, 1902.

Two Indian Bridges. Describes the single-track, meter-gauge Eastern Bengal State Railway bridge over the Teesta River at Kaunia, India, and the Ehegaon viaduct, Thull Gaut, of the Great Indian Peninsular Ry. 1700 w. Eng Rec.—June 21, 1902.

The Rupnarayan Bridge; Bengal-Nagpur Railway. S. Martin-Leake. Describes the construction of this bridge which consists of 7 spans of 300 ft. and 4 spans of 100 ft. 1500 w. Engng—Dec. 19, 1902.

Bridge Over the Rupnarayan (Pont sur le Rupnarayan). Illustrated description of a bridge on the line of the railway between Calcutta and Madras. 1000 w. 1 plate. Génie Civil—Sept. 26, 1903.

The Damodar Coal-Line Bridge: Midnapur-Jherria Extension of the Bengal-Nagpur Railway. William Oswald Taylor. Illustrated detailed description of the construction of a bridge consisting of 5 spans of 150-foot, one span of 100-foot, and one span of 40-foot steel girders, for a single line of rails, on masonry piers. 4200 w. Ills. (No. 3512). Inst of Civ Engrs.

See also **BRIDGE ERECTION; BRIDGE FOUNDATION.**

Indianapolis.—Melan Arch Bridges Over Fall Creek, Indianapolis, Ind. Illustrated description of two concrete-steel bridges of the Melan type, recently constructed. 1100 w. Eng News—April 11, 1901.

Indianapolis, Street.—A Report on the Condition of Street Bridges in Indianapolis. Report of T. L. Condron, showing the dangerous condition of four old bridges over the White River, three of which are carrying electric railway cars, although never designed for such loading. 1300 w. Eng News—Feb. 20, 1902.

Indus.—See **India.**

Interurban Railways.—See Concrete Reinforced; Electric Railway.

Iron.—See History; New Brunswick, Canada; Stockton & Darlington Ry.; **BRIDGE RENEWAL.** ..

Italian Railway.—See **CONCRETE REINFORCED—Bridge and Culvert.**

Janesville, Wis.—The Janesville Bridge. Illustrated description of a railway bridge in Wisconsin, of two 114 1-2-foot spans of plate girders 9 1-2 feet deep and 9 feet apart on centers. 900 w. Eng Rec—July 6, 1901.

Japan.—See **Kintai.**

Jesenica, Austria.—Reinforced Concrete Bridge Over the Jesenica near Reka (Betoneisenbrücke über den Jesenicabach bei Reka). Gustav Hermann. Illustrating the construction of a Melan arch of 19 metres span in Southern Austria. 2000 w. 3 plates. Oesterr Wochenschr f d Oeffent Baudienst—Sept. 10, 1904.

Johnsonville, Tenn.—An Eventful Bridge History. Hunter M'Donald. Read at meeting of the Engng. Assn. of the South. History of the bridge of the Nashville, Chattanooga & St. Louis Railway over the Tennessee River at Johnsonville, Tenn. The bridge was subject to an unusual number of disasters. 2300 w. R R Gas—Feb. 7, 1902.

Jons-Niévroz, France.—Suspension Bridge Across the Rhone at Jons-Niévroz (Pont Suspendu de Jons-Niévroz sur le Rhone). J. Dor. Illustrating a highway suspension bridge of 200 metres clear span across the Rhone above Lyons. 2000 w. 1 plate. Génie Civil—March 18, 1905.

Jubilee, India.—See **India.**

Jura-Simplon Ry.—Reinforced-Concrete Bridges of the Jura-Simplon Railway (Note sur les Ponts Sous Rails en Béton de Ciment Armé Construits dès 1894 par la Cie, de Chemins de Fer Jura Simplon). E. Elskes. An illustrated description of Swiss railway bridges of reinforced concrete. I Plate. 1000 w. Beton & Eisen—2 Heft, 1903.

Kanawha, W. Va.—A Light 510-Foot Suspension Bridge. Illustrates and describes a bridge across the Kanawha valley, near Coperton, W. Va. 2000 w. Eng Rec—Aug. 6, 1904.

Kankakee, Ill.—The Reinforced Concrete Bridge at Kankakee. R. D. Gregg. Detailed description of the construction. 2500 w. Eng Rec—April 1, 1905.

Concrete-Steel Arch Bridge at Kankakee, Illinois. J. B. Marsh. Illustrated detailed description of the construction. The bridge is so designed that the grade forms a vertical curve, with the center 2 1-2 feet higher than the ends. General discussion. 4300 w. .Jour W Soc of Engrs—April, 1905.

Kansas City, Mo.—A Cantilever Plate-Girder Highway Bridge. Illustrated description of a bridge in Kansas City, Missouri, which crosses two tracks of railway. 900 w. Eng Rec—April 9, 1904.

Pivot Pier Caisson and Operating Machinery for a Heavy Swing Bridge. Illustrates and describes interesting features of a very heavy combined railway and highway bridge soon to be built over the Missouri River at Kansas City, Mo. 1600 w.. Eng News—Jan. 7, 1904.

See also **BRIDGE RENEWAL.**

Kaunia.—See **India.**

Kazarguene, Esthonia, Russia.—The Kazarguene Bridge. Illustrates and describes a bridge 985 feet long, with a number of arches built of reinforced concrete. The methods of construction, and the materials are discussed. 1700 w. Sci Am Sup—Aug. 12, 1905.

Kew, Eng.—The King Edward VII. Bridge at Kew. Brief account of the earlier structures occupying the site of this new bridge, with many illustrations and description of the construction of this finely proportioned three-span structure. Serial. 1st part. 2700 w. Engng—May 15, 1903.

New Kew Bridge. The present article deals with the removal of old foundations, describing the construction work, and giving illustrated description of construction details of the new bridge. Serial. 1st part. 1800 w. Engr, Lond—Sept. 26, 1902.

Kinclaven, Scotland.—Concrete Arch Over the River Tay at Kinclaven. Illustration with brief description of a structure built entirely of concrete, faced with red freestone. 700 w. Engng—May 12, 1905.

Kintai, Japan.—The Kintai Wooden Bridge. Illustrated description of a wooden arch bridge with three 150-ft. spans and two somewhat shorter, built in Japan in 1673. 700 w. Eng Rec—Feb. 8, 1902.

Kinzua.—See **VIADUCT.**

Koyakhai, India.—See **BRIDGE FOUNDATION—India.**

Laibach, Austria.—Reconstruction of the Laibach Moor Bridge on the Southern Railway of Austria (Umbau der Laibacher Moorbrücke der Südbahn). F. X. Gürke. A very completely illustrated description of this bridge and viaduct across swampy ground, with details of construction. Also a description of Prof. A. Belar's apparatus for recording bridge vibrations. 3 plates. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 27, 1901.

The Kaiser Franz Joseph Jubilee Bridge at Laibach (Die Kaiser Franz Josefs-Jubiläums Brücke in Laibach). Prof. J. Melan. A well illustrated description of an ornamental highway bridge, on the Melan reinforced concrete system, in the capital of Carniola, Austria. 2 plates. 3000 w. Zeitschr d Oesterr Ing u Arch Vereines—May 22, 1903.

A Concrete-Steel Three-Hinged Arch Bridge. Illustrations and particulars of the bridge at Laibach, Austria, taken from an article by Prof. J. Melan in the "Zeitschrift des Oesterreichischen Ingenieur und Architekten Vereins." 1800 w. Eng News—July 16, 1903.

Lamington, Queensland.—The Lamington Concrete Steel Bridge. Describes the interesting features of a low-level bridge in Queensland. 1200 w. Eng Rec—Nov. 17, 1900.

Las Segadas, Spain.—Hinged Concrete Bridge at Las Segadas (Pont en Béton de Las Segadas, à Articulations). I. E. Ribera. Illustrated description of concrete arch of 50 meters span, with metal joints at crown and springings, over the Nalon Valley, in the Province of Oviedo, Spain. Two articles. 3500 w. Revue Technique—July 10, Aug. 10, 1901.

An Articulated Concrete Arch Bridge. An Illustrated account of a proposed structure in Spain, which departs widely from the customary practice of that country. 1500 w. Engr, Lond—Sept. 6, 1901.

Lawrence, Mass.—A Novel Piece of Bridge Construction at Lawrence, Mass. M. F. Brown. Illustrates and describes a novel method of solving the problem of a skew crossing. 1100 w. Eng News—May 12, 1904.

Liége, Belgium.—The Pont de Commerce at Liége (Le Pont de Commerce à Liége). Th. Seyrig. The bridge consists of twin steel voussoir arches, the thrusts at the middle pier balancing each other, leaving only a vertical component. 8000 w. 2 plates. Mem Soc Ing Civ de France—Oct, 1905.

Lift.—Rolling Lift Bridges. Waldon Fawcett. Remarks on the rolling lift bridges constructed during the past few years, and types previously used. Ill. 1400 w. Sci Am—Sept. 28, 1901.

Some Old Examples of Bascule Bridges. K. Hellenthal. An illustrated description of bridges of this type, or based on similar principles, built before the patents for the bascule bridges were issued. Ill. 1500 w. Jour W. Soc of Engrs—Oct., 1901.

Lift, America.—New Systems of Drawbridges in America (Neuere Systeme Beweglicher Brücken in den Vereinigten Staaten von America). Describing the Harman, Schinke, and Scherzer systems of drawbridges. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 21, 1900.

Lift, Amsterdam.—See **Amsterdam.**

Lift, Barking Creek.—Opening-Bridge Over Barking Creek. Illustrates and describes a bridge on the Barking and Beckton Light Railway. A single-line bridge on the rolling bascule principle, worked by electric power. 1400 w. Engng—March 4, 1904.

Lift, Bridgeport. — Rolling-Lift Plate Girder Bridges. An illustrated detailed description of a recently completed bridge at Bridgeport, Conn., carrying four tracks of the N. Y., N. H. & H. R. R. over the Pequonnock River. 1800 w. Eng Rec—July 11, 1903.

Lift, Brooklyn.—A Scherzer Rolling Lift Bridge in Brooklyn. Illustrates and describes a bridge to be built on Vernon avenue, over Newtown Creek, which has novel features. 600 w. R. R. Gaz—Nov. 29, 1901.

Lift, Chicago.—A Long Span Bascule Bridge Over the Chicago River. An illustrated account of interesting bridge construction, with statement of conditions. 1000 w. R R Gaz—June 7, 1901.

Bascule Bridge Over the Chicago River at Clybourn Place, Chicago. An illustrated description of a bridge that is a type of several to be built in Chicago and vicinity. 5500 w. Eng News—Jan. 31, 1901.

Competitive Designs for the 95th St. Bascule Bridge Over the Calumet River, Chicago. Illustrated description of accepted and submitted designs. 4800 w. Eng News—Jan. 10, 1901.

Page Bascule Bridge Over the Chicago River at Ashland Ave. Illustrates and describes two designs on the Page system, one a high-truss and the other a low-truss design. 3000 w. Eng News April 25, 1901.

The Ashland Avenue Bascule Bridge, Chicago. Illustrated description of a two-leaf structure with about 150 ft. clear span, operated by gears which are driven by electric motors, and meshed into racks on the top chord of the shore end leaf. 2100 w. Eng Rec—April 27, 1901.

A Trunnion Bascule Bridge. Brief illustrated description of the Clybourn Place bridge in Chicago. 500 w. R R Gaz—July 11, 1902.

The Ashland Avenue Bascule Bridge, Chicago. An illustrated description. 1600 w. Eng Rec—Oct. 10, 1903.

The Division Street Bascule Bridge, Chicago. Description of bridge, with illustration, and the operation of each leaf independently by electric motors. 800 w. Eng Rec—Aug. 20, 1904.

Lift, Cleveland.—A New Scherzer Rolling Lift Bridge at Cleveland. Illustrates and describes a recent bridge over the Cuyahoga River, built to replace a swing bridge, because of navigation interests. 900 w. R R Gaz—Jan. 17, 1902.

Construction of a Scherzer Double-Roller Lift Bridge at Middle Seneca Street, Cleveland, Ohio. William J. Carter. An illustrated account of the difficulties encountered in building the bridge, principally the substructure. 2500 w. Jour Assn of Engng Socs—March, 1904.

Trunnion Bridge for W. & L. E. R. R. at Cleveland. A fully illustrated description of an improved type of lift drawbridge, with trunnion supports and counterbalanced leaves—replacing an old swing railroad bridge over the Cuyahoga river. 2500 w. Ry & Engng Rev—Dec. 16, 1905.

Lift, Coney Island.—The Harway Avenue Bascule Bridge, New York City. Illustration and description of bridge over Coney Island Creek, having a clear span of 50 feet, built of medium steel. 800 w. Eng Rec—April 30, 1904.

Lift, Elbe-Trave Canal.—Lift Bridges over the Elbe-Trave Canal, Germany (Ponts Levants du Canal de l'Elbe à la Trave). An illustrated description of vertical lift bridges worked by hydraulic pressure and electric motors and by hand windlass. 1 plate. 1200 w. Génie Civil—Feb. 15, 1902.

Lift, Milwaukee.—The Grand Avenue Bascule Bridge, Milwaukee. Illustrates and describes a structure with pivoted bascules operated by electric motors. 2500 w. Eng Rec—July 12, 1902.

The Broadway Bascule Bridge at Milwaukee, Wis. John Geist. Illustrated detailed description of a bascule lift bridge, possessing novel features in design and construction. 2000 w. Eng News—July 14, 1904.

Lift, Newark Bay.—The Construction of the Scherzer Lift Bridge at Newark Bay. Describes the rolling-lift bridge being built by the Central Railroad of New Jersey to replace a steel truss center-piece swing span. 2700 w. Eng Rec—April 2, 1904.

Twin Lift-Bridge Operated by Gas Engines; New Draw Over Newark Bay, Central R. R. Co. of New Jersey. Illustrates and describes a drawbridge of unusual design erected under difficult conditions. 1600 w. Eng News—Feb. 25, 1904.

The New Newark Bay Bridge. S. D. V. Burr. Illustrates and describes the tandem Scherzer rolling lift bridges on the Central Railroad of New Jersey. 800 w. Ir Age—Jan 5, 1905.

Lift, New Orleans.—Bascule Bridge of the New Orleans Terminal Company. Brief illustrated description of a recently completed bridge across New Basin Canal. 500 w. R R Gaz—Vol. XXXIX. No. 4.

Lift, New York.—The Westchester Avenue Rolling Bridge, New York. Brief illustrated description of a new bridge over the Bronx River. 1700 w. Eng Rec—July 26, 1902.

A Short-Span Bascule Bridge in New York City. Brief illustrated description of the bridge over the Mott Haven Canal at 135th street. 800 w. Eng Rec—June 18, 1904.

Lift, Saginaw.—See **Saginaw.**

Lift, Stettin.—The Hansa Bridge at Stettin (Die Hansabrücke zu Stettin). A fully illustrated account of the new bridge over the Oder at Stettin. There are two shore spans of 37.2 metres, and an electrically operated rolling-lift draw of 18 metres. 6000 w. 1 plate. Zeitschr d Ver Deutscher Ing—April 29, 1905.

Bascule Bridge over the Oder River, at Stettin (Pont à Basculement sur l'Oder, à Stettin. A. Bidault des Chaumes. Well illustrated description of rolling-lift bridge in northern Germany. 1 plate. 1500 w. Génie Civ—Aug. 19, 1905.

Lift, Swale.—The Swale Bridge. Illustrated description of an interesting piece of reconstruction work on the Southeastern and Chatham Railway. A bascule bridge span was replaced by a Scherzer rolling-lift type. 500 w. Engng—Nov. 11, 1904.

Scherzer Lift Bridge Over the River Swale; Foundation Details. Drawings and notes introductory to a description of the erection and of the opening leaf. Serial. 1st part. 500 w. Engng—May 12, 1905.

Lift vs. Swing.—Obstructions in Navigable Channels. Discusses the question of bascule or vertically moving bridges as against the oldtime center-pier obstructions in connection with the plans for bridges over the Potomac. 1200 w. Marine Rev—Dec. 12, 1901

See also **Saginaw.**

Lighting, East River, N. Y.—See **ELECTRIC LIGHTING, East River Bridge, N. Y.**

Little Calumet River.—The Little Calumet River Drawbridge. Illustrated detailed description of a double-track, through plate-girder drawbridge of 171 1-3 ft. span, in Illinois. 2000 w. Eng Rec—Dec. 28, 1901.

Linville Truss.—See **BRIDGE RENEWAL—Trent River, Eng.**

Loading.—See **BRIDGE DESIGN; BRIDGE SPECIFICATION.**

London.—The Widening of London Bridge. Briefly reviews the history of the bridge and illustrates and describes the present scheme, chiefly devoted to dealing with the lateral expansion of the footways. 2500 w. Engr, Lond—Dec. 21, 1900.

The Widening of London Bridge. Editorial, with illustrations on the proposed alterations which will widen the footways. 1800 w. Builder—Dec. 8, 1900.

The Widening of London Bridge. Describes the temporary work, which is of an unusual nature, and the way in which it has been carried out. Ill. 1700 w. Engng—Dec. 5, 1902.

The Widening of London Bridge. Harold J. Shepstone. Illustrated description of the widening of the foot-paths. The method is interesting on account of the conditions under which the work is carried on. 1200 w. Sci Am Sup—Aug. 1, 1903.

The Widening of London Bridge. William Bartholomew Cole. Reviews the various movements for widening this bridge, which was opened in 1831, and the final work of widening the footways. Ils. 8500 w. (No. 3518). Inst of Civ Engrs.
See also **Kew; Vauxhall.**

Long Span.—Some Interesting Long Span Bridges Now Under Construction. Illustrates and describes their general design and special features. 5000 w. Eng News—Nov. 20, 1902.

Luxemburg.—The Luxemburg Stone Arch Viaduct. Illustrated description of a masonry highway arch having a centre span of 275 1-2 ft., the longest span of its kind now in existence. 1000 w. Eng Rec—Oct. 12, 1901.

The New Luxemburg Stone Arch (Le Nouveau Pont de Luxembourg). Aug. Dutreux. A well illustrated description of the largest stone arch in the world, 275 ft. span, carrying a wide highway into the city of Luxemburg. 1 plate. 2000 w.—Génie Civil—Jan. 18, 1902.

The Luxemburg 277-ft. Stone Arch Viaduct. A general description, with two-page plate, of the longest stone arch in the world, now being constructed over the deep valley of the Petrusse, to connect the city with its railway station. 2000 w. Eng News—Feb. 27, 1902.

The Erection of the Luxemburg Stone Arch. Illustrated detailed description of the viaduct between the railway station and the city, which is the longest stone arch yet built, having a 277 1-2 foot span. 1200 w. Eng Rec—March 1, 1902.

Some Reflections on the Luxemburg Bridge. Editorial discussion of the design and the use of stone as a structural material for bridges. Ill. 1700 w. Eng News—March 6, 1902.

The Great Luxemburg Arch. Illustrates and describes this great arch now in course of construction. It has a span of 277 ft. 1500 w. Engr, Lond—May 2, 1902.

The Luxemburg Bridge from the View Point of an American Designer of Masonry Arch Bridges. Albert W. Buel. An illustrated article discussing features of the design and construction. 3700 w. Eng News—May 8, 1902.

The Luxemburg Stone Arch (Die Neue Brücke über die Petrusse in Luxemburg). An illustrated description of the greatest stone arch in the world, 275-foot span, connecting the inner city of Luxemburg with the railroad station in a suburb. 1500 w. Schweiz Bauzeitung—June 28, 1902.

The Monumental Bridge at Luxembourg (Le Pont Monumental de Luxembourg). M. Cart. A description of the great arch of 84 metres span; one half of which is already completed. Illustrations showing the state of the work are given. 3000 w. Rev Gen des Chem de Fer—Dec., 1902.

The Luxembourg Bridge (Le Pont de Luxembourg). R. Bonnin. A well illustrated account of the construction of the great twin masonry arch of 84.65 metres span at Luxembourg. 3000 w. Revue Technique—May 25, 1904.

The Adolphe Bridge at Luxembourg (Le Pont Adolphe à Luxembourg). M. Sejourné. Brief description of the double masonry arch of 84.65 metrès span. 1200 w. Comptes Rendus—May 2, 1904.

See also Plauen; **ARCH CENTER.**

Macleay River, N. S. W.—Bridge Over the Macleay River, New South Wales. Illustrated description of a structure with spans much longer than any hitherto attempted in the Australian colonies. 800 w. Engr, Lond—March 29, 1901.

Magdeburg.—The Königsbrücke in Magdeburg (Die Königsbrücke in Magdeburg). An illustrated description of the erection and taking down of the wooden falsework for the central arch span of this ornamental bridge over the River Elbe. 1000 w. Zentralblatt d Bauverwaltung—May 9, 1903.

The Königsbrücke in Magdeburg (Der Bau der Königsbrücke in Magdeburg). O. Peters. An illustrated description of a large ornamental bridge over the Elbe River, with a steel arch from which the highway is suspended, and masonry towers at the ends. 1 plate. Serial. 2 Parts. 3000 w. Deutsche Bauzeitung—May 30 and June 6, 1903.

Mainz.—See **Mayence.**

Mamaroneck, N. Y.—See **BRIDGE RENEWAL.**

Manhattan, N. Y.—East River Bridge No. 3. Gives a map showing the location of the three bridges, with illustration and particulars concerning "No. 3," for which bids are now called. 900 w. R R Gaz—March 1, 1901.

The Manhattan Bridge, N. Y. Illustrates some of the main features of Bridge No. 3, which will connect Canal Street, New York, with Fulton St., Brooklyn, with description. 1200 w. Eng Rec—Feb. 21, 1903.

A Comparison Between Eye-Bar Chains and Wire Cables for Suspension Bridges. Wilhelm Hildenbrand. Showing that economy is decidedly on the side of wire cables, and criticising the alteration made in the "Manhattan" bridge. 4800 w. Eng News—March 12, 1903.

Report of Special Commission of Engineers on the Plans for the Manhattan Bridge, New York City. Supports Mr. Gustav Lindenthal's claims that the substitution of eye-bar chains will give increased rapidity of erection and no greater first cost. 1800 w. Eng News—March 12, 1903.

Comparison of Eye-Bar Chains with Steel Wire Cables for the Manhattan Bridge. Extracts from a statement by Mr. Lindenthal on the comparative merits of eye-bar chains and steel wire cables for suspension bridges. 1500 w. Eng News—June 25, 1903.

Wire Cables versus Eye-Bar Chains for Suspension Bridges. Wilhelm Hildenbrand. Gives facts and figures favorable to wire cables and criticises the opinions of Mr. Gustav Lindenthal in regard to the Manhattan bridge. 1800 w. Eng Rec—July 4, 1903.

Eye-Bars or Cables for Manhattan Bridge. R. S. Buck. A comparison of theories and conditions, with detailed discussion of material cost, methods, etc. Also editorial. Illustrated. 11700 w. R R Gaz—Dec. 4, 1903.

The New Manhattan Bridge. A discussion of the proposed change to wrought steel chains instead of steel wire cables. 1800 w. Engr, Lond—Aug. 14, 1903.

The Superstructure for the Manhattan Bridge Across the East River at New York City. General description, with illustrated description of special details. 2000 w. Eng News—Dec. 10, 1903.

The Manhattan Bridge Design. Gustav Lindenthal. A letter stating the reasons for the chain bridge. 1400 w. R R Gaz—Dec. 25, 1903.

The Manhattan Bridge Across the East River. Illustrated description of this bridge at New York, the foundations and piers of which are nearly completed. 1800 w. Sci Am—Jan. 23, 1904.

Architectural Features of the Manhattan Bridge. Illustrations, with notes of this bridge across the East River at New York, officially known as No. 3. 1200 w. R. R. Gaz—July 1, 1904.

The Manhattan Bridge Across the East River, New York City: Revised Plans. Brief Illustrated description of proposed changes in the design, with extract from a letter by Carrère & Hastings, giving an outline of the reasons for the architectural changes. 1400 w. Eng News—July 7, 1904.

The Superstructure of the Manhattan Bridge, New York. An illustrated general description of the third East River Suspension Bridge. 2800 w. Eng Rec—July 29, 1905.

Chains vs. Cables in the Manhattan Bridge. Wilhelm Hildenbrand. A letter giving arguments and explanation of the calculations on which the writer based his views. Also editorial. 3500 w. Sci Am—Nov. 4, 1905.

The New Manhattan Bridge. A short sketch of the history of this bridge, with an illustrated description of the design as approved by the Municipal Art Commission. 1200 w. Archts' & Bldrs' Mag—Sept., 1904.

Anchorages for the Manhattan Bridge. Illustrated description of the plans for the anchorages on both sides of the East River for the Manhattan Bridge between New York and Brooklyn. 900 w. R. R. Gaz—Vol. XXXVII, No. 27.

See also **East River; BRIDGE DESIGN; BRIDGE FOUNDATION; BRIDGE TERMINAL; BRIDGE TOWER; CABLE—Bridge, Manhattan; UNDERGROUND RAILWAY.**

Mannheim, Germany.—The Highway Bridge over the Neckar at Mannheim (Strassenbrücke über den Neckar bei Mannheim). Carl Bernhard. A comparison of the various designs submitted in the competition for the proposed bridge. Serial. Part I. 2000 w. Zeitschr der Ver Deutscher Ing—June 15, 1901.

The Construction of Stone Bridges (Ein Beitrag zum Steinbrückenbau). Hr. Probst. An illustrated discussion of the design of wide-span stone arches, with particular reference to the proposed bridge over the Neckar at Mannheim, Germany. 1500 w. Deutsche Bauzeitung—Jan. 4, 1902.

Mansfield, O.—A Three-Hinged Concrete Steel Arch. L. A. Keith. Illustrated description of a recent construction in Mansfield, O., with account of test made of model. 1800 w. Eng Rec—Feb. 18, 1905.

Mans, France.—The X Bridge at Mans, France. Illustrated description of a reinforced concrete structure having very light single columns with expansion rollers, on which rest plate girder spans. 1100 w. Eng Rec—March 23, 1901.

Marietta, O.—The Marietta Long-Span Highway Bridge. An illustrated article, the present number dealing with the stresses, dimensions and deflections of this new bridge across the Ohio River. Serial. 1st part. 3000 w. Eng Rec—Sept. 26, 1903.

The Ohio River Bridge at Marietta, Ohio. An illustrated description of a cantilever highway bridge of peculiar design about to be built. It consists of 5 spans, two separate truss spans, and three which form a cantilever, and a viaduct approach between abutments; also a graded approach to the street level. 2000 w. R. R. Gaz—July 11, 1902.

Maryborough, Queensland.—A Submerged Bridge. A discussion of the unique features of a concrete-steel bridge at Maryborough, Queensland, Australia, designed to be submerged 20 ft. at times in a swift current. 1000 w. Eng Rec—March 9, 1901.

Low-Level Concrete Bridge Over the Mary River, Maryborough, Queensland. Alfred Barton Brady. Abstract of a paper read before the Inst. of Civ. Engrs. of Gt. Britain. Illustrated detailed description of the bridge and method of construction. 3500 w. Eng News—Feb. 14, 1901.

Masonry.—Masonry Bridges for Railways. Discusses the reason for the recent construction of many masonry bridges for railways. 1200 w. Eng Rec—Feb. 22, 1902.

See also **Arch Masonry; Trenton; ARCH; CULVERT; VIADUCT.**

Massachusetts Requirements.—See Electric Railway.

Mattig River, Austria.—Cantilever Bridge Across the River Mattig, Austria. Gives skeleton elevation and plan of a three-span cantilever bridge recently erected, with description from Le Génie Civil. 600 w. Engr, Lond—July 28, 1905.

Mayence, Germany.—New Bridge Near Mayence. Illustrations, with brief description of a bridge making a direct connection between the railways on the right and left banks of the Rhine. 700 w. Engr, Lond—Nov. 11, 1904.

See also **BRIDGE RENEWAL.**

Mechanicsville, N. Y.—A Concrete Arch Bridge Near Mechanicsville, N. Y. Illustrated description of a three-arch highway bridge. 600 w. Eng News—Nov. 5, 1903.

Melan.—See Arch Melan; Concrete Reinforced; CONCRETE REINFORCED.

Mexico.—American Bridges in Mexico. Illustrates and describes points of interest in bridges manufactured in American shops for the Vera Cruz & Pacific R. R. 1200 w. Eng Rec—Aug. 31, 1901.

The Tula and the Chone River Bridges, Mexico. Illustrated descriptions. 1500 w. Eng Rec—Sept. 24, 1904.

Miami & Erie Canal.—See Drawbridge.

Miami River.—See New Baltimore, O.; Dayton, O.; Drawbridge; Hamilton.

Middletown, Conn.—The Middletown (Conn.) Bridge—The Longest Highway Draw Span. H. G. Tyrrell. Illustrates and describes the superstructure and substructure. 2500 w. R R Gaz—Dec. 27, 1901.

The New Middletown Drawbridge. H. G. Tyrrell. Illustrates and describes a highway bridge in Connecticut. 1,300 ft. long, with a 26 ft. roadway, and provision for two 6 ft. sidewalks. Beside the street traffic it carries an electric railway line. 1600 w. Elec Wld & Engr—Feb. 16, 1901.

Mières, Spain.—Bridge in Reinforced Concrete over the Rio Caudal at Mières, Spain (Pont en Béton Armé sur le Rio Caudal à Mières, Espagne). Giving the details of computations of a reinforced concrete arch of 35 metres span by M. J. Eugenio Ribera. 3000 w. Beton & Eisen—1 Heft, 1903.

Military.—Military Bridges. Illustrates and describes methods of construction. 1900 w. Sci Am Sup—May 4, 1901.

Military Cluchagne.—The Cluchagne System of Military Rafts and Bridges. From "La Nature." Illustrated description. 600 w. Sci Am Sup—Oct. 12, 1901.

Miltenberg, Germany.—Three-Hinged Concrete Arch Highway Bridge Over the Main at Miltenberg, Germany. Abstracted from an article by Eduard Fleischmann, in "Zeitschrift für Bauwesen." Illustrated description; the hinges are formed of lead strips. 1400 w. Eng News—July 25, 1901.

Milwaukee.—Riveted Lattice Truss Drawbridge; Chicago & Northwestern Ry. Illustrated detailed description of a swing bridge near Milwaukee, with trusses of the type named. 4300 w. Eng News—Aug. 8, 1901.

Counterbalanced Draw Span on the Chicago, Milwaukee & St. Paul. Illustrated description of a new structure at Milwaukee, made necessary by the widening of the channel crossed by the present drawbridge. 800 w. R R Gaz—March 11, 1904.

Replacing a Double-Track Drawbridge. Illustrated description of the new bridge across the Menominee River, at Milwaukee, Wis. 2000 w. Eng Rec—July 30, 1904.

Milwaukee Lift.—See Lift, Milwaukee.

Minneapolis.—See BRIDGE RENEWAL.

Mississippi River.—The Mississippi River Bridges. F. B. Maltby. An illustrated historical and descriptive sketch of 48 bridges over the Mississippi. 32000 w. Jour W Soc of Engrs—Aug., 1903.

See also Thebes, Ill.

Missouri River.—See Kansas City; Omaha.

Moline, Ill.—The Moline Bridge. Illustrates and describes a riveted steel-truss through structure about 710 ft. long between centers of abutment seats, and a height of 35 ft. above the water. There are four spans, with three river piers. The bridge is somewhat remarkable on account of the proportions and arrangements of the trusses. 3000 w. Eng Rec—Feb. 11, 1905.

Monier.—See Arch Monier; Coblenz-Treves; Concrete Reinforced; BRIDGE DESIGN; CONCRETE REINFORCED.

Monogahela.—See Pittsburg; Morgantown, W. Va.; Rankin, Pa.

Morgantown, W. Va.—The Monongahela River Suspension Bridge at Morgantown, W. Va. W. H. Boughton. Illustrated account of a bridge similar to the one that failed recently at Charleston, W. Va., and about the same age, which is not considered entirely safe. 1100 w. Eng News—March 9, 1905.

See also Charleston.

Movable.—Movable Bridges. George H. Norton. Considers recent economic changes, and the present tendencies in design, noting the limitations and some of the objects sought. Ills. 5300 w. Trans Assn of Civ Engrs of Cornell Univ—1904.

See also Drawbridge; Lift; Military; Pontoon.

Munich.—The World's Largest Concrete-Steel Arch Bridge: The Gruenwald Bridge at Munich. Gives general illustrated description and dimensions of the design of arch ribs, foundations and piers, roadway and approaches, etc. 3500 w. Eng News—Feb. 23, 1905.

The Grünwald Bridge Over the Isar (Die Isarbrücke bei Grünwald). Prof. Mörsch. Detailed description of reinforced-concrete bridge, with two hinged arches of 70 metres span, across the Isar at Munich. Two articles. 4000 w. Schweiz Bauzeitung—Dec. 3. 10, 1904.

Reinforced Concrete Bridge Over the Isar at Grünwald Above Munich (Strassenbrücke in Eisenbeton über die Isar bei Grünwald, oberhalb München). Illustrating and describing a highway bridge with two spans of 70 metres each with hinges at the crown and springings. Three articles. 3000 w. Deutsche Bauzeitung—Oct. 5, 12, 19, 1904.

Bridge Construction in Munich (Münchener Brückenbauten). W. Binswanger. Describing especially the new Cornelius bridge across the Isar. 4000 w. Beton & Eisen—No. V., 1903.

See also BRIDGE ACCIDENT; BRIDGE RENEWAL.

Nantile, Wales.—Bridge Over Llyfni. Illustrates and describes a bridge of rather unusual construction recently erected by the owners of the South Dorothea Slate Quarry at Nantile, North Wales. 600 w. Engr, Lond—Aug. 22, 1902.

Neckarhausen, Germany.—A Great Concrete Arch in Germany. Description and illustration taken from German papers. The bridge is near the town of Neckarhausen. 600 w. Ry Age—Oct. 2, 1903.

Nepean Point, Ottawa.—See Ottawa.

Neuhof-Hamburg.—The Neuhof Swing-Bridge Over the Reiherstieg at Hamburg-Neuhof (Die Drehbrücke Neuhof über den Reiherstieg bei Hamburg-Neuhof). C. Bernhard. A full account of the details of this peculiar example of swing-bridge construction, with strain diagrams and other illustrations. Two articles. 7500 w. Zeitschr d Ver Deutschr Ingenieure—Oct. 20, 27, 1900.

Neusalz, Germany.—Plans for a Combined Railroad and Highway Bridge Over the Oder at Neusalz (Entwürfe für eine Vereinigte Eisenbahn- und Strassenbrücke über die Oder bei Neusalz). F. Dircksen. With details of the designs of various competing firms, including braced arches, trusses, and cantilevers. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—April 15, 22, 1905.

Newark Bay.—See Lift.

Newark, N. J.—A Skew-Span Double-Track 54-Foot Reinforced Concrete Arch. Describes a bridge in progress at Jackson St., Newark, N. J., for carrying the two main tracks of the Central Railroad of New Jersey. 2000 w. Eng Rec—Aug. 16, 1904.

A Three-Track Beam-Floor Girder Bridge. Illustrates and describes the principal structural peculiarities of a bridge in Newark, N. J. 1300 w. Eng Rec—June 18, 1904.

See also BRIDGE ERECTION; BRIDGE MOVING.

Newark, N. Y.—See BRIDGE RENEWAL.

Newark Park.—Reinforced Concrete Bridges in a Newark Park. Illustrated description of two single-arch bridges of monumental design, in Branch Brook Park, with the methods of construction. 2500 w. Eng Rec—Aug. 12, 1905.

New Baltimore, O.—Highway Bridge of 465-Ft. Span Over the Miami River, at New Baltimore, Ohio. Elevation and plan with description of one of the longest highway bridge spans in the United States. 700 w. Eng News—Oct. 16, 1902.

New Bedford, Mass.—New Street Railway Draw-Bridge at New Bedford, Mass. William F. Williams. An illustrated detailed description of this bridge and its operation. There is a double-track electric railway line the entire length of the bridge. 1800 w. St Ry Rev—Nov. 15, 1901.

New Bremen.—See Drawbridge.

New Brunswick, Canada.—Curiosities of Early Iron Railway Bridges. Illustrated notes, made by Job Abbott, of peculiar wrought iron bridges in New Brunswick, Canada. 900 w. Eng Rec—July 27, 1901.

New Brunswick, N. J.—The Raritan River Stone Arch Bridge of the Pennsylvania R. R., at New Brunswick, N. J. This bridge was planned to replace an iron bridge carrying two tracks. One-half the width of the structure has been built alongside the iron bridge. The tracks are to be transferred, then the bridge completed. Illustrated description of methods of construction. 900 w. Eng News—June 18, 1903.

The Pennsylvania Railroad Bridge over the Raritan River at New Brunswick, N. J. An illustrated detailed description of the construction of a fine bridge, with brief review of the removal of the old bridge to a new site without interrupting traffic. Also editorial. 5000 w. Eng Rec—Oct. 10, 1903.

See also Trenton; BRIDGE MOVING.

Newburyport, Mass.—The Merrimac River Bridge at Newburyport. Illustrated description of highway bridge with four fixed spans and one draw span. The large cylinders for piers were grouted in place by air pressure. Also editorial. 3500 w. Eng Rec—Aug. 20, 1904.

Details at the Pivot Pier and Ends of the Merrimac River Drawbridge, Newburyport, Mass. Illustrates and describes the operating mechanism, loading system and electric connections. 1400 w. Eng Rec—Dec. 17, 1904.

Newcastle, Eng.—New Railway Bridge Over the Tyne. Illustrations and particulars of a bridge at Newcastle. for the North-Eastern Ry. Co. Caissons are described. 700 w. Engr, Lond—April 10, 1903.

A New High-Level Bridge Over the River Tyne at Newcastle, on the Northeastern Railway of England. F. E. Harrison. An illustrated detailed description of the construction of a four-track structure. 3800 w. Ry Age—Oct. 23, 1903.

New High Level Bridge Over the Tyne. Illustrates and describes a new railway bridge under construction at Newcastle. 1800 w. Transport—July 3, 1903.

Newcastle, New Brunswick.—See BRIDGE ERECTION.

New England.—See Cantilever.

New Orleans Bascule.—See Lift, New Orleans.

New Orleans Incline.—See TRANSFER BRIDGE.

Newtown Creek.—See Lift, Brooklyn.

New Westminster, B. C.—A New Bridge Over the Fraser River at New Westminster, British Columbia. An illustrated detailed description of a bridge having two decks, one for wagon traffic and the other for steam and electric railroad traffic. 1700 w. R R Gaz—Aug 29, 1902.

The Fraser River Bridge, British Columbia. The present article gives an illustrated detailed description of the approaches and plate-girder spans. Serial. 1st part 2200 w. Eng Rec—April 30, 1904.

The Substructure of the Fraser River Bridge. Illustrates and describes the substructure of this bridge in British Columbia, and its construction. 3300 w. Eng Rec—May 28, 1904.

The Erection of the 282-Foot Triangular Span of the Fraser River Bridge. Illustrated description of erection of the unique spread span of the double-deck railroad and highway bridge at New Westminster, B. C. 1800 w. Eng Rec—Aug. 13, 1904.

The New Westminster Bridge Over the Fraser River, British Columbia. Illustrated detailed description of the double-deck railway and highway structure, and its construction. 2500 w. Eng News—June 15, 1905.

The New Westminster Bridge Over the Fraser River, British Columbia. Illustrates and describes the superstructure, notable for the special "spread" span designed to accommodate a Y-track, and for the methods of erection. 2000 w. Eng News—June 22, 1905.

New York.—New York Bridges. Montgomery Schuyler. A critical review of the bridges across the East River and the Harlem River, noting their good and bad features. 2200 w. Arch Rec—Oct., 1905.

See also Brooklyn; East River; Hudson; Lift; Manhattan; Williamsburg; Willis Avenue; BRIDGE ACCIDENT—Brooklyn.

N. Y. Central R. R.—New York Central Bridges. Charles N. Green. An illustrated article giving information of designs and methods used in the extensive reconstruction work of the road named. 2500 w. Trans Assn of Civ Engrs of Cornell Univ —1901.

Two Drawbridges on the New York Central Railroad. An illustrated account of two steel drawbridges to be built, of interest because of the conditions to be met at the sites. One is over Overpeck Creek, N. J., on the West Shore R. R., and the other over Wappinger Creek, near New Hamburg, N. Y. 1500 w. R R Gaz—March 15, 1901.

The Engineering Department of the New York Central. The present article deals with bridges, and track elevation Ill 1400 w R R Gaz—May 17, 1901

A Heavy Double-Track Skew Bridge Illustrated description of a 237-ft. truss bridge with solid floor on the N. Y. Central Ry. over the Erie Canal, near Buffalo. 1700 w. Eng Rec—May 10, 1902.

See also BRIDGE ERECTION; BRIDGE RENEWAL—Newark, N. Y.

N. Y., Chic. & St. L. Ry.—New York, Chicago and St. Louis R. R. Bridges. Albert J. Himes. Illustrated detailed description. 8300 w. Trans Assn of Civ Engrs of Cornell Univ—1802.

See also BRIDGE RENEWAL.

New York Lift.—See Lift.

N. Y., N. H. and H. Ry.—See Girder.

New York Report.—Report of Commissioner of Bridges of New York City. Data, principally in regard to the East River Bridges, taken from the very interesting report of Bridge Commissioner George E. Best. 2700 w. R R Gaz—Vol. XXXIX. No. 10.

Niagara Arch.—See BRIDGE DESIGN.

Niagara Cantilever.—See BRIDGE RENEWAL.

Niagara, Goat Island.—See Goat Island, Niagara.

Non-Continuous Swing.—See Worthington Swing.

Northampton, Pa.—The Northampton Concrete Bridge, Central Railroad of New Jersey. Illustrated description of a three-track railway arch with spans of 52 and 84 ft. The bridge was built without interfering with traffic over the truss spans which it replaced. 2000 w. Eng Rec—June 8, 1901.

Northern Pacific Ry.—See Railway Standards.

Northfield, Mass.—The Schell Memorial Bridge. Illustrated description of a highway bridge across the Connecticut River at Northfield, Mass. Serial. 1st part. 1500 w. Eng Rec—Dec. 17, 1904.

Northport, Wash.—The Northport Bridge. Illustrated description of a combination single-track bridge having spans of 250 and 150 ft. The structure is an interesting example of a type of bridge used only where good wood is plentiful and metal expensive. 1900 w. Eng Rec—Oct. 19, 1901.

Northwich, Eng.—An English Floating Swing Bridge. Describes a swing span 112 ft. long, supported on a circular steel pontoon, made necessary on account of the rapid settlement of loaded ground due to the pumping of brine from below the surface. 1000 w. Eng Rec—March 23, 1901.

Swing-Bridges Over the Weaver. Illustrates and describes the new pontoon swing-bridges over the river at Northwich, where the salt industry often causes subsidence, and where other exacting conditions had to be met. 3000 w. Engng—Dec. 14, 1900.

Oberschöneweide, Berlin.—The Treskow Bridge at Oberschöneweide near Berlin (Die Treskow-Brücke zu Oberschöneweide bei Berlin). Karl Bernhard. A very full account of the new bridge over the Spree, with full details of construction. The main span is 226 feet. Three articles. 9000 w. Zeitschr d Ver Deutscher Ing—July 15, 29, Aug. 5, 1905.

Old.—See BRIDGE DESIGN—Unit Stresses; BRIDGE RENEWAL.

Omaha.—The Omaha Interstate Bridge. Illustrates and describes the old and new structures of the bridge between Omaha and Council Bluffs. The new bridge is now under construction without interrupting traffic. 4800 w. Eng Rev—Jan. 24, 1903.

Missouri River Bridge of the Omaha Bridge & Terminal Railway Company. Brief outline of the history of this bridge, with illustrated description of the new structure. 1000 w. R R Gaz—Vol XXXVIII, No. 8.

Ornamental.—See Aesthetic.

Ottawa, Can.—Superstructure of the Interprovincial Bridge, Ottawa. F. P. Shearwood. An illustrated description of the superstructure of the bridge recently erected at Nepean Point, Ottawa. Plates. 8200 w. Can Soc of Civ Engrs—Adv. proof—Nov. 21, 1901.

The Interprovincial Bridge, Ottawa. Illustrated description of a cantilever structure 2,287 ft. long with a channel span of 555 ft., carrying a railway, two electric car tracks, two sidewalks, and two roadways. The first part describes the structural features. Serial. 1st part. 4300 w. Eng Rec—Dec. 7, 1901.

Construction of the Substructure of the Royal Alexandra (Interprovincial) Bridge at Ottawa, Canada. Guy C. Dunn. An interesting description of this work with plates. 5000 w. Can Soc of Civ Engrs—Adv. Proof—Dec. 19, 1901.

The Royal Alexandra Bridge at Ottawa. H. D. Bush. Illustrated description of the bridge and its construction. 4200 w. R. R. Gaz—July 18, 1902.

Ottawa River, Can.—See Bout de L'Isle.

Ouachita River, Ark.—The Ouachita River Bridge, Missouri Pacific Railway. Illustrates and describes a structure of interest owing to the range of rise and fall of water. 700 w. Ry Age—April 17, 1903.

Overpeck Creek, N. J.—See N. Y. Central R. R.

Page Bascule.—See Lift, Chicago.

Pan-American Exposition.—Bridges in the Pan-American Exposition Grounds. Illustrated description of the method of constructing 30-ft. timber highway arches. 800 w. Eng Rec—Oct. 26, 1901.

Paris.—The Austerlitz Bridge Across the Seine for the Metropolitan Railway of Paris. Rêne Bonnin. States the conditions to be met and gives an illustrated description of the plan adopted, and method of erection. 4000 w. Eng News—Dec. 7, 1905.

Viaduct across the Seine at Paris (Viaduc sur la Seine à Paris). An illustrated description of the new bridge across the Seine above the Austerlitz bridge, for the Paris Metropolitain. 1800 w. 1 plate. Revue Industrielle—Feb. 25, 1905.

The Austerlitz Viaduct over the Seine (Viaduc d'Austerlitz sur la Seine). A. Dumas. An illustrated description of the bridge recently completed to carry the Metropolitain railway across the Seine at Paris. 3000 w. 1 plate. Génie Civil—April 29, 1905.

The Double-Track Austerlitz Bridge, Paris. Illustrated description of an arch bridge across the

Seine, with a suspended floor of peculiar construction. 2200 w. Eng Rec—June 24, 1905.

Arched Viaduct Over the Seine, Paris. Two-page plate and other illustrations, with description of interesting features. 1700 w. Engng—Jan. 31, 1902.

Arched Viaduct Over the Seine, Paris. Illustrates the viaduct for joining the Gare St. Lazare to the Champ de Mars and to the Invalides Railway Station. Description and further illustrations to appear later. 2-page plate. Serial. 1st part. 200 w. Engng—Jan. 17, 1902.

See also BRIDGE MOVING.

Paris Exposition.—See BRIDGE ACCIDENT.

Paris Foot-Bridge.—The New Foot-Bridge Over the Seine at Paris. Illustrates and describes a structure built for the exposition, but made permanent. 700 w. Engng—Sept. 6, 1901.

See also BRIDGE MOVING.

Paterson, N. J.—Reinforced Concrete Highway Bridges in New Jersey. Illustrates and describes bridges over the Passaic River in the vicinity of Paterson. 2500 w. Eng Rec—Sept. 10, 1904.

Paterson Flood Damage.—See FLOOD—Passaic Valley.

Pecos Valley.—See AQUEDUCT.

Peissnitz.—See Halle, Germany.

Philadelphia.—The Pennsylvania Railroad Bridge over the Delaware at Philadelphia (Die Brücke der Pennsylvania Eisenbahn über den Delaware bei Philadelphia). F. C. Kuns. Illustrated description of the design, construction and erection. Details of fixed and swing spans. Analyses of weights. Allgemeine Bauzeitung—Heft 1, 1901.

The Pennsylvania R. R. Bridge at Fifty-second Street, Philadelphia. Illustrates details and describes a bridge built to avoid a grade crossing. It includes two long viaduct approaches and a single through span, weighing about 900 tons. 2200 w. Eng Rec—Oct. 25, 1902.

The Approach to the Pennsylvania Railroad Bridge at Fifty-second Street, Philadelphia. Detailed description of bridge and approaches of this important improvement. Ill. 2400 w. Eng Rec—Feb. 14, 1903.

See also UNDERGROUND RAILWAY.

Pine Creek.—See Girder.

Pittsburg.—The Point Bridge at Pittsburg, Pa., Which Must Be Rebuilt. Illustrates and describes the design of this historic Bridge, which must now be rebuilt. 2000 w. Eng News—Jan. 21, 1904.

The South Tenth Street Bridge, Pittsburg. Illustrated description of a five-span steel structure, 1,417 ft. long. 2000 w. Eng Rec—Dec. 10, 1904.

The Monongahela Bridge for the Wabash Railroad at Pittsburg. States the requirements to be met and gives an illustrated description of a remarkable bridge of the cantilever type, intended for the heaviest double-track modern service. 700 w. R R Gaz—March 14, 1902.

The Monongahela Bridge. An illustrated detailed description of a double-track bridge for the Pittsburg, Carnegie & Western Ry., at Pittsburg, having the longest truss span yet completed on the American Continent. Gives interesting details in methods and operations of construction. 7500 w. Eng Rec—Jan. 3, 1903.

The Wabash Bridge at Pittsburg. An illustrated description of the cantilever bridge over the Monongahela River, which completes the Wabash extension into Pittsburg. It has a truss span of 812 ft. between pier centers, and is designed to carry the heaviest loads. The steel eye-bars used are the strongest ever made. 1300 w. R R Gaz—Aug. 14, 1903.

The Nine-Mile Run Steel Arch Bridge at Pittsburg, Pa. Willis Whited. Illustrated description, with explanation of the considerations governing the design, and an account of the erection of the superstructure. 3400 w. Eng News—Feb. 26, 1903.

The Highland Park Bridge, Pittsburg. Illustrated description of a cantilever highway bridge with unusual pedestal details, chord members and lateral systems. 3000 w. Eng Rec—March 22, 1902.

A Four-Truss Double-Deck Railroad Bridge. Illustrated detailed description of a bridge across the Allegheny River which was required to carry two pairs of tracks at different fixed levels. Serial. 1st part. 3500 w. Eng Rec—Oct. 11, 1902.

Double Deck Bridge for P. Ft. W. & C. Ry. Crossing the Allegheny River at Pittsburg, Pa. E. A. Amsden. Brief illustrated description, with an account of the removal of the old bridge. 110 w. Pro Engrs' Soc of W Penn—Oct., 1902.

Pennsylvania Company's Bridge at Eleventh street. Crossing the Allegheny River. Antes Snyder. A brief history of the public improvements which formerly occupied the vicinity of the recently constructed double deck bridge at this point. Discussion. Ills. 5000 w. Pro Engs Soc of W Penna—Nov., 1902.

See also Fern Hollow; Rankin; BRIDGE ERECTION; BRIDGE MOVING; BRIDGE RENEWEL.

Plainwell, Mich.—A Concrete-Steel Highway Bridge at Plainwell, Mich. P. A. Courtright. Illustrated description of a bridge across the Kalamazoo River, and its construction. 2800 w. Eng News—May 12, 1904.

Plano, Ill.—75-ft. Concrete Steel Arch on the Burlington. An illustrated description of a structure being built over Big Rock Creek, 51 miles from Chicago. 1000 w. R R Gaz—Dec. 1, 1903.

Big Rock Creek Concrete-Steel Arch on the Chicago, Burlington & Quincy Railway. Illustrates and describes a bridge being built near Plano, Ill., to replace a steel bridge. 1000 w. Eng Rec—Jan. 2, 1904.

Concrete Steel Bridge at Plano, Ill.; Chicago, Burlington & Quincy Ry. Illustrated description of a double-track bridge 44 ft. wide, with an arch of 75 ft. span, and having wing walls which bring the total length to about 212 ft. 1400 w. Eng News—Dec. 22, 1904.

The Plano Arch. John P. Hazen Perry. Illus- the construction of this bridge on the C. B. & Q. R. R., in Illinois. A concrete arch of 75 ft. clear span with wing walls giving a total length of 210 feet. 3000 w. Harvard Engng Jour—Nov., 1905.

Plate Girder.—See Girder; Janesville; GIRDER.

Plattsmouth, Neb.—The New Main Span of the Plattsmouth Bridge. An illustrated detailed description of improvements made in a bridge crossing the Missouri River in order to provide for heavier loads and increasing traffic. 2700 w. Eng Rec—Aug. 27, 1904.

The Plattsmouth Bridge of the Burlington. An illustrated account of the rebuilding of this bridge across the Missouri River. 1000 w. R R Gaz—Aug. 7, 1903.

See also BRIDGE ERECTION.

Plauen, Saxony.—The New Stone Arch Bridge of 295-feet Span at Plauen, Saxony. Illustrations with general description. 900 w. Eng News—Jan. 28, 1904.

The Masonry Bridge at Plauen, Saxony. Carl L. Palen. Illustrates and describes a masonry arch bridge which has a span of 295.2 feet. It will cost about $125,000. 2000 w. Eng Rec—March 26, 1904.

The Bridge over the Syra Valley at Plauen in Voightland (Die Syratalbrücke in Plauen i. V.) Hr. Fleck. A detailed account of the construction of a highway bridge at Plauen near Leipsig. The single masonry arch is of 90 metres span. Two articles. 2500 w. Deutsche Bauzeitung—July 16, 20, 1904.

The Syra Valley Bridge at Plauen (in Vogtland). Herr Fleck. Illustrated detailed description of this stone viaduct. The arch has a span of 295 feet between abutments. 2700 w. Trans Assn of Civ Engrs of Cornell Univ—1905.

Masonry Arch of 90 Metres Span (Pont en Maconnerie de 90 Mètres d'Ouverture). A. Bidault des Chaumes. An illustrated description of the great arch at Plauen, in Saxony, comparing it with the Luxembourg arch. 2000 w. 1 plate. Génie Civil—Nov. 4, 1905.

The Bridge over the Syra Valley at Plauen in Voightland (Die Syratalbrücke in Plauen im Vogtlande). M. Foerster. A well illustrated description of the construction of this, the widest span masonry arch in the world, being 90 metres clear span. 2500 w. Schweiz Bauzeitung—Oct. 14, 1905.

The Plauen Viaduct. An illustrated description of this viaduct, the arch ring having the largest constructive span ever built in stone. 1700 w. Engr, Lond—Oct. 27, 1905.

The Plauen Viaduct. Illustrated description of this viaduct in Saxony which comprises the largest arch masonry ring in the world. 2000 w. Sci Am Sup—Sept. 16, 1905.

The New Masonry Arch Bridge at Plauen, Saxony, and two bridges in the Black Forest. W. J. Douglas. Illustrates and describes three interesting masonry arches. 2500 w. Eng News Aug. 17, 1905.

Pontoon.—See **Chicago Pontoon; Military; Northwich, Eng.**

Portage County, Ohio.—A Steel Truss Highway Bridge with Concrete Floor. An illustrated description of a bridge under construction in Portage County, Ohio, of 100-foot span. 1000 w. Eng Rec—April 25, 1903.

Portage, Erie R. R.—See **VIADUCT.**

Porto Rico.—Concrete-Steel Bridges in Porto Rico. Edwin Thacher. An illustrated detailed description of two bridges built by the writer, with account of tests of the structures and materials, the difficulties encountered, etc. 5000 w. Eng News—Aug. 1, 1901.

Prague.—The Temporary Bridge over Hets Island at Prague, Bohemia (Die Provisorische Brücke über die Hetsinsel in Prag). Rudolf Kaplan. A well illustrated description of the design and construction of a provisional bridge over the Moldan River. 1 plate. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 14, 1901.

Preservation.—See **METAL PROTECTION.**

Protection, Locomotive Gases.—See **METAL PROTECTION—Locomotive Gases.**

Prussian Regulations.—Specifications for the Design of Bridges with Steel Superstructure (Vorschriften für das Entwerfen der Brücken mit Eisernem Ueberbau). The official specifications for steel bridges on Prussian government railways. 5000 w. Zentralblatt d Bauverwaltung—June 20, 1903.

Rules for the Design of Metal Bridges on the Prussian State Railways. From "Zentralblatt der Bauverwaltung." Methods of construction, calculation of strength and weights, bending moments and shearing stresses, etc. 4000 w. Bul Int Ry Cong—Jan., 1904.

New Official Regulations for Railway Bridges in the Prussian State. Considers some of the more prominent points in the new official regulations. 1500 w. Engr, Lond—March 25, 1904.

Purfleet, Eng.—Tests of a Ferro-Concrete Bowstring Bridge. Illustrated article reporting tests made of a 60-ft. bowstring bridge erected at Purfleet. 900 w. Engng—Oct 28, 1904.

Quebec.—The Quebec Bridge. E. A. Hoare. An illustrated description of the new cantilever bridge over the St. Lawrence near Quebec. 2800 w. Can Engr—May, 1902.

The Erection of the Quebec Bridge. An illustrated description of the longest span bridge undertaken in any country. 5200 w. Eng Rec—March 4, 1905.

The General Design of the Quebec Bridge. Illustrated detailed description of the structural features of the bridge over the St. Lawrence river, being the longest span yet undertaken. Serial. 1st part. 2200 w. Eng Rec—April 1, 1905.

The St. Lawrence River Bridge at Quebec, Canada. Illustrated description of a bridge designed to carry two lines of railroad, two trolley lines, two highways and two sidewalks. 900 w. R R Gaz—Vol XXXIX. No. 11.

The 1800 Ft. Span Cantilever Bridge Across the St. Lawrence River at Quebec. An illustrated article giving interesting information regarding the cantilever portion of the structure. 1000 w. Eng News—Sept. 14, 1905.

Progress on the Quebec Bridge. Gives recent photographs and data of the progress made in the construction of this bridge across the St. Lawrence River. 3500 w. Eng Rec—Sept. 16, 1905.

Cantilever Bridge of 1,800-Ft. Span Across the St. Lawrence. Illustrated detailed description of the bridge under construction near Quebec. 1200 w. Engng—Sept. 22, 1905.

See also **BRIDGE APPROACH; BRIDGE ERECTION; BRIDGE FOUNDATION; BRIDGE PIER.**

Rail Bearer.—See **RAIL BEARER.**

Railway.—Progress in Railroad Bridge Building. F. C. McMath. Address before the Detroit Engng Soc. Reviews the progress made in this field in the United States, and some of the causes of the changes in design, with information of interest. 1800 w. Jour Assn of Engng Socs—June, 1904.

See also **ARCH; BRIDGE DESIGN; BRIDGE INSPECTION; BRIDGE RENEWAL; BRIDGE SPECIFICATION; CULVERT; VIADUCT;** and under specific names of bridges.

Railway Assn. Report.—Bridges and Trestles. Report of the Com. of the Am. Ry. Engng. & Main. of Way Assn. The subject was divided and assigned to seven sub-committees, whose various reports are submitted and discussed. Ill. 22000 w. Ry Age (Spe. No.)—March 15, 1901.

Railway Standards.—Northern Pacific Standard Bridge Plans. Ralph Modjeski. An explanation of the new standards prepared by the writer, with critical discussion, and writer's conclusions. Also a diagram of weights, and plates. 6400 w. Jour W Soc of Engs—Feb., 1901.

Short-Span Railway Bridge Standards. Explains the method of the Santa Fe Railway for systematizing its bridge work. 700 w. Eng Rec—June 15, 1901.

Standard plans for Bridges on the Atchinson, Topeka & Santa Fe Ry. Illustrates and describes these plans and the matters governing the designs. 7800 w. Eng News—May 28, 1903.

Standard Short-Span Bridges on the Atchinson, Topeka & Santa Fe Railway. Illustrates and describes the standard designs for single track structures up to spans of 106 ft. 2700 w. Eng Rec—Nov. 14, 1903.

Railway Bridges. Alexander Ross. Read at the Engng. Con. of the Inst. of Civ. Engrs. Indicates the difficulties that exist in standardizing railway practice in respect of loads on bridges up to 200-ft. span. 1500 w. Engng—June 19, 1903.
See also **Harriman Railways.**

Railway Steel.—Steel Railroad Bridges. A summary of replies to circular letters sent out by the Committee on Steel Bridges of the Association of Railway Superintendents of Bridges and Buildings. 1800 w. Eng Rec—Oct. 21, 1905.

Rajahmundry, India.—See **India.**

Rankin, Pa.—Rankin Bridge for the Transit of Molten Iron. Illustrated description of the Union R. R. Co.'s bridge across the Monongahela River for transporting molten metal to the Homestead Works. 500 w. Sci Am—Dec. 7, 1901.

The Rankin Bridge. Illustrated detailed description of a bridge across the Monongahela River, at Rankin, Pa., notable for the massive construction required, and for the special design of the river end of the south approaches. 4500 w. Eng Rec—Nov. 16, 1901.

Redheugh, Eng.—The Redheugh Bridge, Newcastle-on-Tyne. Many illustrations of the details of an interesting structure between Newcastle and Gateshead, with brief description. Two parts. 600 w. Engng—Oct. 4, 18, 1901.

The Redheugh Bridge. Two-page plate and other illustrations of the details of the piers, approach spans, and roadways of the structure, with description. 1200 w. Engng—Nov. 8, 1901.

See also **BRIDGE RENEWAL.**

Red River, La.—The Red River Bridge at Alexandria, La. Illustrated detailed description of a bridge being built for the Shreveport and Red River Ry. The bridge proper is 941 ft. in length, and the trestle approach is 4,800 ft. It has three fixed spans and a draw-span. 800 w. R. R. Gaz—Sept. 20, 1901.

Renewal.—See **BRIDGE RENEWAL.**

Rhodes Creek.—Rhodes Creek Concrete Arch, Illinois Central. Illustrates and describes an interesting elliptical concrete arch bridge, and the method of substituting the old steel structure without interrupting traffic. 3000 w. Ry Age. Special number—March 21, 1902.

Richmond, Ind.—See BRIDGE ERECTION.

Richmond, Va.—See VIADUCT.

Rigolets, Miss.—The Rigolets Bridge. Brief description, with illustrations, of a structure to replace a bridge about 25 years old, on the New Orleans-Mobile line of the Louisville and Nashville. The structure is interesting on account of its length, and the use of creosoted timber piers. 300 w. R R Gaz—May 15, 1903.

Rio Grande.—See Costa Rica.

Riverdale, Ill.—See Little Calumet River.

Roath Dock.—Roath Bridge, Great Western Railway. Illustrated detailed description of this structure, which is on the very severe angle of skew of 22 deg. Its skew and square spans measure respectively 228 ft. and 76 ft. 3 in. 3000 w. Engr, Lond—Feb. 28, 1902.

Rockville, Pa.—The Rockville Bridge of the Pennsylvania. C. W. Hardt. Illustrated description of an imposing bridge nearly completed, costing nearly $1,000,000. 1200 w. R R Gaz—Oct. 25, 1901.

The Rockville Stone Arch Railway Bridge. Illustrated description of a 4-track masonry bridge, 3,820 ft. long, having 48 arches of 70-ft. span, over the Susquehanna River. Explains the design and method of construction. 1700 w. Eng Rec—Nov. 9, 1901.

The Four Track Stone Arch Bridge of the Pennsylvania Railroad Across the Susquehanna River. Illustrates the bridge at Rockville, and the steel bridge removed, giving information concerning them. 500 w. Sci Am Sup—May 7, 1904.

Rolling Lift.—See Lift.

Roumania.—King Charles I. Bridge Across the Danube. Nicolae Ionescu. An account of the circumstances which led to the building of the bridge, the conditions to be met, and an illustrated description of the structures. 1000 w. Sci Am—Oct. 25, 1902.

Ruhrort-Homberg.—The Competition for a Highway Bridge Over the Rhine Between Ruhrort and Homberg (Der Wettbewerb um eine Feste Strassenbrücke über den Rhein zwischen Ruhrort und Homberg). Karl Bernhard. With description of the requirements of the competition and illustrations of some of the designs submitted. Serial. Part I. 1800 w. 2 plates. Zeitschr d Ver Deutscher Ing—July 2, 1904.

The Construction of a Highway Bridge Over the Rhine Between Ruhrort and Homberg (Die Erbauung einer festen Strassenbrücke über den Rhein zwischen Ruhrort und Homberg). F. Bohny. Describing the situation and illustrating some of the proposed designs. 2000 w. Schweiz Bauzeitung—June 18, 1904.

Rupnarayan, India.—See India.

Rye, Eng.—The Reconstruction of the Rye Swing Bridge. E. R. Waight. Illustrated description of the new bridge over the Rother River. Serial. 1st part. 2200 w. Engr, Lond—July 15, 1904.

Rye, N. Y.—Economical Steel and Masonry Highway Bridge Work at Rye, N. Y. Illustrates and describes a steel girder and concrete floor bridge over Blind Brook. 700 w. Eng News—Dec. 13, 1900.

Saginaw.—Relative Merits of Swing and Bascule Bridges and the Saginaw Bridge Letting. Letters from Albert H. Scherzer and Edgar A. Rossiter. The first letter discusses the advantages of the bascule bridge; the second explains why it is not desirable or required at Saginaw. 2400 w. Eng News—Feb. 13, 1902.

St. Lawrence River.—See Quebec.

St. Louis, Mo.—Reinforced Concrete Bridge Over River Des Peres, Forest Park, St. Louis, Mo. Illustrates and describes the general details of a concrete arch bridge reinforced by corrugated square bars. 1200 w. Eng News—June 11, 1903.

Forest Park Bridge of the Wabash at St. Louis. A. O. Cunningham. Illustrated description of a new ornamental structure in keeping with the surroundings, having a clear span of 70 feet. 1500 w. R R Gaz—Vol. XXXVII, No. 20.

St. Paul, Minn.—The South St. Paul Belt Railway Bridge. Illustrated description of a steel bridge and viaduct 1,682 ft. in total length, with one 442-ft. draw-span. A single-track railroad is carried on top and a highway floor is carried below it 2,700 ft. Eng Rec—Nov. 30, 1901.

Reinforced Concrete Arch Bridges, Como Park, St. Paul. Illustrates and describes details of highway and pool bridges. 1000 w. Eng Rec—Dec. 3, 1904.

A Reinforced Concrete Foot-Bridge at Como Park, St. Paul, Minn. Illustrated description of bridge and construction. 600 w. Eng News—April 6, 1905.

See also WIND PRESSURE—Bridge, St. Paul.

St. Petersburg.—The Troitsky Bridge Over the Neva, St. Petersburg. Briefly reviews the history of the undertaking and gives an illustrated description. 3300 w. Engr, Lond—March 18, 1904.

The Troitsky Bridge Over the Neva at St. Petersburg (Le Pont Troitsky sur la Neva à Saint-Pétersbourg). P. Bodin. Detailed illustrated description. The construction is mixed cantilever and hinged arch, with a swing span at one end. 2500 w. 1 plate. Génie Civil—Jan. 23, 1904.

The Troitsky Bridge at St. Petersburg (Le Pont Troitsky à Saint-Pétersbourg). Describing the manner in which electric power is applied to the operation of the swing span of the new bridge across the Neva. 1200 w. Génie Civil—Jan. 21, 1905.

San Leandro, Cal.—The 80-ft. Concrete-Arch Bridge Over the San Leandro Creek, San Leandro, Cal. William B. Barber. Illustrated description of a monolithic structure built entirely of concrete. No iron was used in the construction of any of the parts. 600 w. Eng News—Aug. 27, 1903.

Schell Memorial.—See Northfield, Mass.

Scherzer.—See Hartford; Lift.

Schlitza, Austria.—Concrete Arch Bridges over the Schlitza near Tarvis (Beton Bogenbrücken über die Schlitza bei Tarvis). Julius Stanek. A well illustrated description of two concrete arch highway bridges, of about 100 feet span, in Carinthia, Austria. 4 plates. 4000 w. Oester Wochenschr f d Oeff Baudienst—May 30, 1903.

Sharpsville, Pa.—A Concrete Arch Railroad Bridge. Illustrated detailed description of a semi-circular, single-barrel arch of 15-ft. radius, recently put in service at Sharpsville, Pa. 1500 w. R R Gaz Nov 16, 1900.

Shelton, Conn.—See Housatonic River.

Shocks Mills, Pa.—See RAILWAY CONSTRUCTION—Pennsylvania.

Short Span Standards.—See Railway Standards.

Shreveport, La.—The St. Louis Southwestern Bridge at Shreveport, La. Illustrated detailed description of a bridge with swing span, the total length of the bridge being 1265 ft. 800 w. R R Gaz—Vol. XXXVIII., No. 24.

Shubenacadie River, Nova Scotia.—See BRIDGE ERECTION.

Skew.—See Bendigo; Brooklyn Arch; Concrete Reinforced; Denver; Girder; Lawrence, Mass.; Newark, N. J.; Roath Dock; Soissons, France; South Bend; BRIDGE ABUTMENT—Ulster & Delaware Ry.

Soissons, France.—Reinforced-Concrete Bridge at Soissons (Pont en Beton Armé a Soissons). Full detailed account of three-span arch skew bridge across the Aisne at Soissons, constructed according to the Hennebique system. 3000 w. Plate. Génie Civil—Feb. 13, 1904.

Reinforced Concrete Bridge at Soissons (Pont en Béton Armé à Soissons). M. Riboud. The bridge is of three arches of 24 metres span each, on the Hennebique system. Description of tests and diagrams of deflections are given. 2000 w. Génie Civil—June 18, 1904.

Skew Bridge of Armored Concrete. From "Le Genie Civil." Illustrated description of a bridge recently erected over the river Aisne, which is an interesting example of this type of construction. 4000 w. Engr, Lond—Oct. 7, 1904.

Testing the Armoured Concrete Bridge at Soissons. Describes the tests made of a bridge of the Hennebique type in France, giving the results. 2500 w. Engr, Lond—March 24, 1905.

Sorsogon, P. I.—A Reinforced Concrete Bridge, Sorsogon, P. I. H. L. Stevens. Illustration and brief description of an arch bridge of 45-ft. span and 6-ft. rise. 600 w. Eng Rec—Oct. 21, 1905.

South Bend, Ind.—A Skew-Arch of Concrete Steel. Drawings and description of details of a bridge over St. Joseph River, in South Bend, Ind. 800 w. Munic Engng—Jan., 1905.

Spijkenisse, Holland.—The Bridge over the Maas at Spijkenisse (De Brug over de Oude Maas nabji Spijkenisse). A. L. de Gelder. Illustrating and describing a new railroad bridge with three through trusses of 83.7 metres span, and one draw span with openings of 25 metres. 3000 w. De Ingenieur—Feb. 18, 1905.

Springville, N. Y.—The Springville Bridge. Illustrates and describes details of a 143-foot steel truss bridge, carrying the highway between the towns of Concord and Ashford, N. Y. 900 w. Eng Rec—June 13, 1903.

Stettin, Germany.—See Lift.

Stockton & Darlington Ry., Eng.—The First Iron Railway Bridge. An illustrated account of a bridge built in 1823 for the Stockton and Darlington Railway. 700 w. Engr, Lond—May 10, 1901.

The First Iron Railroad Bridge. F. C. Coleman. Illustration, with the history of a bridge built in 1823 for the Stockton & Darlington Railway in Great Britain. 800 w. R R Gaz—July 8, 1904.

Stone.—See Adda; Arch Masonry; Baden; Luxemburg; Masonry; Plauen; Rockville; ARCH.

Submerged.—See Maryborough, Queensland.

Sunderland, Eng.—New Railway and Road Bridge Over the River Wear at Sunderland. Francis E. Harrison. Illustrates and describes a new bridge for both railway and road purposes, with main span of 330 feet. 2000 w. Transport—Nov. 18, 1904.

Suspension.—A Novel Suspension Bridge. M. S. Parker. Illustrated description of a contractor's bridge consisting of wire cables drawn taut and covered with a light frame track, for use in filling a ravine. 500 w. Eng Rec—Feb. 2, 1901.

A Note on Early American Suspension Bridges. Notes aiming to fix as definitely as possible the claims of certain inventors in connection with the first introduction of suspension bridges. 1500 w. Eng News—March 16, 1905.

See also Blackwell's Island; Bonhomme, France; Brooklyn; Budapest; Conway; Easton; East River; Factory; Foot; Guyandotte; Halle; Haut-Ogoone Co.; Pons-Niévroz; Kanawha; Morgantown; Verraison; Westport-Cardiff; Williamsburg; BRIDGE ACCIDENT—Charleston, W. Va.; BRIDGE DESIGN—Suspension; CABLE—Bridge.

Suspension, Chain.—See Budapest; Cologne; Manhattan; BRIDGE DESIGN; EYE BAR.

Suspension Stiffening.—See Hudson; Manhattan; BRIDGE DESIGN.

Suspension vs. Cantilever.—Suspension and Cantilever Bridges. A discussion and comparison of these types, with remarks on the arch type. 2300 w. Engr, Lond—Jan. 17, 1902.

Swale, Eng.—See Lift.

Swing.—See Drawbridge; Kansas City; Neuhof—Hamburg; Rye, Eng.; Sydney.

Swing vs. Lift.—See Lift vs. Swing.

Sydney, N. S. W.—The Awards in the Sydney Bridge Competition. Brief description of leading designs for a very long bridge across Sydney Harbor, N. S. W., with diagram of cantilever design awarded first prise. 1200 w. Eng Rec—March 2, 1901.

The Sydney Harbor Bridge. Editorial discussion of the terms of the second competition for this structure. 1000 w. Eng Rec—July 27, 1901.

The Proposed Sydney Harbor Bridge, Sydney, New South Wales. An account of this proposed work and the conditions under which it must be carried out, for which bids are asked by the government of New South Wales. 3800 w. Eng News—July 25, 1901.

A Sydney Bridge. Briefly describes the Pyrmont Bridge at Sydney, N. S. W., and its construction. The motive power is electricity. By simply pressing a button the bridge, weighing 800 tons, can be opened or closed in 44 seconds. 800 w. Elec Rev, N. Y.—Aug. 23, 1902.

Sydney Harbour Bridge. Illustrated description of designs submitted for a bridge with a main span of 1,350 ft., 170 ft. above the water, and a total length of 3,000 ft. 3000 w. Engr, Lond—Aug. 12, 1904.

The Sydney Harbor Bridge, Australia. Illustrated description of the accepted design of a proposed bridge over Sydney Harbor. 1700 w. Eng News—Sept. 22, 1904.

Pyrmont Bridge, Sydney, Australia. John Plummer. Illustrations, with brief account of the construction work of this bridge, which has a swing span f 223 ft., and twelve side spans, each of 82 ft. 1000 w. Sci Am Sup—July 11, 1903.

Syra Valley.—See Plauen.

Tal y Cafn, Wales.—Tal-y-Cafn Bridge. Illustration of a bridge in North Wales, over the river Conway. Description to follow later with additional details. 100 w. Engng—July 12, 1901.

Tal-y-Cafn Bridge, North Wales. Description with illustrated details of a bridge built on a site of an ancient ferry. It consists of a steel superstructure supported on limestone masonry abutments, with concrete backing at the shore ends. 800 w. Engng—Aug. 2, 1901.

Tarvis, Austria.—See Schlitza.

Tennessee River.—See Johnsonville, Tenn.; BRIDGE RENEWAL.

Terre Haute, Ind.—The Highway Bridge Over the Wabash River at Terre Haute. Illustrated description of a structure having an unusual combination of trusses and plate girders. 2000 w. Eng Rec—June 17, 1905.

Highway Bridge over the Wabash at Terre Haute, Indiana. Illustrated detailed description of this new bridge and the methods of erection. It is composed of 6 spans of 120 ft., and one of 75 ft., in the center. 1200 w. R R Gaz—Vol. XXXIX., No. 1.

See also BRIDGE PIER; BRIDGE RENEWAL.

Thames River, Eng.—See Kew; London; Vauxhall; BRIDGE DESIGN—Durability.

Thebes, Ill.—Bridge Over the Mississippi River at Thebes, Ill. Illustrated detailed description of a double-track railroad bridge soon to be erected. 2000 w. Ry Age—June 20, 1902.

The Thebes Bridge. Illustrated description of a double-track railroad bridge across the Mississippi River, now nearing completion. 1500 w. Eng Rec—Nov. 12, 1904.

The Thebes Bridge. Ralph Mojeski. An illustrated description of the location, design, and construction, discussing the considerations which led to the design as adopted. 6000 w. Trans Assn of Civ Eng of Cornell Univ—1905.

The Thebes Bridge Superstructure. Brief illustrated description of the steel superstructure of one of the largest bridges across the Mississippi River. 1500 w. Eng Rec—July 22, 1905.

The Erection of the Thebes Bridge Superstructure. Illustrated detailed description of the methods used in erecting the double-track railroad bridge over the Mississippi River at Thebes, Ill. 2000 w. Eng Rec—Sept. 16, 1905.

Cantilever Bridge over the Mississippi River. Begins an illustrated detailed description of the Thebes Bridge. Serial. 1st part. 1600 w. Eng, Lond—July 21, 1905.

The Mississippi River Cantilever Bridge at Thebes, Ill. Illustrated detailed description of one of the most notable bridges in the United States, costing about $2,800,000. 4500 w. Eng News—May 11, 1905.

The Mississippi River Bridge at Thebes. Illustrated detailed description of interesting features of this large cantilever bridge. 1500 w. R R Gaz—Vol. XXXVIII., No. 21.

The Mississippi River Bridge at Thebes. Illustrates and describes a large cantilever bridge under construction for the purpose of forming a connection between railroads. It is especially notable by reason of the nature of its approaches which are to be entirely of concrete. 2700 w. R R Gaz—Jan. 9, 1903.

See also BRIDGE PIER.

Thusis, Switzerland.—See Albula Ry.

Toulouse, France.—Foot Bridge in Reinforced Concrete (Passerelle en Béton Armé). Col. G. Espitallier. Illustrated description of a bridge of 42 metres span on the Hennebique system over the Canal du Midi, at Toulouse. 1800 w. Génie Civil—Sept. 5, 1903.

Armoured Concrete Foot-Bridge at Toulouse. Illustrates and describes the novel features of a bridge having a span of 139 ft. 1200 w. Engr, Lond—Nov. 13, 1903.

Trans-Caspian Railway.—See **Amou Daria River.**

Trenton, N. J.—Masonry Bridges at Trenton and New Brunswick, New Jersey; Pennsylvania R. R. Illustrated details of two new bridges to be built during the present year. 900 w. Eng News—Jan. 30, 1902.

The Delaware River Bridge of the Pennsylvania Railroad at Trenton, N. J. Illustrated description of the construction of a new four-track stone arch bridge at this point, and a change in location of tracks. 2000 w. Ry Age—March 20, 1903.

Treskow.—See **Oberschöneweide.**

Troitsky.—See **St. Petersburg.**

Tula River.—See **Mexico.**

Turtipar, India.—See **BRIDGE ERECTION—India.**

Two-Truss Swing.—Four-Track Two-Truss Swing Bridge; Chicago & Western Indiana R. R. Illustrated description of a novel design, with discussion of its advantages. 2000 w. Eng News—Sept. 12, 1901.

Uddington, Eng.—Railway Bridge Over the Clyde at Uddington. Two-page plate and illustrated description of a new bridge for carrying the Caledonian main line of railway between Glasgow and Carlisle. 1700 w. Engng—June 17, 1904.

Uganda, Africa.—See **VIADUCT.**

Valence.—The New Bridge over the Rhone at Valence (Le Nouveau Pont sur le Rhone à Valence). A description of the new masonry arch bridge, now under construction. There are four segmental arches of 30 metres span. 2000 w. Génie Civil—Oct. 25, 1902.

Vauxhall, London.—New Vauxhall Bridge. A description and illustration of the present state of this structure. Serial. 1st part. 1500 w. Engr, Lond—May 29, 1903.

The New Vauxhall Bridge. Reviews the history of the rebuilding of this bridge and the cause of the delay. Ills. 4700 w. Engng Rev—June, 1904.

Velsen, Holland.—New Swing Bridge Over the Amsterdam Canal. Gives an outline elevation and description of a new swing bridge, of very considerable span, at Velsen, Holland. 1000 w. Engr, Lond—Sept. 18, 1903.

Vernaison, France.—Suspension Bridge at Vernaison. Illustrates and describes a bridge recently constructed over the Rhone. 700 w. Engr, Lond—July 17, 1903.

A Semi-Rigid Suspension Bridge over the Rhone, at Vernaison, France (Pont Suspendu Semi-Rigide de Vernaison, Rhône). Ch. Dantin. Illustrated description of a highway suspension bridge, of 232 meters span, with low stiffening trusses, near Lyons. 1 plate. 1600 w. Génie Civil—July 4, 1903.

The Vernaison Suspension Bridge. Emile Guarini. Illustrates and describes a semi-rigid suspension bridge of light construction, crossing the Rhone 8 1-2 miles below Lyons. 700 w. Sci Am Sup—Oct. 10, 1903.

Viaur Viaduct.—See **VIADUCT—Viaur.**

Victoria Falls, Africa.—See **Zambesi.**

Vierendeel System.—The Vierendeel System of Metal Bridges (Les Ponts Métalliques, System Vierendeel). A. Morizot. Describing especially the bridge at Aveighem, Belgium, of a plate-girder type, pierced with rectangular openings. 2500 w. 1 plate. Génie Civil—June 17, 1905.

Villefranche.—See **BRIDGE RENEWAL.** -

Vulcanite, N. J.—A Reinforced Concrete Double-Track Railroad Arch Bridge. Drawings and description of a bridge being constructed near Vulcanite, N. J., to carry two main line tracks of the Central R. R. of N. J. over a highway. 1500 w. Eng Rec—Sept. 9, 1905.

Wabash Ry.—Reinforced Concrete Bridge Floors, Culverts and Abutments, Wabash R. R. Illustrated description of approved construction. 1600 w. Ry and Engng Rev—July 15, 1905.

See also **Pittsburg.**

Wappinger Creek, N. Y.—See **N. Y. Central R. R.**

Washington, D. C.—"Monumental" Engineering. Montgomery Schuyler. A critical discussion of the designs for the Memorial Bridge across the Potomac from Washington to Arlington. Ill. 7700 w. Archt Rec—Oct., 1901.

Beautifying the Nation's Capital. An illustrated article discussing new bridges to be built to replace what is called the "Long Bridge." 4200 w. In Archt—March, 1902.

Melan Arch Park Bridges at Washington, D. C. W. J. Douglas. Illustrates and describes the construction of two concrete-steel bridges built for the U. S. government, with particulars concerning the work, and the subsequent cleaning made necessary by discolorations. 2400 w. Eng News—Oct. 31, 1901.

Boulder Faced Melan Arch Bridge. National Park, Washington, D. C. W. J. Douglas. Illustrated description of a bridge of reinforced concrete construction. Specifications for the facing are given. 1600 w. Eng News—Aug. 14, 1902.

Pebble Faced Bridge in the National Park, Washington, D. C. W. J. Douglas. Illustrated description of a bridge designed for special surroundings, and of the methods of construction. 1100 w. Eng News—Jan. 22, 1903.

The Anacostia Bridge, Washington. Begins an illustrated detailed description of the steel arch deck structure across the Potomac River, under construction by the U. S. government. Serial. 1st part. 2500 w. Eng Rec—Aug. 19, 1905.

The Anacostia Bridge, Washington, D. C. An illustrated description of an unusually interesting structure, 1000 feet long, consisting of six arches and one drawspan. 1500 w. Ry Age—Aug. 11, 1905.

The New Steel Arch Street Bridge Across the Potomac River, Washington, D. C. Illustrated detailed description of an interesting bridge under construction, at a cost of $375,000. 2000 w. Eng News—Dec. 21, 1905.

Connecticut Avenue Bridge, Washington. Illustrations and description of a proposed viaduct to carry this avenue across the valley. The original design has been recently developed in beautiful details by W. J. Douglas. 1500 w. Ry Age—March 18, 1904.

Connecticut Avenue Bridge, Washington, D. C. An illustrated article showing the progress made on this structure during the past year, the methods of construction, etc. 1000 w. Ry Age—March 24, 1905.

The Connecticut Avenue Concrete Arch Bridge at Washington, D. C. Illustrated description of the structure and methods of construction. 3000 w. Eng News—June 1, 1905.

The Connecticut Avenue Concrete Arch Bridge, Washington, D. C. An illustrated description of progress in the erection. 3000 w. Eng Rec—July 8, 1905.

Parabolic Concrete Arch Bridge Over Piney Creek at 16th St., Washington, D. C. Illustrated detailed description of a bridge of unusual type. The arch ring has the curve of a parabola and a clear span of 125 ft. 3000 w. Eng News—Nov. 16, 1905.

See also **Lift vs. Swing; CITY PLAN; LANDSCAPE ARCHITECTURE; MUNICIPAL ART.**

Waterloo, Iowa.—Fourth Street Bridge, Waterloo, Iowa. Abridged address of M. L. Newton before the Iowa Engng Soc. An illustrated article describing the construction of a Melan arch bridge of 7 spans, having a total length of 586 feet over all. 3500 w. Eng Rec—Feb. 13, 1904.

Watertown, Wis.—Stone Arch Bridge on the Chicago, Milwaukee & St. Paul Ry. at Watertown, Wis. Illustrated description of the construction of a four-span, double-track, stone arch bridge over the Rock river without interruption of traffic. 600 w. Eng News—March 26, 1903.

Waterville, Me.—The Ticonic Foot Bridge, Waterville, Me. Illustrated description of a bridge crossing the Kennebec River. It is a steel structure with a 400-ft. suspended span and two through truss approach spans. 1800 w. Eng Rec—Oct. 15, 1904.

West Hartford, Conn.—A Small Concrete Arch at West Hartford, Conn. Illustrates and describes a structure built without reinforcement of any kind. 600 w. Eng Rec—April 25, 1903.

Westport-Cardiff, N. Z.—A Stiffened Suspension Bridge on a Steep Incline at the Westport-Cardiff Coal Company's Mine, New Zealand. Thomas Harold Rawson and George Herbert Broome. Presented to the Inst. of Civ. Engrs. of Gt. Britain. Describes the conditions which only permitted the most economical design consistent with required strength, and rapid erection. Illustrated description. 1600 w. Eng News—Nov. 14, 1901.

West Shore Ry.—See **N. Y. Central Ry.; BRIDGE RENEWAL.**

Westvale.—Westvale Concrete Bridge. J. R. Worcester. Illustration with description of an elliptical arch bridge built wholly of concrete. It has a clear span of 66 ft. and a roadway of 35 ft. The construction is given in detail. 1600 w. Munic Engng—March, 1902.

White Pass & Yukon Ry.—The Switchback Arch Bridge of the White Pass and Yukon Railway. Illustrated descriptions of this interesting structure and its erection and tests. 1400 w. Eng News—March 28, 1901.

The "Switchback" Cantilever Bridge, White Pass & Yukon Ry. Illustration and description, stating the natural difficulties of the locality. 900 w. Ry & Engng Rev—March 16, 1901.

Williamsburg.—The Suspended Structure for the New East River Bridge. Illustrated description of this part of the work, comprising the stiffening trusses, transverse bracing and floor framing, giving specifications for material and workmanship. 2000 w. Eng News—April 18, 1901.

Construction of the New East River Bridge. Considers the cables and roadway, giving illustrations. 1300 w. Sci Am—April 20, 1901.

The Suspended Span of the New East River Bridge, New York. Illustrated description of the stiffening trusses of this bridge and the unique details of their support at the towers. 1600 w. Eng Rec—May 4, 1901.

Floor System of the New East River Bridge, New York. Cross-sectional views, giving an idea of the carrying power of this new bridge, with description of the stiffening trusses, constructed on the riveted system, and the horignotal system of trussing to resist wind-pressure. 1600 w. Sci Am—June 15, 1901.

The New East River Bridge. Illustrations showing the present condition of the New East River Bridge at New York, with comments. 1200 w. Ir Age—Jan. 2, 1902.

Progress on the New East River Bridge at New York City. Report of the Commissioner of Bridges, for the six months ending June 30, 1902. 1400 w. Eng News—Aug. 21, 1902.

Completion of the Floor of the New East River Bridge. Illustrates and describes the work already completed. 700 w. Sci Am—March 14, 1903.

The Williamsburg Bridge Across the East River at New York City. An illustrated detailed description of the construction of this bridge just opened to traffic. 11200 w. Eng News—Dec. 17, 1903.

The Opening of the New East River Bridge, New York. An exhaustive illustrated account of the construction from the engineering standpoint. 9500 w. Sci Am Sup—Dec. 19, 1903.

The Williamsburg Bridge over the East River in New York (Die Williamsburg-Brücke über den East River in New York). K. Bernhard. A very fully illustrated account of the new bridge, showing its location and construction, with details of the erection. Two articles,. 6000 w. Zeitschr d Ver Deutscher Ing—Aug. 13, 27, 1904.

Williamsburg Bridge, New York. Frank W. Skinner. Illustrated description of this bridge and its construction, explaining the location and conditions and briefly describing the companion bridges. Serial. 1st part. 6000 w. Engng—Oct. 13, 1905.

See also **East River; New York; BRIDGE ACCIDENT; BRIDGE APPROACH; BRIDGE DESIGN; BRIDGE ERECTION; BRIDGE FLOOR; CABLE—Bridge, Williamsburg; ELECTRIC RAILWAY—Williamsburg Bridge.**

Williamsburg Footways.—The Temporary Footways of the New East River Bridge. Brief description with illustrations. 900 w. Sci Am—Sept. 14, 1901.

The Footbridge for Building the Cables of the New East River Bridge, New York. Isaac Harby. Gives a brief description of the cables and a statement of the conditions encountered, with an illustrated description of the construction of the foot bridge, giving the reasons for constructing it. 6300 w. Pro Am Soc of Civ Engrs—Sept., 1902.

See also **BRIDGE ACCIDENT.**

Willis Avenue, New York.—The Willis Avenue Bridge, New York. Illustrated detailed description of bridge across the Harlem River, which is 60 ft. wide and 2,507 ft. long. 2500 w. Eng Rec—Nov. 17, 1900.

Willoughby, O.—New Concrete Arches on the Lake Shore & Michigan Southern Railway. Illustrates and describes the bridge over Chagrin River, at Willonghby, Ohio; and the bridge at Angola, N. Y. 1200 w. Ry Age—March 24, 1905.

Winnington, Eng.—Opening Bridge Over the Flood-Course at Winnington. Illustrated description of a recently constructed bridge operated by electric power. 600 w. Engng—Dec. 27, 1901.

Wooden.—See **Barnegat Bay; Drawbridge Wooden; Kintai; Macleay River, N. S. W.; Zanesville, O.**

Woodsville, Conn.—The Woodsville Railroad and Highway Bridge. Illustrates and describes this bridge across the Connecticut River which is the sixth built at this point. 2500 w. Eng Rec—June 25, 1904.

Worms.—The Railway Bridge Over the Rhine at Worms (Die Eisenbahnbrücke über den Rhein bei Worms). H. Geibel. A very full account of this important structure, with details of the construction and photographs in various stages of erection. 12000 w. Zeitschr d Ver Deutscher Ing—Dec. 1, 1900.

New Bridge Over the Rhine. Drawings and description of the bridge at Worms, with information of the extent and character of the design. 3000 w. Engr, Lond—July 26, 1901.

The New Bridge Across the Rhine at Worms (Nouveau Pont sur le Rhin à Worms). M. Seurat. With full details and views of the structure. There is one span of 388 ft. and two 351 ft., with braced bow-string girders. 2000 w. 1 plate. Génie Civil—May 11, 1901.

Worms and Harburg.—Two New German Bridges, with Transverse Articulation and Freely Suspended Floors. Illustrated description of the striking structural features of the recent bridges built across the Rhine at Worms, and across the Elbe at Harburg. 2200 w. Eng News—Oct. 17, 1901.

Worthington Swing.—A Non-Continuous Swing Bridge. Explains the ordinary construction of swing bridges, and improvements made at different times to overcome difficulties, simplify the operating machinery, and improve them, giving a detailed description of a design recently patented by Charles Worthington, so improved as seemingly to overcome all objections. Ill. 2500 w. Eng News—Feb. 27, 1902.

X.—See **Mans, France.**

Y.—See **Zanesville, O.**

Yellowstone Park.—Bridge Work in the Yellowstone Park. An illustrated article describing work carried on by the U. S. government. The work of placing concrete is carried on day and night without permitting the material to set before deposits are added. 1300 w. Ry & Engng Rev—Sept. 5, 1903.

Reinforced Concrete Arch Bridge Over the Yellowstone River. Yellowstone National Park. H. M. Chittenden. Illustrated description of the bridge and its erection. 2300 w. Eng News—Jan. 14, 1904.

Yorktown, Ind.—Reinforced Concrete Arch Bridge at Yorktown, Ind. Illustrated description of the construction of a reinforced concrete arch bridge of 95-ft. span, with the thrust resisted by a tie connecting the skewbacks across the bed of the stream. It is the longest span of the Luten type ever erected. 1600 w. Eng News—May 11, 1905.

Ypsilanti, Mich.—Race Street Concrete Arch, Ypsilanti, Michigan. W. L. Luten. Illustrates and describes the construction. 800 w. Cement—July, 1905.

Zambesi, Africa.—The Zambesi Bridge. Editorial on the closing of the two arms of this great steel arched bridge spanning the Zambesi gorge over 400 ft. above water-level. 1300 w. Engng—April 7, 1905.

The Victoria Falls Bridge. Illustrated description of the highest bridge in the world in process of erection for the Rhodesian Railway Co. over the Zambesi river, and also describing the natural features of the locality. 2300 w. Engr, Lond—April 7, 1905.

The Bridge over the Zambesi (Le Pont sur le Zambèze). A description of the Falls of the Zambesi and the construction of the railway bridge over the gorge below the falls. 1500 w. Génie Civil—June 3, 1905.

Completion of Victoria Falls Bridge. Gives interesting illustrations of this great engineering work in Central Africa, with some facts about the Cape-to-Cairo railroad and the methods of erection of the bridge. 2000 w. Sci Am—July 22, 1905.

Bridge Over the River Zambesi at Victoria Falls, Rhodesia. An illustrated detailed account of the design and erection of this remarkable bridge at Victoria Falls. Serial. 1st part. 4000 w. Engng —July 7, 1905.

The Opening of the Victoria Falls Bridge. Harold Shepstone. An illustrated account of the opening of this bridge over the Zambesi gorge in central Africa. 1000 w. Sci Am Sup—Nov. 4, 1905.

The Bridge over the Zambesi River at the Victoria Falls in Rhodesia (Die Bogenbrücke über den Sambesi Fluss bei den Victoriafällen in Rhodesia). G. Barkhausen. A detailed illustrated description of the Zambesi bridge, including structural elements and erection. 4500 w. Zeitsch d Ver Deutscher Ing—Dec. 30, 1905.

See also **RAILWAY—Africa; Cape-Cairo; South Africa.**

Zanesville, O.—A Y-shaped Concrete Arch Bridge at Zanesville, Ohio. Illustrated detailed description of a structure recently built to take the place of a wooden highway bridge, built to cross two streams which form a confluence in the midst of the city. 2000 w. Ry & Engng Rev—Dec. 21, 1901.

The Zanesville Concrete-Steel Y-Bridge. Illustrated detailed description of this bridge and its construction. 1800 w. Eng Rec—March 1, 1902.

The Old Y Bridge at Zanesville. Illustrated description of the wooden Burr bridge, some of its trusses of 150-ft. span, built in 1831-32. 800 w. Eng Rec—Dec. 22, 1900.

Concrete-Steel Arch Y-Bridge at Zanesville, O. Illustrated detailed description of this unusual bridge and its construction. 2500 w. Eng News—March 27, 1902.

BRIDGE ABUTMENT.

Concrete Reinforced.—See **BRIDGE.**

Ulster & Delaware Ry.—Concrete Abutment on the Ulster & Delaware. M. H. McGee. Illustrated description of a concrete abutment and long wing wall for a plate girder skew bridge. 500 w. R R Gaz—Vol. XXXVII, No. 25.

BRIDGE ACCIDENT.

Adour River, France.—See **Tarbes.**

Arizona.—A Remarkable Accident. Brief illustrated account of the collapse of a bridge span in Arizona, while a train was passing. 600 w. Ry Age—April 10, 1903.

Bendigo.—See **BRIDGE.**

Brooklyn Bridge.—The Accident to the Brooklyn Bridge. Editorial discussion of the cause of the breaking of suspender rods at the center of the northernmost main cable, on July 24, with Mr. Martin's report, and comments. Ill. 2000 w. Eng News—Aug. 1, 1901.

The Brooklyn Bridge Accident. An illustrated account of the cause of traffic being suspended on July 24, with explanation of C. C. Martin, the chief engineer. 1400 w. Ir Age—Aug. 1, 1901.

Broken Suspension Rods on Brooklyn Bridge. Statement of the accident with report of C. C. Martin, and opinions of Washington A. Roebling. Ill. 2300 w. R R Gaz—Aug. 2, 1901.

The Failure of the Brooklyn Bridge. A discussion of the cause of the accident, with editorial comment. Ill. 2500 w. Sci Am—Aug. 3, 1901.

The Accident to the Brooklyn Bridge. A letter from Wilhelm Hildenbrand in explanation of the recent accident and of the strength and construction of the bridge. Also short letters from Gus. C. Henning and J. Calvin Locke. 4000 w. Eng News—Aug. 8, 1901.

The Safety of the Brooklyn Bridge. An editorial discussion of the recent failures of suspension rods, recommending an effective system of inspection. 1000 w. Eng Rec—Aug. 17, 1901.

The Brooklyn Bridge. Report of the engineers appointed to examine the bridge and report its exact condition. 9000 w. Ir Age—Oct. 10, 1901.

The Brooklyn Bridge—Its Defects and Treatment. Joseph Mayer and Edwin Duryea, Jr. A letter stating the reason why they did not advise replacing the whole superstructure of the bridge. 1100 w. R R Gaz—Oct. 25, 1901.

The Physical Condition and Safety Under Present Loads of the New York and Brooklyn Bridge. Report by Edwin Duryea, Jr., and Joseph Mayer, engineers appointed to investigate the safety of the bridge, with editorial comment. Ill. 30000 w. Engs News—Oct. 10, 1901.

The Brooklyn Bridge—Its Defects and Treatment. George S. Morison. Discusses the design of the bridge, and the proper remedy for the defects. 1000 w. R R Gaz—Oct. 18, 1901.

The New York and Brooklyn Bridge. Review of the report of expert engineers appointed to make an examination of the bridge. 3000 w. Engr, Lond—Nov. 1, 1901.

I. The Physical Condition and Safety Under Present Loads of the New York and Brooklyn Bridge. Gus C. Henning. II. Mr. Hildenbrand's Reply to the Report of Messrs. Duryea and Mayer on the New York and Brooklyn Bridge. Mr. Henning's letter is also a discussion of this same report. 17000 w. Eng News—Jan. 16, 1902.

The Safety of the Brooklyn Bridge—A Rejoinder by Messrs. Hildenbrand and Henning. 4200 w. Eng News—Jan. 30, 1902.

Charleston, W. Va.—The Charleston Bridge Failure. H. G. Tyrrell. An illustrated account of the failure of a suspension bridge at Charleston, W. Va., and an explanation of the cause. 900 w. Eng News—Jan. 5, 1905.

The Suspension Bridge Failure at Charleston, West Virginia. Addison M. Scott. An illustrated account of the fall of an old suspension highway bridge, describing its construction, the place of failure, condition, &c., and giving brief history. 2000 w. Eng News—Feb. 2, 1905.

The Charleston Bridge Failure. Illustrations of the present condition of the wrecked bridge, with information concerning the cause, and editorial comment. 2000 w. Eng Rec—Dec. 31, 1904.

Easton, Pa.—See **BRIDGE RENEWAL.**

Fire.—See **Williamsburg, N. Y.**

Gonzales, Tex.—Collapse of a 200-foot Highway Bridge Over the Colorado River at Gonzales, Tex. Brief illustrated account of an accident caused by the failure of one of the double-cylinder piers on which it was carried. 800 w. Eng News—Oct. 9, 1902.

Houghton, Mich.—Wreck of the Portage Canal Draw-Bridge. A detailed account of the accident at Houghton, Mich., with illustrations, and of the clearing of the channel. 1000 w. Eng News —June 1, 1905.

Meadville, Pa.—Fall of a Railway Bridge Near Meadville, Pa. Illustrations and particulars of the accident. 1200 w. Eng News—Oct. 30, 1902.

Munich.—The Accident at the Maximilian Bridge in Munich (Der Bauunfall der Äusseren Maximiliansbrücke in München). W. Dietz. Describing the displacement of one of the abutment hinges of a three-hinged masonry arch during erection. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 17, 1904.

A Remarkable Accident to a Masonry Arch Bridge. From the "Zeitschrift des Vereines Deutscher Ingenieure." An account of two arches, which were built three-hinged, slipping off their hinges, at Munich, Germany. 1800 w. Eng News —Oct. 27, 1904.

The accident to the Maximilian Bridge at Munich (L'Accident du Pont Maximilien à Munich). Describing the slipping and displacement of one of the hinges of an arch, with computation of the magnitude and direction of the forces causing this action. 1800 w. Génie Civil—July 22, 1905.

Displacement of the Semi-Arches of a Stone Bridge. Illustrated description of an accident during erection of the Maximilian bridge at Munich. 2000 w. Engr, Lond—Dec. 29, 1905.

Paris Exposition.—Collapse of the Foot-Bridge at the Paris Exhibition. Information from the report of the experts appointed to investigate this accident. 1200 w. Engr, Lond—Aug. 16, 1901.

Phoenix & Eastern Ry.—Failure of a Bridge Pier on the Phoenix & Eastern R. R. Brief illustrated description of the failure of a concrete bridge pier in Arizona. 500 w. Eng News—April 6, 1905.

Railway.—A Pin Bridge That Stood Without an End Post. John C. Moses. Illustrates and describes a bridge damaged by a railroad accident, with explanatory comments. 800 w. Eng News—May 19, 1904.

St. Paul.—See **WIND PRESSURE.—Bridge, St. Paul.**

San Mateo, Calif.—Failures of Bridges and Bridge Members. A discussion of the causes of failure of highway bridges and exceptional instances of strength of pin-connected structures. With illustrated letter describing failure of bridge at San Mateo under a drove of horses. 1500 w. Eng Rec—Feb. 16, 1901.

Tarbes, France.—The Fall of a Portable Bridge by Buckling (Chute par Gauchissement d'un Pont Démontable). M. S. Périssé. A discussion of the failure of the bridge over the Adour in 1897, with calculations of the strength and weakness of the girders. 6000 w. 1 plate. Mem Ser Ing Civ de France—June, 1901.

The Collapse of a Long Plate Girder Bridge. An account of an accident while testing an emergency bridge over the Adour River, in France, in July, 1897. 1500 w. Eng Rec—Sept. 21, 1901.

Texas.—Some Peculiar Railroad Bridge Accidents. J. I. Boggs. An account of accidents on the Houston & Texas Central Ry., showing the remarkable performance of some old designs in railroad bridges. 800 w. Pro Am Soc of Civ Engs—Nov., 1900.

Toledo, O.—A Collision with a Swing Bridge at Toledo, O. R. G. Manning. Illustrations showing the damage done, with account of the accident. 700 w. Eng News—Nov. 26, 1903.

See also BRIDGE RENEWAL.

Williamsburg, N. Y.—The Fire on the New East River Bridge. An illustrated account of the fire which consumed the temporary framework on the New York tower and also the foot-walks, though the main cables are believed to be only slightly injured. Also brief editorial. 2200 w. Ir Age—Nov. 13, 1902.

The Fire on the New York Tower of the New East River Bridge. An account of this fire with report of damage by Mr. Gus. C. Henning, who personally examined the scene of the fire. Also report by Mr. Gustav Lindenthal. 2400 w. Eng News—Nov. 13, 1902.

The New East River Bridge Fire. An illustrated account of this disaster, the damage, and the lessons to be learned. 1200 w. Sci Am—Nov. 22, 1902.

The Fire on the New East River Bridge. An illustrated account of the fire, the damage, loss, etc. 2800 w. Eng Rec—Nov. 15, 1902.

BRIDGE ANCHORAGE.

See also BRIDGE; BRIDGE TOWER.

Blackwell's Island.—See BRIDGE.

Manhattan.—See BRIDGE; BRIDGE TOWER.

BRIDGE APPROACH.

See also BRIDGE.

Clairton, Pa.—The Plate-Girder Approaches of the Clairton Bridge. Illustrates and describes details of the viaduct approaches of this bridge near Pittsburg. It is designed largely for steel mill traffic. 1800 w. Eng Rec—March 26, 1904.

Mingo, Ohio.—The Mingo Bridge Approaches. This bridge carries a double-track railroad across the Ohio River near Mingo Island. Begins an illustrated detailed description of the construction work. Serial. 1st part. 2200 w. Eng Rec—June 25, 1904.

New Westminster, B. C.—See BRIDGE.

Philadelphia.—See BRIDGE.

Quebec.—Anchor Approaches for the Quebec Cantilever. Brief illustrated description of this feature of the great 1800-ft. span cantilever bridge across the St. Lawrence. 600 w. Eng Rec—April 11, 1903.

Rankin, Pa.—See BRIDGE.

Williamsburg, N. Y.—Building the Approaches of the New East River Bridge. Brief description with illustration of the new bridge across the East River, New York. 1000 w. Sci Am—Nov. 16, 1901.

See also BRIDGE ERECTION.

BRIDGE BEARING.

See also BRIDGE DESIGN.

Adjusting.—Adjusting the Bearings of Long and High Bridge Spans. Describes methods of repairing roller bearings by wedging the shoes so as to free the rollers. 800 w. Eng Rec—April 13, 1901.

Girder.—Standard Bearings for Long-Span Plate Girder Bridges, Chicago, Milwaukee & St. Paul Ry. Illustrates and describes the character of the end bearings used. 1200 w. Eng Rec—Dec. 9, 1905.

Roller.—Roller Bearings (Ueber Wälzungslager). Dr. Julius Mandl. An analytical discussion of the action of roller bearings under heavy pressure as in supporting the ends of bridge trusses. 3000 w. Oesterr Wochenschr f d Oeffent Baudienst—July 19, 1902.

BRIDGE CABLE.

See CABLE—Bridge; and under names of bridges.

BRIDGE CONSTRUCTION.

See also BRIDGE; BRIDGE DESIGN; BRIDGE ERECTION; BRIDGE MOVING; BRIDGE RENEWAL; BRIDGE WORKS.

Bridge-Building—Past and Present. Editorial on the development, noting progressive types and structures of interest. 2000 w. Engng—Jan. 25, 1901.

The Development of Iron Bridge Construction. Charles S. Davis. A brief review of this work and outline of the methods of conducting the business of a bridge plant, and the need of rapid methods of calculation. Ill. 2200 w. Trans Assn C. E. Cornell Univ. 1901.

Three Questions Respecting Bridge Practice. Edward Godfrey. States three questions for discussion, giving personal views. 900 w. Eng News—Jan. 24, 1901.

Aesthetic.—See BRIDGE.

American.—The Development of Bridge Trusses. An editorial discussion of present tendencies in American bridge design. 800 w. Eng Rec—Nov. 3, 1900.

Recent Progress in American Bridge Construction. Prof. Henry S. Jacoby. Pittsburg address before the Am. Assn. for the Adv. of Science. A review of recent construction, and the problems that have been solved. 4800 w. Sci Am Sup—July 19, 1902.

Bridge Building and Bridge Works in the United States. The first of a series of articles aiming to describe American practice in bridge design and construction, and the shop equipment and methods of American bridge works. Serial. 1st part. 2500 w. Engr, Lond—Jan. 16, 1903.

American vs. British.—Bridge Building Comparisons. L. L. Carson. Brief remarks on the difference in American and British practice. Ill. 1200 w. Am. Mfr—Dec. 18, 1902.

See also British; BRIDGE—Atbara; VIADUCT—Gokteik.

American vs. European.—European and American Bridge Building Practice. T. C. Clarke. A comparison of methods showing the economy which has been effected by the extended use of machinery and standardization, enabling American works to compete successfully for European and Colonial work. 3000 w. Engineering Magazine—April, 1901.

Atchison, Kan.—See PILE DRIVING.

British.—Colonial Structural Work. An examination of the present position of affairs in England, in an endeavor to discover why colonial trade is given to foreign countries. 4400 w. Engr, Lond—Dec. 20, 1901.

The Manufacturers' View. Discusses some of the principal reasons for the loss of British trade, from the standpoint of the manufacturer of structural materials. Serial. 1st part. 9800 w. Engr, London—Nov. 8, 1901.

See also American vs. British; STEEL CONSTRUCTION.

Defective.—Defective Bridge Construction in the Prairie States. Daniel B. Luten. An illustrated article describing a type of steel bridge called the leg bridge, and noting its defects. 1800 w. Eng News—April 17, 1902.

Details.—The Development of Bridge Members. A discussion of the relative advantages of eye bars and built sections for tension chords. 1000 w. Eng Rec—Nov. 10, 1900.

East River.—See BRIDGE; BRIDGE ERECTION.

Floor.—See BRIDGE FLOOR.

India.—See BRIDGE; RIVETING.

Kansas City.—See BRIDGE.

Louisville & Nashville R. R.—Bridge and Building Construction on the Louisville & Nashville R. R. General plans of some of the structures with account of progress. Ill. 7000 w. Ry & Engng Rev—Oct. 18, 1902.

Pan-American Exposition.—See BRIDGE.

Pencoyd Exhibit.—Improvements in Bridge Construction. Report on the exhibit of the Pencoyd Iron Works, at the National Export Exposition, held in Philadelphia, Oct.-Nov., 1899. 1600 w. Jour Fr Inst—Nov., 1900.

Renewal.—See **BRIDGE RENEWAL.**

Riveting.—See **GIRDER; RIVETING.**

Strengthening.—See **BRIDGE RENEWAL.**

Sunday Work.—See **BRIDGE RENEWAL.**

Uganda.—See **VIADUCT.**

Williamsburg.—See **BRIDGE.**

BRIDGE DEFLECTION.

See **BRIDGE TEST.**

BRIDGE DESIGN.

See also **BRIDGE; BRIDGE CONSTRUCTION; FRAMEWORK; GIRDER; STEEL CONSTRUCTION.**

Some Bridge Matters. Editorial discussion of matters relating to bridge design, and the straining action on rivets, etc. 2000 w. Engng—Nov. 23, 1900.

Some Thoughts Concerning Changes in Bridge Design. Editorial discussion of experience in regard to iron bridges and discussing also the cost of a masonry arch and points in its construction. 3000 w. Eng News—Sept. 26, 1901.

The Anatomy of Bridgework. W. H. Thorpe. An illustrated article dealing with cases that have come under the writer's personal notice. The present number considers girder bearings, main girders, and plate-webs. Serial. 1st part. 4000 w. Engng—Nov. 18, 1904.

Aesthetic.—See **BRIDGE.**

American.—See **BRIDGE CONSTRUCTION.**

Arch.—The Computations for Flat Metallic Arches (Calcul des Arcs Métalliques Surbaissés). L. de Boulougne & M. Bedaux. Deriving formulas for arches in which the rise is small compared with the span, including various conditions of loading and forms of construction. 12000 w. 1 plate. Ann des Ponts et Chaussées—1 Trimestre, 1902.

Types and Details of Bridge Construction. Frank W. Skinner. The first of a series of illustrated articles presenting types of bridge construction and giving facts of interest in regard to the notable structures. The present article deals with arches. Serial. 1st part. 2000 w. Eng Rec—April 1, 1903.
See also **ARCH—Curvature; Theory.**

Arch and Suspension.—The Computation of Arches and Suspension Bridges (Calcul des Ponts en Arc et des Ponts Suspendus). A. Considère. A mathematical examination of the stresses in arches, and their relation to similarly proportioned suspension bridges. 1800 w. Comptes Rendus—Jan. 23, 1905.

Arch Curvature.—See **ARCH—Curvature.**

Arch Fixed.—Computation for Arches Fixed at the Springings (Note sur le Calcul des Arcs Encastrés). M. Pigeaud. Developing formulae from which working tables are computed, enabling the computation for arches rigidly built into the springings, to be made by inspection. 6000 w. Ann des Ponts et Chaussées—2 Trimestre, 1905.

Arch Girder. The Graphical Statics of Arched Girders (Zur Graphischen Statik der Bogenträger). T. Stark. Giving the strain diagrams for a hinged arch in simple and convenient form. 1500 w. Zeitschr d Oesterr Ing a Arch Ver—March 21, 1902.

Arched Girders with Elastic Abutments (Bogenträger mit Elastisch Eingespannten Kämpfern). Adolf Francke. A mathematical investigation, computing the stresses for a number of cases. 3500 w. Oesterr Wochenschr f d Oeffent Baudienst—May 20, 1905.

The Computation of Circular Arched Girders (Beitrag zur Berechungsweise der Kreisbogenträger). Adolf Francke. With formulas and diagrams for the determination of stresses in circular braced arches with joints at various points. 3000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Aug. 23, 1902.

Arch Hinged.—Parabolic Lines of Pressure and the Computation of Two-Hinged Arches (Ueber Parabelförmige Einflusslinien und die Berechnung des Zweigelenkbogens). H. Müller-Breslau. A discussion of the determination of the true line of pressure for two-hinged arches under various loads. 2500 w. Zentralblatt der Bauverwaltung—March 4, 1903.

Theory and Calculation of the Two-Hinged Spandrel-Braced Arch. Alex. Rice McKim. Presents a method by which the two-hinglied arch can be constructed so that the stresses may be calculated with some degree of certainty of their being those of the finished structure. The article follows the lines of investigation developed by Mohr, Winkler and Mueller—Breslau. 4000 w. Eng Rec—April 11, 1903.

A New Graphical Method for Stresses in Three-Hinged Arches. J. W. Balet. The explanation of the method considers only the three-hinged braced arch, although it is of general application to arches with or without hinges, braced or solid rib. 2800 w. Eng News—Oct. 20, 1904.

The Pointed Arch with Free Hinged Springings (Der Spitzbogenträger mit Frei Drehbaren Kämpfergelenken). Adolf Francke. A mathematical investigation of the forces in hinged Gothic arches of various forms and loadings. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 28, 1900.

Kinematic Investigation of a Two-Hinged Semi-Circular Arch (Kinematische Untersuchung eines Halbreisförmigen Bogenträgers mit Zwei an den Kämpfern Gelegenen Gelenken). G. Ramisch. A mathematical study of an arch with hinges at the springings, using the elastic theory and the methods of kinematics. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 28, 1902.

The Graphical Computations of Triple-Hinged Arch Bridge (Le Calcul Graphique des Ponts en Arc). M. Jacquier. A study of the distribution of forces in arches with hinges at the crown and springings, employing the method of lines of influence. 5000 w. 1 plate. Ann des Ponts et Chaussées—1 Trimestre—1903 .

The Two-Hinged Arch. Edward Godfrey. An analytic method for finding the stresses in a two-hinged arch, based on the "pull over E" formula, that is, the formula for finding deflections; with diagrams and table. 2200 w. Eng Rec—Dec. 27, 1902.

See also **Arch Pointed; Arch, Semicircular; ARCH—Sandstone Hinges; BRIDGE ACCIDENT—Munich; FRAMEWORK—Graphics.**

Arch Masonry.—The Design and Construction of Masonry Arches. William D. Pence. Discusses the masonry arch from a practical point of view, and briefly considers the concrete-steel construction. 5000 w. Indiana Engng Soc, 1901.

A Graphostatic Examination of Flat Parabolic Arches (Graphostatische Untersuchung des Flachen Parabelgewölbes). Dr. Josef Schreier. A comparison of the graphical and analytical methods of investigating the stresses in masonry arches, taking the parabola as the curve of equilibrium. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 22, 1905.

A Statical Examination of Flat Arches (Zur Statischen Untersuchung von Flachen Gewölben). Dr. Josef Schreier. A mathematical treatment developing formulas for use in designing masonry arches of small size in proportion to span. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 6, 1905.

Concrete and Melan Arches. L. K. Sherman. From a paper before the Illinois Soc. of Engrs. Concerning the computation of arches. 2000 w. Munic Engng—Aug, 1902.

The Computations for a Monier Arch Subjected to Wind Pressure and to Inclined Loads (Die Berechung eines Moniergewölbes für Windangriff und Abstürzende Lasten). Ernst Horowitz. Mathematical analysis of the wind pressure, etc., on a reinforced concrete arch of the Monier system. 3000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—March 25, 1905.

Computations for a Masonry Arch (Sur le Calcul d'Une Arche en Maçonnerie). M. Auric. Deriving equations for the ready calculations of the stresses in an arch of cycloidal curve. 800 w. Comptes Rendus—Oct. 16, 1905.

Computations for Masonry Arches (Calcul des Ponts en Maçonnerie). H. Lossier. A review of the method of Ritter, treating of the distribution of forces in masonry bridges of several arches. 2000 w. Génie Civil—Jan. 3, 1903.

The Economical Construction of Large Stone Bridges (Construction Economique des Larges Ponts en Pierre). M. Sejourné. Showing the advantages of using two narrow arches instead of a single wide arch, as in the case of the Luxembourg and Toulouse bridges. 4000 w. Rev Gen d Chem de Fer—Oct., 1904.

A Statical Investigation of Arches of Constant Dimensions (Statische Untersuchung von Gewölben nach dem Verfahren mit Konstanten Bogengrössen). Dr. Robert Schönhöfer. An analytical and graphical study of the statics of the masonry arch, according to the elastic theory of Müller-Breslau. 2500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—April 2, 1904.

Arch Parabolic.—The Graphical Construction of Parabolas of the Fourth Degree (Tracé Graphique des Paraboles du Quatrième Degré). Farid Boulad. A discussion of the relation of the parabola to the lines of influence of arches and to the shearing stresses on beams. 7000 w. Ann des Ponts et Chaussées—3 Trimestre, 1905.

Arch Pointed.—Investigation of a Pointed Arch, Pivoted at the Springings (Untersuchung eines Spitzbogens auf Zwei Festen Kämpfergelenken). Prof. G. Ramisch. A mathematical and graphical discussion of pointed arches. Diagrams. 2000 w. Zeitschr d Oesterr Ing u Arch Vereines—April 17, 1903.

Arch, Ribbed.—Design of a Fixed-Ended Arched-Rib Highway Bridge. Charles Derleth, Jr. Gives calculations, stress sheets and general drawings for a steel arch-ribbed bridge. Ills. 6500 w. Cal Jour of Tech—May, 1904.

See also **BRIDGE—Deer Park.**

Arch, Semicircular.—A Contribution to the Study of the Semicircular Arch (Beitrag zur Untersuchung des Halbkreisförmigen Bogenträgers). G. Ramisch. An investigation of the distribution of stresses for various loadings of a semicircular arch, hinged at the springings. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—July 3, 1903.

A. T. & Sante Fe Ry.—See **BRIDGE—Railway Standards.**

Bending Moment Curves.—Curves of Maximum Bending Moment. Arthur L. Bell. Describes method of plotting the actual curves of maximum bending moment. 2400 w. Engr, Lond—May 8, 1903.

Blackwell's Island, N. Y.—The Computation of Stresses in the Blackwell's Island Bridge. R. C. Strachan. Read before the Brooklyn Engrs.' Club. A description of the stress analysis, with editorial describing the novel features of the bridge, giving points in the stress calculation. 4800 w. Eng News—Feb. 16, 1905.

See also **Manhattan.**

Cable Bracing.—See **Suspension Stiffening.**

Cantilever.—Some Considerations on the Effect of Stresses on Cantilevers. T. Mackenzie. Considers a simple approximate method of determining the amount of vertical displacement, or the deflection of levers under various conditions of load, etc. 1600 w. Builder—Nov. 28, 1903.

Cantilever Arch Truss.—The Cantilever Arch Truss. N. Clifford Ricker. Describes a novel method devised for finding stress diagrams, as there were difficulties in applying the usual methods of graphic statics for such a truss. 1600 w. Br Build—Feb., 1902.

Catenary Stiffening.—See **Suspension Stiffening.**

Chain.—See **Suspension Stiffening; BRIDGE—Budapest; Cologne; Manhattan; EYE BAR.**

Cologne.—See **BRIDGE.**

Concrete Reinforced.—Some Observations of the Design of Reinforced Concrete Bridges. W. J. Douglass. Gives suggestions based on observations during a trip made for the purpose of inspecting concrete and concrete-steel bridges. 1700 Eng News—July 14, 1904.

The Calculations for Arches of Reinforced Concrete (Die Berechnung von Gewölben aus Eisenbeton). Dr. Max R. v. Thullie. A graphical and analytical study, showing the distribution of stresses for various combinations of iron and concrete in arch construction. 5000 w. Beton und Eisen. No. III., 1903.

The Proportions of Reinforced Concrete Arches (Dimensionierung der Betoneisernen Gewölbe). Dr. Max R. v. Thullie. Giving formulas and tables for practical use, together with a plate of curves for the graphical determination of the coefficients. 3500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Sept. 23, 1905.

A Few Points in the Design of Reinforced Concrete Arches. B. R. Leffler. Gives some short processes in the graphical analysis of the elastic arch, based on the method given by William Cain, with which the reader is supposed to be familiar. Ills. 1200 w. Pro Am Soc of Civ Engrs—April, 1905.

Calculation of the Stresses and Design of Railway Structures of Steel Concrete. Walter W. Colpitts. The discussion has particular reference to the parabolic arch, although in a general way it indicates the manner in which stresses may be investigated in arches of other curves. Ills. Serial. 1st part. 2800 w. Ry Age—April 1, 1904.

The Design of Concrete Steel Arches. E. J. McCaustland. Read before the Am. Assn. for the Adv. of Science. Reviews investigations made by W. S. Edge, in an attempt to determine the most economical proportions of the arch ring, and also to investigate the elastic stresses under moving loads with a view of determining the position of loading which will make these stresses a maximum. 2800 w. Eng News—April 21, 1904.

Empirical Formulas for Reinforced Arches. Daniel B. Luten. Gives rules governing the design, with views and sections of bridges designed in accordance, and describes their erection. 1000 w. Cement—July, 1905.

Bridge and Concrete-Steel Construction. Edwin Thacher. Lecture before the College of Civil Engineering, Cornell. An account of bridge building from the writer's experience, giving descriptions of systems used and much information of interest. 6800 w. Trans Assn of Civ Engrs of Cornell Univ—1902.

See also **BRIDGE; CONCRETE REINFORCED.**

Continuous Girder.—See **BEAM; GIRDER.**

Crowds.—See **CROWDS.—Weight.**

Curved Bridges.—Computations for Curved Bridges (Calcul des Ponts Courbes). M. Résal. A discussion of the stress in bridges in which there is a horizontal curve between piers; with especial reference to the cross strains. 5000 w. Ann des Ponts et Chaussées—4 Trimestre, 1905.

See also **BEAM—Curved Balcony.**

Draw-Bridge.—A Graphical Method for the Solution of Stresses in the Continuous Girder, as Applied to Draw-Bridges. Discussion of the paper by George F. Barton. 2000 w. Pro Am Soc of Civ Engrs—Dec., 1901.

A Graphical Method for the Solution of Stresses in the Continuous Girder, as Applied to Draw-Bridges. George F. Barton. Describes this method which is simple and comprehensive, stating some of its advantages. 3500 w. Pro Am Soc of Civ Engrs—Oct., 1901.

Drawbridge Calculations. Edward Godfrey. Solves the problem by calculation of the deflections. 1300 w. Eng News—April 16, 1903.

See also **BRIDGE.**

Durability.—Design in Relation to the Durability of Bridges. A discussion of this subject, illustrating by a comparison of two modern bridges across the Thames, England. 2200 w. Engr, Lond—Sept. 16, 1904.

East River.—See **Blackwell's Island; Manhattan; Williamsburg.**

End Shear Table.—See **Roller, Imperfect.**

Eye-Bar vs. Cable.—See **BRIDGE—Cologne; Budapest; Manhattan, N. Y.**

Ferry Bridge.—See **FERRY BRIDGE.**

Fidler's Book.—Bridges. Review of a book by T. Claxton Fidler, entitled "A Practical Treatise on Bridge Construction: A Text-book on the Design and Construction of Bridges in Iron and Steel. 5200 w. Builder. Nov. 1, 1902.

Girder.—The Development of the Fundamental Equations of a Girder (Entwickelung der Grundgleichungen eines Trägers). Prof. Ramisch. A mathematical development of a new theory of supports. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 19, 1900.

The Weight of Girders. H. G. Tyrrell. Gives diagrams for determining the weight of steel trusses and plate girders, with explanation of their use. 600 w. Engng—July 25, 1902.

Types and Details of Bridge Construction; Plate Girders. Frank W. Skinner. Presents examples of interesting construction work that has been actually erected, selected with a view to their value to bridge designers, draftsmen, city engineers, and others. Serial. 1st part. 2200 w. Ills. Eng Rec—May 21, 1904.

Plate Girder Bridge with Pile Bents. G. S. Crites. Illustrates and describes a design used on the Southern Pacific in certain places, which seems to eliminate the danger of blocking streams, and fills all demands. 1500 w. Cal Jour of Tech—May, 1905.

See also Arch Girder; BRIDGE BEARING; GIRDER.

Girder Lattice.—The Determination of the Stresses in Lattice-Girder Bridges when Subjected to Concentrated Travelling-Loads, and the Effect of Replacing These Loads by "Equivalent Loads." Frederick Charles Lea. Discusses a simple but accurate method of determining these stresses, considering a number of special cases. Ills. 8200 w. (No. 3539.) Inst of Civ Engrs.

Goat Island, Niagara.—Design of a Fixed-Ended Arched-Rib Highway Bridge. Prof. Chas. Derleth, Jr. Calculations, stress sheets and general drawings for a steel bridge which was one of the designs submitted for a bridge to Goat Island, Niagara River. 2 Plates. 6000 w. Cal Jour of Tech—May, 1904.

Highway.—See BRIDGE.

Hinged Arch.—See Arch, Hinged.

Inclined Bridges.—Influence of the Forces due to the Inclination and the Action of Brakes on the Principal Members of a Railway Bridge with a Heavy Grade (Influence des Efforts dus à la l'Inclinaison et à l'Action des Freins sur les Poutres Principales d' un Pont de Chemin de Fer à Forte Rampe). M. Rey. A mathematical discussion of the design of bridges inclined from the horizontal, particularly one on the Chamounix line. Illustrations. 2000 w. Rev Gen d Chemins de Fer—Feb., 1902.
See also BRIDGE—Suspension Stiffening.

Loads.—Rolling Loads on Railway Bridges. Discusses the best method of determining the effect of rolling loads, considering especially the methods used in England. 2300 w. Engr, Lond—Aug. 23, 1901.

Maximum Moments and Wheel Loads. Mathematical demonstration of problems of beams in which combined loading is used. 1000 w. R R Gaz—May 23, 1902.

Impact and Fatigue in Railway Bridges. J. Graham. Discusses the calculation of the moving load stresses. 1500 w. Engr, Lond—Nov. 14, 1902.

A Conventional System of Treating Wheel Loads. M. F. Brown. Gives results of investigations made recently by the writer of the "Two Floor-beam Maximum" method, and also other methods. 1500 w. Eng News—March 26, 1903.

Loadings for Railroad Bridges. An informal discussion of the subject—"In view of the increasing weights of rolling stock, for what loadings should railroad bridges be designed?" 2400 w. Pro Am Soc of Civ Engrs—Aug., 1903.

Loadings for Railroad Bridges. Continued discussion. 800 w. Pro Am Soc of Civ Engrs—Spe., 1903.

Loadings for Railroad Bridges. Extracts from a discussion at the June meeting of the Am. Soc. of Civ. Engrs., with editorial. 4000 w. R. R. Gaz—Nov. 20, 1903.

Frequency in the Loading of Railway Bridges. Discusses prevailing practice in regard to loading bridges, offering some criticisms. 1400 w. Engr, Lond—Feb. 19, 1904.

The Classification of Engines for Bridge Loading. C. D. Purdon. Describes a method of classification by which the strength of bridges and the weight of engines may be quickly compared to determine whether certain engines may be run over any division. 1000 w. Jour Assn of Engng Socs—Nov., 1904.

Maximum Bending Moments Due to Rolling Loads. An investigation of the stresses produced by loads rolling over bridges. Explains method of obtaining the greatest stress for two, three and four loads, and general conclusions for all loads. 2000 w. Eng, Lond—July 21, 1905.
See also BRIDGE SPECIFICATIONS.

Manhattan.—General Methods for the Calculation of Statically Indeterminate Bridges, as Used in the Check Calculations of Designs for the Manhattan Bridge and the Blackwell's Island Bridge, New York. Frank H. Cilley. Mathematical discussion, with diagrams. 8000 w. Pro Am Soc of Civ Engrs—Aug., 1904.
See also Suspension Stiffening; BRIDGE.

Masonry Arch.—See Arch Masonry.

Moving Loads.—See Loads.

Müller-Breslau Theory.—See Arch, Masonry.

Niagara Arch.—The Horizontal Thrust of the Niagara Falls and Clifton Arch. R. A. Pendergrass. Mathematical determination. 1000 w. Trans Assn of Civ Engrs of Cornell Univ—1901.

Northern Pacific Ry.—See BRIDGE—Railway Standards.

Parabolic Arch.—See ARCH—Parabolic.

Prussian Regulations.—See BRIDGE.

Railway.—The Development of Railroad Bridge Design and Construction. Henry W. Hodge. A general review of progress, with illustrated examples of modern work and description of details in present practice. 3000 w. R R Gaz—Vol. XXXVIII., No. 18.

The Detailed Design of a Railroad Bridge. William H. Burr and Myron S. Falk. An exposition of the design of a steel railroad truss bridge showing the application of engineering science in this field. Ills. 9000 w. Sch of Mines Qr—April, 1904.
See also Von Leber Report; BRIDGE.

Ransome.—See BRIDGE—Bangor, Me.

Refinement.—Excessive Refinement in Bridge Design. Discusses features of design in recent German bridges which were tried and abandoned in the United States 20 years ago. 1100 w. Eng Rec—Oct. 26, 1901.

Ritter.—See Arch, Masonry.

Roller, Imperfect.—I. Effect on Trusses and Plate Girders Due to Imperfect Roller Support. George N. Linday. II. Railway Bridge calculation by End Shear Table. Josiah Gibson. Two papers with discussions on points in bridge design. 8700 w. Jour W Soc of Engrs—April, 1904.

Short Span.—See BRIDGE—Railway Standards.

Spandrel Braced.—See Arch, Hinged.

Stiffened Suspension.—See Suspension Stiffening.

Stiffened Trusses.—Trusses with Three Chords (Dreigurtige Fachwerke). Karl Haberkalt. An examination of a variety of stiffened bridge trusses and suspension girders, with examples of their use. 7500 w. 4 plates. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 20, 1904.

Stress.—The Limits of Working Stress in Bridges. On the considerations which determine the limits of working stress in bridge structures, with examples of the limits actually adopted in the case of important bridges. Serial. 1st part. 3500 w. Engr, Lond—Nov. 29, 1903.

Unit Stresses and Impact in Old Railway Bridges. A. F. Robinson. Abstract of a lecture delivered at the Univ. of Illinois. Discussing what is the highest unit stress that may be permitted in old metal bridges, and how long the structures will be apt to last. 2000 w. Eng News—Sept. 25, 1902.

The Computation of the Cross Frames of Iron Bridges (Beitrag zur Berechnung der Querrahmen Eiserner Brücken). F. Brunner. A very complete graphical analysis of the transverse stresses on bridge trusses for various loadings. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec 9, 1904.

Suspension.—See Arch and Suspension; Suspension Stiffening.

Suspension Girder.—See Stiffened Trusses.

Suspension Stiffening.—The Stiffening System of Long-Span Suspension Bridges for Railway Trains. Joseph Mayer. A comparison of the merits of various types, based on designs furnished for a bridge across the Hudson at New York. The bridge under discussion has twelve tracks. 17900 w. Pro Am Soc of Civ Engrs—Feb., 1902.

The Stiffening Trusses of Long-Span Railway Suspension Bridges. Editorial discussion of the relation between stiffness and cost in such bridges. 1400 w. Eng Rec—March 22, 1802.

Method of Stiffening an Inclined Suspension Bridge. From a paper by T. H. Rawson and George H. Broome, presented to the Inst. of Civ. Engrs. Describes the design and erection of an interesting bridge, built as cheaply as possible, consistent with requisite strength. Ill. 1500 w. Ry & Engng Rev—June 7, 1902.

The Theory of the Stiffened Catenary with Increased Horizontal Tension (Beitrag zur Theorie der Versteiften Kette mit Aufgehobenem Horizontalzuge). Prof. Ramisch. A graphical and analytical study, showing the effect of temperature changes. 1800 w. Oesterr Wochenschr f d Oeffent Baudienst—Aug. 13, 1904.

Theory and Formulas for the Analytical Computation of a Three-Span Suspension Bridge with Braced Cable. Leon S. Moisseiff. Mathematical discussion and diagrams. 5 plates. 5000 w. Pro Am Soc of Civ Engrs—Aug., 1904.

Theory and Formulas for the Analytical Computation of a Three-Span Suspension Bridge with Braced Cable. Irving P. Church. Discussion of paper by Leon S. Moissieff. 1200 w. Pro Am Soc of Civ Engrs—Oct., 1904.

A New Type of Rigid Suspension Bridge. Translation of an article by Commandant Gisclard, in the "Genie Civil." Illustrated description of a type of which three bridges have been built in the French Congo, and one is under construction in the Pyrenees. Combination of cable and inverted arch truss. 3000 w. Eng Rec—Nov. 5, 1904.

A Rational Form of Stiffened Suspension Bridge. Gustav Lindenthal. Showing the advantages of this form, and describing particularly the Manhattan Bridge over the East River, New York. Illustrations and diagrams. 3 Plates. 2500 w. Pro Am Soc of Civ Engrs—Aug., 1904.

A Rational Form of Stiffened Suspension Bridge. Discussion of the paper by Gustav Lindenthal. 8800 w. Pro Am Soc of Civ Engrs—Oct., 1904.

A Rational Form of Stiffened Suspension Bridge. Continued discussion of paper by Gustav Lindenthal. 3000 w. Pro Am Soc of Civ Engrs—Feb., 1905.

A Rational Form of Stiffened Suspension Bridge. J. Melon. Continued discussion of paper by Gustav Lindenthal, on this subject. 1500 w. Pro Am Soc of Civ Engrs—March, 1905. See also **Manhattan.**

Sydney.—See **BRIDGE.**

Trusses.—A Comparison between the Exact and Approximate Methods of Computation for Bridge Trusses (Genauere Behandlung Statisch Unbestimmter Parallelträger und Vergleich mit der Näherungsrechnung). Friedrich Hartmann. With tables of both computations, showing variations of 25 to 33 per cent. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—April 28, 1905.

Some Primary Truss Principles. Myron S. Falk. Shows that trusses whose outlines contain rectangles, or even other polygonal figures, may be stable and statically determinate. 1700 w. Sch of Mines Qr—April, 1905.

The Theory of the Longitudinal Connections of Iron Bridge Trusses (Zur Theorie der Längsverbände Eiserner Fachwerkbrücken). Dr. Alexander Coulmas. A mathematical examination of the action of the various forces on longitudinal connections for different loadings. 7500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 2, 1905.

Viaur Viaduct, France.—See **VIADUCT.**

Von Leber Report.—Bridge Metal and Bridge Tests. A synopsis of the report presented by Max Edler von Leber at the International R. R. Cong. at Paris, on loads, stresses, metal and tests, with the conclusions and comments. 1700 w. R R Gaz—Sept. 13, 1901.

Wheel Loads.—See **Loads.**

Williamsburg.—Engineering Design of the Williamsburg Bridge. Leffert Lefferts Buck. An explanation of the design and of features suggested which have not been carried out in the construction of the new bridge over the East River, New York. 2000 w. R R Gaz—Dec. 25, 1903.

Wind Pressure.—See **WIND PRESSURE—Framed Structures; Bridge, St. Paul.**

BRIDGE ELEVATION.

See **BRIDGE MOVING; TRACK ELEVATION.**

BRIDGE ENGINEERING.

Essentials Necessary for Successful Practice in Bridge Engineering. J. E. Greiner. Extracts from a lecture delivered before the students of Cornell Univ. Emphasizes the need of continued study to keep pace with the times, and considers some points essential to success. 1500 w. Eng News—April 9, 1903.

The Field of Bridge Engineering and Essentials Necessary for Successful practice. J. E. Greiner. An outline of the work required in the design, construction and maintenance of structures which support loads. 13500 w. Trans Assn of Civ Engrs of Cornell Univ—1903.

BRIDGE ERECTION.

See also **BRIDGE; BRIDGE CONSTRUCTION; BRIDGE MOVING; BRIDGE RENEWAL; RIVETING.**

Construction Methods in Civil Engineering. Frank W. Skinner. Read before the Applied Science Soc. of McGill Univ. Introductory remarks on the technical training given civil engineers, with illustrations of typical methods of bridge erection. 6400 w. Can Engr—May, 1901.

Arch Center.—See **ARCH CENTER; BRIDGE—Luxemburg.**

Assisted Cantilever.—Assisted Cantilever Method. An illustrated explanation of this method as applied to the erection of permanent steel bridge work for the Western Maryland Railroad, Cumberland extension. 2000 w. Stevens Ind—July, 1905.

Cantilever Erection of Simple Riveted Railroad Spans. Illustrates and describes the methods of erection used on the extension of the Western Maryland Railroad. 3000 w. Eng Rec—July 15, 1905.

The Erection of the Great Tonoloway Creek Bridge. Illustrates and describes the erection of a deck bridge having three single-track plate girder skew spans, on a sub-structure built to receive two additional lines of girders when the road is double-tracked. 1600 w. Eng Rec—July 29, 1905.

Avignon.—Launching the Metallic Superstructure of the Viaduct over the Rhone at Avignon (Lançage de la Superstructure Métallique du Viaduc sur le Rhone à Avignon). Describing the erection of this important railway bridge. There are six spans of 73 metres each and two of 58 metres. 2000 w. 1 plate. Rev Gen des Chem de Fer—Oct., 1902.

Becks Run, Pa.—Raising a Steel Railroad Viaduct. Brief description of interesting engineering work on the Pennsylvania Railroad, at Becks Run, near Pittsburg. 700 w. Eng Rec—May 30, 1903.

Bellows Falls, Vt.—Erection of the Bellows Falls Arch Bridge. Brief illustrated description of a bridge across the Connecticut River, of interest on account of its long span, and the type of suspended floor. 1200 w. Eng Rec—April 29, 1905.

Blackwell's Island, N. Y.—The Erection of the Blackwell's Island Bridge. An illustrated detailed description of this bridge from East 59th St., Manhattan, over Blackwell's Island to Ravenswood, and the methods of erection. Serial. 1st part. 2500 w. Eng Rec—March 4, 1905. See also **BRIDGE.**

Boston, McKeesport.—See **McKeesport, Pa.**

British Colonial.—Colonial Bridge Erection. Discusses pin-connections vs. rivets, the influence of climate, native labor and other conditions. 3500 w. Engr, Lond—Jan. 31, 1902. See also **India; VIADUCT—Gokteik; Uganda.**

Cambridge, Boston. — Erection of the Cambridge Bridge, Boston. Brief illustrated description. 900 w. Eng Rec—April 15, 1905.

Cantilever.—See **Assisted Cantilever; St. Joseph.**

Concrete Reinforced.—See **BRIDGE DESIGN.**

Contractor's Plant.—See **ELECTRIC EQUIPMENT—Bridge Contractor.**

Falsework.—Falsework for Rocky Bottoms in Rapid Currents. From the report of the committee of the Bridges and Buildings Assn. Illustrations with brief descriptions of designs where piles cannot be driven. 1000 w. R R Gaz—Oct. 30, 1903. See also **Gilbertville; India.**

Finland.—The erection of the Kemi-Isohara Bridge in Finland (Die Aufstellung der Kemi-Isohara Brücke in Finnland). K. Snellman. An illustrated account of the erection and launching of a 125-metre span truss on the line of the Norrlandsbahn in Finland. 4000 w. Zeitschr d Ver Deutscher Ing—Jan. 2, 1904.

Floating.—See **BRIDGE MOVING—Hackensack River; Newark.**

Gilbertsville, Ky.—Substructure and Falsework Construction for the Gilbertsville Bridge. Illustrates and describes the construction of this bridge across the Tennessee River at Gilbertsville, Ky. The substructure for the main spans consists of six river piers and two shore piers, all made of reinforced concrete. 1000 w. Eng Rec—May 20, 1905.

See also **BRIDGE PIER—Concrete Reinforced.**

Grand Rapids, Mich.—Erection of the Grand-Rapids Bridge. Illustrated description of the erection of a single track bridge with seven 175-ft. through Pratt truss pin-connected spans and two 50-ft. plate-girder deck spans. 1300 w. Eng Rec—Nov. 7, 1903.

Hoisting Tackle.—See **HOISTING TACKLE.**

India.—Erection of the Girna Bridge, India. An illustrated account of engineering work of exceptional interest, including sinking of piers and erecting superstructure. Serial. 1st part. 1600 w. Engr, Lond—Sept. 25, 1903.

Erection of the Turtipar Bridge on Barges and Cantilever Falsework. Brief description of the unusual manner of erecting a bridge across the Gogra River, India. 700 w. Eng Rec—Dec. 5, 1903.

See also **BRIDGE; RIVETING; VIADUCT—Gokteik.**

Kemi-Isohara.—See **Finland.**

Kentucky River.—The Erection of the Kentucky River Viaduct in 1877. Joseph H. Springer, Sr. Outlines briefly the methods adopted in constructing this structure, which carries the Cincinnati Southern Ry. across the Kentucky River. Ills. 2400 w. Eng News—March 23, 1905.

See also **Avignon; Queensland.**

Launching.—Bridge Launching. B. J. Forrest. A short paper on this method of erection of steel bridges. 1000 w. Can Soc of Civ Engrs—Dec 22, 1904.

See also**Avignon; Queensland.**

Luxemburg.—See **ARCH CENTER; BRIDGE.**

McKeesport, Pa.—Raising the Boston Bridge, Near McKeesport. Illustrated description of the method of raising half of a cantilever bridge by adding supports 14 ft. high on the top of the pier. 900 w. Eng Rec—Dec. 15, 1900.

Maastricht, Holland.—The Erection of the Bridge Over the Maas at Maastricht (Herstellings-werken aan de Brug over de Maas te Maastricht). Ch. Driessen. Illustrated account of the erection of a lattice truss railroad bridge at Maastricht, Holland, the two principal spans being 100 metres long each. 4000 w. De Ingenieur—Oct 8, 1904.

Mingo, O.—The Erection of the Double Track Mingo Cantilever Bridge Over the Ohio River. An illustrated description of an unusually difficult undertaking; a 700 ft. channel span crossing the Ohio River. Serial. 1st part. 2000 w. Eng Rec—Nov. 26, 1904.

Newark, N. J.—Erection of a Plate Girder Bridge with a Gin Pole. J. W. Philips. Illustrated description of an interesting work in connection with the Lackawanna improvements in Newark, N. J. 700 w. R R Gaz—Vol. XXXVII, No. 29.

The Erection of a Three-span Plate-Girder Bridge. Illustration, with brief description of the construction of the bridge at Newark, N. J., which carries the tracks of the Central R. R. of N. J. across the Pennsylvania R. R. 2000 w. Eng Rec—July 23, 1904.

See also **BRIDGE; BRIDGE MOVING.**

Newcastle, N. B.—Erection of the Northwest Miramichi Bridge, Newcastle, N. B. Illustrated detailed description of the bridges of the Intercolonial Railway, which cross the branches of the Miramichi River, and of the excellent state of preservation of the bridge which is being replaced, with particulars of the erection of the new structure. 2700 w. R. R. Gaz—Jan. 23, 1903.

Erection of the Northwest Miramichi Bridge, Newcastle, N. B. H. D. Bush. Read before the Canadian Soc. of Civ. Engrs. Describes this new bridge of the Intercolonial Ry., the removal of the old spans, and method of erecting the new. 220 w. Can Engr—March, 1903.

N. Y. Central Terminal.—A Difficult Piece of Bridge Erection in Connection with Terminal Improvements on the New York Central & Hudson River R. R. Co. Frank O. Shepherd. An illustrated description of the peculiar conditions and the methods employed. 1200 w. Eng News—Jan. 5, 1905.

Nova Scotia.—See **Shubenacadie River.**

Pittsburg.—The Erection of the Monongahela River Bridge, Pittsburg. The present article illustrates and describes the general features, falsework, derricks, and erection of anchor arms. Serial. 1st part. 3800 w. Eng Rec—March 5, 1904.

The Erection of the Tenth Street Bridge, Pittsburg. An illustrated detailed description of methods used in erecting a bridge carrying highway and street car traffic across the Monongahela River. 2000 w. Eng Rec—Aug. 27, 1904.

See also **BRIDGE; BRIDGE MOVING; BRIDGE RENEWAL.**

Plattsmouth, Neb.—The Erection of the Missouri River Bridge at Plattsmouth, Neb. F. T. Darrow. Illustrates and describes the method of erecting a renewed bridge 1,658 ft. long, on the C. B. & Q. system, without interrupting traffic. 3500 w. Eng Rec—March 4, 1905.

See also **BRIDGE.**

Quebec.—See **BRIDGE.**

Queensland.—A Novel Method of Bridge Erection Without Falsework. Extract from a recent paper before the Inst. of Civ. Engs., by C. F. V. Jackson, describing the design and construction of a railway bridge in Queensland, Australia, presenting a novel plan for dispensing with falsework. 1000 w. Eng News—Feb. 21, 1901.

Erecting Bridge Spans by Sliding Them Forward from the Shore. Illustrations of a bridge in Queensland erected in this way with accounts of other erections, epsecially a parallel case from Finland. 1000 w. Eng News.—April 21, 1904.

Richmond, Ind.—Single-Track Plate Girder Railroad Bridges at Richmond, Ind. Illustrated description of the details of erection of some large plate-girder spans. 2200 w. Eng Rec—May 17, 1902.

Riveting.—See **RIVETING.**

St. Joseph, Mo.—The Cantilever Erection of the St. Joseph Drawbridge. An illustrated account of this work, with an explanation of the difficulties encountered in erecting the east arm of the draw span over the Missouri River. 1500 w. Eng Rec—June 3, 1905.

Shubenacadie River, N. S.—Piers of Midland Railway Bridge, Schubenacadie River South Maitland, Nova Scotia. George E. Thomas. Illustrated description of the difficulties encountered and overcome in the building of these pneumatic caisson piers. 6000 w. Jour W Soc of Engrs—April, 1901.

Substructure Work and Erection of the Shubenacadie Bridge. This railway bridge crosses the river five miles from its mouth, where it is subject to very high tides. The conditions are described in an illustrated description of the substructure work given. 4300 w. Eng Rec—March 26, 1904.

The Shubenacadie River Bridge—Midland Railway. J. J. Taylor. An illustrated detailed description of the construction of a single track bridge over a river 1,220 feet wide at the point of crossing, where the tides were extremely high and swift. 8000 w. Can Soc of Civ Engrs, Adv Proof—Jan. 28, 1904.

Thebes, Ill.—See **BRIDGE; BRIDGE PIER.**

Tonoloway Creek, Md.—See **Assisted Cantilever.**

Uganda, Africa.—See **VIADUCT.**

Villefranche.—See **BRIDGE RENEWAL.**

Western Maryland Railway.—See **Assisted Cantilever.**

West Va. Ry.—Bridge Erection on the West Virginia Short Line R. R. An illustrated article describing the construction of a line 60 miles in length, which contains 54 steel bridges and three tunnels, one of the latter being 3300 ft long. 2000 w. Ry & Engng Rev—March 15, 1902.

Erection of Girder Spans on the West Virginia Short Line R. R. Illustrates and describes some of the work on the West Virginia Short Line Railroad, a single-track line recently built to develop rich coal and oil resources. It is 60 miles in length and has 54 steel bridges and 3 tunnels. 4000 w. Eng Rec—Jan. 18, 1902.

Williamsburg.—The Main Span of the Williamsburg Bridge, Across the East River, New York City. Begins an illustrated detailed description of the operation of erecting the suspended superstructure of this long-span bridge. 2000 w. Eng Rec—Dec. 19, 1903.

Erecting the End Spans of the New East River Bridge. Illustrated description of heavy high false work and travelers and their use in erecting spans of 300 ft. each. 2000 w. Eng Rec—April 27, 1901.

Williamsburg, Approaches.—Erection of the New East River Bridge Approaches. Illustrated detailed description of the structures between New York and Brooklyn and their erection. Two independent travelers are in use. 3800 w. Eng Rec—Sept. 21, 1901.

Erection of the Manhattan Approaches to the Williamsburg Bridge. An outline of the design and construction of this great engineering work, with report of the progress on the viaduct approach, and related matters of interest. 1200 w. Eng Rec—May 9, 1903.

Williamsburg, Towers.—Erection of Upper Parts of New East River Bridge, New York. Illustrated description of contractors' methods of constructing unusually lofty and heavy towers. 2000 w. Eng Rec—March 30, 1901.

Yellowstone Park.—See **BRIDGE.**

BRIDGE FLOOR.

See also **BRIDGE.**

Ballasted.—The Protection of Steel in Ballasted Floor Bridges. An illustrated article giving the practice of different railways in regard to solid floor construction. 3800 w. Eng News—Nov. 12, 1903.

Ballasted Floors on the Atchison, Topeka & Santa Fe. Drawings and description of ballasted bridge floors. 600 w. Ry Age—Nov. 27, 1903.

Ballasted Bridge Floors. A. F. Robinson. Gives illustrations and information of work in Great Britain and America, with remarks on the various types. General discussion follows. 14000 w. Jour W Soc of Engs—June, 1905.

Concrete.—Proposed Concrete Floors for Railway Bridges and Tracks. J. W. Schaub. Illustrates and describes a proposed design in which the track rests on a longitudinal timber bolted to a concrete floor. 1000 w. Eng News—Nov. 2, 1905.

Concrete Reinforced.—Concrete Floors for Railway Bridges. Illustrates and describes examples of solid floors of reinforced concrete, as used by different railways. 900 w. Eng News—Feb. 16, 1905.

Reinforced Concrete for Bridge Floors (Betoneisentragwerke für Strassenbrücken). Anton Kraupa. Computations of strength for various distributions of load; with details of construction. 1500 w. Oesterr Wochenschr f d Oeffent Baudienst—June 10, 1905.

Concrete Reinforced vs. Wood.—The Abandonment of Wooden Floors for Suspension Bridges (La Suppression du Bois dans les Tabliers des Ponts Suspendus Modernes). G. Leinekugel Le Cocq. Data and results of experiments showing the superiority of reinforced concrete floors over wood. 2000 w. Génie Civil—Feb. 18, 1905.

Cushioned.—Cushioned Floor Beds for Railroad Bridges. Gives experience in the use of granulated cinder. General discussion. 2200 w. Pro Engrs' Soc of W Penn—March, 1905.

Rail Bearers.—See **RAIL BEARER.**

Solid.—See **BRIDGE—Concrete Reinforced.**

Waterproofing.—Protecting and Waterproofing Solid Floor Bridges. W. C. Cushing. Reprinted from Bul. 64 of the Am. Ry Engng and Main of Way Assn. An illustrated explanation of some of the plans used on the P., C., C. & St. L. at Brighton Park and Englewood, in 1904. 5500 w. R R Gaz—Vol. XXXIX, No. 5.

Waterproofing Bridge Floors. A review of the tests reported in a paper by W. C. Cushing, read before the Am. Ry. Engng. & Main. of Way Assn. 3000 w. Engng—Sept. 1, 1905.

Williamsburg.—Steel Underflooring and Wood Block Pavement for the Roadways of the Williamsburg Bridge. Gives sections showing construction, with extracts from specifications in regard to treatment for the prevention of oxidation, and requirements for materials and workmanship in paving. 1500 w. Eng News—May 21, 1903.

See also **BRIDGE.**

Wood.—Experiments on the Strength of Wooden Floor Construction of Suspension Bridges (Versuche über die Tragfähigkeit der Hölzernen Fahrbahnconstructionen von Hängebrücken). A review of an article by M. Pierret in the "Revue Général de la Construction Métallique et de la Serrurerie," giving the results of experiments on French highway bridges. 1500 w. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 4, 1902.

See also **Concrete Reinforced vs. Wood.**

Wood Block.—See **BRIDGE—Brooklyn Drawbridge; BRIDGE FLOOR—Williamsburg.**

BRIDGE FOUNDATION.

See also **BRIDGE; BRIDGE PIER; BRIDGE TOWER; CAISSON; COFFERDAM.**

Blackwell's Island.—Substructure for the Fourth East River Bridge, New York City. Abstract of the specifications for material and workmanship are given, with illustrations of details. 2600 w. Eng News—June 20, 1901.

Cambridge, Boston.—See **BRIDGE; BRIDGE PIER.**

Chic., Mil. & St. Paul Ry.—Some Odd Jobs of Foundation work. W. A. Rogers. Describes a few problems in masonry and foundation work, of a perplexing nature, which have been solved during the last season by the Bridge and Building Department of the Chicago, Milwaukee and St. Paul Railway. 3300 w. R R Gaz—March 8, 1901.

Compressed Air.—Compressed Air Foundations for Bridges. G. W. M. Boycott. An illustrated article dealing with pneumatic cylinders and caissons only, and giving brief descriptions of work in England. Serial. 1st part. 2800 w. Eng, Lond—Aug. 4, 1905.

Cooper's Specification.—Cooper's Bridge Foundation Specifications. Selected illustrations and abstracts indicating the character of general specifications, prepared by Mr. Theodore Cooper, soon to be published. 3800 w. Eng Rec—Nov. 1, 1902.

Footings.—Preparing Foundation-Beds for Short Railway Spans. Walter N. Frickstad. Describes the manner in which the foundation-beds for the concrete and masonry on which rest the steel superstructure of some of the bridges recently built by the Southern Pacific in Nevada were prepared, without the use of machinery, except pump and boiler. 4000 w. Cal Jour of Tech—Nov., 1904.

Glasgow, Mo.—See **BRIDGE RENEWAL.**

India.—Sinking Foundation Wells for the Koyakhai Bridge, Bengal-Nagpur Railway. Graves William Eves. Illustrated detailed description of methods used in difficult work in India. 2500 w. Eng News—Dec. 26, 1901.

Manhattan, N. Y.—The Brooklyn Caisson for the Manhattan-Brooklyn Bridge. Illustrated description of a heavy timber pneumatic caisson 144x78 ft. in plan to carry one pier of a suspension bridge of 1,400 ft. clear span. 1900 w. Eng Rec—March 2, 1901.

Brooklyn Tower Foundation. Third East River Bridge. An illustrated description of the caisson and cofferdam work and the masonry work. 2800 w. Eng News—March 7, 1901.

Some Observations on the Deep Pneumatic Work of the New East River Bridge Foundations. Edwin Duryea, Jr. A general description of special features of the work; the compressed air conditions, caisson sinking, material encountered, temperatures, etc. 4500 w. Eng News—May 1, 1902.

Sinking the Caissons for East River Bridge No. 3. Illustrates and describes the sinking of the caissons which form the foundations of the towers for this new bridge at New York. 1900 w. Sci Am—May 31, 1902.

The New York Tower Foundations for the Manhattan Bridge. Briefly describes the work giving the specifications for the caissons. 2400 w. Eng News—Nov. 27, 1902.

Tower Foundations of the Manhattan Bridge Across the East River, New York City. Illustrated detailed description of the construction. 2800 w. Eng Rec—March 12, 1904.

Marsh River, Me.—See **BRIDGE.**

Mingo, Ohio River.—The Substructure of the Mingo Bridge Over the Ohio River. Illustrates and describes a railroad bridge near Mingo Island, which has a cantilever main span 1,296 1-2 feet long, with a clear center span of 700 feet, weighing 6000 tons. The river is subject to floods which demand great stability and strength for the substructure. 2000 w. Eng Rec—Oct. 3, 1903.

Ottawa, Can.—See **BRIDGE.**

Quebec.—The Quebec Bridge Piers. Illustrated description of the large caissons and heavy masonry for the cantilever bridge over the St. Lawrence River. 2800 w. Eng Rec—July 27, 1901.

The Substructure for the 1800-ft. Cantilever Bridge at Quebec, Canada. Illustrated description of the substructure and foundations of the longest span bridge in the world, now in process of construction across the St. Lawrence River. 6000 w. Eng News—Jan. 29, 1903.

Specification.—See **Cooper's Specification.**

Swale, Eng.—See **BRIDGE—Lift, Swale, Eng.**

BRIDGE INSPECTION.

See also **BRIDGE CONSTRUCTION; BRIDGE TEST; INSPECTION.**

Bridge Inspection. George H. Burgess. Considers the methods of inspection of steel bridges only, describing the ordinary practice. 2500 w. Wis Engr—May, 1901.

The Value of Inspection of Metal Bridges During Construction and Erection. Walter L. Golden. Explains the various stages of inspection work in mill, shop and field, and gives information showing its value. 8500 w. Jour Assn of Engng Socs—March, 1904.

Railways.—Method of Making Annual Inspection of Bridges and Culverts. Abstract of report of committee of the Association of Railway Superintendents of Bridges and Buildings, presented at Quebec, Canada, Oct. 20-23, 1903. 3800 w. Eng News—Oct. 29, 1903.

BRIDGE LOADING.

See **BRIDGE DESIGN; BRIDGE SPECIFICATIONS.**

BRIDGE MACHINERY.

Amsterdam.—See **BRIDGE.**

Charlestown, Boston.—See **BRIDGE.**

Electric.—See **BRIDGE—Charlestown; Drawbridge; Winnington, Eng.**

Gas Engines.—See **BRIDGE—Newark Bay.**

Marquette, Ill.—Turntable and Operating Mechanism of a 360-Foot Swing Bridge. Illustrated description of a single-track swing span on the Indiana & Iowa R. R., over the Illinois River, having a number of special features in the turntable and latching apparatus. 1200 w. Eng Rec—May 18, 1901.

BRIDGE MANUFACTURE.

See **BRIDGE CONSTRUCTION.**

BRIDGE MODEL.

Test Mansfield.—See **BRIDGE—Mansfield, O.**

BRIDGE MOVING.

See also **BRIDGE ERECTION; BRIDGE RENEWAL.**

Chicago.—The Elevation of the Chicago and Alton Bridge at Bridgeport, Chicago. Illustrated description of the work of elevating a drawbridge 11 feet from the old foundation without interrupting river or railroad traffic. 600 w. Ry Age—Jan. 23, 1903.

Columbus, O.—An Interesting Bridge Removal. Illustrated description of method of moving a 875-ft. single track bridge of the Hocking Valley R. R. nearly a mile. 400 w. Eng Rec—Nov. 3, 1900.

D., L. & W. Ry.—See **Hackensack River; Newark, N. J.**

Fort Wayne.—Moving the Fort Wayne Bridge. Reports details and operations of a work of interest by which a double-track five-span structure is being built in the position of an old bridge which has been moved bodily at one operation to a position alongside so as to maintain traffic until the new bridge is completed. 2200 w. Eng Rec—May 31, 1902.

Hackensack River.—Floating a Drawbridge into Place. An illustrated account of the work of substituting a new and heavier drawbridge for an old one across the Hackensack River, on the Morris & Essex Div. of the D., L. & W. R. R. 2400 w. Ir Age—March 7, 1901.

Moving the Hackensack River Drawbridge. Illustrated description of the method of floating two large draw spans, one replacing the other. 2100 w. Eng Rec—March 9, 1901.

Newark, N. J.—A Novel Plan for Removing a Bridge. An illustrated account of the bridge on the D., L. & W. R. R., crossing the Passaic river at Newark, N. J., where the action of the tides complicated the problem. 1400 w. Ry Age—March 20, 1903.

Moving a Drawbridge with Sand Jacks. Fine photographs showing views while moving was in progress, with information concerning the work of lowering the bridge over the Passaic River, at Newark, N. J. 2500 w. R. R. Gaz—Jan. 1, 1904.

Replacing a Passaic River Drawbridge. Describes the method of floating away a 220 1-2-ft. swing span and replacing it by a heavier span also floated into place. 700 w. Eng Rec—May 25, 1901.

Moving a Drawbridge on the Lackawanna. An illustrated description of the removal of a double-decked bridge crossing the Passaic River in New Jersey, which involved many novel features. 400 w. Ry Age—Jan. 1, 1904.

The Use of Scows and Sand Jacks in Moving and Lowering a 1000-ton Drawbridge over the Passaic River, at Newark, N. J. Lincoln Bush. An illustrated article describing this work, especially the use of sand jacks. 4500 w. Eng News—Dec. 31, 1903.

A Novel Engineering Feat. An illustrated description of method used in lowering a 1000-ton drawbridge a distance of more than ten feet by means of floating sand jacks. 2500 w. Ir Age—Dec. 31, 1903.

New Brunswick, N. J.—Moving a Railroad Bridge. Describes the moving of the Raritan River drawbridge, at New Brunswick, N. J. The bridge is double-tracked, with five fixed spans and one draw span. Ill. 500 w. R R Gaz—June 6, 1902.

Moving a Long Railroad Bridge at New Brunswick, N. J. Illustrates and describes the method of moving a 6-span, 900 ft. steel bridge 14 1-2 feet to one side, with a total interruption to traffic of only 15 minutes. 2000 w. Eng Rec—July 5, 1902.

Paris.—Moving a Seine Bridge. Gives a brief illustrated description of a foot-bridge in Paris, which was moved to allow the erection of a new structure on the same site, explaining the conditions and the methods. 1600 w. Engr, Lond—Dec. 11, 1903.

The Movement of the Passy Bridge (Le Déplacement de la Passereille de Passy). J. Feugères. An illustrated description of the manner in which the highway bridge across the Seine between Passy and Grenelle was moved bodily a distance of 29 metres. 2000 w. Génie Civil—Sept. 19, 1903.

Moving a Paris Footbridge Over the Seine and Withdrawing Its Piers by Hydraulic Jacks. Rene Bonnin. An illustrated account of the methods used in moving the Passy Footbridge. 2000 w. Eng News—Feb. 18, 1904.

Passaic River, N. J.—See **Newark, N. J.**

Pittsburg.—Removal of the Old South Tenth Street Bridge, Pittsburg, Pa. Willis Whited. Gives a brief account of the bridge and describes the method of removal. 1300 w. Eng Rec—Nov. 29, 1902.

Moving the Ft. Wayne Bridge at Pittsburg. Illustrates and describes a movement made necessary by the necessity of erecting a new bridge of greater strength. 1800 w. Ry & Engng Rev—May 3, 1902.

Sand Jacks.—See **Newark, N. J.**

BRIDGE PIER.

See also **BRIDGE; BRIDGE FOUNDATION; BRIDGE TOWER; CAISSON.**

Blackwell's Island.—Construction of the Blackwell's Island Bridge Masonry. An illustrated article describing the methods of work, materials, method of preparing and handling, etc. 4300 w. Eng Rec—Dec. 16, 1902.

Masonry Construction for the Blackwell's Island Bridge. Describes the construction of the piers and anchorages of this bridge, which will be the third, in order of completion across the East River at New York. Illustrated. 3000 w. Eng Rec—March 5, 1904.

See also **BRIDGE; BRIDGE FOUNDATION.**

Brumath, Alsace.—See **Concrete Reinforced.**

Cambridge, Boston.—Construction of the Cambridge Bridge Piers. Describes the methods used in replacing the old pile bridge known as the West Boston Bridge. 1800 w. Eng Rec—July 6, 1901.

Methods of Construction of the New Cambridge Bridge Substructure, Boston, Mass. Sanford E. Thompson. Illustrates and describes the pile driving; the cutting off of the piles; the construction of the cofferdams; and the concrete mixing and laying. 3300 w. Eng News—Oct. 17, 1901.

Canadian Railway.—Bridge Foundation Work on the Great Northern Railway of Canada. Extract from paper by J. M. Shanly, before the Canadian Soc. of Civ. Engrs. Describes features of interest in the work. 1800 w. Ry & Engng Rev—May 31, 1902.

Cofferdam.—See **COFFERDAM.**

Concrete.—See **Stone's River, Tenn.**

Concrete Reinforced.—Iron Concrete Piers (Ueber Betoneisen Piloten). F. v. Emperger. A description of the reinforced concrete construction of the piers of the new bridge at Brumath, Alsace. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 7, 1902.

Reinforced Concrete Piers of the Gilbertsville Bridge. Illustrated description of piers 60 to 71 ft. high from bottom of footing to top of coping. 800 w. Eng Rec—March 4, 1905.

Design and Construction of High Bridge Piers of Reinforced Concrete. William M. Torrance. Gives calculations made for the design of piers of a bridge across the Tennessee River, on the Louisville Div. of the Illinois Central R. R. Also gives notes on construction. Ills. .4000 w. Eng News—May 25, 1905.

Cornwall, .Ont.—Reinforcing and Rebuilding the Cornwall Bridge Piers. Illustrated description of a steel caisson and coffer-dam placed about a masonry pier and filled with concrete for the purpose of increasing the stability of the pier. 2000 w. Eng Rec—Dec. 29, 1900.

Dunsbach Ferry, N. Y.—See **BRIDGE.**

Failure, Arizona.—See **BRIDGE ACCIDENT—Phoenix & Eastern Ry.**

Georgetown, D. C.—Rebuilding Pier No. 4 of the Aqueduct Bridge, Georgetown, D. C. Illustrated description of difficult caisson work in 28 ft. of water, involving the support of the adjoining ends of two spans of a highway bridge on temporary towers while the old pier was torn down and rebuilt. 3100 w. Eng Rec—Aug. 10, 1901.

Gilbertsville, Ky.—See **Concrete Reinforced; BRIDGE ERECTION.**

Gonzales, Texas.—See **BRIDGE ACCIDENT.**

Phoenix & Eastern Ry.—See **BRIDGE ACCIDENT.**

Quebec.—See **BRIDGE; BRIDGE FOUNDATION.**

Reinforcing.—Reinforcing an Undermined Bridge Pier. Describes the method of sinking a new caisson around an old one which was thrown out of plumb by floods. 1300 w. Eng Rec—Feb. 8, 1902.

Sewer.—See **SEWER—Bridge Pier.**

South Maitland, N. S.—See **BRIDGE ERECTION—Shubenacadie River.**

Stone's River, Tenn.—High Concrete Piers for Railway Bridge Across Stone's River; Tennessee Central Ry. Illustrations with brief description of piers 65 1-2 ft. high. 400 w. Eng News—March 27, 1902.

Terre Haute, Ind.—See **BRIDGE RENEWAL.**

Thebes, Ill.—Construction of the Thebes Bridge Piers. Illustrated description of the construction of the piers for a long bridge across the Mississippi River at Thebes. 1400 w. Eng Rec—March 4, 1904.

Withdrawing.—See **BRIDGE MOVING—Paris.**

BRIDGE RENEWAL.

See also BRIDGE ERECTION; BRIDGE MOVING; BRIDGE PIER.

The Replacement of Members of a Railway Truss Bridge (Streben Auswechslung mit einem Zugstangen Systeme an einer Eisenbahn-Gitterbrücke). Julius Novak. Describing the operation of replacing the struts and tie rods of an old bridge, including experimental methods of measuring existing stresses. 3500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Jan. 13, 1905.

Whether to Strengthen the Old Bridge or Renew It? H. G. Tyrrell. Discusses when it is impracticable to make over old bridges; method of estimating, etc. 1000 w. R. R. Gaz—Aug. 2, 1901.

Arch Masonry.—Description of the Method of Repairing an Arch of 12 Metres Span (Notice Explicative sur la Méthode Suivie pour Réparer un Pont de 12 Metres d'Ouverture). M. Jouvion. Describing the manner of injecting mortar into the joints of an arch which had become weakened by the settling of an abutment. 1200 w. Revue Technique—Feb. 25, 1905.

Argental, France.—Replacing a Suspension Bridge by a Masonry Arch. Brief illustrated description of special work in replacing a highway bridge crossing the Dordogne River at Argental, in France. 700 w. Eng News—July 16, 1903.

Benwood, W. Va.—The Reconstruction of the Baltimore and Ohio Railroad Bridge Over the Ohio River, at Benwood, West Virginia. J. E. Greiner. Describes the old bridge, and the reconstruction, which was done in sections, extending over a number of years. 8 plates and ills. 2200 w. Pro Am Soc of Civ Engrs—March, 1905.

Brooklyn, N. Y.—A Proposed Plan for Rebuilding the Brooklyn Bridge. An illustrated article giving plans for reconstruction of the suspension bridge between Brooklyn and New York, suggested by Mr. Gustav Lindenthal. 2000 w. Eng News—Jan 7, 1904.

Buffalo.—The International Bridge, Buffalo. Illustrated description of the method of removing the spans of a bridge across the Niagara River and replacing them with heavier spans without any material interruption of passenger traffic. 2500 w. Eng Rec—June 15, 1901.

Cornwall.—See **BRIDGE PIER.**

Cuba.—Concrete Arch Bridge Over the San Juan River on the Road from Santiago de Cuba to Caney. Eduardo J. Chibas. An illustrated description of the rebuilding of this bridge. The old brick arch, built 50 years ago, was repaired and left, and a concrete arch added on each side to provide sufficient room for the water to pass in time of floods. 1700 w. Eng News—June 18, 1903.

Easton, Pa.—Rebuilding a Wrecked Railroad Bridge at Easton, Pa. Describes the condition of the bridge after being wrecked, the temporary repairs to maintain traffic, and the final rebuilding. Ills. 3500 w. Eng Rec—Oct. 1, 1904.

Florence.—Renewal of the Florence Bridge, Louisville and Nashville and Southern Railways. Describes a novel method of renewing a bridge of 12 spans of about 120 ft. each. Ill. 400 w. Ry & Engng Rev—March 15, 1902.

Geneva.—The Reconstruction Works Upon the Mont Blanc Bridge at Geneva (Les Travaux de Réfection du Pont du Mont Blanc à Genève). George Autran. An illustrated account of the placing of a new superstructure upon the piers of the bridge over the Rhône. 1800 w. Schweiz Bauzeitung—Sept. 3, 1904.

Glasgow, Mo.—Reconstruction of the Missouri River Bridge at Glasgow, Mo.; Chicago & Alton Ry. W. D. Taylor. Describes the old bridge and the new, giving an account of the interesting features of the construction work. Ill. 3000 w. Eng News—March 14, 1901.

The Reconstruction of the Glasgow Bridge on the Chicago and Alton Railway. W. D. Taylor. Illustrated description of a railway bridge, 2,805 ft. long, over the Missouri River, with notes on special methods of erecting long spans and unusual details of steel work. 5000 w. Eng Rec——March 16, 1901.

The Substructure of Glasgow Bridge Over the Missouri River. H. P. Boardman. An illustrated description of this bridge, with an interesting discussion, in which Gen. W. Sooysmith reviews the history of the old bridge, which was the first great steel bridge ever built. 12000 w. Jour W Soc of Engrs—April, 1901.

Iron,—The Strengthening and Maintenance of Early Iron Bridges. William Marriott. Describes the measures adopted for the strengthening of two bridges built in the sixties and seventies, in order to adapt them to modern requirements and to protect them from rust. Discussion. Ills. 14500 w. Inst of Civ Engrs. (No. 3554).

The Strengthening of Early Iron Bridges. The present article discusses the need of inspection and considers floors, cast-iron girders and suspended bowstring girders. Serial. 1st part. 3300 w. Engr, Lond—April 11, 1902.

Kansas City.—The Kansas City Flow-Line Bridge Repairs. J. A. L. Waddell. Illustrated detailed description of repairs made to the bridge over the Kaw River that carries the pipes for the water supply of Kansas City, which was badly damaged by the recent flood. 6000 w. Eng Rec—Oct. 31, 1903.

The Kansas City Flow-Line Bridge Repairs. J. A. L. Waddell. A statement, with illustrations, concerning the repair work to the bridge over the Kaw river that carries the pipes for the water supply of Kansas City, which was badly injured by the flood. 5500 w. Eng News—Oct. 29, 1903.

La Crosse, Wis.—An Important Bridge Renewal. Illustrated description of an important piece of bridge replacement work in progress at La Crosse, Wis., over the channels of the Mississippi and Black Rivers. 1600 w. Ry Age—July 11, 1902.

Lorain, O.—Bridge Renewal Under Unusual Conditions. Illustrates and describes the methods used in renewing the drawbridge on the New York, Chicago & St. Louis Ry. at Lorain, showing the difficulties of the work and how they were overcome. 1100 w. Eng News—Sept. 22, 1904.

Ludlow, Ky.—See **VIADUCT.**

Mamaroneck, N. Y.—Saving a Sinking Concrete Arch Bridge. Illustrates and describes the method adopted for saving a bridge at Mamaroneck, N. Y. 800 w. Eng Rec—Feb. 6, 1904.

Marsh River, Me.—Substructure of Marsh River Bridge. Herbert J. Wild. Illustrated description of the construction of the substructure of a bridge in Maine to replace a wooden bridge on the Knox and Lincoln Ry. 3700 w. Pro Am Soc of Civ Engrs—Feb., 1904.

Mayence, Germany.—Reconstruction of a Railway Bridge Near Mayence. An illustrated account of the various stages of the work. Each of the old 115 ft. flood spans was, in a space of two hours, replaced by a new one weighing nearly 80 tons. 900 w. Engr, Lond—Oct. 10, 1902.

See also **BRIDGE.**

Midland Railway.—See **Trent River, Eng.**

Milwaukee.—See **BRIDGE.**

Minneapolis.—Chicago, Milwaukee & St. Paul Bridge at Minneapolis. Illustrated description of an important piece of replacement work over the Mississippi River. 800 w. Ry Age—Jan. 3, 1902.

The Erection of the Short Line R. R. Bridge at Minneapolis. An illustrated article describing the building on the same alignment, without interrupting traffic, of a heavy double-track structure to replace a light single-track bridge across the Mississippi River. 1200 w. Eng Rec—May 20, 1905.

Munich.—The Reconstruction of the Maximilian Bridge at Munich (Die Rekonstruktion der Maximiliansbrücke in München). Prof. Mörsch. An account of the method employed in replacing a hinged masonry arch which had slipped from its hinges. 2000 w. Schweiz Bauzeitung—May 13, 1905.

Newark, N. Y.—Replacing a Four-Track Bridge Under Heavy Traffic. Brief account of methods adopted in replacing an old structure by a new one without interrupting traffic. The bridge carries the N. Y. C. & H. R. R. R. over the Erie canal near Newark, N. Y. Ils. 1000 w. Eng Rec—July 29, 1905.

New Richmond, Mich.—Converting a Fixed Bridge Span Into a Swing Span. Illustrates and describes an interesting piece of work on the Pere Marquette R. R. at New Richmond, Mich., carried on without interrupting traffic. 600 w. Eng News—Jan. 17, 1901.

N. Y., Chic. & St. L. Ry.—Recent Bridge Work on the Nickel Plate. Albert J. Himes. An illustrated account of reconstruction work, replacing the early bridges which were unsuited to the present heavy traffic. 1800 w. R R Gaz—Vol. XXXIX., No. 15.

Niagara Cantilever.—Strengthening the Michigan Central R. R. Cantilever Bridge, Niagara Falls, N. Y. Illustrated description of the methods and details of the work. 2300 w. Eng News—Nov. 1, 1900.

Pittsburg, Pa.—The Reconstruction of the Point Bridge, Pittsburg, Pa. Willis Whited. An illustrated article describing the condition of the old structure, the repairs that were made, and the manner of executing the work. 4800 w. Eng News—Jan. 26, 1905.

The Reconstruction of the Point Bridge, Pittsburg. Describes work on this bridge across the Monongahela River, describing the old bridge, the condition before repairs, and the reinforcement of anchorages in the present article. Ils. Serial. 1st part. 2700 w. Eng Rev—May 6, 1905.

See also **BRIDGE.**

Poughkeepsie, N. Y.—Reinforcing the Poughkeepsie Bridge. Describes the high-level, double-track deck structure across the Hudson, completed about 20 years ago, and the improvements to be made to meet present requirements. 1700 w. Eng Rec—Oct. 28, 1905.

Railway.—Reinforcing a Railroad Bridge in Service. Illustrated description of the method by which five 139-ft. single-track spans were reinforced, without interfering with traffic, by providing new and independent members to carry the excess of load due to heavy traffic. 1200 w. Eng Rec—June 14, 1902.

A Railway Bridge Renewal. Illustrates and describes the removal of a bridge, where a railway intersected a railway, with as little interruption to traffic as was possible. 1600 w. Engr, Lond—Nov. 15, 1901.

Redheugh, Eng.—The Redheugh Bridge. Illustrated description of the recent reconstruction of this bridge between Newcastle and Gates head. 800 w. Engng—May 10, 1901.

The New Redheugh Bridge at Newcastle-on-Tyne. Illustrations of a reconstruction with several new features, with brief description. 1100 w. Sci Am.—Feb. 22, 1902.

See also **BRIDGE.**

Rockville, Pa.—See **BRIDGE.**

Rondout Creek, N. Y.—See **West Shore Ry.**

St. Gothard Railway.—Strengthening Bridges on the Gothard Railway (Einige Brückenverstärkungen der Gotthardbahn). Emilio Lubini. Giving illustrations and computations of the methods by which a number of lattice girder bridges on the Gothard railway have been reinforced. Two articles, 3800 w. Schweizerische Bauzeitung—Jan. 19, 26, 1901.

Sunday Work—Sunday Work on Railway Bridges. Discusses the methods of renewal with as little interruption of traffic as possible. 3600 w. Engr, Lond—Sept. 13, 1901.

Swale, Eng.—See **BRIDGE—Lift, Swale.**

Tennessee River.—The Tennessee River Bridge of the Illinois Central. H. W. Parkhurst. Illustrated description of a new bridge constructed on a new site, the line being diverted to take out nearly 120 deg. of curvature, and of the methods of erection. 3300 w. R R Gaz—Vol. XXXIX, No. 2.

Terre Haute, Ind.—Rebuilding the Big Four Bridge at Terre Haute. Illustrates and describes changes being made in a bridge over the Wabash River. Three Pratt truss spans, too light for present loading, are being replaced with two 184-ft. spans. 700 w. R R Gaz—Vol. XXXVIII, No. 4.

Reconstructing Piers of a Railroad Bridge in Service. Illustrates and describes a difficult piece of substructure work involving the replacing of two piers and repairing one abutment of a railroad bridge under traffic, at Terre Haute, Ind. 2500 w. Eng Rec—March 4, 1905.

Toledo, O.—Repairing a Wrecked Drawbridge Over the Maumee River at Toledo. An illustrated account of the wrecking of a drawbridge on the Wheeling & Lake Erie R. R. by a steamer; and the repairs. 1000 w. Eng Rec—Nov. 19, 1904.

Trent River, Eng.—Reconstruction of a Bridge on the Midland Railway Across the River Trent. Frank Horace Frere. Reprinted from Pro. of Inst. of Civ. Engrs. Describes the old bridge, the method of taking down and removal, and the erection of the new bridge, which is built entirely of steel, of lattice girders of the type known as the "Linville truss." Ils. 3000 w. R R Gaz—March 25, 1904.

Vienna.—The Rebuilding of the High Bridge over the "Tiefen Graben" in Vienna (Der Umbau der Hohen Brücke über den Tiefen Graben in Wien). Karl Christl. Illustrated description of a viaduct carrying an important city street over an old depressed quarter. 2000 w. 3 plates. Oesterr Wochenschr f d Oeff Baudienst—June 11, 1904.

Villefranche, France.—The Reconstruction of the Frans Bridge (La Reconstruction du Pont de Frans). G. Canat. An account of the replacement of the suspension bridge over the Saone at Villefranche by a cantilever railway bridge. 6000 w. 2 plates. Ann des Ponts et Chaussées—1 Trimestre, 1903

Novel Method of Erection Adopted for the Frans Bridge at Villefranche Over the Saône. From "Annales des Ponts et Chaussées. Illustrates and describes novel methods of erection of a cantilever bridge. 600 w. Eng News—Oct. 22, 1903.

The Reconstruction of the Frans Bridge (Reconstruction du Pont du Frans). Illustrated description of the new cantilever bridge across the river Saone at Villefranche, replacing the former suspension bridge. 2000 w. 1 plate. Génie Civil —Oct. 31, 1903.

West Shore Ry.—Renewal of a Bridge Over Rondout Creek on the West Shore Railroad. Illustrated description of a new bridge 1,228 feet long which presents many questions of adjustment to existing conditions, and must be built without 'interrupting traffic. 800 w. Ry Age—March 18, 1904.

Renewing Bridges on the West Shore. An illustrated article giving information regarding the extensive bridge renewals in the course of improving this road for heavy traffic. 1500 w. R R Gaz—Vol. XXXVII, No. 23.

BRIDGE SPECIFICATIONS.

See also **BRIDGE—Prussian Regulations; Railway Standards; BRIDGE DESIGN; STEEL SPECIFICATIONS.**

Proposed Specifications for Steel Railroad Bridges. J. W. Schaub. Gives proposed methods explaining why they are advocated, also specifications, and a general discussion. 20000 w. Jour W Soc of Engrs—Oct., 1900.

A Comparison of the Requirements of Recent Railway Bridge Specifications. A. H. Heller. Gives a table showing a summary of such requirements as depend mostly on the engineer's judgment. Also much valuable information. 4000 w. Eng News—Nov. 19, 1903.

American Bridge Co.—The American Bridge Company's New Specifications. A series of extracts from the specifications for steel railway bridges, giving the more important changes from previous specifications and an explanation of the reasons for certain of them. Also ah editorial discussion of the value of these specifications. 3800 w. Eng Rec—Dec. 1, 1900.

General Specifications for Railway Bridges in North America (Grundzüge für die Berechnung und Construction der Eisenbahnbrücken in Nordamerika). Prof. J. Melan. An abstract of the general specifications for steel bridges recently issued by the American Bridge Co. 2400 w. Zeitschr d Oesterr Ing u Arch Ver—April 5, 1901.

Blackwell's Island, N. Y.—The Specifications for the Superstructure of the Blackwell's Island Bridge. Lengthy abstract of these specifications, without comment. 3300 w. Eng Rec—Aug. 22, 1903.

The Blackwell's Island Bridge. Specifications for the material and workmanship for the superstructure, and engravings showing the plan and elevation of this bridge, with details. 1400 w. R R Gaz—Aug. 28, 1903.

British.—See **BRIDGE CONSTRUCTION.**

Cooper.—See **BRIDGE FOUNDATION.**

Easton Suspension.—See **BRIDGE.**

Highway.—See **BRIDGE.**

Loads.—Specified Loadings for Railroad Bridges. Ward Baldwin. A list of loadings specified in 1901 by the railroads more than 100 miles long, in the United States, Canada and Mexico, and comparison with those specified in 1893. 2000 w. R R Gaz—May 2, 1902.

See also **BRIDGE DESIGN.**

Massachusetts.—Notes on Massachusetts Railroad Commissioners' Bridge Specifications. Gives some of the more important details of the specifications drawn by Prof. George F. Swain for bridges carrying electric railways. 2500 w. St Ry Jour—April 5, 1902.

Prussia.—See **BRIDGE—Prussian Regulations.**

BRIDGE TERMINAL.

Brooklyn-New York.—The Brooklyn Bridge Terminal Problem. Editorial discussion of the plans proposed in 1888 by A. M. Wellington, the changed conditions since then, and some suggestions suited to the present problem. 3000 w. Eng News—April 11, 1901.

The Manhattan Terminal of the Brooklyn Bridge. Editorial discussion of the plan of William Barclay Parsons for the improvement of the Manhattan terminal and relief of congested traffic. 3000 w. R R Gaz—July 4, 1902.

An Expert Report on the Improvement of the Brooklyn Bridge Terminals. Report of a board of engineers, with editorial comment. 5500 w. Eng News—Oct. 17, 1901.

The Manhattan Terminal of the Brooklyn Bridge. Extracts from the report of a board of engineers, with editorial comments. Ill. 5400 w. R R Gaz—Oct. 18, 1901.

A New Plan for Improving the New York Terminal of the Brooklyn Bridge. Editorial discussing the plan of Mr. William Barclay Parsons, and reviewing the plans proposed during the last year. 2500 w. Eng News—July 10, 1902.

Parsons' Solution of Brooklyn Bridge Problem. Gives details of the plan proposed for the relief of the present crush, and for providing adequate facilities for transportation. Plan. 2800 w. St Ry Jour—July 12, 1902.

A Proposed New Brooklyn Bridge Trolley Terminal Plan. A brief illustrated explanation of the plan designed by Mr. Neils Poulson. 500 w. Eng News—Sept. 11, 1902.

Plan for Relieving Brooklyn Bridge. Illustrations and plans with description of changes proposed by Neils Poulson, for relief of the congestion of traffic at the Manhattan terminal. 900 w. St Ry Jour—Sept. 20, 1902.

Proposed Brooklyn Bridge Terminal and City Offices. Henry F. Hornbostel. An illustrated general outline of extensive improvements planned, which will cost $50,000,000 when fully carried out. 1300 w. Archt & Build's Mag—Aug., 1903.

A Proposed Solution of the Brooklyn Bridge Terminal Problem. S. S. Neff. Describes a plan that can be carried out without the purchase of land or very much alteration of the terminal building, and at comparatively small cost. 2800 w. Eng News—March 3, 1904.

The New Manhattan Terminal for the Brooklyn Bridge. Illustrations and description of the principal features of the proposed new station, and the arrangement of tracks. 600 w. R R Gaz—Vol. XXXIX., No. 2.

The Extension of the Manhattan Terminal of the New York and Brooklyn Bridge. General remarks on the many great engineering works in progress, to improve the terminal facilities of the transportation lines of New York City, and especially discussing the plans proposed for improving the terminal named. Ills. 2500 w. Archts & Builds Mag—Sept., 1905.

See also **ELECTRIC RAILWAY—N. Y. Bridge Connections.**

Manhattan, N. Y.—Terminals of the Manhattan Bridge. Outlines the general design of the bridge and illustrates both terminals. 600 w. R R Gaz —Vol. XXXIX., No. 22.

BRIDGE TEST.

See also **CONCRETE REINFORCED.**

The Testing of Railway Bridges. Discusses the need of the first and of periodic tests, giving the opinions of various engineers and the methods used. 3300 w. Engr, Lond—Feb. 14, 1902.

Belar Apparatus.—See **BRIDGE—Laibach, Austria.**

Blaubeuren, Germany.—See **CONCRETE REINFORCED—Test, Blaubeuren.**

Concrete.—See **ARCH—Concrete Test.**

Concrete Reinforced.—See **BRIDGE—Mansfield, O.; Soissons; BRIDGE ACCIDENT—Tarbes; CONCRETE REINFORCED—Test.**

France.—Experiments on the Deformation of Bridges (Conférence sur l'Expérimentation des Ponts). M. Rabut. A well illustrated account of apparatus and experiments to determine the deflection and vibration of bridges under various loads. Diagrams. 12000 w. Ann d Ponts et Chaussées—3 Trimestre, 1901.

Conférence sur l'Experimentation des Ponts (Report on the Testing of Bridges). M. Rabut. An important paper presented before the Engineering Congress at Paris, describing the construction and use of instruments for recording the deflection and vibrations of bridges in actual service. 10000 w. Rev Gen des Chem de Fer—Nov., 1901.

Experiments on French Metal Bridges. Description of experiments on girder and truss bridges indicating that the distribution of stresses in the various members is different from the usual assumptions made in engineering designs. 1700 w. Eng Rec—Nov. 9, 1901.

Experiments on Railway and Road Bridges. An account of some interesting and instructive experiments made by M. Rabut, to ascertain the results attending the transit of traffic over bridges, with respect to vibration and shock. 1200 w. Engr, Lond—July 11, 1902.

Heusden, Holland.—Test of the Bridge at Heusden (Beproeving van de Brug bij Heusden). H. van Oordt. Report of official test, with description of instruments for measuring deflection, and tabulated results. 10000 w. Tidschr v h Klik Inst van Ing—Feb 9, 1901.

Mansfield, O.—See BRIDGE.

Netherlands Railways.—Experimental Examination of the Stringers of Railway Bridges (Enquête Expérimentale sur les Longerons des Ponts). N. C. Kist. A report of tests upon the bridges of the Netherlands State Railways with reference to certain breakages in the longitudinal members supporting the rails. 5000 w. 1 plate. Ann des Ponts et Chaussées—2 Trimestre, 1901.

Strain Recorder.—Apparatus for Recording the Local Deformation of Metal Pieces (Appareil Enregistreur de la Déformation Locale des Pièces Métalliques). MM. Schroeder, Vander Kolk & Kist. Illustrating and describing various devices for attachment to members of a bridge or other framed structure, to record the deflections under actual loads. 2000 w. Ann des Ponts et Chaussées—2 Trimestre, 1901.

Von Leber Report.—See BRIDGE DESIGN.

Viaur Viaduct.—See VIADUCT—Viaur Test.

BRIDGE TOWER.

See also BRIDGE; BRIDGE FOUNDATION; BRIDGE PIER.

Manhattan, N. Y.—Towers and Anchorages of the Manhattan Bridge, New York. Illustrated description prepared from the specifications and drawings issued by Commissioner Lindenthal. 2000 w. Eng Rec—Dec. 12, 1903.

The Upper Sections of the Manhattan Bridge Towers. Illustrates and describes details of towers, the scheme of horizontal bracing, &c., of the Manhattan bridge in New York City. 1000 w. Eng Rec—Dec. 2, 1905.

The Design of the Post Base of the Manhattan Bridge Towers. Gives an illustrated description of the tower post of this suspension bridge across the East River, New York, designed for very heavy loads. 2000 w. Eng Rec—Nov. 25, 1905.

Williamsburg, N. Y.—Details of the Williamsburg Bridge Towers. Photographs illustrating some of the typical features of the steel work connections of the bridge across the East River at New York, with description. 1100 w. Eng Rec—Jan. 16, 1904.

See also BRIDGE; BRIDGE ERECTION.

BRIDGE WORKS.

See also BRIDGE CONSTRUCTION.

Construction and Equipment of a Bridge Shop Plant. Illustrated description of works, having numerous novel methods of handling tools and work; using electric power transmission. 1600 w. Eng Rec—Jan. 5, 1901.

Modern Practice in Bridge Shop Work. W. H. Pratt. A brief paper on the development of these shops, with discussion. Ill. 1200 w. Jour W Soc of Engrs—Oct., 1901.

Some of the New and Enlarged Bridge and Structural Mills. Brief report of proposed extensions and new plants in America. 1700 w. R R Gaz—March 14, 1902.

Ambridge.—The New Pittsburg Plant of the American Bridge Company. Plan and description of new works now being constructed at Ambridge, 15 miles below Allegheny, on Ohio River. 2500 w. Ir Age—June 26, 1902.

The American Bridge Company's Ambridge Works. Illustrated detailed description of the largest bridge plant in the world. 2500 w. Ir Age—Aug. 4, 1904.

The Ambridge Plant of the American Bridge Company. An illustrated description of the arrangement, operation, power, transportation and buildings. Serial. 1st part. 5500 w. Eng Rec—Nov. 21, 1903.

Boston.—The Boston Bridge Works. Illustrates and describes briefly the new shops built on the site of the old ones which were destroyed by fire, and gives details of layout. 4500 w. Eng Rec—Jan. 14, 1905.

Derby.—Clarke-Street Works, Derby Illustrated description of these new works, which are an extension of the large plant of A. Handyside & Co., Ltd. 2200 w. Engr, Lond—July 29, 1904.

Pencoyd.—See MACHINE SHOP.

Pennsylvania Steel Co.—See Steelton, Pa.

Steelton, Pa.—A Model Bridge and Construction Shop. An illustrated detailed description of the Pennsylvania Steel Company's new plant at Steelton, Pa. The finest bridge shop in the United States. 3500 w. Ir Age—Sept. 10, 1903.

The Pennsylvania Steel Company's Model Bridge Plant. Illustrated description of the general arrangement and principal features of the plant at Steelton, near Harrisburg, Pa. Serial. 1st part. 5700 w. Eng Rec—Sept. 26, 1903.

BRINELL HARDNESS TEST.

See TESTING—Hardness.

BRIQUETTING.

See also COAL CRUSHING; COAL DUST; COAL PREPARATION; COKE MANUFACTURE.

Briquettes as Steam Fuel. Reviews the early attempts at making briquettes, and reports tests made with various fuels. 2200 w. Ir & Coal Trds Rev—Dec. 7, 1900.

American Coal Briquettes. Information concerning the methods of manufacture in America as compared with European practice; the advantages, etc. 1800 w. Sci Am—Dec. 8, 1900.

The Briquetting of Pulverulent Ores (Agglomération des Minerais Pulvérulents). A. Lapanche. An illustrated description of methods of forming finely divided ore into briquettes for convenience in metallurgical treatment. 1 plate. 2200 w. Génie Civil—April 13, 1901.

The Briquetting of Fuels and Fine Mineral Ores. Wm. Gilbert Irwin. A review of the development of briquetting methods and machinery with some account of their applications in the United States. 4000 w. Engineering Magazine—March, 1902.

The Fuel Briquetting Industry in the United States. William G. Irwin. On the importance of utilising waste coal and the methods employed, the practice in Europe and America, cause of early failures and recent progress. 5300 w. Ir Age—June 19, 1902.

The Briquetting of Fuels. R. Schorr. Considers this industry, its development in foreign countries, and what has been done in the United States. 1700 w. Eng & Min Jour—Nov. 8, 1902.

The Manufacture of Briquettes. Editorial review of the process in use for briquetting fuel, the binding materials used, etc. 2200 w. Engng —Nov. 14, 1902.

The Briquetting of Flue Dust, Fine Ore and Fuel. Considers this method of utilising fine material, the machines used, and the results. Ill. 9500 w. Eng News—Feb. 12, 1903.

Briquet Fuel. W. H. Booth. Information relating to the making and use of briquets in various countries. 3000 w. Engr, U S A—April 1, 1903.

Fuel Briquetting. Considers the materials which may be used, the extent of the industry and methods and machinery used in Europe and Canada. Ill. 6500 w. Mines & Min—Aug., 1903.

The Briquetting of Small Coal (Die Herstellung Kleinstückiger Briketts). Dr. Steger. A review of various briquetting processes with especial reference to the utilisation of coal slack and fine coal. Two articles. 5000 w. Stahl u Eisen—Dec. 1, 1903.

Briquetting Fuel Material. George E. Walsh. Considers the waste material which contains sufficient burning properties to utilise as fuel, the efficiency and cost of briquetting, and related subjects. 3500 w. Power—April, 1904.

The Fuel Briquetting Industry. John Fulton. Considers the materials of which briquets are made, binders, fuel value, shapes of briquets, and processes and machinery used. Ills. Serial. 1st part. 4600 w. Mines & Min—Oct., 1904.

The Improvement of Briquette Fuel for Minimizing Smoke Production (Aufbesserung der Steinkohlen-Briketts zwecks Rauchverminderung). H. Schöndeling. Showing the influence of a suitable binding material and a heavy moulding pressure upon the smokelessness of briquettes. 1200 w. Glückauf—Nov. 5, 1904.

On Coal Briquetting. Dr. Alfred Gradenwitz. Explains the three types of presses in use, illustrating machines and describing the method of work. 1700 w. Min Rept—Dec. 29, 1904.

Briquetted Fuels, Foreign and Domestic. G. M. Randall. Gives a brief resumé concerning the manufacture of artificial fuel in several foreign countries, and matters of related interest. 4000 w. Power—March, 1905.

Briquetting Fuel. George E. Walsh. An account of this industry in Europe and America. Min Rept—April 13, 1905.

The Manufacture of Briquettes. Translated from "Der Stein der Weisen." Explains the methods of forming both anthracite and bituminous briquettes, illustrating ovens used. 2000 w. Sci Am Sup—July 1, 1905.

Broken Hill, Australia.—The Preparation of Fine Material for Smelting. T. J. Greenway. Describes a briquetting process used at the works of The Broken Hill Proprietary Block 14. 1400 w. Eng & Min Jour—Jan. 12, 1905.

Brown Coal.—The Briquetting of Brown Coal (Die Entstehung des Braunkohlenbriketts). C. Kegel. A discussion of the physical and chemical properties of brown coal and their influence on processes of briquetting. 2000 w. Glückauf—July 5, 1902.

The Lignite Briquette Works of the Lauchhammer Company (Die Braunkohlenbrikett fabrik der Aktiengesellschaft Lauchhammer). A description of the briquette works of Lauchhammer, Prussia, with details of the process by which the local brown coal is compressed into serviceable fuel. 2000 w. 1 plate. Glückauf—Aug. 29, 1903.

The Utilization of Slack in the Bohemian Lignite Mines (Die Verwertung der Kohlenlösche auf den Böhmischen Braun-Kohlengruben). Wilhelm Schöndeling. A discussion of methods of briquetting and coking lignite slack and dust, from a commercial point of view. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—May 20, 1905.

See also Peat; BROWN COAL.

Brown Coal, California.—The Briquetting Plant at Stockton, California. Robert Schorr. Description of a large plant for crushing lignite and making it into briquettes. 1000 w. Eng and Min Jour—Aug. 18, 1904.

Calorific Value.—See Tests.

Cement, Disintegration.—Disintegration of Portland Cement Briquettes by Oil and Experiments to Prevent It. James C. Hain. A report of experimental investigations and the results. Ills. 4000 w. Eng News—March 16, 1905.

Düsseldorf Exposition.—See COKE.

France.—The Briquette Industry in France. Ed. Lose. Notes giving a general idea of the industry. Serial. 1st part. 1400 w. Eng & Min Jour—Aug. 22, 1903.

German Machinery.—German Process and Machinery for Briquette Manufacture. An account of this industry in Germany, the machines used, etc. Ill. 2500 w. U S Cons Repts, No. 1466—Oct. 11, 1902.

German Briquette Machinery for America. A résumé of the briquette manufacture, as it exists in Germany, with illustrations. 2000 w. U S Cons Rpts, No. 1527—Dec. 23, 1902.

Iron Flue Dust.—Briquetting Iron Flue Dust. R. M. Hale. Describes the methods employed in the manufacture of briquettes, discussing important points, and conclusions from actual operation. 3500 w. Ir Age—Dec. 11, 1902.

Iron Ore.—The Utilization of Small Ores. H. Bumby. Read before the West of Scotland Iron & Steel Inst. Concerning the briquetting of such ores and the processes. 4000 w. Ir & Coal Trds Rev—March 21, 1902.

Briquetting:—Its History, Value and Possibilities in the Iron Industry. Henry S. Mould. Reviews the history of briquetting iron ores and the writer's experience in the work, some of the difficulties encountered and the present success, with advantages claimed. Discussion. Ill. 6600 w. Pro Engrs Soc of W Penna—Nov., 1902.

The Briquetting of Iron Ores (Ueber Brikettierung von Eisenerzen) Dr. Alois Weiskopf. A discussion of the various binding materials employed, together with a list of patents and brief bibliography of the subject. 4000 w. Stahl u Eisen—March 1, 1904.

Briquetting Plant for Iron Ore (Erzbrikettierungsanlage). H. Zeidler. A detailed description of the plant of the iron works at Kertsch, in Southern Russia. 3500 w. Stahl u Eisen—March 15, 1905.

A Russian Ore-Briquetting Plant. Herr Zeidler in 'Stahl und Eisen." Plan and description of a plant constructed to deal with the oolitic and argillaceous brown iron ore obtained from the deposits in the Kertsch peninsula. 1800 w. Ir & Coal Trds Rev—May 5, 1905.

Iron Ore Briquettes for the Blast Furnace. Henry Louis. Reviews the history of ore briquetting, describing the operations, and stating the advantages, and explaining various methods. Ills. 4000 w. Cassier's Mag—July, 1905.

Kertsch, Russia.—See Iron Ore.

Kuhn & Co., Bruch.—Apparatus for Compressing Coal before Coking (Installation pour la Compression du Charbon avant sa Transformation en Coke). With illustrations of the briquette plant of Kuhn & Co. of Bruch, Westphalia, with plate of details. 1200 w. 1 plate. Génie Civil—Nov. 15, 1902.

Oberhausen, Germany.—Washing and Briquetting Plant. Dr. Alfred Gradenwitz. Illustrated description of the plant for screening, washing and briquetting coal at the Altstaden mine, Oberhausen, Germany. 1400 w. Mines & Min—Sept., 1905.

Peat.—Recent Advances in the Utilization of Peat and Lignite. H. H. Wotherspoon, Jr. Abstract of a paper read before the N. Y. Acad. of Sci. concerning the manufacture and cost of briquettes in Europe. Ills. 600 w. Eng & Min Jour—April 7, 1904.

See also Stauber; PEAT—Briquetting.

Precious Mineral Ores.—Briquetting Precious Mineral Ores. William G. Irwin. Reviews briefly what has been accomplished, especially in America. 1200 w. Sci Am—July 11, 1903.

San Francisco.—A Bricking Plant for Flue Dust and Fine Ores. Jas. C. Bennett. Illustrates and describes the plant for briquetting ores at the Selby Smelter, San Francisco. 1100 w. Eng & Min Jour—Sept. 15, 1904.

Schorr.—The Briquetting of Minerals. Robert Schorr. On the value of briquetting in connection with metallurgical processes and the manufacture of artificial stone, and the processes in use. 1200 w. Eng & Min Jour—Nov. 22, 1902.

Fuel and Mineral Briquetting. Robert Schorr. Information concerning the manufacture of coal and coke, peat, and mineral briquette, and artificial stone, with costs, &c. 6600 w. Trans Am Inst of Min Engrs—Feb., 1904.

Fuel and Mineral Briquetting. A discussion of the paper by Robert Schorr. 1000 w. Am Inst of Min Engrs—May, 1905.

The Schorr Briquette Press. Robert Schorr. Brief illustrated description of machine especially adapted for the manufacture of small briquettes for fuel. 600 w. Eng & Min Jour—Oct. 7, 1905.

Stauber Process.—Lignite and Peat Briquettes in Germany. Concerning the efforts made to utilise the turf beds with an account of the Stauber process of making briquettes. 700 w. U S Cons Repts, No. 1142—Sept. 21, 1901.

Tests.—The Influence of the Strength of Coal Briquettes upon Their Steaming Value (Der Einfluss der Festigkeit von Steinkohlenbriketts auf ihre Verdampfungsfähigkeit). E. J. Constam. Data and results of tests, showing the steaming value of briquettes to be unaffected by their broken condition. 2000 w. Zeitschr d Ver Deutscher Ing—June 25, 1904.

White Press.—Briquetting—Its Progress and Commercial Advantages. Henry S. Mould. An illustrated description of various types of the White Briquetting Press. 2200 w. Am Mfr—Jan. 17, 1901.

Wood Waste.—Manufacture of Briquettes from Wood Waste. Gustaf v. Heidenstam. Extract from a report of the results obtained by investigations and experiments carried out by the writer, as to the manufacture and carbonisation of briquettes from the waste of lumber and saw mills. Ill. 3000 w. Engr, Lond—Nov. 1, 1901.

BROMINE.

A proposed Method for the Extraction of Bromine. Anson G. Betts. On the distribution of bromine, and a proposed method based on its well-known reaction in aqueous solution with phenol. 1000 w. Eng & Min Jour—June 22, 1901.

BRONZE.

See also **ALLOY—Copper-Tin; ALUMINUM ALLOY; COPPER ALLOY.**

Aluminum.—See **ALUMINUM ALLOY—Copper.**

Analysis.—See **BRASS.**

Casting.—An Account of Bronze Casting in Egypt, Europe and Japan. Randolph I. Geare. History of the art. 5500 w. Sci Am Sup—July 25, 1903.

The Casting of the Williamsburg Bridge Entablatures—A Notable Technical Achievement. Illustrations, with brief description of the casting of tablets 52 feet 7 inches long and 4 feet 8 inches wide. 800 w. Sci Am—May 28, 1904.

Williamsburg Bridge Tablets. Illustrated description of the making of these large tablets. 600 w. Foundry—Oct., 1904.

Notes on Bronze Castings. An illustrated article pointing out the importance of considering thermal conditions, and the suitability of certain alloys for certain classes of work. 1700 w. Ir & Coal Trds Rev—Oct. 13, 1905.

Locomotive Construction.—See **Strength.**

Manganese.—See **COPPER ALLOY.**

Monumental.—The Monumental Treatment of Bronze. J. Starkie Gardner. A review of the history of bronze as applied to monumental statuary and architectural decoration. Discussion. Ills. 10800 w. Jour Soc of Arts—May 12, 1905.

Patina.—See **PATINA.**

Quenching.—See **COPPER ALLOY.**

Steam Use.—Physical Characteristics of Certain Bronzes for Steam Use. Strickland L. Kneass. Discusses the essential characteristics of good steam metals, the deteriorating agencies to which they are subject, and the value of the microscope and testing-machine in determining quality. General discussion. 3800 w. Jour Fr Inst—Jan., 1905.

Strength.—Bronzes and Brasses Used in Machine Construction and for Valves and Cocks. Ern. Roussel. Reports investigations made to determine the strength of the different bronzes and brasses used in machine construction and more particularly in locomotive building. 2000 w. 5 tables and figure. Bul Int Ry Cong—Vol. XIX., No. 6.

Temperature Effects.—Experiments Upon the Effect of Temperature on the Resistance and Ductility of Bronze (Versuche über die Abhängigkeit der Festigkeit und Dehnung der Bronze von der Temperatur). C. Bach. A very full record of experiments, with tables and digrams. 3500 w. Zeitschr d Ver Deutscher Ing—Dec. 22, 1900.

The Strength and Ductility of Bronze in Relation to Temperature. C. Bach, in "Zeitschrift d Ver Deutscher Ing." A report of experiments giving tables and diagrams. 2800 w. Engr, Lond—April 5, 1901.

Further Researches upon the Relation of the Strength of Bronze to its Temperature (Weitere Versuche über die Abhängigkeit der Zugfestigkeit und Bruchdehnung der Bronze von der Temperatur). C. Bach. A fully tabulated account of Prof. Bach's important and latest results. Zeitschr d Ver Deutscher Ing—Oct. 19, 1901.

BRONZE POWDER.

Germany.—The Manufacture of Bronze Powder in Germany. Information concerning this product, used for producing gilt and bronze effects in wood, paper and various metals. 1000 w. U. S. Cons Repts, No. 1087—July 15, 1901.

BROWN.

The Debt of Eelectrical Engineering to C. E. L. Brown. B. A. Behrend. The first of several articles giving an account of the work of a great engineer, and also showing the origin of many of the standard types of electrical apparatus. Serial. 1st part. 3000 w. Elec Wld & Engr—Nov. 16, 1901.

BROWN COAL.

See also **COAL; COAL REGION; FUEL; MINERAL REGION.**

Brown Coal as Fuel. S. Linderoth. Information concerning the origin, varieties, structure and heating value. 1200 w. Brick—Nov. 1, 1900.

Alpine.—See **FUEL GAS—Brown Coal.**

Bohemia.—Notes on the Bohemian Lignite Industry (Einiges vom Böhmischen Braunkohlenbergbau). H. Prietze. An account of the methods used in working the brown coal deposits of northwestern Bohemia. 1500 w. Glückauf—Sept. 5, 1903.

See also **COAL INDUSTRY; COAL MINING—Pillars; Saxony.**

Briquetting.—See **BRIQUETTING.**

Germany.—Power from Lignite in Germany. An account of large works in Germany where lignite is the only fuel used for steam-raising purposes. 700 w. Engr, Lond—Sept. 5, 1902.
See also **FUEL.**

Germany and Austria.—The Brown Coal Industry in Germany and Austria. James Stirling. From the reports issued by the Dept. of Mines of Victoria. Gives the result of personal inspection of the principal brown coal districts of the countries named. Ill. 1300 w. Col Guard—June 28, 1901.

The Brown Coal Industry of Germany and Austria. A résumé of the report of James Stirling, giving information of the principal mining areas in the countries named. Ill. 3700 w. Ir & Coal Trds Rev—Aug. 23, 1901.

Locomotive Operation.—See **LOCOMOTIVE OPERATION—Brown Coal.**

North Dakota.—Lignite Deposits, or Fields of Brown Coal in North Dakota. R. M. Haseltine. Read before the Ohio Inst. of Min. Engrs. Discusses their extent, thickness and fuel value. 3500 w. Mines & Min—July, 1901.

The Lignite Mines of North Dakota. Frank A. A. Wilder. The first of three illustrated articles reviewing the nature and extent of these deposits, their fuel value, and present state of development. Serial. 1st part. 2000 w. Eng & Min Jour—Nov. 22, 1902.

The Fuel Value of the North Dakota Lignites. Frank A. Wilder. Information in regard to the quality, the uses to which it may be applied, results of tests, etc. Ill. 2000 w. Eng & Min Jour—Feb. 7, 1903.

The Lignite Mines of North Dakota. Frank A. Wilder. Facts relating to output, the development of the lignite industry, mines and methods of mining. 2000 w. Eng & Min Jour—Feb. 28, 1903.

Oregon.—See **COAL REGION.**

St. Louis Tests.—See **FUEL TEST.**

Styria.—The Lignite Deposits at Hrastovetz (Der Braunkohlenbergbau von Hrastovetz). Ivan Kavcic. An account of the deposits of brown coal in lower Styria, with data of chemical composition and calorific power. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 14, 1905.

Texas.—See **MINERAL REGION.**

Victoria.—Brown Coal at Narracan (V.). Henry C. Jenkins. A report by the government metallurgist on this deposit. 1900 w. Aust Min Stand—Oct. 17, 1901.

BRUNEL.

Brunel and the 7-Ft. Gauge. Herbert T. Walker. Reviews the engineering works of Isambard Kingdom Brunel, and gives an account of the 7-ft. gauge laid for the Great Western Railway of England. Ill. 3000 w. R R Gaz—Oct. 16, 1903.

BRUSH.

See also **COMMUTATOR; ELECTRIC GENERATOR; ELECTRIC MACHINERY; ELECTRIC MOTOR.**

Oil Insulated.—See **COMMUTATOR—Oil Insulated.**

BRUSH SPECIFICATION.

Long Island Ry.—Brush Specifications, Long Island Railroad. A copy of these novel specifications. Ill. 1200 w. R R Gaz—June 26, 1903.

BUCKLING.

See **BEAM; COLUMN; MATERIALS' STRENGTH.**

BUCKSTAY.

I-Beam.—I-Beam Buckstays. J. H. Granbery. Shows the advantage in cost and strength gained by the use of buckstays for strengthening furnace walls, of I-beam and channel sections in place of the tee-rail. 600 w. Eng & Min Jour—Sept. 16, 1905.

BUFFER.

See CAR COUPLER; DRAFT GEAR; SPRING.

BUILDING.

See also BUILDING CONSTRUCTION; STEEL CONSTRUCTION; and under specific names of buildings.

Armory.—See ARMORY.

Chamber of Commerce.—The Chamber of Commerce Building, New York. Illustrated detailed description of the building and its arrangement. 1800 w. Eng Rec—March 1, 1902.

Collapse.—See BUILDING ACCIDENT.

Engineering.—See ENGINEERING BUILDING.

Government.—See BUILDING CONSTRUCTION—Engineer and Architect.

Mining and Metallurgy.—See EDUCATION.

Operating Costs.—Cost of Operating Buildings. Gives results of some investigations recently made of a number of New York buildings, compiled from actual running expenses. 1000 w. Eng Rec—Dec. 19, 1903.

See also MECHANICAL PLANT; POWER PLANT.

Railway.—See RAILWAY BUILDINGS.

Railway Exchange, Chicago.—The Railway Exchange Building, Chicago, Ill. Illustrations, with brief description of a fine building in Chicago for needs of the railroads centering in Chicago for general office purposes. 500 w. Archts & Builders' Mag—July, 1904.

Railway Office, Montreal.—The Grand Trunk's New Office Building. Illustrated detailed description of this recently completed fine building in Montreal. 1300 w. Ry Age—Oct. 17, 1902.

Sunlight.—The Orientation of Buildings and of Streets in Relation to Sunlight. William Atkinson. A study of the subject in relation especially to hospital architecture, but applicable to residences. Ills. 5700 w. Tech Qr—Sept., 1905.

Y. M. C. A.—The Twenty-third Street Y. M. C. A. Building, New York. Illustrated description of unusual features in a ten-story building, which will contain an auditorium, gymnasium, swimming tank and running track, and so require heavy construction. 3500 w. Eng Rec—May 31, 1902.

BUILDING ACCIDENT.

Albany.—The Collapse of the Meyers' Building, Albany. Explains the conditions existing, and the cause of the disaster, giving extracts from the report made by the committee of examination. 1300 w. Eng Rec—Sept. 2, 1905.

The Collapse of a Department Store Building at Albany, N. Y. Gives a summary of the circumstances of the accident, which occurred during reconstruction work. Also editorial. Ills. 5000 w. Eng News—Sept. 7, 1905.

Darlington Hotel, N. Y.—The Collapse of the Darlington Apartment House in New York City. A statement of the general circumstances as known, with discussion of the construction work, and the possible causes of the collapse. Ill. 3000 w. Eng News—March 10, 1904.

Collapse of Ten Stories of an Iron and Steel Frame Structure. Illustration, with account of the collapse of the Darlington Hotel, in course of construction on 46th St., New York. 1500 w. Ir Age—March 10, 1904.

The Darlington Hotel Collapse in New York City. Description of this disaster, with editorial comment. 3000 w. Eng Rec—March 12, 1904.

Causes of the Darlington Hotel Collapse. Report of H. deB. Parsons, summarizing the causes of the collapse. 1500 w. Ir Age—March 17, 1904.

Causes of the Darlington Hotel Collapse. Drawings and further notes illustrating the points brought out in the report of H. deB. Parsons. 600 w. Ir Age—March 24, 1904.

Concerning the Fall of the Darlington Building. Editorial on this disaster, outlining the history of the case and commenting upon it. 3300 w. Eng News—March 24, 1904.

The Collapse of a Building During Construction. H. de B. Parsons. Brief description of the construction and collapse of the Hotel Darlington. Ill. 1600 w. Pro Am Soc of Civ Engrs—April, 1904.

The Collapse of a Building During Construction. Discussion on paper by H. de B. Parsons on the Hotel Darlington disaster in New York. 10000 w. Pro Am Soc of Civ Engrs—Aug., 1904.

New York.—The Court of Final Resort of New York on the Failure of the Ireland Building. Full text of a decision exonerating from blame the owner of a building which fell during construction on account of improper foundation for columns. 3000 w. Eng Rec—April 20, 1901.

An Expert Report on the Collapse of Buildings in New York City. Report of the Board of expert engineers on the causes of the fall of several nearly completed buildings. Considers the failures were due to defective construction—slovenly mason work and poor mortar. 1200 w. Eng News—April 13, 1905.

See also Darlington Hotel.

BUILDING COLLAPSE.

See BUILDING ACCIDENT.

BUILDING CONSTRUCTION.

See also ARCHITECTURE; BUILDING; BUILDING MOVING; CAISSON; FIREPROOF CONSTRUCTION; FOUNDATION; GIRDER; STEEL CONSTRUCTION; UNDERPINNING; and under specific buildings and structures.

Some Features of the Design and Construction of High Buildings. William Copeland Furber. Outlines the courses that led to this peculiar type of building, and discusses the design and construction, giving illustrations. Considers fireproofing, rust protection wind bracing, etc,. etc. 10,700 w. Pro Engrs' Club of Phila—Jan., 1902.

Influences Affecting Modern Building. Cyril Blackel. Read before the Inst. of Archts. of N. S. W., Sydney. Compares the materials in present use with those of one hundred years ago, discusses the sewerage systems, steel work, gas, electricity and other influences that have affected design. 3500 w. Archt, Lond—Nov. 28, 1902.

Sky-Scrapers. Arthur W. French. Considers the construction of tall steel-framed buildings, and the engineering problems involved. 5200 w. Jour Worcester Poly Inst—July, 1904.

Altman, N. Y.—The New Altman Building. New York. Describes the construction of this fine department store at 5th Ave., 34th and 35th Sts., giving details of the steelwork. 1200 w. Eng. Rec—Nov. 4, 1905.

American vs. British.—A Comparison of English and American Methods in the Erection of Buildings. Charles Heathcote. Read before the Inst. of Builders. 5200 w. Builder—Dec. 5, 1903.

American Methods of Erecting Buildings. R. A. Denell. Considers constructive methods, especially in regard to the increase in rapidity of construction and economy. Ills. Discussion. 12000 w. Jour Roy Inst of Brit Archts—Nov. 25, 1905.

See also British Westinghouse.

Ansonia Apartments.—See POWER PLANT.

Apartment House, N. Y.—Structural Engineering in Apartment-House Construction. Editorial discussion of phases of construction in current practice in New York, with illustration of a typical building. 2500 w. Eng News—April 14, 1904.

Architect and Engineer.—See Engineer and Architect.

Austrian Standards.—Loads and Working Stresses for Austrian Building Work. Gives the unit stresses adopted by the Austrian Society of Engineers and Architects after an investigation covering two years. 600 w. Eng Rec—April 5, 1902.

Baltimore-American.—The Rapid Construction of the Baltimore-American Building. An illustrated account of the construction of a newspaper building on the site of the great fire within a year from the date of the destruction. 1400 w. Eng Rec—Feb. 18, 1905.

Baltimore, Continental Trust.—The Reconstruction of the Continental Trust Building, Baltimore. Describes this sixteen-story steel-cage office building as first constructed, the damage wrought by the great fire, and the method and extent of reconstruction. Ills. 2500 w. Eng Rec—June 3, 1905.

Bank, Chicago.—The Chicago National Bank Building. Illustrates and describes the construction of a 90 1-2 x 181 1-2-foot four-story steel and brick structure. 2400 w. Eng Rec—Aug. 31, 1901.

Bank, N. Y.—The Hanover National Bank Building, New York. Illustrated description of the steelwork in a 111x98 ft. office building rising 330 ft. above the sidewalk. 2000 w. Eng Rec—March 8, 1902.

The Construction of the Hanover Bank Building, New York. Illustrates and describes the method of constructing pneumatic foundations and erecting steel-work of a 22-story office building. The details of a large steel derrick are shown. 2000 w. Eng Rec—April 12, 1902.

The Bank of the State of New York. Illustrated description of a 25-story, steel-cage structure resting on foundation piers sunk by the pneumatic process, and showing many unusual details in the wind bracing and connections of the steelwork. 3800 w. Eng Rec—Sept. 13, 1902.

Extension of the Corn Exchange Bank Building, New York. Illustrated description of the enlargement by the addition of a steel cage extension. 2800 w. Eng Rec—June 14, 1902.

See also **CAISSON.**

Bank, Pittsburg.—The Steel Framework of the Farmers' Bank Building, Pittsburg, Pa. An illustrated description of the steel structural work of a 24-story office building. 4200 w. Eng News—Sept. 18, 1902.

The Construction of the Farmers' Bank Building, Pittsburg. An illustrated description of rapid building operations. A 24-story steel-cage office building with basement and sub-basement was erected and occupied in less than one year. 2400 w. Eng Rec—March 18, 1905.

The Diamond Bank Building, Pittsburg. Illustrated description of a 12-story, steel-cage office building showing special features in the steel construction for the substructure, and in other details. 2200 w. Eng Rec—Feb. 18, 1905.

Battery Place, N. Y.—The Battery Place Building, New York. Illustrated description of the steelwork and methods of carrying the face walls of a 20-story office building. 1800 w. Eng Rec—July 19, 1902.

See also **CAISSON.**

Bellevue-Stratford Hotel.—See **GIRDER.**

Blair, N. Y.—The Blair Building, New York. Illustrated description of the construction of a 20-story, steel-cage office building in New York. 3000 w. Eng Rec—Sept. 6, 1902.

Brick.—See **British Westinghouse; BRICKWORK.**

British.—Structural Costs. The present article is introductory and shows that designs are often made by men ignorant of practical work, of the costs of different classes of work, and the disadvantages that result. The subject is considered from the British point of view. Serial. 1st part. 2500 w. Engr, Lond—May 23, 1902.

British Westinghouse.—Bricklaying at the British Westinghouse Works. J. C. Stewart, in the London "Times." Explains the method adopted to double and triple the rate of bricklaying per man in Great Britain. 1700 w. Eng Rec—March 29, 1902.

British vs. American Methods of Construction. Extract from an article by D. N. Dunlop, in the "Nottingham Guardian," relating primarily to the Westinghouse Electric Works at Manchester, but involving questions which affect the entire industrial situation of Great Britain. 1000 w. U S Cons Repts, No. 1289—March 14, 1902.

The American Engineer in England. William G. Sloan. Describes the work of building the plant of the British Westinghouse Elec. & Mfg. Co., comparing English and American methods and giving many interesting facts. Ill. 5200 w. Jour W Soc of Engrs—Aug., 1902.

How to Get Despatch in Construction. Discusses facts brought out in a recent paper by Charles Heathcote, bearing upon methods of securing economy and dspatch in construction. Considers the building of the Westinghouse Works at Manchester, Eng. 2400 w. Jour Gas Lgt—Dec. 22, 1903.

Broadway-Chambers, N. Y.—The Broadway-Chambers. Illustrated description of a fine 18-story building in New York, which was fully represented at the Paris Exhibition. 1200 w. Arch & Builds' Mag—Nov., 1900.

Candler, Atlanta.—The Candler Building, Atlanta. Illustrated detailed description of a 17-story steel-cage office building. 1500 w. Eng Rec—June 17, 1905.

Cellar Bracing.—Cellar Bracing in the New York Stock Exchange. This building is remarkable for the character and depth of the foundations. Some of the features of special construction used in providing bracing to resist hydraulic pressure below the ground-water line are described in this article. Ill. 3500 w. Eng Rec—Aug. 16, 1902.

Chicago.—The Montgomery Ward & Company Building, Chicago. Illustrated description of a 12-story steel-cage office building with a tower 390 ft. high. The structural details of the latter, the special system of fire-proofing and an unusual system of open elevator shafts are described. 2200 w. Eng Rec—May 25, 1901.

The New Schlesinger and Mayer Building, Chicago. Illustrated description of interesting construction work on a department store building. 2000 w. Br Build—May, 1903.

See also **Bank.**

Cincinnati, O.—See **CONCRETE REINFORCED—Office Building.**

Column.—See **COLUMN.**

Columns, Hall of Records.—Setting Heavy Columns in the Hall of Records, New York. Describes the method of handling granite columns 4 1-2 feet in diameter and 36 ft. long. 900 w. Eng Rec—May 10, 1902.

Setting the Heavy Granite Columns on the Hall of Records. An illustrated account of the transportation and setting of 40-ton columns. 600 w. Sci Am—June 7, 1902.

Column Seat.—A Poor Column Seat. Illustrated description of skin work in a New York apartment house. 600 w. Eng Rec—July 27, 1901.

Composite.—See **Paris Exposition.**

Concrete Reinforced.—See **CONCRETE REINFORCED.**

Conservatory of Music, Boston.—See **Music Conservatory.**

Continental Trust, Baltimore.—See **Baltimore Continental Trust.**

Crystal Palace, London.—See **CRYSTAL PALACE.**

Dining Hall.—Steel Details of a Large Dining Hall. Illustrates and describes details of the dining hall for the Middletown State Hospital for the Insane. 1600 w. Eng Rec—Nov. 5, 1904.

Dome.—See **DOME.**

Earthquake-Proof.—Earthquake-Proof Buildings in Japan. Illustrated description of methods of construction adapted to divide up brick walls in small sections firmly held by steelwork. 1400 w. Eng Rec—Feb. 22, 1902.

Electric Plant.—See **ELECTRIC PLANT; POWER PLANT.**

Electric Station.—See **ELECTRIC STATION.**

Electric Station, Schenectady.—Structural Details of the General Electric Company's Power House, Schenectady. Illustrated description. Serial. 1st part. 1800 w. Eng Rec—Sept. 30, 1905.

Engineer and Architect.—The Relation of the Architect and Engineer to the Design and Erection of Government Buildings. John Stephen Sewell. From a paper read at the convention of the Am. Inst. of Archts. at Washington. Discusses their relative positions and the need of improving the system of the construction of these works. 2000 w. Eng News—Dec. 18, 1902.

The Engineer, the Architect, and the General Construction Company. Reginald Pelham Bolton. An arraignment of the abuses existing in the present practice of conduct of the engineering portions of modern building construction. 3000 w. Engineering Magazine—August, 1904.

The Relation of the Engineer to the Architect. Corydon T. Purdy. Read at the convention of the Am. Inst. of Archts. Considers the various methods of accomplishing work requiring both architects and engineers, and offers suggestions for adjusting their relations. 7500 w. Eng News—Jan. 26, 1905.

Estimating.—See **ESTIMATING.**

Flatiron, New York.—The Flatiron Building, New York. Illustrated description of the unusual structural steel details of a 21-story office building, triangular in plan and exposed to wind on all sides. 4800 w. Eng Rec—March 29, 1902.

The Flatiron Building, New York. Illustrations with brief description of this conspicuous New York office building. 800 w. Ir Age—Aug. 21, 1902.

Giletti System.—A New Method of Building Construction. S. Giletti. Illustrates and describes a method of building walls, partitions and floors in which the metallic frame is inserted in flues left open for this purpose, the walls being built first, and then filled in, binding the whole in a solid mass. 1500 w. Jour Assn of Engng Socs—Sept., 1904.

Gill, N. Y.—The Gill Building, New York. Illustrated description of the foundations and steel work in a 15-story, 56x86-ft. building. A number of the connections in the metal work are of special design. 2500 w. Eng Rec—Nov. 3, 1900.

Hangers.—Points that Should be Considered in Selecting or Designing Joist and Wall Hangers. F. E. Kidder. An illustrated article giving information of interest and practical value. 3300 w. Ins Engng—May, 1903.

Hippodrome, N. Y.—See **STEEL CONSTRUCTION.**

History.—The Biography of an Office Building. Arthur Goodrich. An illustrated article tracing the development of the American sky-scraper from the signing of the contract to completion. 3200 w. World's Work—Jan., 1903.

Hollow Wall.—See **Concrete.**

Hotel, N. Y.—Hotel Belmont. Illustrated description of the difficult engineering features of a hotel under construction in New York City, at the corner of 42d St. and Park Ave., 26 stories high, with 5 below the surface. The conditions and requirements are in many respects unusual. The Rapid Transit Ry. passes under one corner. 5700 w. Eng Rec—Feb. 7, 1903.

Supporting an Old Wall from a New Building. Illustrates and describes a difficult piece of work successfully accomplished, in the course of enlarging the Imperial Hotel of New York City. 900 w. Eng Rec—Jan. 16, 1904.

The Extension of the Imperial Hotel, New York. Illustrated detailed description of important features of the work. Serial. 1st part. 3300 w. Eng Rec—April 16, 1904.

Ingalls, Cincinnati.—See **CONCRETE REINFORCED—Office Building.**

Iron, Early.—Early Iron Building Construction. Illustrates and describes interesting details of floor framing in an old building in New York. 2700 w. Eng News—Sept. 10, 1903.

Johnson System.—See **FLOOR.**

Kuhn-Loeb, N. Y.—Structural Details of the Kuhn-Loeb Building, New York. Details of a twenty-story steel cage structure are illustrated and described. 2200 w. Eng Rec—Jan. 2, 1904.

Loft Building, N. Y.—Column and Girder Details in a Loft Building. Brief illustrated description of details of a ten-story and basement building in New York, with a statement of the advantages claimed by the designers. 1000 w. Eng Rec July 1, 1905.

Machine Shop and Power House.—See **MACHINE SHOP—Cramp's, Philadelphia.**

Manchester, Eng.—See **Westinghouse Works, Eng.**

Manhattan Life, N. Y.—Enlarging and Remodeling the Manhattan Life Building. A description of this interesting engineering work, with illustrated details and methods of carrying out the work. 4800 w. Eng Rec—April 4, 1903.

Mechanical Plant.—See **MECHANICAL PLANT—Tall Buildings.**

Medical College, Cornell.—Structural Details of the Medical Building, Cornell University. Illustrated description. 1800 w. Eng Rec—May 16, 1903.

Mercantile, N. Y.—Reconstruction of the Mercantile Building, New York City. Illustrates and describes the methods used in adding six more stories, and building a steel-cage addition on the East Side. 3300 w. Eng Rec—Oct. 28, 1905.

Mexico.—The Mutual Life Building in the City of Mexico. Brief illustrated description of a modern office building costing $1,500,000. The treacherous soil made it necessary to float the building on a mattress of concrete and steel grillages. 1500 w. Eng Rec—June 10, 1905.

Morse.—Reconstructing the Morse Building, New York. Illustrated description of the methods employed in building an 8-story steel cage structure on top of one of the oldest office buildings in the city. 3100 w. Eng Rec—Nov. 2, 1901.

Music Conservatory, Boston.—Engineering Features of the New England Conservatory of Music, Boston. Howard S. Knowlton. Illustrates and describes the construction of a building to meet the needs of about 1,500 students in instrumental and vocal music. 2500 w. Eng Rec—April 1, 1905.

Mutual Life, N. Y.—See **FOUNDATION—Office Building, N. Y.**

Naval Academy.—See **NAVAL ACADEMY.**

Naval Station, New Orleans.—Structural Features of the New Buildings at the New Orleans Naval Station. L. F. Bellinger. Illustrations with brief description. 700 w. Eng Rec—Oct. 28, 1905.

New Orleans.—The Hibernia Building, New Orleans. I. Foundations. An illustrated detailed description of special features in a 12-story steel cage building. The present article considers the foundations which are built on very wet soft ground. 2500 w. Eng Rec—Nov. 22, 1902.

New York.—See **Bank; Battery Place; Blair; Broadway; Flatiron; Gill; Hotel; Imperial Hotel; Kuhn-Loeb; Manhattan Life; Mercantile; Morse; Pabst; Stock Exchange; Times; Trinity; Wall Street Exchange.**

Pabst, N. Y.—The Pabst Hotel and Majestic Theater. Illustrated detailed description of a four-story, steel-cage, fireproof building recently erected in New York. 2000 w. Eng Rec—Nov. 7, 1903.

Paris Exposition.—Composite Structures. An account of tests made of buildings which did service at the recent Paris Exposition, especially the Pavilion of the Republic of San Marino, a system of reinforced brick work and concrete with interwoven cores. The economy of material combined with resistance to all kinds of demolition could hardly be exceeded. 2800 w. Engng—March 21, 1902.

Philadelphia.—The Twenty-Three-Story Land Title Building, Philadelphia, Pa. The first article deals especially with foundations, wind-bracing, etc. An illustrated detailed description. Serial. 1st part. 3300 w. Eng Rec—Oct. 3, 1903.

Phipps, Pittsburg.—See **Power Plant, Pittsburg.**

Pittsburg.—Structural Features of the Frick Building, Pittsburg. Illustrates and describes the construction of a twenty-story steel-cage fireproof office building. 3000 w. Eng Rec—Jan. 11, 1902.

The Philadelphia Company's Building, Pittsburg. Illustrated description of the foundation and steel-work of a high office building. Eng Rec—Oct. 4, 1902.

Pittsburg R. R. Terminal.—See **RAILWAY TERMINAL.**

Power House and Pulp Mills.—See **DAM—Schuylerville, N. Y.**

Power Plant, Pittsburg.—The Phipps Power Building. Gerald E. Flanagan. An illustrated detailed description of a building and its equipment, designed to furnish power in various forms to a group of buildings adjacent. 4000 w. Pro Engrs' Soc of W Penn—Aug., 1904.

The Equipment and Construction of the Phipps Power Building at Pittsburg. Gerald E. Flanagan. Illustrated description of a building designed to furnish power in various forms from a central station to a group of buildings adjacent. 4000 w. Ir Trd Rev—Sept. 15, 1904.

Structural Features in the Phipps Power Building, Pittsburg, Pa. Edward Godfrey. Brief illustrated description of the structural steel works. 1300 w. Pro Engrs Soc of W Penn—Nov., 1904.

Pugh, Cincinnati.—See **CONCRETE REINFORCED.**

Railway Exchange.—See **BUILDING.**

Railway Stations.—See **RAILWAY STATION.**

Rapid.—See **British Westinghouse.**

Remsen, N. Y.—Construction of the Remsen Building, New York. Illustrated description of the method of building a 16-story steel-cage office building and of special derricks used in the work. 2800 w. Eng Rec—March 22, 1902.

Replacing Girders.—Replacing Girders in a Lower Story of a High Office Building. Illustrated description of work carried out in enlarging the N. Y. Times Building, on Park Row, New York. 3000 w. Eng Rec—Sept. 24, 1904.

Rockefeller, Cleveland.—Structural Features of Rockefeller Building at Cleveland. Illustrated description of interesting features of a 17-story, steel-cage, fireproof office building. 1500 w. Eng Rec—May 27, 1905.

Rolled Joists.—The Use of Rolled Joists in Construction. A. T. Walmisley. Read before the British Archt. Assn. An interesting and valuable paper, with many diagrams, and short general discussion. 8700 w. Builder—Dec. 1, 1900.

Rolling Mill.—See **ROLLING MILL—Middletown, O.**

Running Stream.—A Novel Method of Supporting a Building Over a Running Stream. Illustrated description of the solution of a troublesome problem in construction, in connection with extensions of the plant of the N. Y. Rubber Co., at Matteawan, N. Y. 800 w. Eng News—Nov. 15, 1900.

St. Louis Exposition.—The Building of a World's Fair. An illustrated description of how the Louisiana Purchase Exposition has been constructed, with map showing civil engineering works on grounds. 9600 w. Eng Rec—May 7, 1904.

The Building Construction of the St. Louis Exhibition. Illustrated article describing in detail the construction of these buildings. 6500 w. Eng News—May 19, 1904.

See also **ST. LOUIS EXPOSITION.**

Sanitary.—Dwelling Houses; Their Sanitary Construction and Arrangement. W. H. Corfield. Concerning the proper ventilation of houses. 1800 w. Dom Engng—Sept. 15, 1901.

See also **ARCHITECTURE.**

Shoring.—A Unique Case of Shoring Work on a New York Telephone Building. An illustrated description of method used in enlarging the "Madison Square" Station, in which a brick and iron building was swung up from overhead rather than shored up from below in order to remove certain parts of its walls. 1300 w. Eng News—April 7, 1904.

See also **Hotel, N. Y.**

Stock Exchange, N. Y.—The New York Stock Exchange Building. Illustrated description of the heavy steel-work in a 150x150 ft. building having an unusual arrangement of rooms. 2600 w. Eng Rec—May 17, 1902.

Erection of the New York Stock Exchange Building. Illustrated description of the method of bulding a steel frame so heavy that bridge erection methods had to be adopted. 2300 w. Eng Rec—May 24, 1902.

See also **Cellar Bracing; FOUNDATION.**

Sugar Factory, Hawaii.—Practice in the Design, Construction and Operation of Raw Cane Sugar Factories in the Hawaiian Islands. J. N. S. Williams. An illustrated detailed description of works designed to meet the changed conditions and increase in production. 9700 w. Inst of Mech Engrs—Nov. 21, 1902.

Telephone Exchange. — See **TELEPHONE EXCHANGE.**

Temporary Timber.—Temporary Timber Structures. Considers the principles to be observed in designing these structures, that they may bear safely the great weight often put upon them. 1700 w. Builder—June 14, 1902.

Terra Cotta Reinforced.—See **TERRA COTTA—Reinforced.**

Times, N. Y.—The New York "Times" Building. An illustrated account of the new building at Broadway and 42d Sstreet, New York. 2500 w. Stevens Ind—July, 1904.

The Construction of the Times Building, New York City. An illustrated general description. The present article deals especially with the foundations and excavation. Serial. 1st part. 3500 w. Eng Rec—April 30, 1904.

The New Times Building. Illustrated detailed description of the design and construction. 4000 w. Archts & B'ldrs' Mag—March, 1905.

See also **UNDERPINNING.**

Trinity, N. Y.—The Erection of the Trinity Building, New York. Illustrated description of a building under construction adjacent to Trinity Church, of great height and of special interest. 2000 w. Eng Rec—Dec. 3, 1904.

The Steel Framework of the Trinity Building, New York. An illustrated detailed description of a building of twenty-one stories, or nearly 300 feet above the curb. 2700 w. Eng Rec—Jan. 14, 1905.

See also **FOUNDATION.**

U. S. Printing Office.—Foundations and Steel Work in the Government Printing Office in Washington, D. C. Illustrated description with data relating to the construction. 3500 w. Eng Rec—March 7, 1903.

Vaults.—See **VAULT.**

Wall Street Exchange.—The Erection of the Wall Street Exchange Building, New York. Illustrated description of a steel cage building about 100 feet square and 327 feet high from sidewalk to top of roof beams. 2000 w. Eng Rec—March 5, 1904.

Wanamaker, Philadelphia.—The Erection of the Wanamaker Building, Philadelphia. Illustration, with brief description of methods of construction. 1800 w. Eng Rec—Aug. 5, 1905.

Westinghouse, England.—See **British Westinghouse.**

BUILDING LAW.

New York.—Some Comments on Building Laws. Gunvald Aus. Remarks on engineering points in the New York building code. Elaborated from an address in the Brooklyn Chapter of the Am. Inst. of Archts. 3500 w. Eng News—April 14, 1904.

Tarnsey Act.—Building Construction Under the Tarnsey Act and Suggestions for Modifying It. William A. Boring. Suggestions based on the author's experience in connection with the immigrant station on Ellis Island, N. Y., for remedying the defective features of the law governing the work of architects employed on national buildings. 3500 w. Eng Rec—Oct. 26, 1901.

BUILDING MACHINERY.

Düsseldorf Exposition.—Construction Machinery at the Düsseldorf Exposition, 1902 (Die Baumaschinen der Düsseldorfer Ausstellung, 1902). W. Hübbe. An illustrated account of concrete mixers, elevators, pile drivers, excavators and other machines for building operations. 3000 w. Zeitschr d Oesterr Ing u Arch Vereines—May 8, 1903.

BUILDING MATERIAL.

See also **MATERIALS' STRENGTH** and under specific materials.

Asphalt.—See **ASPHALT—Rock.**

Austrian Report.—Report of the Building Materials Committee (Bericht des Baumaterialien-Ausschusses). Karl Stöckl. A report of a committee of the Austrian Society of Engineers and Architects, with tables for all kinds of building materials and for floors, roofs, etc., with discussion. 4000 w. Zeitschr d Oester Ing u Arch Ver—Special Supplement—Feb. 21, March 7, 1902.

Basalt.—See **BASALT.**

Brick.—See **BRICK.**

Ceramics vs. Stone.—See **CERAMICS.**

Estimating.—See **ESTIMATING.**

Glass.—See **GLASS.**

Iron.—See **IRON—Building Material.**

Paris Exposition.—Building Materials at the Paris Exhibition, 1900. A review of the exhibits of this class, with comments on the attempted classification. Serial. 1st part. 3200 w. Engng—Dec. 7, 1900.

Preservation.—The Preservation of Materials of Construction. An interesting informal discussion of this subject. Ill. 11300 w. Pro Am Soc of Civ Engrs—March, 1903.

The Preservation of Materials of Construction. Continued informal discussion of this subject. Ill. 2300 w. Pro Am Soc of Civ Engrs—May, 1903.

See also **METAL CORROSION; METAL PROTECTION; STEEL CONSTRUCTION.**

Quarzitol.—See **BRICK.**

Slag.—See **SLAG—Structural Material.**

Specific Gravity.—See **Weight.**

Stone.—See **STONE.**

Strength.—Some Principles Common to All Building Materials. Frank Caws. A comparison of the strength and strains of building material with the human body. 6500 w. Jour Roy Inst of Brit Archts—Feb. 9, 1901.

Testing.—Regulations of the Bureau of Buildings, Borough of Manhattan, for the Testing of New Materials of Construction. Gives regulations based on common brick as a standard, using the results obtained by Prof. Ira H. Woolson. 1200 w. Eng News—April 13, 1905.

Weight.—Specific Gravity and Weight of Building Stone, Cements and Other Non-Metallic Structural Materials. Edwin C. Eckel. Aims to give reliable data on the specific gravity and weight per cubic foot of various classes of building stones, and also of plasters, limes and cements. 2000 w. Eng News—Sept. 7, 1905.

BUILDING MOVING.

See also **BUILDING CONSTRUCTION; UNDERPINNING.**

Brooklyn, N. Y.—Moving a Block of City Residences. Describes the removal of two rows of city residences in Brooklyn, N. Y., of brick and stone construction of different styles, built at different periods. Ills. 1200 w. Eng Rec—Dec. 16, 1905.

Pittsburg.—Moving and Underpinning Buildings. Illustrated description of methods employed in raising, lowering and underpinning timber, brick and stone buildings in Pittsburg and vicinity. 3000 w. Eng Rec—April 27, 1901.

Raising a Brick Dwelling One Hundred and Sixty Feet. Illustrates and describes a remarkable job of house raising and moving recently successfully accomplished in Pittsburg. 1200 w. Eng Rec—Dec. 19, 1903.

BULKHEAD.

See also **BREAKWATER; HARBOR; PIER; RIVER REGULATION; WATER-TIGHT COMPARTMENT.**

Philadelphia.—See **PIER.**

New York.—See **PIER.**

Ship.—See **WATER-TIGHT COMPARTMENT.**

BULKHEAD DOOR.

See **WATER-TIGHT DOOR.**

BUMPING POST.

Hydraulic.—Hydraulic Bumping Posts (Hydraulische Prellböcke). An illustrated description, partly from a paper by Hr. Sarre before the Verein für Eisenbahnkunde, of bumping posts with hydraulic cylinders, in use in German railway stations. 1000 w. Zeitschr f Lokomotivführer—Feb. 28, 1902.

BUNSEN BURNER.

See **GASBURNER—Bunsen; INCANDESCENT GAS LIGHTING.**

BUOY.

See also **LIGHTHOUSE.**

Bell.—Bell Buoy That Rings Under All Conditions. Illustrated description of an improved type in use in Baltimore harbor. 1200 w. Marine Rev—Aug. 14, 1902.

BURNER.

Gas.—See **GAS BURNER; INCANDESCENT GAS LIGHTING.**

Gasoline.—See **LIQUID FUEL—Burner.**

Kerosene.—See **LIQUID FUEL—Burner.**

Oil.—See **LIQUID FUEL—Burner.**

BY-PRODUCTS.

See also **BLAST-FURNACE GAS; COKE MANUFACTURE; COKE OVEN; GAS MANUFACTURE; WASTE UTILIZATION.**

Gas, Coke and Pig Iron.—By-Products from Gas, Coke and Pig Iron Manufacture. Information from the report of R. Forbes Carpenter. 2500 w. Col Guard—Aug. 7, 1903.

C

CABLE.

See also **CABLE RAILWAY; CABLEWAY; ELECTRIC CABLE; HOISTING; SUBMARINE CABLE; TELEPHONE CABLE; WIRE ROPE.**

Bridge.—The Construction of Suspension Bridge Cables. An editorial review of the history of cable construction, particularly the attempts to improve upon the parallel wire cable. 1500 w. Eng News—Nov. 27, 1902.

Wire Cables and Wide Cable Spans (Drahtseile und Grosse Seilspannweiten). Sigfried Abt. Describing improved methods of laying wire cables, together with data about wide suspension spans. 2000 w. Schweiz Bauzeitung—July 15, 1905.

Bridge, Brooklyn.—See **BRIDGE ACCIDENT—Brooklyn.**

Bridge, Manhattan.—Cables for the Manhattan Bridge. Gives drawings showing some of the details of the cable connections and suspenders, with information from the specifications. 1300 w. R R Gaz—Vol. XXXIX. No. 4.

Bridge, Williamsburg.—Cable Making on the New East River Bridge, New York. A description of the method of laying the wires for a suspension bridge with cables 2,985 ft. long. 2200 w. Eng Rec—May 3, 1902.

Cable Making on the New East River Bridge. An illustrated description of this interesting work. Each cable will be composed of 7696 wires, and have a strength of 200,000 lbs. per sectional square inch. Describes the process of cable making, the changes introduced, and the system of anchoring the cables. 1400 w. Ir Age—May 8, 1902.

Making the Cables on the New East River Bridge, New York. An illustrated description of the method of building these cables which are the largest suspension cables in the world. 1600 w. Sci Am—July 26, 1902.

Waterproof Wrapping for the Cables of the New East River Bridge, New York. Wilhelm Hildenbrand. Describes methods that have been in use for preserving cables, and have proved successful, and especially the new method adopted for the protection of the cables of the New East River Bridge and the manner of enclosing them in a waterproof covering. 3000 w. Eng News—Nov. 13, 1902.

The Injury to the Cables of the New East River Bridge. Isaac Harby. Also report of commission appointed to report on the condition in which the fire left the cables of the new suspension bridge across the East River at New York. 1800 w. R R Gaz—Jan. 16, 1903.

The Damage to the New East River Bridge Cables by Fire and the Proposed Method of Repairing it. Technical portions of the report of the Board of Engineers appointed to report in regard to the repairs needed for the partially completed bridge across the East River at New York. 2200 w. Eng News—Jan. 22, 1903.

Repairing the Williamsburg Bridge Cables. An illustrated article describing the very efficient repairs made to the cables injured by fire on this East River bridge at New York. 1200 w. Eng Rec—Sept. 5, 1903.

Making the Cables of a Large Suspension Bridge. Isaac Harby. A detailed description of this work on the Williamsburg Bridge, across the East River, at New York. Gives brief description of the bridge, also. Ills. 6500 w. Cassier's Mag—May, 1905.

See also **BRIDGE—Williamsburg; BRIDGE ACCIDENT.**

Telephone.—See **TELEPHONE CABLE; TELEPHONE LINE.**

Tension.—The Arnodin System of Measuring Cable Tension (Note sur les Cables Témoins, Système F. Arnodin). F. Arnodin. An illustrated description of a system of measuring the tension of cables and ropes by means of an auxiliary cable which is made to have the same curvature and which is connected to a dynamometer. 2500 w. Mem Soc Ing Civils de France—March, 1903.

Waterproof Wrapping.—See **Bridge, Williamsburg.**

CABLE RAILWAY.

See also **MOUNTAIN RAILWAY.**

Bronson, Mich.—Cable Haulage for Transporting Marl to the Mills of the Bronson Portland Cement Co. Illustrated description of a haulage plant which works successfully from marl beds to mills, located at Bronson, Mich. 1500 w. Eng News—Jan 21, 1904.

Car Transfer.—The Operation of Cars and Transfer Tables by Continuous Running Cables (Die Bewegung von Eisenbahnwagen und Schiebebühnen mittels stetig Umlaufenden Endlosen Seils). H. Glinz. Illustrating the use of an endless continuous running cable for hauling and transferring cars about a yard, using grip connections. Serial. Part I. 3500 w. Glückauf—Aug. 6, 1904.

Edinburgh.—Edinburgh Cable Tramways. A statement of the present condition of affairs. The new cable lines amount to 37 miles of track, covering some 19 miles of street. 2000 w. Ry & Tram Wld—Dec. 6, 1900.

Cabling the Edinburgh Tramways. Illustrates and describes the distinguishing features of this work now nearing completion. Serial. 1st part. 3000 w. Engr, Lond—July 12, 1901.

Penwyllt Brick Works.—Penwyllt Haulage. A statement of the conditions to be met at the Penwyllt Dinas Silica Brick Works, Wales, with an illustrated description of the special system of endless rope haulage adopted on account of its low initial cost and its economy in working. 1100 w. Col Guard—June 19, 1903.

Safety Appliances.—See also **MINE HAULAGE.**

San Francisco.—See **STREET RAILWAY.**

CABLE SHEATH.

Eddy Current.—See **EDDY CURRENT.**

CABLE SHIP.

See also **SUBMARINE CABLE; SUBMARINE TELEGRAPH.**

"Pacific."—The Cable Steamer "Pacific." Illustrated detailed description of the latest built ship of this class. 3000 w. Electn, Lond—May 20, 1904.

"Patrol."—See **"Restorer."**

"Restorer."—The Cable-Ships "Restorer" and "Patrol." Illustrated descriptions of two recently completed vessels which represent the most modern practice, and possess interesting details due to their being intended for repairing rather than laying cables. Serial. 1st part. 2500 w. Elect'n, Lond—Feb. 27, 1903.

"Silverton."—See also **SUBMARINE CABLE—Pacific.**

"Stephan."—The Twin-Screw Cable Steamer "Stephan" (Der Doppelschrauben-Kabeldampfer "Stephan"). H. Hildebrandt. Illustrated description of the new steamer constructed for use in laying the second German trans-Atlantic cable. 3000 w. 2 plates. Zeitschr d Ver Deutscher Ing—Oct. 31, 1903.

The Cable-Laying Steamer Stephan (Le Stephan, Navire Poseur de Cables). Illustrated description of the new vessel of the German cable company, used for laying the second line via the Azores to New York . 1500 w. 1 plate. Génie Civil—Jan. 30, 1904.

The Twin-Screw Cable-Laying Steamer "Stephan." An illustrated detailed description of the second German cable steamer. Serial. 1st part. 2800 w. Engng—March 25, 1904.

"Viking."—A New Telegraph Steamer, SS. "Viking." Description of latest cable laying and repairing steamer, and its equipment. Ill. 1800 w. Elec Rev, Lond—Jan. 31, 1902.

CABLEWAY.

See also **COAL HANDLING; CONVEYOR; MECHANICAL HANDLING; TELPHERAGE.**

Aerial Cable Transportation. William Hewitt. An illustrated review of the various systems and the uses to which they have been applied. Also discussion. 8200 w. Pro Engrs Club of Phila—Oct., 1902.

Aerial Tramways. Stephen de Zoulboria. Address before the Am. Min. Cong. at Deadwood. Considers the advantages of rope tramways, the systems, construction, cost of installation, etc. 2000 w. Ir Age—Sept. 24, 1903.

Suspension Cableways. Andrew A. Bruch. An illustrated article explaining the use and construction of inclined and horizontal cableways. 3300 w. Mines & Min—April, 1904.

Wire Rope Tramways. J. H. Janeway, Jr. Illustrates and describes different styles of cableway, the methods of construction and circumstances suited to cableway transportation. 5200 w. Mines & Min—April, 1904.

Aberfeldy.—The Aerial Ropeway at Aberfeldy. Illustrated description of a new aerial ropeway in Scotland, for the conveyance of stone from the quarries, a distance of 2 1-4 miles. 600 w. Engr, Lond—Sept. 2, 1904.

Arlington Mine, B. C.—The Arlington Tramway. H. E. T. Haultain. An illustrated description of the tramway at Arlington mine, Erie, B. C. 1100 w. B. C. Min Rec—March, 1902.

Beachy Head Lighthouse.—Ropeway at the New Beachy Head Lighthouse. Describes the arrangement of a ropeway used in the construction of a new lighthouse, which was used not only for the transportation of materials, but of machinery and workmen. Ill. 1600 w. Engng—Jan. 11, 1901.

Bleichert.—The Bleichert Aerial Ropeways. Illustrated detailed description of this system of wire ropeway and its working. 8000 w. Ir & Coal Trds Rev—July 11, 1902.

See also **SILVER—Bingham, Utah.**

Bronson, Mich.—See **CABLE RAILWAY.**

Cape Breton.—See **COAL HANDLING.**

Coast.—The Provision of Harbor Facilities on Difficult Coasts by Means of Cableways (Die Schaffung von Landungsstellen an sonst Unzügänglichen Küsten mittels Schwebender Transporteinrichtungen). G. Dietrich. Describing the use of a cableway, carried on a cantilever pier for handling cargo off difficult coasts. Serial. Part I. 2500 w. 1 plate. Glasers Annalen—June 1, 1905.

Electric.—See **MINE HAULAGE—Cable-Electric; MOUNTAIN RAILWAY; ORE HANDLING; TELPHERAGE.**

Grand Encampment, Wyoming.—Wire-Rope Tramway at Grand Encampment, Wyoming. Illustrated description of a line sixteen miles long. 2800 w. Mines & Min—April, 1904.

India.—A Wire Ropeway in the Anaimalai Hills. Horace H. Gass. Illustrates and describes a new ropeway for the transport of valuable lumber through inaccessible parts of Southern India. 3000 w. Page's Mag—Aug., 1903.

Kotagudi Aerial Ropeway and Connecting Roads in North Travancore. Richard Fenwick Thorp. Describes the construction of a ropeway, a tramway, and a cart road to improve transportation in a mountainous portion of India. Ills. 4200 w. (No. 3524). Inst of Civ Engrs.

Iron Ore.—See **IRON ORE HANDLING.**

Kneuttingen.—Cableways and Railways (Seilbahn und Eisenbahn). A description of the very extensive cableway installation, conveying iron ore from the Anmetz mine to the Friede furnace at Kneuttingen, the capacity being 5 1-2 ton-kilometres per year. 1800 w. 1 plate. Stahl u Eisen—March 1 1905.

Miller.—See **Open Pit Mining; COALING AT SEA.**

Open Pit Mining.—Cableways for Open-Pit Mining. Spencer Miller. An illustrated article discussing the advantages of horizontal cableways and those of the radial type. 1800 w. Mines & Min.—April, 1904.

Ore Handling.—See **IRON ORE HANDLING.**

Pyrenees.—Aerial Ropeway for Contractors' Work. Daniel Bellet. Gives an illustrated description of the construction of a railway in the French Pyrenees, in which an aerial ropeway was first built for transporting the necessary material. 1000 w. Trac & Trans—April, 1904.

Radial.—Erecting Radial Cableways for Gold Mining in Mexico. Illustrated description of an installation of two 800-ft. radial traveling cableways, each with a capacity of 100-yds. of gravel per hour, for stripping gold-bearing gravels from the bottom of cañons. 1200 w. Eng Rec—March 11, 1905.

See also **Open Pit Mining.**

Rother Vale Collieries.—The Aerial Ropeway at the Rother Vale Collieries. Illustrated description of a ropeway to carry 2-ton loads, recently put in operation. 1500 w. Ir & Coal Trds Rev—Oct. 27, 1905.

Silver Cup Mine, B. C.—The Aerial Tramways at the Silver Cup Mine. George Attwood. Abstract of a paper in "Pro. of the Inst. of Civ. Engrs.' Illustrates and describes four tramways for conveying mining and food supplies, mining timbers and firewood, as well as passengers. 1600 w. Eng & Min Jour—Nov. 4, 1905.

Silver King, Utah.—See **SAMPLING.**

Telpherage.—See **TELPHERAGE.**

Utah Mine.—See **MINERAL REGION—Utah; SAMPLING—Silver King; SILVER—Bingham.**

Vivero, Spain.—The Ore-Carrying Wire Ropeway at Vivero, Spain. Illustrates and describes an installation to convey iron-ore from the mines to the coast. 1500 w. Sci Am—Aug. 1, 1903.

Vouvry, Switzerland.—The Cableway of the Hydro-Electric Plant at Vouvry (Transporteur Aérien sur Cables de l'Usine Hydro- Electrique de Vouvry). A

Boudon. A description of the method used in handling the material for a hydraulic pipe line in Switzerland, in steep and difficult country. 2000 w. Génie Civil—March 29, 1902.

Wetterhorn, Switzerland.—See SUSPENDED RAILWAY.

Zambesi River.—Electric Cable-Way Over the Zambesi River. An illustrated description of an interesting cable-way in Africa, erected to transport material for building the Victoria Bridge across this river, and for making the railway. 1500 w. Engng—April 22, 1904.

See also BRIDGE.

CABLE WORKS.

See ELECTRIC CABLE WORKS.

CABOOSE.

See CAR—Caboose.

CADMIUM.

Analysis.—The Quantitative Determination of Cadmium. Edmund H. Miller and Robert W. Page. Describes work on a solution of cadmium chloride. The methods compared are the electrolytic, the carbonate and the phosphate. 2000 w. Sch of Mines Qr—July, 1901.

Electric Deposition.—Notes on the Electro-Deposition of Cadmium and Its Alloys. Sherard Cowper-Cowles. Reports results of investigations made. 2500 w. Elec-Chem & Met—March, 1904.

CAISSON.

See also AIR LOCK; BRIDGE FOUNDATION; BRIDGE PIER; BUILDING CONSTRUCTION; FOUNDATION.

Caisson Foundations(Fondations par Caissons à Air Comprimé.) J. Grimaud. Abstract from "Les Trauvaux Publics" giving a well illustrated review of caisson work for foundation building. Serial. Two parts. 7000 w. Rev Technique—June 25, July 10, 1902.

Accident, N. Y. — A Peculiar Pneumatic Caisson Wreck. Describes an accident on the foundation work of the new United States Express Co. building on Greenwich St., New York. Ills. 1000 w. Eng Rec—Sept. 16, 1905.

Air Lock.—See AIR LOCK.

Bank, New York.—Auxiliary Pneumatic Caisson Work for the Bank of the State of New York. An illustrated description of difficult foundation work in New York City, where the soil was sandy and very wet. After a large amount of work had been done on the building, the excavation was carried down 10 ft. farther. 2500 w. Eng Rec—Aug. 29, 1903.

Bilbao Breakwater. — See BREAKWATER; HARBOR.

Kiel Dry Dock.—Dry-Dock Foundation at Kiel, Germany, Laid from a Floating Caisson with Compressed Air. Brief illustrated description. 400 w. Eng News—Oct. 10, 1901.

The Caisson at the Kiel Dry-Dock. From "Illustrierte Zeitung." Illustration, with brief description of a huge caissou costing about $250,000. 450 w. Sci Am Sup—Nov. 2, 1901.

Construction with Compressed Air (Construction par l'Air Comprimé). A description of the pneumatic process employed in the construction of the foundations of the new dry docks at the port of Kiel. 1800 w. 1 plate. Génie Civil—Oct. 24, 1903.

The Concrete Dry-Dock at Kiel, Germany: Subaqueous Construction by Floating Pneumatic Caisson. An illustrated description of interesting construction work, a new plan being devised to meet the peculiar conditions. The central feature of the work is the use of what is in effect a huge diving bell. 6000 w. Eng news—Dec. 3, 1903.

See also AIR LOCK.

Manhattan Bridge.—See BRIDGE FOUNDATION.

Newcastle, Eng.—See BRIDGE.

Office Building, N. Y.—The Pneumatic Caisson Foundations for the Broad-Exchange Building, New York City. An illustrated description of the apparatus and methods of work in constructing the foundations of what will be the largest office-building in the United States. 2500 w. Eng News—Nov. 15, 1900.

The Pneumatic Caisson Foundation for the Broad Exchange Building, New York City. A description of foundation work, interesting for its extent and the difficulties resulting from the short time available for carrying it out. Ill. 2800 w. Compressed Air—Feb., 1901.

The Pneumatic Foundations of the Battery Place Building, New York. Illustrated description of circular and rectangular caissons sunk by pneumatic methods for foundations of 20-story office building. 2100 w. Eng Rec—June 21, 1902.

Caisson Foundations for a Large Steel-Cage Office Building on Broadway, New York. Describes in detail foundations of 29 caissons carried down to hard pan, and the methods used. Ills. 2200 w. Eng Rec—March 5, 1904.

Quicksand.—See FOUNDATION.

Water-Jet Sinking.—See FOUNDATION.

CAISSON DISEASE.

Observations on Compressed Air Illness. Frederick R. Wainwright, in "The Lancet." On the effects from prolonged working in compressed air and the treatment of recompression. 11500 w. Compressed Air—April, 1901.

The Occurrence and Treatment of Caisson Disease in Engineering Work. Facts concerning the limits within which work under compressed air can be carried on, taken from the discussion of a paper by Benjamin Hall Blythe. Also editorial. 6600 w. Eng News—Sept. 5, 1901.

Caisson Illness and Diver's Palsy; an Experimental Study. Leonard Hill, and J. J. R. Mcleod. Abstract of an article in the "Journal of Hygiene." On the effects of compressed air on the human system and the cause of the disease known as "the bends," and the method of its prevention. A valuable article. 8000 w. Eng News—May 5, 1904.

CALCIUM.

See ELECTRO-METALLURGY—Calcium.

CALCIUM CARBIDE.

See also ACETYLENE; ACETYLENE GENERATOR; CARBIDE.

Some Notes on Calcium Carbide Manufacture. Reviews an article by M. G. Pradon, of Paris, recently published in the "Zeitschrift für Calciumcarbid Fabrikation." 1400 w. Elec Rev, Lond—Sept. 20, 1901.

Calcium Carbide and Acetylene. A general review of these industries, with illustration and curves. 1400 w. Elec-Chem Ind—Dec., 1902.

The Combustion of Carbon During the Reduction of Calcium Carbide (Neber die Verbrennung des Kohlenstoffs bei der Calciumcarbid-Reduktion). Fr. von Kügelgen. An account of experiments on the formation of the reaction gases during the electrolytic production of calcium carbide. 2000 w. Zeitschr f Elektrochemie—May 14, 1903.

Blast-Furnace Gas Power.—The Application of Blast Furnace Gases to the Manufacture of Calcium Carbide (Die Benutzung der Hochofengase sur Fabrikation von Calcium Carbid). A discussion of the commercial practicability of using furnace gases for the generation of electric current for carbide manufacture. 1800 w. Glückauf—Nov. 10, 1900.

Electric Furnace.—The Manufacture of Calcium Carbide. John B. C. Kershaw. Considers the efficiency and yield of carbide furnaces, and lessons derived from the study. Serial. 1st part. .1200 w Elect'n, Lond—Nov. 23, 1900.

See also Milan Works; ELECTRIC FURNACE.

Electric Power.—See ELECTRIC POWER—Calcium Carbide.

Flums, Switzerland. — See HYDRO-ELECTRIC PLANT.

Milan Works.—The Calcium Carbide Works at Milan (L'Officina pel Carburo di Calcio di Milano). Dr. V. Lucchini. With illustrations showing the general arrangement of the works. The Gin & Leleux electric furnace is used. 2500 w. Elettricita—Dec. 1, 1900.

Phylloxera.—Some New Uses for Calcium Carbide. Describes the processes of preparing the carbide and states uses for the destruction of mildew and phylloxera in vines. 1500 w. Engr, Lond—Jan. 18, 1901.

Reactions.—The Reaction Equations in the Reduction of Calcium Carbide (Die Reaktionsgleichung bei der Calciumcarbid-Reduktion). Dr. B. Neumann. A review of the chemical reactions involved in the production of calcium carbide in the electric furnace. 1500 w. Zeitschr f Elektrochemie—Oct. 2, 1902.

The Reaction Equations in the Reduction of Calcium Carbide (Die Reaktionsgleichung bei der Calciumcarbid Reduktion). Fr. von Kügelgen. A comment on the discussion of Dr. Neumann upon the production of calcium carbide. 1200 w. Zeitschr f Elektrochemie—Oct. 9, 1902.

Reducing Action.—The Reducing Action of Calcium Carbide (Studien über die Reduzierende Kraft des Calcium Carbides). F. v. Kügelgen. A very full account of experiments with salts of lead, copper, silver, zinc, etc. Three articles. 10000 w. Zeitschr f Elektrochemie—April 11, 18, 25, 1901.

CALCULATING.

Errors.—Short and Easy Methods for Computing Probable Errors. E. A. Fuertes. Explains the method, giving an account of its origin. 2000 w. Pro Am Soc of Civ Engrs—Aug., 1901.

CALCULATING MACHINE.

See also **COST KEEPING—Mechanical Aid; INTEGRATOR; PLANIMETER; SLIDE RULE.**

The Construction of Algebraic Machines (Sur la Construction des Machine Algébriques). L. Torres. A discussion of the mechanical devices of the author for the summation of series, and for the permutation of roots. Serial. Part I. 5000 w. Revue de Mécanique—Sept. 30, 1901.

Adding.—The Use and Construction of the Adding Machine. Fred W. McArdle. Explains various types and their uses, the principles and the operation. 2400 w. Am Mach—Vol. 28, No. 32.

Arithmograph.—The Arithmograph, a Calculating Machine (Sur un Calculateur Mécanique Appelé Arithmographe). M. Troncet. An illustrated description of an apparatus which will perform mechanically all arithmetical operations. 400 w. Comptes Rendus—March 30, 1903.

Balance Lever.—The Balance Lever as a Calculating Machine. Ulrich Lever as a Calculating Machine. Ulrich Peters. Gives practical applications of the lever, with an illustrated description. 1400 w. Ir Age—July 23, 1903.

Cask Counting.—See **COUNTING APPARATUS.**

Cost-Keeping.—See **COST KEEPING—Mechanical Aids.**

Electric Meter Counter.—A New Mechanical Apparatus for Computing Current Consumption (Ueber einen Neuen Apparat für die Mechanische Her-Stellung von Stromrechnungen für Elektrizitätswerke). F. Bierman. Describing a form of mechanical counter for summing up the reading of electric meters, and reducing the clerical labor. 3500 w. Elektrotech Zeitschr—May 5, 1904.

Hollerith.—The Mechanical Work of the Twelfth Census. Edward M. Byrn. Illustrates and describes the Hollerith system of mechanical punching and tabulation in its latest development. 1900 w. Sci Am—April 19, 1902.

Office Equipment.—New Methods of Office Work. LeRoy Scott. Describes the many kinds of work now performed rapidly by ingenious machines, which formerly required much time and many hands. 3000 w. World's Work—March, 1905.

Mechanical Aids in Factory Office Equipment. George Harvey Seward. With numerous illustrations of mechanical computers, slide rules, and other calculating machines adapted for office and factory use. 5000 w. Engineering Magazine—July, 1904.

Screw Propeller.—The Screw-Propeller Computer. Illustrated description of a computer designed by Prof. McDermott, explaining its use. 700 w. Sib Jour of Mech Engng—Jan., 1903.

Slide Rule.—See **SLIDE RULE.**

Weight.—The Weight of Solids of Revolution. George F. Summers. Brief illustrated description of an arrangement that performs computations automatically. 300 w. Am Mach—Jan. 15, 1903.

CALCULATOR BOARD.

Graphic Methods.—The Calculator Board and Graphic Methods. Illustrates and describes an improved board and apparatus for facilitating graphic methods of calculation, and the like. 1600 w. Elec Rev, Lond—Aug. 28, 1903.

CALIPER.

Koopman.—The Koopman Calipers. Fred. Wertheim. An illustrated description of several calipers of superior design. 500 w. Am Mach—Dec. 4, 1902.

Micrometer.—See **MICROMETER CALIPER.**

Spring.—Evolution of the Spring Caliper. E. R. Markham. Brief review of the improvements made and the growth of the business. Ill. 1100 w. Am Mach—Oct. 2, 1902.

Tire.—See **TIRE—Wear and Turning.**

CALORIC ENGINE.

See **MOTOR.**

CALORIFIC POWER.

See **CALORIFIC VALUE.**

CALORIFIC VALUE.

See also **BOILER TEST; CALORIMETRY; COAL; COMBUSTION; FUEL; FUEL TEST.**

Relative Values of Fuel. Gives the results of Prof. William Kent's experiments, as given in "Steam Boiler Economy." Also results obtained by other experimenters, with remarks. 1800 w. Dom Engng—Oct. 25, 1902.

The Determination of the Heating Value of Fuel. Herman Poole. Gives brief accounts of some of the leading methods used to determine the heating value of fuels. 2800 w. Engr, U S A—April 1, 1903.

On Fuel Formulas. Considers a formula proposed by Mahler for obtaining the heat value of fuels which is exact enough for most purposes. 2000 w. Locomotive—Nov., 1903.

Comparative Heat-Producing Values of Different Fuels. Prof. Erasmus Haworth. Explains the method usually adopted for testing heat-producing qualities and gives results and general information. 3800 w. Pro Age—Dec. 15, 1905.

Bagasse.—See **FUEL.**

California Tests.—See **FUEL TEST—California.**

Coal.—The Heating and Evaporative Power of Coal (Heizwert und Verdampfungsfähigkeit der Kohle). A. Dosch. From Dingler's Polytech Journal. This part gives the theoretical calorific power with different percentages of carbon, hydrogen, etc. Serial. Part I. Tables. 2000 w. Ill. Zeitschr f Klein u Strassenbahnen—March 1, 1902.

The Heating Effect of Coal. W. R. Crane. Gives a simple method, with a description of apparatus which may be constructed easily and at small cost, which will permit such tests to be made with ease and dispatch and a fair degree of accuracy. 4000 w. Mines & Min—May, 1902.

The Calorific Power of Coals (Sur le Pouvoir Calorifique de la Houille). M. Goutal. Giving a simplified formula for computing the calorific power of a given coal from its chemical composition. 700 w. Comptes Rendus—Sept. 22, 1902.

Coal as a Boiler Fuel. E. B. Wilson. Discusses the comparative values of carbon and volatile matters for steam making, and the different causes of incomplete combustion. 1500 w. Mines & Min—May, 1903.

The Relative Values of Coals and How to Burn Them. Jay M. Whitman. Gives information of capacities of various fuels measured in steam output, and suggestions for firing. 1200 w. Power—Aug., 1903.

See also **CALORIMETRY; COAL—Gas Manufacture; Illinois; Valuation; COAL ANALYSIS.**

Coal, British.—Coal as Fuel at Barrow-in-Furness. W. F. Pettigrew. An account of experiments made to find the relative value of coals obtained from various districts in England, Scotland and Wales. 3800 w. Ir & Coal Trds Rev—Sept. 4, 1903.

Flame.—The Value of the Flame of Combustibles. P. Mahler. Translated from the "Revue Universelle des Mines." A comparison of different coals on the basis of the temperature of combustion; also of other combustibles. 2700 w. Jour Fr Inst—Jan., 1905.

Gas.—See **CALORIMETRY; GAS—Heating Power.**

Gas Residuals.—The Fuel Value of Residuals. Charles F. Prichard. Read before the Am. Gas Lgt. Assn. Gives ultimate analyses of residuals which have fuel values, their fuel values based on these analyses, their fuel values tested by calorimeter, and their fuel value obtained by burning large quantities of them and the methods employed. 3700 w. Am Gas Lgt Jour—Nov. 18, 1901.

Naphtha and Kerosene.—Some Thermal Properties of Naphthas and Kerosenes. A. H. Gill and H. R.

Healey. Experimental work to determine the heating value is described. 2000 w. Tech Qr—March, 1902.

Peat.—See PEAT—Calorific Value.

CALORIMETRY.

See also CALORIFIC VALUE; FUEL; FUEL TEST.

Comparison of Different Types of Calorimeters. Extract from a paper by J. S. S. Brame and Wallace A. Cowan read before the London Sec. of the Soc. of Chem. Ind., giving a report of investigations and the results. 1700 w. Gas Wld—Jan. 23, 1904.

Observations upon Calorimetric Methods (Observations sur les Méthodes Employés en Calorimétry). M. Berthelot. A study of the determination of the heat of combustion of organic substances by means of the calorimeter. 2500 w. Comptes Rendus—June 5, 1905.

Air.—See Electric Generator Test.

Bomb.—See Junker; Oxygen Impurities.

Callendar.—Measuring the Mechanical Equivalent of Heat. Illustrates and describes the invention of Prof. H. L. Callendar and its working. 800 w. Sci Am—Aug. 19, 1905.

Coal.—The Calorimetric Testing of Coal. George T. Hanchett. Describes method of conducting a test with very simple apparatus. 2500 w. Am Elect'n—April, 1905.

Corrections.—A System of Corrections for Heat Losses in Calorimetric Experiments. Joseph W. Richards. Describes systems of corrections which have been used several years and given accurate and satisfactory results. 2300 w. Jour Fr Inst—Aug., 1901.

Darling.—A Simple Form of Fuel Calorimeter. Charles R. Darling. Illustrated description of an instrument for which is claimed the advantages of simplicity in working, a visible combustion completely under control, and considerable accuracy. 1600 w. Engng—June 20, 1902.

Electric Generator Test.—The Testing of Electric Generators by Air Calorimetry. Richard Threlfall. Read before the Inst. of Elec. Engrs., England. An account of experimental investigations of the writer, and this method of testing. Ill. 8800 w. Elect'n, Lond—Nov. 27, 1903.

The Testing of Electric Generators by Air Calorimetry. Abstract of the discussion of paper by Prof. R. Threlfall, with editorial. 3500 w. Elect'n, Lond—Dec. 4, 1903.

Exhaust Gases.—The Calorimetry of the Gases Exhausted from an Internal Combustion Engine. B. Hopkinson. Abstract of a paper before the British Assn. Describes tests. Ills. 2500 w. Engng—Aug. 26, 1904.

Gas.—On the Determination of the Heat of Dissociation and of Combustion of Acetylene, Ethylene, and Methane. W. G. Mixter. An account of experimental investigations made at the Sheffield Laboratory of Yale University. 3000 w. Am Jour of Sci—Nov., 1901.

Calorimetry of Gaseous Fuels. W. Garnet Wernham. Read before the Jr. Inst. of Engrs. Reviews the development of the modern form of gaseous fuel calorimeter, illustrating and describing various types. Serial. 1st part. 3000 w. Gas Wld—March 28, 1903.

Calorimetry. E. Fearon. Read at meeting of the Manchester and Dist. Jr. Gas Assn., England. Describes method of determining the calorific value of gas by means of a calorimeter. 2200 w. Am Gas Lgt Jour—May 18, 1903.

The Calorimetry of Gaseous Fuels. W. Garnet Wernham. Abstract of a paper read before the Junior Inst. of Engrs. Describes the method of finding the calorific value of a gas by analysis and by the direct calorimetric test, giving illustrated descriptions of various calorimeters. 4500 w. Mech Engr—Sept. 3, 1904.

Calorimetry. John F. Simmance. Shows the value of calorimetry and the method of determining the heating value of gases by the calorimeter, with examples. Ill. 3500 w. Engng—Jan. 13, 1905.

See also Junker; GAS—Heating Power; GAS FUEL.

Gases and Liquids.—Calorimetry of Gaseous and Liquid Fuels. W. Garnet Wernham. Extracts from a paper read before the Jr. Inst. of Engrs. Considers modern calorimeters, and methods of determining heating values of fuels. 3400 w. Jour Gas Lgt—March 3, 1903.

Junker.—The Junker Gas Calorimeter in Practice. Carl F. Dietz. Describes the apparatus for determining the calorific value of gases and a test made with it. Discussing the results, adaptability, &c. Ills. 3000 w. Stevens Ind—Jan., 1905.

The Junker Calorimeter for the Determination of Heating Values (Das Junkers-Kalorimeter als Heizwertanzeiger). P. Meyer. A brief discussion of the method of using the Junker calorimeter in such manner as to obtain the thermal values of gaseous fuels with a high degree of precision. 1200 w. Zeitschr d ver Deutscher Ing—June 3, 1905.

The Junkers Calorimeter as an Indicator of Heating Values (Das Junkers-Kalorimeter als Heizwertanzeiger). Jos. C. Breinl. Results of comparative tests and analyses of blast furnace gas. 700 w. Zeitschr d Ver Deutscher Ing—Aug. 26, 1905.

Impurities.—The Effect of Impurities in Compressed Oxygen upon Combustion in the Calorimetric Bomb (Sur les Impuretés de l'Oxygène Comprimé et sur leur Rôle dans les Combustions Opérées au Moyen de la Bombe Calorimétrique). M. Berthelot. An examination of the impurities found in commercial compressed oxygen, showing especially the possible errors produced by the presence of hydrogen, when used in the calorimetric bomb. 1500 w. Comptes Rendus—Nov. 17, 1902.

Respiration.—The Respiration Calorimeter. Description of machines for measuring and recording the changes in air supplied to living beings, including temperature, chemical composition, etc. 2000 w. Am Mach—Sept. 11, 1902.

Steam.—A New Form of Calorimeter for Measuring the Wetness of Steam. John Goodman. Illustrated description of a new form of instrument designed by the author, and the method of using it. 2500 w. Prac Engr—Oct. 26, 1900.

A New Form of Calorimeter for Measuring the Wetness of Steam. John Goodman. Read at Bradford meeting of the British Assn. Illustrates and describes an instrument designed by the author, and also the method of using it. 2000 w. Gas Engs' Mag—Nov. 10, 1900.

The Steam Calorimeter. A. F. Nagle. Explains the principles upon which those in common use are designed, and their present development. Ill. 1600 w. Am Elect'n—Nov., 1900.

Calorimeter Trials for Moisture in Steam. Robert W. King. Shows the importance of calorimeter trials and describes methods. Ill. 2300 w. Can Engr—April, 1901.

Thompson.—The Commercial Value of the Lewis Thompson Calorimeter. J. S. S. Brame. Summarizes results given in two recent papers, and gives further information showing that only approximate results can be obtained with bituminous coals, while with other coals the figures have no value. 1800 w. Engr, Lond—May 19, 1905.

Williams.—The Advantage of a Scientific Basis for Determining the Value of Fuels. Henry J. Williams. Showing the value of analysis and the calorimeter test, offering suggestions for sampling, and describing a calorimeter perfected by the writer. Also discussion. Ills. 9500 w. Jour N Eng W-Wks Assn—March, 1905.

Wire Drawing.—See STEAM ENGINEERING; SUPERHEATED STEAM.

CAM.

Cutting Attachment.—A Cam-Cutting Attachment for the Milling Machine. Brief illustrated description. 400 w. Am Mach—July 10, 1902.

Design.—The Layout and Construction of Cams. Charles F. Smith. Explains the order of work when laying and making cams, the design of a cam operated machine, laying out a single cam, &c. Ills. Serial. 1st part. 3000 w. Am Mach—Vol. 28, No. 11.

Monotype Machine.—The Double Cam System of the Monotype. Illustrated detailed description of the system used and the cam-cutting machine. 2000 w. Am Mach—Vol. 28, No. 50.

Screw Machine.—See SCREW MACHINE—Camming.

Stamp Battery.—Theory of the Stamp Battery Cam. R. W. Chapman. A study of the geometry of the problem. 2000 w. Aust Min Stand—March 5, 1903.

See also **STAMP MILL.**

Valve Gear.—See **VALVE GEAR—Cam Operation.**

CANADA.

See also **COAL REGION; GOLD; MINERAL REGION.**

The Development of Canada. George W. Colles. A review of the history of Canada and the causes that have affected its development, giving much information of the resources and recent changes. 5000 w. Cassier's Mag—Feb., 1905.

The Canadian Dominion of To-day: Its Industries, Commerce, Railways and Waterways. An interesting general review. Ills. 19500 w. Ir & Coal Trds Rev—May 12, 1905.

CANAL.

See also **CANAL HAULAGE; CANAL LIFT; CANAL LOCK; CANAL NAVIGATION; HARBOR; IRRIGATION; NAVIGATION; NAVIGATION CONGRESS; RIVER REGULATION; WATERWAY.**

Great Canals of the World. Information from a study prepared by the Treasury Bureau of Statistics, for publication in the "Monthly Summary of Commerce and Finance," showing the commerce, cost, and dimensions of the great canals of the world. 1200 w. Am Archt—Feb. 8, 1902.

Ship Canals (Seekanäle). Hr. Eger. A general review of the ship canals of the world, both built and projected, with tables of statistics. Serial. 2 parts. 3500 w. Zentralblatt d Bauverwaltung—May 16 and 20, 1903.

American.—American Canal Problems, with Special Reference to the State of New York. Robert E. Horton. Considers a waterway to the Great Lakes a national question, rather than sectional. The problem of connecting the Atlantic and Pacific is regarded as of first importance, and the Great Lake outlet is second. The possible solutions of the latter are discussed. 3800 w. Marine Engng—May, 1901.

Amsterdam.—See **HARBOR.**

Austria.—Administration, Construction and Operation of New Waterways in Austria (Verwaltung, Bau, und Betrieb der zu Erbauenden Wasserstrassen in Oesterreich). Prof. A. Oelwein. A review of the work upon the Danube-Elbe canal, the Danube-Oder canal, and other waterways aggregating more than 1,000 miles. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—April 19, 1901.

Austria's Great Canal System. Outlines a recently adopted measure for a system of canals of great importance. 600 w. U S Cons Repts, No. 1085—July 12, 1901.

The Austrian Canal Projects (Die Trassen der Oesterreichischen Kanäle). Richard Kuhn. A discussion of the proposed waterways in Austria, including the Danube-Oder canal, the Danube-Moldau canal, and the various auxiliary projects. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 5, 1904.

See also **CANAL LIFT; RIVER REGULATION.**

Baltic-Black Sea.—See **Riga-Cherson.**

Baltic-Volga.—The Canals and Waterways of the Russian Lake District (Kanäle und Kanalverbindungen Russlands im Seengebiete). N. Romanow. An account, with map, of the system of waterways connecting the Baltic Sea with the Volga and other waterways in the northwestern part of Russia. 3500 w. Oesterr Wochenschr f d Oeff Baudienst—May 16, 1903.

Bank Construction.—A Method of Bank Construction by Dumping from Movable Trestles. Joseph Wright. Brief illustrated description of a method recently used on the Illinois & Mississippi Canal. 600 w. Eng News—June 12, 1902.

Belgium.—See **WATERWAY.**

Bordeaux-Narbonne.—The Canal of the Two Seas (Le Canal des Deux-Mers). Francis Marre. A discussion of the project to cut a canal from Bordeaux, on the Atlantic, to Narbonne, on the Mediterranean. Serial. Part I. 4500 w. Revue Technique—Jan. 10, 1905.

Boston-Taunton.—The Proposed Taunton River and Boston Harbor Ship Canal. From the report of Frank W. Hodgson. An abstract of the surveys and estimates for a proposed ship canal to connect Narragansett Bay and Boston Harbor by the way of the Taunton and Weymouth Fore Rivers. 900 w. Eng News—Feb. 6, 1902.

Bridge.—See **BRIDGE—Aqueduct; Canal.**

Bridgewater, Eng.—The Bridgewater Canal Navigations. Walter Hartley Wiswall. Information concerning this 40-mile canal in England. 700 w. (No. 3504.) Inst of Civ Engrs.

British.—The Canal System of Britain. H. E. P. Cottrell. Describes the present condition of the canals and navigations, briefly reviewing their history and working, and giving tabulated information of interest. Map. 5400 w. Trac & Trans—May, 1903.

Canal Policy in England. W. M. Acworth. A discussion of the proposed new policy. 2000 w. Ry Age—July 29, 1904.

The British Canals Problem. Arthur Lee. Discusses the policy adopted on the Continent, and the policy of the British Railway Companies, and the importance of the matter. General discussion follows. 11500 w. Jour Soc of Arts—Dec. 2, 1904.

Canal Transport. Discusses the canals of Great Britain, their improvement, and the method of haulage, their cost, etc., especially illustrating and describing the method of electric traction employed on the Teltow Canal. Also editorial. 4000 w. Ir and Coal Trds Rev—Aug. 4, 1905.

The Value of Our Canals, and What We Ought to do With Them. Discusses the British canal situation. 3000 w. Elec Rev, Lond—Aug. 18, 1905.

See also **CANAL HAULAGE—Electric, British.**

Bruges.—See **HARBOR.**

Brussels, North Sea.—Brussels as a Seaport (Bruxelles Maritime). E. Guarini. An account of the cutting of the canal which is to connect Brussels with the North Sea. 2000 w. Revue Technique—Nov. 25, 1903.

Buffalo.—A New Ship Canal at South Buffalo. Illustrates and describes interesting engineering features. 1000 w. R R Gaz—May 27, 1904.

Canada.—The Canals of Canada. Waldon Fawcett. Information of interest concerning the Welland and the St. Lawrence Canals. Ill. 1800 w. Sci Am—Feb. 9, 1901.

The Canals of Canada. Reviews the existing and proposed canals and improvements, and gives reasons why an open water route from the Great Lakes to the sea should be maintained. 2000 w. Builder—Sept. 28, 1901.

Canada's Canal System. M. M. Wilner. An illustrated account of the canals along the St. Lawrence river, around Niagara Falls, and connecting the Great Lakes. 3500 w. Rev of Revs—Aug., 1905.

See also **Cornwall; Georgian Bay; Great Lakes; Lachine; Soulange; Trent.**

Cementing.—See **CEMENT—Irrigation Canal.**

Champlain-St. Lawrence.—The Projected Lake Champlain and St. Lawrence Ship Canal. E. G. M. Cape. Brief consideration of this project, with a discussion of its effect on freight from the Great Lakes. 900 w. Eng Rec—April 18, 1903.

Charleroi, Belgium.—See **CANAL HAULAGE—Electric.**

Chicago Drainage.—See **RIVER REGULATION; WATER POWER.**

Concrete Reinforced.—See **CONCRETE REINFORCED—Canal Lining.**

Corinthian.—The Corinthian Canal. Gives an outline of the history of this project, describing important features and discussing why it is almost deserted by foreign craft. Ill. 1500 w. U S Cons Repts, No. 1635—May 1, 1903.

The Corinthian Canal. Frank W. Jackson. Brief historical account of this undertaking, with discussion of reasons why it has not proved commercially successful. Ill. 1500 w. Sci Am Sup—July 25, 1903.

Cornwall, Canada.—Electric Equipment for Cornwall Canal. F. H. Leonard, Jr. Briefly outlines the hydraulic and generating equipment, and describes the lighting, lockages and weirs. 6 plates. 5000 w. Can Soc of Civ Engrs. Adv Proof—March 24, 1904.

Electrical Equipment for Cornwall Canal. F. H. Leonard, Jr. Abstract of paper read before the Can. Soc. of Civ. Engrs. Describes the equipment for lighting and power, which are so liberal as to make navigation at night as easy as by daylight. Discussion. 6200 w. Can Elec News—April, 1904.

Electrical Equipment for Cornwall Canal. F. H. Leonard, Jr. Read before the Can. Soc. of Civ. Engrs. Illustrates and describes the arrangements for power and lighting. 4500 w. Elec Rev, N. Y.—June 11, 1904.

See also **ELECTRIC LIGHTING.**

Danube-Main, Bavaria.—The Danube-Main Canal System (Die Donau-Main-Wasserstrasse). D. Lange. A review of the proposed development of the canal system of Bavaria. 2500 w. Glasers Annalen—Sept. 1, 1903.

Danube-Moldau.—The Danube-Moldau Canal Project (Die Donau-Moldau Canal Projecte). Rudolf Ritter v. Gunesch. A review of the plan to connect the upper waters of the Danube and Moldau and open a continuous waterway from the Black Sea to the North Sea. 4000 w. 2 plates. Zeitschr d Oesterr Ing u Arch Ver—May 16, 1902.

Danube-Oder.—The Water Supply for the Danube-Oder Canal (Die Wasserversorgung des Donau-Oder-Kanales). Emil Grohmann. An exhaustive study of the watershed, with tables of the run-off of various districts, together with topographical map and profiles. Two articles. 12000 w. 2 plates. Zeitschr d Oesterr Ing u Arch Ver—Feb. 12, 19, 1904.

See also **CANAL LIFT.**

Dortmund-Ems.—The Dortmund-Ems Canal (Der Dortmund-Ems Kanal). Dr. H. Hoffmann. Especially discussing the harbor improvements at the port of Dortmund, including docks, railway terminals, etc. 3000 w. Zeitschr d Ver Deutscher Ing—July 6, 1901.

The Dortmund and Ems Canal. Herr Hermann. Abstract of paper read before the Glasgow Congress. Describes the route and dimensions of the canal, its ports, cost and working. 2700 w. Ir & Coal Trds Rev—Sept. 6, 1901.

The Dortmund-Ems Canal (Der Dortmund-Ems-Kanal). Johann Mrasick. An address giving a general account of this Westphalian canal. 6000 w. Zeitschr d Oesterr Ing u Arch Vereines—May 1, 1903.

See also **BRIDGE—Aqueduct; Canal, Lippe River; CANAL LIFT—Henrichenburg.**

Elbe-Kiel.—The Proposed Elbe-Kiel Canal (Das Project eines Elbe-Kielkanals). Josef Riedel. A review of the project of Hr. August Sartori for a canal between the port of Kiel, on the Baltic, and the Elbe River, at Lauenburg, with map and profile. 1 plate. 1500 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 28, 1901.

See also **Kiel.**

Elbe-Moldau.—See RIVER REGULATION.

Electric Equipment.—See Cornwall; Lachine; Soulanges; CANAL HAULAGE.

Epinal, France.—See CONCRETE REINFORCED—Canal Facing.

Erie.—See New York.

Europe.—See WATERWAY.

Flow Measurement.—See WATER FLOW—Measurement.

Forth-Clyde.—Proposed Forth-Clyde Ship Canal. Information, by David Alan Stevenson, in regard to this proposed deep-water canal across Scotland. Map. 2000 w. U S Cons Repts, No. 1705—July 24, 1903.

The Suggested Forth and Clyde Ship Canal. Benjamin Taylor. A survey of the rival schemes for the construction of a deep water ship canal between the Forth and the Clyde. 4500 w. Page's Mag—Oct., 1903.

France.—The Utilization of Canals to Revive our Seaports (Utilisation des Canaux pour le Relievement de nos Ports de Transit). A discussion of the necessity of improving the canals of France to restore the commerce of Marseilles, Havre, etc. Serial. Part I. 1200 w. Revue Technique—June 25, 1901.

Transportation in the Northeastern Part of France (L'Outillage des Transports dans le Nord-Est de la France). A review of the transportation facilities, particularly for coal and projects for new canals and canal improvement. 1200 w. Moniteur Industriel—Dec. 21, 28, 1901.

Canal Improvements in France. A project for internal improvement now being discussed, which may cost $193,000,000. 600 w. U S Cons Repts, No. 1387—May 9, 1902.

See also **Inferiority; Loire-Rhone; WATERWAY.**

Georgian Bay, Canada.—Georgian Bay Canals. Discusses its construction from the commercial standpoint and the effects it would have on the trade of the Great Lakes. 4300 w. Marine Rev—Oct. 3, 1901.

See also **Montreal—Lake Huron; Trent.**

Germany.—The Prussian Canal Projects. Editorial discussion of the new schemes, their main features, and some particulars. 3600 w. Engng—May 24, 1901.

The New Canal Plans (Die Neue Kanalvorlage). A review of the latest plans for a system of internal waterways in Germany, with estimates of cost, and extensive maps. 4000 w. 4 plates. Glückauf—April 23, 1904.

See also **CANAL LIFT.**

Great Lakes—Atlantic.—Increased Transportation Facilities. Albert H. Scherzer. A plea for the development of inland waterways, especially a ship canal in United States territory from the Great Lakes to the Seas, in advance of building an isthmian canal. 1800 w. Marine Rev—Nov. 29, 1900.

The Proposed Ship Canal to Connect the Great Lakes and the Atlantic Ocean. James H. Brace. Reviews the surveys made and reports of various routes. 5000 w. Wis Engr—Jan., 1901.

Shall a Canal Be Built From the Lakes to the Sea? William G. Raymond. An argument against the construction, urging that the enterprise is unnecessary and unjustifiable. 2000 w. R R Gaz—Feb. 15, 1901.

A Deep Waterway from the Lakes to the Atlantic. A description of this proposed ship canal, with editorial making a comparison with the 1000-ton barge-canal project before the New York legislature, and favoring the Federal deep waterway. Ill. 5300 w. Eng News—Feb. 26, 1903.

See also **American; New York; Trent.**

Haack Experiments.—See CANAL NAVIGATION.

Hanover-Rhine.—See Rhine-Hanover.

Holland.—The Eems Canal and Its Accompanying Canals and Streams (Het Eems Kanaal en de daarop Afwaterende Kanalen en Riviertjes). D. H. S. Blaupot ten Cate. A general account of the canal system about Groningen, Holland, with map. 5000 w. 1 plate. De Ingenieur—Feb. 28, 1903.

Illinois and Mississippi.—The Hennepin, or the Illinois and Mississippi Canal. Henry Fox. An illustrated description of the construction work, with an account of routes surveyed, the development of the country, and the reasons for the undertaking. 3200 w. Wis Engr—Jan., 1901.
See also **Bank Construction.**

Inferiority.—The Inferiority of Canals as a Means of Goods Transport. Daniel Bellet. Discusses the canals of France and the conditions that made the work less costly than the usual construction of artificial waterways, and claims that such transportation is out of date, inefficient, and not cheap. 2700 w. Engng—Sept. 15, 1905.

Ireland.—Irish Canals: Their History and Influence on Trade. Abstract of a paper by A. W. Shaw, read at a meeting of the Limerick Chamber of Commerce. 1400 w. Transport—Oct. 17, 1902.

Irrigation.—See IRRIGATION.

Isthmian.—The Isthmian Canal Commission's Report. The full text of the first part of the report submitted on Nov. 30; it covers the organization of the Commission's working force, a total of over 800 men, the investigations made on foreign canals, the results of the examination of the work at Panama, special surveys in the Darien country, and the examination of the Nicaragua Canal project. Also an editorial on this portion of the report. Serial. 1st part. 10400 w. Eng Rec—Dec. 8, 1900.

The Preliminary Report of the Isthmian Canal Commission. Abstract of the first part of this report, dealing with dimensions, routes, harbors, etc. Serial. 1st part. 5400 w. Eng News—Dec. 20, 1900.

American Isthmian Canals. I. The Topography and Hydrography of the Isthmian Region is discussed by James Christie. II. The Engineering Features of the Nicaragua Route, by Edwin F.

Smith. III. The Panama Route, by Louis Y. Schermerhorn. Maps. 7500 w. Pro Engs' Club of Phila—Feb., 1901.

The Isthmian Canal from a Military Point of View. Col. Peter C. Hains. Extract from an address before the Am. Acad. of Political and Social Science. Considers a neutral canal, with a large area of neutral waters at each terminus a more useful canal to the United States than one controlled by military power. 700 w. Eng News—Feb. 28, 1901.

The Isthmian Canal from a Military Point of View. Peter C. Hains. Full paper presented before the Am. Acad. of Pol. & Soc. Sci. Showing that a neutral canal is a more useful canal to the United States than one controlled by military power. 4000 w. Jour U. S. Art—May-June, 1901.

The Isthmian Canals. Extracts from the lectures of Mr. Bunau-Varilla, discussing various elements which must be considered in deciding on the relative merits of the Nicaragua and Panama routes. 2300 w. R R Gaz—May 24, 1901.

Comparative Characteristics of the Panama and Nicaragua Canals. From a pamphlet by Mr. Bunau-Varilla, showing the relative amount of excavtion, quantity of steel, depth of cuts, cost of maintenance and operation, number of locks, etc., etc., giving diagrams. 500 w. R R Gaz—July 26, 1902.

The Report of the Isthmian Canal Commission. Reviews the leading results of the investigation of this Commission, which has cost $1,000,000. and lasted several years. Serial. 1st part. 1700 w. Eng Rec—Dec. 14, 1901.

The Report of the Isthmian Canal Commission. Editorial discussion of a few features of the report which are of special interest. 2000 w. Eng News—Dec. 26, 1901.

Nicaragua or Panama. Philippe Bunau-Varilla. Address to the Chamber of Commerce of the City of New York, with editorial. A comparison based on reports of Commissions. Serial. 1st part. 5500 w. Sci Am & Sci Am Sup—Dec. 21, 1901.

International Aspects of the Isthmian Canal. Gen. Henry L. Abbot. A critical comparison between the Nicaragua and Panama routes, forming an impressive warning against the folly of accepting the former. 3500 w. Engineering Magazine—Jan., 1902.

The Report of the Isthmian Canal Commission. Editorial review of the questions as to whether the canal will pay, the risks due to earthquakes and climate, and dimensions and unit prices. 2500 w. Eng News—Jan. 2, 1902.

The Isthmian Canal Commission's Explanation of Its Choice of Dimensions for the Isthmian Canal. Ill. 1200 w. Eng Rec—Jan. 18, 1902.

The Canal Across the Isthmus. Editorial discussion of the routes. 1600 w. R R Gaz—Jan. 3, 1902.

The Isthmian Canal Controversy. Two complete articles on the Panama and Nicaragua routes based upon the reports of the International Commission on Panama and of the Nicaragua Canal Commission, with digest of the report just issued, and many illustrations. 14700 w. Sci Am Sup—Jan. 18, 1902.

A Comparison of the Panama and Nicaragua Canal Routes. A general description, with map and diagram, showing the advantages of one route over the other. Also editorials. 5000 w. Sci Am—Jan. 18, 1902.

Panama or Nicaragua? Editorial discussion of the present position of this project, presenting the leading features of the two schemes. 1800 w. Engng—Jan. 24, 1902.

Why Not Own the Panama Isthmus? Frederic C. Penfield. Discusses the canal routes, favoring Panama, and suggesting the purchase of the territory. 2500 w. N Am Rev—Feb., 1902.

Work of the Isthmian Canal Engineers. Frederick Moore. An outline of the work done in surveying routes and gathering the needed information to determine the most advantageous location. Sci Am—Feb. 1, 1902.

The Isthmian Canal. George S. Morison. Extracts from an address at a banquet of the Chicago Commercial Club. Gives brief descriptions of the Panama and Nicaragua routes, stating the advantages of each, and giving reasons why the Panama Canal is to be preferred. 5000 w. R R Gaz—Feb. 7, 1902.

The Conditions Governing the Panama and the Nicaragua Canal Routes. George S. Morison. An address before the Massachusetts Reform Club. States the advantages of the two routes in a general way, but favors the Panama route. Also discusses the reasons why a canal should be built. 6000 w. R R Gaz—May 9, 1902.

Time as it Affects the Selection of an Isthmian Canal Route. A letter from H. H. Trundle discussing various matters relating to proposed routes. Also additional notes. 2800 w. Eng News—Feb. 20, 1902.

The Reports of the Isthmian Canal Commission. John Geo. Leigh. A critical analysis of the respective routes, based upon the reports of the Isthmian Canal Commission, and showing the superiority of the Panama route. 4000 w. Engineering Magazine—April, 1902.

A Bit of the "Ancient" History of the Isthmian Canal Problem. John Meikle. An account, with map, of a survey made about the middle of the nineteenth century for a canal across the isthmus of Darien. 2300 w. Sci Am Sup—March 29, 1902.

The Isthmian Canal. Briefly reviews the suggested routes, especially discussing the Panama and the Nicaragua routes, and the problems in connection with each. 5800 w. Locomotive—March 1902.

The Choice of Isthmian Canal Routes. John T. Morgan. Presents the advantages of the Nicaragua route. 5600 w. N Am Rev—May, 1902.

The Proposed Inter-Oceanic Canal. The first of a series of articles discussing the present outlook of this project, the routes favored, causes of delay, and matters of interest connected with the undertaking. Sections of the Nicaragua route are given. Serial. 1st part. 2500 w. Engr, Lond—May 2, 1902.

The Common Sense of the Isthmian Canal Decision. An editorial summary of the successive stages of the struggle which ended in the selection of the Panama route for the Isthmian canal. 3000 w. Engineering Magazine—August, 1902.

The Need of an American Isthmian Canal. W. J. Manson. Discusses trade and domestic advantages, shipping interests, etc., briefly reviewing the subject of a selection of a canal route. 2500 w. Marine Engng—Oct., 1902.

Panama or Nicaragua? Editorial discussion of the attitude of the Columbian legislators, and of some of the advantages of the Nicaraguan route. 2000 w. Eng News—Sept. 17, 1903.

See also American; Nicaragua; Panama; San Blas; SHIP RAILWAY; SURVEYING.

Isthmian Sanitation.—See Panama Sanitation.

Jonage, France.—The Canal of Jonage. Enrico Bignami. Begins an illustrated description of a canal which starts at Jons and re-enters the Rhone river at Lyons, below Cusset Falls, and which has cost $10,000,000. Serial. 1st part. 2000 w. Engr, U S A—March 15, 1904.

Kennet-Avon.—A Remarkable Old Waterway. Illustration and descriptive account of the Kennet and Avon Canal, and Devizes Locks. 2000 w. Engr, Lond—Nov. 30, 1900.

Kiel.—The North-East Sea Canal. Describes the canal from Kiel to the Elbe and shows why it has not proved a profitable financial concern. 1500 w. Engng—June 5, 1903.

The Kaiser Wilhelm Canal and Its Operation (Der Kaiser Wilhelm-Kanal und Seine Bisherigen Betriebsergebnisse). Josef Riedel. An illustrated description of this ship canal between the North Sea and the Baltic, and account of its operation, with statistics of traffic. Tables. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—July 4, 1903.

The Baltic Canal. An examination of the commercial and financial deficiencies of the Kiel Canal, showing the causes to be the low charges and high expenditures. 1000 w. Engr, Lond—Oct. 2, 1903.

Kiel-Elbe.—See Elbe-Kiel.

Lachine, Canada.—The Use of Electricity on the Lachine Canal. L. A. Herdt. Brief description of this canal, showing its importance, and of the application of electricity for lighting the canal, locks, and bridges, for heating the power house and lock cabins, to open and close the lock gates, sluice valves and waste weirs, and to operate the swing bridges. Ills. 2500 w. Can Soc of Civ Engrs, Adv Proof—March 24, 1904.

Loire-Rhone.—The Loire-Rhone Canal (Loire-Rhone Kanal). Hr. Zimmler. A review of a report to the French Chamber of Deputies by M. Andiffred on a canal to connect the Loire and Rhone rivers, and a comparison with the Danube-Moldau canal. 1000 w. Oesterr Wochenschr f d Oeff Baudienst—April 25, 1903.

Madagascar.—See WATERWAY.

Mandingo.—See San Blas.

Massena, N. Y.—See DREDGE.

Mississippi.—See RIVER REGULATION.

Moldau-Elbe.—See Austria; RIVER REGULATION; SURVEYING—Canal Construction.

Montreal-LakeHuron.—Proposed Canal to Connect Montreal with the Head of Lake Huron. Day Allan Willey. An explanation of the discussed plan and the advantages it would give. 1600 w. Sci Am Sup—Oct. 29, 1904.

See also Georgian Bay.

Morris Crossing Lackawanna.—The Morris Canal Crossing of the Lackawanna R. R. Brief illustrated description of the unusual methods adopted to maintain traffic in the canal during the work of depressing the tracks of this road, and the building of an inverted siphon. 1100 w. Eng Rec—June 17, 1905.

Morris, N. J.—See CANAL LIFT—Inclined Plane.

Neste, Pyrenees.—See RIVER REGULATION.

New York.—Canals from the Lakes to New York. Discussion of papers by Joseph Mayer and George Y. Wisner. 7000 w. Pro Am Soc of Civ Engs—Nov., 1900.

Canals from the Lakes to New York. Continued Discussion of papers by Joseph Mayer and George Y. Wisner. 19300 w. Pro Am Soc of Civ Engs—Dec., 1900.

Canals from the Lakes to New York. Continued discussion of papers by Messrs. Joseph Mayer and George Y. Wisner. 14000 w. Pro Am Soc of Civ Engs—Feb., 1901.

The Latest Report on the Improvement of the Erie Canal. A review of the recommendations of the State Engineer for a 1,000-ton barge canal, and of the Governor for a smaller waterway. 2200 w. Eng Rec—March 23, 1901.

Surveys for a Barge Canal Across the State of New York. Abstract of the report of the survey presented to the Governor by the State Engineer, stating the important features. Also editorial discussion with extracts from the Governor's message. 4500 w. Eng News—March 21, 1901.

The Improvement of the Erie Canal. An illustrated article explaining the bill now before the Legislature, calling for the appropriation of $30,000,000 to be devoted to the reconstruction of the locks, and the relocation of the canal at certain points. 1800 w. Sci Am—April 26, 1902.

The New York Barge Canal Project Again. Editorial, discussing the report against the Ontario route just rendered by the committee of Canal Assn. of Greater N. Y. 1600 w. Eng News—Sept. 11, 1902.

History of the Erie Canal. Briefly reviews the first construction and improvements made at different times, discussing the proposed enlargement to a 1,000-ton barge capacity, and the cost. 1500 w. Marine Review—Oct. 30, 1902.

The Reorganization Needed in New York before Canal Construction. Albert J. Himes. Discussing the administrative methods by which the canal improvements can be most economically executed, and showing the present organization unfit and incompetent to carry out an undertaking to cost many millions. Also Editorial. 8400 w. Eng News—Dec. 25, 1902.

Governor Odell on the Proposed 1000-Ton Barge Canal. A portion of the Governor's message to the legislature in regard to the project for the construction of a 100-ton barge canal from Lake Erie to the Hudson river. 1300 w. Eng News—Jan. 15, 1903.

Proposed Improvements in the Erie Canal. Map, with review of the different plans for improvements proposed. 1200 w. Sci Am Sup—Jan. 17, 1903.

The Canal Discussion in New York. Editorial discussion of the arguments to be brought before the New York legislature. 2000 w. Eng News—March 19, 1903.

The Lake Ontario Route for a Barge Canal. Editorial discussion of this route, giving the report of Mr. William Pierson Judson. 1700 w. Eng News—May 14, 1903.

The Erie Canal—Its Past and Future. M. M. Wilner. Gives an account of the proposed enlargement, reviews the past history, and discusses the outlook and New York's industrial position. Ill. 4700 w. Rev of Revs—July, 1903.

The Opinions of Engineers on the New York Barge Canal Proposition. Editorial, with letters from prominent engineers in reply to a request for their opinions. 9000 w. Eng News—Oct. 22, 1903.

Summary of the Case Against the Erie Canal Enlargement. Editorial review of the arguments that have been advanced. 1800 w. R R Gaz—Oct. 23, 1903.

The Ontario Route for a Barge Canal vs. the Seneca-Oneida-Mohawk Route. T. W. Symons. An argument against the Ontario route and in favor of the inland route, with editorial discussion. 4800 w. Eng News—Oct. 2, 1902.

New York's New Canal System. Col. Thomas W. Symons. A review of the proceedings which led to the bill appropriating over $100,000,000 for canal improvement, with an outline of the work already begun. 2000 w. Marine Rev—March 10, 1904.

The Barge Canal Across New York State. Plan showing the route of the canal, with particulars concerning changes, difficulties, etc. 2500 w. R R Gaz—April 8, 1904.

Preliminary Engineering Work on the New York Barge Canal Improvements. Reviews a manual of instructions recently issued by H. A. Van Alstyne, State Engineer, for preliminary work on the improvement of the Erie, Oswego and Champlain Canals. 2200 w. Eng Rec—Nov. 12, 1904.

See also American; Great Lakes.

Niagara.—See DAM.

Nicaragua.—The Nicaragua Canal Bill in Congress. Editorial discussion of the probability of the U. S. Congress authorizing the construction of this canal, and of matters related to the project. 1800 w. Eng News—Nov. 29, 1900.

The Nicaragua Canal Question and the Clayton-Bulwer Treaty. Robert Bromley. A discussion of the Hepburn Bill, the Clayton-Bulwer Treaty, and international matters relating to the construction of this canal. 7300 w. Nineteenth Cent—Jan., 1901.

The Nicaragua Canal Project and its Relation to Commercial and Industrial Prosperity. W. K. Kavanaugh, at the Industrial Convention at Philadelphia. Address urging the building of this canal by the United States. 2800 w. Pro St Louis Ry Club—July 12, 1901.

The Nicaragua Canal Project. S. D. Webster. A critical discussion of a paper by W. K. Kavanaugh, read at the Industrial Convention at Philadelphia. 4500 w. St. Louis Ry Club—Nov. 8, 1901.

Why Is An Isthmian Canal Not Built? Lewis M. Haupt. A discussion favoring the Nicaragua route, and urging the commencement of the work under the present administration. 3000 w. N Am Rev—July, 1902.

An Alternative Line for the Nicaragua Canal; and a Proposed New Method of Dam Construction. J. Francis Le Baron. Considers the Colorado mouth as a much more desirable harbor, describing how it can be made available. Proposes a loose-rock dam, enclosed in a heavy chain-cable net. Ill. and map. 6000 w. Pro Am Soc of Civ Engrs—Oct., 1902.

An Alternative Line for the Nicaragua Canal; and a Proposed New Method of Dam Construction. Discussion of a paper by J. Francis Le Baron. Map. 10,800 w. Pro Am Soc of Civ Engrs—Dec., 1902.

An Alternative Line for the Nicaragua Canal; and a Proposed New Method of Dam Construction. J. Francis Le Baron. A reply to the discussion of the writer's paper on this subject. 3500 w. Pro Am Soc of Civ Engrs—Jan., 1903.

See also Isthmian; Panama.

Nicaragua Lake.—The Water Supply of Lake Nicaragua. Angelo Heilprin. A reply to criticisms by the hydrographer of the Nicaragua Canal Commission. 1700 w. Sci Am Sup—Jan. 12, 1901.

Nicaragua Volcanic Conditions.—Volcanic Conditions on the Line of the Nicaragua Canal. Extracts from lectures of Mr. Bunau-Varilla, a distinguished French engineer, on the probability of volcanic disturbances. 1000 w. R R Gaz—April 26, 1901.

Ohio-Erie.—The Improvement of the Ohio Canals. W. Frank McClure. A brief account of improvements to create a new deep water link between Lake Erie and the Ohio River, with illustration of the weigh-lock of the Ohio and Erie canal. 900 w. Sci Am—Aug. 5, 1905.

Ohio River.—See RIVER REGULATION—Ohio.

Panama.—Central American Ship Canals. Devoted mostly to the Panama enterprise, giving the history of its development. Map. Serial. 1st part. 3500 w. Engr, Lond—Oct. 26, 1900.

The New Panama Canal Proposals. Discusses the reasons why the United States government favor the Nicaragua route, and the work being done by the new Panama Canal Co., and urges British interest in the Panama project. 3300 w. Engng—Feb. 1, 1901.

The Panama Canals. Editorial review of paper by J. T. Ford, read before the Inst. of Civ. Engs. (England), discussing the engineering lessons to be learned from the condition of the Panama Canal works since their abandonment. 1300 w. Eng Rec—March 2, 1901.

Recent Claims for the Panama Canal. A discussion of the influence of earthquakes, trade winds and curvature on the selection of a route across the isthmus. 1500 w. Eng Rec—March 30, 1901.

The Panama Canal Route. Editorial on the changed conditions due to the recent offer of the French company and the present position of the undertaking. 1200 w. Eng Rec—Jan. 25, 1902.

The Panama Route for a Ship Canal. Prof. William H. Burr. A complete review of the history of this route, and all matters relating to it. Ill. 7800 w. Pop Sci M—July, 1902.

The Present Aspect of the Panama Canal Construction. Wm. H. Burr. A general account of the existing conditions and plans for work at the isthmus. 3500 w. Engineering Magazine—Jan., 1905.

Report of the Committee on Engineering of the Isthmian Canal Commission. Report of William H. Burr and William Barclay Parsons outlining the work of the Committee between Jan. 24 and Feb. 14. 5000 w. Eng News—March 2, 1905.

The Panama Canal. Reviews the address of Mr. George S. Morison before the Massachusetts Reform Club, and discusses the present state of the project, and the engineering features. Ill. 3300 w. Engng—July 4, 1902.

The Panama Canal. George S. Morison. An illustrated article discussing the principal features of the canal, describing both plans and giving comparative estimates. 11000 w. Pro Am Soc of Civ Engrs—Jan., 1903.

The Panama Canal. Discussion of paper by George S. Morison. 7800 w. Pro Am Soc of Civ Engrs—March, 1903.

The Panama Canal. Continued discussion of paper by George S. Morison. 4000 w. Pro Am Soc of Civ Engrs—April, 1903.

The Advantages of Lake Bohio at the Higher Level. George S. Morison. A brief expression of the conclusions which led the Isthmian Canal Commission to advocate plans for the Panama Canal with a high summit level, and an answer to the principal criticisms of those plans, especially as to the Bohio Dam. Ill. 900 w. The Engineering Magazine—June, 1903.

The Panama Canal: The Dual Versus the Single-Lake Project. Gen. Henry L. Abbot. Summarizing the objections to the high-level plans advanced by the Isthmian Canal Commission and by Mr. George S. Morison, and the superior advantages of the project of the Comité Technique for a lower summit at Lake Bohio and a second dam at Alhajuela. The article is a reply to one by Mr. Morison in The Engineering Magazine for January, 1903. 2400 w. The Engineering Magazine—June, 1903.

The Solution of the Isthmian Canal Problem. Gen. H. L. Abbot. A review of the dangers which have been escaped by the choice of the Panama route for the Isthmian Canal. 3000 w. Engineering Magazine—Jan., 1904.

The Revival of De Lesseps' Sea-Level Plan for the Panama Canal. Gen. H. L. Abbot. An examination of hydraulic problems involved in the sea-level scheme, showing its impracticability. 3000 w. Engineering Magazine—Feb., 1905.

The Panama Canal (Der Panama-Kanal). W. Kaemmerer. A general review of the Panama Canal and the principal plans for its construction, with maps and illustrations. 3540 w. Zeitschr d Ver Deutscher Ing—May 9, 1903.

The Panama Canal. John George Leigh. This first of a series of articles gives an interesting historical review of this project, with maps, sections and illustrations. Serial. 1st part. 1300 w. Trac & Trans—Feb., 1903.

A Colombian View of the Panama Canal Question. Raul Pérez. A statement of the case. 2500 w. N Am Rev—July, 1903.

Panama Canal. Editorial statement of the present discussion of routes, outlining the plans that have been considered. 1600 w. Engng—Jan. 13, 1905.

The First Annual Report of the Isthmian Canal Commission. Such portions of the report as are of most interest to engineers are given. 7000 w. Eng News—Jan. 26, 1905.

The Work of the Commission on the Panama Canal. C. E. Grunsky. An authoritative account of the policy which controls its work and of the results which have been accomplished. 4500 w. Engineering Magazine—Feb., 1905.

The Panama Canal and Its Problems. John Barrett. Considers the responsibility of Chief Engineer Wallace, a sea-level or high-level canal, projects for dams and artificial lakes, the securing of competent labor, &c., &c. 7500 w. Rev of Revs—Feb., 1905.

Some Engineering Features of the Panama Canal. F. E. Turneaure. Gives a general description of the work, discussing the Bohio dam, the Culebra Cut, and other features. 3300 w. Wis Engr—March, 1905.

The Panama Canal. The present article reviews the recent history of the project, explaining present conditions. Serial. 1st part. 3500 w. Engr, Lond—March 3, 1905.

Report on, and Progress Views of, the Panama Canal. Gives interesting views of excavation on the Panama Canal, with some general information, and the report of the engineering committee of the Isthmian Canal Commission. 7000 w. Ry & Engng Rev—March 18, 1905.

Report of the Chief Engineer of the Isthmian Canal Commission. Report of John F. Wallace, with editorial comment. 8500 w. Eng News—April 20, 1905.

The Actual Problems of the Panama Canal. John F. Wallace. The first of a series of critical articles discussing the plans and methods of execution of the works at the isthmus. 4500 w. Engineering Magazine—September, 1905.

Preliminary Work on the Panama Canal. John F. Wallace. The second of a series of articles, which shows the physical and governmental red-tape difficulties encountered, and the necessary preparation and organization before work on the canal begins. 5000 w. Engineering Magazine—October, 1905.

The First Year's Preparatory Work on the Panama Canal. John F. Wallace. Mr. Wallace's third article gives a summary of the actual construction work accomplished during the year in which he was in charge, and shows the actual costs and the difficulties to be overcome. 4500 w. Engineering Magazine—Nov., 1905.

A New Plan for the Panama Canal. An explanation of the project submitted by Lindon W. Bates, which provides for terminal lakes and a 20-foot summit level. Also suggests an alternative plan with higher summit level. 1500 w. Eng Rec—April 22, 1905.

The Problem of the Panama Canal. Lindon W. Bates. A brief review of the plans and a discussion of the problems, explaining the terminal lake plan proposed by the writer. Map. 2500 w. Yale Sci M—June, 1905.

The Panama Canal (Le Canal de Panama). A. Dumas. An illustrated historical account of the two French companies and of the sale of the concession and works to the United States government. Three articles. 7500 w. Génie Civil—May 6, 13, 20, 1905.

The Panama Canal. Six relief model maps showing the six plans that have been considered for this great undertaking. 1200 w. Marine. Engng—June, 1905.

History and Present Status of the Panama Canal. With illustrations and editorial on the alternative plans for the canal. 3600 w. Sci Am—June 3, 1905.

The Present Status of the Panama Canal. C. F. Z. Caracristi. An able discussion of the causes of delay in this work, and of the resignation of the chief engineer, the sanitation of the isthmus, and related topics. 4000 w. Mfrs Rec—July 13, 1905.

The Panama Canal: Some Serious Objections to the Sea Level Plan. Cassius E. Gillette. Proposes a lock canal with a dam at Gatun, pointing out its advantages. Discusses the question of the disposition of floods and silt from the streams in the Chagres Valley. Ills. 6000 w. Eng News—July 27, 1905.

The Present Status of the Panama Canal. Fullerton L. Waldo. A review of the work accomplished, discussing the site for dams, the plans proposed for sea-level and for lock canals, and the reports of investigators. 4000 w. Eng Rec—Oct. 7, 1905.

An Engineer's Life in the Field on the Isthmus. Fullerton L. Waldo. A well illustrated account from actual experience on the canal work; together with a hitherto unpublished report on the Gamboa Dam. 6000 w. Engineering Magazine—Dec., 1905.

The Real Conditions at Panama. Eugene P. Lyle, Jr. The second of a series of investigations of the problems involved in the control of the canal. 6800 w. World's Work—Nov., 1905.

Progress on the Panama Canal Work. Information from the address of Hon. William H. Taft, before the St. Louis Commercial Club. Especially concerning the troubles and difficulties experienced during the last two years. 7200 w. Eng News—Nov. 23, 1905.

The Conflict of Engineers Over Plans for the Panama Canal. Three papers by Mr. William Ham. Hall, discussing the relative merits of the several different plans for the canal and explaining some of the reasons for the conflict of opinion among engineers. Serial. 1st part. 7000 w. Eng News—Nov. 30, 1905.

The Panama Contretemps. Editorial discussion of the present situation. 1800 w. R R Gaz—Vol. XXXIX., No. 21.

Mr. Wallace Before the Panama Board. A statement of the recommendations of the former Chief Engineer of the Isthmian Canal. 1700 w. R R Gaz—Vol XXXIX., No. 22.

See also Isthmian; COLOMBIA; DAM — Bohio; Gatun; GEOLOGY; SANITATION; SHIP RAILWAY; SURVEYING—Isthmian Canal.

Panama, Bohio.—Lake Bohio, the Summit Level of the Panama Canal. George S. Morison. An authoritative exposition of the project adopted by the American Isthmian Canal Commission for the control of the summit level. 4000 w. Engineering Magazine—Jan., 1903.

Panama, Chagres River.—The Panama Canal and the Regulation of the Chagres River. Gen. H. L. Abbot. An exhaustive review of the relation of the Chagres river to the Panama canal. giving a complete project for flood control and water supply. 15000 w. Engineering Magazine—Dec., 1902.

Panama Finance.—Payments on Account of the Panama Canal. A discussion of the financial side of this great undertaking. 1600 w. Bankers' Mag. N. Y.—Dec., 1903.

Panama, French Control.—Panama in French Canal Times. W. F. Dennis. Notes on the conditions of the isthmus during the operations of the French Company are reviewed. Ills. 3000 w. Eng Rec—April 1, 1905.

Panama, Machinery.—Modern Machinery and the Panama Canal. A. W. Robinson. Mr. Robinson's first article deals with methods and costs of previous works, discussing the extent to which they can safely be used as guides for the work at Panama. 3500 w. Engineering Magazine—April, 1905.

Modern Excavating Machinery for the Panama Canal. A. W. Robinson. Mr. Robinson's second paper gives a general review of the latest and most powerful types of excavating and dredging machinery available for use on the Panama canal works. 2500 w. Engineering Magazine—May, 1905.

Machinery On the Panama Canal. H. Prime Kieffer. An illustrated account of the repair work under way to make ready for use the machinery already on the Isthmus, with some information relating to the work to be accomplished. 3000 w. Mod Mach—April, 1905.

Panama, Natural Conditions.—The Republic of Panama. Wm. H. Burr. An illustrated article describing the country, customs, climate and conditions, and discussing the various projects for a ship canal. 6400 w. Nat Geog Mag—Feb., 1904.

Natural Conditions Affecting the Building of the Panama Canal. Gen. H. L. Abbot. A study of the data relating to the climate and rainfall of the isthmus which solve the problems of water supply and control. 3500 w. Engineering Magazine—August, 1904.

Panama Organization.—Organization and Personnel in the Building of the Panama Canal. Fullerton L. Waldo. A discussion of an outline of practical plans for the actual construction work on the canal. 2500 w. Engineering Magazine—Jan., 1903.

Panama Sanitation.—Sanitary Problems Connected with the Construction of the Isthmian Canal. Geo. M. Sternberg. Considers how best to avoid unnecessary sacrifice of life by those employed on this great work. 3700 w. N Am Rev—Sept., 1902.

Health Conditions on the Isthmus of Panama. Dr. W. C. Gorgas. A statement of the sanitary conditions explaining the dangers to health and discussing the probability of keeping them under control. 2200 w. Eng Rec—June 4, 1904.

Paris Exposition.—Internal Waterways at the Paris Exposition (Die Binnenschiffahrts-Kanäle auf der Pariser Weltausstellung 1900). Richard Kuhn. A review of the internal waterways of various countries as illustrated by exhibits at Paris. 5000 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1901.

Prussia.—See Germany.

Puget Sound-Lake Washington.—Earthwork of the Seattle and Lake Washington Waterway Co. C. H. Rollins. Read before the Pacific Northwest Soc of Engrs. Describes the scheme and methods of construction of the canal connecting Puget Sount with Lake Washington. 4000 w. Eng News—Jan. 12, 1905.

Rhine-Hanover.—The Projected New Canal from the River Rhine to the City of Hanover. Describes the project, and gives a summary of the advantages promised. Map. 1600 w. Ir & Coal Trds Rev—Nov. 4, 1904.

Rhine-Marne.—See PUMPING STATION.

Riga-Cherson.—A New Baltic-Black Sea Canal Scheme. Briefly outlines the plan suggested by M. W. von Rukteschell, a Russian engineer. It is called the Riga-Cherson Canal scheme, and utilizes the Duna and Dnieper rivers with a connecting canal. 900 w. Engng—May 12, 1905.

Russia.—See Baltic-Volga; Riga-Cherson; WATERWAY.

San Blas-Mandingo.—The Latest Route Proposed for the Isthmian Canal—Mandingo Route. The statement of the American Isthmus Ship Canal Company concerning this proposed route with map. 2500 w. Nat Geog Mag—Feb., 1902.

Isthmus Canal: Sea Level Versus Locks. William W. Redfield. A brief discussion, explaining the writer's reasons for favoring the San Blas route for the canal. 1500 w. Jour Assn of Engng Socs—Dec., 1904.

See also Isthmian.

Sault Ste. Marie.—Commerce of Lake Superior. Information from an interesting report of government officials in charge of the St. Mary's Falls canal. 2700 w. Marine Rev—Feb. 21, 1901.

The Enlargement of the Sault Canal. Waldon Fawcett. An illustrated article on the proposal to enlarge the locks of the governmental ship canal which connects Lakes Huron and Superior. 1500 w. Am Mfr—Feb. 20, 1902.

The Development of the Sault Ste. Marie Canal. William Gilbert Irwin. A brief review of the history and development. 2000 w. Sci Am—June 21, 1902.

The "Soo" Ship Canal System—The Fiftieth Anniversary of its Commencement. Day Allen Willey. Remarks on the importance of this canal, comparing it with other waterways, and showing the immense amount of traffic which passes through it. Ill. 1500 w. Sci Am—June 6, 1903.

The Pioneer Sault Canal. Charles T. Harvey. An interesting review of the history from the earliest promoting measures in 1857. 7500 w. Marine Rev—Aug. 4, 1904.

What of Our Commerce? Lewis M. Haupt. Gives a chart showing graphically the growth in traffic through this canal, and comparison with the Suez Canal, and urges the further improvement of these waterways. 1000 w. Marine Rev—Aug. 3, 1905.

The Semi-Centennial of St. Mary's Falls Canal. Illustrates the first lock constructed in America, and the present locks of the Sault Ste. Marie Canal, giving some information concerning the immense traffic. 800 w. Marine Engng—Aug., 1905.

The Semi-Centennial of St. Mary's Falls Canal. An illustrated article briefly reviewing the history of the régime and the construction of the canal and its development. 1500 w. Naut Gaz—Aug. 3, 1905.

Sault Canal Celebration. An account of the celebration of the fiftieth anniversary, with the historical address of Hon. Peter White. Ills. 8000 w. Marine Rev—Aug. 3, 1905.

Sault Canal Celebration. An illustrated article giving particulars of the exercises and the addresses of Gov. Fred M. Warner and Vice-President Fairbanks, and extracts from other addresses. 6000 w. Marine Rev—Aug. 10, 1905.

See also **ELECTRIC INDUSTRY; HYDRO-ELECTRIC PLANT.**

Scotland.—See **Forth-Clyde.**

Seattle and Lake Washington.—See **Puget Sound.**

Shrewsbury and Shropshire.—Two Interesting Canal Relics. Brief illustrated descriptions of the inclined plane of the Shropshire canal, and the aqueduct of the Shrewsbury canal. 700 w. Engr, Lond—Aug. 30, 1901.

"Soo."—See **Sault Ste. Marie.**

Soulanges, Canada. — The Soulanges Canal Works, Canada. C. R. Coultée. The present article gives an illustrated description of the place, profile and cross-section, guard lock, culverts, draw bridges, locks, etc., of a canal representative of modern hydraulic engineering of this class. Serial. 1st part. 4800 w. Eng News—April 18, 1901.

Electrical Installation for the Soulanges Canal. Illustrates and describes the electric plant for the operation of the locks, sluices and bridges, and to light the canal throughout its entire length of about 14 miles. 2000 w. Can Elec News—June, 1902.

Electrical Work on the Soulanges Canal. Illustrates and describes the electrical installation which operates the sluices, gates and bridges of this new canal around the rapids of the St. Lawrence. 700 w. Engr, Lond—Jan. 9, 1903.

Suez.—The Engineering Works of the Suez Canal. Condensation of a report to the Inst. C. E. by Sir Charles Hartley, being the first complete report in English. 5000 w. Eng Rec—Jan 5, 1901.

Through the Suez Canal on a Man-of-War. H. H. Byrne. An account of the project, its early history, the construction, etc. 2000 w. Sci Am—July 19, 1902.

The Suez Canal and Its Improvements (Der Suezkanal und seine Verbesserungen). An account of the various improvement works which have been made upon the Suez Canal since its opening, with a table of the traffic. 3500 w. Glasers Annalen—Oct. 1, 1903.

Suez Harbors.—See **HARBOR.**

Suez, Obstruction.—The Clearing of the Suez Canal from Obstruction by a Dynamite Ship (Déblaiement du Canal de Suez Obstrué par un Navire Chargé de Dynamite). An illustrated account of the clearing of the Suez Canal from the wreck of the dynamite steamship Chatham. 2000 w. Génie Civil—Nov. 18, 1905.

Tasmania.—The East Bay Neck Ship-Canal, Tasmania. Charles Napier Bell. A brief description of a ship-canal across a peninsula on the east coast of Tasmania, for the use of coasting steamers and fishing craft. 300 w. Inst of Civ Engrs. (No. 3563.)

Teltow.—The Teltow Canal (Der Teltow Kanal). Chr. Havestadt. A description of the waterway connecting the upper Spree with the Havel. With map, profile, and section of the channel. Serial. Part I. 1500 w. Deutsche Bauzeitung—Feb. 7, 1903.

See also **CANAL HAULAGE—Electric, Teltow.**

Trent, Canada.—The Trent Valley Waterway. R. B. Rogers. A brief description of a projected waterway to connect Georgian Bay on Lake Huron, with Lake Ontario, at Trenton, a distance of about 200 miles. 2000 w. Marine Rev—March 5, 1903.

Trent Valley Canal. J. Alexander Culverwell. Map and description of this route which will shorten the transportation from the Great Lakes to the Ocean. It will accommodate barges of 800 tons, and the total cost of the work will be $9,000,000, of which $4,000,000 has been already expended. 1500 w. Can Elec News—April, 1904.

See also **Georgian Bay; CANAL LIFT.**

Truckee, Nevada.—A Description of the Truckee Main River Canal. George Shuey. An illustrated description of this irrigation project in Nevada. 1700 w. Cal Jour of Tech—Oct., 1904.

Vicksburg, Miss.—See **RIVER REGULATION—Yazoo.**

CANAL BOAT.

Gasoline.—See **BOAT, GASOLINE.**

Gas Power.—See **BOAT, GAS POWER.**

Screw.—See **BARGE.**

Tractive Resistance.—See **CANAL NAVIGATION.**

CANAL HAULAGE.

Chain.—Mechanical Traction on the Nivernais Canal. Brief description, with illustrations of mechanical haulage by means of an universal chain. 400 w. Engng—March 7, 1902.

Mechanical Traction on the Nivernais Canal (Canal du Nivernais—Touage Mécanique). M. Mazoyer. Illustrating the chain towing barges used on the Nivernais Canal connecting the Seine and the Loire. 3500 w. 1 plate. Ann des Ponts et Chaussées— 1 Trimestre, 1902.

Current Propulsion.—The Propulsion of Boats by the Current (Propulsion des Bateaux par le Courant). G. Laurent. Proposing a method of propelling boats in canals and other artificial waterways by the maintenance of a continuous current in the stream. 1800 w. Rev Technique—Feb. 25, 1905.

Deutz Motor.—See **BOAT, GAS-POWER.**

Electric.—The Development of Electric Traction on Canals. A summary of the work which has been done in the United States, and brief notice of recent work in Europe. 3500 w. Elec Wld & Engr—Feb. 2, 1901.

Electric Haulage on Canals. E. W. Marchant, D. Sc. Paper before the Manchester Section of the Institution of Electrical Engineers, illustrating and describing various systems of electric traction for canals. Serial. Part I. 2000 w. Elect'n, Lond—Jan. 2, 1903.

Electric Traction on Canals (Le Halage Electrique sur Canaux). Georges Petit. A review of the applications which have been made of electric power to canal traction, showing the conditions under which it may prove advantageous. 3000 w. Revue Technique—Sept. 25, 1903.

Recent Canal Haulage Improvements. George E. Walsh. Considers recent electric haulage systems, and the general tendency. 1800 w. Ir Age—Oct. 29, 1903.

Electricity in Internal Navigation (Die Elektrotechnik in der Binnenschiffahrt). H. Karels. Discussing the practicability of the commercial application of electric towing to canals. 1500 w. Zeitschr f Elektrotechnik—March 13, 1904.

A Review of the Present State of Mechanical Canal Traction. F. H. Davies. Considers the advantages and disadvantages of the system tried, concluding in favor of electrical tractors. 4000 w. Elec Engr, Lond—Aug. 19, 1904.

See also **CANAL**—Cornwall; Lachine; Soulanges; **BRIDGE**—Drawbridge.

Electric, Belgium.—Results with Electric Canal Towage in Belgium. Illustrates and describes an installation on a canal between Brussels and Charleroi. 1000 w. Elek Wld & Engr—Aug 2, 1902.

Electrically-Operated Canals in Belgian Coal Mining Districts. Frank C. Perkins. Illustrates and describes the operation of the Charleroi Canal in Belgium, and reports the progress in electric propulsion generally. 1000 w. Marine Engng—Sept., 1902.

Electric, Finow.—Electric Propulsion on Canals. Editorial on the recent trials ordered by the Prussian government, on the Finow Canal. 1700 w. Elect'n, Lond—Nov. 23, 1900.

Electric, Ganz.—The New Ganz System of Electric Canal Haulage. G. Szasz. An illustrated description of the main characteristics of this system. 5500 w. Feilden's Mag—March, 1903.

See also Electric, Teltow.

Electric, Miami.—Electric Haulage on the Miami & Erie Canal. An illustrated detailed description of the first three-phase traction system in the United States. The most extensive application of mechanical canal-boat haulage yet installed. Also editorial. 5300 w. St Ry Rev—March 20, 1903.

Electric Equipment of the Miami Erie Canal. Charles W. Ricker. Illustrates and describes the equipment and plan of operation. Tows of eight or ten boats are to be hauled by a locomotive running on a track, using three-phase motors, and taking current from trolley wires at high voltage. Also editorial. 9500 w. St Ry Jour—Nov. 7, 1903.

See also Electric, Wood.

Electric, Teltow.—Electric Canal Traction in Germany (La Traction Electrique sur Canaux en Allemagne). Marcel Fabre. With especial reference to the installation of trolley tractors on the Teltown Canal between the Spree and the Havel. 2000 w. 1 plate. Génie Civil—Oct. 25, 1902.

A New System for Electric Haulage on Canals (Ueber ein Neues System für Elektrischen Schiffszug auf Kanälen). Julius Szász. An illustrated description of the system proposed by Ganz & Co. for the Teltow Canal, near Berlin, in which there is a locomotive with inclined axles and four wheels which run on a single rail. Three-phase current is used. Serial. 2 parts. 4500 w. Zeitschr f Elektrotechnik—May 3 and 10, 1903.

Electric Haulage on Canals. Frank C. Perkins. Considers some of the work in this field, and the results of competition for haulage on the Teltow Canal. 3500 w. Elec Rev, N Y—June 6, 1903.

Electric Haulage on Canals. Frank C. Perkins. Considers work done in electric canal haulage, and gives an illustrated detailed account of the tests of systems made on the Teltow Canal, in Germany. 2000 w. Sci Am—June 27, 1903.

Electric Haulage on the Teltow Canal, Germany (Elektrische Treidelei auf dem Teltow-Kanal). Illustrated description of electric locomotive and of electric towboat. 1000 w. Elektrotech Zeitschr—Dec. 31, 1903.

Electric Towing and the Electric Traction System on the Teltow Canal (Elektrische Treideleiversuche und Einführung des Elektrischen Schleppbetriebes auf dem Teltowkanal). Erich Block. With numerous illustrations of traction motors for canal service and results of tests of performance. 4000 w. Glasers Annalen—April 15, 1904.

Electric Haulage in Germany. Clarence B. Schultz. Facts concerning the Teltow Canal, near Berlin, Germany, describing the system of traction, the machinery adopted, etc., giving a financial review of the different electric haulage systems, Ills. 4000 w. Marine Engng—Dec., 1904.

Modern Electric Canal Haulage. An illustrated article describing the electric canal haulage locomotive tried on the Teltow Canal, and other systems of electric canal haulage. 2000 w. Mod Mach—July, 1905.

See also Ganz; **CANAL**—British.

Electric, Wood.—Electric Traction on Canals. Reviews the various systems that have been tried, giving information in regard to the recent trials of the Wood system at Schenectady, and the sytem in operation on the Miami and Erie Canal. Ill. 2000 w. Eng Rec—Nov. 14, 1903.

Electric Towing on the Erie Canal. Brief illustrated description of a direct current aerial monorail system on trial at Schenectady. 1600 w. Elec Wld & Engr—Nov. 14, 1903.

Electricity vs. Mule Power on Canals. H. M. Riseley. Illustrated description of an electrical device invented by Stephen W. Wood. 800 w. Sci Am Sup—April 9, 1904.

Gas Power.—See **BOAT, GAS-POWER.**

Nivernais.—See Chain.

Test Danube.—Towing Tests on the Canal of the Iron Gates (Mitteilungen über die am Eisernen Tor Durchgeführten Schiffszugsversuche). Alois Hoszpotzky. Data and results of dynamometer tests of the power required to tow boats up against the current in the canalized Danube at the Iron Gates. 8000 w. 3 plates. Oesterr Wochenschr f d Oeffent Baudienst—Oct. 14, 1905.

Wood-Electric.—See Electric, Wood.

CANAL LIFT.

See also **CANAL; CANAL LOCK.**

Improved Methods of Overcoming High Canal Lifts (Neuere Vorschläge zur Ueberwindung Hoher Stufen in Schiffahrtskanälen). H. R. Rintelen. A review of various schemes for replacing canal locks, including movable tanks, inclined planes, etc. 5000 w. Glasers Annalen—Dec. 15, 1903.

Austria.—Means for Overcoming Great Differences in Level by Vessels in Internal Waterways (Moyens de Faire Franchir les Grands Chutes par les Bateaux de Navigation Intérieure). A. de Bovet. Review of results of the recent Austrian competition for canal lifts, locks, inclined planes, etc. 6500 w. Mem Soc Ing Civils de France—Aug., 1905.

See also Danube-Oder; Inclined Plane; **CANAL.**

Competition.—See Danube-Oder.

Danube-Moldau.—See Inclined Plane.

Danube-Oder.—International Competition for a Canal Lift (Internationale Wettbewerb-Ausschreibung für ein Kanal-Schiffshebewerk). Specifications for competitive designs for a canal lift to overcome a difference of level of 36 meters on the Danube-Oder canal, Austria. Plans must be submitted to the Minister of Commerce, Vienna, before March 31, 1904. I plate. 2000 w. Zeitschr d Oesterr Ing u Arch Vereines—May 1, 1903.

International Competition for a Canal Lift (Wettbewerbausschreibung für ein Kanal-Schiffshebewerk). Specifications for competitive designs for a canal lift with a height of 36 meters, on the Danube-Oder canal, Austria. Competition closes March 31, 1904, with Minister of Commerce, Vienna. 1 plate. 1500 w. Oesterr Wochenschr f d Oeff Baudienst—May 9, 1903.

Lifts on the Moravian Canals (Ueber das Schiffsheben auf Mährischen Kanalen). Anton Smrcek. Discussing especially the comparative advantages of locks, lifts, and inclined planes for the Danube-Oder canal system. 5000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—April 9, 1904.

The Prize Designs in the International Competition for a Canal Lift (Die Preisgekrönten Projekte im Internationalen Wettbewerbe für ein Kanalschiffschebewerk). Karl Haberkalt. The prize designs for the Danube-Oder Canal were for an inclined plane, and for a great revolving wheel. Two articles. 15,000 w. 7 plates. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 3, 10, 1904.

The International Competition for a Canal Lift (Der Internationale Wettbewerb für ein Kanal-Schiffshebewerk). B. Gerdau. Illustrating a design for an inclined plane entered in the Danube-Oder competition. 4500 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 24, 1904.

A Design for a Canal Lift (Project d'Ascenseur pour Bateaux). Illustrating a design submitted for the Danube-Oder canal, employing a large revolving cylinder, carrying tanks for the boats. 1800 w. I plate. Génie Civil—Jan. 7, 1905.

The Electric Portion of a Canal Lift System (Der Elektrische Teil der Wettbewerbsarbeiten für ein Kanal Schiffshebewerk). Ernest Kronstein. A description of the electrical portion of an inclined-plane canal lift proposed for the Danube-Oder canal scheme. 4000 w. Zeitschr f Electrotechnik—July 30, 1905.

The Electric Portion of the Prize Canal Lift Project (Der Elektrische Teil des Preisgekrönten Schiffshebewerk Projektes "Universell"). Josef Rothmüller. Details of the electrical hoisting machinery for the inclined plane lift proposed for the Danube-Oder Canal. Serial. Part I. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—June 30, 1905.

Foxton, Eng.—Barge Lift at Foxton, Leicestershire. Illustrated description, with statement of the advantages of the lift over locking. 600 w. Engng—Jan. 25, 1901.

A Novel Canal Lift at Foxton. Illustrates and describes a system devised by Gordon & James B. Thomas, of England, for abolishing locks and raising and lowering boats by mechanical means. 1500 w. Sci Am—Sept. 3, 1904.

Germany.—Recent Canal Lifts (Neuere Schiffshebewerke). Hr. Krell. A discussion of the various proporsitions and designs for hydraulic lifts to replace locks in connection with the development of the internal waterways of Germany. 4000 w. Zeitschr d Ver Deutschr Ing—Dec. 24, 1904.

Henrichenburg.—Electric Ship's Lift at Henrichenburg. Illustrated description of a ship's lift in which a large tank 230 ft. long, 28 ft. wide, and 8 ft. deep, having sufficient water-carrying capacity and space to float canal vessels up to 800 tons displacement, is moved up and down from one level to the other. 2500 w. Engr, Lond—Jan. 3, 1902.

The Dortmund-Ems Canal and Henrichenburg Canal Lift. An illustrated detailed description of this famous canal lift, with outline of the project of which it forms a part. Serial. 1st part. 4800 w. Trac & Trans—Dec., 1903.

Inclined Plane.—Austrian Canal Projects From a Mechanical Engineering Standpoint (Unsere Canal-Projecte vom Standpunkte der Oesterreichischen Maschinen-Industrie). Victor Schönbach. A general review of some Austrian canal projects and the proposed inclined-plane lifts. 2000 w. Oesterr Wochensch f d Oeffent Baudienst—April 6, 1901.

New Plans for the Lifts on the Danube-Moldau Canal (Neue Entwürfe für die Hebewerke des Donau-Moldaukanals). Victor Schönbach. A very well illustrated description of the proposed inclined-plane canal-boat railways, with map and profile of canal between Vienna and Budweiss, Bohemia. 6 plates. 4500 w. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 4, 1902.

Inclined Planes for Canal Locks (Frogschleusen auf Geneigten Fahrbahnen). Jaroslav Gröger. With especial reference to the overcoming of differences of level on the Danube-Moldau Canal. Two articles. 10,000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Nov. 19, 1901.

Canal Lifts on the Austrian Waterways (Die Anlage von Schiffshebewerken im Zuge der Oesterreichischen Wasserstrassen). Emil Krumholz. Illustrated plans for transporting vessels from one level to another and over an intervening ridge. 3 plates. 9000 w. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 22, 1902.

The Construction of Inclined Planes for Transporting Vessels (Zur Construction von Geneigten Ebenen für Schiffstransport). Franz Prasil. An illustrated description of an inclined plane system for shifting canal boats from one level to another. 1 plate. 1800 w. Oesterr Wochenschr f d Oeffent Baudienst—March 1, 1902.

The Inclined Plane of the Morris Canal. Brief illustrated description of the inclined plane for raising canal boats over elevations on this canal in New Jersey. 800 w. Sci Am—Nov. 15, 1902.

Canal Locks Considered as Inclined Planes (Ueber Schleusentröge auf Quergeneigter Ebene). Fr. Jebens. A consideration of the inclination of the surface of the water in canal locks, due to the effect of the movement of the water. 1500 w. Glasers Annalen—Dec. 15, 1904.

Inclined-Plane Canal Lifts (Ueber Schiffs-Förderung auf Schiefen Ebenen mit Längsneigung). Fr. Jebens. A discussion of canal lifts in which the boats are floated in tanks, the latter being drawn up on tracks on inclined planes. 1800 w. Glasers Annalen—March 15, 1905.

See also Danube-Oder; CANAL—Shrewsbury and Shropshire.

Moravian.—See Danube-Oder.

New York.—Mechanical Lift Locks in America. Lieut.-Col. Thomas W. Symons. Extracts from a paper submitted to the 10th Int. Nav. Cong. Describes the three kinds of mechanical locks suggested to acomplish the lift of 112 ft. at Cohoes, and the rather remarkable lock proposed for Lockport. 2000 w. Eng Rec—Dec. 16, 1905.

Peterborough, Ont.—A Canadian Lift Lock. Illustrations with brief description of a canal lift at Peterborough, Ontario. 1000 w. Engr, Lond—Jan. 15, 1904.

The Hydraulic Lock on the Trent Canal at Peterborough. Walter J. Francis. Illustrated description of this lock, designed to take the place of ordinary locks where great differences in elevation are found in a comparatively short distance. Claims a saving of time, economy of water and increased capacity. 4500 w. R R Gaz—March 25, 1904.

The Hydraulic Lift Lock in the Trent Canal. John McClelland Bulkley. Illustrated description of the new lock at Peterborough, Ontario, with a lift of 65 feet, designed for 800-ton barges. Also editorial. 4500 w. Eng Rec—Aug. 13, 1904.

CANAL LOCK.

See also CANAL; CANAL LIFT.

Cardot Oscillating.—The Cardot Oscillating Lock (Ecluse Oscillante, Système Cardot). A. Morel. An illustrated discussion of a canal lock which consists of a tank with watertight compartments, moving on a hinge. Serial. Part I. 2500 w. Rev. Technique—May 10, 1903.

Chicago Drainage.—See RIVER REGULATION.

Concrete.—See Nussdorf; CONCRETE—Canal Lock.

Devizes.—See CANAL—Kennet-Avon.

Hydraulic.—See CANAL LIFT—Peterborough.

Meeker Island, Minn.—See also CONCRETE—Canal Lock; RIVER REGULATION—Mississippi, Minneapolis.

Nussdorf.—Submarine Concrete Foundations for the Locks at Nussdorf (Betonierung unter Wasser bei der Schleusen-Anlage in Nussdorf).—E. Grohmann. A detailed account of the important foundation work of the lock chambers of the Danube Canal at Nussdorf. Serial. Part. 1. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—July 25, 1902.

Submarine Concrete Work at the Nussdorf Locks (Betonierungen unter Wasser bei der Schleusen-Anlage in Nussdorf). Emil Grohmann. Giving details of the apparatus for mixing and delivering the concrete to the submarine foundations. Two articles. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 22, Sept. 12, 1902.

Peterborough, Ont.—See CANAL LIFT.

Seine, France.—Electrically Operated Locks on the River Seine. Daniel Bellet. Illustrates and describes the locks and barrage at Amfreville-Poses, recently built to improve the flow of the river and insure a 10 ft. 6 in. minimum depth of water between Rouen and Paris. 1900 w. Trac & Trans—May, 1903.

The New Lock at Port-a-l'Anglais on the Upper Seine (Nouvelle Ecluse à Port-a-l'Anglais sur la Haute Seine). M. Alby. With full details of the masonry construction, the operation of the gates, and the sluices. 5000 w. 3 plates. Ann des Ponts et Chaussées—3 Trimestre, 1902.

Tenscher-Csischek.—A New Canal-Lock System (Ein Neues Sparschleusen-System). Prof. L. Csischek. A description of the Tenscher-Csischek systems in which a rolling cylinder displaces the water necessary to effect the desired difference in level.

4500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Aug. 29, 1902.

CANAL-LOCK GATE.

Electric.—The Electric Feed Gates at Münster and Gleesen (Die Elektrisch Betriebenen Sparschleusen bei Münster und Gleesen). H. Rudolph. A description of the apparatus for regulating the supply of feed water to the upper section of the Dortmund-Ems Canal. Serial. Part 1. 3500 w. Zeitschr d Ver Deutscher Ing—July 20, 1901.

See also **CANAL LOCK—Seine.**

Wood vs. Iron.—Lock Gates of Wood and of Iron (Portes d'Ecluses en Fer et en Bois). M. Claise. A comparison of the two constructions with regard to repairs and cost considered in view of the magnitude of traffic. 3000 w. Ann des Ponts et Chaussées—1 Trimestre, 1901.

Iron or Wooden Lock Gates: Cost of Construction and Maintenance. Points from the summary, by Mr. Fulscher, of reports presented at the Düsseldorf navigation congress. 1400 w. Eng News—Oct. 9, 1902.

CANAL MACHINERY.

See **CANAL—Panama Machinery; CANAL LIFT; CANAL LOCK GATE.**

CANAL NAVIGATION.

Tractive Resistance of Canal Boats. Extracts from Mr. Elnathan Sweet's essay in the State Engineer's report on the proposed barge canal from the Hudson to the Great Lakes. 3500 w. Eng Rec—June 29, 1901.

Some Important Phases of Canal Navigation. Illustrated by Recent Experiments in Germany. Elnathan Sweet. A consideration of the experiments of Herr R. Haack, in Germany, and the knowledge they give of the negative velocities produced in canal navigation, and the limited rate of dirigible speed. 2800 w. Pro Am Soc of Civ Engrs—Dec., 1901.

Some Phases of Canal Navigation. Editorial review of paper by Elnathan Sweet, published in the "Transactions" of the Am. Soc. of Civ. Engrs., under the title "Some Important Phases of Canal Navigation." 1600 w. Eng Rec—June 7, 1902.

CAN MACHINE.

Zeb.—Niagara Automatic Can Body Machine. Illustrated description of an invention of Edmund Zeb which promises an output of 30,000 cans a day. 2500 w. Ir Age—Feb. 18, 1904.

CANNEL COAL.

See **COAL—Cannel.**

CANNON.

See **COAST DEFENCE; GUN; ORDNANCE.**

CANOE.

Collapsible.—See **BOAT—Folding.**

CAPITAL.

Relation to Labor.—See **LABOR—Relation to Capital; WAGES; WORKS MANAGEMENT.**

CAPSTAN.

See also **DOCK; ELECTRIC EQUIPMENT; HARBOR.**

Electric.—Improved Electric Capstan (Nouveau Système de Cabestan Electrique). F. Loppé. Describing the electric capstan made by the Creil Works; so arranged that it can be inverted upon trunnions to give access to the electric machinery. 1800 w. Revue Technique—Oct. 25, 1904.

New Electric Capstan at Antwerp. Illustrated description. 800 w. Sci Am—Dec. 30, 1905.

CAR.

See also **ELECTRIC CAR; LOCOMOTIVE; ROLLING STOCK; STREET CAR; TRAIN.**

Advantages and Disadvantages of Standard Box Cars. H. H. Perkins discusses what is regarded as the standard car, and their loads and handling. General discussion follows. 4000 w. Cent Ry Club—May, 1902.

Air Brake Instruction.—See **AIR BRAKE.**

Am. Car & Foundry Co.—45-Ton Box Car of the American Car & Foundry Co. Illustrated detailed description. 1000 w. R R Gaz—May 17, 1901.

Argentine.—See Cattle; Flat.

A. T. & S. F. Ry.—80,000-lb. Capacity Box Cars of the Atchison, Topeka & Santa Fe. Illustrated description. 700 w. R R Gaz—July 26, 1901.

Automobile.—See **CAR, MOTOR DRIVEN.**

Automobile Carrying.—Baggage Car for Automobiles. Brief illustrated article showing the construction. 400 w. Am Engr & R R Jour—Dec., 1905.

Axle.—See **AXLE.**

Bearings.—See **CAR BEARING.**

Bolster.—The Bolster Problem. R. P. Lamont. Presents points, mainly from the standpoint of the manufacturer, giving also information of a large number of cars. Followed by general discussion. 11000 w. W Ry Club—Jan. 21, 1902.

See also Steel Sills.

Brake Records.—See **AIR BRAKE.**

Breakages.—Breakage of Car Equipment. Past, Present and Future, Cause and Remedy. Charles Waughop. Short paper presenting facts bearing on this subject, followed by discussion. 8000 w. St. Louis Ry Club—Nov. 13, 1903.

British.—Wagons of High Capacity for British Railways. Illustrates and describes two types of cars of new design. 1700 w. Engng—Oct. 18, 1901.

Large Railway Wagons. Illustrated description of fine cars built in England. 1700 w. Engng—Nov. 29, 1901.

See also Steel.

British Private.—Private Owners' Wagons. Revised specifications and drawings issued by the Railway Clearing House Committee of England. 2300 w. Col Guard—Aug. 28, 1903.

20-Ton Private Owners' Wagons. Official drawings and specifications which are to regulate the construction of this class of rolling stock in England. 2500 w. Bul Int Ry Cong—Jan., 1904.

British Standard.—The Modern Railway Wagon and the Details of Its Design. George Willans. A discussion of the present standard wagon specifications and their details, and high-capacity stock and future requirements. Ill. Serial. 1st part. 1600 w. Prac Engr—Jan. 29, 1904.

Buffer Rods.—See **DRAFT GEAR.**

Buffet, B. & O. Ry.—See Dining, B. & O. Ry.

Buffet Combination.—Chicago Great Western House and Buffet Cars. Illustrates and describes special cars having original features of interest. 800 w. Ry Age—Dec. 18, 1903.

See also Dining Combination.

Cabin, P. R. R.—Four-Wheeled Cabin Car. Southwest System Pennsylvania Lines. Detailed drawings and description of a recently designed car for freight train crews, making their quarters more comfortable and commodious. 1100 w. Ry & Engng Rev—June 14, 1902.

Caboose.—The American Caboose Car. An illustrated detailed description of the latest standard forms of caboose cars and their construction. 5000 w. R R Car Jour—Dec., 1900.

A Chesapeake & Ohio Standard Caboose. Illustrated description of a design especially adapted to the needs of this road. 800 w. Ry Age—Aug. 9, 1901.

Four-Wheeled Caboose for the Big Four. Description, with engravings showing their construction and arrangement. 1000 w. R R Gaz—Vol. XXXVIII. No. 26.

See also Repair.

Caledonian.—See Steel Caledonian.

Capacity.—Capacity of Railway Wagons as Affecting Cost of Transport. J. D. Twinberrow. Discusses the possible saving by employing vehicles of greater earning capacity, and the difficulties that stand in the way. Ill. 6300 w. Inst of Mech Engs—Nov. 16, 1900.

Capacity of Railway Wagons as Affecting Cost of Transport. J. D. Twinberrow. Read before the Inst. of Mech. Engs. Indicates the course of railway finance during the last decade, and discusses the economies possible, especially by employing vehicles of greater earning capacity. Ill. Serial. 1st part. 3800 w. Engng.—Nov. 23, 1900.

Increasing the Capacity of Freight Cars (Ueber die Erhöhung der Ladefähigkeit der Offenen Güterwagen). Hr. Schwabe. A discussion of the commercial importance of large cars and automatic unloading methods, based mainly on American practice. 4000 w. Stahl u Eisen—June 1, 1901.

The Increase in Capacity of Open Freight Wagons (Ueber die Erhöhung der Ladefähigkeit der Offenen Güterwagen). Hr. von Schwabe. A discussion of the advantages of large coal cars, considering especially the Prussian railways. 5000 w. Glückauf—Nov. 30, 1901.

The Increase in Capacity of Open Freight Cars on the Prussian State Railways (Ueber die Erhöhung der Ladefähigkeit der Offenen Güterwagen bei den Preussischen Staatsbahnen). Hr. von Schwabe. A discussion of the question of increasing the capacity of cars, and figures showing the relations between live and dead loads on German and American railways. 2000 w. Glasers Annalen—July 1, 1903.

Note on Increased Tonnage of Open Wagons and Increased Speed in Loading and Unloading Them. Mr. Schwabe, in "Zeitung des Vereins." A discussion of the advantages, considering the subject in relation to the Prussian State Railway. 5 tables. 3200 w. Bul Int Ry Cong—July, 1904.

Increasing the Capacity of Cars (Die Bestrebungen auf Erhöhung der Tragfähigkeit von Güterwagen). Hr. Engel. A discussion of British reports on American transportation and comparisons of American, British and German cars, particularly for coal and other heavy freight. Illustrations. 6 plates. 6000 w. Glückauf—May 2, 1903.

Note on the New 40-Ton Car of the Northern Railway of France (Note à Propos du Nouveau Wagon de 40 Tonnes de la Compagnie du Nord). Felix Sartiaux. A discussion of the advantages and disadvantages of large cars, showing the large gain from their use. 6000 w. Rev Gen des Chem de Fer—Aug., 1904.

American Freight Cars of Large Capacity (Amerikanische Güterwagen mit Grosser Ladefähigkeit). M. A. Nüscheler. A discussion of the economy attainable by the use of cars of large capacity; with examples from American practice. 2500 w. Glasers Annalen—Oct. 1, 1904.

The Capacity of Freight Cars (La Capacité des Wagons à Marchandises). E. Biard. A discussion of the relation of the size of cars to traffic efficiency, with especial reference to the increasing capacity of cars in the United States, compared with other countries. 9000 w. 1 plate. Mem Soc Ing Civ de France—Jan., 1905.

High Capacity Cars. Rodney Hitt. Considers briefly the development of high capacity cars and the benefits derived from their use. 3300 w. R R Gaz—Vol. XXXVIII., No. 20.

Large Freight Cars (Güterwagen von Hoher Tragkraft). E. Metzeltin. With numerous illustrations of flat top, box, and hopper cars of the largest sizes in German, British and American railway service. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 4, 1905.

See also Coal Capacity; RAILWAY TRANSPORTATION—Train Loads.

Cattle.—See Horse; Sanitation; Stock.

Cent. of N. J.—Standard 60,000 Lbs. Capacity Box Cars for the Central of New Jersey. Illustrated description. 500 w. R. R. Gaz—April 11, 1902.

Box Car with Strong End Construction, for the Central Railroad of New Jersey. Illustrated description. 1000 w. Loc Engng—Sept., 1903.

C. & O.—Box Car, 80,000 Pounds Capacity, Drawings illustrating a new box car with wooden sills and metal bolsters, built for the Chesapeake & Ohio. 350 w. Am Engr & R R Jour—Feb., 1902.

Chicago & W. Indiana.—See LOCOMOTIVE.

C., B. & Q.—New 80,000 lbs. Capacity Box Cars for the Chicago, Burlington & Quincy Railroad. Drawings and description. 600 w. R R Gaz—Dec. 6, 1901.

Coal.—50-Ton Steel Coal Car, with Westinghouse Friction Draft Gear; Pennsylvania R. R. Illustrates and describes the construction of these cars and compares them with some others of the same class built by the same firm for other railways. 1800 w. Eng News—Sept. 4, 1902.

Is the 10-Ton Wagon the Best After All? Compares British and American practice, and considers the 10-ton type the most suitable for the traffic in England. Also discusses other matters affecting the cost of haulage. 2800 w. Ir & Coal Trds Rev—Feb. 13, 1903.

40-Ton Coal Car, with Steel Underframe. Drawings, photographs and detailed description of some interesting cars recently constructed for a coal mining company. 800 w. R R Gaz—Feb. 5, 1904.

The Evolution of the Coal Car. C. H. Caruthers. An interesting review, with illustrations. 2200 w. R R Gaz—Vol XXXIX., No. 16.

See also Capacity; Gondola; Hopper; Hopper Composite; Steel; Vanderbilt.

Coal, British.—Self-Emptying Coal Wagons. Illustrates and describes cars provided with doors of special design in the floors. 600 w. Engr, Lond—April 1, 1904.

Fifteen and Twenty-Ton Wooden Coal Wagons—North Eastern Railway. Brief description with illustrations. 500 w. Ir & Coal Trds Rev—Nov. 7, 1902.

Coal, Can. Pac.—Canadian Pacific Coal Car. Illustrated description of cars of 40 tons capacity of the latest design, aiming to eliminate all tendencies toward sagging or bulging. 600 w. Loc Engng—April, 1903.

Coal Capacity.—High Capacity Wagons. An account of tests on the North-eastern Railway to determine the most economical type for mineral traffic. Illustrates and describes the 40-ton coal wagon on trial. Serial. 1st part. 2300 w. Ir & Coal Trds Rev—Oct. 3, 1902.

The Ownership and Capacity of Railway Coal Trucks. Discusses the tendency in England toward increasing the size of the coal cars, and the problems arising in connection with the large number of firms owning private cars. 1800 w. Jour Gas Lgt—Oct. 14, 1902.

Coal, C., B. & Q.—Coal Cars of 80,000 Pounds' Capacity. Illustrated description of cars for the Chicago, Burlington & Quincy Railroad. 600 w. Am Engr & R R Jour—Dec., 1900.

Forty-Ton Hopper Bottom Coal Cars, C., B. & Q. R. R. Illustrations of new cars now building which show novel features. 500 w. Ry & Engng Rev—July 13, 1901.

Coal, Chic., Mil & St. P.—100,000 Lbs. Capacity Coal Cars—Chicago, Milwaukee & St. Paul Railway. Illustrated detailed description of the form of construction. 700 w. Ry Mas Mech—Feb., 1904.

Coal, French.—50-Ton Mineral Wagons on French Railways. Illustrated descriptions of types of high-capacity coal cars. Also a bogie truck for passenger carriages is shown. 500 w. Engng—April 7, 1905.

Coal, Phil. & Reading.—Coal Car for the Philadelphia & Reading. Illustrates and describes the latest design for a hopper bottom self-cleaning coal car of 80,000 lbs. capacity. 500 w. Ry Age—Oct. 24, 1902.

Coal, Pittsburg Co.—80,000 Lbs. Capacity Drop Bottom Coal Car—Pittsburg Coal Co. Illustrated description of a design from which 500 cars are being built. 1000 w. Aug. 23, 1901.

Coal Private.—See British Private.

Coke.—See Steel, Coke.

Composite Hopper.—See Hopper Composite.

Construction.—Progress in Car Building. Editorial review of recent improvements and designs, the troublesome details, types, etc. 2000 w. R R Gaz—June 26, 1903.

The Building of a Railway Car. Day Allen Willey. Illustrated detailed description of the methods of constructing the coaches used on the principal American railways. 1800 w. Sci Am—Aug. 19, 1905.

Construction of a Passenger Car. C. F. Rydberg. Read before the Canadian Ry. Club. A general discussion of the more important points in the construction. 5000 w. Ry & Engng Rev—Dec. 2, 1905.

Contagion.—See Sanitation.

Convertible.—A New Type of Car for Steam Roads. Illustrated description of a satisfactory car for suburban traffic. The window sash is double and of much larger size than usually employed, and so arranged that the sash slides upward into the roof, entirely out of sight when it is desirable to have the car open. 1200 w. Ry & Engng Rev—May 4, 1901.

See also ELECTRIC CAR.

Convertible Freight.—See Dump, Hart.

Convertible Hopper.—See Hopper Convertible.

Corridor.—Improvements in Bogie-Truck Corridor Cars (Neuerungen an Vierachsigen Durchgang-Personenwagen). Hr. Herr. A paper before the Verein Deutscher Maschinen-Ingenieure, giving a well illustrated description of new passenger cars on the Prussian State Railways and various details. 7 plates. 4000 w. Glasers Annalen—April 15, 1902.

Corridor Carriage for the Cambrian Railways. Two-page plate, with description. 800 w. Engng —Dec. 16, 1904.

Coupler.—See CAR COUPLER.

D., L. & W.—Thirty-six Foot 60,000-lb. Capacity Box Cars, Delaware, Lackawanna and Western. Plans and brief description of design of which 1000 cars were recently ordered. 400 w. Ry Mas Mech—Feb., 1902.

Design.—Modern Car Design. C. A. Seley. Considers the general principles of importance in this line of engineering. 2000 w. Am Engr & R R Jour—June, 1902.

Design, Purdue University.—The Course in Car Design at Purdue University. William Forsyth. A description of the course as conducted during the fall term of 1901. 2400 w. R R Gaz—June 13, 1902.

Dining.—A Modern Dining Car—C., B. & Q. Railway. Illustrated description of new cars possessing novel features. 600 w. Ry Mas Mech —April, 1901.

New Parlor and Café Dining Cars, B. & O. R. R. Half-tone illustrations and floor plan, with description. 400 w. Ry & Engng Rev—June 22, 1901.

New Dining Car on the Denver & Rio Grande Ry. Illustrates and describes a car of fine construction and unique features. 600 w. Ry Mas Mech—Oct., 1901.

The Dining Car Department in America. Gives an idea of the first cost of a dining-car and its equipment, the operation and maintenance; discusses the problems to be solved to make the service satisfactory, and related matters. 1800 w. R R Gaz—Vol. XXXVIII., No. 20.

See also Sleeper, British; Buffet.

Dining, B. & O.—New Dining and Parlor Café Cars, Baltimore & Ohio R. R. Exterior and interior views, floor plans and description. 1200 w. Ry & Engng Rev—Feb. 21, 1903.

Dining Combination.—Combination Dining, Parlor and Day Cars. Illustrated description of special cars designed for routes where the hauling of dining cars would not be justified. 800 w. Eng News—Feb. 18, 1904.

Disinfection.—See Sanitation.

Douai.—See Steel, French.

Double-Deck.—See Stock; ELECTRIC CAR.

Draft Gear.—See CAR COUPLER; CAR TRUCK; DRAFT GEAR.

Dump.—Hocking Valley Ry. 30-Ton Side Dump Car with Steel Box. Illustrated description. 1000 w. Ry & Engng Rev—Feb. 1, 1902.

Self-Dumping Cars in Railroad Construction. Day Allen Willey. An illustrated article on the remarkable work done by these cars in the building of railroads. 900 w. Sci Am—June 7, 1902.

The Lawson Dump Car. Illustrated detailed description. 900 w. R R Gaz—March 11, 1904.

The Lawson Improved Dumping Car. Illustrated description of a type of car used for trestle filling, ballast handling, general construction work, etc. 700 w. Am Engr & R R Jour—April, 1904.

Fifteen-Ton Tipping Car (Kippwagen von 15 t. Tragfähigkeit). Illustrating an improved tipping car for sand, gravel, etc., arranged with the ordinary hook coupling as well as the Janney type of coupler. 800 w. 1 plate. Zeitschr d Ver Deutschr Ing—April 1, 1905.

Lateral Tipping Car (Wagon à Basculement Latéral). Illustrating a sheet iron car of 15 tons capacity, arranged to tip to either side, and provided with automatic couplers. 800 w. 1 plate. Génie Civil.—April 15, 1905.

Self-Discharging Single-Hopper Wagon; Prussian State Railways. Illustrations, with brief description. 800 w. Engng—Oct. 13, 1905.

A Combination Stock and Drop-Bottom Dump Car. Illustrates and describes a new type of 80,000-lb. stock car, intended primarily for coal or coke service when not carrying stock. 600 w. R R Gaz—Vol. XXXIX., No. 18.

See also Hopper; Steel Underframe; Steel Dump; Unloaders.

Dump, Buffalo & Susq.—Buffalo & Susquehanna Dump Car. Illustration and brief description of a side dump coke car of large capacity and minimum weight. 400 w. Ry & Loc Engng—Oct., 1905.

Dump, Hart.—The Hart Convertible Ballasting and Freight Car, and the Work of Ballasting Track. Illustrates and describes this convertible dump car and its operation. 2200 w. Eng News—July 6, 1905.

Dump, Ingoldsby.—Test of an Ingoldsby 100,000 Lbs. Capacity Wooden Dump Car. Illustration with report of test. 500 w. R R Gaz—April 4, 1902.

The Ingoldsby Dumping Car. Illustrates and describes both the steel and wood construction. 1400 w. Ry & Engng Rev—July 22, 1901.

Dump, Pratt.—Pratt Side Dumping Coal Car. Drawings and description of a 60,000-lb. car. 500 w. R R Gaz—Feb. 27, 1903.

Düsseldorf Exposition.—Railway Rolling Stock at the Düsseldorf Exposition (Eisenbahn-Fahrbetriebsmittel auf der Ausstellung in Düsseldorf 1902). Berthold Braun. Giving illustrated descriptions of cars for steam and electric railways exhibited at Düsseldorf. 6000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Dec. 26, 1902.

Dynagraphs.—See Vibration.

Dynamometer.—Dynamometer Car of the Orleans Railway (Wagon Dynamometre de la Compagnie d'Orleans). Mr. Huet. Illustrated description of dynamometer car containing improved recording devices constructed by Amsler, of Schaffhausen. 3500 w. 3 plates. Rev Gen des Chem de Fer—March, 1903.

The Orleans Dynamometer Car. Mr. Huet. An illustrated description, translated from the "Revue Générale des Chemins de Fer." 2300 w. R R Gaz—June 19, 1903.

The Recording Apparatus on the Northern Railway of France (L'Appareil Enregistreur Employé sur le Reseau du Nord). M. Rossignol. A description of the recording dynamometer car used for investigating the condition of the permanent way on the Northern Railway of France. 4000 w. Rev Gen des Chem de Fer—Dec., 1903.

A New Dynamometer Car. Illustrated description of a car recently put in service by the International Correspondence Schools of Scranton, Pa. 1500 w. Ry & Engng Rev—June 18, 1904.

Dynamometer Car. Drawings and description of a new car on the New York Central lines. 600 w. Am Engr & R R Jour—June, 1905.

The New Pennsylvania Dynamometer Car. W. O. Dunbar. Description given in a discussion before the Engineers' Club of Philadelphia. 2500 w. Am Engr & R R Jour—Sept., 1905.

Note on the Dynamometer Car of the Belgian State Railway. A. Huberti and J. Doyen. Illustrated description of the car and appliances and the working. 9600 w. Bul Int Ry Cong—Dec., 1905.

See also Test; Vibration; DYNAMOMETER; ELECTRIC CAR; ELECTRIC RAILWAY—Acceleration Tests; TRACTION.

Efficiencies.—Comparative Efficiencies of Freight Cars, With Some Observations Concerning Their Design. George I. King and Albert Pancoast. Discussion of this subject, with observations on car design in accordance with known laws and facts of structure and mechanical engineering. 2000 w. R. R. Gaz—June 14, 1901.

Electric.—See AUTOMOBILE; ELECTRIC; ELECTRIC CAR; ELECTRIC RAILWAY.

End Shock.—End Schocks in Car Service and Provision for Same in Car Framing. A. Stucki. Discusses the present service conditions, present car equipments, advantages of a standard to regulate both, and the best basis for such a standard. Ills. 2500 w. Pro Ry Club of Pittsburg—Sept. 1905.

See also **DRAFT GEAR.**

Fireproof.—See **London Underground; FIREPROOFING—Cars.**

Fish Tank.—See **Tank, Fish.**

Flat.—36-Ft. Flat Car. Minneapolis, S. Paul & S. Ste Marie Ry. Illustrated description of flat cars of 60,000 lbs. capacity. 800 w. Ry & Engng Rev—April 12, 1902.

See also **Steel Flat; ELECTRIC CAR.**

Flat, Argentine.—Flat Cars for the Argentine Government Railways. Illustrates and describes the principal features of their construction. 1500 w. R R Gaz—Vol. XXXVIII., No. 9.

Flat, Heavy Castings.—A Flat-Car for Heavy Castings. Illustrates and describes steel under frame flat cars, the largest capacity eight-wheel cars ever built. 600 w. R R Gaz—Nov. 13, 1903.

Flat, Steel.—See **Steel Flat.**

Frame.—Framing of Passenger and Freight Cars. C. A. Seley. From an address before the students of Purdue Univ. Reviews the development and present practice in Europe and America. 4800 w. Ry & Engng Rev—June 10, 1905.

See also **Steel Frame; Steel Underframe; Suburban; CAR FRAME.**

Frame Stresses.—Graphical Method of Determining Stresses in Car Framing. J. H. Lonie. Gives diagrams with notes showing the application of this method. 1000 w. Am Engr & R R Jour—May, 1902.

Furniture.—50-Ft. Furniture Car with Steel Underframing—Erie Railroad. Illustrates and describes cars of 60,000 lbs. capacity, of interest because of its dimensions and composite structure. 1000 w. R R Gaz—April 26, 1901.

Gasoline.—See **AUTOMOBILE, GASOLINE; CAR, MOTOR-DRIVEN.**

Georgia Central.—80,000-lbs. Capacity Box Car—Central of Georgia. Illustrated description of one of 300 cars now being built from this design. 1200 w. R R Gaz—June 21, 1901.

Gibbs Steel.—See **ELECTRIC CAR—Steel, N. Y. Subway.**

Giesecke.—See **Unloader, Giesecke.**

Gondola.—Low Drop-Bottom Gondola Car, 80,000 lbs. Capacity. Illustrates and describes a design approved for adoption on the Chicago & Northwestern and allied lines. 300 w. Am Engr & R R Jour—Jan., 1901.

Low-Side Gondola Car for the Union Steel Company. Drawings and description with data from the calculations of stresses. 500 w. R R Gaz—Aug. 2, 1901.

90,000-Pounds Capacity Gondola Car. Illustrates and describes a car with steel draft frame and roller side bearings built for the L. S. & M. S. Ry. 300 w. Am Engr & R R Jour—Sept., 1902.

New Designs of 100,000 lbs. Capacity Gondolas for the Pennsylvania. Illustrated descriptions of two new designs, one having a steel underframe with wooden body, and the other being all steel. 800 w. R R Gaz—Oct. 10, 1902.

Large Capacity Gondola Cars; Chicago & Alton Ry. Brief illustrated description. 500 w. Eng News—Feb. 26, 1903.

Composite Gondola Cars, C. B. & Q. R. R. An illustrated description of 100,000 lbs. capacity cars. 1000 w. Ry & Engng Rev—Oct. 24, 1903.

Delaware & Hudson Composite Coal Car. Illustrated description of composite hopper gondola cars of 80,000 pounds capacity. 400 w. Ry Age—Aug. 4, 1905.

See also **Coal; Hopper; Rail; Steel.**

Gondola, N. Y. C.—See **Steel Underframe.**

Gondola Steel.—See **Steel Gondola; LOCOMOTIVE—Consolidation, Norfolk & Western.**

Goodwin.—The Constructive Features of the Goodwin Car. John M. Goodwin. Describes the special features of this car. 1600 w. R R Gaz—Aug. 8, 1902.

Handy.—The "Handy" Car. Illustrated description of a new combination car, with new features in the construction of the sides and ends of the box. 900 w. R R Gaz—Feb. 1, 1901.

Headlight.—See **HEADLIGHT—Electric.**

History.—Development of the Railroad Car. Eugene Chamberlin. Recalls the peculiarities of early freight and passenger cars, and the improvements introduced. 1200 w. Loc Engng—Feb., 1903.

A Quarter of a Century of Car Building. States some of the conditions existing twenty-five years ago, reviewing the development of the freight car. 5400 w. Ry Mas Mech—Feb., 1903.

See also **REFRIGERATOR CAR.**

Hedges.—See **Steel Frame.**

Holland Sleeper.—See **Sleeper, Holland.**

Hopper.—New 100,000-lb. Hopper Bottom Coal Cars—Norfolk & Western Railway. Drawings and information concerning new cars soon to be built. 500 w. R R Gaz—Nov. 30, 1900.

See also **Coal; Dump; Gondola; Ore; Steel; Vanderbilt.**

Hopper, Composite.—Composite Hopper Coal Cars. 100,000 Pounds Capacity. Illustrated description of cars with steel frames and wooden hoppers. built for the Norfolk & Western Ry. 1800 w. Am Engr & R R Jour—Feb., 1901.

Hopper, Convertible.—A New Convertible Hopper and Gondola Car. Illustrates and describes a car especially designed for ballasting, which can be changed into an ordinary flat-bottom gondola car capable of carrying 84,000 lbs. of coal. 900 w. R R Gaz—Sept. 20, 1901.

Hopper Rigging.—An Inexpensive Hopper Rigging. Brief illustrated description of a simple and effective hopper rigging for use on double-bottom coal cars on the Central Railroad of N. Jersey. 500 w. Am Engr & R R Jour—Nov., 1900.

Horse Transportation.—Sixty-Foot-Horse Car, Central R. R. of New Jersey. Illustrated description of cars designed for the transportation of blooded stock. 600 w. Ry & Engng Rev—Oct. 8, 1904.

Hospital.—Medical Relief Car of the Prussian State Railway (Die Herstellung der Arztwagen für die Hülfszüge der Preussischen Staatseisenbahn-Verwaltung). H. Schlesinger. With general description of the hospital car and plates of details. 1800 w. 2 plates. Glasers Annalen—Nov. 15, 1902.

Hospital Car for the Southern Pacific. Illustrated description of a handsome special car which is arranged for hospital service, but so constructed that it can be used as a private car. 1000 w. Ry Age—Nov. 3, 1905.

Hospital, Southern Pacific.—Hospital Car, Southern Pacific Company. Illustrated detailed description of a fine car equipped for the service of a well appointed hospital. 1500 w. Ry & Engng Rev—Oct. 28, 1905.

Illinois Central.—80,000 Lbs. Box Car, Illinois Central R. R. Illustrated description of the latest design of high-capacity box car adopted by this road. 1000 w. Ry & Engng Rev—March 29, 1902.

See also **Suburban.**

Ingoldsby Dump.—See **Dump, Ingoldsby.**

Inspection.—See **CAR, MOTOR-DRIVEN—Gasoline Inspection; LOCOMOTIVE—Inspection N. Y. Central.**

International Correspondence School.—See **Dynamometer.**

Italy.—Rolling Stock Construction in Italy. Illustrates and describes recent examples of the rolling-stock made at the works of the Officine Meccaniche of Milan. 2700 w. Engng—Oct. 11, 1901.

Japan.—Covered Goods Wagons for Japanese Railways. Brief illustrated description of a lot of 900 narrow gauge (3 ft. 3 in.) covered goods wagons being built in Chicago for the Japanese Imperial Government Railways. 400 w. R R Gaz—Vol. XXXIX., No. 7.

Lawson.—See **Dump.**

Leek & Manifold Ry.—Rolling Stock on the Leek and Manifold Light Railway. Illustrated description of cars for a 2 ft. 6 in. gauge. 800 w. Engr, Lond—Oct. 21, 1904.

Lake Shore & M. S.—See **Gondola.**

Logging.—60,000 Lbs. Capacity Logging Car. A. T. & S. F. Ry. System. Illustrated description of cars built for service in the lumber districts of

Northern Texas. 900 w. Ry & Engng Rev—June 21, 1902.

London Underground.—See ELECTRIC CAR.

Lubrication.—See CAR BEARING; LUBRICATION—Cars.

McCann.—See Spreader.

Maintenance.—Best Methods in Shop Practice in Meeting the Requirements for the Maintenance of All-Steel Cars. Paper by W. S. Morris, with lengthy discussion. Ill. 15600 w. N Y R R Club—Feb. 20, 1902.

M. C. B. Convention.—A Review of the Master Car Builders' Convention of 1902. J. W. Taylor. Outlines the work done at the last convention. General discussion follows. 12000 w. Pro W Ry Club—Oct. 21, 1902.

Milk.—Special Milk Cars for the Delaware & Hudson. Illustrates and describes cars used in this service. 600 w. Ry Age—April 11, 1902.

Mine.—See MINE CAR; MINE HAULAGE.

Mine Watering.—See COAL DUST—Mine Watering Car.

Monon.—See Passenger, C. H. & D.

Motions.—See Vibration.
which are novel, and designed with a view to overcoming defects. 1200 w. Ry Age—Feb. 28, 1902.

Motor.—See CAR, MOTOR-DRIVEN.

Narrow-Gauge.—See Leek & Manifold; CAR TRANSPORTER.

Narrow-Gauge Stability.—See TRAIN.

New York Central.—The New York Central Box Car. Illustrations of the standard box car F 8 are presented, showing how the problem of designing an all-wood box car has been solved. 900 w. Ry Age—Feb. 28, 1902.

80,000-Lb. Capacity Box Car. Illustrated description of a new standard 36-ft. box car for the N. Y. C. & H. R. R. 500 w. Am Engr & R R Jour—March, 1902.

Norfolk & Western.—80,000 Lbs. Capacity Box Car, Norfolk & Western Ry. Illustrated description of the latest type of all-wood box car. 1200 w. Ry & Engng Rev—April 5, 1902.

See also LOCOMOTIVE—Consolidation, N. & W.

Northern Pacific.—70,000-Lb. Capacity Box Cars for the Northern Pacific Ry. Plans for a 36-ft. car are given, with description. A lot of 2,750 are in process of construction. 900 w. Ry & Engng Rev—Feb. 23, 1901.

Oil.—See Tank.

Open.—See ELECTRIC CAR—Brooklyn Elevated.

Ore.—New 100,000-Lb. Capacity Wooden Ore Cars—Chicago, Milwaukee & St. Paul Ry. Illustrated description. 500 w. R R Gaz—March 1, 1901.

Improved Ore Car, 100,000 Pounds Capacity. Illustrated description of a hopper ore car for the Chicago, Milwaukee and St. Paul Railway. 450 w. Am Engr & R R Jour—April, 1901.

100,000-Lb. Ore Car; Chicago, Milwaukee & St. Paul Ry. Illustrated detailed description. 1000 w. Eng News—June 20, 1901.

100,000 Lbs. Capacity Steel Ore Cars for the Great Northern Ry. Illustrated detailed description of design from which 800 cars have been ordered. 1800 w. Ry & Engng Rev—June 14, 1902.

Oscillation.—See Vibration.

Painting.—See PAINTING—Steel Cars.

Paris Exposition.—Railway Carriages at the Paris Exposition, 1900 (Eisenbahnwagen auf der Weltausstellung in Paris, 1900). H. Bernstein. An illustrated review of the exhibits at Vincennes, with plans and views of the carriages of many countries. Serial. Part I. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—May 3, 1901.

Parlor.—See Dining; Rhodesia; Passenger; Sleeper.

Passenger.—New Passenger, Dining and Observation Cars. Brief illustrated descriptions of a few examples of recent design. 1100 w. Eng News—June 20, 1901.
See also Buffet; Dining; Private; Rhodesia; Royal Canadian; Sanitation; Sleeper; Steel.

Passenger, British.—The Latest Type of Passenger Cars in Great Britain. Brief illustrated description of cars built for the East Coast route between England and Scotland. 800 w. Ry Age—Dec. 5, 1902.

Passenger, C. H. & D.—Long Passenger Cars for the Monon. Plans, elevation and description of a combination passenger and baggage car with steel underframe; and a ladies' coach, 70 ft. 8 in. in length; seating 88 persons. 450 w. R R Gaz—June 26, 1903.

Passenger, Dayton and Union.—Special Local Passenger Service on a Steam Railway to Compete with an Interurban Electric Road. Illustrates a special car built for the Dayton & Union R. R., Ohio, describing its equipment. 500 w. Eng News—Dec. 5, 1901.

Passenger Hazards.—Hazards of Passenger Cars. An illustrated article considering recent advances in construction. Specially discusses the cars of the Illinois Central, and the Subway cars in New York City. 2800 w. Gunton's Mag—Oct., 1903.

Passenger, India.—The Design and Construction of Railway Carriages in India. C. F. Bamford. Illustrates and describes the design and construction of the different railway passenger carriages adopted on the Assam-Bengal Railway metre-gauge, and also the general practice adopted by other Indian broad and metre-gauge railways. Serial. 1st part. Engng—Feb. 21, 1902.

Passenger, Lehigh Valley.—New Coaches for "Black Diamond" Express. Plan, illustrations and description of new cars for the Lehigh Valley R. R. 500 w. R R Car Jour—Nov., 1900.

Passenger, St. Louis.—Special Cars for Local Traffic at the St. Louis Exhibition; Wabash Railway. Brief illustrated description of side-door cars with steel underframes. 500 w. Eng News—June 9, 1904.

Passenger, South Eastern & Chatham, Eng.—First-Class Salon for the South-Eastern and Chatham Railway. Illustrated description of handsome first-class carriages. 2-page plate. 700 w. Engng—Oct. 28, 1904.

South-Eastern and Chatham Railway New Rolling Stock. Illustrates and describes some new first-class passenger saloons and coaches. 900 w. Engr, Lond—May 26, 1905.

Pennsylvania.—The Pennsylvania 100,000 Lbs. Capacity Box Cars. Illustrations from working drawings, with brief description. 700 w. Ry & Engng Rev—Dec. 7, 1901.

Standard Freight Cars on the Pennsylvania Railroad. Illustrates and describes the various types. 2500 w. Ry & Engng Rev—June 17, 1905.

Postal, Santa Fe.—Steel Underframe Postal Car for the Santa Fe. Drawings and description. 700 w. R R Gaz—Vol. XXXVIII., No. 24.

Pressed Steel.—See Steel.

Private.—See British; Rhodesia; Royal Canadian; ELECTRIC CAR; RAILWAY TRAFFIC; REFRIGERATOR CAR.

Private "Brunswick."—Private Car "Brunswick," Brunswick & Birmingham R. R. Exterior and interior views, with floor plan and descriptive notes. 700 w. Ry & Engng Rev—Jan. 31, 1903.

Private Freight.—See British Private; REFRIGERATOR CAR.

Private, St. Louis Exhibition.—A Handsome Private Car. Illustrated description of a fine car built for exhibition at St. Louis. 700 w. Ry Age—Sept. 9, 1904.

Produce.—A 60,000-Lbs. Capacity Produce Car—New York Central. Illustrations and description showing the design of a 35-ft. produce car, 300 of which are being built for the hauling of fruit and vegetables. 1100 w. R R Gaz—March 28, 1902.

Purdue University.—See Design.

Rail.—66-Ft. Rail Cars and 38-Ft. Gondola Cars. Illustrates and describes special cars for the Cleveland, Lorain & Wheeling Ry. 2000 w. Eng News—May 9, 1901.

Refrigerator.—See REFRIGERATOR CAR.

Registering Machine.—See RAILWAY TRAFFIC—Car Recording.

Repair.—A Combined Caboose and Repair Car. Illustrates and describes a car designed especially to accompany trains of all steel cars, thus furnishing facilities for any repairs made necessary by a collision. 900 w. Ry & Engng Rev—Oct. 11, 1902.

Repair Costs.—Distributed Cost of Car Repairs. Gives a table showing the results of a carefully kept record in an important trunk line for the year 1902. 350 w. Am Engr & R R Jour—Sept., 1903.

Repairing.—Repairs to Bent Steel Car Bodies and Trucks. Report of committee, followed by discussion. 7300 w. Cent Ry Club—April, 1901.

Some Notes on Steel Car Repairing. Describes the arrangements and methods at some of the shops identified with the early history of these cars. 2400 w. R R Gaz—June 5, 1903.

Experience in the Maintenance and Repair of Steel Freight Cars. Gives results of a recent inquiry as to current experience and practice in the maintenance and repair of these cars. 4800 w. Eng News—June 23, 1904.

See also Maintenance; CAR SHOP; RAILWAY SHOP.

Rhodesia, S. A.—New Rolling Stock for the Rhodesia Railways. Illustrates and describes special cars designed for the use of several of the officers of the line, providing comfortable accommodation for day and night. 1000 w. Engr, Lond—April 1, 1904.

A Train de Luxe for Rhodesia. Illustrated description of a magnificent train for first-class passenger traffic. 700 w. Transport—April 12, 1901.

Rhodesian Railway Rolling-Stock. Illustrated description of the "train de luxe" for this road. Serial. 1st part. 900 w. Engng—May 31, 1901.

Rhodesian Railway Rolling Stock. Illustrates typical cars, giving brief description. 500 w. Engng—Aug. 9, 1901.

Royal British.—Special Salon for Royal Train, London and North-Western Railway. Illustrated detailed description. 900 w. Engng—Jan. 15, 1904.

New Passenger Equipment for the London & Northwestern Railway. Illustrated detailed description of recently built cars, among them two royal saloon cars. 2500 w. Ry Age—May 20, 1904.

Royal Canadian.—The Royal Train of the Canadian Pacific. Illustrated description of the train built for the use of the Duke and Duchess of York during their Canadian tour. 800 w. R R Gaz—Sept. 20, 1901.

Royal Indian.—Royal Train for India. Illustrated description of the new train constructed by native labor, under European supervision, from raw materials, for the use of the Prince and Princess of Wales on their Indian tour. Serial. 1st part. 1200 w. Engng—Sept. 15, 1905.

Salt Galician.—East Galician Salt Cars (Ostgalizischer Saltztransportwagen). Eduard Windakiewicz. An illustrated description of hand cars which have been introduced in salt works to carry the salt in process of manufacture from one part of the works to another, thereby eliminating man transport. 1 plate. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 28, 1903.

Sanitation.—Passenger Coach Sanitation. J. N. Hurty. From a paper read before the International Assn. of Ry. Surgeons. Suggestions for construction, ventilation, cleanliness, disinfection, etc., especially of Pullman coaches, sleeping cars, and dining cars. 2200 w. Am Engr & R R Jour—Feb., 1901.

Prevention of Contagion in Passenger Cars. Leroy M. Yale. Considers the liability of contagion remaining in a car after the departure of the contagious case. 2200 w. R R Gaz—Nov. 20, 1903.

On the Disinfection of Passenger Carriages, of Cattle Trucks, and of Goods Wagons. Dr. De Rechter. Discusses the conclusions adopted by the XIIIth International Sanitary Congress, showing the great variety of methods used in different countries. 5800 w. Brit Int Ry Cong—April, 1904.

The Disinfection of Cattle Cars (Die Wirksame Desinfektion der Viehwagen). Adolf Freund. Showing the necessity of an effective disinfection of cars in which cattle have been carried, and advocating the use of chloride of lime. 4000 w. Gesundheits-Ingenieur—July 20, 1904.

Scales.—See SCALES—Dopp Locomotive.

Seal.—Seals for Freight Cars. An explanation of the plan of sealing freight cars and its value in tracing any theft of freight. 1200 w. Sci Am Sup—Oct. 7, 1905.

Self-Emptying.—See Coal, British; Dump; Hopper; Steel Dump.

Siamese Railway—See RAILWAY—Siam.

Sills.—See Steel Sills.

Sill Splicing.—Splicing Sills in Long Passenger Equipment. From the topical discussion of the M. C. B. convention. Ill. 1000 w. Ry & Engng Rev—July 6, 1901.

Size.—See Capacity; Coal; RAILWAY TRANSPORTATION—Tonnage.

Slack Steel.—See Steel Slack.

Slag.—A Special Form of Slag-Car. L. J. W. Jones and B. H. Bennetts. Illustrated description of a car in use at the copper blast-furnaces at Tacoma, Wash. 1200 w. Am Inst of Min Engrs—March, 1905.

Sleeper.—Pullman Sleeping Cars for the Midland Railway. Illustrated description of fine cars for the Scotch service. All berths are on a level, the upper berths having been abandoned. 500 w. Engng—Nov. 9, 1900.

Sleeper, British.—Some New English and Continental Passenger Cars. Illustrations and brief descriptions of sleeping cars and dining cars. 800 w. R R Gaz—May 22, 1903.

Sleeper, Holland.—Unique Design for Combined Sleeping and Parlor Car. Brief description of the Holland patent, which gives a compartment sleeping car for night service, and an open parlor car for day travel, with partitions that can be easily operated. 700 w. Ry & Engng Rev—Aug. 16, 1902.

Spain.—Freight Cars for the North of Spain Railroad. Brief illustrated description. 500 w. R R Gaz—June 28, 1901.

Spreader.—The McCann Spreader Car. Illustrates and describes improvements that have been made in this car, and the character of some of the work handled. 1500 w. Ry & Engng Rev—April 19, 1902.

Standardizing.—See LOCOMOTIVE.

Steam.—See AUTOMOBILE, STEAM; CAR, MOTOR-DRIVEN.

Steel.—The Large Steel Car. W. S. Morris. Discusses its development and position in the business of railroads. 4000 w. Am Engr & R R Jour—Jan., 1901.

The Design of Structural Steel Cars. George I. King. Gives standard specifications for freight car equipment of this type, calling attention to unusual features. Ill. 1700 w. R R Gaz—Jan. 4, 1901.

Special Steel Car, Northern Ry. of France. Illustrated description of a special design of freight car equipment for the transportation of heavy machinery. 800 w. Ry & Engng Rev—April 20, 1901.

Pressed Steel System of Car Construction. An estimate of the economies realized by the use of steel cars. Ill. 2200 w. Sci Am—June 22, 1901.

Pressed Steel Car of 100,000 lbs. Capacity—Car for the Pennsylvania R. R. Illustrations and brief description, with general dimensions. 600 w. Ry & Engng Rev—Jan. 18, 1902.

The Use of Steel in Car Construction. J. W. Stokes. Considers the general features of steel cars and related subjects. 2800 w. St Louis Ry Club—April 11, 1902.

Steel Cars Without Center Sills. E. W. Summers. Suggests changes that might be advantageously made in steel cars, especially discussing the doing away with the center sill. General discussion. Ill. 13400 w. Pro Ry Club of Pittsburg—March, 1903.

Modern Steel Cars. Illustrations, and brief descriptions of recent designs. 1200 w. R R Gaz—June 26, 1903.

Steel Car Development. Historical review, with illustrated details of the more important designs, and discussion of the principles involved in their construction. Serial. 1st part. 1800 w. Am Engr & R R Jour—Oct., 1903.

The Development of Steel Freight Cars in the United States. A review of the situation, with editorial discussion. 8500 w. Eng News—Jan. 7, 1904.

Steel in Car Construction. C. A. Seley. Suggestions for the use of steel in the box cars and coal cars, with report of cars that have been in use. General discussion. 9500 w. Pro W Ry Club—March 15, 1904.

The Construction of Steel Cars. Abstracts of three papers recently read before the Inst. of Civ.

Engrs., England. 2000 w. Sci Am Sup—April 2, 1904.

Steel Car Design. A. Stucki. Gives information based on several years' work in designing and building cars, supplemented with valuable data from the testing room. Gives analysis of stresses, arch-bars and axles in the present number. Diagrams. Serial. 1st part. 1500 w. R R Gaz—June 17, 1904.

Steel Freight Car Design. C. A. Seley. From an address at Purdue University. Discusses the design of the steel-frame box car. 1400 w. Am Engr & R R Jour—Aug., 1905.

Steel Wagon Construction in the United States. Notes on the general methods of a modern American steel car shop which tend to rapidity of manufacture. 1800 w. Engr, Lond—Oct. 13, 1905.

Steel Cars. Extracts from a paper by J. F. MacEnulty, read at meeting of the New England R. R. Club. Presents the advantages of this type of construction, and attempts to show that such cars are more economical than modern cars. 2000 w. R R Gaz—Vol. XXXVII., No. 24.

See also Coal; Gondola; Hopper; Maintenance; Oil; Vanderbilt; CAR WORKS—Canton, O.; MINE CAR; RAILWAY ACCIDENT—United States.

Steel and Wood.—Santa Fe Combination Steel and Wood Box Car, 80,000 Pounds' Capacity. Illustrates and describes a car having special features which are novel, and designed with a view to overcoming defects. 1200 w. Ry Age—Feb. 28, 1902.

Steel, B. & L. E. R. R.—Steel Cars on the Bessemer and Lake Erie Railroad. Drawings and information showing the development on this road. 2500 w. Am Engr & R R Jour—May, 1903.

Steel Box.—All-Steel Box Car, A., T., & S. F. Ry. Illustrations and brief description. 600 w. Ry & Engng Rev—May 4, 1901.

Steel, British.—New "High-Capacity" Wagons on the Great Central Railway. Illustrated description of 30-ton all steel bogie and cars. 2000 w. Ir & Coal Trds Rev—April 1, 1904.

Steel, Caledonian.—Steel Cars on the Caledonian Railway of Scotland. Illustrations and descriptions of 30-ton cars recently put in service. 2200 w. R R Gaz—Feb. 19, 1904.

Steel Coke.—Coke Car for the Cambria Steel Company. Plans and description of 50-ton steel hopper bin coke cars. 600 w. R R Gaz—June 17, 1904.

100,000-lb. Coke Cars for the Chicago, Lake Shore & Eastern. Illustrated description of steel cars, built of commercial shapes, without continuous center sills. 700 w. R R Gaz—Vol. XXXVII., No. 10.

See also Vanderbilt.

Steel Dump.—80,000-lbs. Capacity Steel Dump Car—Atchison, Topeka & Santa Fe. Illustrated description. 800 w. R R Gaz—June 14, 1901.

Test of 100,000-Lbs. Capacity Steel Dump Cars for Colorado Fuel & Iron Co. Illustration, with report of loading tests. 600 w. Ry & Engng Rev—July 12, 1902.

Steel Flat.—Steel Flat Cars, 100,000 Pounds Capacity. Drawings and description of cars for the N. Y. C. & H. R. R. 400 w. Am Engr & R R Jour—Nov., 1900.

Structural Steel Flat Car. Illustrated detailed description of specially designed very long cars. 1000 w. Ry & Engng Rev—Jan. 26, 1901.

100,000 Lbs. Capacity Steel Flat Car—Chicago & Alton Ry. Illustrated detailed description. 500 w. R R Gaz—Oct. 25, 1901.

75-Ton Steel Flat Car. Illustrated detailed description of cars built for the Pittsburgh & Lake Erie R. R. 700 w. Am Engr & R R Jour—Sept., 1905.

Steel Frame.—A System of Steel Framing for Freight Cars. G. W. Scott. Illustrated description of a system of underframing and a discussion of the requirements fundamental in car design. General discussion follows. 10500 w. Pro W Ry Club—March, 1901.

Forty-Ton Steel Frame Box Car, Norfolk & Western Railway. Drawings and description. 1800 w. R R Gaz—April 18, 1902.

A New Method of Steel Car Construction. Plan and elevation drawings, with detail views of a design of car which is the invention of H. C. Hodges. The claim is that a lighter, cheaper, simpler steel frame car is shown which will compare favorably in strength with any of the present forms. 1400 w. Ry & Engng Rev—Aug. 2, 1902.

Steel Frames for Cars. C. A. Seley. Gives a steel frame box car design, and discusses the use of steel in car construction. Ill. 1000 w. Am Engr & R R Jour—June, 1903.

See also Suburban, Side Door; Tank; CAR FRAME—Steel.

Steel, French.—Car of 50 Tons Capacity in Pressed Steel (Wagon de 50 Tonnes en Tole d'Acier Embontie). Ch. Dantin. Illustrated description of 50-ton pressed-steel coal car of French manufacture. 1000 w. Génie Civil—Sept. 12, 1903.

The New Fifty-Ton Freight Cars of the Douai Forge Company (Les Récents Wagons de 50-Tonnes Construits par les Forges de Douai). Col. Fix. Illustrating recent heavy freight cars for the French railways. 2500 w. Revue Technique—April 25, 1904.

Steel, Gibbs.—See ELECTRIC CAR—Subway, N. Y.

Steel Gondola.—Fifty-Ton Steel Drop-Bottom Gondolas. Illustrated description of cars now building for the Elgin, Joliet & Eastern R. R. 700 w. Am. Engr & R R Jour—Sept., 1901.

New Designs of 100,000-Lbs. Capacity Steel Gondola Car. E. W. Summers. Illustrated description. 700 w. Ry & Engng Rev—May 30, 1903.

Steel Underground Gondolas for the B. & O. Illustration, drawings and description of drop-end gondolas of 100,000 lbs. capacity. 500 w. R R Gaz—Vol. XXXVIII, No. 15.

50-Ton Steel Twin Hopper Gondola Car. Illustrates and describes cars almost entirely of structural steel, and having several departures from ordinary designs. 1,000 have been received by the L. S. & M. S. Ry. 1500 w. Am Engr & R R Jour—Nov., 1905.

Steel, Great Central.—High-Capacity Cars on the Great Central of England. Illustrates and describes several types of steel cars recently put in service. 1000 w. R R Gaz—Vol. XXXVIII, No. 3.

Steel Hopper.—Structural Steel Hopper-Bottom Car of the American Car & Foundry Company. Illustrated description of an 88,000 lbs. capacity steel car. 700 w. R R Gaz—Feb. 8, 1901.

100,000 Pounds Capacity Steel Hopper Cars. The specially interesting features of the design given are the light weight of the car and the method of construction in which the center sills are made of light sections, reinforced by truss rods. Ill. 800 w. Am Engr & R R Jour—July, 1901.

A New Type of Steel Hopper Car. Illustration with description of a decided departure from any design in use. Built by the Wellman-Seaver-Morgan Co. 5000 w. Eng News—Nov. 5, 1903.

Steel Maintenance.—See RAILWAY SHOP.

Steel Mine.—See MINE CAR.

Steel Ore.—See Ore.

Steel Passenger.—The Use of Steel in Passenger Car Construction. William Forsyth. Read before the M. C. B. Convention. Urges the use of steel in building stronger passenger cars, giving a design of car with steel underframe, and much of the body of steel. Ils. 2700 w. Ry & Engng Rev—June 25, 1904.

Steel Railway Coaches. Brief illustrated description of steel coaches for the Great Northern and City Railway. 900 w. Engr, Lond—Dec. 22, 1905.

Steel Passenger, N. Y. Central.—Steel Cars for the New York Central's Electric Suburban Service. Illustrated description of all-steel cars. 1500 w. R R Gaz—Vol. XXXIX., No. 18.

Steel, Repairs.—See Repairing.

Steel, Side Door.—See Suburban, Ill. Central.

Steel Sills.—36-Foot Box Car with Steel Center Sills—Chicago, Milwaukee & St. Paul Railroad. Illustrated description. 500 w. R R Gaz—Jan. 17, 1902.

New Construction of Steel Center Sills and Bolsters. Illustrates the arrangement employed in recent cars of the Chicago, Milwaukee & St. Paul Railway. 400 w. Am Engr & R R Jour—Feb., 1902.

Steel, Slack.—The L. M. Slack Steel Cars. Illustrated description of types of gondola cars recently designed. 1500 w. R R Gaz—Jan. 18, 1901.

Steel Underframe.—60,000-lb. Capacity Box Car with Pressed Steel Underframe—Philadelphia & Reading Railroad. Description, photograph and line drawings. 1100 w. R R Gaz—March 29, 1901.

40-Ton Box Cars with Steel Underframes. Illustrates and describes cars for the Union Pacific R. R. 800 w. Am Engr & R R Jour—April, 1901.

Steel in Car Building. John M. Housen. On the advantages of the steel underframe. 2000 w. R R Gaz—June 14, 1901.

Philadelphia & Reading Box Cars with Steel Underframes. Illustrated description of a design for 500 box cars of 50,000 lbs. capacity. 1200 w. R R Gaz—June 21, 1901.

50-Ton Twin-Hopper Car with Rolled Steel Underframe—Northern Pacific. Illustrated description. 700 w. R R Gaz—Aug. 9, 1901.

50-Ton Steel Underframe Box Car. Illustrated description of cars intended for grain traffic, built for the Illinois River Packet Co. 600 w. R R Gaz—Jan. 1, 1904.

A New 50-Ton Box Car. Illustrated description of a car with structural steel underframe, designed to meet special requirements in handling grain shipments. 1500 w. Am Engr & R R Jour—Feb., 1904.

Second Class Railway Cars with Bogie Trucks (Les Voitures de Seconde Classe à Bogies). Robert Dubois. Detailed description of improved passenger cars of the Western Railway of France, with steel girder sills. 5000 w. Rev Gen des Chem de Fer—June, 1904.

The Design of a Steel Underframe of Standard Shapes for Freight Cars. Frits B. Ernst. Gives design made up of standard shapes, with the exception of the bolsters, showing the method by which the different parts may be calculated. 5500 w. Ry Age—June 17, 1904.

New York Central Steel Underframe Gondola Car. Illustrates and describes new cars which show original features of design. 600 w. Ry Age—June 23, 1905.

See also Coal; Furniture; Postal; Steel.

Stock.—60,000-Lbs. Capacity Stock Car. Illinois Central R. R. Detailed drawings, with description. 700 w. Ry & Engng Rev—Feb. 8, 1902.

Two-Floor Sheep or Cattle Wagon. Illustrated description of a car used on Argentine railways. The upper floor is raised when it is used for cattle, and lowered into position when the two floors are required for sheep. 600 w. Engr, Lond—Oct. 24, 1902.

Stock Vestibule.—See Vestibule Stock.

Street.—See ELECTRIC CAR; STREET CAR.

Street, Overcrowding.—See STREET RAILWAY MANAGEMENT—Overcrowding.

Suburban.—The Suburban Car Seating Problem. Describes the four plans of seat arrangement being considered by the Illinois Central R. R. 900 w. Loc Engng—July, 1903.

Suburban Side Door.—Steel-Frame, Side-Door, Suburban Passenger Cars. Describes cars being built for the Illinois Central upon a new plan; the basis of construction is the use of side doors. 1800 w. Ill. Am Engr & R R Jour—June, 1903.

Steel-Frame Side-Door Passenger Car—Illinois Central R. R. Illustrated detailed description, with discussion of the design. 2 plates. 3800 w. Ry Age—Sept. 4, 1903.

Steel Frame Side Door Suburban Cars of the Illinois Central R. R. Full illustrated detailed description of this new type. 3200 w. Ry Mas Mech—Oct., 1903.

Side-Door Steel Suburban Cars for the Illinois Central Railroad. Illustrated detailed description, with statement of the advantages. 3500 w. St. Ry Jour—April 30, 1904.

Subway, N. Y.—See Illinois Central; ELECTRIC CAR.

Supply.—The Railway Supply Car. J. P. Murphy. Discusses the distribution of supplies with a regularly assigned car, and the merits of the system, giving an illustrated description of an arrangement found practicable. Discussion. 10800 w. Pro W Ry Club—Jan. 20, 1903.

Switching Damage.—The Extent of Damage Done to Freight Cars While Switching in Terminal Yards and on Sidings. General discussion of this subject. 7000 w. Pro W Ry Club—Oct. 21, 1902.

Tank.—Eighty Thousand Pounds Capacity Tank Cars. Illustrated description of cars for the Atchison, Topeka & Santa Fe Railway for carrying oil or water. 400 w. Am Engr & R R Jour—Nov., 1901.

Tank and Box.—Combination, Box and Tank Car. Brief illustrated description. 500 w. R R Gaz—Vol. XXXVIII. No. 24.

Tank and Gondola.—Combined Tank and Gondola Car. Illustrates and describes a car designed with the object of providing a tank car which will hold and carry the maximum weight of liquid, and which when empty may be utilised as a flat or box car for transporting freight. 800 w. Ry & Eng Rev—June 25, 1902.

Tank Fish.—Special Cars for the Transport of Living Fish (Les Wagons Spéciaux Affectés au Transport des Poissons Vivants). M. Goeury. Describing a special form of tank car used in central Europe and Russia. 3000 w. 1 plate. Rev Gen des Chem de Fer—Nov., 1902.

Tank, Pa. R. R.—Requirements for Tank Cars Running Over the Pennsylvania Lines. Extracts covering the important requirements. 1100 w. R R Gaz—Nov. 27, 1903.

Tank, Vanderbilt.—Vanderbilt Steel Tank Car, 12,000 Gallons Capacity. Illustrated description of a car designed for the Equitable Land and Oil Company, to be used in transporting oil from the Texas oil fields to St. Louis. The largest capacity tank cars in use. 800 w. Am Engr & R R Jour—Jan., 1902.

Vanderbilt Steel Frame Tank Car. Drawings, photograph and detailed description. 6000 w. R R Gaz—Feb. 19, 1904.

Tank, Van Dyke.—The Van Dyke Tank Car. Illustrates and describes a new tank car of simple design, calling attention to novel features. 800 w. R R Gaz—March 6, 1903.

Taxation.—See RAILWAY TAXATION.

Test.—Railway Test Car No. 17, Univ. of Illinois and Ill. Cent. R. R. Edward C. Schmidt. Illustrations and account of the performance of this test car during its nine months of service. 1800 w. Ry & Engng Rev—June 1, 1901.

Burlington Route Test Car. Max H. Wickhorst. Illustrated detailed description of the car and account of the uses made of it. 2400 w. Ry Mas Mech—May, 1902.

Test and Dynamometer Car, Chicago, Burlington & Quincy R. R. Drawings and particulars of this car and its equipment which has recently been thoroughly overhauled, with list of tests made. 2700 w. Eng News—May 15, 1902.

Test of Dump.—See Dump, Ingoldsby.

Transporter.—See CAR TRANSPORTER.

Truck.—See CAR TRUCK.

Unloader.—Automatic Unloaders (Selbstentlader). M. Buhle. Illustrating and describing various forms of cars for tipping and dumping earth, including both American and German designs. 2000 w. Zeitschr d Ver Deutscher Ing—May 25, 1901.

Railway Tipping Unloaders (Eisenbahnwagenkipper). Fr. Frölich. Describing a tipping platform for immediate unloading of car loads of sugar beets. 1200 w. Zeitschr d Ver Deutscher Ing—March 18, 1905.

Unloader, Giesecke.—The Giesecke Automatic Unloader for Railway Wagons. Illustrates a number of cars to which this device has been applied, describing the working. 1200 w. Col Guard—May 27, 1904.

Unloading.—See Dump; Goodwin; COAL HANDLING—Hoboken, D. L. & W.

Vanderbilt.—The Vanderbilt Steel Hopper Coal Car. 100,000 Pounds Capacity. Illustrates and describes an interesting car of new design. 1000 w. Am Engr & R R Jour—Nov., 1901.

Vanderbilt 50-Ton Hopper Coal Car. Drawings and description of steel hopper cars, designed by Cornelius Vanderbilt, 800 of which are now being built for the West Virginia Central & Pittsburg Ry. 700 w. Am Engr & R R Jour—April, 1902.

50-Ton Steel Coal Car (Vanderbilt Type); West Virginia Central & Pittsburg Ry. Illustrates and describes the design and construction of hopper-bottom coal cars. 800 w. Eng News—June 19, 1902.

Vanderbilt Structural Steel Car. Illustrated description of hopper bottom self-dumping coal cars being placed in service on the W. Va. Cent. & Pittsburg. 500 w. Ry Age—Nov. 14, 1902.

Two New Vanderbilt Cars. Illustrates and describes new designs for structural steel cars of 80,000 lbs. capacity. 500 w. Am Engr & R R Jour—Dec., 1902.

Steel Coke Car of Vanderbilt Design. Illustrated description of all-steel cars of large capacity. 450 w. Ry Age—Feb. 5, 1904.

See also Tank.

Vestibule.—New Vestibule Coaches on the C. R. R. of N. J. Very handsome coaches are illustrated and described. 400 w. Loc Engng—Aug., 1902.

Railway-Carriage Vestibule. Illustrations of two forms of this appliance, of English make. 1300 w. Engng—April 21, 1905.

Vestibule Stock.—Vestibule Stock Car. Illustrated description with statement of advantages claimed. 600 w. Loc Engng—Jan., 1904.

Vibration.—A Study of the Secondary Motions of Moving Cars (Etude des Mouvements sur les Véhicules en Marche). M. Sabouret. A description of various recording instruments used for showing the lateral and other irregular motions of railway cars as used on the Western Railway of France. 6000 w. Rev Gen des Chem de Fer—Feb., 1904.

The Vibration of Railway Vehicles. Gives an account of a new method, invented by M. Sabouret, by which a full report can be drawn of the state of the line and of the technical conditions observed when it was laid down. Ills. 3300 w. Engr, Lond—July 15, 1904.

New Apparatus for Recording the Vibration of Railway Cars. Emile Guarini. An illustrated description of the Sabouret apparatus and its working. 1400 w. Sci Am Sup—April 29, 1905.

The Oscillations of Railway Vehicles upon their Springs (Oscillations des Véhicules de Chemin de Fer sur leurs Ressorts de Suspension). Georges Marié. Showing the importance of a rigid road-bed and great flexibility of springs, in diminishing oscillations. 1200 w. Comptes Rendus—March 6, 1905.

The Oscillation of Cars upon Entering and Leaving Curves (Oscilaltions des Véhicules de Chemin de Fer à l'Entrée en Courbe et à la Sortie). Georges Marié. Deriving equations for computing the oscillations of cars, with suggestions for the improvement of curves and way. 1200 w. Comptes Rendus—May 8, 1905.

The Oscillations of Railway Vehicles on Entering and Leaving Curves (Les Oscillations du Materiel des Chemins de Fer à l'Entrée en Courbe et à la Sortie). Georges Marié. An exhaustive mathematical and practical study of the action of centrifugal and inertia forces to produce oscillations. 10000 w. Mem Soc Ing Civ de France—Nov., 1905.

The Measurement of Vibratious of Railway Cars. Frank C. Perkins. Illustrated description of the Sabouret pneumatic apparatus for the study of secondary movements on moving vehicles, in use in France. 1100 w. Ry Age—Dec. 29, 1905.

See also Dynamometer.

Wood-Burning.—New Wood-Burning Cars, C. M. & St. P. Ry. Illustrated description of one of the new machines for this purpose, with an account of its working. 1500. Ry & Engng Rev—June 27, 1903.

Western Ry., France.—New Types of Railway Rolling Stock (Quelques Nouveaux Types de Materiel de Chemins de Fer). H. Chevalier. Describing some new coaches and sleeping cars of the Western Railway of France. 2500 w. 1 plate. Mem Soc Ing Civ de France—Sept., 1905.

Wheel.—See CAR WHEEL.

CAR AXLE.

See also AXLE.

Dust Guard.—See DUST GUARD.

CAR BEARING.

See also BEARING; JOURNAL.

Alloys.—Improved Alloys for Car Bearings. Editorial reviewing briefly the history of the development of these alloys, and calling attention to the importance of lead. 1000 w. Ry Age—Oct. 30, 1903.

Ball.—See BALL BEARING—Chapman.

Center Plates.—Center Plates. Edward Grafstrom. Considers the suggestions contained in the report of the committee of the M. C. B. Assn. Ill. 1500 w. Am Engr & R R Jour—Jan., 1901.

See also Test; TRAIN RESISTANCE.

Chapman.—See BALL BEARING.

Middle.—Middle Bearings on Driving Axles, N. Y., O. & W. Ry. Illustrates and describes the details of an adaptation devised by George W. West, to relieve the boxes at the sides of a portion of the weight. 450 w. Ry & Engng Rev—Jan. 19, 1901.

Packing.—See PACKING.

Symington Box.—The Improved Symington Journal Box. Gives causes of failure of journal boxes, and describes the improvements made in this design. Ill. 1000 w. R R Gaz—May 8, 1903.

Test.—Tests of the Friction of Side Bearings and Center Plates for Freight Cars. Abstract of a report of a special committee of the Mass. Car Bldrs. Assn., giving account of tests, with results and conclusions. 4000 w. Eng News—July 10, 1902.

"Anti-Friction' Car Side Bearings and Center Plates. Gives results of tests made on the Pittsburg & Lake Erie road, showing a marked effect on train resistance. 700 w. Am Engng & R R Jour—April, 1903.

CARBIDE.

See also CALCIUM CARBIDE.

Metallic Carbides (Die Metall-Carbide). A review of an article by H. Moissan treating the subject comprehensively. 2500 w. Zeitschr f Elektrochemie—Jan. 16, 1902.

CAR BOLSTER.

See CAR—Bolster; CAR FRAME; CAR TRUCK.

CARBON.

See also ARC LIGHT; IRON; and under electric apparatus and instruments.

Arc Light.—The Proper Structure for Carbon Electrodes (Ueber die Günstige Struktur von Kohlenelektroden). J. Härden. With microscopic sections showing the advantages of converting the carbon into the graphite state. 1000 w, Elektrotech Zeitschr—July 18, 1901.

Combustion Temperature.—The Temperature of Inflammation and Combustion of the Three Varieties of Carbon (Sur la Temperature d'Inflammation et sur le Combustion dans l'Oxygène, des Trois Variétés de Carbone). H. Moissan. A detailed study of the combustion of carbon in oxygen, including experiments with diamond, graphite, and amorphous carbon. 2000 w. Comptes Rendus—Dec. 1, 1902.

Electric Furnace.—See DIAMOND; ELECTRIC FURNACE—Carbon Tube.

Electric Purposes.—The Development of the Artificial Carbon Industry (Die Entwickelung der Kunstkohlenfabrikation). J. Zellner. A historical review of the various processes for making carbon terminals and electrodes. 3000 w. Zeitschr f Elektrochemie—March 28, 1901.

The Manufacture and Testing of Carbon for Electrical Purposes (Herstellung und Prüfung von Kohle für Elektrotechnische Zwecke). J. Härdén. A well illustrated account of the preparation and testing of carbons for electrodes, brushes, arc lights and other purposes. 4500 w. Elektrotech Zeitschr—April 11, 1901.

The Manufacture of Carbon for Electrical Purposes (Note sur la Fabrication des Charbons Agglomérés pour l'Electricité). J. Worms. A review of the manufacture of compressed carbons for arc lamps, batteries, microphones and other electrical purposes. 1400 w. Electricien—Dec. 14, 1901.

Electro-Chemistry.—Carbon in Electro-Chemical Operations. A consideration of the necessary conditions which carbons for different purposes should fulfil, and of how the process of manufacture affects the physical and mechanical qualities of the material. 3000 w. Elec Chem & Met—April, 1901.

Fusion.—The Fusion of Carbon (Die Schmelzung der Kohle). Dr. A. Ludwig. A discussion of the efforts which have been made to effect the fusion of carbon, and the conditions which should be fulfilled. 3000 w. Zeitschr f Elektrochemie—May 8, 1902.

Iron Constitution.—See **IRON—Constitution.**

CARBON BISULPHIDE.

Electric Manufacture.—The Electrical Manufacture of Carbon Bisulphide. Edward R. Taylor. Gives illustrations of the furnace, with description. 1000 w. Elec Rev, N Y—Feb. 1, 1902.

The Manufacture of the Bisulphide of Carbon in the Electric Furnace. Edward R. Taylor. Read at meeting of the Am. Electro-Chem. Soc. Describes the electrical process developed by the writer which has proved highly satisfactory. 1000 w. Sci Am Sup—Sept. 13, 1902.

The Manufacture of Carbon Bisulphide in the Electric Furnace at Penn Yan, N. Y., U. S. A. Illustrates and describes the furnace used. 1000 w. Electro-Chem & Met—Oct., 1903.

Heat Engines.—Graphics of Carbon Disulphide, with Formulas and Vapor Table. Thomas M. Gardner. Shows the properties of this vapor, and its value as a working fluid for heat engines. 2000 w. Jour Fr Inst—Oct., 1903.

Substitutes for Steam. Compares water and bisulphid of carbon, following them through their respective cycles and showing how the amounts of heat supplied compare with the results obtained. Ills. 3500 w. Power—Sept., 1905.

CARBONIC ACID.

See also **REFRIGERATION; REFRIGERATOR CAR.**

Compressed.—See **OXYGEN.**

Compressor.—See **COMPRESSOR.**

Liquid.—The Preparation and Applications of Liquid Carbonic Acid (La Préparation Industrielle et les Applications de l'Acide Carbonique Liquide). E. Mathias. Describing the modern methods of preparing the liquefied gas, and its numerous uses in the arts. Two articles. 7500 w. Rev Gen des Sciences—Feb. 28, March 15, 1902.

Railway Signal.—See **RAILWAY SIGNAL—Carbonic Acid Gas.**

Solid.—See **LOW TEMPERATURES.**

CARBORUNDUM.

See also **ABRASIVE.**

Carborundum. L. J. Gray. An account of the discovery and early development of the manufacture, describing the furnaces and their working, the appearance of the crystals, etc., with a discussion of the properties which render it so valuable. 5400 w. Engs' Year Bk, Univ of Minn.—1901.

Manufacture and Uses of Carborundum. A. J. Fitz Gerald. Read before the Phila. Found. Assn. Deals with the origin of carborundrum, present methods of manufacture, uses, characteristics, etc. 4000 w. Ir Age—Oct. 15, 1903.

Carborundum: Its Manufacture and Uses. R. N. Kofoid. Reviews the history of the discovery, describes the manufacture and some of the uses to which it has been applied. 5700 w. Technograph, No. 18, 1903-4.

Carborundrum. Dr. J. Ohly. Reviews the experiments of E. G. Acheson and the development of this substance, its uses, values, &c. 2000 w. Min Rept—Oct. 27, 1904.

Firesand.—Carborundum Firesand. T. J. Tone. On its special properties and the applications. 1200 w. Ir Trd Rev—July 21, 1904.

Furnace Lining.—See **REFRACTORY MATERIAL—Electric Furnace Lining.**

History.—The History of Silicon Carbide (Zur Geschichte der Siliziumkarbide). Ed. Donath. A review of the historical development of compounds of silicon and carbon, showing that silicon carbide, or carborundrum, was first described by Colson in 1882. Two articles, 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 1, 8, 1903.

CAR BUFFER.

See **CAR COUPLER; DRAFT GEAR; SPRING.**

CARBURETTED AIR.

Carburetting Air for Lighting Purposes. Reviews what has been done by the French Aërogen Gas Company, in the direction of the practical application of carburetted air for the purpose of illumination. Ill. 2100 w. Jour Gas Lgt—March 18, 1902.

The Production and Application of Air Gas (Das Luftgas, seine Herstellung und Verwendung). Dr. Walter Thiem. Describing a process of charging compressed air with hydro-carbon vapor for illuminating purposes. 3000 w. Glasers Annalen—March 15, 1904.

Air Gas. Describes methods of preparing carburetted air, its properties, defects, etc. 2800 w. Engr, Lond—Nov. 6, 1903.

Fischer System.—The Fischer Air-Gas System. Illustration, with description, of a plant for generating a gas by carburetting air with heavy tar oils—especially benzol—in a refined or unrefined state, claimed to be the cheapest illuminating medium known. 1800 w. Jour Gas Lgt—March 3, 1903.

"Petrogene."—"Petrogene" Air Gas to Replace Dear Coal Gas. An account of a system being exploited in England, giving plans of plant, and a comparative statement of cost. 3400 w. Jour Gas Lgt—Feb. 3, 1903.

CARBURETTER.

See also **AUTOMOBILE, GASOLINE; GAS ENGINE; GAS MANUFACTURE; GASOLINE ENGINE; LIQUID FUEL—Burners.**

Carburetters Condemned. Hugh Dolnar. Proving that the commonly used forms of carburetters are needless and troublesome, and briefly describing some recent patents for introducing liquid fuel to a motor cylinder. Ill. 2000 w. Autocar—Feb. 23, 1901.

Carburetters. The term as used includes all forms of apparatus for enabling engines to be run with the heavier oils which are not volatile at ordinary atmospheric pressure. Considers their characteristics and peculiarities as compared and contrasted with one another. Also illustrated description of types. 4400 w. Auto Jour—April, 1901.

Carburators, Vaporizers and Volatilizers Used in Petrol, Alcohol, Kerosene and Crude Oil Engines. E. Butler. Illustrates and describes various types of carburators in the present article. Serial. 1st part. 2400 w. Engng Rev—Feb., 1904.

Carburetters and Carburation. F. Strickland. Discusses the requirements of a carburetter. 1700 w. Autocar—Feb. 20, 1904.

Carburetters. Abstract of a lecture by Mr. Mervyn O'Gorman before the Auto. & Cycle Engrs.' Inst. A study of the requirements, what has already been accomplished, and how to get the best results. Serial. 1st part. 4000 w. Autocar—April 22, 1905.

Alcohol.—Carburetters at the Paris Alcohol Show. Brief illustrated descriptions of interesting devices. 1200 w. Auto Jour—June 7, 1902.

Alcohol Carburetters. Capt. C. C. Longridge. Considers the design of alcohol carburetters. 1500 w. Engr, Lond—Aug. 28, 1903.

Carburetters for Alcohol Motors (Carburateurs pour Moteurs à Alcool). Réné Dhommée. Discussing the conditions involved in the production of a suitable vaporized charge from alcohol and air, with illustrations of a number of special carburetters for use with alcohol motors. 1200 w. Revue Technique—Aug. 10, 1904.

See also **ALCOHOL MOTOR.**

Automatic.—An Automatic Carburetter for Internal Combustion Motors (Sur un Carburateur Automatique pour Moteurs à Explosions). A. Krebs. Illustrated description of a self-regulating carburetter, well adapted for automobile vehicles or for stationary motors. 1500 w. Comptes Rendus—Nov. 24, 1902.

The Principles of Automatic Carburation. Translation of an article from the French by Henri Walcker. 2500 w. Autocar—Jan. 9, 1904.

The Automatic Carburettor on the Crossley Car. Illustrated description. 1500 w. Auto Jour—Feb. 13, 1904.

See also **Grouville; Prunel.**

Buck.—The Buck Carburetter. Illustrated description of a carburetter used in connection with a small stationary petrol engine where its carburetting action has been shown to be economical and efficient. 800 w. Autocar—July 19, 1902.

Claudel.—The Claudel Carburetter (Le Carburateur Claudel). H. Claudel. A study of the general theory of carburetting air with the vapor of liquid fuels for internal combustion motors, and a description of the author's apparatus. 4000 w. Mem Soc Ing Civ de France—March, 1904.

The Claudel Kerosene Carburetter. Explains the designer's theory of the gasification of heavy oils, and its practical application to automobile motors. 2400 w. Automobile—Dec. 10, 1904.

Crossley.—See **Automatic; AUTOMOBILE, GASOLINE.**

French.—Some 1904 French Carburetters. Ed. Vrard, in "La Vie Automobile." Illustrates and describes some improved types exhibited at the Paris show. 1000 w. Automobile—Jan. 16, 1904.

Grouvelle and Arquembourg.—New Form of Automatic Carburetter. Illustrates and describes an interesting new carburetter brought out by Grouvelle and Arquembourg. 1800 w. Automobile—Dec. 24, 1904.

Heavy Oils.—The Carburetting of Heavy Oils. R. Desmarest. Translated from "L'Automobile." States general laws evolved from a study of carburation, examining them successively from the point of view of their application to kerosene. 3800 w. Sci Am Sup—March 18, 1905.

Kerosene.—See **Claudel.**

Loomis.—The Loomis Carburetter and Muffler. Illustrated description of articles named which have been in use for some time on gasoline vehicles. 600 w. Sci Am—Sept. 13, 1902.

Longuemore.—The Improved Longuemore Carburetter. Illustrated description. 1500 w. Sci Am Sup—Oct. 10, 1903.

Maybach Case.—The Maybach Carburetter Case. Discusses this case, which is of interest to the automobile industry, from the technical, legal and commercial points of view. 7700 w. Auto Jour—Aug., 1901.

Napier.—The Napier Carburetter. Illustrates and describes the present type of Napier carburetter. 1000 w. Autocar—June 17, 1905.

Paraffine.—A Paraffine Carburetter. Hugh Dolnar. An illustrated article explaining how paraffin is burned in the "Secor" engines. 1800 w. Autocar—Oct. 17, 1903.

See also **OIL ENGINE.**

Prunel.—The Prunel Automatic Carburetter. Illustrated description of a small bicycle type carburetter recently brought out. 1200 w. Auto Jour—Jan. 2, 1904.

Spray Type.—Carburetters. J. S. V. Bickford. An examination into the construction and function of the spray type of carburetter from the theoretical side. Ills. 2500 w. Engr, Lond—July 22, 1904.

Troubles.—Carburetter Troubles and Remedies. Considers forms of carburetters, the action, troubles and the remedies. 4000 w. Automobile—Aug. 22, 1903.

Twombly.—See **AUTOMOBILE, GASOLINE.**

CAR CONSTRUCTION.

See CAR.

CAR COUPLER.

See also CAR; DRAFT GEAR.

I. Improvements in Car Couplers and Draft Rigging. II. Flexibility in Car Coupling Attachments. Two articles discussing recent papers before the railway clubs. 6000 w. Ill. Eng News—Jan. 30, 1902.

Automatic Car Couplers. George Groobey. A study of these couplers, giving ideas of many mechanical and operating officials, gathered during a nine months' tour of observation, and a statement of the requirements of the modern coupler. 3000 w. R R Gas—Vol. XXXVIII., No. 19.

Air and Steam.—See **Westinghouse; AIR BRAKE—Coupler.**

Allison Smith.—A New Automatic Buffer Coupling. Charles Rous-Marten. An illustrated description of the Allison Smith automatic buffer coupler. Engr, Lond—May 22, 1903.

Boirault.—Automatic Coupling for Railway Cars (Attelage Automatique des Wagons). G. Mareschal. An illustrated description of an automatic coupling, invented by M. Boirault, which is being experimented with on French railways. 1000 w. Génie Civil—April 25, 1903.

Automatic Couplers (Attelage Automatique). M. Boirault. An illustrated description of the improved automatic coupler designed for use on the State Railways of France. 2500 w. Revue Technique—March 25, 1905.

Breaking.—See **TRAIN—Parting.**

British.—Automatic Couplers on British Railways. T. A. Brockelbank. Discusses their use in other countries, the danger to employees in coupling cars, traffic delays, etc., urging the adoption of automatic couplers. General discussion. Ill. 9400 w. Jour Soc of Arts—May 1, 1903.

Buffer.—See **Allison Smith; Roe; Thomas; DRAFT GEAR.**

Electric Connections.—Couplings for Electrical Connections between Railway Cars (Ueber die Kupplung Elektrischer Leitungen Zwischen den Fahrzeugen der Vollbahnen). A. Mykish. With especial reference to the connections for electric signals and lighting on main-line trains. 2000 w. Glasers Annalen—May 15, 1905.

Forsyth.—See **AIR BRAKE—Coupler.**

Freight Car.—The Freight Car Coupler Situation. Edward Grafstrom. Discusses drop testing machines, the coupler contour gauge, the "angling test," etc. 1300 w. Ry Mas Mech—June, 1901.

Germany.—See **Screw.**

Hill.—An Improved Coupling Appliance for Railway Wagons. Illustrated description of a recent invention by Edward Hill, of London. 1600 w. Col Guard—Dec. 14, 1900.

International Railway Congress.—On the Question of Automatic Couplers (Subject VII. for Discussion at the Seventh Session of the Railway Congress). William F. Pettigrew. Considers the advantages and disadvantages, the improvements effected in their construction, and their use with other couplers. For England. Ills. 5700 w. Bul Int Ry Cong—July, 1904.

Automatic Couplers. William F. Pettigrew. Report to be presented at the session of the International Railway Congress, to be held in Washington, May, 1905. Ills. 3500 w. Ry Age—July 29, 1904.

On the Question of Automatic Couplers (Subject VII. for discussion at the seventh session of the Railway Congress). G. Noltein. Discusses the advantages and disadvantages, improvements in construction, use, &c. For all countries, except England and America. 11200 w. Table and fig. Bul Int Ry Cong—Jan., 1905.

On the Question of Automatic Couplers (Subject VIII. for discussion at the seventh session of the Railway Congress). G. Noltein. Discusses the Discussing the advantages and disadvantages, improvements, uses, &c. 10600 w. Bul Int Ry Cong—Jan., 1905.

Master Car Builders.—The M. C. B. Coupler. R. P. C. Sanderson. A short paper discussing some of its shortcomings and the remedy, with general discussion. 11000 w. W Ry Club—Oct., 1901.

A Diagnosis of M. C. B. Coupler Defects, Based on Results Obtained in Service. R. D. Smith. Gives statistics concerning couplers and their performance, showing the comparative strength of the different parts of the mechanism. General discussion follows. 6800 w. W Ry Club—May 20, 1902.

See also **Screw; Test.**

Mine Car—Deterioration.—Deterioration of Mine-Car Couplings. Walter H. Finley. Abstract of a paper read before the Engng. Assn. of the South. Describes a case of fatigue of metals by crystallization, and the method used to remedy the trouble. 800 w. Eng & Min Jour—May 4, 1905.

Roe's Bull's Eye.—Roe's "Bull's Eye" Coupler and Central Buffer Draw Gear. An illustrated description of an automatic railway coupling now undergoing tests at the trials by the Russian railway officials. 500 w. Prac Engr—June 5, 1903.

Scheib.—Central Buffer Claw Coupling (Mittelpuffer-Klauenkupplung). A description of the Scheib Car coupler, a modified form of the American Master Car Builders' design. 1200 w. Glasers Annalen—Jan. 1, 1905.

Screw.—The Conversion of the European Screw-Coupling into the American Coupling (Die Umwandlung der Europäischen Schraubenkuppelung in die Amerikanische Mittelpuffer-Kuppelung). J. Grimme. Illustrating an arrangement by which hooks of the Janney type are combined with the screw form, to aid in the transition. 1500 w. Glasers Annalen—Aug. 15, 1901.

Automatic Couplers for Railway Cars (Selbstthätige Kuppelungen für Eisenbahnfahrzüge). Ernst Sauer. A discussion of the adaptability of the standard couplers of the American Master Car Builders' Association, in conection with the existing screw couplers of Germany. 7000 w. Glasers Annalen—Dec. 15, 1902.

Automatic Couplings for Railway Rolling Stock. Ernst Sauer. Abstract from "Glaser's Annalen." Discusses the adaptability of the American Master Car Builders' couplers in connection with the German screw couplers. Ill. 5500 w. Bul Internat Ry Cong—Aug., 1903.

The Substitution of Automatic Couplings for Screw-Couplings. Mr. Weiss, in "Zeitung des Vereines." Describes a system for the introduction of automatic couplers, discussing matters of construction. 2000 w. Bul Internat Ry Cong—Oct., 1903.

Automatic Car Couplers (Selbsttätige Kuppelungen für Eisenbahnfahrzeuge). E. Sauer. An account of the various automatic couplers submitted for use on the German railways, the hooks being of the M. C. B. type. Two articles. 10,000 w. Glasers Annalen—Oct. 15, Nov. 1, 1903.

Side Play.—Side Play Required in Car Couplers. Theodore H. Curtis. Gives formulas for computing the end sill clearance on curves, and length of safety chains. 1100 w. Am Engr & R R Jour—Nov., 1902.

Tests.—Tests of the M. C. B. Couplers. Report of the standing committee concerning the tests of the last year. 4300 w. Am Mast Car Bldrs' Assn—Saratoga meeting, 1901.

Automatic Couplings for Railway Rolling Stock. Mr. Sauer. Abstract translation of a report of a series of trials made by Messrs. Fried. Krupp, of Essen, on Feb. 12, 1903, with illustrations of details of construction of automatic couplings. 6600 w. Bul Int Ry Cong—April, 1904.

Tests, Cardiff.—Railway Couplings. Tabulated report showing strength of standard wagon couplings, as ascertained by experiments in the testing machine at University College, Cardiff, with an account of the work. Ill. 1200 w. Engng—Feb. 15, 1901.

Thomas.—The Car Coupler Problem. J. E. Thomas. Outlines a design of the writer, stating its advantages. 4500 w. St. Louis Ry Club—Sept. 13, 1901.

Thomas's Central Automatic Buffer-Coupling. Description of the apparatus, with drawings. 1200 w. Engng—Aug. 11, 1905.

Westinghouse.—The Automatic Air and Steam Coupler. Illustrated description of the undersized automatic air and steam coupler as manufactured by the Westinghouse Air Brake Co. 400 w. Loc Engng—Oct., 1904.

The Westinghouse Automatic Air and Steam Coupler. Illustrated description of this interesting exhibit at St. Louis. 1200 w. R R Gaz—Vol. XXXVII. No. 14.

CAR DESIGN.

See **CAR.**

CARD INDEX.

See **COST-KEEPING; INDEX. ELECTRO-CHEMISTRY—Bibliography.**

CARD SYSTEM.

"Duca."—See **COST-KEEPING.**

CAR FAMINE.

See **RAILWAY TRANSPORTATION—Car Famines.**

CAR FERRY.

See **FERRY; FERRYBOAT; ICE BREAKER; TRANSFER BRIDGE.**

CAR FRAME.

See **CAR.**

CAR HEATING.

See also **CAR LIGHTING; HEATING.**

Air Pump Exhaust.—Heating Passenger Trains with Exhaust Steam From the Air Pump. Illustrates and describes a system of heating used for the past two winters by the Maine Central R. R. 900 w. R R Gaz—Feb. 22, 1901.

Air Pumps Exhaust for Passenger Train Heating. Report of a committee of the Air-Brake Assn., presented at the Chicago meeting. 2200 w. Ry Age—May 10, 1901.

America.—See **CAR LIGHTING.**

Electric Westinghouse.—See **BRAKE—Westinghouse—Newell.**

Europe.—Notes on Railway Carriage Heating. Notes containing observations of a trip from the North of England to Central Italy at Christmas time, noting the sensations of comfort or discomfort over eight lines of railways, the systems of heating, &c. 2000 w. Engr, Lond—Sept. 27, 1901.

France.—The Heating of Railway Cars (Le Chauffage des Voitures de Chemins de Fer). H. Guérin. An exhaustive review of the great improvements in heating railway carriages in France as shown by the expositions of 1889 and 1900. Three articles. 6000 w. Génie Civil—May 18, 25, June 1, 1901.

See also Steam; Steam and Air.

Germany.—See **Steam.**

International Ry. Congress.—See **CAR LIGHTING.**

Lancrenon.—See **Steam and Air.**

Steam.—Steam and Its Application to the Heating of Railway Carriages. A paper read by Mr. Claypool before the British Inst. of Heat and Ven. Engrs. on the heating and ventilation of railway cars, the systems in use, &c. General discussion follows. 4000 w. Dom Engng—July 25, 1903.

Heating by Steam upon French Railways. Brief descriptions of the four systems now in service. Ils. 2500 w. Ry Age—July 8, 1904.

The Heating of Railway Trains (Heizung der Eisenbahnwagen). E. Ritt. Illustrated details of steam heating apparatus as used in German railway trains. 1800 w. Gesundheits-Ingenieur—Nov. 10, 1905.

See also Air Pump Exhaust.

Steam and Air.—Train Heating by Steam and Compressed Air (L'Application Générale du Chauffage des Trains par la Vapeur et L'Air Comprimé Combiné). M. Lancrenon. An account of the results obtained on the Eastern Railway of France. 6000 w. 2 plates. Rev Gen des Chem de Fer—Nov., 1903.

Car Heating by Steam Mixed with Air: Eastern Railway of France. Translated from "Revue Generale des Chemins de Fer." Illustrated description of system in use. 800 w. Eng News—Dec. 31, 1903.

The Heating System of the Eastern Railway of France (Chauffage des Trains du Réseau de l'Este). H. Guérin. An account of the practical operation of the Lancrenon system, using a combination of steam and compressed air. 2000 w. 1 plate. Génie Civil—Jan. 2, 1904.

Tramway.—Heating of Tramway and Light Railway Cars. M. C. de Burlet. Abstract of paper read at the Congress at Paris. Considers methods of heating. 1200 w. Tram & Ry Wld—Oct. 11, 1900.

CAR HOOD.

See **ELECTRIC CAR—Hood.**

CAR HOUSE.

See **ELECTRIC CAR HOUSE; ELECTRIC RAILWAY SHOP; ELECTRIC STATION; RAILWAY SHOP.**

CAR INTERCHANGE.

See **RAILWAY TRAFFIC.**

CAR LIGHTING.

See also **CAR HEATING.**

The Lighting of Railway Cars. George D. Shepardson. Reviews the various methods that have been tried and their degree of success, and gives an account of the development of the electric light for this service. 2200 w. W Elect'n—May 18, 1901.

The Lighting of Railway Cars (L'Eclairage des Voitures de Chemins de Fer). J. Carlier. A comprehensive, illustrated review of all methods of lighting cars by candles, oil, gas, acetylene, electricity, etc. Serial. Part I. 7000 w. Rev Universelles des Mines—May, 1902.

Car Lighting. L. T. Canfield. Topical discussion at the Mas. Car Bldrs. Assn. Discusses the Pintsch light and the electric light principally. 2000 w. R R Gaz—July 11, 1902.

The Present Status of the Art of Illumination, with Reference to Train Lighting (Der Heutige Stand der Beleuchtungswesen mit Berücksichtigung der Beleuchtung der Eisenbahnwagen). Dr. W. Wedding. A general discussion of the technics of artificial lighting, presented before the German Railway Association. 3000 w. Glasers Annalen—Feb. 1, 1903.

Symposium on Car Lighting. Extracts from papers read before the New England Railroad Club, considering the various systems of lighting cars. 8500 w. Ry Age—Feb. 20, 1903.

Car Lighting and Ventilation. John P. Fox. Illustrates and describes some of the methods employed on foreign roads. 800 w. St Ry Jour—March 25, 1905.

Car Lighting. Robert N. Tweedy. Discusses the cost of the lavish illumination now demanded, the effect on the eyes, and gives points that should be taken into consideration when a car is being designed. 2000 w. Elec Rev, Lond—Aug. 25, 1905.

Acetelyne.—The Adlake System of Aceteylene Gas Car Lighting. An illustrated description of the apparatus, with an explaantion of how the needed conditions have been met. 2800 w. R R Gaz—Nov. 22, 1901.

Car Lighting by Acetylene Gas on the Avery Acetylite System. Illustrates and describes the apparatus and its conections as used on cars. 900 w. Eng News—Dec. 5, 1901.

Acetylene for Railway Lighting in France. Information concerning the mixture of acetylene and cannel coal gas used in lighting the coaches of the Paris-Lyons-Mediterranean Ry. 1000 w. Engr, Lond—March 14, 1902.

Car Lighting by Acetylene and Electricity. Extracts from the address of L. T. Canfield before the M. C. B. Association at Saratoga. 1500 w. Am Engr & R R Jour—Aug., 1902.

Car Lighting. E. G. Fisher. Describes the acetone-acetylene storage system. 2500 w. Ry & Engng Rev—Feb. 14, 1903.

The Adlake Acetylene Car Liyhting System. Louis K. Gillson. Read before the New England Ry. Club. A description of this system, claiming efficiency, economy, reliability, and safety. 4000 w. Ry & Engng Rev—Feb. 28, 1903.

Two Systems of Using Acetylene Gas for Car Lighting. Abstract of a paper by E. G. Fisher read at meeting of the International Acetylene Assn. in Chicago; also a summary of the Elliott & Wilson system as given by another paper at the same meeting. 1800 w. Eng News—Oct. 1, 1903.

Dissolved Acetylene. Discusses the manufacture of this gas, as given in a recent paper by Herr Kuchel, and the process of using it, especially in regard to its application for the illumination of trains. 3300 w. Engr, Lond—Oct. 20, 1905.

See also ACETYLENE—Railway Lighting; ACETYLENE GENERATOR.

Acetylene Enrichment.—Works for Rich Gas and Acetylene (Usine à Gas Riche et à Acétylène). H. Guérin. A description of the plant for generating a rich coal gas, and its further enrichment with acetylene for the carriages of the Paris-Lyons-Mediterranean railway. 1200 w. Génie Civil—Oct. 26, 1901.

Adlake.—See **Acetylene.**

Aichele.—See **Electric.**

America.—Heating, Lighting and Ventilation of Cars. George L. Fowler. An outline of the development and present conditions of American practice. 5000 w. R R Gaz—Vol. XXXVIII., No. 20.

See also **International Ry. Congress.**

Axle.—See **Electric.**

Boehm.—See **Electric.**

Dick System.—See **Electric, Dick; Electric, Germany and Austria.**

Distribution.—The Lighting of Railway Cars. E. L. Elliott. Discusses the elements of car illumination, and the improvements in distribution that could be obtained by reflectors and the use of frosted lamps. 2000 w. Elec Rev, N Y—May 13, 1905.

Dynamo.—An Improved Dynamo for Lighting Railway Trains (Eine Neue Dynamomaschine und ihre Anwendung sur Beleuchtung von Eisenbahnwagen). E. Rosenberg. Describing an improved dynamo which gives a current always in the same direction no matter which way it is run. The general application to train lighting is discussed at length. 10000 w. Elektrotech Zeitschr—April 20, 1905.

A New Dynamo for Lighting Railway Trains (Eine Neue Dynamomaschine für Beleuchtung von Eisenbahnzügen). E. Rosenberg. The dynamo is especially designed to be driven from the car axle, and gives a continuous current when rotated in either direction. 2500 w. Zeitschr f Elektrotechnik—April 30, 1905.

See also **Electric.**

Electric.—Electric Passenger-Coach Lighting. Emerson L. Clark. Illustrates and describes the axle-driven system, claiming its advantages over the one generating unit system. 1600 w. W Elect'n—Dec. 22, 1900.

The Electric Lighting of Railway Trains (L'Eclairage Electrique des Voitures de Chemin de Fer). A description of the method of the Compagnie Générale Electrique, using a dynamo driven by the axle, and operated in connection with an accumulator. 8500 w. Revue Technique—Oct. 25, 1900.

Train Lighting from the Car Axle. Reviews the history of train lighting, from the beginning, when penny candles were used, and describes the Consolidation Axle Light system. Ill. 1400 w. Sci Am—Jan. 26, 1901.

Train Lighting by Electricity. George D. Shepardson. Briefly reviews the history of train lighting and the advantages of electric lights, and notes the various plans that have been tried. Ill. 7400 w. St. Louis Ry Club—March 8, 1901.

Some of the Problems of Electric Train Lighting. George D. Shepardson. A brief review of the application of electricity to train lighting, the various plans and their troubles and cost. 2200 w. Trans Am Inst of Elec Engrs—March, 1903.

The Electric ligting of Trains (Eclairage Electrique des Trains). M. Jacquin. A comprehensive illustrated account of the principal systems of car lighting by electricity. Two parts. 2000 w. Bull Soc Internationale des Electriciens—May and June, 1902.

Steam Dynamo for Electric Train Lighting (Versuche mit einer Dampf-Dynamo für Elektrische Beleuchtung von Eisenbahnzügen). A description of the Schichau-Shuckert machine, a small generating set placed on the locomotive, operating in connection with a storage battery. 1000 w. Glasers Annalen—Dec. 15, 1902.

An Electric Car Lighting System. W. L. Bliss. Illustrated description of an axle-driven electric car lighting system in which the generator is located on the truck frame, the armature being rotated by means of a single reduction gearing. 5900 w. Trans Am Inst of Elec Engrs—March, 1903.

An Electric Car Lighting System. W. L. Bliss. An illustrated description of an axle-driven electric car lighting system in which the generator is located on the truck frame, the armature being rotated by means of a single reduction gearing. 6800 w. Pro St Louis Ry Club—July 10, 1903.

Discussion of Papers on Railway Train Lighting. General discussion at New York, Pittsburg, Schenectady, St. Louis and other cities. 9300 w. Trans Am Inst of Elec Engrs—March, 1903.

Axle-Lighting. Elmer A. Sperry. A statement of some of the problems encountered in electric train lighting, criticizing some of the methods employed in solving these problems, and announcing a new system of axle-lighting. 2800 w. Trans Am Inst of Elec Engrs—March, 1903.

Axle Lighting. Elmer A. Sperry. Discusses the advantages of electricity for car lighting, the progress and the system of the future, announcing a new system of axle-lighting, with regulating devices. 3000 w. St. Louis Ry Club—Aug. 14, 1903.

An Axle-Light System of Train Lighting. Arthur J. Farnsworth. Gives reasons why axle-systems have theoretical possibilities of meeting the exacting requirements of the problem better than other systems, and gives an illustrated description of an axle-lighting system and its operation. 2400 w. Trans Am Inst of Elec Engrs—March, 1903.

Train Lighting Equipments. E. Kilburn Scott. Reviews the papers by Elmer A. Sperry and by Arthur J. Farnsworth. Ill. 1000 w. Elec Rev, Lond—April 10, 1903.

The Electric Lighting of Railway Trains. Dr. Alfred Gradenwitz. Illustrates and describes a system designed by Mr. Aichele, and being brought out by the Aktien-Gesellschaft Brown, Boveri & Co. of Baden, Switzerland. Each car has a lighting plant of its own. 3800 w. Elec Engr, Lond—Jan. 13, 1905.

See also **Acetylene; Dynamo; Tests; Wiring.**

Electric, Aichele.—The Aichele Electric Train-Lighting System (Elektrische Zugbeleuchtung, System Aichele). A single dynamo, driven from an axle, supplies current for the entire train, regulation being effected by a storage battery and automatic shunt. 2500 w. Elektrotech Zeitschr—Jan. 26, 1905.

The Electric Lighting of Trains (L'Eclairage Electrique des Trains). An illustrated description of the Aichele system, employing a dynamo driven from the car axle. 3500 w. Bull Tech de la Suisse Romande—Jan. 25, 1905.

Electric, Austria.—Electric Train Lighting in Connection with the Austrian Mail Service (Ueber Elektrische Zugbeleuchtung mit besonderer Berücksichtigung der Oesterreichischen Bahnpostwagen). Karl Wallitschek. A description of the use of accumulators and axle-driven dynamos for lighting the railway post-office cars in Austria. Two articles. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 6, 13, 1905.

Electric Boehm.—The Boehm System of Electric Lighting for Trains. The system obtains its current from a generator driven by one of the axles of the train. Its chief interest lies in the method employed to regulate the speed and voltage of the generator. Ills. 900 w. Elec Rev, Lond—June 17, 1904.

Electric Connections.—See **CAR COUPLER.**

Electric, Dick.—The Dick System of Lighting Trains by Electricity. Emile Guarini. Illustrated description. 800 w. Sci Am Sup—March 26, 1904.

The Mixed System of Electric Train Lighting (Elektrische Beleuchtung von Personenwagen nach dem Gemischten Betrieb). Emil Dick. A comparison of the use of storage batteries and of the mixed system of dynamo and storage battery for the lighting of passenger trains. 4000 w. Zeitschr f Elektrotechnik—Nov. 26, 1905.

Electric, Germany.—Electric Lighting for Railway Cars in Germany. A railway accident has caused an investigation into the danger of illumination by gas, and the advantages of electric lightning. 1100 w. U S Cons Repts, No. 929—Jan. 8, 1901.

The Electric Lighting of Railway Carriages (Die Einführung Elektrischer Beleuchtung der Eisenbahnwagen). A very full discussion before the German Electrotechnical Society, by Dr. Buttner and others. 15000 w. Elektrotech Zeitschr—Jan. 3, 1901.

See also **Electric, Prussia.**

Electric, Germany and Austria.—Electric Lights on Railway Trains in Germany and Austria. Illustrations with brief notes on the Dick system. 600 w. U S Cons Repts, No. 1740—Sept. 3, 1903.

Electric, Kull.—Electric Lighting of Trains. An illustrated description of the Kull system. Serial. 1st part. 1300 w. Aust Min Stand—Jan. 29, 1903.

Electric, Leitner-Lucas.—The Leitner-Lucas System of Electric Train Lighting. An illustrated description of a system applied to independent single railway coaches, which is under trial in England. Serial. 1st part. 1800 w. Elec Rev, Lond—March 17, 1905.

The Leitner-Lucas Train-Lighting Dynamo. Illustrates and describes this system in its improved form, explaining its working and mechanical design. 2500 w. Elect'n, Lond—July 7, 1905.

Electric, Loppé.—A French System of Train Lighting. P. Letheule. A description with diagrams of the M. F. Loppé system of electric lighting for trains, in which the dynamo has two field windings in opposition, so that the voltage is regulated closely. A storage battery is also used. 2000 w. Elec Wld & Engr—Dec. 20, 1902.

Electric, L'Hoest-Pieper.—The L'Hoest and Pieper System of Electric Train Lighting (Die Elektrische Zugbeleuchtung von L'Hoest und Pieper). E. Wikander. A steam-driven generating set is mounted on the locomotive boiler, the current being regulated on each car, and a small storage battery supplying current for three hours in case of detachment. 1800 w. Elektrotech Zeitschr—Nov. 16, 1905.

The L'Hoest-Pieper System of Train Lighting. Describes this system which aims to eliminate the axle-driven generator, and to reduce the equipment of each car to a small battery just sufficient for lighting the car in case it is disconnected from the locomotive. 800 w. Elec Wld & Engr—Dec. 2, 1905.

Electric, McElroy.—McElroy Automatic Axle Lighting System. Illustrates and describes this system of electric train lighting. 900 w. Ry Age—March 3, 1905.

Electric, Prussia.—German Progress in Electric Lighting for Railway Cars. Information from Herr Wichert's address giving results of the experiments with various forms of electric lighting made in Prussia. 700 w. U S Cons Repts, No. 1349—May 23, 1902.

The Electric Lighting of Corridor Trains on the Prussian State Railways. (Die Elektrische Beleuchtung einiger D-Züge der Preussischen Staatsbahn-Verwaltung). H. Wichert. Describing the use of the de Laval steam turbine, driving a dynamo mounted on the locomotive, for producing current for electric lighting of railway trains. 5000 w. Glasers Annalen—Aug. 15, 1902.

Electric Train-Lighting in Germany. Editorial review of an interesting paper by Herr Geheimer Oberbaurath Wichert, printed in the "Glaser's Annalen," giving particulars of recent experiments in the matter of train-lighting by electricity, carried out in the Prussian State Railways. 1500 w. Engng—Oct. 10, 1902.

The Electric Lighting of a Few Steam Trains of the Prussian Railroads. Abtract of a paper presented at the German Engrs.' convention by Privy Councillor Wichert. Considers individual car lighting, and general train lighting, comparing the two systems, and describes the experimental equipments of the latter system put on two trains in general service. Ill. 7800 w. Ry & Engng Rev—June 13, 1903.

Electric Lighting of Corridor Trains on the Prussian State Railways. Mr. Wichert, at a meeting of the German Inst. of Mech Engrs. on April 22, 1903. Translated from "Glaser's Annalen." The system chosen was that with engine and dynamos fixed on the locomotive and a battery fitted to each carriage. Ill. 8500 w. Bul Internat Ry Cong—June, 1903.

Train Lighting with Steam Turbines. Geheimrath Wichert. Abstract translation from a report on the Prussian Nat. Rys. presented at the German Engrs. convention. Illustrated detailed description of the system adopted, with brief review of other systems. 4000 w. Sci Am Sup—Aug. 1, 1903.

The Prussian System of Electric Train Lighting. Herr Carl Roderbourg. Describes the system of electric lighting adopted. 2500 w. Int Elec Cong of St. Louis—Sept., 1904.

The Improved System of Electric Lighting on the Corridor Trains of the Prussian State Railways (Die Neueren Einrichtungen der Elektrischen Beleuchtung einiger D-Züge der Preussischen Staatsbahnverwaltung). Max Buttner. Showing both independent steam dynamos on the locomotive and dynamos on the car axles. Serial. Part I. 2000 w. Glasers Annalen—May 15, 1905.

See also **Electric, Germany.**

Electric, Stone.—Railway Carriage Lighting by Electricity: J. Stone & Co.'s System. J. H. Dowling. Read before the Dublin Local Soc. of the Inst. of Elec Engrs. Illustrated detailed description. 3000 w. Elec Engr, Lond—Jan. 23, 1903.

Electric Train Lighting (Elektrische Zugsbeleuchtung). Reviewing the methods using a dynamo driven from the car axle, with especial reference to the Stone system. 1800 w. Schweizerische Bauzeitung—Feb. 21, 1903.

Power Required for the Electric Lighting of Passenger Carriages on the Stone System. Mr. Staby in "Zeitung des Vereins." Information on the amount of energy consumed. 1200 w. Bul Int Ry Cong—May, 1904.

Electric, Vicarino.—Systems of Electric Train Lighting (Einige Systeme Elektrischer Zugbeleuchtung). Hans Dominik. Describing especially the systems of Vicarino and of Kull, using dynamos driven from the car axle. 3000 w. Ill. Zeitschr f Klein a Strassenbahnwesen—Jan. 1, 1903.

Electric Train Lighting (Elektrische Zugsbeleuchtung). A description of the Vicarino system, as introduced on the Swiss Government railways. A dynamo driven from the car axle is used. 1500 w. Schweiz Bauzeitung—Sept. 19, 1903.

Europe.—The Lighting of Railway Trains in Continental Europe. Henri Guérin. A systematic account of train lighting system on the Continent, including oil, gas, acetylene, and electricity. 3500 w. Engineering Magazine—October, 1902.

France.—See Incandescent Gas.

Incandescent Gas.—Incandescent Gas Lighting for Railway Cars (Eclairage des Voitures de Chemins de Fer au Moyen de l'Incandescence par le Gaz). H. Giraud and G. Manclère. An illustrated account of successful experience in lighting cars of the Eastern Ry. of France by incandescent gas light, using various kinds of gas. 5000 w. Rev Gén des Chem de Fer—May, 1903.

The Lighting of Railway Carriages (Eclairage des Voitures de Chemins de Fer). An illustrated account of the successful use of incandescent gas mantles for lighting railway trains in France. 2000 w. Génie Civil—Aug. 22, 1903.

Train-Lighting on the Eastern Railway of France. An account of the difficulties met in using the system of incandescent gas-lighting, and the final type of lamp and burner adopted. Ill. 2500 w. Engng—Sept. 18, 1903.

Railway Carriage Lighting by Incandescent Gas. Particulars of experiments made in France. Summary from articles in the "Revue Générale des Chemins de Fer," and from "Génie Civil." Ill. 1700 w. Jour Gas Lgt—Oct. 20, 1903.

International Ry. Congress.—On the Question of Lighting, Heating and Ventilation of Trains (Subject IX, for discussion at the Seventh Session of the Railway Congress). Charles B. Dudley. Considers improvements made in America. 1500 w. Table and fig. Bul Int Ry Cong—Jan., 1905.

On the Question of Lighting, Heating, and Ventilation of Trains. Cajetan Banovits. Report No. 2 for all countries, except America, on Subject IX. for discussion at the seventh session of the Railway Congress. 7 tables. 34000 w. Bul Int Ry Cong—April. 1905.

Kull.—See Electric, Kull; Electric, Vicarino.

Leitner-Lucas.—See Electric, Leitner-Lucas.

Schichau-Schuckert.—See Electric.

Stone.—See Electric.

Tests.—Train Lighting Tests. E. L. French and W. J. Spence. From a paper presented at the meeting of the Northwest Ry. Club. An illustrated account of tests made to gain light on train lighting in general and especially on the use of storage batteries. 2000 w. Ry Age—May 23, 1902.

Turbo-Generator.—See Electric, Prussia.

Wiring Diagrams.—Some Wiring Diagrams for Car Lighting. Cole Gough. Diagrams and descriptions of various wiring schemes. 500 w. St Ry Jour—Nov. 2, 1905.

CAR MANUFACTURE.

See **BENDING MACHINE—Beam; CAR; CAR SHOP; ELECTRIC CAR; ELECTRIC RAILWAY SHOP; RAILWAY SHOP.**

CAR, MOTOR-DRIVEN.

See also **CAR—Passenger, Dayton and Union; ELECTRIC CAR; GASOLINE LOCOMOTIVE.**

Automobile Cars and Locomotives for Railways (Gleis-Motorwagen und Gleis-Motorlokomotiven). Julius Küster. Illustrated description of automobiles for hauling cars or for carrying loads themselves, adapted to run on tracks. 1 plate. 3000 w. Zeitschr d Mitteleuropäischen Motorwagen-Ver—No. 9, 1903.

Automobile Railway Vehicles (Les Voitures Automotrices des Chemins de Fer). L. Turgan. Illustrating and describing various forms of self-propelled cars for special uses on railways, including both steam and petrol as motive power. 6000 w. 1 plate. Mem Soc Ing Civ de France—Nov., 1903.

The Development and Handling of Local Railway Traffic. Discusses the question of motor car service on steam railways. 3500 w. Eng News—July 28, 1904.

Motor Cars for Light Passenger Traffic on Steam Railways. Gives information of lines in England and the United States, and a report on motor cars on European railways. 4000 w. Eng News—Oct. 13, 1904.

The Use of Automobile Vehicles on Railways (Emploi des Voitures Automobiles sur les Lignes de Chemins de Fer). F. Barbier. Notes concerning the use of self-propelled cars in various countries for local traffic on main-line railways. 2000 w. Génie Civil—March 18, 1905.

British.—Rail Motor Cars in Great Britain. J. F. Gairns. The present article states the advantages of these vehicles, gives a general classification, and illustrated descriptions of examples of steam cars. Serial. 1st part. 4800 w. Cassier's Mag—Sept., 1905.

Recent Developments in Motor Coaches Upon British Railroads. Illustrates and describes some recent types, especially the Peebles Steam Car. 2000 w. Sci Am Sup—Dec. 2, 1905.

See also **Gasoline; Gasoline-Electric; Steam.**

European.—Motor Cars on European Railways. Illustrates and describes some of the recent motor cars and motor-car services of European railways. 6800 w. Eng News—July 28, 1904.

Gasoline.—Gasoline Vehicles for Railways (Quadricycle et Wagonette à Pétrole pour la Circulation sur les Lignes de Chemins de Fer). L. Pierre-Guédon. An illustrated description of a quadricycle and a wagonette with petrol motors, for regular railway service. 800 w. Génie Civil—April 18, 1903.

The Use of Independent Motor Cars on Railways. Philip Dawson. A discussion of this subject, describing the various motor cars that have come into use and concluding that the car driven by a petrol, or gasoline motor, is the best thus far tried. 11000 w. St Ry Jour—Nov. 5, 1904.

Gasoline Locomotives and Cars for Railroads. Illustrates and describes experimental vehicles on trial in England in the effort to solve the problem of economical operation of short lines. 2200 w. Sci Am Sup—Feb. 18, 1905.

See also **GASOLINE LOCOMOTIVE.**

Gasoline, Daimler.—The Daimler Petrol Automobile Car (Automotrice à Pétrole Daimler). R. Bonnin. Illustrated description of a passenger car for main-line local traffic, propelled by a Daimler internal-combustion motor. 1200 w. Revue Technique—March 25, 1905.

Gasoline, Dick-Kerr.—A Petrol Motor Car for Railways. Illustrates and describes the Dick-Kerr petrol motor car being tried on the Great Northern Railway of England. 900 w. Tram & Ry Wld—Jan. 12, 1905.

Gasoline-Electric.—The Petrol Electric Cars for the North Eastern Railway. Brief illustrated description of cars with Wolseley gasoline engines driving electric generators for supplying current to the motors. 800 w. Engng—April 22, 1904.

The Heaviest Gasoline Propelled Vehicle in the World. Emile Guarini. Illustration and brief description of the gasoline electric motor coaches put in service on the North-Eastern Railway of England. 700 w. Ry & Loc Engng—Feb., 1905.

A New Gasoline Electric Motor Car. Illustrated description of a car deriving its motive power from a four-cylinder gasoline engine of the marine type, direct connected to a direct-current generator, which supplies current to four 35 H. P. motors mounted on the trucks. 1400 w. Ry & Engng Rev—April 8, 1905.

A 100-H. P. Two-Cycle Air-Cooled Motor. Illustrated description of a gasoline-electric car, built by E. W. Roberts, Clyde, O., for a western railroad, which is the largest of this type built in the United States. 2000 w. Automobile—Dec. 7, 1905.

See also **Gasoline, Union Pacific; AUTOMOBILE; GASOLINE ENGINE—Wolseley; GASOLINE LOCOMOTIVE.**

Gasoline Inspection.—The Latest Applications of the Gasoline Automobile Motor. Illustrates its application to a railway inspection car, and also to a light delivery wagon. 500 w. Sci Am—Oct. 17, 1903.

Gasoline Inspection Cars for Railways. Illustrated descriptions of two new forms recently appearing in London. The inventions of Robert W. A. Brewer, and of Frederick R. Simms. 800 w. Sci Am Sup—March 19, 1904.

Gasoline, Iowa.—Gasoline Cars for Interurban Service. Illustrates and describes a gasoline car put in service in Iowa. 2000 w. St Ry Jour—Sept. 19, 1903.

Gasoline, Portland, Ore.—See Gasoline, Union Pacific.

Gasoline, Street.—Applications of Hydrocarbon Motors to Traction Service (Anwendungen von Kohlenwasserstoffmotoren für Traktionsswecke). Illustrated description of internal combustion motors, using benzine or gasoline as fuel, in connection with tramway traction. 2000 w. Ill. Zeitschr f Klein u Strassenbahnwesen—Dec. 16, 1902.

Gasoline, Tunis.—Petrol Automotor for Railway Service (Draisine à Pétrole pour Voies Ferrées). An illustrated description of the Campagne car, designed for inspection service and light emergency traction on the French railways in Tunis. 1200 w. Génie Civil—Dec. 23, 1905.

Gasoline, Union Pacific.—Union Pacific Gasoline Motor Car. Illustration, with brief description, of a car for high-speed interurban and branch service to be used experimentally for local passenger service at Portland, Ore. 700 w. Ry Age—March 10, 1905.

Self-Propelled Passenger Coach. Illustration, with brief description of a car equipped with six-cylinder standard gasoline engine for local traffic at Portland, Ore. 600 w. Automobile—April 1, 1905.

The Union Pacific Motor Car No. 1. Illustrated description of a single-truck, four-wheel car, designed for light branch and interurban service. The motive power is a six-cylinder gasoline engine of 100 horse-power. 1300 w. Ry Mas Mech—Aug., 1905.

American Gasoline Railway Motor Cars. Illustrates and describes the Union Pacific's gasoline car, and the gasoline electric car of the St. Joseph Valley Co. 1800 w. Sci Am—Aug. 26, 1905.

Gasoline Motor Car No. 2, U. P. R. R. Illustrated description of this car and its improvements over car No. 1. Its strength is one of the most interesting features. 1200 w. Ry & Engng Rev—Oct. 7, 1905.

German.—Motor Cars for Railway Service (Motorwagen im Eisenbahnbetriebe). A. Heller. A fully illustrated account of various types of self-propelled cars for local railway service, using both steam and gasoline. Serial. Part I. 5000 w. Zeitschr d Ver Deutscher Ing—Sept. 23, 1905.

High-Speed.—See **LOCOMOTIVE DESIGN.**

Military.—The Simms 6-H. P. Petrol Motor and War Car. Illustrates and describes a car built to run upon the permanent ways of any railroad system, intended for making inspections or sending dispatches, and for the protection of the railway generally. 1000 w. Auto Jour—April, 1901.

Paris.—See **Steam, Purrey.**

St. Joseph Valley Co.—See **Gasoline, Union Pacific.**

Steam.—Steam Motor Cars for Railway Service. An illustrated account of some experiments undertaken a few years ago with steam motor cars for railway service, with disappointing results. Also editorial discussion of some of the reasons of their failure, and of the great field awaiting a successful independent motor car. 7500 w. Eng News—Feb. 6, 1902.

Steam Automobiles for Railway Service (Nouvelles Voitures Automobiles à Vapeur pour Voies Ferrées). F. Barbier. Illustrating and describing a number of special and inspection cars for use in minor service on steam railways in France and England. 3000 w. 1 plate. Génie Civil—April 9, 1904.

See also **British.**

Steam, Drummond.—See **Steam, London & Southwestern.**

Steam, Ganz.—The Ganz Rail Auto Car. An illustrated description of a car designed by Ganz & Co. of Budapest. 800 w. R R Gaz—Vol. XXXVII. No. 12.

Steam, German.—New Steam Motor Cars for Railway Service (Neue Dampfmotorwagen im Eisenbahnbetrieb). Dr. Alfred Brunn. With numerous illustrations of self-propelled cars for local and special service. Two articles. 6000 w. Ill. Zeitschr f Klein u Strassenbahnen—Oct. 19, Nov. 2, 1904.

Steam, Glasgow & Southwestern.—Steam Motor Car for the Glasgow & Southwestern Ry. Illustrates and describes a motor car in which the engine is detachable from the car. 300 w. Eng News—July 20, 1905.

Steam, Great North of Scotland.—Steam Coach; Great North of Scotland Railway. Illustrations of coach and boiler with short description. 350 w. Engng—Aug. 25, 1905.

Railway Motor Coach. Illustrated description of the interesting engine used in the motor passenger carriage introduced on the Great North of Scotland Railway. 500 w. Engr, Lond—Sept. 1, 1905.

Steam, Great Western.—Great Western Railway Steam Motor Carriage. Illustrated description of a coach recently put in service in England. 600 w. Engr, Lond—Oct. 16, 1903.

Railroad Motor Coaches Near London. W. B. Paley. Describes the steam cars introduced on the Great Western railway. 1400 w. R R Gaz—June 10, 1904.

Extension of the Great Western Motor Coach Services. Gives information concerning this service and its success. 1500 w. Engr, Lond—Nov. 4, 1904.

The Great Western Motor Omnibus Services. W. B. Paley. An account of this system as used by the British railroad named. 2500 w. R R Gaz—Vol. XXXVII, No. 28.

Steam, Komarek.—Light Motors on Local Railways (Einführung Leichter Motoren beim Betriebe auf Lokalbahnen). Illustrated description of steam motor cars, built by F. X. Komarek, to replace locomotives on some Austrian railways. 1 plate. 1000 w. Mitt de Ver f d Förderung d Lokal u Strassenbahnwesens—April, 1903.

Steam, London & Northwestern.—Motor Railway Coach. Illustrated description of the steam rail motor coach introduced by the London and Northwestern Railway. 600 w. Engr, Lond—Sept. 15, 1905.

Steam, London & Southwestern.—A Steam Railway Coach. Illustrations, with brief description, of a new steam-driven motor coach, constructed by D. Drummond, for the London & Southwestern and the London, Brighton and South Coast Railways. 500 w. Engr, Lond—April 10, 1903.

Motor Coaches for British Railroads. Illustration and brief description of a steam motor coach built for the London and South-Western Railway. 1200 w. Sci Am—May 23, 1903.

A Steam Railway Car. An illustrated description of a steam passenger car used on the London and South-Western Ry. for local traffic in the neighborhood of Portsmouth. 1700 w. Engng—May 22, 1903.

Steam, Midland.—Steam Motor Coaches, Midland Railway. Illustrated description of the self-propelled steam railway coaches being run between Morecambe and Heysham. 1800 w. Engr, Lond—Aug. 26, 1904.

Steam, Northern of France.—The New Steam Automobile Car of the Northern Railway of France (La Nouvelle Voiture Automobile à Vapeur du Chemin de Fer du Nord). MM. Sartiaux and Koechlin. Illustrated description of steam motor car for railway service, with details of water-tube boiler, and running gear. 3500 w. 3 plates. Rev Gen des Chemins de Fer—Jan., 1904.

Steam, Peebles.—The Peebles Steam Rail-Car. Illustration and description of a new type of steam car for branch line traffic. 1400 w. Tram & Ry Wld—Aug. 10, 1905.

See also **British.**

Steam, Purrey.—The Purrey Steam Tramway Motor (Automotrice à Vapeur, Système Purrey). L. Pierre-Guédon. Describing a steam-driven motor car used on certain tramway lines in Paris; a water-tube boiler is used. 3000 w. 1 plate. Génie Civil—Feb. 28, 1903.

Purrey Steam Motor Cars on French Railways (Voitures Automotrices à Vapeur. Système V. Purrey). J. Tête. Illustrated descriptions of passenger cars with steam motors, one on the Paris-Lyons-Mediterranean, and another on the Orleans Railway, with results of operation. 2 plates. 4000 w. Rev Gén Chemins d Fer—July, 1903.

Railway Motor Car for the Paris-Orleans Railway Company. An illustrated description of an experimental steam car built by Purrey. 1700 w. Engng—Oct. 23, 1903.

Rail-Autocar for the Paris, Lyons, and Mediterranean Railway. Illustrated description of the design of a motor-car with compound steam engine, built by Purrey. 500 w. Engng—May 6, 1904.

Auto Cars on French Railways. Illustrates and describes types put in service, especially the Purrey carriages. 1600 w. Ry Age—Nov. 11, 1904.

Steam, Rock Island. — See **RAILWAY MOTIVE POWER—Rock Island Report.**

Steam,. Rowan.—Mechanical Traction of Tramways. Translated from "La Nature." Illustrates and describes a Rowan steam motor car. 1700 w. Sci Am Sup—May 30, 1903.

Steam, Serpollet.—Motor Vehicles with Serpollet Boilers (Motorwagen mit Serpollet-Kesseln). H. Hempel. An account of the performance of the Serpollet steam motor vehicles in local tramway service. 1200 w. Zeitschr d Ver Deutscher Ing—March 29, 1902.
See also **AUTOMOBILE, STEAM.**

Steam, Shappey.—Steam-Motor Carriage for the Shappey Light Railway; S.-E. and C. R. Company. Brief illustrated description. 500 w. Engng—March 3, 1905.

Steam, Taff Vale.—Steam Motor Car for the Taff Vale Railway. Illustration and brief description of car which has been running for some time. 400 w. Engng—Jan. 8, 1904.

Steam Motor Cars on the Taff Vale Ry., England. Drawings and description. 600 w. Eng News—Oct. 5, 1905.

Steam, Yucatan.—A Steam Propelled Street Car. An illustrated description of a self-propelled car being built for use in Yucatan, Mexico. 1200 w. St Ry Jour—Jan. 10, 1903.

CARNEGIE.

See **STEEL INDUSTRY; STEEL WORKS.**

CARNOTITE.

See also **URANIUM.**

The Commercial Treatment of Carnotite. J. Ohly. Description of the chemical concentration of the values contained in this mineral. The instruction is limited to the extraction of uranium values exclusively. 2000 w. Min Rept—July 25, 1901.

The Commercial Preparation of Vanadium and Uranium Compounds from Carnotite. Dr. J. Ohly. Describes the treatment by a continuous process, eliminating the vanadium contents, and recovering the uranium remaining in the residue. 2300 w. Min & Met—Oct. 1, 1901.

The Separation of Vanadium, Uranium, and Radium from Carnotite. Dr. J. Ohly. Describes the treatment for the recovery of vanadium, radium, and uranium values. 1600 w. Min Rept—Aug. 6, 1903.

CARPET CLEANING.

Compressed Air.—Automobile Compressed Air Plant for Carpet Cleaning. Illustrated description of a novel form of motor vehicle recently built for service in South Wales. 500 w. Engr, Lond—April 21, 1905.

CARRIAGE WORKS.

Saltley, Eng.—See **ELECTRIC DRIVING—Carriage Works.**

CAR SERVICE.

See **RAILWAY TRAFFIC—Car Service.**

CAR SHOP.

See also **ELECTRIC CAR HOUSE; ELECTRIC RAILWAY SHOP; LOCOMOTIVE SHOP; RAILWAY SHOP.**

A Modern Car Shop. W. E. Sharp. An illustrated article describing the arrangement considered best suited to give large output at the lowest cost, the operation, etc. Discussion follows. 4000 w. Pro W Ry Club—Jan. 20, 1903.

Canton, O.—The Structural Steel Car Company. Brief description of the works at Canton, Ohio, and of the cars made. 2000 w. R R Gaz—June 13, 1902.

Detroit.—Detroit Steel Car Works of the American Car & Foundry Company. Illustrated description and information concerning this recently completed plant. 2300 w. R A Gaz—June 13, 1902.

Equipment.—See **MACHINE SHOP—Newark, N. J.**

Keyser Valley, Pa.—Keyser Valley Car Shops of the Delaware, Lackawanna & Western. Illustrated detailed description of a large plant, near Scranton, Pa., for repairing cars. 1000 w. Ry Age—Oct. 28, 1904.

Milnes, Hadley, Eng.—Modern Car Building. An illustrated description of G. F. Milnes and Company's works at Hadley. 2600 w. Tram & Ry Wld—March 7, 1901.

Readville, Mass.—New Car Shops. Illustrates and describes a new plant for the N. Y., N. H. & H. R. R. at Readville, Mass., used exclusively for cars and having electric distribution of power. 1100 w. Am Engr & R R Jour—Feb., 1901.

Readville Car Shops—New York, New Haven & Hartford. General plan of shops being built at Readville, Mass., which will probably be the most extensive plant in the United States. Description. 1700 w. R R Gaz—Feb. 15, 1901.

Readville Car Shops—New York, New Haven & Hartford R. R. Illustrated article on the arrangement of tools and machinery of the blacksmith and machine shops. 1200 w. R R Gaz—Feb. 22, 1901.

New Car Shops at Readville, Mass.—New York, New Haven & Hartford R. R. Engravings, illustrating the chief details of the buildings, except the power house, with description. 1500 w. Am Engr & R R Jour—March, 1901.

A Typical Shop Equipment for Handling Steel-Tired Wheels. Illustrates and describes the arrangement of equipment and facilities in a model wheel plant of the New York, New Haven & Hartford Railroad at Readville. 1500 w. St Ry Jour—Feb. 4, 1905.

Wolverton, Eng.—See **RAILWAY SHOP.**

CAR TRANSPORTER.

Conveyance of Standard-Gauge Stock Over Narrow-Gauge or Tramway Lines. Illustrated description of an arrangment for carrying standard-gauge cars on transportation trucks running on the small-gauge line. Trials have been made in France and are reported. 2700 w. Tram & Ry Wld—Feb. 13, 1902.

Electric Truck for Carrying Standard Gauge Cars on Narrow Gauge Railways (Transporteur Electrique de Wagons à Voie Normal sur les Voies Etroites). A. Taveau. Illustrated description of an electrically propelled platform truck arranged to carry standard freight cars upon narrow gauge railways. 1800 w. 1 plate. Génie Civil—Aug. 23, 1902.

Wagon Transporters. From "Le Genie Civil." Illustrated detailed description of electric transporters for carrying cars of standard gauge over lines of smaller gauge, which have quite recently been experimented with at Rheims. 1200 w. Engr, Lond—Sept. 12, 1902.

CARTRIDGE CASE.

See also **AMMUNITION WORKS; HYDRAULIC PRESS.**

Trubia, Spain.—See **AMMUNITION WORKS.**

CAR TRUCK.

See also **CAR; CAR BEARINGS; ELECTRIC CAR; LOCOMOTIVE TRUCK.**

Improvements in Trucks. Elmer E. Cook. Abstract of paper and discussion before the Tramways & Light Rys. Assoc. Calls attention to defects due to bad fitting, and considers the radial truck the greatest recent improvement. Ills. 2000 w. Elect'n, Lond—Dec. 22, 1905.

Accident.—See **RAILWAY ACCIDENT—Derailment.**

Brill.—Development of the Brill System of Trucks for Electric Motor Cars. William H. Heulings, Jr. An interesting illustrated account, with discussion. 4500 w. Pro Engrs' Club of Phila—Jan., 1904.

C., B. & Q. Ry.—Four-Wheel Passenger Truck of the Chicago, Burlington & Quincy. Illustrated description of the latest design for this road, to be used under cars weighing from 80,000 to 85,000 lbs. 500 w. R R Gaz—March 15, 1901.

Continental.—Continental Types of High-Capacity Railway Trucks. From "Glückauf." Illustrations, with brief descriptions. 500 w. Col. Guard—Aug. 7, 1903.

Electric Car.—Bogie Trucks for Electric Railway Cars. George L. Fowler. Illustrates and describes various designs. Serial. 1st part. 2400 w. R. R. Digest—May, 1901.

Electric Traction Trucks. Elmer E. Cook. Describes the main types of trucks in use, with some account of their performances. Ills. 5600 w. Trac & Trans—Oct., 1904.

See also **High Speed; ELECTRIC CAR.**

Flexible.—The Flexible Car Truck. Charles S. Shallenberger. Discusses the evils of various forms of trucks and methods of remedying them, suggesting the introduction in car truck construction of spring-bearing column guide plates, giving longitudinal flexibility for the absorption of shock. Ill. 2500 w. St. Louis Ry Club—Jan. 9, 1903.

High-Speed Electric.—Trucks for Interurban Service. C. F. Uebelacker. Gives the conditions to be met by a truck intended for high-speed service, and gives illustrated descriptions of various types. 4200 w. St Ry Jour—Oct. 4, 1902.

Trucks for High Speed Electric Railroads. An interesting review of the development, with illustrations of many types for high speed service. 4000 w. R R Gaz—June 19, 1903.

A New Design of Steel Motor Truck for Heavy Electric Traction Service. Illustrates and describes a truck for heavy high-speed electric railway operation. 1500 w. St Ry Jour—Oct. 29, 1904.

Passenger, French.—See CAR—Coal.

Rigid vs. Swing Center.—Rigid vs. Swing Center Car Trucks. F. P. Roesch. The writer explains and proves his theory that the rigid cars pull harder, weight for weight, than the swing-truck and loose drawbar car. 1600 w. Loc Engng—June, 1901.

Side Bearing.—Side-Bearing Trucks. W. J. Knox. Illustrates a truck which aims to combine and improve the best features of both side-bearing and center-bearing trucks, and compares it with the regular center-bearing truck. 2000 w. Ry Age—Jan. 29, 1904.

See also CAR BEARING; CAR WHEEL—Flange Wear.

Steel Frame.—Four-Wheel Steel Frame Truck and Steel Frame Draft Gear. Drawings and description. 700 w. Am Engr & R R Jour—Jan., 1901.

Steel Frame Passenger Truck. Brief illustrated description of a recent design for the Chemin de Fer du Nord, with springs over journal boxes. 400 w. Am Engr & R R Jour—Feb., 1901.

See also CAR.

Transporter.—See CAR TRANSPORTER.

CAR VENTILATION.

See also CAR HEATING; CAR LIGHTING.

Car Ventilation. Ross Taylor. Brief paper followed by discussion, in which round house ventilation is also discussed. 5000 w. Pro St Louis Ry Club—Sept. 8, 1905.

America.—See CAR LIGHTING.

International Ry. Congress.—See CAR LIGHTING.

Pennsylvania R. R.—New Ventilating System for Passenger Cars. Illustrates and describes with some detail the system which has been applied to over 200 cars of the Pennsylvania Railroad. 5000 w. Am Engr & R R Jour—June, 1901.

The Passenger Car Ventilation System of the Pennsylvania Railroad. Outlines the system adopted, after much experimental work. Ills. 2500 w. Eng Rec—Sept. 24, 1904.

CAR WHEEL.

See also RAILWAY ACCIDENT—Derailment; TIRE; WHEEL.

The Wheel Question. C. G. Bacon, Jr. Gives results of recent investigations of wheels and conclusions drawn, discussing certain points. 2000 w. St Ry Jour—July 8, 1905.

Boston Elevated.—Steel-Tired Wheels on the Boston Elevated Railway System. Illustrates and describes the methods adopted to keep the wheels absolutely round, and the repairs to the wheels. 1600 w. St Ry Jour—March 26, 1904.

Wheel Grinding on the Boston Elevated Railway. Explains the methods of maintaining wheels, the wear upon passenger cars being so great that the wheel has to be ground every two weeks. Ills. 2000 w. St Ry Rev—May 15, 1905.

Breakages.—Comparative Study of the Breakages of Tires and of Solid Wheels (Statistique Comparée des Ruptures et Avaries de Bandages et de Roues Pleines). E. Biard. An exhaustive study based on the reports of the German Railway Union from 1887 to 1896. 15000 w. Rev. Gen de Chemins de Fer—Oct., 1901.

Cast Iron.—Cast-Iron Car Wheels. G. W. Beebe. Abstract of a paper presented before the W. Ry Club. Discusses the manufacture and testing of cast-iron wheels, with a comparative record of tests made by the writer, and recommendations which he thinks would lead to better results. Ill. 2200 w. Eng News—Oct. 18, 1900.

Cast Iron Wheels Under 50-Ton Cars. Editorial discussion of the breakages of chilled cast iron wheels, and their ability for service. 1200 w. R R Gaz—May 24, 1901.

Chilled Cast Iron Car Wheels at Present and in the Future. William Fawcett. Concerning the severe inspection and the requirements demanded, with description of an ideal car-wheel foundry. 3000 w. Ir Age—May 16, 1901.

The Further Development of Cast Iron Wheels. S. P. Bush. Suggestions for the improvement of the wheels by a change in the contour. 800 w. R R Gaz—June 14, 1901.

Cast-Iron Wheels. Committee report to the Master Car Builders' Assn. Ill. 900 w. Ry & Engng Rev—June 29, 1901.

Chilled Cast Iron Car Wheels. C. H. Vannier. Extracts from an address delivered before the engineering students of Purdue University. Concerning the history of cast iron wheels and their improvements, tests, etc. 1500 w. R R Gaz—March 28, 1902.

Chilled Cast Iron Car Wheels. C. H. Vannier. Read before the students of Purdue Univ. Describes the method of manufacture in detail. 5000 w. Ir Trd Rev—April 24, 1902.

Cast Iron Wheels Under Heavy Cars. Information obtained by recent investigations, confirming the opinion that with proper materials and design and correct methods of manufacture the cast-iron wheel may be made adequate for any service now required. Ill. 3000 w. R R Gaz—June 13, 1902.

The Chilled Iron Car Wheel. C. V. Slocum. Brief paper on the strength and durability of these wheels and the demands made on them, followed by discussion. 7300 w. Ry Club of Pittsburgh—Nov., 1902.

Defects of Cast Iron Wheels and How to Inspect for Them. W. A. Mitchell. Suggestions helpful to inspectors. 2000 w. Loc Engng—Sept 1903.

Cast-Iron Wheels to Meet To-day's Requirements. Papers by F. W. Sargent, Pemberton Smith and W. J. Taylor, with discussion. 11700 w. N Y R R Club—Jan. 16, 1903.

Chilled Cast Iron Car Wheels. C. H. Vannier. Read before the students of Purdue Univ. Detailed description of the method of manufacture, and testing, with remarks. 5000 w. Foundry—April, 1903.

Chilled Cast Iron Car Wheels. J. S. Ferguson. Considers improvements made, outlining the practice of wheel casting as used by a reliable company, and the tests. 2500 w. Pro Rocky Mt Ry Club—Feb., 1904.

The Manufacture of Chilled Iron Wheels. Illustrated description of the work as carried out at the Edinburgh works of Messrs. Miller & Co. 2000 w. Tram & Ry Wld—Feb. 11, 1904.

A Review of the Cast-Iron Wheel Situation. C. W. Gennet, Jr. Discussion of failures of wheels and improvements in form. 2000 w. R R Gaz—Vol. XXXVII., No. 9.

Cast-Iron Car Wheels. J. E. Muhlfeld. Discusses the difficulty with the cast-iron wheel as at present produced in the United States, giving results of records and tests, and concluding that the undesirable performance may be overcome, giving suggestions. 2500 w. R R Gaz—Vol. XXXVIII., No. 18.

The Manufacture of Chilled Wheels. P. H. Griffin. Presents the wheel maker's position in the controversy over the failure of such wheels under high capacity cars. 3500 w. R R Gaz—Vol. XXXVIII., No. 24.

See also Specifications.

Cast-Iron Hub.—Strength of Cast Iron Hubs. George L. Fowler. A report of experimental investigations to determine the bursting strength of some cast-iron hubs to be used in railroad service, where it was desired to use the thinnest metal possible. 2700 w. Ry Age—Aug. 23, 1901.

Chicago Elevated.—Inspection and Care of Car Wheels. An explanation of the inspection system on the Northwestern Elevated R. R. of Chicago. Ills. 2000 w. St Ry Rev—June 20, 1904.

Chilled.—See Cast Iron.

Cost.—The Cost of Car Wheels. Gives actual cost and car miles run on a large number of different lines. 1200 w. St Ry Jour—April 5, 1902.

Car Wheels—A Study of Their Costs. D. F. Carver. Gives diagrams for determining service and scrap value of new and worn cast-iron wheels, and for comparing cost of iron and steel wheels and steel tires, and method of reasoning by which conclusions are reached. 2300 w. St Ry Jour—March 11, 1905.

Derailment.—See **RAILWAY ACCIDENT.**

Electric Railway.—Street Railway Wheels in Europe. Illustrated descriptions of wheels used and facts relating to their wear, cost, etc. 2200 w. St Ry Jour—Dec. 6, 1902.

The Shape of Wheels on Electric Railways (Neigungswinkel des Laufradprofiles bei Elektrischen Bahnen). K. Sieber. A discussion of the influence of the degree of coning of wheels on the vibrations of cars and the wear of wheels and rails, and the best shape for wheels. 2500 w. Zeitschr d Ver Deutschr Ing—June 6, 1903.

Tramway Car Wheels and Rails. Some Notes on Cost and Maintenance. A. N. Banister. Read before the Assn. of Tram. & Lgt. Ry Officials at Wakefield. Notes on cost and maintenance, with discussion. Ills. 5000 w. Tram & Ry Wld—Dec. 8, 1904.

Flange Wear.—Flange Wear and Side Bearing Trucks. Gustav Lindenthal. Shows the forces that produce flange wear and the way to reduce them, with a view to economy. Full paper and discussion. Ills. 9700 w. N Y R R Club—Sept. 16, 1904.

Flange Wear and Side Bearing Trucks. Gustav Lindenthal. Read before the N. Y. R. R. Club. Also editorial. An investigation of the wear of wheel flanges and of the inside flange of the outside rail of curves and the remedy. Ills. 5700 w. Eng News—Sept. 22, 1904.

Forging.—See **FORGING—Wheel.**

Foundry.—See **FOUNDRY—Altoona, Pa.; Car Wheel.**

Grinding.—See **Boston Elevated.**

Life.—The Life of Wheels and Rails. George E. Walsh. Remarks on the factors that affect the life of both wheels and rails, the types, construction, etc. 1800 w. Ry Age—March 24, 1905.

Load.—Permissible Wheel-Load per Foot of Wheel Diameter and per Inch of Breadth of Railhead. Francis J. E. Spring. From the "Pro. of the Inst. of Civ. Engrs. Also editorial. On the limits of wheel loadings in railway service. 3000 w. Eng News—Nov. 19, 1903.

Safe Limits of Working Load for Wheel Pressures. Tabulating the safe pressures for various diameters and surfaces for car wheels and for small roller bearings. 1800 w. Eng News—April 20, 1905.

Manufacture.—The Manufacture of Car and Locomotive Wheels and Tires (Beiträge zur Fabrikation der Eisenbahnräder und Bandagen). An illustrated description of the manufacture of wheels as carried out at one of the Krupp works, including solid steel wheels and various other kinds. 1500 w. Ill Zeitschr f Klein u Strassenbahnen—June 16, 1903.

The Manufacture of Cast Iron Car Wheels. An illustrated description of the system and special appliances used at the new plant of the Pennsylvania Railroad at South Altoona, Pa. 4000 w. Ir Age—Jan. 5, 1905.

See also Steel; **CAR SHOP—Readville; ELECTRIC RAILWAY SHOP—New York.**

Section for Interurban.—The Proper Wheel Section for Interurban Railways. Discusses the conditions of service and the difficulties due to the use of the wheels on city streets, showing the necessity of having the flanges as deep and thick as the urban roads will permit. 1200 w. St Ry Jour—May 4, 1901.

Special.—Some Experience with Special Wheels in Heavy Service. P. H. Griffin. States experience of a company having a reputation for special wheels for exacting service, and shows the effect of manganese in promoting the class of fractures which have given alarm. 1500 w. R R Gaz—June 13, 1902.

Specifications.—Specifications for Cast Iron Car Wheels. A copy of the standard specifications proposed by the committee of the American Society for Testing Materials. 2000 w. Ry & Engng Rev—Feb. 27, 1904.

Standard Specifications for Cast-Iron Car-Wheels. Charles B. Dudley. Discussing the specifications submitted by the sub-committee of the Am. Soc. for Test. Materials. 3300 w. Trans Am Inst of Min Engrs—Feb., 1904.

Specifications for Car Wheels. C. B. Dudley. Specifications prepared for the American Society for Testing Materials, containing important improvements which are explained by the writer. 2800 w. Am Engr & R R Jour—June, 1904.

Proposed Specifications for Cast-Iron Wheels. C. W. Gennet, Jr. Gives specifications prepared with the purpose of defining the requirements of a satisfactory wheel and to provide for a method of testing. 1500 w. R R Gaz—Vol. XXXVIII., No. 6.

Steel.—The Manufacture of Hydraulically Forged and Rolled Solid Steel Railway Wheels. Henrik V. von Z. Loss. An illustrated description of the process used in the manufacture of wheels for steel cars, with much information related. 4700 w. Jour Fr Inst—May, 1904.

Rolled-Steel Car Wheels. Samuel M. Vauclain. Describes and illustrates the manufacture of these wheels, discussing their superiority and the great need in these days of heavy rolling-stock of securing a safe wheel. General discussion. 3000 w. Jour Fr Inst—Feb., 1905.

The Steel Wheel for Street Railway service. George L. Fowler. States the probable advantages of using a steel wheel, and briefly discusses type, material, etc. 2400 w. St Ry Jour—June 17, 1905.

Steel, Ehrhardt.—The Ehrhardt Patent Seamless Spoke-Wheel. R. M. Daelen. Describes this wheel and states the advantages claimed. 700 w. Ir & Coal Trds Rev—April 3, 1903.

The Ehrhardt Seamless Car Wheel (Nahtloses Speichenrad, Patent Ehrhardt). An illustrated description of a spoke wheel for railway cars in which the hub and spokes are forged from a single block of steel. 900 w. Stahl u Eisen—April 15, 1903.

Steel, Street.—Steel Street Car Wheels. W. L. Wright. Reviews the difficulties encountered in making a satisfactory steel wheel for street cars, and discusses the requirements of an ideal wheel. 1500 w. St. Ry Jour—March 1, 1902.

Steel-Tire.—Notes on Truck Wheels. Sam Steele. Information concerning the manufacture and wear of steel-tired wheels. 1300 w. Loc Engng—Feb., 1901.

The Fused Steel-Tired Wheel. Knox Taylor. Illustrates and describes a wheel of American production coming into service for high-speed electric railways. 1400 w. St Ry Jour—March 5, 1904.

The Steel-Tired Wheel in Street Railway Service. Norman McD. Crawford. Gives facts from the experience of the Hartford Street Railway Company, showing that these wheels are superior not only in safety and serviceability, but also in economy. 2200 w. St Ry Jour—Jan. 21, 1905.

Wear of Steel Tired Wheels—How to Eliminate Excessive Flange Wear. W. G. Price. Considers the cause of excessive wear to be due to faulty truck construction. 1000 w. St Ry Rev—Feb. 15, 1905.

See also **Boston Elevated; CAR SHOP—Readville; TIRE.**

Test.—See **Specification.**

Tire.—See **Steel Tire; TIRE.**

CAR WORKS.

See **CAR SHOP; ELECTRIC RAILWAY SHOP; RAILWAY SHOP.**

CASE HARDENING.

See **HARDENING.**

CASK.

Counting Apparatus.—See **COUNTING APPARATUS.**

CASTING.

See also **CASTING MACHINE; FOUNDRY; IRON; IRON METALLURGY; MOLDING; PATTERN; PIG IRON; STEEL CASTING;** and under specific metals.

Notes and Observations on Cast-Iron. J. E. Johnson, Jr. Considers especially the production of satisfactory castings from iron considered unsuitable by the average foundryman, giving much information of value. 4500 w. Trans Am Inst of Min Engrs—Feb., 1904.

Iron and Steel in the Foundry. E. L. Rhead. Discusses the suitability of a metal for making castings, the extrusion of impurities during solidification, influence of specific and latent heat, etc. Ills. Serial. 1st part. 2400 w. Mech Engr—May 27, 1905.

Accounts.—See COST-KEEPING—Foundry.

Alloys.—See Non-Ferrous Metals; ALLOY—Casting.

Aluminum.—See ALUMINUM—Casting.

Boiler Bases.—Casting Bases for Upright Boilers. R. H. Palmer. Illustrated description. 500 w. Am Mach—Jan. 2, 1902.

Brass.—See Non-Ferrous Metals; BRASS CASTING.

Brass to Iron.—Casting Brass or Bronze on to Iron. Walter J. May. An illustrated article giving hints that will give satisfactory results. 800 w. Prac Engr—Aug. 11, 1905.

Bronze.—See Non-Ferrous Metals; BRONZE—Casting.

Bronze to Iron.—See Brass to Iron.

Centrifugal.—Centrifugal Casting. A. E. Fay. The author endeavors to give a complete history of the subject, especially describing the three important practical applications which have been made, setting forth the advantages which have been claimed and demonstrated. Ill. 3800 w. Ir Age—Feb. 28, 1901.

Chilled.—Bell Cranks and Small Chilled Castings. C. Neil. Illustrates and describes methods of molding. 700 w. Foundry—Oct., 1904.

See also CAR WHEEL—Cast Iron.

Cleaning.—See FOUNDRY—Management.

Clearance Allowances.—Clearance Allowances in Rough Castings. Joseph Horner. Discusses methods, giving helpful suggestions. Ills. 2200 w. Am Mach—April 14, 1904.

Clutch Coupling.—See MOLDING MACHINE.

Commutator Segments.—Casting Commutator Segments. C. Vickers. Directions and suggestions for securing the extreme acuracy required in such castiugs. Ill. 1800 w. Am Mach—March 5, 1903.

Continuous.—See STEEL METALLURGY—Casting and Rolling.

Contraction.—See Shrinkage.

Copper.—See Non-Ferrous Metals; COPPER CASTING.

Core.—See MOLDING.

Corners.—Corners on Castings. Walter J. May. An illustrated article showing that rounded edges are stronger than angles, and discussing points bearing on the strength of castings. 1200 w. Prac Engr—June 9, 1905.

Curvature.—Why Castings Curve. From the "English Mechanic and World of Science." Discusses the causes and remedies. Ills. 2500 w. Sci Am Sup—Dec. 16, 1905.

Cylinder.—Composition and Resistance of Steam Cylinder Castings (Zusammensetzung und Festigkeitseigenschaften des Dampfzylindergusses). F. Wüst & P. Goerens. With curves showing the strength and deflection of cast iron of various compositions. 2500 w. 1 plate. Stahl u Eisen—Oct. 1, 1903.

Molding and Casting of a Gas-Engine Cylinder, with Special Treatment of the Casting After Pouring. R. H. Palmer. Illustrated description of the methods used. 1800 w. Am Mach—Vol. 27. No. 37.

Casting a Slide-Valve Cylinder. R. H. Palmer. Illustrated description of method used. 1200 w. Am Mach—Vol. 28, No. 25.

Defects.—Defects in Cast Iron, Their Causes and Remedies. Herbert E. Field. Read before the New England Found. Assn. Considers shrinkage and its causes, prevention, etc., blow holes, cracks, cold shuts, weakness, dirt, and hardness. 5700 w. Ir Trd Rev—March 17, 1904.

The Defects in Ingot-Iron Castings. Prof. K. Hermann Wedding. Special consideration of the open-hearth process, considering blow-holes, shrinkage cavities, air bubbles, steam cavities, surface cracks, etc. Ir & Steel Mag—March, 1905.

The Causes and Remedies for Defects in Castings (Wie Entstehen in der Eisengiesserei Fehlgüsse and Wie Lassen sie sich Vermeiden). H. Fichtner. A discussion of the influence of methods of molding, gating, venting, etc., upon the soundness of castings. 2000 w. Zeitschr d Ver Deutscher Ing—April 15, 1905.

Direct from Blast Furnace.—Direct Casting from the Blast Furnace. An account of the revival of an old practice, with very considerable improvements, in Northamptonshire, by which a portion of the make of the furnaces is converted into castings, describing the arrangements. 1800 w. Engr, Lond—July 1, 1904.

Direct Casting from the Blast Furnace. Illustrates and describes the methods of production of cast iron tunnel segments as pursued at the works of Thomas Butlin & Co., Ltd., Wellingsborough, Scotland. 2000 w. Ir Age—Jan. 12, 1905.

Dressing.—Dressing Castings. Percy Longmuir. Remarks and suggestions on the trimming of castings. 1600 w. Foundry—Aug., 1902.

Engine Bed.—Casting a Tangye Engine Bed.. R. H. Palmer. Illustrated detailed description of the manner of making the casting. 2000 w. Am Mach—Feb. 14, 1901.

Ferro-Manganese.—See FOUNDRY.

Fine Surfaced.—Making Fine-Surfaced Castings. Walter J. May. Suggestions for obtaining good results. 1500 w. Prac Engr—April 14, 1905.

Fixture.—See MACHINE TOOL—Fixture.

Fluid Iron.—Fluid Iron for Casting. Walter J. May. Suggestions for cupola management, material, and matters necessary to secure good castings. 1100 w. Prac Engr—April 26, 1901.

Fluxing Metals.—Fluxing Metals for Casting. Walter J. May. Suggestions and general information on the use of fluxes. 1500 w. Prac Engr—Aug. 7, 1903.

Gating.—The Gating of Castings. Benjamin D. Fuller. Read before the Pittsburg Foundrymen's Assn. Illustrated discussion of a number of examples and the methods employed. 2000 w. Foundry—March, 1903.

Gating Malleable Castings. Jean P. Fermal. Information on methods of gating that have given successful castings. 1800 w. Foundry—Oct., 1905.

See also MOLDING.

Gelsenkirchen.—See FOUNDRY.

Grey Iron.—See Specifications.

Hard-Skinned.—Hard-Skinned and Knotty Castings. Walter J. May. Discusses the things that cause an abnormally hard skin on castings, and knotty iron. 1000 w. Prac Engr—Sept. 1, 1905.

Heat Treatment.—Strength of White-Iron Castings as Influenced by Heat Treatment. A. E. Outerbridge, Jr. Read at meeting of the Am. Soc. of Testing Materials, June, 1902. Gives a résumé of the history of the process of heat-treatment of white-iron castings, and states facts regarding tensile strength and other features of interest. 3800 w. Jour Fr Inst—April, 1903.

The Influence of Varying Casting Temperature on the Properties of Steel and Iron Castings. Percy Longmuir. Experimental work in which all conditions other than temperature are identical, the results showing the influence of varying casting temperature. 3200 w. Ir & Coal Trds Rev—May 6, 1904.

Hoisting Drums.—See CRANE—Anchors.

Iron Around Steel.—Casting Iron Around Steel. E. H. Powell. Gives directions for this class of work. 1100 w. Foundry—March, 1904.

Jet Condenser.—A Jet Condenser Casting and the Pattern Work for It. Joseph Horner. Illustrated description of patterns and methods used. 1200 w. Am Mach—April 13, 1905.

See also MOLDING.

Journal Bearing.—Casting Car Journal Bearings. C. Vickers. Detailed description of manner of casting car brasses. 1500 w. Am Mach—Oct 2, 1902.

See also MOLDING.

Knotty.—See Hard Skinned.

Malleable.—See Gating; FOUNDRY—Gelsenkirchen; Malleable; IRON.

Mending.—The Burning or Mending of Castings. Edward B. Gilmore. Describes the successful work of the writer, giving suggestions. Ill. 900 w. Jour Am Found Assn—Vol. 14, Part 1.

See also ALUMINOTHERMY.

Metallography.—See METALLOGRAPHY.

Metallurgy.—See IRON METALLURGY.

Mixing.—See FOUNDRY.

Non-Ferrous Metals.—Casting Non-Ferrous Metals. From "Eisen Zeitung." Suggestions for successful work in the casting of bronze, brass, copper and various alloys. 1000 w. Mech Engr—Nov. 25, 1905.

Nut Threads.—See THREADS.

Paris Exposition.—See METALLURGY.

Pickling.—Pickling Castings. Some points on methods in use, the acids and the dangers accompanying their use. 1200 w. Foundry—Nov., 1903.

The Pickling of Castings with Acid (Das Putzen der Gussstücke mit Säurewasser). J. L. C. Eckelt. Describing a method in which the dilute acid is sprayed upon the castings by jets instead of immersion in vats. 1500 w. Stahl u Eisen—March 15, 1904.

Pipes.—See PIPE MANUFACTURE—Rotary Casting.

Pit.—See STEEL CASTING.

Pouring.—The Relative Advantages of Casting from Above or Below (Guss von Oben—Guss von Unten). A. Messerschmitt. An examination of the influence of the method of pouring upon the strength and quality of the casting. 5000 w. Stahl u Eisen—April 15, 1905.

Preparation.—Preparing Castings for Machine Work. Frank B. Kleinhans. Describes pickling, putting through the foundry mill, grinding and chipping. 1500 w. Foundry—March, 1904.

Round Flasks.—Cast Round Flasks in Cores. H. J. M'Caslin. Illustrates and describes a method of casting round flasks of large diameter in cores with satisfactory results. 500 w. Foundry—March, 1905.

Saw-Mill Housing.—Casting a Housing for a Saw Mill. R. H. Palmer. Illustrates casting and explains method of casting. 900 w. Am Mach—July 18, 1901.

Scabs and Buckles.—Scabs and Buckles—Their Cause and Effect. Edward B. Gilmour. Explains the terms as applied to castings, and discusses the erroneous views held and the true cause. 1000 w. Foundry—Dec., 1900.

Scrap Metal.—See SCRAP.

Screw Threads.—See Threads.

Seattle.—A Heavy Casting. Illustrates and describes a heavy casting made in Seattle, Wash., with the mold and method employed in pouring the same. 800 w. Foundry—Aug., 1904.

Shell.—Casting a High-Explosive Shell. Grahame H. Powell. Describes the methods used in casting the Isham high-explosive shell. 1300 w. Am Mach—Jan. 8, 1903.

Shrinkage.—An Automatic Foundry Test for Contraction. Asa W. Whitney. Suggests a test for contraction proposed as a rational chill test for cast iron. 2200 w. Ir Age—Nov. 13, 1902.

Some Phenomena in the Shrinkage of Cast Iron. Thomas D. West. A study of the shrinkage question presenting facts of interest and suggesting ideas for valuable research. 1000 w. Ir & St Mag—Oct., 1904.

Shrinkage Troubles and Methods of "Feeding." Thomas D. West. Read before the New England Found. Assn. Discusses the different methods that may be employed to prevent shrinkage. 2500 w. Ir Trd Rev—Oct. 20, 1904.

Shrinkage Troubles and Methods of "Feeding." Thomas D. West. Read before the New England Found. Assn. Discusses shrinkage and methods of treating it, difficulties in feeding, and methods. 2700 w. Foundry—Jan., 1905.

Shrinkage Control.—Controlling the Contraction of Metals While Casting. William D. Allen. Abstract of a paper read before the Foundrymen's Assn. of Phila. Illustrates and describes the process. 1200 w. Ir Age—Nov. 14, 1901.

Slag.—Slag in Castings. William Leary. Discusses the causes and remedies for slag in castings and for kishy and gassy iron. 1500 w. Foundry—Dec., 1904.

Small Plants.—On Small Plants for the Production of Castings. R. M. Daelen. Considers the working of small Bessemer plants, small open-hearth furnace, and the application of the electric current. 1500 w. Ir & Coal Trds Rev—Nov. 4, 1904.

Specifications.—Specifications for Pig-Iron and Iron Castings. Robert Job. Gives the method used by the Philadelphia & Reading Railway Co., with remarks. 600 w. Trans Am Inst of Min Engrs—Feb., 1904.

Specifications for Cast-Iron and Finished Castings. Richard Moldenke. Remarks on the research work of foundry men and the results. 700 w. Trans Am Inst of Min Engrs—March, 1904.

The Need of Standard Specifications for Gray-Iron Castings. Henry Souther. Discusses the proposed specifications, giving reports of tests of material made as directed, and information concerning the castings. 3500 w. Trans Am Inst of Min Engrs—Feb., 1904.

Standard Specifications for Gray Iron Castings. Gives the specifications adopted by the American Society for Testing Materials. Ills. 600 w. Ir Trds Rev—Nov. 2, 1905.

See also FOUNDRY; PIG IRON; SCRAP; TESTING.

Spouts.—See Tuyere Boxes.

Statue.—An Australian Statue. John F. Buchanan. Gives an illustration of the design and explains the process of casting in detail. 1700 w. Foundry—June, 1903.

See also BRONZE.

Steel.—See STEEL CASTING.

Straight from Crooked Pattern.—A Straight Casting from a Crooked Old Pattern. L. C. Jewett. Describes the method used with success. Ill. 900 w. Am Mach—March 21, 1901.

Sulphur.—The Presence of Sulphur in Cast Iron and Its Influence on Machine Castings (Ueber die Schwefelverteilung in Gussstücken und deren Einfluss auf den Werkzeugmaschinenguss). A. Messerschmidt. Showing that the irregular distribution of sulphur in castings may cause serious local weaknesses. 3500 w. Stahl u Eisen—Aug. 1, 1905.

Tablets, Williamsburg Bridge.—See BRONZE—Casting.

Tank.—Casting a Round Tank. R. H. Palmer. Illustrates and describes one of the ways of molding and pouring a tank of this kind. 1100 w. Am Mach—Aug. 28, 1902.

Testing.—See TESTING—Castings.

Thermit.—See ALUMINOTHERMY.

Threads.—Casting Threads in Nuts. Walter Ferris. Illustrates and describes the work, giving results. 1200 w. Am Mach—April 4, 1901.

Casting Fine Threads in Gray Iron. John Randol. An illustrated description of interesting work. 1800 w. Am Mach—Sept. 3, 1903.

Tuyere-Boxes.—Casting Spouts and Tuyere-Boxes. Hiram W. Hixon. Drawings and description of methods for casting spouts for copper blast-furnaces, and tuyere-boxes for copper converters, of converter copper. 400 w. Eng & Min Jour—Dec. 22, 1904.

Vacuum.—Vacuum Casting. A. E. Fay. Showing the main idea of vacuum casting to be erroneous, and indicating two legitimate uses of the idea. Reviews early inventions utilizing the vacuum idea, and the work of various inventors in order of time. 5400 w. Ir Age—Nov. 6, 1902.

Warped.—Warping of Castings. Thomas Mack. Illustrates and describes a warped casting and the means adopted for remedying the trouble, discussing the cause. 1000 w. Foundry—Sept., 1904.

Weight Calculation.—The Calculation of the Weight of Castings with the Aid of the Planimeter. C. M. Schwerin. Describes a graphic method for estimating the weight of a casting when the cross-section is not a uniform geometrical figure. 700 w. Trans Am Inst of Min Engrs—Sept., 1902.

See also CALCULATING MACHINE.

White Iron.—See Heat Treatment; IRON.

Williamsburg Bridge Tablets.—See BRONZE—Casting.

Worm Gear.—See GEAR—Worm.

CASTING MACHINE.

See also BLAST FURNACE; IRON METALLURGY; IRON WORKS; LADLE CAR; PIG IRON; STEEL WORKS.

The Development of the Pig Casting Machine. A. E. Fay. Compares the different makes, showing who conceived the fundamental ideas of the modern machines, and who first put them into practical operation, tracing the development, and describing the latest improvements. Serial. 1st part. 4700 w. Ir Age—Oct. 10, 1901.

Pig-Iron Casting and Conveying Machinery. E. A. Uehling. An illustrated article reviewing its development in the United States. 7500 w. Cassier's Mag—June, 1903.

Casting Machines and Appliances (Giesserei-Maschinen und Einrichtungen). Illustrated description. Serial. Part 1. 2000 w. Stahl u Eisen—Sept. 1, 1905.

Foundry Iron.—Machine Cast Foundry Pig Iron. Albert Ladd Colby. Read before the Philadelphia Foundrymen's Assn. On the application of machine casting to foundry pig, the advantages, and difficulties, attending its introduction. Ill. 4500 w. Ir Age—Sept. 12, 1901.

Orth.—The Orth Casting Apparatus. From "Stahl und Eisen." Illustrated description of apparatus intended to facilitate the casting of molten iron into several rows of metallic moulds at once. 700 w. Col Guard—Nov. 2, 1900.

Ramsey.—Pig Iron Casting Machines (Roheisen-Giessmaschinen). E. Belani. A description of the Ramsey machine, which differs from that of Uehling in having the moulds on the periphery of a large wheel, instead of being carried on a chain gear. 1200 w. Stahl und Eisen—Aug. 15, 1901.

The Ramsay Casting and Conveying Machine. Illustrated detailed description. 2000 w. Ir Trd Rev.—Dec. 13, 1900.

CASTING WAGON.

See **LADLE CAR.**

CAST IRON.

See also **CASTING; FOUNDRY; IRON; METALLOGRAPHY; PIG IRON; TESTING.**

Magnetic Properties.—See **MAGNETISM.**

Strength.—See **IRON; STEEL—Heat Treatment; TESTING.**

Testing.—See **TESTING—Cast Iron.**

CATHEDRAL.

See also **CHURCH.**

St. John's, N. Y.—See **COLUMN—Granite.**

St. Paul's Undermining.—Earth Movements, Underground Water and Foundations. Extract from a letter of Mr. Somers Clarke, concerning the condition of St. Paul's Cathedral, London. Also discussion of the subject by Dr. G. Johnsone Stoney. 2800 w. Stone—Aug., 1901.

The Effect of Railway Tunneling on St. Paul's Cathedral, London. Letter published in the London "Times," written by Somers Clarke, outlining the condition of this great building. 1900 w. Eng Rec—Aug. 24, 1901.

See also **UNDERGROUND RAILWAY—London.**

Truro.—See **MASONRY—Rigidity.**

CATHODE.

See **ELECTRO-CHEMISTRY; ELECTRODE; ELECTRO-PHYSICS; VACUUM TUBE.**

CATHODE RAY.

See **ELECTRIC CURRENT, ALTERNATING—Wave Indicator; ELECTRON; ELECTRO-PHYSICS; OSCILLOGRAPH; RADIOACTIVITY; RADIOGRAPHY; ROENTGEN RAY; VACUUM TUBE.**

CEMENT.

See also **CEMENT KILN; CEMENT PAVEMENT; CEMENT TEST; CEMENT WORKS; CONCRETE; CONCRETE REINFORCED; DRYING—Minerals.**

Portland Cement. Sketch of Materials and Process. T. B. Newberry. General description of the Portland cement industry. 4300 w. Eng Rec—Nov. 10, 1900.

Notes on Cements and Cement Testing. Henry Fox. Gives a description of the raw materials in the composition, and a method of converting the same by means of a chemical and mechanical process into a fine powder of double silicate or calcium and alumina, and discusses methods of testing. Ill. 6700 w. Wis Engr—May, 1901.

Notes on Cement. J. R. Gardiner. A synopsis of what has been written on this subject, given in a concise form. 2000 w. Can Archt—May, 1901.

The Manufacture and Testing of Portland Cement. Walter E. Bush. This paper gained a special prize offered by the Cement Users' Testing Assn. Reviews the history of the inception and progress of this material, the manufacture, the kilns and grinding machinery, and methods of testing. 5000 w. Quarry—June 1, 1901.

The History, Manufacture, Testing, and Uses of Portland Cement. H. Howard Humphreys. Reviews the history, describes the principal methods of manufacture and testing, and much information of interest. Also discussion. 17700 w. Builder—Dec. 28, 1901.

The History, Manufacture, Testing and Uses of Portland Cement. H. Howard Humphreys. Reviews the history, principal methods of manufacture, and of testing, in the present article. Serial. 1st part. 4000 w. Quarry—Feb. 1, 1902.

Portland Cement. Richard K. Meade. Considers its constitution, properties and manufacture, and the regions where the different materials are found. 3000 w. Mines & Min—June, 1902.

The Portland Cement Industry (L'Industrie du Ciment Portland). E. Candlot. A general account of the method of making Portland cement with illustrated descriptions of works in various countries. 10,000 w. Bull Soc d'Encour—Nov. 30, 1902.

Cement—Its Manufacture, What It is, and How to Test It. Armin Schotte. A short historical sketch, with a description of the difference between natural and Portland cement, the methods of manufacture, and the materials. 3000 w. Pro Engr's Soc of W Penn—April, 1903.

The Cement Age: The Many New Uses and Increasing Demand for Plastic Materials. A topical discussion, introduced by R. W. Lesley. 6800 w. Pro Engr's Club of Phila—April, 1904.

Portland Cement. Presidential address of David Butler Butler before the Soc. of Engrs. (England). On the manufacture, testing, uses, applications, etc. 3200 w. Am Archt—April 2, 1904.

Notes on Lutes and Cements. Samuel S. Sadtler. Treats of kinds of lutes and cements most likely to be used by engineers, and arranged according to the intended application. 2800 w. Pro Engrs' Club of Phila—Oct., 1904.

Alabama.—The Cement Resources of Alabama. Samuel H. Lea. Reports an almost inexhaustible supply of materials suitable for Portland cement, discussing the economic advantages they possess. Map. 2500 w. Mines & Min—June, 1905.

America.—American Portland Cements. S. B. Newberry. A brief study of the manner in which American engineers have solved the chemical and mechanical problems of adapting its manufacture to American conditions. 2300 w. Indiana Engng Soc—1901.

Cement in Canada, Latin America, and the West Indies. Information concerning the cement trade. 6000 w. U. S. Cons Repts. No. 1052—June 3, 1901.

The Cement Industry of the United States. Extracts from Mr. Bill's report concerning the rapid development of the industry, with reasons why German and Belgian cements are sold more largely than the British product. 2500 w. Arch, Lond—July 19, 1901.

Plasters and Hard Finishing Cements in the United States. Edwin C. Eckel. Gives the divisions of the "Hydrate Cements," and some notes on Keene's cement. 900 w. Eng News—Jan. 29, 1903.

The Development of the Portland Cement Industry in the United States (Die Herstellung von Portlandzement in den Vereinigten Staaten von Amerika). A. Heller. With plans of recent works and details of the equipment. 3000 w. Zeitschr d Ver Deutscher Ing—March 11, 1905.

Analysis.—See Chemistry; **CEMENT TEST; LIME.**

Blast Furnace Slag.—See Slag.

Blocks.—See also **CONCRETE; FOUNDATION—Engine.**

Blocks, Decorative.—Decorative Forms in Cement Block Construction. Louis H. Gibson. Gives suggestions for the artistic use of this material, recently coming into use. Ills. 2500 w. Munic Engng—Dec., 1905.

Briquettes.—See **BRIQUETTE—Cement Disintegration.**

California.—The Manufacture of Portland Cement in California. Edward Booth. The effect of the discovery of petroleum in California on the industries of the state; the present article dealing with the development of the cement-making material. 1500 w. Sci Am Sup—July 13, 1901.

The Portland Cement Industry in California. G. P. Grimsley. Reviews the attempts made to manufacture portland cement in this state, the causes of failure, and recent plants. Ill. 1200 w. Eng & Min Jour—July 20, 1901.

See also **Pacific Coast; CEMENT WORKS.**

Chemistry.—The Cause of the Cementing Value of

Rock Powders. Abstract of a paper by Allerton S. Cushman in the "Journal of the American Chemical Society." Gives an outline description of the methods of preparing and testing these materials as introductory to a study of certain significant qualities. 3300 w. Eng Rec—June 13, 1903.

What Can Chemical Research Do for the Portland Cement Industry? Extracts from an address by Mr. Clifford Richardson at the annual dinner of the Assn. of Portland Cement Mfrs. Considers how chemical research can be best carried on, and some of the problems it may be depended upon to assist. 3000 w. Eng Rec—Dec. 24, 1904.

See also **Classification; Constitution; Structure.**

Classification.—The Classification of Crystalline Cements. Edwin C. Eckel. Formulates a classification believed to be rational and practical. It is based primarily upon the amount of chemical change caused by the processes of manufacture and use; and secondarily upon the chemical composition after setting. 2400 w. Am Geol—March, 1902.

Clay.—See **Manufacture.**

Clinkering.—Changes Which Take Place in the Clinkering of the Lehigh Valley "Cement Rock." Richard K. Meade. Read before the Assn. of Portland Cement Mfrs. A report of experimental investigations, discussing results. 2000 w. Cement—Sept., 1905.

Cold Test.—See **CEMENT TEST—Cold.**

Constitution.—The Structure of Cementing Materials. W. Carrick Anderson. Read before the Sci. Soc. of the Glasgow & W. Scotland Tech. Col. Presents much information on the chemistry of these materials, reporting valuable investigations. 8000 w. Quarry—April 1, 1902.

A Study of the Constitution of Hydraulic Cements (Étude sur la Constitution des Ciments Hydrauliques). S. B. Newberry and Melville M. Smith. Chemical and physical examinations of Portland and other cements. 5000 w. Bull Soc d'Encou—May 31, 1903.

The Constitution of Portland Cement from a Physico-Chemical Standpoint. Clifford Richardson. Address before the Association of Portland Cement Manufacturers, discussing the microscopical examination and chemical analysis of cements, showing that latter is not a sure test of their value. Tables. 7000 w. Eng Rec—Aug. 13 & 20, 1904. Also Eng News—Aug. 11, 1904.

The Constitution of Portland Cements from a Physico-Chemical Standpoint. Clifford Richardson. Address before the Assn. of Portland Cement Mfrs. Reviews the work of Le Chatelier and Törnebohm, and other investigators, with account of the author's work. Serial. 1st part. 5000 w. Sci Am Sup—Dec. 10, 1904.

Review of an Article by Eduard Jordis and Erhard H. Kanter, on the Historical Development of the Theories Concerning the Constitution of Portland Cement. Published in the "Zeitschrift für Angewandte Chemie," Berlin. Serial. 1st part. 3300 w. Cement Age—Feb., 1905.

See also **CEMENT TEST.**

Cost.—See **Material.**

Definition.—A New Definition of Portland Cement. A. D. Elbers. 500 w. Sci Am Sup—Oct. 4, 1902.

Dry Mixture.—The Dry Mixture of Cement. A. L. Goetzmann. Read before the Nat. Assn. of Cement Users. Considers the dry mixture and the manufacture of concrete blocks under this method, outlining the methods for cement testing and mixing. 3800 w. Munic Engng—Feb., 1905.

Fatigue.—The Fatigue of Cement Products. J. L. Van Ornum. States results of experiments made to determine the behavior of certain Portland cement mixtures when subjected to repeated loads of a less intensity than would produce failure when once applied. 700 w. Pro Am Soc of Civ Engrs—Aug., 1903.

The Fatigue of Cement-Products. Discussion of paper by J. L. Van Ornum. 1500 w. Pro Am Soc of Civ Engrs—Nov., 1903.

Germany.—Portland Cement in Germany. Reports the production as far exceeding the demand, and gives information in regard to consumption, etc. U S Cons Repts, No. 1691—July 8, 1903.

Grappier.—Hydraulic Limes and Grappier Cements. Edwin C. Eckel. Describes the manufacture and properties of these two cementing products which are closely allied to the natural cements. 2800 w. Munic Engng—Sept., 1904.

Grinding.—The Grinding of Portland Cement. George M. Newcomer. A study of the problem of grinding. 4500 w. Cement Age—June, 1905.

Grinding, Kent Mill.—Recent Results Obtained with the Kent Mill as a Fine Grinder. George H. Fraser.. Address before the Assn. of Am. Port. Cement Mfrs. upon the grinding of cement. 4000 w. Cement—May, 1905.

Hardening.—The Conditions Hydration and Hardening (Ueber Hydratations und Erhärtungsvorgänge). Dr. P. Rohland. A study of the conditions of hardening of plasters, cements, mortars, etc. 4000 w. Zeitschr f Elektrochemie—Nov. 25, 1904.

Industry.—The Cement Industry and Its Prospects for 1903. Discusses the production and use, the prospect of over production, the domestic and imported products, etc. 2500 w. Munic Engng—Feb., 1903.

The Portland Cement Industry. Percy F. Balfour, in "Queens' Quarterly." Reviews the history of the development of this industry in various countries. 3000 w. Can Archt—Aug., 1903.

The Cement Industry. Frederick W. Huber. Gives a classification of materials discussing their composition, and the process of manufacture of Portland cement. 5000 w. Cal Jour of Tech—Feb., 1905.

Irrigation Canal.—Method of Cementing the Irrigation Canals of the North Riverside and Jarupa Canal Co., California. E. Duryee. Brief illustrated description of the method adopted in plastering with cement the canals named. 600 w. Eng News—Feb. 21, 1901.

Keene's.—See **America.**

Kent Mill.—See **Grinding, Kent Mill.**

Lehigh County, Pa.—The Cement-Belt in Lehigh and Northampton Counties of Pennsylvania. F. B. Peck. Read before the Am. Chem. Soc. An illustrated description of the geological formations. 3000 w. Mines & Min—Sept., 1904 .

Lehigh Valley.—The Development of the Portland Cement Industry in the Lehigh Valley. Ira Judson Coe. Historical account of this industry and its growth in the section named. 2000 w. Trans Assn of Civ Engrs of Cornell Univ—1903.

Manufacture.—Engineering Problems in Cement Manufacture. S. B. Newberry. An account of the development of this industry in the United States during the last ten or twelve years, with remarks on the nature of hydraulic materials. Ill. Also discussion. 5300 w. Jour W Soc of Engrs—June, 1901.

Portland Cement. Richard K. Meade. An illustrated description of methods employed in its manufacture, and types of American and foreign cement machinery. 2800 w. Mines & Min—July, 1902.

The Manufacture and Testing of Portland Cement (Die Fabrication und Prüfung von Portland-cement). Theodore Pierus. A general account of the development of the manufacture of Portland cement, with especial reference to the growth of the industry in Germany. 9000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 3, 1902.

Portland Cement and Its Manufacture. Prof. Cambessedès in "The Brickbuilder and Cement Maker," London. Discusses the choice of materials, methods of manufacture, properties, &c. 3500 w. Stone—May, 1903.

Portland Cement Manufacture. Edwin C. Eckel. In the present paper an account is given of the excavation and transportation to mill of the raw cement materials and the cost. 1400 w. Munic Engng—Aug., 1903.

Portland Cement Manufacture. Edwin C. Eckel. The present article deals with the preparation of dry materials for the kiln. 1500 w. Munic Engng—Sept., 1903.

Portland Cement Manufacture. Edwin C. Eckel. Considers the preparation of slag-limestone mixtures. 1700 w. Munic Engng—Oct., 1903.

The Manufacture of Artificial Portland Cement (Fabrication du Ciment Portland Artificiel). A. Morel. A general description of the different processes, furnaces, and grinding machinery. Three articles. 5000 w. Génie Civil—Nov. 28, Dec. 5, 12, 1903.

Engineering Problems in Portland Cement Manufacture. S. B. Newberry. Explains the different classes of hydraulic cements and the making of Portland cement. Ill. 2200 w. Wis Engr —Feb., 1904.

Manufacture and Testing of Portland Cement. C. J. Wheeler. Reviews briefly the history of cement manufacture, describing present practice and giving information of interest. 4000 w. Jour Assn of Engng Socs—Sept., 1904.

Portland Cement. H. K. G. Bamber. Read before the Soc. of Archts. Describes processes of manufacture, considering particularly cement manufactured with chalk and clay. Also points on the testing of cement. 6500 w. Archt, Lond—April 21, 1905.

The Cement Industry in the United States (L'Industrie du Ciment aux Etats Unis). George P. Roux. A review of the development of the manufacture of Portland cement in America, from a French viewpoint. 6000 w. Mem Soc Ing Civ de France—May, 1905.

See also **Grinding; Marl; CEMENT KILN; CEMENT WORKS.**

Marl.—Manufacture of Cement from Marl and Clay. Henry S. Spackman. Information concerning the marl deposits and an illustrated account of the methods used. 4800 w. Pro Engrs Club of Phila—April, 1903.

Manufacture of Cement from Marl and Clay. Discussion of paper by Henry S. Spackman. 2700 w. Pro Engrs' Club of Phila—July, 1903.

Masonry.—Some Notes on Cement Masonry. I. N. Knapp. Read before the Am. Gas Lgt. Assn. Concerning the composition, testing, setting, strength, etc., of hydraulic cement. Also discusses the construction work, the proper way to lay brick in cement mortar, etc. Also discussion. 9500 w. Am Gas Lgt Jour—Nov. 10, 1902.

See also **MASONRY.**

Materials.—The Raw Materials Employed and the Amount of Portland Cement Made from Each in the United States. Edwin C. Eckel. Gives a statement based upon very complete data, compiled and tabulated by the author, on the materials and methods at the various plants. 800 w. Eng News—April 16, 1903.

Portland Cement Manufacture the Raw Materials. Edwin C. Eckel. Discusses the character of the raw materials available, and the proportions of the mixture. 1600 w. Munic Engng—July, 1903.

Prospecting and Sampling Deposits of Raw Material for Portland Cement Manufacture. Gives briefly instructions laid down by Albert V. Bleininger in a report to the Ohio Geological Survey. 2500 w. Eng News—May 11, 1905.

Portland Cement Materials. O. H. Howarth. Considers the importance of thorough mixing; the presence of iron; and the sources of materials in the United States. 4800 w. Mines & Min—Dec., 1905.

Materials Cost. — The Cost of Raw Materials for Portland Cement Manufacture. Morris M. Green. Information of interest, giving estimates. 1800 w. Eng Rec—Jan. 23, 1904.

Michigan.—The Portland Cement Industry in Michigan. Its history as given by Prof. Israel C. Russell in the Annual Report of the U. S. Geol. Survey. 1200 w. Sci Am Sup—May 17, 1902.

Mixtures.—The Proportions of Cement Mixtures. S. B. Newberry. Explains the chemical calculations used in controlling Portland cement raw mixtures. 3000 w. Cement Age—July, 1905.

Molding Effect.—Effect of Different Methods of Molding Upon the Strength of Cement. Ira O. Baker. Reports the results of experimental tests made to compare methods. 1000 w. Technograph, No. 15—1900-1901.

Mortar.—See **MORTAR.**

Natural.—The Passing of Natural Rock Cement. F. H. Doremus. A discussion of the decadence of this industry and the causes. 2000 w. Am Archt—March 28, 1903.

Natural Hydraulic Cements. E. C. Eckel. Discusses the natural cements as a class, noting the points of resemblance of the various brands. 1800 w. Munic Engng—Dec., 1904.

Natural Hydraulic Cement. Edwin C. Eckel. Discusses the grinding of the clinker, and types of grinding machinery. 3000 w. Munic Engng—April, 1905.

The First Attempt to Manufacture Natural Cement in the United States. Edwin C. Eckel. Gives a letter describing an attempt to manufacture this product, made by a Mr. Randolph, of Virginia, in 1817. 1000 w. Eng News—Dec. 7, 1905.

See also **Chemistry.**

New York.—The Portland Cement Industry in New York. Edwin E. Eckel. Briefly states the early history of the industry, and reviews the plants and materials. 6000 w. Eng News—May 16, 1901.

Northampton.—See **CEMENT WORKS.**

Northampton County, Pa.—See **Lehigh County.**

Pacific Coast.—Possibilities for Portland Cement manufacture on the Pacific Coast. A. H. Cederberg. Discusses the situation, cost of plant, etc. 1100 w. Min & Sci Pr—Oct. 12, 1901.

See also **California; CEMENT WORKS.**

Pavement.—See **CEMENT PAVEMENT.**

Pozzuolana.—The Use of Trass and Pozzuolana With Portland Cement Mortar (De Toevoeging van Tras en andere Puzzolanen aan Portlandcement Mortel). H. Wortman. With record diagrams of tests, showing the economy and advantage of a judicious admixture of puzzolana. 3000 w. De Ingenieur—May 18, 1901.

The Addition of Pozzuolana to Portland Cement (Addition de Pouzzolanes aux Cimente Portland). R. Feret. An examination of experiments showing the advantages of the addition of pozzuolana to cement used in maritime work. 3000 w. 1 plate. Ann des Ponts et Chaussées—4 Trimestre, 1901.

Properties.—The Chemical and Physical Properties of Portland Cement. B. Brentnall Lathbury. Brief notes on the important ingredients, physical properties and tests. 1000 w. Br Build—Nov., 1901.

Report.—Report of the Board of Engineers, U. S. A., on the Properties and Testing of Hydraulic Cement. Almost full report of the investigations of the Board of Engineers on the manipulating and testing of hydraulic cements used in the public works, and the conclusions. 12300 w. Eng News—Sept. 12, 1901.

Rock Powders.—See **Chemistry.**

St. Louis Exhibition.—The Cement Exhibits at the St. Louis Exhibition. Illustrated description of the cement building, model testing laboratory, and other exhibits. 3000 w. Eng News—Nov. 10, 1904.

Sand.—Sand Cement for Concrete Works Remote from Transportation Lines. Edward Duryee. Abstract from a paper of the U. S. Geol. Surv. An account of investigations made and the results, with report of costs. 1700 w. Eng News—May 28, 1903.

See also **BRICK—Sand-Lime.**

Sea Water Action.—The Decomposition of Cement by Sea Water. Abstract of a paper by H. Le Chatelier, presented before the International Congress, at Paris, discussing this subject. 2100 w. Eng News—Aug. 15, 1901.

The Decomposition of Cements by Sea Water. Henri Le Chatelier. Abstract translation of a paper prepared for the St. Petersburg Congress of the International Society for Testing Materials. Specially considers the chemical action. 5200 w. Cement Age—March, 1905.

Setting.—The Setting of Portland Cement. Gavin J. Burns. Diagram showing the microscopic appearance while setting, with description of the process whereby the cement is converted into a solid mass. 1200 w. Builder—June 15, 1901.

Materials Which Retard the Setting of Portland Cement. R. C. Carpenter. Gives a brief description of experiments made for the purpose of determining the regulating power on the cement of gypsum and chloride of calcium. 2200 w. Eng Rec—Dec. 31, 1904.

The Setting or Hydration of Portland Cement. Clifford Richardson. Read before the Assn. of Am. Portland Cement Mfrs. Gives results of investigations which are of scientific interest. 1200 w. Eng News—Jan. 26, 1905.

See also **Sulphates; CEMENT TEST.**

Sidewalk.—See **CEMENT PAVEMENT.**

Slag.—Tests of American Slag Cements. William Kendrick Hatt. A statement of the nature and properties of slag cements and a report of the results of tests performed at Purdue University on five kinds of American cement made from blast furnace slag as one element in the product. 6000 w. Indiana Engng Soc—1901.

American Slag Cements. Abstract of paper by W. K. Hatt, giving results of tests of cement made by grinding a mixture of slag and lime. 1600 w. Eng Rec—March 2, 1901.

A Historical Sketch of Slag Cement. William Kendrick Hatt. From a paper before the Indiana Soc. of Engrs. An elementary statement of the nature and properties of slag cements. 2200 w. Munic Engng—May, 1901.

Slag Cement Manufacture in Alabama. Edwin C. Eckel. Description of two slag cement plants now operating near Birmingham, Ala. 1400 w. Eng News—Jan. 23, 1902.

The Use of Slag in Cement Making. Extracts from advance sheets of a report by Edwin C. Eckel on the Utilisation of Iron and Steel Slags, in "Mineral Resources, 1901." 1200 w. Eng Rec—Nov. 1, 1902.

The Manufacture of Iron-Portland Cement from Blast-Furnace Slag (Die Verwertung der Hochofenschlacke zu Eisen-Portlandzement). Hr. Jantzen. Paper before the "Verein zur Beförderung des Gewerbfleisses," giving a historical and technical account of the manufacture of hydraulic cement from blast-furnace slag. Diagram. 3500. Stahl u Eisen—March 15, 1903.

Portland Cement Manufactured from Blast-Furnace Slag. Chevalier C. de Schwarz. A paper before the Iron and Steel Institute, giving a statement of the advantages and disadvantages of this product, for what uses adapted, etc., giving results of recent tests, and other information. 3500 w. Ir & Coal Trds Rev—May 8, 1903.

Portland Cement and Blast Furnace Slag (Portlandzement und Hochofenschlacke). Dr. H. Passow. An exhaustive study of the constitution of Portland cement, with micrographs of cements and clinker, showing the applicability of certain slags for making Portland cement. 6000 w. Stahl und Eisen—Aug. 1, 1903.

Slag and Portland Cements (Ueber Schlacken und Eisen-Portlandzement). Fritz Hromatka. A comparison of the properties of slag cement with those of the so-called "iron" Portland cement and ordinary Portland cement, discussing their respective applications. 3500 w. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 25, 1905.

Slag Cement. W. B. Ruggles. Reviews the early use of this material, the industry in the United States, and recent advances. 2000 w. Ir Age—May 18, 1905.

See also **Zulkowski**; **SLAG—Granulation.**

Specification.—Some Comparisons of Standard Specifications for Testing Portland Cement. E. Duryee. A comparison of the Russian specifications with the American, German, and French rules. 2200 w. Eng News—Jan. 9, 1902.

The Advantages of Uniformity in Specifications for Cement and Methods of Testing. George S. Webster. Read before the Am. Sec. International Assn. for Test Materials. A statement of the advantages and discussion of the causes of present variations in the results obtained. 2000 w. Eng Rec—June 28, 1902.

Standard Cement Specifications. R. W. Lesley. Read before the Am. Sec. of the International Assn. for Test. Materials. On the necessity of codifying requirements for Portland cement for different classes of service. 2300 w. Eng Rec—July 5, 1902.

Report of Committee on a Standard Specification for Portland Cement. Gives the specification and testing recommended. 3800 w. Can Soc of Civ Engrs, Adv Proof—Jan. 27, 1903.

Certain Vexatious and Fallacious Cement Tests Now in Vogue. D. B. Butler. Read before the Soc. of Engrs. Discusses methods and gives standard specifications for general purposes. 3000 w. Engr, Lond—Oct. 16, 1903.

Standard Specifications for Cement. Gives the specifications ordered sent out for approval by the Am. Soc. for Testing Materials. 1100 w. Eng Rec—June 25, 1904.

Practical Cement Control. Dr. Charles F. McKenna. Condensed from a paper read before the Am. Soc. for Test. Mat. Applies principally to large works, giving specifications and methods of inspection. 2400 w. Eng Rec—Aug. 27, 1904.

British Standard Specifications for Portland Cement. Gives the specifications recently adopted by the Committee on Cement of the Engineering Standards Committee of Great Britain. 1500 w. Eng News—March 2, 1905.

A Comparison of the Recent British and American Specifications for Cement. R. W. Lesley. Abstract of a paper read before the Am. Soc. for Test. Materials. 1300 w. Eng News—Nov. 16, 1905.

See also **CEMENT TEST.**

Standards, Swiss.—The New Swiss Standards for Hydraulic Cements (Die Neuen Schweiz. Normen für Hydraulische Bindemittel). A comparison of the old standards for cement and cement testing and those recently adopted by the Swiss Cement Manufacturers' Association and Swiss Engineers and Architects Society. 2000 w. Schweiz Bauzeitung—April 19, 1902.

Steps and Curbs.—See **CEMENT PAVEMENT—Curbs and Steps.**

Street Foundation.—See **CEMENT PAVEMENT.**

Structure.—See **Constitution.**

Sulphates.—Action of Sulphate of Lime on Cement (Action du Sulfate de Chaux sur les Ciments). L. Deval. A recrod of experiments with various cements. 1000 w. Bull Soc d'Encour—Dec., 1901.

The Reaction of Sulphate of Lime on Cement (Réaction du Sulfate de Chaux sur les Ciments). L. Deval. A record of analyses and tests, showing the effect of sulphate of lime upon the setting of anhydrous and hydrated cements. 3000 w. Bull Soc d'Encour—July 31, 1901.

The Influence of Sulphates on the Setting of Cement (Influence des Sulfates sur la Prise du Ciment). Louis Périn. With diagrams showing the effect of the addition of a small quantity of plaster to Portland cement. 1500 w. Génie Civil—April 15, 1905.

Swiss Standards.—See **Standards.**

United States.—See **America**; **Report.**

Uses.—Portland Cement. E. Kuichling. Considers its uses in various engineering constructions, reviewing its history and rapid developments. Serial. 1st part. 4000 w. Munic Jour & Engr—March, 1904.

Portland Cement and Its Uses in Engineering Construction. E. Kuichling. The present article reviews the investigations made by S. B. and W. B. Newberry. Serial. 1st part. 3500 w. Munic Jour & Engr—April, 1904.

Western Australia.—The Cement Industry of Western Australia. T. A. Rickard. Outlines the general character of the deposit at Kanowna, and their formation, and gives related matter of interest. Ill. 1700 w. Eng & Min Jour—July 13, 1901.

White.—Experiments on the Manufacture of White Portland Cement. Charles Delavan Quick. Discusses the commercial practicability of producing a pure white Portland cement. 1800 w. Eng News—Dec. 28, 1905.

Zulkowski Theory.—Blast Furnace Slag and Cement in Connection with the Theory of Zulkowski (Hochofenschlacke und Zement im Lichte der Zulkowskischen Theorie). C. Canaris, Jr. An examination of the chemical properties of furnace slag and its combinations, comparing slag cement and Portland cement from the chemical standpoint. 5000 w. Stahl u Eisen—July 15, 1904.

CEMENTATION.

See **STEEL METALLURGY—Cementation.**

CEMENT KILN.

See also **CEMENT—Manufacture; CEMENT WORKS.**

Fuel Consumption.—A Comparison of the Theoretical with the Actual Fuel Consumption in Cement Burning. Henry S. Spackman. Read before the Assn. of Am. Port. Cem. Mfrs. An explanation of the methods of making calculations, giving the results. 3500 w. Eng Rec—April 29, 1905.

Rotary.—A British Opinion of Rotary Cement Kilns. B. Blount before the Inst. of Civ. Engs., approv- An abstract of a paper by W. H. Stanger and ing American rotary kiln practice. 1000 w. Eng Rec—March 16, 1901.

The Rotary Kiln Process of Cement Manufacture. William Harry Stanger and Bertram Blount. Abstract of a paper presented to the Inst. of Civ. Engrs., with editorial. An exposition of the theory and practice of this process and of the adaptability and economy of the rotary kiln. Ill. 14400 w. Eng News—Oct. 24, 1901.

Discussion of Published Data on the Thermal Efficiency of the Rotary Kiln, and Possible Reduction of Fuel Requirement. Henry S. Spackman. Gives an analysis of investigations. Also editorial. 4200 w. Eng Rec—May 14, 1904.

Efficiency of Rotary Cement Kilns. Dr. W. Michaëlis, Jr. Illustration, with description of a patent of the writer's for increasing the capacity of a rotary kiln under the wet process. 1600 w. Eng Rec—June 4, 1904.

The Efficiency of Waste Gas Boilers in Connection with Rotary Cement Kilns. A. B. Helbig. An illustrated article aiming to prove that the waste gas boiler solves the fuel problem of the cement mill. 4500 w. Eng News—Feb. 16, 1905.

The Development of the Portland Cement Industry (Le Progres de l'Industrie du Ciment Portland). E. Candlot. An historical review of the cement industry, with especial reference to the development of the rotary kiln. 4000 w. Mem Soc Ing Civ de France—May, 1905.

Rotary, Heat Balance.—The Heat Balance of the Rotary Cement Kiln (Die Wärmebilanz des Zement-Drehofens). Carl Naske. An examination of the performance of various American cement kilns, deducing a heat balance. The conclusions of Richards are criticised. 3500 w. Zeitschr d Ver Deutscher Ing—Aug. 19, 1905.

Waste Gas.—See **Rotary.**

CEMENT PAVEMENT.

See also **PAVEMENT; SIDEWALK.**.

Curb and Gutter.—Suggestions Covering Combined Curb and Gutter. Albert Moyer. Gives outlines for specifications for the manufacture of monolithic cement stone. 1800 w. Eng Rec—Nov. 4, 1905.

Curbs and Steps.—How to Lay Portland Cement Steps, Curbs, and Similar Structures. F. H. Crafts. Directions, with illustrations of tools used. 1100 w. Munic Eng—Dec., 1902.

Sidewalk.—How to Lay Portland Cement Flagstone Walks. F. H. Crafts. Gives details of construction, with illustrations of tools used. 1500 w. Munic Engng—Oct., 1902.

Practical Work of Constructing Sidewalks. A. T. Gridley. Read before the Nat. Assn. of Cement Users. Gives specifications and considers some of the requisites of good work, materials, methods, &c. 2500 w. Munic Engng—Feb., 1905.

Street Foundations.—The Relative Merits of Portland and Natural Cements for Street Foundations. C. H. Rust. Discusses the advantages of Portland over natural cement. 800 w. Munic Engng—Nov., 1901.

Cement for a Modern Street. Dr. S. F. Peckham. Briefly describes the different cementing materials experimented with in the construction of concrete foundations, giving the details of the process of manufacture of Portland cement. Ill. 4200 w. Pop Sci M—Dec., 1901.

CEMENT POST.

See **POST—Cement.**

CEMENT TEST.

See also **CEMENT; CONCRETE.**

Cement and Mortar Testing. A discussion of the different purposes of neat and sand tests of cement. 1000 w. Eng Rec—April 6, 1901.

The Inspection and Testing of Cements. Richard L. Humphrey. Reviews early tests made of this material, giving an illustrated account of the methods of testing developed; and discusses inspecting and sampling, chemical analysis, fineness, specific gravity, time of setting, etc. Serial. 1st part. 6000 w. Jour Fr Ins—Dec., 1901.

The Testing of Cement. Editorial review of an article by Richard L. Humphrey, in "The Journal of the Franklin Institute," on the Inspection and Testing of Cements. 3800 w. Builder—July 5, 1902.

Data and Notes Derived from Tests on Cement and also on Concrete Taken from Regular Batches Used in Actual Works. James S. Costigan. 5600 w. Can Soc of Civ Engrs., Adv. Proof—Feb. 27, 1902.

Testing Methods in the Physical Examination of Portland Cement. A. H. Cederberg. Gives results of methods pursued and observations made in 6,238 tests of samples made during the last four years. Serial. 1st part. 2700 w. Min & Sci Pr—Oct. 3, 1903.

Testing Portland Cement. James Nangle. Describes tests for soundness, fineness of grinding and tensile strength to determine whether cement is safe to use. Ills. 3500 w. Aust Min Stand—Sept. 8, 1904.

Testing Cements and Asphalts. Prof. A. W. Dow. Digest of a report giving rules and methods recommended. 2500 w. Munic Jour & Engr—April, 1905.

Cement Testing. Robert Gray. Describes briefly methods of testing to determine the quality. Ills. 1200 w. Yale Sci M—May, 1905.

Methods of Testing and Some Peculiarities of Cement. W. A. Aiken. Read before the Assn. of Am. Portland Cement Mfrs. Outlines the methods of testing carried out by the Department of Inspection of Materials under the Board of Rapid Transit R. R. Commissioners of the City of New York. 3400 w. Cement Age—Oct., 1905.

Accelerated.—The Practical Value of Accelerated Cement Tests. A translation of investigations by M. Gary, of the practical value of cements condemned by accelerated tests. 3500 w. Eng Rec—Dec. 8, 1900.

Alkalies.—The Determination of Alkalies in Portland and Natural Cements. Thomas B. Stillman. Explains the scheme for the analysis. 1400 w. Stevens Ind—Oct., 1901.

Am. Soc. C. E. Report.—Progress Report of Special Committee on Uniform Tests of Cement. An important article on cement testing practice, giving the results of investigations and conclusions of a special committee appointed to determine a uniform method. Ill. 4000 w. Pro Am Soc of Civ Engrs—Jan., 1903.

Progress Report of Special Committee on Uniform Tests of Cement. Discussion of this report, by Sanford E. Thompson. 1700 w. Pro Am Soc of Civ Engrs—Aug., 1903.
See also **Soundness.**

Analysis.—Portland Cements. Gives a comparison of the chemical analysis of a good Portland cement with two natural cements of the lime and magnesia class, and discusses tests, quality, value, &c. 1200 w. Can Archt—June, 1901.

Uniformity of Analysis in the Portland Cement Industry. Describes the method of analysis formulated by the Committee of the Society of Chemical Industry. 1700 w. Eng Rec—Dec. 28, 1901.

The Chemical Analysis of Portland Cement. Richard K. Meade. On the value of chemical analysis, what it shows, &c. 800 w. Min & Sci Pr—Jan. 4, 1902.

The Chemical Analysis of Portland Cement; Its Possibilities and Its Limitations. Richard K. Meade. Read before the Am. Sec. of the International Assn. for Testing Materials. 2400 w. Eng Rec—Aug. 9, 1902.

Bending.—Bending Tests of Small Bars of Cement (Essais de Flexion sur des Barrettes Verticales de Ciment Soumises à un Effort Determinant dans leur Longeur un Moment Fléchissant Constant). L. Deval. An account of cement tests with small vertical bars to determine if breaking by a uniform bending movement is applicable to rapid cement testing. Curves and tables. 1600 w. Bull Soc d'Encouragement—March 31, 1903.

Boiling.—Some Notes on the Boiling Tests of Cement. Frederick H. Lewis. Read before the Am. Soc. for Testing Materials. Deals with advantages arising from variations in the compositions of the cement. 1600 w. Eng Rec—July 2, 1904.

Brick.—See **BRICK—Sand-Lime.**

Budapest Congress.—Continental Opinion and Practice in Regard to Cement Testing. Résumé of the papers read at the recent Budapest meeting of the International Assn. for Testing Materials. 4200 w. Builder—Nov. 30, 1901.

See also **Germany.**

Cold.—Tests of Portland Cement Mortar Exposed to Cold. C. S. Gowen. Read before the Am. Soc. for Tests. Materials. An account of experiments made to secure definite information on the effect of frost under the different conditions in which it may be desired to use Portland cement mortar in cold weather. Also editorial. 2800 w. Eng News—July 30, 1903.

See also **Frost and Adhesion; CONCRETE.**

Constitution.—Tests and Constitution of Portland Cement. A. D. Elbers. A discussion of the tests adopted by engineering societies, with suggestions helpful in the study of cases of deterioration of current work. 3300 w. Am Mfr—Jan. 30, 1902.

Errors.—Irregular Methods of Testing Cement. H.

A. Schaffer. Read before the Assn. of Portland Cement Mfrs. Points out errors made by many cement testers employed by contractors, engineers and architects. 4500 w. Cement Age—March, 1905.

Fallacy.—The Fallacy of the Tests Ordinarily Applied to Portland Cement. Richard K. Meade. Read before the Lehigh Valley Sec. of the Am. Chem. Soc. Discusses some of the false conclusions that may be drawn from a too rigid interpretation of the results of tests. 8500 w. Eng Rec—April 2, 1904.

Fatigue.—See CEMENT.

Frost and Adhesion.—Some Frost and Adhesion Tests of Cement Mixtures. Abstract from a paper by James S. Costigan, describing special tests made of this material. 1300 w. Eng News—Oct. 2, 1902.

Germany.—The Present State of Cement Testing in Germany. A report by Max Gary to the Budapest congress of the International Assn. for Testing Materials. Describes the standard Prussian tests and recommends alterations in the method of conducting them. Serial. 1st part. 5400 w. Eng Rec—Dec. 14, 1901.

See also Soundness.

Goreham Flourometer.—A New Test for the Fineness of Cement. Describes a new form of testing apparatus, known as the Goreham Flourometer, and the method of testing. 1100 w. Builder—July 20, 1901.

Laboratory.—The Cement Testing Laboratory at Cornell University. Edgar B. Kay. Describes briefly the appointments and apparatus of these laboratories. Ill. 1500 w. Munic Engng—July, 1902.

Cement Testing in Municipal Laboratories. R. L. Humphrey. A paper, slightly condensed, read before the Am. Sec. of the International Assn. for Testing Materials. A study of the equipment and methods in use in various laboratories. 3800 w. Eng Rec—July 12, 1902.

See also LABORATORY—Municipal.

Low-Pulling.—Low-Pulling Portland Cements. W. A. Aiken. Read before the Am. Soc. of Test. Materials. Gives information obtained in testing cement for the N. Y. subway construction. 1200 w. Eng Rec—July 8, 1905.

Manhattan Power Station.—See CONCRETE.

Moisture.—See CONCRETE REINFORCED—Test, Moisture.

Municipal Laboratory.—See Laboratory; LABORATORY—Municipal.

Practical.—Practical Cement Testing. Gives simple ways of testing that may be used by any engineer, and shows that it is unwise to trust to a cement maker to send good cement. 3500 w. Builder—July 13, 1901.

St. Louis Exposition.—Cement and Concrete Tests at the St. Louis Exposition. Richard L. Humphrey. Gives a description of the results of the tests which were made. 4000 w. Eng News—Sept. 21, 1905.

Setting.—A Machine for Investigating the Rate and Time of Set of Cement Mortars. Edgar B. Kay. Illustrated description of a machine recently installed in the Cement Laboratory of the College of Civil Engng., Cornell Univ. for investigation uses. 800 w. Eng News—Aug. 8, 1901.

Slag.—See CEMENT.

Soundness.—The Determination of the Soundness of Portland Cement. Translated report of the Committee of the Soc. of German Portland Cement Mfrs. 600 w. Eng Rec—Jan. 18, 1902.

Testing the Soundness of Cement. Frederick W. Taylor, and Sanford E. Thompson. Considers the methods advocated by the Committee of the Am. Soc. of Civ. Engrs., and outlines several other methods. 3000 w. Am Arch't—July 18, 1903.

Soundness Tests of Portland Cement. W. P. Taylor. Read before the Am. Soc. of Testing Materials. An illustrated article reviewing methods of testing for determining soundness, and explaining some of the causes of unsoundness. 3000 w. Eng News—July 23, 1903.

Specification.—See CEMENT.

Specific Gravity.—An Apparatus for the Direct Determination of the Specific Gravity of Cement. Daniel D. Jackson. Read before the N. Y. Sec. of the Soc. Chem. Ind. Illustration, with description of new apparatus, requiring only ten minutes to make a determination, and giving an accuracy to 0.01. 1200 w. Eng Rec—July 16, 1904.

Sulphates.—See CEMENT.

Watertown Arsenal.—Tests of Cements. J. E. Howard. Begins an account of the tests made at the Watertown Arsenal, near Boston. Serial. 1st part. 3300 w. Am Archt—June 18 ,1904.

Tests of Cements at the Watertown Arsenal. James E. Howard. Read before the Assn. of Am. Portland Cem. Mfrs. Report of tests made during the past four years. 4500 w. Eng Rec—May 6, 1905.

Tests of Cement at the Watertown Arsenal. James E. Howard. A report covering tests made during the past four years. 4800 w. Cement Age—June, 1905.

CEMENT WORKS.

See also CEMENT; CEMENT KILN.

Almendares, Cuba.—The Almendares Portland Cement Works, Cuba. An illustrated description of works near Havana. 2500 w. Eng Rec—Jan. 9, 1904.

Alpha, N. J.—The New Plant of the Alpha Portland Cement Company at Alpha, N. J. Illustrated description of a plant having ten rotary kilns. The various processes of manufacture are described successively and the special features of the plant, particularly the conveying apparatus. 2800 w. Eng Rec—Oct. 5, 1901.

Alsen, N. Y.—An Electric Cement-Making Plant. Illustrated description of a plant at Alsen, N. Y., which shows the adaptability of electric power to meet the requirements of cement-making machinery. 1000 w. Elec Wld & Engr—July 19, 1902.

The Alsen's American Portland Cement Works. An illustrated detailed description of the works and their equipment. 3300 w. Eng Rec—Jan. 3, 1903.

Atlas.—See Northampton.

Bay City, Mich.—Plant and Buildings of the Hecla Portland Cement & Coal Co. Illustrated detailed description of the plant at Bay City, Mich. 2500 w. Eng News—March 10, 1904.

Buckhorn.—The Plant of the Buckhorn Portland Cement Co. Richard L. Humphrey. Illustrates and describes an interesting plant in W. Va., built on the side of the mountain from which the raw material is obtained. 3000 w. Eng News—Nov. 5, 1903.

California.—The Pacific Portland Cement Company's Works. Watson Vredenburgh, Jr. Illustrated detailed description of a hillside plant in California. The power is electrical, and the fuel for the burning and driving is obtained from the California oil fields. 2200 w. Eng Rec—Aug. 30, 1902.

The Pacific Portland Cement Co. W. W. Whitton. An illustrated article describing the process of manufacture as carried out by this California company. 3800 w. Cal Jour of Tech—Feb., 1905.

See also CEMENT.

China.—The Artificial Portland Cement of Haiphong (Ciments Portland Artificiels de Haiphong). F. Schiff. A description of the cement works at Haiphong, China, and their products. 2000 w. Génie Civil—Jan. 24, 1903

Cost.—Cost of Building and Operating a Portland Cement Plant. Considers things that cause variation in the cost, and gives information concerning a mill with an output of 2000 barrels per day. 3000 w. Munic Engng—June, 1904.

Cuba.—See Almendares.

Dexter, Pa.—The Dexter Portland Cement Works. Illustrated description of mills in Pennsylvania. 2000 w. Eng Rec—Aug. 6, 1904.

Djatkowo, Russia.—The Portland Cement Works at Djatkowo (Die Portlandzementfabrik Djatkowo). Carl Naske. An illustrated description of a works having an output of 500,000 barrels of 170 kilograms per year; situated at Djatkowo, near Briansk, Russia. 1800 w. 1 plate. Zeitschr d Ver Deutscher Ing—Nov. 1, 1902.

Edison.—A Visit to the Plant of the Edison Portland Cement Co., at Stewartsville, N. J. Plan of the works with description. 1800 w. Eng News—May 29, 1902.

The Edison Portland Cement Works at New Village, N. J. An illustrated detailed description of these works and their operation. The distinctive feature is the use of roll crushers and grinders. Also editorial. 5500 w. Eng News—Dec. 24, 1903.

Edison Portland Cement Company. An illustrated description of the extensive plant at New Village, N. J., and the novel processes of manufacture employed. 6500 w. Ir Age—Dec. 24, 1903.

The Edison Portland Cement Works. Illustrated detailed description of this remarkable plant. Serial. 1st part. 1700 w. Sci Am Sup—Jan. 30, 1904.

Egyptian Portland.—See **Fenton, Mich.**

Electric Equipment.—Electric Apparatus in a Modern Cement Mill. An illustrated description of the application of electric apparatus to severe conditions with entire success. 2200 w. Elec Rev, N Y—Nov. 1, 1902.

See also **Alsen.**

Fenton, Mich.—The Works of the Egyptian Portland Cement Company. Illustrates and describes the methods used at a new marl cement mill, situated at Fenton, Mich. Gives plan and section, showing the arrangement of the plant. 2000 w. Eng Rec—March 12, 1904.

Grays.—Cement Works at Grays. Describes the works and the methods of manufacture. Everything, except the main shafting, is driven electrically. 1200 w. Engr, Lond—July 11, 1902.

Greenhithe, Eng.—The Cement Works of I. C. Johnson and Co., Ltd., Greenhithe. Plan and description of these works and their equipment, and some of the methods employed. Ill. 4000 w. Engr, Lond—Feb. 7, 1902.

Haubourdin, France.—The Manufacture of Portland Cement with Rotary Kilns (Fabrication du Portland Artificial par Fours Rotatifs). E. Leduc. An illustrated description of Portland cement works at Haubourdin, France, installed by Smidth Davidsen, of Copenhagen. 2000 w. Rev Technique—July 10, 1902.

Hudson, N. Y.—The Plant of the Hudson Portland Cement Co. at Hudson, N. Y. An illustrated detailed description of a plant using limestone and shale or clay as raw materials, now being built. The rotary kiln dry process. 2200 w. Eng News—July 23, 1903.

Hull, Canada.—The International Portland Cement Works at Hull, P. Q., Canada. John McClelland Bulkley. Illustrates and describes a factory comprising twenty buildings that will have a capacity of about 2,000 bbls. per day. 2500 w. Eng Rec—Jan. 28, 1905.

Jonesville, Mich.—The Omega Portland Cement Works, Jonesville, Mich. Illustrated detailed description of these works and their equipment, and the methods employed. 2700 w. Eng Rec—Aug. 17, 1901.

Kansas.—The Works of the Kansas Portland Cement Co. Ellis Soper. Illustrated description of the plant and its operation. 2000 w. Eng Rec—Aug. 12, 1905.

Kosmos, Kentucky.—The Works of the Kosmos Portland Cement Co. Illustrates and describes a plant in Kentucky and its equipment. 1800 w. Eng Rec—Oct. 21, 1905.

Krause.—See **Machinery Test.**

Lehigh Valley, Pa.—See **CEMENT.**

Machinery Test.—Test of Machinery in a Cement Works. Describes tests of the power required to drive kilns, conveyors, crushers, and other machineryi n the Krause Cement Works, Martins Creek, Pa. 1600 w. Eng Rec—April 20, 1901.

Martins Creek, Pa.—The National Portland Cement Works, Martin's Creek, Pa. Begins an illustrated detailed description of works of unusual interest in several respects. Serial. 1st part. 2500 w. Eng Rec—March 11, 1905.

New Village, N. J.—See **Edison.**

Northampton.—The Plant of the Northampton Portland Cement Company. Richard K. Meade. Illustrated detailed description. 2000 w. Eng Rec—Dec. 5, 1903.

Power Plants of the Atlas Portland Cement Co. An illustrated detailed description of the power equipment of the Northampton, Pa. mills of this company. 6000 w. Power—Dec., 1904.

Portland, Colo.—New Cement Works at Portland, Colo. James D. Schuyler. An illustrated description of an interesting plant. Serial. 1st part. 2200 w. Eng Rec—Feb. 20, 1904.

Prospect Hill, Mo.—The Works of the St. Louis Portland Cement Company, Prospect Hill, Mo. John E. Conselman. An illustrated detailed description of a modern plant for the manufacture of Portland cement by the dry process. 3500 w. Eng Rec—July 11, 1903.

Pyrenees.—See **Spain.**

Roosevelt, Arizona.—The Government Cement Mill at Roosevelt, Arizona. H. B. Connor. Gives a statement of the amount saved by manufacturing on the ground the cement needed for the construction of the Salt River reclamation project, describing the plant. 1500 w. Min Wld—May 20, 1905.

Rudelsburg, Germany.—The Rudelsburg Portland Cement Works (Die Portlandzementfabrik Rudelsburg). An illustrated description of the works of the Saxon-Thuringian Company, near Kösen, particularly of the dust-prevention apparatus. 1 plate. 3000 w. Zeitschr d Ver Deutscher Ing—Jan. 25, 1902.

The Rudelsburg Portland Cement Works. Illustrates and describes an interesting plant erected under unusual difficulties, because of the severe requirements never before imposed on a Portland cement company. 2200 w. Eng Rec—March 1, 1902.

St. Louis.—See **Prospect Hill, Mo.**

Spain.—A New Spanish Portland Cement Works. Illustrated detailed description of new works in Spain, built by American engineers and equipped with American machinery, operated entirely by water power. 1800 w. Eng News—May 5, 1904.

A Gravity Cement Mill in the Pyrenees. G. M. Peek. A fully illustrated account of the construction and mechanical equipment of a mill driven by hydraulic power, and utilizing gravity in the movement of material. 3000 w. Engineering Magazine—Dec., 1904.

CENSUS.

See also **POPULATION.**

Hollerith Machine.—See **CALCULATING MACHINE.**

CENTRAL STATION.

See **ELECTRIC STATION; HEATING.**

CENTRIFUGAL FORCE.

Centrifugal Force and its Applications in General and Technical Mechanics (Die Zentrifugalkräfte und ihre Anwendung in der Kosmischen und Technischen Mechanik). Dr. Holzmüller. A summary of the laws governing the action of centrifugal force, considered both in relation to space in general, and in connection with the attraction of the earth. 3500 w. Zeitschr d Ver Deutscher Ing—Nov. 7, 1903.

Diagrams.—Centrifugal Force Diagrams. P. Muller. Gives diagrams constructed to obtain the rim tension per square inch for a given metal in one reading at any radius or speed, without having to resort to laborious calculations. 400 w. Am Mach—Nov. 28, 1901.

CENTRIFUGAL MACHINE.

See also **SUGAR.**

Centrifugal Machines and Their Uses. Bartholomew Viola. Describes the various styles of centrifugal machinery in use for the separating and refining of sugars, cream, and the like. Ill. 3500 w. Trans Am Soc of Mech Engrs, No. 0000—Dec., 1902.

British.—See **Electric Driving.**

Electric Driving.—The Driving of Centrifugal Machines. Illustrated description of an electrically-driven centrifugal made in Glasgow. 800 w. Engng—June 20, 1902.

An Electrically-Driven Centrifugal Machine. Illustrates and describes two different patterns of a new centrifugal machine of British make. 800 w. Engng—Dec. 19, 1902.

Glasgow Exhibition.—Centrifugals at the Glasgow Exhibition. Illustrated description of sugar-making machinery with Pelton wheel drive. 2200 w. Engng—May 17, 1901.

CENTRIFUGAL PUMP.

See **PUMP—Centrifugal.**

"CENTIFRUGAL RAILWAY."

A "Centrifugal" Railway for Pleasure Resorts.

M. F. Brown. A brief illustrated description of a railway built at Rivers Beach, Mass. 1000 w. Eng News—Nov. 15, 1900.

CERAMICS.

Architecture.—Ceramics versus Stone in Architecture. Reprint of an article from "La Ceramique," concerning the employment of ceramics, and the reasons why they are not popular with architects. 1400 w. Stone—Aug., 1901.

CERIUM.

See **ELECTRO-CHEMISTRY; INCANDESCENT GAS LIGHTING; NERNST LAMP.**

CESSPOOL.

Knobloch.—See **SEWAGE DISPOSAL.**

CEUTA.

See **GIBRALTAR.**

CHAIN.

Crane.—See **CRANE—Anchors.**

Development.—The Evolution of the Chain. J. Hartley Wicksteed. Traces its history from the earliest times, discussing its modern developments. Fully illustrated. 6000 w. Page's Mag—Feb., 1904.

Electric Welding.—Chain-Making by Electric Welding. Andris-Jochams. Illustrated description of the method of making chain by the Giraud process, stating the advantages of electric welding, and giving information regarding cost and quality. 3000 w. Ir Age—July 13, 1905.

Gear.—See **CHAIN GEAR.**

Hoisting Cage.—See **HOISTING—Cage Chain.**

Locke.—The Locke Steel Chain. Illustrated description of this automatic machine made chain, noting the operations, and commending the product. 1200 w. Engng—Aug. 22, 1902.

Manufacture.—Chains and Their Manufacture. An illustrated article discussing the various types and their manufacture. 3600 w. Ir Age—July 3, 1902.

Making Fifty-Ton Anchor Chains. Brief illustrated description of the manufacture of these chains at Lebanon, Pa. 700 w. Sci Am Sup—July 12, 1902.

Chain Making. Illustrates and describes the methods used by the American Chain Cable Works, of Troy, New York. 1700 w. Sci Am—Dec. 12, 1903.

The Manufacture of Chains. L. B. Powell. Illustrated description of the manufacture of machine-made, and of hand-made chains, the testing, wear, &c. 4500 w. Ir Age—Jan. 5, 1905.

A New Belgian Process of Manufacturing Weldless Chains. Emile Guarini. Illustrates and describes a process of annular rolling, due to M. Massin. 1300 w. Sci Am Sup—March 11, 1905.

The Manufacture of Chain Cables. L. B. Powell. Gives extract from the lighthouse board requirements for chain, showing what must be secured in the way of iron, and describes the forming of the selected material into chains. 3000 w. Marine Rev—Sept. 7, 1905.

Modern Methods of Manufacturing Welded Chain. Leslie B. Powell. Describes the old method of manufacture and the present method, illustrating the three important labor-saving machines used. 1700 w. Am Mach—Vol. 28, No. 19.

See also **CHAIN MACHINE; MACHINE TOOL—Roll Grooving.**

Renold.—See **CHAIN GEAR.**

Roller.—See **CHAIN GEAR.**

Stresses.—Stress in Chain Links. G. A. Goodenough. Gives results of an analytical investigation of the stresses in oval links, outlining the method used. 1800 w. Technograph, No. 16—1901-2.

Testing Machine.—See **TESTING MACHINE—Anchors and Chains.**

Weldless.—Weldness Chain (Nahtlose Ketten). O. Klatte. Describing processes for making weldless chain by rolling and forming machinery. Two articles. 4000 w. Stahl u Eisen—Nov. 15, Dec. 1, 1904.

West Point.—Construction of the West Point Chain. E. P. Buffet. An account of the chain stretched across the Hudson River by the American Army during the Revolutionary War, giving authentic records in regard to its manufacture. 2500 w. Am Mach—April 21, 1904.

CHAIN BOAT.

See **CANAL HAULAGE; STEAMBOAT—Chain Towing.**

CHAIN GEAR.

Chains and Chain Gearing. Charles Piez. Concerning the use and treatment of chains, with illustrated description of the principle of chain gearing with the ordinary types of chain, design, &c. 3500 w. Pro Engrs' Club of Phila—April, 1901.

Chain and Chain Gearing. Charles Piez. Illustrated discussion of the principle of chain gearing, the care needed, etc. 2200 w. Am Mfr—May 30, 1901.

Some Recent Developments in Chain Driving. C. R. Garrard. Read before the Glasgow Congress. States the requirements for chain driving or transmission, discussing the elements of durability, efficiency, etc. Ill. 3000 w. Auto Jour—Oct., 1901.

Renold.—A Silent Chain Gear. J. O. Nixon. States the objections to chain gearing, and gives an illustrated description of the chain gear developed by Hans Renold, of Manchester, Eng., stating its advantages. 2500 w. Trans Am Soc of Mech Engrs, No. 919—Dec., 1901.

The Renold Silent Chain Gear. J. O. Nixon. An illustrated detailed discussion of a gear that may be run at high speeds, with no noise, for the transmission of any amount of power. 3500 w. Jour Fr Inst—May, 1902.

The Renold Silent Chain in Connection with Machine and Structural Tools. J. O. Nixon. An illustrated article setting forth the advantages of these chains. 1200 w. Mach, N Y—Dec., 1902.

Roller.—Roller Chain Power Transmission and Construction of Sprockets. A. Eugene Michel. Information in regard to recent roller chains and the pitch line clearances of their sprockets. Ills. 2000 w. Mach, N. Y.—Feb., 1905.

CHAIN MACHINE.

Riveter.—See **MACHINE TOOL—Roll Grooving.**

Spuhl.—The Spuhl New Chain Making Machine. Illustrated description of a machine, which will bend and weld effectively with report of tests as to the tensile strength of chains made. 1200 w. Ir Age—May 22, 1902.

Strathern.—The Strathern Weldless Chain Manufacture. An illustrated description of the machine and process of manufacture. 3000 w. Prac Engr—May 23, 1902.

CHAIN TOWING.

See **CANAL HAULAGE; FERRY—Chain Towing; STEAMBOAT—Chain Towing.**

CHAIR.

Motor.—The New Motor Chair. Illustration with description of an attractive vehicle for carrying one or two persons in comfort. A novelty shown at the British Auto Ex. 900 w. Sci Am—June 13, 1903.

CHANDELIER.

Improvement of the Chandelier for Gas and Electric Lighting. A. Hallard. An illustrated article describing the "Surprise pendant," a chandelier especially designed by an English firm for the incandescent burner, which can be used at any height. 1500 w. Archt Rec—Aug., 1903.

CHANNELLING MACHINE.

Oil-Way.—Oil-Way Channelling Machine. Illustrated with description of a machine for cutting the oil channels in journal brasses. 700 w. Engng—July 4, 1902.

CHARCOAL.

See also **BLAST FURNACE—Charcoal.**

The Manufacture and Properties of Charcoal. S. H. Stupakoff. Considers the methods in vogue for making charcoal, its uses, properties, and characteristics. 2500 w. Ir Age—Aug. 31, 1905.

By-Products.—By-Products from Charcoal. Frank H. Mason. The products from various woods and how they are obtained and marketed. From the U S Cons Repts. 3500 w. Mines & Min—July, 1901.

See also **GAS, WOOD.**

Cooling.—A New Charcoal Cooling Process. Bernard Zwillinger. A description of a process of cooling the gases which are produced during the distillation of wood under exclusion of air and then passing them through the charcoal. 4300 w. Ir Age—June 11, 1903.

Lancashire.—Charcoal Burning in the Lake District. Details of the business as carried on in the Furness district of Lancashire, England. 2200 w. Engng—Sept. 26, 1902.

Retort Plant.—A New Charcoal Retort Plant. Ernst A. Sjöstedt. Illustrates and describes the plant of the Algoma Steel Co., at Sault Ste. Marie, Ont. 2000 w. Ir Age—Jan. 28, 1904.

Ural, Russia.—Charcoal Fuel in the Ural (Holzkohlensorten im Ural). Ed. Juon. An account of the varieties of charcoal made in the iron districts of the Urals, furnishing practically the entire fuel for the Russian blast furnaces. 4000 w. Stahl u Eisen—Nov. 1, 1904.

CHARGING MACHINE.

See also **MECHANICAL HANDLING—Steel Works; OPEN HEARTH PROCESS.**

Recent Electric Charging Appliances for Open-Hearth Furnaces (Ueber Neuere Elektrisch Betriebene Beschickungsvorrichtungen für Herdöfen). Oskar Simmersbach. An illustrated review of some American, German and other electric charging apparatus for open-hearth furnaces. 2500 w. Stahl u Eisen—July 15, 1903.

Improved Machinery for Charging Open Hearth Furnaces (Neuere Chargiermaschine zur Beschikkung der Herdöfen in Hüttenwerken). W. Küppers. Describing improved electrically operated machines designed in Germany for operating in connection with overhead travelling cranes. 2500 w. Elektrotech Zeitschr—Dec. 3, 1903.

Improved Electric Charging Machine (Elektrisch Betriebene Block-Einsetzmaschine). Illustrated description of a traveling machine for placing ingots in reheating furnaces. 2000 w. Stahl u Eisen—June 1, 1904.

Crane.—See **CRANE—Furnace Charging.**

Gas Retorts.—See **GAS RETORT—Charging.**

Wellman.—Wellman Electric Charging Machine for Open Hearth Furnaces (Chargeuse Electrique, Système Wellmann pour Fours Siemens-Martin). An illustrated description of these machines for charging steel furnaces mechanically. 1500 w. Génie Civil—Feb. 15, 1902.

Notes on Cranes. The Wellman Furnace Charging Machine. A. D. Williams. Illustrates and describes types of Wellman machines. 800 w. Am Mach—Vol. 28, No. 5.

CHART.

See also **GRAPHICS.**

Machine Design.—See **MACHINE DESIGN—Charts.**

CHEMICAL ENGINEER.

See **CHEMISTRY; ENGINEER—Chemical.**

CHEMICAL INDUSTRIES.

Engineering in the Chemical Industries. R. H. Thurston. On the value of a knowledge of chemistry in connection with mechanical engineering. 7200 w. Sib Jour of Engng—Feb., 1902.

Spain.—See **METALLURGY.**

CHEMISTRY.

See also **ANALYSIS.**

Chemistry in Its Relations to Engineering. Frank Clowes. Abstract of the "James Forrest" lecture delivered before the Inst. of Civ. Engrs. Shows the advantages engineers have derived from chemical coadjutors, illustrating by instances from various fields. 3000 w. Engr, Lond—April 26, 1901.

Education.—See **EDUCATION—Chemist.**

Engineering.—Engineering and Chemistry (Ingenieur wissenschaft und Chemie). Dr. W. Ostwald. An address delivered at the München meeting of the Verein Deutscher Ingenieure, showing the extent to which the work of the engineer and the chemical technologist harmonizes. 4000 w. Zeitschr d Ver Deutscher Ing—Aug. 29, 1903.

Engine Room.—Engine Room Chemistry.—Introductory. Augustus H. Gill. The first of a series of articles aiming to make engineers somewhat familiar with the substances with which they deal, as fuel, water and oil, and some points in connection with their use. Serial. 1st part. 3000 w. Power—May, 1905.

Foundry.—See **FOUNDRY—Chemistry.**

Gas Works.—A Brief Outline of Gas-Works Chemistry. H. B. Harrop. Read at meeting of Wis. Gas Assn. An outline of a desirable course, intended to give practical help to gas-workers. 12500 w. Pro Age—April 1, 1904.
See also **GAS MANUFACTURE.**

Reaction Heat.—The Forecast of Chemical Reactions from the Algebraic Signs of the Quantities of Heat Liberated. H. Le Chatelier. A study of the connection existing between chemical and calorific phenomena. 2000 w. Trans Am Inst of Min Engrs—April, 1901.

St. Louis Address.—Some American Contributions to Technical Chemistry. Marcus Benjamin. An address delivered before the Congress of Arts and Sciences, St. Louis. A review of the discoveries of American chemists, including many advances in metallurgy. 5700 w. Sci Am Sup—July 29, 1905.

CHICAGO.

Early Engineering in Chicago. Reminiscences by Messrs. Morehouse, L. E. Cooley, Liljencrantz, J. F. Foster and Sedden. 7500 w. Jour W Soc of Engrs—June, 1902.

CHILE.

The Industrial Future of Chile in Connection with the Panama Canal. G. Fred. Collins. A fully illustrated description of the country, its resources, development, and engineering opportunities. 3000 w. Engineering Magazine—April, 1904.

CHIMNEY.

See also **BOILER PLANT; DRAFT; ELECTRIC STATION; MECHANICAL DRAFT; POWER PLANT.**

Chimneys. George A. Orrok. How to determine height and calculate draft; methods of construction are discussed. 2000 w. Power—Jan., 1902.

Chimney Shafts. An illustrated article discussing the repair, straightening, raising and felling of chimneys. 2200 w. Public Works—April, 1905.

Action.—Chimney Action. W. H. Booth. Discusses the efficiency of chimneys, their working, draught, etc. 3000 w. Elec Rev, Lond—Oct. 14, 1904.

Anaconda.—See **COPPER METALLURGY.**

Bellevue, Mich.—A 182-ft. Chimney of Reinforced Concrete at Bellevue, Mich. Illustrates and describes a structure having interesting features. 900 w. Eng News—Dec. 29, 1904.

Boston Elevated Ry.—The Boston Elevated Railway's Chimney at Lincoln Wharf. Illustrated description of a 251-ft. brick stack having new details at the flues. 500 w. Eng Rec—Dec. 22, 1900.

Bottom Cone.—See **Steel.**

Brick.—See **Factory.**

Building and Repairing.—The Building and Repairing of Tall Chimneys. Illustrates and describes methods of accomplishing difficult work. 1200 w. Sci Am—Jan. 12, 1901.

Camden, N. J.—Notes on the Construction of a Factory Chimney. Wendell Hubbard. Illustrated notes on the erection of a chimney at Camden, N. J. 1200 w. Pro Engrs' Club of Phila—July, 1901.

Concrete.—High Concrete Chimney for the Pacific Electric Ry. Illustrated description of a chimney at Los Angeles, Cal., 180 ft. high, built of armored concrete. 1600 w. Ry & Engng Rev—March 14, 1903.

Concrete Reinforced.—A Concrete Chimney. Ralph C. Davison. Ilustrated description of a chimney built at Elizabethport, N. J., for the Singer Mfr. Co. It is of the Ransom cold-twisted iron construction, 125 ft. high, with a 9-foot flue. 1000 w. Sci Am—May 18, 1901.

A 108-Foot Concrete Steel Chimney. Illustrates and describes a chimney built in Jersey City, according to the Ransome system, which employs cold-twisted square steel bars to reinforce the concrete. 1400 w. Eng Rec—Nov. 30, 1901.

Concrete-Steel Chimney for the Pacific Electric Ry. Co., Los Angeles, Cal. Jas. D. Schuyler. Illustrated description of a notable piece of concrete construction, the erection, materials and method of working. 1700 w. Eng News—April 2, 1903.

A 165-Foot Concrete Chimney. James D. Schuyler. Illustrates and describes the construction of concrete-steel stacks in Los Angeles, Cal., and in New Jersey and Indiana. 2800 w. Eng Rec—April 11, 1903.

A Concrete-Steel Chimney Reinforced with T-Bars. Illustrates and describes a recently completed chimney at Zeigler, Ill., 154 feet 10 inches high, with an inside diameter of 6 feet. 800 w. Eng Rec—May 21, 1904.
See also **Bellevue, Mich.**; **Steel and Concrete.**

Constable Hook, N. J.—A 360-Foot Single-Shell Chimney. Illustrated description of a stack 360 ft. high and 10 to 20 ft. in diameter inside, built of radial perforated brick for the Oxford Copper Co., at Bergen Point, N. J. 700 w. Eng Rec—Jan. 26, 1901.

Construction.—The Building of a 255-Foot Chimney. J. W. Buzzell. Gives an illustrated general description of the chimney, the methods of construction, methods of testing materials, and of supplying stock to the masons, etc. 3500 w. Engr, U S A—May 15, 1904.

Tall Chimney Construction. Discusses problems in connection with the design and construction of tall chimneys. Illus. 2800 w. Builder—April 8, 1905.

Demolition.—The Demolition of a 150-Ft. Brick Chimney by Dynamite. W. J. Douglas. An illustrated account of the means recently adopted at Washington, D. C., to demolish a brick chimney, with approximate cost of the work. 1000 w. Eng News—Dec. 4, 1902.

Chimney Notes. William Wallace Christie. Illustrated description of the tearing down of a large chimney in Paterson, N. J., and considers various features of brick chimneys. 1500 w. R R Gaz—Feb 13, 1903.

Design.—Chimney Design. Charles L. Hubbard. Reviews methods of determining the dimensions of chimneys. Ill. 1800 w. Engr, U S A—April 1, 1902.

The Statical Computations for the Stability of a Chimney (Beiträge zur Statischen Untersuchung von Schornsteinen). A mathematical investigation of the stability of masonry chimneys by M. Preuss and G. Lang, discussing the accuracy of the formula of Müller-Breslau, and the tables based upon it. 1500 w. Zeitschr d Ver Deutscher Ing—Aug. 30, 1902.

Chimneys. Charles L. Hubbard. Some points on the determining of the height, form and size of chimneys. 1800 w. Am Elect'n—March, 1904.

Chimneys. F. H. Davies. Discusses the questions that must be studied in properly designing chimneys. 1700 w. Elec Engr, Lond—March 10, 1905.

Statical Computations for Chimneys (Zur Statischen Untersuchung von Schornsteinen). Frans Heckelbacher. A brief examination of the conditions of stability for masonry chimneys of round and square section; with a graphical diagram enabling the proportions to be scaled off directly. 2000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Nov. 25, 1905.

Efficiency.—See **BOILER—Horse Power.**

Erection.—See **Steel.**

Factory.—The Design and Construction of Factory Chimneys. Francis Schumann. Considers only brick chimneys, discussing the form and dimensions of flue, construction, stability, design, etc. Ill. and general discussion. 6500 w. Pro Engrs' Club of Phila—July, 1901.

Brick Factory Chimneys: Some Features of Their Construction. William Wallace Christie. Read at meeting of the New England Cotton Mfrs. Assn. Discusses points in design and construction, materials, etc. 2500 w. Engr, U S A—July 15, 1902.

Germany.—The Construction and Dimensions of Chimneys for Boiler Plants. Abstract of article by G. Lang, in "Zeitschrift d. Ver Deutscher Ing." Part I. gives rules for determining the height and diameter and thickness of a stack, and explains German practice concerning materials. Serial. 1st part. 3600 w. Eng Rec—July 20, 1901.

Horse-Power.—The Horse Power of a Chimney. W. H. Wakeman. Considers only natural draft, and explains how to calculate the horse power. 1500 w. Elec, N Y—Jan. 15, 1902.

Los Angeles.—See **Concrete; Concrete Reinforced.**

Newark, N. J.—The New Stack of the Prudential Building, Newark, N. J. Illustrated description of a chimney 231-ft. high, built independent of but closely adjacent to a tall office building. 900 w. Eng Rec—Dec. 14, 1901.

The Photobiography of a Chimney. Edgar Mels. Illustrated description of the second largest chimney in America, built at Newark, N. J. 800 w. Sci Am—Dec. 2, 1905.

New York Interborough.—Chimneys of the Interborough Rapid Transit Power House, New York City. Walter Kelsey. Illustrated detailed description of the plan of the six chimneys. 1400 w. Engr, U S A—Nov. 1, 1904.

Photobiography.—See **Newark, N. J.**

Power Stations.—Brick Chimneys for Power Stations. William D. Ennis. Discussion of the design and construction. Ill. 2500 w. Am Elect'n—Dec., 1901.

Prudential Building.—See **Newark, N. J.**

Smoky.—Smoky Chimneys. Hastwell Grayson. Reviews the principles of flues, and the causes of smoky chimneys. 2800 w. Jour Ry Inst of Brit Archts—March 19, 1904.
See also **SMOKE PREVENTION.**

Stability.—Stability of a Tall Chimney. Carl Hays. An examination of the stability of a chimney erected at Urbana, Ill., and its maximum pressure on the masonry and on the soil. 1000 w. Technograph, No. 15—1900-1901.

Steel.—Construction of a Steel Chimney. A. H. Neureuther. An illustrated description of the construction of a stack erected in Peru, Ill. 1800 w. Technograph, No. 15—1900-1901.

Novel Method of Erecting a Steel Stack. Illustrates and describes a method employed in erecting a stack at West Albany, N. Y., by which the entire stack was raised at one time. 700 w. Ir Age—July 21, 1902.

Self-Supporting Steel Stacks. R. E. Newton. Gives formulae for rivet spacing and for solving the strains in the anchor rods. 1000 w. Eng Rec—June 6, 1903.

Steel Chimneys and Their Construction. E. C. Sherman. Briefly explains the object of chimneys and how to compute the height and area, and gives particulars in regard to guyed and self-supporting steel chimneys. Ills. 1800 w. Engr, U S A—Sept. 1, 1904.

Development of Bottom Cone for Stack. T. J. M'Dermott. Drawings and description of a successful scheme for a steel stack. 250 w. Boiler Maker—June, 1905.

The Design of Self-Supporting Steel Chimneys. John D. Adams. Considers the thickness of plates, the foundation, anchor-bolts, and tapering stocks. 2500 w. Eng News—July 20, 1905.

Steel and Concrete.—Some Interesting Features of Recent Chimney Construction. Illustrates and describes three large chimneys of steel, each of which has interesting features, and also a concrete steel chimney. 3500 w. Eng News—Dec. 19, 1901.

Wind Pressure.—See **WIND PRESSURE.**

CHIMNEY DRAFT.

See also **COMBUSTION; DAMPER; DRAFT; MECHANICAL DRAFT.**

Gas Manufacture. — See **GAS MANUFACTURE — Chimney Draft.**

CHIMNEY GAS.

Analysis.—See **BOILER TEST; GAS ANALYSIS.**

CHINA.

See also **COAL REGION; RAILWAY.**

Up-to-Date Chinese Engineering. L. F. Bellinger. Photographs taken by Prof. G. D. Brill, with brief descriptions. 1700 w. Eng News—June 19, 1902.

Notes on China (Notes sur la Chine). F. Sibel. An illustrated account of navigation on the Yang-tse-Kiang, and of building and other industries in China. Serial. 3 parts. 5500 w. Rev Technique—May 25, June 10 and 25, 1903.

Anti-Foreign Agitation in China. Editorial discussion of the boycott of American goods and other matters affecting Chinese trade. 2700 w. Eng'ng—Dec. 22, 1905.

CHLORINATION.

See **GOLD METALLURGY.**

CHLORINE.

Castner Process.—See **ELECTRO-CHEMISTRY.**

McDonald Cell. — See **ELECTRO-CHEMISTRY — Chlorine.**

CHROMITE.

Chromite or Chromic Iron Ore. Joseph Hyde Pratt. Information concerning chromium, its uses, its source, alloys, etc., where deposits are found, cost, etc. 2800 w. Am Mfr—Nov. 21, 1901.

CHRONOGRAPH.

See also **CHRONOMETER; CLOCK.**

Apparatus for Determining the Sensitiveness of the Chronograph (Ueber einen Apparat zur Empfindlichkeitsbestimmung des Chronographen). R. F. Pozdena. The time intervals are magnified mechanically, and the indications of the chronograph under test are recorded electrically upon the same plate for comparison. 2000 w. Elektrotech Zeitschr—Oct. 9, 1902.

Automobile Race.—The Auto-Chronograph. Illustrates and describes an apparatus devised by M. Maurice Espagnent for the precise measurement of speed. 1600 w. Auto Topics—Nov. 22, 1902.

The Auto-Chronograph: A New Electric Timing Apparatus for Automobiles. Translated from an article by Maurice Espagnent, in "La Locomotion." Illustrates and describes the apparatus, stating its advantages. 1800 w. Sci Am Sup—Jan. 24, 1903.

New Electric Chronometer for Timing Automobiles. Illustrates and describes an ingenious electric apparatus and its operation. 900 w. Sci Am—April 23, 1904.

A Mors Electric Device for Timing Automobiles. B. F. Hirshaur. Illustrated description of a new electric chronometer. 2200 w. Elec Rev, N Y—Nov. 26, 1904.

Coasting, St. Moritz.—Electric Timing Arrangement on the "Cresta" at St. Moritz. An illustrated description of the apparatus for timing the racing on this celebrated coasting course or toboggan run in Switzerland. 1100 w. Elec Rev, Lond—April 1, 1904.

Electric.—A New Electro-Chronograph. David Owen. Brief, illustrated description. 900 w. Elect'n, Lond—Sept. 30, 1904.

See also **Automobile Race; Coasting.**

Sounding.—See **SOUNDING.**

CHRONOMETER.

See also **CLOCK; NAVIGATION.**

Correcting.—A Practical Method of Correcting the Secondary Error of Chronometers (Procédé Pratique pour la Correction de Erreur Secondaire des Chronometres). C. E. Guillaume. Showing that the very slight expansibility of certain nickel-steel alloys makes it suitable for balance springs for chronometers. 1000 w. Comptes Rendus—May 6, 1901.

Electric.—See **CHRONOGRAPH.**

Longitude Determination.—See **LONGITUDE—Chronometer.**

Magnetism.—See **MAGNETISM—Chronometer.**

CHRONOPHOTOGRAPHY.

See **KINEMATOGRAPH.**

CHUCK.

Bench Lathe.—Bench Lathe Chucks and Attachments for Operating Them. Jos. M. Stabel. Illustrates and describes several chucks, and the devices for operating them. 900 w. Am Mach—May 7, 1903.

Milling.—See **MILLING CHUCK.**

CHURCH.

See also **CATHEDRAL.**

Steel Frame.—A Steel-Frame Church. Illustrated description of a 150 x 98-ft. stone and brick building with steel framework and roof. The vaulted ceiling of the nave rises 60 ft. above the floor, and there is a tower rising to a height of 125 ft. 1600 w. Eng Rec—Dec. 14, 1901.

Trinity Foundation, N. Y.—See **FOUNDATION—Trinity Church.**

U. S. Naval Academy.—See **CONCRETE REINFORCED—Chapel.**

CINNABAR.

Texas.—See **MERCURY.**

CIRCUIT BREAKER.

See **ELECTRIC PROTECTIVE APPARATUS.**

CIRCULAR SAW.

See **SAW.**

CISTERN.

See also **STANDPIPE; TANK; WATER TOWER; WATERWORKS.**

Allegheny.—A 75,000 Gallon Concrete Steel Cistern. Edward Godfrey. Illustrated description of a cistern, to be used for fire protection, built at Allegheny, Pa. 1200 w. Eng News—Sept. 28, 1905.

CITY PLAN.

See also **LANDSCAPE ARCHITECTURE; MUNICIPAL IMPROVEMENT; MUNICIPAL ART.**

The Construction of Towns. Prof. L. Cloquet. Deals with the planning of a town, the street design, and the public places. Plans. Serial. 1st part. 3000 w. Engng Rev—Dec., 1904.

Vienna.—Behsel's Plan of Vienna (Der Behsel'sche Plan von Wien). S. Wellisch. An examination of the map of Vienna made in 1824, compared with existing landmarks. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 16, 1900.

Washington, D. C.—The Monumental Grouping of Government Buildings in Washington, D. C. Extracts from a paper by E. V. Seeler, before the A. I. A., on the l'Enfant plan for the development of Washington, and the unfortunate departure from it. 2800 w. Eng Rec—Dec. 22, 1900.

See also **BRIDGE; LANDSCAPE ARCHITECTURE; MUNICIPAL ART.**

CIVIL ENGINEER.

See also **ENGINEER; MUNICIPAL ENGINEERING.**

Small Cities.—The Civil Engineer and His Work in Small Cities. J. S. Humphrey. Considers the varied demands made upon a city civil engineer. 2500 w. Pro Indiana Engng Soc—1903.

CIVIL ENGINEERING.

Mr. L. F. Vernon-Harcourt on the Profession of Civil Engineering. Review of an article that appeared in the "National Review." 2000 w. Jour Gas Lgt—Dec. 4, 1900.

Address.—Presidential Address before the Institution of Civil Engineers. John Clarke Hawkshaw. Also editorial. Considers docks, timber, coal, water, power, etc. Serial. 1st part. 6000 w. Engng—Nov. 7, 1902.

Electric Engineering, Relation.—See **ELECTRIC ENGINEERING.**

Field Construction.—Field Construction in Civil Engineering. Frank W. Skinner. Reviews what has been accomplished in the last quarter of a century in advance of previous practice. 3500 w. Eng Rec—Jan. 3, 1903.

Legal Regulations.—Civil Engineering Practice: Shall It Be Regulated by Law? Informal discussion at the annual convention, June 26, 1901. 5800 w. Pro Am Soc of Civ Engrs—Aug., 1901.

Nineteenth Century.—Civil Engineering. Editorial review of the nineteenth century work in this field, and noting the more prominent results. 4600 w. Engr, Lond—Jan. 4, 1901.

A Century of Civil Engineering. J. James R. Croes. Presidential address at the convention at Niagara Falls, N. Y., June 25, 1901. 7000 w. Am Soc of Civ Engrs, No. 897—June, 1901.

CLAY.

See also **BRICK; BRICK MANUFACTURE; CRUCIBLE—Clay.**

Clays and Their Properties. An editorial on the importance of the investigations carried on in the Division of Tests of the U. S. Dept. of Agriculture, summarizing the results, and showing the behavior of the material. 1300 w. Eng Rec—July 30, 1904.

Analysis.—See **Fire Test.**

Burning.—On the Role Played by Iron in the Burning of Clays. Prof. Edward Orton, Jr. An illustrated article giving the principal facts concerning the behavior of iron in clay burning. 2000 w. Brick—Jan. 1, 1904.

See also **BRICK MANUFACTURE.**

China.—See **Kaolin.**

Cohesion.—An Unrecorded Property of Clay. H. J. Camble. On the loss of its cohesive properties, if dried sufficiently to remove all its moisture. 1000 w. Can Soc of Civ Engrs—Adv Proof—Dec. 4, 1902.

Fire.—See **FIRE CLAY.**

Fusion Point.—Effect of Fineness of Grain on the Fusibility of Clay. Heinrich Ries. A brief report of experiments showing that the size of grain exerts a marked influence on the point of fusion. 700 w. Trans Am Inst Min Engrs—Feb., 1903.

Kaolin.—Kaolin, or China Clay.—J. H. Collins. Describes the deposits and methods of working. 2000 w. Eng & Min Jour—June 8, 1905.

Nova Scotia.—Potters' Clay at Middle Musquodoboit. F. H. Mason. Read before the Min Soc. of Nova Scotia. Describes the deposits and tests made. 1000 w. Can Min Rev—July 31, 1901.

Plasticity.—Researches upon the Plasticity of Clay. (Recherches sur la Plasticite des Argiles). B. Zschokke. An exhaustive study of clays, and their uses in the arts. 12000 w. Bull Soc d'Encour—Nov. 30, 1902.

Potters'.—See **Kaolin; Nova Scotia; South Carolina.**

South Carolina.—Clays Found in South Carolina. Earle Sloan. The present number considers the clay bodies of the potter's art, sedimentary kaolins, paper stock kaolin, and fire clay. Ills. Serial. 1st part. 2200 w. Brick—Dec., 1904.

Test.—The Testing of Clay. Prof. Edward Orton, Jr. Read before the Nat. Brick Mfrs.' Assn. Considers chemical testing and empiric testing. 8500 w. Brick—Feb., 1905.

Test, Fire.—Fire Test and Analysis of Clay. Dr. J. Ohly. Directions for testing to determine the valuation for the making of brick or similar material. 700 w. Min Rept—Feb. 16, 1905.

Useful Properties.—The Useful Properties of Clays. Allerton S. Cushman. The present article considers the formation of clays, and the kinds; their plasticity, binding power, tensile strength, slaking, and air shrinkage. Serial. 1st part. 3000 w. Brick—March, 1905.

CLOCK.

See also **CHRONOGRAPH; CHRONOMETER; TIME SIGNAL.**

Electric.—The Barr, Stout, and Becker Electric Clocks at the Glasgow Exhibition. Illustrated description of these clocks, fourteen of which are installed at the Glasgow exhibition. 1100 w. Engng—July 26, 1901.

Recent Types of Electric Clocks (De Quelques Types Récents d'Horloges Electriques). Paul L. Mercanton. Illustrated descriptions of Swiss clock wound or controlled electrically. 1500 w. Bull Tech d l Suisse Romande—May 10, 1903.

See also **CHRONOGRAPH.**

Electric, Hopkins.—An "Electric Earth Clock" and Its Construction. N. Monroe Hopkins. Brief review of progress made in time measuring devices, with an illustrated description of the electric clock designed by the writer. 2800 w. Sci Am Sup—Dec. 1, 1900.

Electric, Perret.—The David Perret Electric Clock. Emile Guarini. An illustrated description of a clock invented by a Swiss electrician. 1100 w. Sci Am Sup—May 30, 1903.

Philadelphia City Hall.—The Philadelphia City Hall Clock. Warren S. Johnson. Briefly explains the principles under which an accurate timepiece must work, and the problems encountered in the installation of the clock named, and the apparatus used. Ill. 5800 w. Jour Fr Inst—Feb., 1901.

Remontoir Clock.—A New Remontoir Clock. Illustrated description of a clock mechanism having new features of interest to the designers of fine machinery. 2800 w. Mach, N. Y.—Nov., 1901.

CLUTCH.

See also **AUTOMOBILE GEAR; MACHINE TOOL; SHAFTING.**

Clutches (Les Embrayages). M. Enverte. The first installment of an elaborate detailed treatise on clutches and couplings of all sorts. The present portion treats of classification. 5000 w. Revue de Mécanique—Nov. 30, 1901.

Automobile.—See **AUTOMOBILE GEAR.**

Bradley.—The Bradley Multiple-Disc Clutch. Illustrates and describes the improved friction-clutch invented by E. F. Bradley. Serial. 1st part. 2000 w. Auto Jour—March 11, 1905.

Cone.—A Little Talk on Cone Clutches. Rene M. Petard. Discusses this device, and also other types. 1200 w. Automobile—June 1, 1905.

Expanding.—Some New Expanding Clutches. Brief illustrated descriptions of the Dombret clutch, the Herisson clutch, the Gillet-Forest, and the Julien clutch. 2000 w. Mech Engr—Oct. 7, 1905.

Friction.—A New Friction Clutch. Thomas Henry Smith. Illustrates and describes the Phillips friction clutch. 1000 w. Eng News—June 6, 1901.

A New Form of Friction Clutch. Prof. H. S. Hele-Shaw. States the object of a friction clutch and the conditions involved, giving illustrated descriptions of various classes, and applications. 3700 w. Inst Mech Engrs—July, 1903.

An Improved Clutch (Sur un Nouvel Embrayage). M. Hérisson. Describing an improved form of friction clutch giving gradual engagement without excessive wear from sliding friction. 1000 w. Comptes Rendus—Feb. 6, 1905.

An Improved Clutch (Sur un Nouvel Embrayage). MM. de Guiche and Gillardoni. Describing a clutch consisting of a friction shoe acting upon the interior of a drum by means of a toggle link. 1000 w. Comptes Rendus—April 25, 1905.

A New Form of Friction Clutch. Emile Guarini. Illustrated description of the Hele-Shaw clutch and some of its applications. 800 w. Sci Am Sup—May 20, 1905.

The Friction Clutch. John Edgar. Considers only the expansion-ring frictions, explaining the theory of its action, and the design. 900 w. Am Mach—Vol. 28. No. 26.

See also **AUTOMOBILE GEAR.**

Hele-Shaw.—See **Friction.**

Magnetic Planer.—Magnetic Planer Clutch. Illustrates and describes a device invented by John Riddell which has been under test for about a year and given high satisfaction. 1000 w. Am Mach—May 2, 1901.

Multiple Disc.—See **BRADLEY.**

Reversing.—See **ROLLING MILL; WATER WHEEL—Replogle Governor.**

Teeth.—The Cutting of Clutch Teeth. Guido H. Marx. An illustrated description of methods of cutting the straight toothed and the saw toothed. 1500 w. Am Mach—July 2, 1903.

CLYDESIDE.

Clydeside Industrial Development. The first of a series of illustrated articles giving a general account of the most important of the many transferences of industries recently effected. Serial. 1st part. 2300 w. Engr, Lond—Jan. 2, 1903.

COAL.

See also **COAL INDUSTRY; COAL REGION;** etc.

Alabama.—Alabama Coal Mining. Neill Hutchings. Describes some general features of the developments in the Pratt Seam in the Birmingham District, Ala. 1800 w. Mines & Min—Jan.. 1902.

Preparation of Alabama Coal for Coke Making. L. O. Gabany. Abstract of a paper read before the Engng Assn. of the South. Describes the coal and the treatment needed. 1300 w. Eng & Min Jour—Oct. 27, 1904.

America.—Coals, Their Sources and Heating Values. John W. Langley. Concerning the origin, distribution in the United States, analyses of coals and cokes, and heating power. 1800 w. Engr, U S A—April 1, 1903.

Anthracite.—See also **BLAST FURNACE—Russian; COAL REGION.**

Anthracite Strength.—Compressive Strength of Anthracite Coal. Tabulated results of investigations made by a committee of the Scranton Engrs. Club. 1500 w. Mines & Min—March, 1903.

Bench Firing.—See **GAS MANUFACTURE.**

Brick Manufacture.—See **BRICK MANUFACTURE—Coal Fuel.**

British Columbia.—Coal in British Columbia. W. A. Harkins. Outlines the results accomplished at Coleman in less than a year, in these bituminous coal lands. 1700 w. Min & Sci Pr—Oct. 15, 1904.

Graham Island Coal. William Blakemore. This island is the most northerly of the Queen Charlotte group, on the nortwest coast of British Columbia. Gives information of these deposits and their value. 1200 w. Eng & Min Jour—Oct. 20, 1904.

British Navy.—See COAL INDUSTRY—British.

Briquette.—See BRIQUETTING—Coal Oberhausen, Germany.

Calorific Value.—See CALORIFIC VALUE.

Calorimetry.—See CALORIMETRY.

Canadian.—See COAL GEOLOGY—Canada.

Cannel Boghead.—Boghead Cannel. A copy of a report of this coal made in 1850 in regard to its value for the production of gas. 1500 w. Gas Wld—Oct. 17, 1903.

Cannel, Tasmania.—Kerosene Shale, or Cannel Coal Seams at Preolenna, Tasmania. Interesting details from the report of W. H. Twelvetrees. Map. 900 w. Ir & Coal Trds Rev—Oct. 2, 1903.

Cannel, U. S.—Cannel Coal in the United States. George H. Ashley. Considers the causes of failures of cannel coal, the importance of investigating the appearance, analysis, thickness, extent of the beds, and discusses the uses for which it it adapted. Serial. 1st part. 3800 w. Min Wld—July 29, 1905.

Car.—See CAR—Coal.

Chihuahua.—See COKE.

Chinese.—The Composition of Chinese Coals. M. Monod, in "Moniteur Industriel." Information concerning the coal-bearing strata, with analyses of samples collected during travels, showing that some of the coals can rival the best known fields. 1300 w. Col Guard—May 17, 1901.

Classification.—The Classification of Coals. Marius R. Campbell. Presents a scheme for accurately defining the various classes of coal, which ap- anthracite coals. 4000 w. Am Inst of Min Engrs plies to lignites as well as to bituminous and —Sept., 1905.

Composition.—The Coking and the Composition of Coal (Betrachtungen über das Backen und über die Bildung der Steinkohle). Prof. Ed. Donath. A discussion of the origin and composition of coal and of the theory of coking. Serial. 3 parts. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 11, 18, 25, 1902.

Crushing Strength.—The Crushing Strength of Coal. Prof. R. C. Carpenter. Investigations of importance in connection with mining operations, where columns of coal are often left to support the roof of the mine. 1200 w. Sib Jour of Engng—Dec., 1901.

Exhibition.—See COAL INDUSTRY—London Exhibition.

Gas Manufacture.—Influence of the Physical Condition of Coal on the Quality of the Products of Carbonization. M. Verdier. Read at the meeting of the Société Technique. Gives investigations, results, and conclusions. 1200 w. Jour Gas Lgt—Aug. 6, 1901.

Coals: Their Composition, Properties and Uses. W. Ivison Macadam. Lecture before the Irish Assn. of Gas Mgrs. Considers the formation, composition, calorific power, weight of gases and photometric tests. 3500 w. Gas Wld—Aug. 17, 1901.

Analytical Valuation of Gas Coals. Particulars from a paper by G. P. Lishman, read at London meeting of Inst. of Min. Engrs. Discusses the difficulties attending the testing of gas coal, and explaining the writer's system. 1700 w. Jour Gas Lgt—June 3, 1902.

The Analytical Valuation of Gas Coals. G. P. Lishman. Read before the Inst. of Min. Engrs. Also a critical editorial. Describes the apparatus in use at Lambton, the difficulties met and means used to remove them. Ill. 5000 w. Gas Wld—Oct. 4, 1902.

The Valuation of Gas Coals. A paper read before the N. of England Inst. of Min. & Mech. Engrs., with the chief portions of the discussion. 2500 w. Gas Wld—July 25, 1903.

The Analytical Valuation of Gas Coals. G. P. Lishman. Abstract of a paper submitted to the Inst. of Min. Engrs. Report of an investigation to determine the value. 2500 w. Gas Wld—June 4, 1904.

See also GAS MANUFACTURE—Coal Earnings.

Illinois.—The Coals of Illinois; Their Chemical Analysis and Calorific Value. S. W. Parr. A compilation of accumulated information arranged for reference. 1600 w. Technograph, No. 16—1901-2.

India.—Seebpore Coal. Frederick Grover. Information concerning a practical test made of this coal, pronouncing it satisfactory. 1500 w. Jour Soc of Arts—Sept. 4, 1903.

Kansas.—Kansas Coal Mining. W. R. Crane. An illustrated article describing the deposits, methods of prospecting and mining, and other details. 5800 w. Eng & Min Jour—Dec. 7, 1901.

Loaders.—See COAL HANDLING—Box Car Loaders.

Misuse.—The Misuse of Coal. W. Hibbert. Remarks on suggestions of Prof. Perry regarding the wastefulness of the steam engine and on the more efficient methods of utilizing the potential energy of coal, with review of a work on "Primary Batteries." 2200 w. Elec Rev, Lond—April 18, 1902.

Ohio.—The Economic Value of the Clarion Coal in Vinton and Jackson Counties, Ohio. N. W. Lord. Abstract of a paper read before the Ohio Inst. of Min. Engrs. Describes tests made of these coals, and gives results. 1400 w. Eng News—Aug. 22, 1901.

Origin.—See Composition; COAL GEOLOGY.

Petroleum, Compared.—See PETROLEUM—Coal, Compared.

Powdered.—See POWDERED COAL.

Rocky Mountains.—The Efficiency of Some Rocky Mountain Coals. W. H. Williams. Read before the Montana Soc. of Engrs. Describes tests made of these coals, and gives results. 1600 w. Jour Assn of Engng Socs—Dec., 1902.

Sampling.—See COAL ANALYSIS.

Seebpore.—See India.

Small Sizes.—Small Sizes Anthracite. Samuel Sanford. Information in regard to the rapid increase in the consumption of the small sizes, and the amounts recently recovered by the washeries. Serial. 1st part. 2200 w. Eng & Min Jour—Dec. 22, 1904.

The Economy of Small Size Coal for the Power Plant. Percival Robert Moses. A discussion of the conditions under which buckwheat coal and other low grade fuels can be advantageously used for steam making. 3500 w. Engineering Magaine—Feb., 1905.

Spontaneous Combustion.—Storage and Spontaneous Ignition of Coal. Herr Sohren. Abstract of a paper read before the German Gas Assn. Discusses the subject of spontaneous ignition, reviewing the early investigations and recent work, and giving Dr. Munk's recommendations. 1700 w. Gas Wld—April 13, 1901.

The Spontaneous Ignition of Coal. Alfred O. Doane. Discussion of the causes of, and remedies for, spontaneous ignition of coal. 1400 w. Eng News—Aug. 18, 1904.

The Reduction of Risk from Fires Caused by Spontaneous Combustion of Soft Coal. Advice from a bulletin of the Home Insurance Co., of New York, prepared by F. M. Griswold. 800 w. Eng News—Nov. 10, 1904.

See also COAL GEOLOGY—Origin.

Tasmania.—See Cannel.

Testing.—See also Rocky Mountains; CALORIMETRY; COAL ANALYSIS; FUEL TEST.

Testing Plant.—See FUEL TEST.

Uneconomic Use.—Coal; Its Uneconomic Use and Abuse. John Livingstone. Discusses its uneconomic use and abuse generally, by steam makers, but especially by the railways, and how to save 50 per cent. Also general discussion. 17000 w. Pro St. Louis Ry Club—Oct. 13, 1905.

Unloading.—See COAL HANDLING—Hoboken, D. L. & W.

Valuation.—The Valuation of Coals. E. L. Rhead. Read before the Manchester (Eng.) Soc. of Chem. Ind. Brief discussion of methods of determining the specific gravity, moisture, ash, coking power, volatile matter, sulphur, calorific power, etc. 4000 w. Ir & Coal Trds Rev—April 3, 1903.

See also CALORIFIC VALUE.

Weighing.—See LOCOMOTIVE OPERATION—Coal Consumption.

Welsh.—See COAL INDUSTRY—British.

COAL ANALYSIS.

See also CALORIFIC VALUE; COAL; FUEL TEST.

A Neglected Factor in Coal Analysis. S. W. Par. Shows the error in regarding the ash and moisture as the inert substance, and the volatile matter and fixed carbon as the true combustible, proposing a possible remedy. 900 w. Technograph, No. 18—1903-4.

The Technical Analysis of Mineral Coal. Dr. J. Ohly. Describes methods in making the determinations. 2000 w. Min Rept—April 6, 1905.

Coal Testing. Myles Brown. On the value of true sampling, the methods and articles required; the apparatus for the analysis of coal, estimation of moisture, etc. Serial. 1st part. 3000 w. Mines & Min—Nov., 1905.

Sampling, Analyses and Preparation of Coal. F. R. Wadleigh. Many practical points on the analysis and testing of coal, with tables of proximate and ultimate analyses. 3000 w. R. R. Gas—Vol. XXXVII, No. 11.

Arsenic.—Arsenic in Coal and Coke. Alfred C. Chapman, in "The Analyst." Describes the method adopted by the writer for the detection and estimation of arsenic. The method consists in the gentle ignition of the fuel with a mixture of magnesia and carbonate of soda. 1500 w. Ir & Coal Trds Rev—April 4, 1902.

Brown vs. Hard.—The Distinguishing Characteristics of Brown Coal and Hard Coal (Zur Unterscheidung von Braun- und Steinkohle). Ed. Donath and Hugo Ditz. A discussion of the chemical and physical difference of coals and methods of determining them. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 6, 1903.

California.—See FUEL TEST.

Gas.—The Determination of the Value of Gas Coals (Die Wertbestimmung der Gaskohlen). Dr. Bertelsmann. A comparison of various English and German coals with regards to their adaptability for the production of illuminating gas. 2000 w. Glückauf—Sept. 24, 1904.

Gas Manufacture.—See COAL.

Sulphur.—The Determination of Sulphur in Coal. Charles W. Stoddart. Abstract from the "Jour. Am. Chem. Soc." Gives details of the various methods used, describing the standard method. 2000 w. Eng & Min Jour—June 27, 1903.

West Virginia.—Analyses and Fuel Value of the Pittsburg Coal in the Fairmont Region of West Virginia. Frank Haas. Reprinted from W. Va. Geol. Survey. Shows the influence of different constituents upon the value of the coal. 3400 w. Mines & Min—Sept., 1903.

COAL BIN.

See also COAL CHUTE; COALING STATION; COAL STORAGE.

Atlantic City.—See Concrete Reinforced.

Concrete Reinforced.—The Building of a Concrete Coal Pocket. John M. Bruce. Illustrates and describes an interesting example of reinforced concrete construction at Bradford, R. I. 1500 w. Cement Age—March, 1905.

A Reinforced-Concrete Coal Pocket, Atlantic City Water Works. Kenneth Allen. Illustrates and describes a recently completed coal pocket of unique form, and the method of construction. 1200 w. Eng Rec—Sept. 16, 1905.

Formulae.—Some Formulas and Tables for Bin Designing. R. W. Dull. A summary of the principal formulas required, with tables of pressure-constants for several cases of bins or hoppers for anthracite, bituminous coal, ashes, and sand. 2500 w. Eng News—July 21, 1904.

Foundation, Boston. — See FOUNDATION — Coal Pocket.

Pocahontas Field.—Coal-Storage Bins in the Pocahontas Field. An illustrated description of some of the early types, their shortcomings and later improvements. 2000 w. Mines & Min—Nov., 1902.

COAL BREAKER.

See also COAL CRUSHER; COAL PREPARATION; COAL SCREENING; COAL WASHING.

Auchincloss.—The Auchincloss Breaker. George L. Carlisle, Jr. An illustrated description of the novel methods employed in construction, and in arrangement and driving of the machinery of this breaker at Nanticoke, Pa. 2800 w. Mines & Min—Sept., 1902.

Stockett, Mont.—A Bituminous-Coal Breaker. Lewis Stockett. Illustrates and describes the building and machinery directed at Stockett, Mont., giving results obtained. 1800 w. Trans Am Inst of Min Engrs—Feb., 1904.

COAL BRIQUETTE.

See BRIQUETTING.

COAL CHUTE.

See also COAL BIN; COAL HANDLING; COALING STATION; COAL STORAGE.

Hopper.—Laying Out a Hopper for a Coal Chute by the Method of Triangulation. George Gunts. Drawings and description of the method used. 1000 w. Boiler Maker—July, 1905.

Locomotive.—Coal Chutes for Locomotives. Illustrates and describes chutes used on the Baltimore & Ohio Railroad which are made to measure the coal delivered as accurately as it can be measured by volume. 1000 w. Am Engr & R R Jour—Feb., 1904.

Railway. — See Locomotive; ROUNDHOUSE — Oelwein.

COAL CONVEYOR.

Blackett.—See COAL HANDLING.

COAL CRUSHER.

See also COAL BREAKER; COKE MANUFACTURE—Compressed Fuel—CRUSHING.

Coal Crushers (Ueber Kohlenstampvorrichtungen). Describing improved coal crushers for use in connection with coking, briquetting, and the preparation of gas coals. 2000 w. Stahl und Eisen—Dec. 15, 1900.

COAL-CUTTING MACHINERY.

See COAL-MINING MACHINERY.

COAL DREDGING.

Illinois.—Dredging for Coal. An illustrated description of the method of mining in the Mission Field Coal Mine, Illinois, by the use of the steam shovel cableway. 1500 w. Mines & Min—Aug., 1901.

COAL DUST.

See also COAL MINE EXPLOSION; DUST; FIRE-DAMP; POWDERED COAL.

Briquetting.—See Separation; BRIQUETTING.

Explosion.—See COAL MINE EXPLOSION.

Removal.—Can Explosions in Coal Mines, with Their Associated Toxic Fatalities, Be Prevented? B. H. Thwaite. Read before the Inst. of Min. Engrs. Presents the arguments showing that a removal of the coal dust would greatly lessen the danger, and describes an apparatus for effecting its removal. 3500 w. Ir & Coal Trds Rev—Sept. 15, 1905.

Separation.—Separation of Dust from Coal. Explanatory drawings of two systems of recovering the very fine dust in a condition fit for firing, or briquette making. 1000 w. Ir & Coal Trds Rev—May 5, 1905.

Sprinkling.—Apparatus for Laying Coal Dust (Einrichtungen zur Unschädlichmachung des Kohlenstaubes). H. Winkhaus. An examination of the cost of installing sprinkling apparatus in the mines of the Cologne Mining Company at Altenessen. 2500 w. Glückauf—March 2, 1901.

The Watering of Mines. Discusses the theories of Prof. Galloway. S. T. Evans and J. T. Robson on the subject of water as a preventive of explosions. 3500 w. Col Guard—May 16, 1902.

Damping the Air of Coal Mines as a Safeguard Against Explosions. James Ashworth. Gives the recommendations of the Royal Commission, and discusses how far they have been carried out, and the results. Concludes that no means have yet been devised that protects with any degree of certainty. 3800 w. Ir & Coal Trds Rev—Sept. 26, 1902.

A Portable Tank for Watering Roadways in Mines. W. Galloway. Read before the South Wales Inst. of Engrs. Briefly describes various appliances that have been used, especially an invention of the writer's in which compressed air expels the water. Ill. 1600 w. Ir & Coal Trds Rev—Oct. 2, 1902.

The Spraying or Watering Problems of Dusty Mines. James Ashworth. Considers dangers connected with spraying, as shown by reports of various experiments and dust explosions. 4500 w. Mines & Min—Oct., 1903.

The Spraying or Watering Problems of Dusty Mines. James Ashworth. Dangers connected with spraying as shown by various experiments and dust explosions. 1800 w. Mines & Min—Feb., 1904.

Apparatus for Laying Dust in Coal-Mines. J. Cresswell-Roscamp. Abstract of a paper in Trans. Inst. of Min. Engrs, 1905. Illustrates and describes an improved watering car, and the treatment of coal-dust. 900 w. Eng & Min Jour—Aug. 26, 1905.

See also **COAL MINE—Pumping and Spraying.**

COAL-DUST FUEL.
See **POWDERED COAL.**

COAL FIELD.
See **COAL; COAL GEOLOGY; COAL INDUSTRY; COAL MINE; COAL REGION.**

COAL FLEET.
See**BARGE; COALING BARGE; COAL TRANSPORTATION.**

COAL GEOLOGY.
See also **COAL REGION; GEOLOGY—Mining.**

Mining Geology. G. J. Binns. Lecture delivered before the South Midland Branch of the Coal Managers' Assn. Discusses geology especially in its relation to coal fields. 6300 w. N Z Mines Rec—Dec. 16, 1901.

Belgium.—The Coal Districts of Northern Belgium (Das Nordbelgische Kohlenvorkommen). H. Mentel. A review of the geology of Northern Belgium, with a sketch map showing the location of coal deposits. 1800 w. 1 plate. Glückauf—Dec. 27, 1902.

The Coal Basin of Northern Belgium (Le Bassin Houiller du Nord de la Belgique). Paul Habets. A commercial and geological account of the district with map and sections. 12000 w. 3 plates. Mem Soc Ing. Civ de France—May, 1904.

Borings in the Coal and Iron Districts of Northern Belgium (Bohraufschlüsse von Kohlen und Blackband Lagerstätten im Nordbelgischen Kohlenbecken der Campine). B. Schulz-Briesen. With sections of the strata, and map showing the relation of the deposits to those of England and Germany. 2500 w. Glückauf—Jan. 14, 1905.
See also **MINERAL REGION.**

British.—See also **England; Scotland; Wales.**

Re-Survey of the Carboniferous Strata in Derbyshire and Nottinghamshire. From the "Summary of Progress of the Geol. Surv.," 1902. Describes the work of examining these coal measures. 4000 w. Ir & Coal Trds Rev—Sept. 11, 1903.

The Carboniferous Epoch and Its Flora. John Pringle. Read before the N. Wales Branch of the Nat. Assn. of Coal Mgrs. A sketch of the carboniferous formation of Great Britain, and its flora. 5500 w. Ir & Coal Trds Rev—July 1, 1904.

Carboniferous Flora of Britain. John Pringle. Read before the N. Wales branch of the Nat. Assn. of Colliery Engrs. Reviews the geology of Britain and gives information of interest concerning the coal plants. 5500 w. Aust Min Stand—Dec. 29, 1904.

British Columbia.—See **COAL REGION.**

Colorado.—The Book Cliff Coal Mines. Prof. Arthur Lakes. Illustrated description of coal seams near Grand Junction, Colorado, which exhibit interesting peculiarities in their locations and formations. 2500 w. Mines & Min—Jan., 1904.

The Spanish Peaks Coal Region in Southern Colorado. Arthur Lakes. An illustration of the effects of volcanic action on coal seams. Ill. 2000 w. Mines & Min—May, 1902.

The Coal Fields of Colorado. Describes the geology and the six important fields. Maps. 5600 w. Bul Colo Sch of Mines—Jan., 1904.

The Walsenburg Coal District of Colorado. R. C. Hills. Abstract of monograph published by the U. S. Geol. Survey. A description of the geology, the area and the different coal seams found. Ills. 2500 w.—Mines & Min.—Feb., 1904.

The Geology and Coal Deposits of the Spanish Peaks' District. A. Lakes. Illustrated description of these Southern coal fields of Colorado. 1500 w. Min Rept—Feb. 16, 1905.

Disturbances and Other Peculiarities of the Northeastern Coal Field of Colorado Between Ralston Creek and Boulder. A. Lakes. Illustrated description of the geology of these coal-fields, unusually complicated by folds and faults. 1800 w. Min Rept—March 30, 1905.

The Grand River Coal Field. A. Lakes. Describes this largest field in Colorado, which contains a greater variety of coals than any other in the State. Ills. 1300 w. Min Rept—April 13, 1905.

England, Kent.—Kent Coal. Report made by Mr. R. Etheridge, the consulting geologist to the consolidated Kent Collieries Corporation, Ltd., on the coal and coal-measure rocks being brought to the surface by the Kind-Chaudron, or new process, adopted for deep shaft and pit sinking. 2400 w. Col Guard—Nov. 27, 1903.

England, Midland.—The Search for Coal Beneath the Red Rocks of the Midland Counties. Wolcot Gibson. From the summary of progress of the Geological Survey for 1904. Gives the more important results obtained from the examination of several borings. 3800 w. Ir & Coal Trds Rev—Sept. 8, 1905.

The Search for Coal Beneath the Red Rocks of the Midland Counties. Wolcot Gibson. Gives important results obtained from the examination of several borings, with remarks of interest to mining engineers. Serial. 1st part. 1500 w. Col. Guard—Sept. 22, 1905.

England, Shropshire.—The Unconformity in the Coal Measures of the Shropshire Coalfields. William James Clarke. Illustrated description of the positions of the beds, with explanations regarding them. 3000 w. Col Guard—Feb. 22, 1901.

The Great East or Symon Fault of the Shropshire Coalfield. Explains the term and describes the Coalbrookdale Coalfield, discussing the effect of the Symon fault upon lower productive coal measures. 2700 w. Col Guard—April 29, 1904.

England, Somerset.—The Mid-Somerset Coalfield Problem. Gives map and description of the peculiar geological formation found here, discussing the methods for extracting the coal. 3500 w. Col Guard—March 14, 1902.

Overthrust Faults in the Somerset Coalfield. Abstract of paper by F. A. Steart, and of the discussion. Describes the disturbance and gives conclusions drawn from the study. 1500 w. Col Guard—May 30, 1902.

England.—See also **British; MINERAL REGION—Belgium.**

Faunal Studies.—Coal Measures Faunal Studies. J. W. Beede and Austin F. Rogers. The first of a series of papers giving lists of the faunas of the different horizons of the Coal Measures of Kansas and certain parts of western Missouri. Serial. 1st part. 5000 w. Kansas Univ Qr—Oct., 1900.

Fire Clays.—See **FIRE CLAY—Coal Measures.**

Flora.—See **British.**

Fossils.—Codonotheca, a New Type of Spore-Bearing Organ from the Coal Measures. E. H. Sellards. An illustrated description of a peculiar type of fructification. 4000 w. Am Jour of Sci—July, 1903.

See also **British; Faunal Studies.**

Grand Junction, Col.—See **Colorado.**

Iowa.—Character and Strategraphical Peculiarities of the Southwestern Iowa Coal Fields. Charles R. Keyes. Describes these deposits, giving analyses. 700 w. Eng & Min Jour—May 10, 1902.

Kent, Eng.—See **England.**

Midland, Eng.—See **England.**

New Mexico.—The Geology of the Cerrillos Hills, New Mexico. Douglas Wilson Johnson. Aims to give a fairly complete account of the geology of this district. Ill. Serial. 1st part. 16500 w. Sch of Mines Qr—April, 1903.

New South Wales.—See also **Splitting.**

New Zealand.—The Supposed Coal Seam on Kaita Range, Near Greymouth. Alexander McKay. Report of the government geologist concerning an outcrop of coal-conglomerate in New Zealand. 1400 w. N. Z. Mines Rec—Dec. 17, 1901.

Norton.—See **COAL REGION—Big Sandy..**

Nova Scotia.—On the Possible Occurrence of a Coal Area Beneath the Neo-Carboniferous or Permian Strata of Pictou County, Nova Scotia. Dr. H. M. Ami. An illustrated explanation of the geology of the district and reasons for supposing a new coal-field may be found. 2500 w. Can Min Rev—June 30, 1902.

Ohio.—Names for the Formations of the Ohio Coal Measures. Charles S. Prosser. Reviews the formations of Ohio, showing that their limits correspond to those of Pennsylvania, and proposing that the same names be used. 2500 w. Am Jour of Sci—March, 1901.

Origin.—The Origin of Coal. Reviews the theory set forth by Aubrey Strahan in a paper read at a meeting of the Geol. Soc. 1400 w. Engng—Aug. 23, 1901.

Some New Views on the Origin of Coal and Its Spontaneous Combustion, as well as on Firedamp Explosions (Einiges Neue über die Entstehung der Mineralkohlen und Ihre Selbstentzündung, sowie über die Schlagwetterexplosionen). F. Janda. A paleontological and chemical discussion. 5 parts. 10,000 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 13, 20, 27, July 4 and 11, 1903.

See also **COAL.**—Composition.

Outcrops.—Coal Outcrops. Continued discussion of Mr. Catlett's paper, presented at the Canadian meeting. 900 w. Trans Am Inst of Min Engs—April, 1901.

Permo-Carboniferous Boundary.—The Permo-Carboniferous Boundary and What We Learn About It from the Sealand and Thurgarton Boreholes. W. J. Clarke. Abstract of a paper read before the Chester Soc. of Nat. Science. On means of determining the dividing line between the permian and carboniferous formations. 1500 w. Col Guard—April 4, 1901.

Post Carboniferous.—Post-Carboniferous Coalfields. Calls attention to deposits belonging to more recent geological dates than the true carboniferous, and their economic importance. Ill. Serial. 1st part. 3500 w. Col Guard—Dec. 21, 1900.

Queensland.—Central District Coal Measures. Walter E. Cameron. A report of field work with the object of tracing the continuation of these coal measures towards the Mackay and Nebo districts. Map. Serial. 1st part. 3000 w. Queens Gov Min Jour—April 15, 1905.

Rhenish-Westphalia.—The Mountain Formations of the Rhenish-Wesphalian Coal District (Das Deckgebirge des Rheinisch-Westfälischen Carbons). H. Schulz-Briesen. A geological study of the mountains overlying the so-called Münster coal basin. 5000 w. 2 plates. Glückauf—Nov. 8, 1902.

Scotland.—The Carboniferous Limestone Coals of Scotland. R. W. Dron. Read before the Geol. Soc. of Glasgow. Descriptive. 2500 w. Col Guard—Jan. 18, 1901.

Scotland, West Lothian.—The Carboniferous Limestone Coal Fields of the West Lothian. Henry M. Cadell. Abstract of a paper read before the Glasgow Congress. Describes the seams and gives diagrams. 1200 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Shropshire, Eng.—See England.

Somerset, Eng.—See England.

Splitting.—On the Structure of Coal Fields. Thomas Parton. Read before the N. S. W. Chamber of Mines. Details on the structure of coal fields, with special reference to the splitting of seams. 5000 w. N Z Mines Rec—Dec. 16, 1903.

Transformation.—Hypothesis to Account for the Transformation of Vegetable Matter into the Different Grades of Coal. Marius R. Campbell. Gives a working hypothesis embodying the provisional conclusions of the writer, in explanation of the various grades found in different localities. Heat is considered the principal cause, affected by conditions. 3000 w. Ec Geol—Oct., 1905.

Trans-Mississippi.—Horizons of Arkansas and Indian Territory Coals Compared with those of Other Trans-Mississippian Coals. Charles R. Keyes. A geological study of these beds. Ill. 2000 w. Eng & Min Jour—June 1, 1901.

The Stratigraphical Location of Named Trans-Mississippian Coals. Charles R. Keyes. Gives the original localities. 1200 w. Eng & Min Jour—Aug. 17, 1901.

Wales.—The Coal Measures of Llanelly, Llannon, and Cross Hands, in the South Wales Coal Field. From the Memoirs of the Geol. Surv. 10000 w. Ir & Coal Trds Rev—Aug. 28, 1903.

The Coal Measures of the Valley of the Gwendraeth-farm in South Wales. T. C. Cantrill and E. E. L. Dixon. From the Genl. Surv. of the United Kingdom. An account of the veins and their working, faults, disturbances, etc. 4000 w. Ir & Coal Trds Rev—Nov. 4, 1904.

Geology of the South Wales Coal Field. Information from the recently published Geological Survey Memoir. 5200 w. Engng—June 23, 1905.

West Lothian.—See Scotland.

COAL HANDLING.

See also **CABLEWAY; COALING; COKE HANDLING; CONVEYOR; IRON ORE HANDLING; MECHANICAL HANDLING.**

Modern Coal Handling Machinery. Waldon Fawcett. Reviews the great development in this field during the last ten years. Ill. 2000 w. Am Mfr—Aug. 22, 1901.

Automatic Machinery for Handling Coal. Day Allen Willey. Illustrates and describes various forms of conveying machinery. 1200 w. Sci Am—July 4, 1903.

Modern Coal-Hoisting Apparatus. Frank C. Perkins. Illustrations with notes on examples of cranes, hoisting towers, engines and buckets. 1100 w. Sci Am Sup—July 30, 1904.

Modern Coal and Ore Handling Machinery. Henry S. Fleming. Illustrates and describes a few modern systems for the mechanical handling of materials. 2000 w. Min Mag—Dec., 1904.

Aerial Tramway.—See Cape Breton; Tug River; CABLEWAY.

America.—Modern Soft-Coal Mining and Handling in the United States. Henry Hale. Illustrated description of methods of mining and shipping. 1800 w. Sci Am—Dec. 15, 1900.

Anthracite.—Handling Anthracite Coal. Waldon Fawcett. Illustrates and describes the improved and economical methods now in use. 1900 w. Sci Am—Dec. 1, 1900.

Belt Conveyor.—Belt Coal Conveyors. Francis H. Davies. An illustrated article describing early and recent types. 2400 w. Elec Rev, Lond—Oct. 13, 1905.

Bethune, France.—Coal Loading Appliances at Bethune. A. da Cunha, in "La Nature." Illustrates and describes an installation for loading canal boats from the Marles Colliery. The coal is discharged by gravitation. 8000 w. Col Guard—Nov. 1, 1901.

Blackett Conveyor.—Mechanical Coal Conveying at the Face. Abstract of a paper by H. Palmer, "Jour. Brit. Soc. of Min. Students." Illustrated notes on the construction and management of an underground conveying system, patented by W. C. Blackett. 1300 w. Col Guard—April 7, 1905.

Mechanical Coal Conveying at the Face, with Especial Reference to the "Blackett" Conveyor and Its Work at Derwent Colliery, Co. Durham. Harry Palmer. From the "Jour. of the Brit. Soc. of Min. Students." Ills. 1800 w. Ir & Coal Trds Rev—March 17, 1905.

Boston, Edison. — Coal Handling and Storage. Charles H. Parker. Read before the Assn. of Edison Ill. Cos. An illustrated description of the apparatus installed at the South Boston Plant of the Edison Illuminating Company. 4500 w. Cent Sta—Nov., 1905.

Cape Breton.—Shipping Coal by the Aerial Wire Rope System at Port Morien, Cape Breton. Joseph G. S. Hudson. Describes the system installed and its very satisfactory working. 1800 w. Can Min Rev—March 31, 1901.

Shipping Coal by the Aerial Wire-Rope System at Port Morien, Cape Breton. Joseph G. S. Hudson. Abstract of a paper read before the Canadian Min. Inst. An illustrated description of the arrangements. 1000 w. Col Guard—Nov. 1, 1901.

Car Loaders.—Box-Car Loaders. William L. Affelder. Illustrated description of some of the early types and their development to those in use at the present time. 6000 w. Mines & Min—March, 1905.

Car Loader, Smith.—Machine for Loading Box Cars with Coal. Illustrated description of the tilting cradle, invented by S. Kedzie Smith, and its operation. 1700 w. Eng News—Aug. 3, 1905.

Charlottenburg Gas Works.—See **MECHANICAL HANDLING.**

Conveyor Systems. See **CONVEYOR**—Coal, Germany.

Dunfermline Gas Works.—Coal and Coke Handling Plant at Dunfermline Gas Works. A. Waddell. Read before the N. British Assn. of Gas Mgrs.

Illustrates and describes a combination coal and coke plant, stating its capabilities. Discussion. 3200 w. Gas Wld—Aug. 15, 1903.

Edinburgh Electricity Works.—Coal-Conveying Plant at Edinburgh (McDonald Road) Electricity Works. Brief illustrated description. 1200 w. Elect'n, Lond—Dec. 13, 1901.

Electric.—Electrically Operated Coal Hoist Having Variable Speed Control. P. O. Keilholtz. Illustrated description and data concerning the operation. 500 w. Trans Am Inst of Elec Engrs—Dec., 1902.

An Electrically Operated Coal Hoist. Richard Lamb. Illustrates and describes a plant that does not use varying voltage generators. 1500 w. Elec Wld & Engr—Aug. 1, 1903.

Coal Handling Machinery Driven by Electric Motors. D. A. Willey. Illustrates and describes the plant recently installed at Sparrow's Point, Md. 1200 w. Elec Rev, N Y—Sept. 19, 1903.

The Use of Electricity in Driving Coal Conveying Machinery. Frank C. Perkins. An illustrated description of apparatus at the works of a large steel company at Sparrow's Pt., Md. 700 w. Sci Am—Dec. 10, 1904.

An Electrically Driven Conveyor (Eine Elektrisch Betriebene Fahrbare Kabelbahn). H. Landmann. Illustrating and describing a traveling crane and cable conveyor for handling coal. 2000 w. Zeitschr d Ver Deutscher Ing—July 22, 1905.

Electric, Rotterdam.—Electric Coal Handling Plant at the Harbor of Rotterdam (Elektrisch Betriebene Kohlenkippe für den Hafen von Rotterdam). A very full account of the harbor improvements at Rotterdam, with illustrations of the plant by which the extensive coal trade is handled. Serial, Part I. 4000 w. 1 plate. Zeitschr d Ver Deutscher Ing—June 8, 1901.

Electric Station.—Coal Handling Machinery in Central Stations. F. L. Hutchinson. Illustrated descriptions of arrangements used. 3200 w. Am Elect'n—Oct., 1901.

Electrically Operated Temperley Transporters. Illustrated description of coal handling apparatus for electric stations. 1200 w. Elct'n, Lond—Aug. 5, 1904.

See also **CONVEYOR.**

Electric Station, London.—Automatic Coal Conveyors for Boiler Houses. Illustrated detailed description of the conveyors of the Central Electric Supply Company, London. 1200 w. Engr, Lond—Oct. 9, 1903.

Fairmont, W. Va. — Coal Tipple and Cantilever Bridge Over Tygart's Valley River, near Fairmont, W. Va. Illustrates and describes details of a new surface plant for operating coal mines. 900 w. Eng News—Sept. 19, 1901.

Gas Works.—See **COKE HANDLING; CONVEYOR; GAS WORKS** — **Heckmondwike; Nancy; Paris; Zurich; MECHANICAL HANDLING;** and under names of gas works.

Germany.—Improved Conveyor Systems and Appliances (Neuere Konveyor-Systeme und Anlagen). M. Buhle. Illustrating and describing the coal conveying systems of Hunt, of Bradley, and others as used in Germany. 1800 w. 1 plate. Glückauf—Feb. 11, 1905.

Giesecke Unloader.—See **CAR.**

Goodwin System.—Further Economics of Coal and Ore Handling. John M. Goodwin. Illustrates and describes the method patented by the writer. 1000 w. R R Gaz—March 1, 1901.

Great Yarmouth Works.—Coal Unloading and Stoking Machinery at Great Yarmouth Gas Works. W. J. Carpenter. An illustrated account of the system introduced, and the results. 3000 w. Gas Wld—Oct. 5, 1901.

Hoboken, D. L. & W.—Coal Shipping Plant at Hoboken, D., L. & W. R. R. Illustrates and describes an installation on the McMyler system, adapted to the tide-water conditions of a coal-handling road. 1000 w. Ry & Engng Rev—May 28, 1904.

Coal Handling Plant at the Hoboken Terminal of the Lackawanna R. R. Illustrates and describes the two McMyler car dumping machines installed and their operation. 2800 w. Eng Rec—Dec. 9, 1905.

Hydraulic Hoist, Glasgow.—Hydraulic Coal Hoist at Glasgow Harbor. Illustration of the hoist and its approaches with information as to its construction. 1000 w. Engr, Lond—Oct. 16, 1903.

India.—Coal Shipping in India. Illustrated description of a coal conveyor designed by Sir Bradford Leslie, particularly with a view to the obtainment of the greatest value from the coolie labor. 2200 w. Ir & Coal Trds Rev—Oct. 18, 1901.

Ipswich Gas Works.—See **COAL STORAGE.**

Island of Elba.—See **ORE HANDLING.**

Locomotive.—See **COALING STATION.**

Loraine, O.—A New Coal-Loading Plant at Lorain, O. An illustrated description of a coal shipping plant, explaining the conditions to be met. 1500 w. Eng News—April 20, 1905.

Louisenthal, Germany.—The Coal-Handling Plant at the Gerhard Mine at Louisenthal on the Saar (Die Einrichtungen zur Verladung von Kohlen auf der Grube Gerhard bei Louisenthal a. d. Saar). H. Althans. With plans of the buildings and tracks, and illustrations of the conveyors, cranes and buckets for delivering the coal into barges by the wharf. 3000 w. 5 plates. Glückauf—Sept. 17, 1904.

McMyler.—See **Hoboken, D. L. & W.**

Mechanical Devices.—See **COAL MINING.**

Milwaukee, Wis.—A Novel Coal Handling Plant. Illustrates and describes the hoisting plant for the Milwaukee Electric Railway and Light Company. The coal is stored at the top of the building and a special method was devised to handle it rapidly and economically. 500 w. Eng News —Feb. 25, 1904.

Nancy Gas Works.—Coal Unloading and Conveying Plant at the Nancy Gas Works. An illustrated description, from the "Journal für Gasbeleuchtung" of the arrangements at this town in France. 800 w. Jour Gas Lgt—Nov. 18, 1902.

New England Gas & Coal Co.—Steel Trestle and Storage Pockets for Coke Ovens. Illustrated description of works erected for the New England Gas and Coke Co. 900 w. Engr, Lond—April 26, 1901.

N. Y. Central Ry.—Handling Locomotive Coal on the New York Central. Brief illustrated description of the coaling and sanding station at Syracuse, and the coal storage plant at DeWitt. 700 w. R R Gaz—March 8, 1901.

N. Y. Interborough.—The Coal-Handling Plant of the Power-House of the Interborough Rapid Transit Company. Illustrated description of the Robins system, installed to handle coal and ashes at this plant in New York City. 900 w. Elec Rev, N. Y.—Dec. 31, 1904.

New York Navy Yard.—See **COAL STORAGE.**

Northumberland and Durham, Eng.—English Shipping Appliances for Coal. Illustrates and describes the methods of shipping export coal, used in the Northumberland and Durham centers and in South Wales. 2000 w. R R Gaz—May 1, 1903.

Paris Gas Works.—The Mechanical Conveying of Coal and Coke. Emile Guarini. Illustrates and describes the apparatus installed by the Paris Gas Co. Serial. 1st part. 1100 w. Sci Am Sup—Sept. 12, 1903.

Pockets.—See **COALING STATION—Newark, N. J., Lehigh Valley.**

Power Plants.—Coal Handling Machinery and Its Application to Steam Power Plants. T. F. Webster. Discusses particularly the methods of mechanically handling coal in steam power plants, and other classes in connection with such plants. Ill. 6000 w. Pro Engrs Soc of W. Penn—May, 1903.

Railway.—See **ROUNDHOUSE—Oelwein, Iowa.**

Shadyside, N. J.—See **COAL STORAGE.**

Steamships.—See **COALING; COALING AT SEA.**

Syracuse, N. Y.—A Unique Coal-Handling Plant for an Electric Power Station. Illustrated description of the auxiliary coal storage and handling plant of the Syracuse, N. Y., lighting company. 1000 w. Eng News—Oct. 19, 1905.

Treharris, Wales.—Modern Colliery Surface Equipment. Illustrated description of economic coal-mining appliances, as shown in a plant erected in South Wales. 3300 w. Ir & Coal Trds Rev—April 26, 1901.

Tug River.—Aerial Tramways in the Tug River Coal Fields. Henry Mace Payne. Illustrated description of two plants built to carry the coal mined on Kentucky side of Tug River to the railroad on the West Virginia side. 700 w. Sci Am—Aug. 19, 1905.

Vaclavik.—An Improved Coal-Handling Plant (Eine Neuartige Kohlensturzanlage). J. Vaclavik. An improved form of overhead railway, with continuously traveling cars. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—July 13, 1901.

A New Coal-Tipping Plant. J. Vaclavik, in Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrates and describes a plant based on the principle of continuous circulation on the part of the full and empty trucks. 800 w. Col Guard—July 19, 1901.

Wigan, Eng.—Coal-Handling Plant at the Douglas Bank Colliery, Wigan. Illustrated description of coal picking, screening and loading plant. 1000 w. Ir & Coal Trds Rev—Aug. 12, 1904.

Willesden Junction Plant.—Coal Conveying Plant at the Metropolitan Electric Supply Co.'s Works. Illustrates and describes the methods of coal-handling and firing employed at the Willesden Junction plant. 1300 w. Engng—July 14, 1905.

Wrightson's Shipper. — Wrightson's Patent Coal Shipper. Illustrates and describes an apparatus that claims minimum breakage of the coal. 900 w. Col Guard—Oct. 16, 1903.

Zürich Gas Works.—Criticisms on Construction of Coal and Coke Handling Plant at Zürich Gas Works. Archibald Little. An investigation of the question of suitability in design of the coal and coke conveying machinery in its situation at Zürich, and adaptability for similar duty in other towns. Serial. 1st part. 6000 w. Jour Gas Lgt—Feb. 4, 1902.

COAL HOIST.

See **COAL HANDLING; HOIST; HOISTING; HOISTING MACHINE.**

COAL INDUSTRY.

See also **COAL; COAL GEOLOGY; COAL MINE; COAL MINING; COAL REGION; IRON INDUSTRY.**

The Coal Production of the Principal Countries of the World. Statistics from the report of the British Board of Trade. 2700 w. Col Guard—July 26, 1901.

Development of the Coal Industry. William Gilbert Irwin. Reviews the history of this industry, the improvements in mining methods, the railway development due to this industry, the cooking industry, etc. 2500 w. Gunton's Mag—June, 1902.

The Production, Consumption, Imports and Exports of the World's Coal Trade. Information from the annual statement prepared by the British Board of Trade. 2700 w. Ir & Coal Trds Rev—Oct. 10, 1902.

Coal Production and Consumption of the Principal countries of the world. A statement of the production, value, etc., of coal in the five principal coal-producing countries of the world. 3000 w. Col Guard—Oct. 30, 1903.

Coal Production and Consumption. Editorial review of the returns from all the large industrial countries, recently published by the British Board of Trade. 1800 w. Engng—Nov. 13, 1903.

American.—Growth of the Coal Industry in the United States. From a report issued by the United States Government; giving a review of the progress, the geographical distribution, and related information. 5000 w. Col Guard—March 22, 1901.

The Coal Fields and Seaports of the United States. Edward W. Parker. Their locations in relation to one another, the shipping routes and distances. 3000 w. Mines Min—July, 1901.

Our Coal Supremacy and Its Significance. Edwin Moxey. Discusses the relation of fuel supply to progress as a nation. 3200 w. Sci Am Sup—March 15, 1902.

United States Coal Trade. Frederick E. Saward. Gives information concerning the important coal-producing districts. 2200 w. Loc Engng—July, 1902.

What We May Learn from America (Was Wir von Amerika Lernen Können). Hr. von Schwabe. A review of the development of the coal and iron production of America, and the cost of transport, with lessons to be gained for Europe. 2500 w. Stahl u Eisen—Nov. 15, 1902.

The Magnitude of the Coal Industry. F. E. Saward. Extracts from an address before the Modern Sciences Club of Brooklyn. Considers especially mining and distribution in the United States. 2500 w. Ir Age—Dec. 10, 1903.

Problems of the Expansion of the American Coal Trade. F. E. Saward. A review of recent statistics, showing the enormous growth of the coal trade of the United States, both domestic and export. 2500 w. Engineering Magazine—Dec., 1905.

See also **British vs. American; United States; Waste.**

American Exports.—The Growth of American Coal Exports. F. E. Saward. A study of the increasing exports of American coal, showing how this cheap source of fuel supply will promote European industries. 3500 w. Engineering Magazine—Dec., 1901.

American Coal in France (Les Charbons Americains en France). A. de Gennes. A review of the conditions, particularly in the United States, which have led to the export of coal to France. Map and diagram. 2500 w. Mem Soc Ing Civils de France—Feb., 1902.

American Coal in Europe. Discusses the important factors in the creation of a permanent export trade. 1500 w. U S Cons Repts, No. 1258—Feb. 6, 1902.

Bituminous.—The Development of the Bituminous Coal Industry. William Gilbert Irwin. Reviews the history of this industry. 1800 w. Sci Am—Oct. 19, 1901.

Bohemia.—The Coal Mining Industry of Northwestern Bohemia (Darstellung der Verhältnisse des Nordwestböhmischen Kohlenbergbaues). A general review of the Bohemian brown-coal industry as set forth in a speech by Frederick Zechner before the Austrian House of Deputies. 7000 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 1, 1902.

Brazil.—Opening for American Coal in Brazil. A letter from Mr. Castello Branco concerning the opportunity for starting a trade in American coal, giving particulars of points necessary to success. 1800 w. U S Cons Repts, No. 1155—Oct. 7, 1901.

British.—The New Coal Question. A full supplement, with editorial and trade opinions concerning the justice and expediency of levying an export tax on coal. 35000 w. Ir & Coal Trds Rev—April 26, 1901.

The Value of Coal and the Average Wages of Coal Miners. Tabulated statistics showing output, wages, value at pit's mouth, etc., based on the British Home Office statistics. 800 w. Col Guard—May 24, 1901.

The Coal Problem: Its Relations to the Empire. Carlyon W. Bellairs. A survey of the existing position of England, with conclusions. Appendix and discussion. 7000 w. Jour Soc of Arts—June 7, 1901.

Professor Geikie on Our Coal Resources. Review of an article by Prof. James Geikie, published in the "Pall Mall Magazine," showing the need of more information in regard to the quantities of fuel in the coal fields of the British Islands. 2000 w. Jour Gas Lgt—July 16, 1901.

Some Practical and Economic Problems in Relation to Our Coal Supplies. J. Stephen Jeans. From the "Proceedings of the South Wales Inst. of Engrs." Considers the coal reserves, cost of working, waste, coal-cutting machinery, etc. 5500 w. Ir Coal Trds Rev—Sept. 20, 1901.

Britain's Cheap Coal Supplies. The present article discusses the report of the Argyll Commission, and the light that has been thrown on this subject since that report was issued some thirty years ago. Serial. 1st part. 3400 w. Ir & Coal Trds Rev—Nov. 22, 1901.

Some Problems in Relation to Our Coal Supplies. Remarks of Prof. Archibald Elliott, contributed to the discussion of a paper by J. Stephen Jeans. The subject of Great Britain's supply is considered from a mathematical point of view. 3800 w. Ir & Coal Trds Rev—April 11, 1902.

Legislation and Ownership of Coal Properties. Daniel Jones. Abstract of a paper before the South Staffordshire and East Worcestershire Inst. of Min Engrs. Discusses what legislation is needed to enable the nation to avail itself of the coal supplies existing under numberless small properties. 2700 w. Col Guard—June 6, 1902.

Our Fuel Supply. Abstract of a paper read by James Anderson before the Inst. of Marine Engrs. Considers the increasing demands; the enhanced value; the necessity of conserving; the substitutes for coal, etc. 1900 w. Col Guard—Nov. 7, 1902.

The Growth and Direction of Our Foreign Trade in Coal During the Last Half Century. D. A. Thomas. Read before the Royal Statistical Soc. Serial. 2 parts. 15000 w. Ir Coal Trds Rev—May 22 and 29, 1903.

Wages and Profits in Coal Mining. Tabulated statistics from a pamphlet issued by the British Board of Trade showing the quantity and value of coal produced in the United Kingdom and the number and average wages of coal miners, etc. 1800 w. Ir & Coal Trds Rev—June 19, 1903.

Report of the Royal Commission on Coal Supplies. The first instalment of a digest of evidence taken last year before the Commission. The working of thin seams is considered in the present number. Serial. 1st part. 5600 w. Col Guard—Aug. 28, 1903.

The Coal Mining Industry of the United Kingdom. R. A. S. Redmayne. The first of a series of papers discussing the development of British coal mining. The present article deals largely with the historical portion of the subject. 3500 w. Engineering Magazine—October, 1903.

The Coal Mining Industry of the United Kingdom. R. A. S. Redmayne. Professor Redmayne's third and concluding paper reviews the present economic conditions of coal mining in Great Britain, together with the questions of future supply and foreign competition. 3000 w. Engineering Magazine—Dec., 1903.

Reserves of Welsh Smokeless Steam Coal for the British Navy. W. H. Renwick. Discusses the schemes for curtailing the export of this coal, with the object of conserving it for future naval requirements. 4500 w. Nineteenth Cent—Jan., 1905.

See also **Export Duty; History; Lancashire.**

British Columbia.—The Future of the Coal and Coke Supply of British Columbia. W. Blakemore. Showing that the prosperity of the province depends on an abundant supply of the best fuel at a low price, and discusses where to look for the coal needed. 3500 w. Can Min Rev—Oct. 31, 1902.

Coal Production of British Columbia. Information from the annual report of the Minister of Mines. 3000 w. Col Guard—July 3, 1903.

British, 1899.—The Output, Value and Distribution of Coal during 1899. Information from the General Report dealing with the output and value of the minerals and metals of the United Kingdom. 3300 w. Col Guard—Nov. 9, 1900.

British, 1900.—The Coal Question in 1900. A review of its different aspects and a summary of the history of the past year in England. 3000 w. Jour Gas Lgt—Jan. 1, 1901.

The Coal Trade of 1900. A review of the various mining districts of Great Britain. 11800 w. Col Guard—Jan. 4, 1901.

British, 1902.—The Coal Trade for 1902. A general review by districts of the coal trade of Great Britain. 17500 w. Col Guard—Jan. 2, 1903.

British, 1903.—The Coal Trade of 1903. A review of the past year in the districts of England, Scotland and Wales. 16300 w. Col Guard—Jan. 1, 1904.

British vs. American.—British and American Fuel: Is Competition Possible? Considers the whole problem hinges on the question of freights, and discusses this side of the question in some detail. 3700 w. Ir & Coal Trds Rev—Dec. 6, 1901.

North Staffordshire Institution of Mining and Mechanical Engineers. Presidential address of A. M. Henshaw, discussing the coal and iron industry of Great Britain in comparison with the United States, deep mining, waste of fuel, electricity, blast furnace gas, etc. 5800 w. Ir & Coal Trds Rev—Oct. 24, 1902.

California.—See **FUEL.**

Canada.—Coal Mining in the North-West Territories and Its Probable Future. Frank B. Smith. A general outline of the coal-mining of this region and its value. 4000 w. Can Min Rev—April 30, 1902.

Alberta Territory, Canada. Coal Fields on Crow's Nest Pass, Branch of the Canadian Pacific Railway. William M. Brewer. Describes the two distinct coal fields of this region, the development, extent, quality of coal, etc. 1600 w. Eng & Min Jour—May 31, 1902.

See also **Nineteenth Century; IRON INDUSTRY.**

Canada-United States.—See **Free Trade.**

Cheapening.—The Cheapening of Coal. F. E. Saward. Discusses features of the coal industry, the surplus of pea, buck, and rice sizes, and the effect on prices. Also the tendency of bituminous sizes. 1500 w. Ir Age—Aug. 20, 1903.

China.—The Fuel Problem of China and the Far East. F. Lynwood Garrison. Information concerning the coal fields, the imports of coal, cost, consumption, etc., and the relation of other countries. 2800 w. Ir Age—Nov. 8, 1900.

See also **COAL REGION.**

Dortmund, Germany.—See **Germany.**

Electric Stations.—See **ELECTRIC-STATION MANAGEMENT—Coal Question.**

Export Duty.—The Export Duty on Coal. A report of the discussion of the subject in the House of Commons, of the duty of 1 s. per ton on coal exported from Great Britain or Ireland. 8000 w. Col Guard—June 28, 1901.

France.—Present Condition of the Coal Market in France. Discusses the question of reducing the cost of ocean transportation of coal so as to enable the United States to compete with Gt. Britain in supplying European markets. 1200 w. U. S. Cons Repts, No. 994—March 26, 1901.

Coal, Iron and Steel Production of France. Statistics giving an estimate of the coal, lignite, iron, and steel produced in France during 1899 and 1900. 600 w. U S Cons Repts, No. 1021—April 26, 1901.

In the French Black Country. Remarks on St. Etienne, the conditions of mining, hours of labor, wages, &c. 2800 w. Ir & Coal Trds Rev—Jan. 29, 1904.

Free Trade.—The Question of Free Coal. W. Blakemore. An examination of the advantages and disadvantages of a reciprocal free coal agreement between the United States and Canada. 3000 w. Can Min Rev—Jan. 31, 1903.

German Iron Companies.—The Acquisition of Coal Mines in the Ruhr District, Germany, by Iron Companies (Erwerbung von Steinkohlengruben im Ruhrkohlenbezirk durch Hüttenwerke). Hr. Hundt. An account of the increasing ownership of their own coal mines by iron works, and a discussion of general effects of this practice. 5000 w. Stahl u Eisen—July 1, 1903.

German Syndicates.—The German Coal Cartel and Its Renewal. Francis Walker. The plan of organisation and the results accomplished by the coal and coke syndicates. Serial. 1st part. 7500 w. Mines & Min—Feb., 1904.

The Report of the Rhenish-Westphalian Coal Syndicate for 1901 (Vorstandsbericht des Rheinisch-Westfälischen Kohlensyndikats über das Jahr 1901). A review of the report of the board of directors of this great German syndicate covering production, transportation, exports, etc. 2000 w. Glückauf—April 26, 1902.

The Reconstruction of the Westphalian Coal Syndicate. Discusses the project for the reconstruction and the chief points of the new agreement. 2200 w. Ir & Coal Trds Rev—Oct. 9, 1903.

See also **IRON INDUSTRY; TRUST.**

Germany.—The Question of Coal (Zur Kohlenfrage). A review of the question of coal consumption and production, with especial reference to Germany. Glückauf—Oct. 27, 1900.

The General Coal Industry: Syndicates and Government Mines. Discusses the questions relating to this industry which are being considered. The new tariff, etc. 2000 w. Col Guard—Aug. 30, 1901.

The Government Acquisition of Westphalian Coal Mines. Discusses the recent purchase of this coal-mining property by the German government, comparing the present situation with that prevailing two or three months ago. 2000 w. Col Guard—Feb. 28, 1902.

A Brief Review of the Coal Reserve and Mining Conditions in Germany. A summary analysis of a description given in a volume circulated by the Dortmund Coal Owners' Assn. 2000 w. Ir & Coal Trds Rev—April 26, 1902.

The Report for 1902 of the Association of the Mining Industry in the Dortmund District, Germany (Jahresbericht des Vereins für die Bergbaulichen Interessen im Oberbergamtsbezirk Dortmund für das Jahr, 1902). A report, with many statistics, on the production of coal, coke and briquettes, transportation, mining, wages, etc., with comparative tables and diagrams. 3 plates. 7000 w. Glückauf—April 11, 1903.

See also IRON INDUSTRY.

History.—Annals of Coal Mining and the Coal Trade. Robert L. Galloway. The present article reviews the period from 1836 to 1850, in England. 3500 w. Col Guard—Oct. 26, 1900.

See also British.

Hungary.—Coal-Mining in Hungary. Gives the history, geology and statistics. 1100 w. Col Guard—Jan. 11, 1901.

India.—Indian Coal. Editorial discussion of the opening of coal mines in different parts of India, because of the high price of English coal. 1200 w. Engng—Aug. 16, 1901.

The Coal Question in India. Discusses the production, companies, labor question, mining methods, etc. Serial. 1st part. 4800 w. Ind & East Engr—Nov., 1901.

Indian Coal. Concerning the recent progress made in the coal mining industry, the extent of the coal fields, etc. 1300 w. Engr, Lond—Nov. 29, 1901.

Japan.—The Coal Mines and Coal Trade of Japan. Gives a series of sectional maps showing the location of the principal collieries, giving a report of the mines, especially the Miike mines. 1200 w. Ir & Coal Trds Rev—Dec. 6, 1901.

Lancashire, 1900.—The Lancashire Coal Trade in 1900. T. B. Wood. Reviews the output, prices and conditions affecting this industry. 2200 w. Ir & Trds Rev—Dec. 28, 1900.

London Exhibition.—The Colliery Exhibition. An illustrated general survey of the exhibits at the Royal Agricultural Hall, London, N. 19000 w. Ir & Coal Trds Rev—June 24, 1904.

The Colliery Exhibition. An account of the opening at Islington, with brief illustrated descriptions of the exhibits. 31500 w. Col Guard—July 1, 1904.

Louisiana Purchase.—See COAL REGION.

Natal.—Coal and Iron in Natal. Information relating to these industries, the methods used, deposits, etc. 2000 w. Ir & Coal Trds Rev—Dec. 28, 1900.

Coal-Mining in Natal. Information from the report of C. J. Gray, Commissioner of Mines for Natal. 1800 w. Col Guard—Nov. 6, 1903.

New South Wales.—Coal-Mining in New South Wales. Information from the annual report of the output, value, etc. 2500 w. Col Guard—Oct. 23, 1903.

New Zealand.—Coal Mining in New Zealand. Information from the annual report of the Minister of Mines for New Zealand, for year ending Dec. 31, 1902. 1400 w. Col Guard—Feb. 12, 1904.
See also GOLD.

1900.—The Foreign Coal and Iron Trades in 1900. Briefly reviews the various European countries, in the production of these products, the prices and general conditions. 5500 w. Ir & Coal Trds Rev—Dec. 28, 1900.

Coal in 1900. An output greater than in 1899, and the increase principally from the United States. Reports from various districts. 10300 w. Eng & Min Jour—Jna. 5, 1901.

1902.—Coal in 1902. Samuel Sanford, and other writers. Articles reviewing the whole production, and by districts, and matters that have affected the industry. 15000 w. Eng Min Jour—Jan. 3, 1903.

1904.—Coal Mining and Production for the Year 1904. Samuel Sanford. A general review of the year, with statistics of interest. Maps. 4200 w. Min Wld—Jan. 21, 1905 (Special).

Nineteenth Century.—The Nineteenth Century—Its Makers and Its Achievements. Part first deals with the progress made in coal-mining during the century. Also the handling and transportation, markets, etc., from the English point of view. Serial. 1st part. 4300 w. Ir & Coal Trds Rev—Jan. 4, 1901.

Coal Mining in the Nineteenth Century. W. Blakemore. Read before the Applied Science Society of McGill Univ. Gives statistics of production, discussing the remarkable development, economic considerations, effect on transportation, improved methods, &c., referring especially to Canada. 7500 w. Can Engr—Aug., 1901.

Nova Scotia.—Coal Mining in Nova Scotia. Concerning the production and new developments. 800 w. Eng & Min Jour—April 20, 1901.

See also Nineteenth Century; IRON INDUSTRY—Canada East.

Pennsylvania.—Coal Production of Pennsylvania. Statistics from the reports for 1902, with remarks. 1000 w. Eng & Min Jour—June 6, 1903.

Pennsylvania Anthracite.—History of Anthracite Coal Production in Pennsylvania. A graphic illustration by a chart prepared by William W. Ruley. The article discusses the probable life of these coal fields. 600 w. Min & Met—May 1, 1901.

The Anthracite Situation. Robert Lincoln O'Brien. A discussion of coal prices and the systems regulating them; causes of shortage; the attitude of operators and miners, etc. 1600 w. Eng & Min Jour—Jan. 31, 1903.

The Coal Industry of Pennsylvania. W. Frank M'Clure. Remarks on the rapid development during recent years, with information concerning the mines and methods. Ill. 2500 w. Sci Am—May 23, 1903.
See also STRIKE.

Pittsburg.—Beginning and Development of Pittsburg's Coal Industry. Edgar W. Hassler. Brief review of the early history of this important industry. 2000 w. Am Mfr—March 7, 1901.

Poland.—The Coal and Iron Industries of Poland. Particulars regarding these industries for the year 1900. 3000 w. Col Guard—May 3, 1901.

Production Statistics.—The Coal Production of the World (Die Steinkohlenvorräte der Erde). Oskar Simmersbach. A classified statement of the coal production of the various important producing countries of the world, showing the rate of increase. 5000 w. Stahl u Eisen—Dec. 1, 1904.

Queensland.—Queensland Coal Mining Industry. Extracts from the report of the Inspector of Mines for the year 1903. Information concerning output, quality, mines, &c. Ils. 5500 w. Queens Gov Min Jour—May 14, 1904.

Queensland Coal Mines. Reports of mine inspectors in regard to the trade, production, coal fields, etc. Plate. Ils. 5000 w. Queens Gov Min Jour—June 15, 1905.

Queensland Anthracite Coal. R. J. Cottell. Information concerning this industry in Central Queensland, giving an analysis of the coal, and the results obtained with it. 1800 w. Aust Min Stand—July 12, 1905.

Retail.—The Course of the Retail Coal Trade. Dr. David T. Day. An outline of the past and prospective course of the retail coal trade, giving an explanation of the effect of the recent strike, the cost of transportation, and the price of coal at various points. 2700 w. Nat Geog Mag—Nov., 1902.

Rhenish-Westphalian Syndicate.—See German Syndicate.

Russia.—The Russian Coal and Pig Iron Industry (Die Russiche Kohlen und Roheisen Industrie). Dr. Neumark. Especially discussing the products of southern Russia, with tabulated statistics and maps. Two articles. 7500 w. 2 plates. Stahl und Eisen—Jan. 15, Feb. 1, 1901.

The Russian Coal and Pig-Iron Industry. Dr. Neumark. A lecture delivered at the general meeting of the ironmasters of Upper Silesia. Translated and condensed from "Stahl und Eisen." General information of these important industries, with special reference to that of Southern Russia. Serial. 1st part. 2300 w. Ir & Coal Trds Rev—Feb. 15, 1901.

Russian Coal. Editorial discussing the coal fields of Russia and their development, and the temporary remission of duty on coal imported into certain parts of the country. 1800 w. Engng—Oct. 18, 1901.

The Coal-Mining Industry of Russia. Particulars, prepared by A. Loransky, extracted from a recently published work issued by order of the State Secretary. Serial. 1st part. 2400 w. Col Guard—March 27, 1902.
See also IRON INDUSTRY.

Saward Address.—The Magnitude of the Coal Industry. Extracts from an address before the Modern Science Club of Brooklyn by F. E. Saward. 3000 w. Sci Am Sup—Feb. 27, 1904.

Scotland.—Some Notes on the Output of Coal from the Scottish Coal Field. R. W. Dron. Read before the British Assn. Considers the economic circumstances affecting the output, and concludes that if wisely handled the coal fields of Great Britain will supply many generations. 2700 w. Ir & Coal Trds Rev—Sept. 27, 1901.

Small Coal.—See **GAS MANUFACTURE.**

Spain.—See **IRON INDUSTRY.**

Supplies, 1905.—Final Report of the Royal Commission on Coal Supplies, 1905. 18500 w. Col Guard—Jan. 27, 1905 (Supplement).

Sweden.—See **IRON INDUSTRY.**

United States.—See **America; Waste.**

United States-Canada.—See **Free Trade.**

United States, 1903.—Coal in 1903. Samuel Sanford. Reviews the developments of the principal coal fields of the world during the last year. Also brief reports from various districts in the United States. 8500 w. Eng & Min Jour—Jan. 7, 1904.

U. S., 1904.—The Production of Coal in 1904. Edward W. Parker. From the Mineral Resources of the United States. Gives statistics and a review of the conditions. 4400 w. Min Wld—Aug. 19, 1905.

U. S. Southern.—Coal Production Measuring Southern Advance. Edward Wheeler Parker. Reviews the history of the coal-mining industry in the South. 8200 w. Mfrs Rec—Feb. 20, 1902. Special number.

The Coal Mining Industry of the South. Frederick E. Saward. Reviews the rapid development of recent years in Alabama, West Virginia, Virginia, Kentucky, Tennessee, Indian Territory, Maryland and Texas. 2000 w. Ir Age—March 5, 1905.

Wales.—Coal and Mines of South Wales. A. Howells. Read before the Ohio Min. Inst. Considers why Welsh coal can withstand competition and yet command a higher price; also the difficulties met in mining it. 2700 w. Mines & Min—May, 1901.

The Welsh Anthracite Coal Trade. An interesting article giving much information in regard to the collieries, deposits, etc., in Wales, as well as discussing the trade. 3500 w. Ir & Coal Trds—Jan. 23, 1903.

The Situation and the Outlook in the South Wales Coal Industry. Written under direction of D. A. Thomas. Considers briefly wages, trade, prices, profits, etc. 4000 w. Ir & Coal Trds Rev—Dec. 30, 1904.

Washington.—Coal Production of Washington for 1903. C. F. Owen. Statement condensed from annual report of output. 900 w. Min Rept—Feb. 11, 1904.

Waste, United States.—Squandering Coal. Egbert P. Watson. Remarks on the wastefulness so general in the United States, illustrating by actual occurrences, and urging greater economy. 1600 w. Ir Age—March 26, 1903.

Westphalian Syndicate.—See **German Syndicates.**

West Virginia.—Coal and Coke Developments in West Virginia. W. G. Irwin. Brief account of the flourishing condition of these industries. 1000 w. Eng & Min Jour—July 20, 1901.

COALING.

See also **COAL HANDLING; COALING AT SEA; COALING STATION; COAL STORAGE.**

Steamships.—A New Apparatus for Coaling Steamers. An illustrated description of conveying machinery, the invention of L. A. de Mayo, and its working. 800 w. Sci Am—June 10, 1905.

Warships.—The Coaling of Warships. J. R. Edwards. A full discussion of the question; need of improvements in bunkers, rapidity, best means of coaling warships, use of Temperley conveyors, coaling stations, and coal-handling appliances, coaling at sea, the Clarke automatic coaling and weighing barge, the Walsh coal and freight delivery vessels, the Miller marine cableway, and other related matters. Ill. 16500 w. Jour Am Soc of Nav Engs—Feb., 1901.

COALING AT SEA.

Coaling Warships at Sea. Herbert C. Fyfe. Describes the equipment of the U. S. Battleship "Illinois" with the apparatus for coaling at sea, and gives information concerning experiments made by Great Britain and Russia. Ill. 1200 w. Sci Am—June 27, 1903.

Coaling of Ships of War at Sea and in Harbor. G. C. Mackrow. Illustrated description of a proposed system worked out at the Thames Ironworks. Describes the loading at sea and also in harbor. General discussion. 6300 w. Jour Roy U Serv Inst—Feb. 15, 1905.

Cunningham-Seaton.—Coaling at Sea. A. C. Cunningham. An illustrated description of the Cunningham-Seaton proposed method. 1600 w. Jour Am Soc of Nav Engrs—Nov., 1903.

Miller.—The Coaling of the U. S. S. "Massachusetts" at Sea. Spencer Miller. Describes the apparatus of the marine cableway for coaling at sea, discussing possible improvements and the importance of the work. Fully illustrated. 4000 w. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

Supplying Combustible at Sea (Rifornimento di Combustibile in Mare). E. Ferretti. A discussion of the importance of coaling war ships from colliers at sea, with reference to the Miller cable conveyor. 6000 w. Rivista Marittima—Oct., 1902.

Coaling Warships at Sea—Recent Developments. Spencer Miller. An illustrated article reviewing the development from 1900 to the present time. 9500 w. Soc of Naval Archts & Marine Engrs, No. 7—Nov., 1904.

COALING BARGE.

Ingenious Vessel-Coaling Boat. Full illustrated description of the Clarke automatic coaling and weighing barge. 4000 w. Naut Gaz—July 4, 1901.

The Clarke Automatic Coaling and Weighing Barge. Illustrated detailed description of this barge for coaling steamers and its method of work. 3000 w. Ir Age—June 20, 1901.

COALING STATION.

See also **COAL BIN; COAL CHUTE; COAL HANDLING; COAL STORAGE; RAILWAY BUILDINGS.**

Chicago and Alton.—The New Chicago & Alton Coaling Stations. Illustrated descriptions of these stations and their equipment. Arrangements are such that locomotives receive their supply of coal, water, and sand, and discharge the cinders from fire-box and smoke-box simultaneously. 1000 w. R R Gaz—March 14, 1902.

Defence.—The Defence of Coaling Stations. S. Eardley-Wilmot. Arguments favoring the defence against sea attack being given to men with sea experience. 1600 w. Engrs, Lond—June 21, 1901.

Fond-du-Lac, Wis.—Locomotive Coaling Station of the Wisconsin Central Ry. at Fond-du-Lac, Wisconsin. An illustrated description of a large coal storage and coal handling plant for supplying locomotives. 1100 w. Eng News—Nov. 27, 1902.

Frenchman's Bay, Maine.—Coaling Plant for the U. S. Navy at East Lamoine, Frenchman's Bay, Maine. J. A. McNicol. Brief illustrated description. 1300 w. Eng News—July 24, 1902.

Frenchman's Bay Coaling Plant. Illustrated description of this naval coal depot on the Maine coast. 3700 w. Eng Rec—Jan. 30, 1904.

Hamburg.—Coal Pockets in the Harbor of Hamburg (Kohlenkipper im Hamburger Hafen). Describing the newly installed appliances for handling coal for the vessels of the Hamburg- American Line at Hamburg. 1500 w. Zeitschr d Ver Deutscher Ing—July 29, 1905.

Hammond, Ind.—Coal Storage and Transfer Plant for the Chicago & Erie R. R. at Hammond, Ind. An illustrated description of a plant having a storage capacity of 60,000 tons, and facilities for handling coal in like proportion. 1400 w. Ry & Engng Rev—Oct. 12, 1901.

Holmen.—Holmen Coaling Station. Pennsylvania Lines. Illustrated detailed description of a type of coaling station being installed at many places on the lines west of Pittsburg. 700 w. Ry Age—June 9, 1905.

Locomotive.—Locomotive Coaling Stations. Waldon Fawcett. Illustrates and describes a recent system of coaling which the writer considers almost perfect. A steel coal pocket of the suspended-bin type is mounted above the tracks. The arrangements for filling are described and also for emptying the ashes. 1500 w. Loc Engng—March, 1902.

Coaling Locomotives. Charles H. Fry. Reviews early practice on American railroads, and describes many types of coaling stations tried on various roads, and the modern methods finally installed. Ills. 5200 w. R R Gaz—Vol. XXXVIII., No. 19.

Locomotive, Berlin.—The Locomotive Coaling Plant at the Grunewald Station in Berlin (Anlage sur Lokomotivebekohlung auf Bahnhof Grunewald in Berlin). M. Buhle. Illustrated description of a coal pocket and handling plant for railway service. 1000 w. Zeitschr d Ver Deutscher Ing—May 13, 1905.

Mt. Pleasant-St. L. S. Ry.—Modern Methods of Coaling Locomotives. An illustrated description of the Mt. Pleasant coaling station, of the St. Louis Southwestern Ry. system. 1100 w. Ry & Engng—Dec. 27, 1902.

Narragansett Bay.—The New Coaling Station at Narragansett Bay. Illustrated description of a new coaling station recently completed at Bradford, near Newport, and its operation. 3000 w. Eng Rec—Nov. 25, 1905.

Newark, N. J., Lehigh Valley.—Local Coal Pockets for the Lehigh Valley R. R. at Newark, N. J. Walter G. Berg. Illustrated detailed description of recently constructed pockets with modern improvements. 1200 w. Eng News—April 2, 1903.

New London, Conn.—The Coaling Stations of the United States Navy. Waldon Fawcett. Illustrates and describes the station at New London, Conn., its equipment, etc. Also gives information of other stations to be similarly fitted. 1200 w. Am Mfr—Feb., 1901.

New York.—See **COAL STORAGE—New York Navy Yard**

N. Y. Central Ry.—See **COAL HANDLING.**

Penna. R. R.—See **Holmen.**

Sangley Point. — The Sangley Point Coaling Plant. Illustrated description of a government plant in the Philippine Islands, which includes a dredged approach, a large iron wharf, coal sheds, handling and weighing apparatus, power plant and fire service. 3000 w. Eng Rec—Aug. 9, 1902.

COAL MINE.

See also **COAL INDUSTRY; COAL MINING; COAL PREPARATION; COAL REGION.**

Alabama.—The Belle Ellen Coal Mine, Alabama. William M. Given. Abstract of a paper read before the Engng. Assn. of the South. Descriptive. 1000 w. Eng & Min Jour—July 27, 1901.

Anthracite.—Anthracite Coal Mines and Mining. Rosamond D. Rhone. An illustrated article describing the mines, their ventilation, mining accidents, etc., the methods of mining and preparing the coal for market are also considered and related matters of interest. 7000 w. Rev of Revs—July, 1902.

Auchincloss, Pa.—The Auchincloss Colliery. Illustrated description of this new plant in the Wyoming-Lackawanna anthracite region. 2500 w. Eng & Min Jour—May 5, 1904.

Bargoed, Eng.—New Colliery at Bargoed. Illustrated description of a new colliery in the Rhymney Valley, on the boundary between England and Wales. 1200 w. Col Guard—Dec. 18, 1903.

Bathgate, Eng.—Extensive Colliery Developments of Bathgate. Describes and illustrates the extensive work of the last ten years, the character of the coal, the equipment of the mines, etc. 2500 w. Col Guard—Aug. 22, 1902.
See also **COAL WASHING.**

Bethune, France.—See **COAL WASHING.**

Bohemia, Pillars.—See **COAL MINING—Pillars.**

Bridgeport, Pa.—A Monongahela River Mine. Brief description of the opening of a new coal mine. 1200 w. Eng & Min Jour—Oct. 6, 1904.

British Columbia.—See **Crow's Nest; COAL REGION.**

Buildings.—See **COAL MINE BUILDING.**

China.—The Tong Colliery, Kaiping, North China. Thomas Webster. From the Pro. of the So. Wals Inst. of Min. Engrs. A description of the coal seams, methods of working and the machinery used. 3800 w. Mines & Min—Feb., 1901.

Clifford, Ill.—A Model Illinois Coal Mining Plant. Charles H. Smith. Illustrated description of No. 3, a new mine plant at Clifford, Illinois. 2000 w. Min Wld—Dec. 23, 1905.

Comox, B. C.—A Description of the Mining Operations, Pumping and Hauling Plant, etc., at the Comox Colliery. Jno. Matthews. 1800 w. B C Min Rec—Sept., 1902.

Crow's Nest, B. C.—The Coal Creek Colliery of the Crow's Nest Pass Coal Co. C. V. Corless. Read before the Canadian Min. Inst. Illustrated description of the mines and their working, production, etc. 5500 w. Can Min Rev—March 31, 1901.

Pioneer Work in the Crow's Nest Coal Areas. William Blakemore. An account of the opening of this mine in the Rocky Mts., the difficulties, etc., describing the appliances, plant and machinery installed. Maps. 5800 w. Can Min Rev—May 31, 1901.

Notes on Some Special Features of Coal Mining in the Crow's Nest. James McEvoy. Read at meeting of the Canadian Min. Inst. Describes the geology of this region and the physical and chemical properties of the coal. 1800 w. Can Min Rev—March 31, 1904.

Depreciation.—See **DEPRECIATION.**

Divernon, Ill.—The Divernon Coal Mine. J. J. Rutledge. An illustrated description of the plant and arrangements at mine No. 6, of the Madison Coal Co., at Divernon, Illinois. 4500 w. Mines & Min—Dec., 1901.

Ehrenfeld, Pa.—The Ehrenfeld Plant of the Webster Coal and Coke Co. Illustrated description of a large modern mining plant at Ehrenfeld, Pa., containing a number of novel features. 6200 w. Mines & Min—May, 1902.

The Ehrenfeld Colliery. Description, with illustrations, of the electric plant and other features of coal mines near Johnstown, Pa. 2000 w. Eng & Min Jour—Aug. 18, 1904.

Electric Plant.—See also **Ehrenfeld, Pa.; ELECTRIC EQUIPMENT; ELECTRIC PLANT.**

Electric Power.—See **ELECTRIC EQUIPMENT—Coal Mine.**

Engineering Progress.—See **BOILER—Lancashire.**

Ernest, Penna.—The Ernest Plant of the Jefferson & Clearfield Coal & Iron Co., at Ernest, Indiana County, Pennsylvania. G. W. Harris. Illustrates and describes a development of coal properties exceeding in magnitude and originality anything hitherto attempted. 5000 w. Mines & Min—May, 1904.

Eureka, Pa.—The Eureka Collieries. An illustrated article summarising the present methods and equipment of ten mines in Pennsylvania, near Johnstown. 2000 w. Eng Min Jour—June 2, 1904.

Exhibition.—See **COAL MINE EXHIBITION.**

Flat Top, Ala.—Flat Top Mine. Samuel H. Lea. Describes a typical coal mine in the Birmingham, Ala., district, with the characteristics and manner of working. 3500 w. Mines & Min—March, 1905.

Floods.—Some Lessons from the Recent Floods in the Anthracite Mines of Pennsylvania. W. S. Ayres. Discusses the serious results and great expense caused by the floods of this past winter, and the means of guarding against such loss. 1700 w. Eng & Min Jour—March 15, 1902.

Florence.—See **MINE HAULAGE—Electric.**

Gelsenkirchen, Westphalia.—The Rhine-Elbe Mine of the Gelsenkirchen Mining Company (Die Schachtanlage Rhein-Elbe III. der Gelsenkirchener Bergwerks-A-G.). With map and plans of the hoisting machinery, power plant, and general installation. 3000 w. 4 plates. Glückauf—Sept. 7, 1901.

The Plant at the Zollern Shaft No. II. of the Gelsenkirchen Mining Company (Die Schachtanlage Zollern II. der Gelsenkirchener Bergwerks-Aktien-Gesellschaft). H. Randebrock. A very fully illustrated description of a fine modern colliery equipment, including power house, head works, winding engines, etc. 7500 w. 3 plates. Glückauf—June 24, 1905.
See also **BOILER TEST—Dalbusch Mine, Westphalia.**

Germany.—The Costs and the Conditions of Working Collieries in Germany. The present article gives information concerning the Harpen collieries, their production, earnings, expenses, profits, etc. Serial. 1st part. 1700 w. Ir & Coal Trds Rev—March 6, 1903.

Glapwell, Derby, Eng.—Notes on Glapwell Colliery. Maurice Deacon. Describes the surface plant, ventilation and underground arrangements. General discussion. 4500 w. Col Guard—Oct. 9, 1903.

Haulage.—See **ELECTRIC EQUIPMENT; MINE HAULAGE.**

Head Frame.—See COAL TIPPLE; HEAD FRAME.

Henry, West Va.—The Henry Colliery. J. T. Jennings. Description of extensive modern developments in the coal mines of West Virginia. 8500 w. Eng & Min Jour—Feb. 18, 1904.

The Henry Colliery of the Davis Coal and Coke Company. J. F. Healy. An illustrated description of the plant and the mechanical equipment. 2700 w. Mines & Min—Oct., 1904.

Hibernia, Prussia.—The Plan for the State Control of the Hibernia Coal Mines (Die Geplante Verstaatlichung der Bergwerks-Gesellschaft Hibernia). H. Engel. An account of the plans of the Prussian Government to obtain a controlling influence in the coal syndicate. 3000 w. Glückauf—Aug. 13, 1904.

Illinois.—Coal Mines at Streator. A. Dinsmore. An interesting illustrated description of the important coal fields and mines in La Salle County, Illinois. 2300 w. Mines & Min—Nov., 1900.

India.—An Indian Colliery and Its Miners. Henry M. Cadell. Notes on a visit to the Karharbari colliery in Lower Bengal, 206 miles northwest from Calcutta. 3500 w. Trans of Min Inst of Scotland—June 9, 1900.

Indwe, Cape Colony.—The Indwe Coal Mines, Cape Colony, Africa. A description of these mines which produce nearly 70 per cent. of the total coal mined in Cape Colony. Ill. Serial. 1st part. 3300 w. Col Guard—Aug. 29, 1902.

Iowa.—Appanoose County Coal Field. J. J. Rutledge. A description of the coal, the methods of mining and the use of machines in thin veins. 2600 w. Mines & Min—March, 1901.

An Iowa Coal Mine. Illustrated description of mine known as Cleveland No. 4. 900 w. Eng & Min Jour—March 23, 1901.

Iselin, Pa.—The Iselin Plant. F. L. Dixon. An illustrated description of the principal features of the model new coal plant at Iselin, Indiana County, Pa. 1800 w. Mines & Min—Sept., 1905.

Japan.—Notes on the Takasima Coal Mines, Nagasaki, Japan. E. W. Nardin. Read before the Australian Inst. of Min Engrs. Describes the occurrence and working of these coal seams, which comprise four islands near the entrance to Nagasaki harbor. Ill. 1300 w. Ir Coal Trds Rev—June 13, 1902.

The Takasima Coal Mines, Japan. Abstract of a paper read by E. W. Nardin before the Australasian Inst. of Min. Engrs. Describes the mines and methods of working. 1100 w. Col Guard—Nov. 21, 1902.

The Takasima Coal Mines of Nagasaki, Japan. E. W. Nardin. A finely illustrated article describing mines having unusual features. 1700 w. Page's Mag—Oct., 1903.

Japanese Coal Mines. K. Gonekra. A brief illustrated outline of the mining department of the Kokkaido Colliery & Railway Company, Japan. Serial. 1st part. 5000 w. Mines & Min—March, 1904.

See also COAL MINING; MINING INDUSTRY.

La Salle, Ill.—Coal Mines and Zinc Works at La Salle, Illinois. A. Dinsmore. A description of mining plant at La Salle shaft, and of the Matthiessen & Hegeler zinc works. 2800 w. Mines & Min—April, 1903.

Kansas.—The Kansas Coal Mines of the Missouri Valley. W. R. Crane. A short description of the typical mines of this district. 4000 w. Eng & Min Jour—Oct. 18, 1902.

Loup Creek, W. Virginia.—The Loup Creek Colliery Company. George W. Harris. An illustrated description of this mining property in West Virginia, the methods of mining, coke oven equipment, etc. 3800 w. Eng & Min Jour—Dec. 9, 1905.

Manners.—See HEAD FRAME.

Mechanical Engineering.—The Mechanical Engineering of Modern Collieries. William Bardill. Abstract of a paper read before the Birmingham Sec. of the Inst. of Mech Engrs. Brief consideration of the mechanical appliances the mining engineer has found necessary in carrying on his work. 3000 w. Col Guard—March 20, 1903

Mexico.—The Cerrillos Anthracite Mines. Arthur Lakes. Describes a New Mexican coal mine which illustrates the metamorphosis of bituminous into anthracite. 1200 w. Mines & Min—March, 1901.

Las Esperanzas Coal Mines, Mexico. Edwin Ludlow. Illustrated description of mines and coke oven plants. 1000 w. Eng & Min Jour—March 16, 1901.

Coal Mining in Mexico. An illustrated description of the development of a coal field in the state of Coahuila, as reported in "Modern Mexico." 450 w. Col Guard—April 26, 1901.

Monongahela River.—See Bridgeport, Pa.

Murton, Eng.—See South Hetton.

New Zealand.—New Zealand Coal Mines. Abstracts in reference to the workings at the principal mines and districts visited by the Royal Commission, taken from the report to Parliament. 11600 w. N Z Mines Rec—Aug. 16, 1901.

The State Coal Mines. Reports of the Point Elizabeth coal mines, and the Seddonville coal mine. 2500 w. N Z Mines Rec—Sept. 16, 1903.

Westport Coal Company's Mine Creek Colliery. Urquhart Brand Inglis. Illustrations and brief description of colliery, with an outline of the method of getting out the coal. 1100 w. N Z Mines Rec—Oct. 16, 1903.

Nuneaton, Eng.—See COAL MINING MACHINERY—Stanley.

Paris Exposition.—See COAL MINE EXHIBITION.

Pittsburg & Buffalo Co.—The Pittsburg & Buffalo Coal Company's Mines. Illustrates and describes mines, showing the great advances made in coal mining by machinery, handling the coal, haulage, etc. 2500 w. Eng & Min Jour—Dec. 22, 1900.

Pittsburg, Thin Vein.—Mines Nos. 1 and 2 of the National Mining Co. James Collins. Illustrated description of the two best equipped mines in the Pittsburg thin-vein district. 2500 w. Mines & Min—Nov., 1905.

Poteau, Indian Territory.—The Poteau Coal Mines. Prof. W. R. Crane. An illustrated description of the modern equipment and methods of working employed. 3500 w. Mines & Min—Sept., 1905.

Price-Pancoast, Pa.—The Price-Pancoast Colliery. George W. Harris. A description of this colliery, especially the surface arrangements and methods of preparing the coal for market in practice in the Lackawanna region. Ills. Serial. 1st part. 2400 w. Eng & Min Jour—July 15, 1905.

Primero, Colo.—The Primero Mines. R. M. Hosea. An illustrated description of the extensive plant of the Colorado Fuel & Iron Co. for the mining and coking of coal. 4800 w. Mines & Min—June, 1904.

Pumping and Spraying.—The Pumping and Spraying Arrangements at a Bohemian Colliery. A. Padour, in "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrated description of Riedler pumping engines and spraying devices to keep the mines cool. 2000 w. Col Guard—Feb. 22, 1901.

See also COAL DUST—Sprinkling.

Queensland.—Queensland Coal Mines. Information from the annual report of W. Fryar, Inspector of Mines, Ill. 5500 w. Queens Gov Min Jour—May 15, 1903.

Redheugh.—See MINE HAULAGE.

Red Jacket, West Va.—Red Jacket Coal and Coke Co. Mines in Logan County, West Virginia. Frank A. Hill. An illustrated description of the coal, the mines and methods of handling. 2200 w. Mines & Min—Dec., 1902.

Rock Spring, Wyoming.—Rock Springs Coal Mines in Wyoming. Prof. Arthur Lakes. Notes on the formation, the mines, and methods of mining. 2000 w. Mines & Min—March, 1905.

Ronchamp.—Sinking and Installing a Shaft, 1,010 Metres in Depth, at the Ronchamp Collieries. From "L'Ingénieur Francais." Illustrates and describes the ventilation, sinking, winding engine, central engine house, air compressors and boilers. 2500 w. Col Guard—March 27, 1902.

Safety Explosives.—Experiments with Safety Explosives (Mitteilungen der Beggewerkschaftlichen Versuchsstrecke. Versuche mit Sicherheitssprengstoffen). Hr. Beyling. An account of experiments with various safety explosives for coal mines, undertaken at the mining companies' testing plant at Gelsenkirchen, Germany. 3500 w. Glückauf—May 9, 1903.

St. Etienne.—See COAL INDUSTRY—France; COAL MINE EXHIBITION—Paris; HOISTING—Safety Appliances.

Sakhalin.—The Coal Mines of the Island of Sakhalin (Der Steinkohlenbergbau auf der Insel Sachalin). F. F. Kleye. An account of the important developments of coal in the island of Sakhalin in the sea of Okhotsk at the mouth of the Amoor. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 10, 1900.

Sandwell.—Description of Sandwell New Sinkings, Warstone Fields, West Bromwich. H. C. Cole. Describes the pumping arrangements, boilers, sinking and hauling engines, etc. Ill. 1800 w. Ir & Coal Trds Rev—Nov. 23, 1900.

The Sandwell Park New Sinkings. H. C. Cole. Abstract of a paper contributed to the "Journal" of the British Society of Mining Students. Descriptive account. 1500 w. Col Guard—Dec. 7, 1900.

Scharnhorst-Dortmund.—The New Plant of the Scharnhorst Mine at Brackel near Dortmund (Die Neue Schacht-Anlage "Scharnhorst" in Brackel bei Dortmund). F. Schulte. Describing power plant, lighting, coal washing, pumping, etc., of a modern mining installation. 3500 w. 10 plates. Glückauf—Sept. 7, 1901.

South Hetton, Eng.—The South Hetton Coal Company's Collieries and Their Equipment. Interesting account of the collieries of South Hetton and Murton; the latter is said to be the most arduous, difficult and expensive mining undertaking on record. Ill. Serial. 1st part. 3200 w. Ir & Coal Trds Rev—Feb. 1, 1901.

South Wilkes-Barre, Pa.—The South Wilkes-Barre Colliery. Illustrates and describes one of the most gaseous mines in the anthracite region, the general plan of working, means of ventilation, and precautions to prevent mine fires. 1800 w. Eng & Min Jour—Sept. 22, 1904.

Spring Valley, Ill.—New Plant at Shaft No. 5 of the Spring Valley Coal Co., at Spring Valley, Ill. A. Dinsmoor. An illustrated description of the underground and surface arrangements. 3300 w. Mines & Min—Feb., 1902.

The Spring Valley Coal Company's Mines. Leo Gluck. An illustrated description of this coal field in Illinois, and the operation of the mines. 3500 w. Min Wld—Oct. 21, 1905.

Sprinkling.—See **Pumping and Spraying; COAL DUST.**

State Control.—See **Hibernia, Prussia.**

Subsidence.—Coal-Mining Subsidences in Relation to Sewerage Works. F. W. Mayer. Directs attention to the irregular nature of the protection against subsidencies from mining operations. 1000 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Temperature.—The Development of Heat in Coal Mines (Die Wärmeverhältnisse im Kohle-Führenden Gebirge). H. Höfer. A discussion of the ratio of the development of temperature with depth, with especial reference to the striking of a seam of water of 90 deg. F. at a depth of 1150 feet, near Teplitz, Bohemia. Serial. Part I. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 11, 1901.

Tennessee.—Brushy Mountain Coal Mines. A. W. Evans. An illustrated description of the coal, the methods of mining and the haulage plant. 2000 w. Mines & Min—May, 1901.

Tonkin, Indo-China.—The Coal Mines of Tonkin (Les Charbonnages du Tonkin). F. Schiff. A well illustrated description of some of the coal mines of French Indo-China and their exploitation. 3000 w. Génie Civil—March 14, 1903.

Truesdale, Pa.—The Truesdale Plant. Begins an illustrated description of one of the most complete anthracite collieries, having the largest breaker in the field, which is electrically operated. Serial. 1st part. 800 w. Eng & Min Jour—Sept 2, 1905.

Vancouver.—Coal Mining on Vancouver Island. An account, with illustrations, of the three collieries worked last year. 1100 w. Col Guard—March 1, 1901.

The Vancouver Coal Mines. An account of quite a number of changes in the mines of Vancouver Island during the past year. 1000 w. U S Cons Repts. No. 1020—April 25, 1901.

Vesta, Pa.—The Vesta No. 4 Colliery. Illustrated description of a mine in Western Pennsylvania, of interest because of its costly equipment. 2800 w. Eng & Min Jour—June 30, 1904.

Vesta No. 4 Mine of the Vesta Coal Co. at California, Pa. William L. Affelder. An illustrated detailed description of one of the finest equipped coal mines in the United States. 6500 w. Mines & Min—Feb., 1905.

Virginia.—Norton Coal Mines at Norton, Virginia. Robert Fleming. An illustrated description of the mines, the coal seams, and the methods of mining and handling the coal. 1200 w. Mines & Min—Feb., 1901.

Southwest Virginia Coal Belt. Joseph Virgin. An illustrated description of the coal and coke plant of the Virginia Iron, Coal & Coke Co. 1000 w. Mines & Min—Oct., 1901.

Watering.—See **Pumping and Spraying; COAL DUST.**

Whitehaven, England.—Improvements at the William Pit, Whitehaven Collieries, Cumberland. These collieries are remarkable for the large area of under-sea workings, and the long haulage. An illustrated account of changes in methods of working, and the introduction of endless rope haulage. 1200 w. Ir & Coal Trds Rev—April 19, 1901.

Wilczek, Austria.—See **COAL MINING—Filling; Waste Removal; Wilczek; EXPLOSIVE—Coal Mine.**

Windber, Pa.—The Windber Mine. J. S. Cunningham. Read before the Western Penn. Cen. Min. Inst. Plan of mine with description of underground haulage and mining methods as installed and used at Windber, Pa. 1800 w. Mines & Min—March, 1901.

Wyoming-Lackawanna, Pa.—See **Auchincloss, Pa.**

COAL MINE ACCIDENT.

See also **COAL MINE EXPLOSION; COAL MINE FIRE; FIREDAMP; MINE ACCIDENT; RESCUE APPARATUS; RESCUE STATION.**

America.—Fatal Accidents in Coal Mining in North America. F. L. Hoffman. Reviews the period 1890-1899 for the United States and Canada, with comments. 1300 w. Eng & Min Jour—Nov. 24, 1900.

Fatal Accidents in Coal Mining in North America. Frederick L. Hoffman. Comparative statistics covering the last decade, showing the fatalities in 1900 to be greater than in any other year. 1200 w. Eng & Min Jour—Aug. 10, 1901.

Fatal Accidents in Coal Mines in North America, 1901. Frederick L. Hoffman. Tabulated information with remarks. 900 w. Eng & Min Jour—Oct. 25, 1902.

Fatal Accidents in Coal Mines in North America, 1902. Frederick L. Hoffman. Statistics showing a decided increase in the fatal accidents. 1000 w. Eng & Min Jour—Sept. 5., 1903.

Fatal Accidents in Coal Mines of North America. Frederick L. Hoffman. Some facts bearing upon the gradual increase in the fatality rate. 900 w. Eng & Min Jour—Sept. 26, 1903.

Fatal Accidents in Coal Mining in 1903. Frederick L. Hoffman. A careful study of coal mine accidents in the United States. 1600 w. Eng & Min Jour—Dec. 22, 1904.

Donibristle.—The Donibristle Colliery Accident. Gives description of the colliery in Scotland, and an account of the accident, which was caused by a flow of soft peat or moss into the mine causing the loss of eight lives. Ill. 5500 w. Col Guard—Jan. 3, 1902.

Dortmund, Germany.—The Landslip in the Hansa Mine, near Dotrmund (Die Gebirgsschiebung in den Beiden Schächten der Zeche Hansa bei Dortmund). H. Dill. An account of the deformation in two deep shafts by the action of an underground landslip. 2500 w. Glückauf—Dec. 26, 1903.

1904.—Fatal Accidents in Coal Mining in 1904. Frederick L. Hoffman. A report of the facts with comment on the causes and conditions. 3500 w. Eng & Min Jour—Dec. 2, 1905.

Pennsylvania.—Accidents in Coal Mines of Pennsylvania. Facts from the report of the Chief of the Bureau of Mines for the year 1900. 4000 w. Mines & Min—Oct., 1901.

Pocahontas.—Disaster at Pocahontas Mines. Charles S. Thorne. An account of the disasters occurring on Nov. 14 and 22. 1500 w. Mines & Min—Jan., 1902.

Rescue Station.—See **RESCUE STATION—Altofts, Eng.**

Saxony.—Accidents in the Saxon Coal Mines (Die Betriebsunfälle beim Sächisschen Steinkohlenbergbau). Dr. G. Stein. With data from 1888 to 1809, showing the diminution in the number of accidents. 2500 w. Glückauf—Nov. 24, 1900.

COAL MINE BUILDING.

Recklinghausen, Westphalia.—The Administration Buildings of the Recklinghausen Mines (Das Kauen- und Verwaltungsgebäude der Zeche Recklinghausen I). H. Fuchs. An illustrated description, showing the toilet and bath arrangements for the miners, care of clothes, lamps, etc., as well as business offices. 2500 w. 2 plates. Glückauf—May 13, 1905.

COAL MINE EXHIBITION.

Düsseldorf Exposition.—The Exhibit of the Dortmund District Society of Mining Industry at the Düsseldorf Exposition (Die Kollektivausstellung des Vereins für die Bergbaulichen Interessen im Oberbergamtsbezirk Dortmund auf der Düsseldorfer Ausstellung 1902). Hr. Hecker. A review of an exhibit of coal mining, mining machinery, etc., with plan. 3500 w. Glückauf—April 26, 1902.

See also **COAL PREPARATION; COKE; MINING MACHINERY.**

London.—The Colliery Exhibition at the Royal Agricultural Hall, London. Brief illustrated descriptions of some of the more interesting exhibits. 16000 w. Ir Coal Trds Rev—July 3, 1903.

International Colliery Exhibition. A comprehensive illustrated description of the various exhibits at the Agricultural Hall, London. Serial. 1st part. 10800 w. Col Guard—July 10, 1903.

Paris.—Loire Collieries at the Paris Exhibition. Describes the exhibits of these collieries. 2800 w. Col Guard—Oct. 26, 1900.

Bethune Colliery at the Paris Exhibition. An illustrated account of the exhibit of this colliery, with a review of its history. 3300 w. Col Guard—Nov. 9, 1900.

Lens Collieries at the Paris Exhibition. An account of the exhibit made by one of the most important French collieries, showing the appliances used and methods of working. 4000 w. Col Guard—Nov. 16, 1900.

Lievin Colliery at the Paris Exhibition. An account of the exhibits made by this company, the methods of mining practiced, etc. 5300 w. Col Guard—Nov. 23, 1900.

Douchy Colliery at the Paris Exhibition. An account of the exhibits made by this colliery and of its deposit, method of working, etc. 2500 w. Col Guard—Nov. 30, 1900.

Roche-la-Molière and Firminy Collieries at the Paris Exhibition. Description of an interesting exhibit which obtained a grand prix. 5500 w. Col Guard—Dec. 14, 1900.

Bessèges Collieries at the Paris Exhibition. Describes the interesting exhibit of this colliery, the working, etc. 4600 w. Col Guard—Dec. 28, 1900.

The Saint-Etienne Collieries (Loire), France. Describes the exhibits made at the Paris Exhibition and gives statistics. Ill. 3000 w. Col Guard—Jan. 4, 1901.

See also **MINING—Paris Exposition.**

St. Louis.—Coal Mining at the Louisiana Purchase Exposition. Illustrated description of models showing works of some of the large bituminous coal companies. 2500 w. Mines & Min—Sept., 1904.

COAL MINE EXPLOSION.

See also **COAL MINE ACCIDENT; FIREDAMP; RESCUE APPARATUS; RESCUE STATION; SAFETY LAMP.**

Abertysswg, Wales.—The Abertysswg Colliery Explosion. Reported by Mr. S. T. Evans and J. S. Martin on the circumstances attending this explosion, which occurred at Mac Laren Colliery, Sept. 3, 1902. Serial. 2 parts. 8500 w. Col Guard—Jan. 30, 1903.

Berryburg, W. Va.—Berryburg Mine Disaster, W. Va. James W. Paul. A description of the mine, the conditions under which it was operated and the probable cause of the explosion. 3000 w. Mines & Min—Dec., 1901.

Blaendare, Eng.—Official Report on the Blaendare Explosion. Presents reports by S. T. Evans and Joseph S. Martin on the circumstances attending the explosion by firedamp, which occurred on Feb. 28, 1901. Ill. 3000 w. Col Guard—Aug. 2, 1901.

Boryslaw, Austria.—Gas Explosion at Boryslaw (Schlagwetterexplosion in Boryslaw). Johann Holobek. An account of the disastrous explosion of fire-damp in the Boryslaw mines, Galicia, Austria, June 2, 1902. Two articles, 1 plate. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 23, 30, 1904.

British.—See **SAFETY LAMP.**

Cambrian, Wales.—Cambrian Collieries Explosion. A report of the circumstances attending the explosion which occurred on March 10, 1905. 4000 w. Col Guard—Sept. 1, 1905.

Clydach, S. Wales.—The Clydach Vale Explosion, South Wales. James Ashworth. An account of this explosion, showing weak points of watering, and of construction in safety lamps. Ills. 3700 w. Mines & Min—Nov., 1905.

Compressed Air.—See **COMPRESSED AIR.**

Dahlbusch, Germany.—See **FIREDAMP—Surface Explosion.**

Dust.—The Origin of Coal-Dust Explosions. James Tinsley. Read before the Monmouthshire Colliery Officials Assn. Discusses the causes of these explosions, and urges that in mines yielding inflammable dust shot-firing be prohibited. 4300 w. Ir & Coal Trds Rev—Dec. 19, 1902.

Coal-Dust Explosions in Mines. W. H. Graves. Discusses the conditions under which they have occurred and the methods for their prevention. 3000 w. Mines & Min—Feb., 1905.

See also **Upper Silesia; COAL DUST.**

Dust Removal.—See **COAL DUST—Removal.**

Dusty Shots.—Dusty Shots as a Factor in Coal Dust Explosions. Henry S. Munroe. Gives instances showing that dusty shots, in combination with blown-out shots, must be taken into serious consideration in devising means for preventing such explosions. 3500 w. Eng & Min Jour—June 27, 1903.

Mine Explosions. J. T. Beard. Explosions due to excessive use of powder and other causes are discussed, and the energy developed in the combustion of powder and coal dust. Serial. 1st part. 3900 w. Mines & Min—June, 1905.

Dux, Bohemia.—The Gas Explosion in the Frischglück Mine at Dux (Die Brandgas Explosion auf der Frischglückzeche bei Dux). F. Okorn. A description of the disastrous gas explosion which occurred at Dux, in Bohemia, September 19, 1900, with an examination of the causes. Serial. Part I. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—June 1, 1901.

Electric Motor Test.—See **ELECTRIC EQUIPMENT—Coal Mine.**

Fernie, B. C.—The Fernie Colliery Disaster. C. H. Gibbons. An account of a disastrous explosion at Coal Creek, British Columbia, costing 151 lives. Ill. 1800 w. B. C. Min Rec—July, 1902.

The Fernie Colliery Explosion. A discussion of this disaster at the Fernie Coal Mines in British Columbia, which occasioned the death of 130 men or more, on May 22, 1902. 2800 w. Col Guard—July 25, 1902.

Fraterville, Tenn.—The Fraterville Mine Disaster. Official report of Hon. R. A. Shiflett, Commissioner of Labor, to the Governor of Tennessee, in regard to this coal mine explosion, in which 184 lives were lost. 5300 w. Mines & Min—March, 1903.

Hardwick, Pa.—The Harwick Mine Explosion. Report of the Commissioner of Mines by Board of Mine Inspectors who investigated immediately after the explosion. 7500 w. Mines & Min—May, 1904.

Johnstown, Pa.—The Mine Explosion at Johnstown. M. G. Moore. A statement of the facts relating to the explosion of fire damp in the rolling mill mine of the Cambria Steel Co., July 10, 1902. 6000 w. Jour Fr Inst—Aug., 1904.

Kansas.—Coal-Mine Explosions in Kansas. Report of a commission appointed to investigate the causes. 2000 w. Eng & Min Jour—March 16, 1905.

Explosions in Kansas. Report of Commission on the causes of recent explosions in coal mines of southeastern Kansas. 2500 w. Mines & Min—April, 1905.

Llanbradach, Wales.—The Llanbradach Colliery Explosion. Official report, by J. S. Martin, on the circumstances attending an explosion near Cardiff, on Sept. 10, 1901. 2800 w. Col Guard—Jan. 24, 1902.

Notes on the Llanbradach Explosion. A review of the report on this disaster, which occurred Sept. 10, 1901. 1800 w. Col Guard—Feb. 14, 1902.

Modlan, Bohemia.—The Gas Explosion at the Doblhoff Shaft at Modlan (Die Brandgas Explosion auf dem Doblhoff III Schachte in Modlan). Adolf Hummel. A detailed account of the disastrous mine explosion at Modlan, near Brüx, Bohemia, on April 30, 1902. Serial. Part I. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 7, 1903.

Mt. Kembla, N. S. W.—The Mount Kembla Disaster. An account of a terrible explosion in a colliery in New South Wales in which eighty-seven lives were lost. Also editorial. 2800 w. Aust Min Stand—Aug. 7, 1902.

Pennsylvania.—Mine Explosions. Austin King. Gives the history and cause of those occurring in the bituminous regions of Pennsylvania since 1883, and the lessons taught by them. 4200 w. Mines & Min—March, 1902.

Port Royal, Pa.—The Port Royal Mine Explosion. An account of the explosions on June 10th, with editorial on the prevention of mine accidents. 1800 w. Eng & Min Jour—June 22, 1901.

Red Ash, W. Va.—The Explosion at the Red-Ash Colliery, Fayette County, West Virginia. W. N. Page. Gives results of an examination to determine the extent and cause of the explosion that occurred March 6, 1900, destroying much property and many lives. 3500 w. Trans Am Inst of Min Engs—Aug., 1900.

Rescue Apparatus.—See **PNEUMATOPHORE; RESCUE APPARATUS.**

Rush, W. Virginia.—Rush Run Mine Explosions. W. F. Paul. An account of the two explosions at Rush Run and Red Ash mines, West Virginia, March 18 and 19, 1905. 4000 w. Mines & Min—Sept., 1905.

Sherman, Ill.—Peabody Coal Mine Explosion at Sherman, Ill. Richard Newsam. An illustrated account of an explosion caused by excessive use of powder. 2000 w. Mines & Min—April, 1905.

Talk-o'-th' Hill.—The Talk-o'-th'-Hill Colliery Explosion. Official report by W. N. Atkinson, H. M. inspector of mines, on an accident in Staffordshire, England. Ill. 5500 w. Col Guard—Jan. 31, 1902.

Notes on the Talk-o'-th'-Hill Explosion. An interesting account of the explosion which occurred May 27, 1901, killing four persons and twenty-seven horses and ponies. Also brief notes on other explosions. 2300 w. Col Guard—Feb. 21, 1902.

Universal.—The Universal Colliery Explosion. Prof. W. Galloway. From the official Home Office Report. Describes the method of working, ventilation and general conditions, the explosion, supposed cause, means of preventing, etc. 5800 w. Ir & Coal Trds Rev—Feb. 28, 1902.

Upper Silesia.—Coal Dust Explosions in Upper Silesia (Ueber Kohlenstaub-Explosionen in Oberschlesien). H. Knochenhauer. Detailed accounts of a number of explosions in coal mines, due to the ignition of the dust in the air. 5000 w. Glückauf—Oct. 29, 1904.

Wales.—Report on the Cwm Pit Explosion. Report of committee appointed to investigate the causes and circumstances of an explosion which occured in Wales on May 14, 1900. 2000 w. Col Guard—Nov. 30, 1900.

Colliery Explosion in South Wales. An account of a terrible explosion involving the death of 82 miners, occurring on the 24th of May at the Universal Colliery. 2800 w. Col Guard—May 31, 1901.

Watering Mines.—See **COAL MINE.**

Wattstown, South Wales.—The Wattstown Colliery Explosion. Notes on the disaster that occurred July 11, 1905, at Wattstown, South Wales, by James Ashworth, and an official report. 9000 w. Ir & Coal Trds Rev—Dec. 1, 1905.

The United National Colliery Disaster. An illustrated article giving facts in regard to the explosion which occurred on July 11, and describing the equipment of the mine. 1800 w. Ir & Coal Trds Rev—July 14, 1905.

Wiesa, Bohemia.—The Firedamp Explosion in the Pluto Shaft at Wiesa (Die Schlagwetterexplosionen auf den Plutoschächten in Wiesa). F. Okorn. Abstract of the official report upon the fatal explosion of Nov. 13, 1900. Serial. Part I. 1500 w. Two plates. Oesterr Zeitschr f Berg u Hüttenwesen—July 20, 1901.

Wigan, Eng.—Flameless Explosives and Coal Dust. James Ashworth. An account of the explosion on April 19, in the Four-feet mine of the Walthew House Colliery, near Wigan. 2100 w. Col. Guard—July 5, 1901.

Ziegler, Ill.—The Ziegler Mine Explosion. J. T. Beard gives the report of the Illinois State Mining Board with a brief description of results of the explosion. 2200 w. Mines & Min—June, 1905.

COAL MINE FIRE.

Underground Fires. F. W. Hardwick. Read before the International Fire Prevention Congress. Discusses the dangers, causes and means of prevention of mine fires. 5700 w. Col Guard—July 31, 1903.

Decazeville, France.—Fires in Coal Mines (Etude sur les Feux des Mines de Houille). J. Abadie. A study of the origin of fires in coal mines, and the most effective methods of controlling them, based upon experience in the Decazeville district, in the department of Aveyron, France. Serial. Part I. 2000 w. Génie Civil—Oct. 4, 1902.

Glace Bay, N. S.—The Mine Fire at Dominion No. 1 Colliery, Glace Bay, N. S. Shirley Davidson and Norman McKenzie. A description of the mine and the disaster, with illustrations and plates. 5400 w. Can Soc of Civ Engrs—Jan., 1905.

Gob-Fires.—God-Fires, Their Theory and Practice. George Farmer. Read before the Yorkshire Branch of the Nat. Assn. of Col. Mgrs. Deals with spontaneous combustion, and the problem of gob-fires, their causes, prevention, and means of extinction. 5800 w. Ir & Coal Trds Rev—Sept. 25, 1903.

The Problem of Gob-Fires. George Farmer. Read before the Inst. of Min. Engrs. Deals with spontaneous combustion and the problem of gob-fires, their cause, prevention, and extinction. Discussion. 4500 w. Ir & Coal Trds Rev—Sept. 16, 1904.

Milk of Lime.—The Handling of Underground Fires with Milk of Lime (Behandlung von Grubenfeuern mit Kalkmilch). Wolfgang Kummer. Describing a method of extinguishing fires behind masonry walls or closed workings by the injection of milk of lime under high pressure. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 9, 1904.

New South Wales.—The Occurrence of Underground Fires at the Greta Colliery, New South Wales. J. Jeffries. Abstract of a paper read before the Inst. of Min. Engrs. Gives the writer's opinion of the cause of the fires. 2200 w. Ir & Coal Trds Rev—June 9, 1905.

Pittsburg Region.—Mine Fires in Pittsburg Region. James Blick. Read before the Cent. Min Inst. of W. Penn. Gives their history and causes and methods used to subdue them, as gleaned from observation. 4600 w. Mines & Min—April, 1902.

Protection.—The Prevention and Extinction of Spontaneous Coal Fires in the Zwickau District (Die Entstehung, Verhütung, und Bekämpfung der durch Selbstenzündung von Kohle Hervorgerufenen Grubenbrände im Zwickaner Steinkohlenreviere). H. Brauns. A very complete account of practical methods of handling fires in coal mines. Three articles, 2 plates, 10000 w. Glückauf—May 28, June 4, 11, 1904.

COAL MINE GAS.

See **COAL MINE EXPLOSION; FIREDAMP; MINE GAS.**

COAL MINE HAULAGE.

See **ELECTRIC EQUIPMENT—Coal Mine; MINE HAULAGE.**

COAL MINE MANAGEMENT.

See also **COAL MINE; COAL MINER; MINE MANAGEMENT; STRIKE.**

The Management and Control of the Colliery. Wm. Blakemore. Mr. Blakemore's first paper is devoted to the discussion of standard practice in opening up the mine and conducting the underground workings. 3000 w. Engineering Magazine—July, 1901.

The Management and Control of the Colliery. W. Blakemore. Mr. Blakemore's second paper is devoted to the surface arrangements, and to details of general management. 2500 w. Engineering Magazine—Aug., 1901.

Anthracite Conciliation Board.—See **LABOR.**

Education.—See **EDUCATION—Mining Engineer.**

Machine Cutting.—A Puncher Machine Mine. Charlton Dixon. Discusses some of the Difficulties of management and their causes, with suggestions for obtaining the greatest efficiency of plant. 5000 w. Mines & Min—Nov., 1905.

See also **COAL MINING MACHINERY.**

Operator vs. Public.—The Coal Mine Operator versus the Public. Herman Justi. An address on "Coal Men's Day" at the Louisiana Purchase Exposition, St. Louis. Considers the peculiar conditions which have resulted in criticism of operators by the general public. 8000 w. Mines & Min—Nov., 1904.

Recklinghausen, Westphalia.—See **COAL MINE Building.**

Russia.—The Choice of a System of Development for a Mining Property (Die Wahl eines Ausrichtungssystems beim Abbaue einer Flözgruppe). B. Boky. A discussion of the conditions governing the choice of the method of working a mining district, with especial reference to Russian coal workings. Serial. Part I. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 25, 1905.

Strikes.—The Illinois Coal Operators' Plan for Removing the Occasion of Strikes. Herman Justi. How the plan originated and the method of accomplishing its object. 4000 w. Mines & Min—Jan., 1901.

COAL MINER.

See also **COAL MINE MANAGEMENT; MINER; STRIKE.**

Ankylostomiasis.—See **ANKYLOSTOMIASIS.**

Anthracite.—See **STRIKE.**

Anthracite Law.—See **MINING LAW—Pennsylvania Anthracite.**

Eight-Hour Bill—See **LABOR.**

Foremen.—Coal Mine Foremen and Labor-Saving Devices. L. C. Morganroth. Discusses the duties of the foreman, and some of the devices in use in different mines. 2000 w. Eng & Min Jour—Feb. 16, 1901.

France.—Labor Conditions at the Coal Mines of Northern France (Arbeiterverhältnisse und Arbeiter-Wohlfahrtseinrichtungen im Steinkohlenbezirk der Departments Nord und Pas-de-Calais in Nordfrankreich). Hr. Tittler. A review of the coal miners' work, social conditions, benevolent associations, etc., and illustrations of workmen's dwellings. 1 plate. 5500 w. Glückauf—May 10, 1902.

Pennsylvania Anthracite.—See **STRIKE.**

Pocahontas.—See **COAL REGION.**

Ruhr, Prussia.—The Condition of Miners in the Ruhr District (Die Lage der Bergarbeiter im Ruhrrevier). A review of the book of Dr. Pieper, showing the wages, cost of living, and general condition of the miners in the coal mining district of the Ruhr. 2500 w. Glückhauf—Nov. 28, 1903.

Trade Unions.—See **TRADE UNION—Coal Miner.**

Union.—See **TRADE UNION—Coal Mine.**

Wages' Assessment.—See **WAGES—Coal Miners' Assessment.**

Worm Disease.—See **ANKYLOSTOMIASIS.**

COAL MINE VENTILATION.

See **MINE VENTILATION.**

COAL MINING.

See also **COAL INDUSTRY; COAL MINE; COAL MINING MACHINERY; COAL REGION; MINE HAULAGE; MINING—Non-Metallic; TIMBERING.**

Colliery Engineering Progress. C. M. Percy. Reviews the early history of tunneling machines and of the application of compressed air power for running them. 3600 w. Mines & Min—Oct., 1901.

Coal Mining Methods. The characteristics of the deposits, which determine the method of mining, are described; the room-pillar and long-wall systems and their modifications, stating the conditions favoring long-wall mining. 2000 w. Eng & Min Jour—Nov. 18, 1905.

Austria.—See **SAXONY.**

Belgium.—Improved Mining Appliances in Belgian Collieries. A. Marcette, in "Annales des Mines de Belgique." An illustrated article considering method of deepening a pit from below, movable stage for lining a shaft, mono-rail haulage, etc. 1800 w. Col Guard—Dec. 24, 1903.

Bench Method.—Mining on the Bench Method of Working Adapted to Peculiar Conditions in the Clinch Valley Field of Southwestern Virginia. Charles Colcock Jones. Describes the conditions and the methods of working. 1000 w. Mines & Min—Dec., 1902.

Bengal.—See **Thick Seams.**

Bentrop System.—See **MINE SHAFT—Airtight Head Casings.**

Blasting.—See **BLASTING; COAL MINE EXPLOSION.**

Borneo.—Coal Mining in Borneo. Extracts from a paper by James Roden, read before the Min. Inst. of Scotland. Gives details of some of the mines and their methods of working. 1500 w. Col Guard—May 5, 1905.

British.—Coal Mines Inspection in 1901. A report of the West Scotland district. 3300 w. Col Guard —May 9, 1902.

Coal Mines Inspection in 1901. Report of the Swansea district. 1800 w. Col Guard—May 16, 1902.

Coal Mines Inspection in 1901. A report of the Midland district. 1800 w. Col Guard—May 23, 1902.

Coal Mines Inspection in 1901. A report of the Newcastle district concerning persons employed, output, accidents, etc. 1600 w. Col Guard—May 30, 1902.

Rise and Progress of Coal-Mining in the United Kingdom. Prof. R. A. S. Redmayne. Notes of the first of a series of lectures delivered at the University of Birmingham. The present article reviews the early history. 2500 w. Col Guard—March 6, 1903.

See also **Waste Prevention; COAL INDUSTRY; COAL MINE; COAL MINING MACHINERY.**

Canada.—The Development of Coal Mining in Canada. William Blakemore. A report on the abundance of coal in most parts of Canada, and its effect on the industries. 1500 w. Can Min Rev —Aug. 31, 1904.

Cost.—See **British; Scotland.**

Deep.—Problems of Thick Coal Workings in Deep Mines. Lawrence Holland. Read before the S. Staffordshire & E. Worcestershire Inst. of Min. Engrs. Describes conditions in mines 3,483 ft. in depth, offering suggestions for working. General discussion follows. 4000 w. Col Guard—Jan. 27, 1905.

See also **COAL-MINING MACHINERY.**

Dover, Eng.—See **SHAFT SINKING—Kind-Chaudron.**

Dredging.—See **COAL DREDGING.**

Drowned Workings.—Tapping Drowned Workings. W. B. Wilson, Jr. Abstract of a paper and the discussion before the N. of Eng. Inst. of Min. & Mech. Engrs. Describes the tapping at Wheatley Hill Colliery. The workings were those of Thornley Colliery, which, owing to a fire in 1858, it had been found necessary to drown out. 3000 w. Col Guard—Feb. 14, 1902.

Düsseldorf Exposition.—See **COAL MINE EXHIBITION; COAL PREPARATION; COKE; MINING MACHINERY.**

Explosive. — See **BLASTING; EXPLOSIVE—Coal Coal Mine.**

Filling.—The Hydraulic Filling-In of Coal Mine Workings at Myslowitz, Silesia (Scheibenförmiger Abbau Mächtiger Flötze unter Arwendung von Versatz mittelst Wasserspülung auf dem Steinkohlenbergwerk Myslowitz bei Myslowitz). Gustav Williger. From the "Zeitschrift des Oberschlesischen Berg-und Hüttenmännischen Vereins," giving a description of mining thick seams by taking out layers and filling in with sand and waste material hydraulically. 3000 w. Glückauf—Jan. 4, 1902.

The Hydraulic Packing of Coal Mines (Bergversatz mit Wasserspülung am Dreifaltigkeitsschachte). Karl Cizek. An address before the

Mining and Metallurgical Society of Moravian Ostrawa, giving a description of the filling of the workings of the Trinity coal mine, in Polish Ostrawa, Austria, with material from the surface conveyed hydraulically, in order to get out the pillars left standing. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen (Supplement)—April 25, 1903, and also with plate, May 30, 1903.

Packing Goaf with Sand and Granulated Slag by the Flushing Process. C. Cizek, in "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Describes this system, which has been successfully carried out, stating its advantages where applicable, and claiming a large recovery of coal. 700 w. Col Guard—June 12, 1903.

New Methods of Filling in the Goaf in Germany. From the report of Herr Williger, printed in the Report of the Prussian Commission on the Fall of Stone and Coal in Mines. Illustrates and describes the methods used, stating the advantages and difficulties and giving information of interest. 6000 w. Ir & Coal Trds Rev—Aug. 7, 1903.

See also **Waste Removal; Wilczek.**

Filling Compression.—The Compression of Stope Fillings. Bergassessor Jacob Oberhausen, in "Glückauf." Gives data as to the compressibility of the filling derived from experiments made at shaft No. 2 of the Kaiser mine in the Ruhr coal district. 1200 w. Sch of Mines Qr—April, 1905.

Flat Beds.—The Economic Theory of Shafts and Slopes for Flat Coal Beds. E. Brackett. A discussion of the economical means of raising the loaded mine cars for the purpose of screening the coal. Serial. 1st part. 2400 w. Eng & Min Jour—Sept. 20, 1902.

Gob.—Mining Under an Old Gob. Explains the conditions and the methods used in extracting coal under difficulties. 1500 w. Col Guard—March 14, 1902.

Hydraulic Cartridge.—The Hydraulic Cartridge. James Tonge, Jr. Awarded the Benjamin Shaw prize for industrial hygiene. A description of an appliance for breaking down coal in mines without the use of explosives, and of the mode of working. 2000 w. Jour Soc of Arts—Sept. 5, 1902.

Hydraulic Packing.—See **Filling; Waste Removal; Wilczek.**

Inclined Seams.—On the Best and Most Economical System of Working Coal Seams of a Moderate Inclination in South Wales. Ralph Hawtrey. Second Lewis Prize paper, 1900. Illustrates and describes the longwall system, discussing its advantages and applications. Also refers to the pillar and stall system. 8800 w. Ir & Coal Trds Rev—July 5, 1901.

Inclined Seams, France.—Methods of Working Coal in the North of France. An account of methods, principally in inclined seams, as given in the report of the Prussian Royal Commission. Ill. 1200 w. Ir & Coal Trds Rev—May 22, 1903.

India.—Cheap Coal Mining in India. An account of the methods of mining, the miners and their cheap labor. 1900 w. Am Mfr—Nov. 28, 1900.

Iron Bar Supports.—See **TIMBERING.**

Japan.—The Yubari Coal Mines in Japan. Gives the history, geology, methods of mining, and an illustrated description of the plant for preparing the coal. 1300 w. Mines & Min—May, 1903.

See also **COAL MINE.**

Kansas.—See **Stripping.**

Labor-Saving Levices.—See **Mechanical Devices; COAL MINER—Foremen; COAL MINING MACHINERY.**

Lining Galleries.—See **TIMBERING.**

Longwall.—A Modified Longwall System. Clarence R. Claghorn. Read before the Cen. Min. Inst. of W. Penn. Illustrated notes on the method employed at the Vintondale mine of the Vinton Colliery Company. 3500 w. Mines & Min—Aug., 1901.

The Action, Influence and Control of the Roof in Longwall Workings. H. G. Halbaum. (Prize essay). Gives conclusions drawn from experience and from mechanical aud geological theory. Serial. 1st part. 5200 w. Ills. Mines & Min—Sept., 1905.

Mechanical Devices.—Mechanical Devices at Coal Mines. L. L. Logan. Read before the Cent. Min. Inst. of W. Penn. Illustrates some improvements in car-dumps, mine-car running gear, and rock-dumping apparatus. 3500 w. Mines & Min—Feb., 1904.

Labor-Saving Devices in Coal Mining. R. V. Norris. An account of the manner in which some of the labor problems in coal mining have been met by the introduction of improved machinery. 3500 w. Engineering Magazine—Jan., 1905.

See also **COAL MINING MACHINERY.**

Mechanical Engineering.—Mechanical Engineering as Applied to Coal Mines, and Its Relation to the Economical and Successful Operation of the Same. William Glyde Wilkins. Read before the W. Penn. Cent. Min. Inst. 4200 w. Mines & Min—Feb., 1902.

The Mechanical Engineering of Collieries. T. Campbell Futers. The present article is introductory to a discussion of the mechanical engineering of modern mines, with all the recent improvements, and also of the yet unsolved problems. Serial. 1st part. 1000 w. Col Guard—Jan. 1, 1904.

Midland District, Eng.—Mining in the Midland District in the Nineteenth Century. A. H. Stokes. From the report of the inspector of the mines, showing the first fifty years as a period of slow development and crude methods, and the latter fifty as a period of great development and improved appliances. 6500 w. Col Guard—June 21, 1901.

Non-Fiery.—Some Points in the Working of a Non-fiery, Naturally Wet House Coal Seam. Discusses some of the difficulties and disturbances of small workings. 1700 w. Ir & Coal Trds Rev—May 15, 1903.

Packing.—See **Filling; Waste Removal.**

Pillars, Bohemia.—The Spacing of Pillars in the Brown-Coal Measures of Northwestern Bohemia (Schutzpfeilerbreite bei der Auskohlung des Braunkohlenflötzes in dem Nordwestböhmischen Becken). K. Balling. Giving the method of computing the pressures and the dimensions and spacing of pillars to sustain the roof with a minimum loss of coal. Serial. Part I. 1800 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 6, 1902.

Pitch.—Across the Pitch versus Up the Pitch. O. E. S. Whiteside. Read at the meeting of the Canadian Min. Inst. Discusses when each method is to be preferred, the manner of operating, etc. 1100 w. Eng & Min Jour—May 18, 1901.

Prospecting.—See **COAL PROSPECTING; COAL REGION—France.**

Prussia.—The Development of Mining in Prussia in 1900. Versuche und Verbesserungen beim Bergwerkbetriebe in Preussen während des Jahres 1900). Discussing especially explosives and coal cutting machinery. 1800 w. Glückauf—Aug. 17, 1901.

Rhenish-Wesphalia.—Methods of Working Coal in the Rhenish-Westphalian Basin. Abstract from a report by Maurice Bodart. Describes the characteristic features and the methods adopted. Ills. 4500 w. Ir & Coal Trds Rev—May 27, 1904.

Russia.—See **COAL-MINE MANAGEMENT.**

Saxony.—On the Methods of Working Coal in Saxony and Austria. Illustrates and describes the methods used in these collieries, and describes the working of lignite in northwest Bohemia. 2500 w. Ir & Coal Trds Rev—Oct. 7, 1904.

Scotland.—The Cost of Working Coal in Scotland. R. W. Dron. Discusses the increased cost of mining, the causes and the remedies. 2000 w. Ir & Coal Trds Rev—Dec. 5, 1902.

South Wilkes-Barre.—See **COAL MINE.**

Staffordshire.—A Method of Working. William Charlton. Read before the So. Staffordshire and E. Worcestershire Inst. of Min. Engrs., England. Illustrates and describes the method of working the thick coal seam in two sections, at the New Hawne Colliery, Staffordshire, England. 1500 w. Mines & Min—July, 1902.

Stope Filling.—See **Filling.**

Stripping.—Coal Stripping by Steam Shovel in Kansas. W. R. Crane. An illustrated description of the methods employed, the cost of the stripping operations ranging from 2 1-2 to 3 cents per cubic yard. 3200 w. Eng & Min Jour—Nov. 8, 1902.

Submarine, N. S. Wales.—Submarine Coal Mining. A. Selwyn-Brown. Information concerning the dangerous risks in the submarine mines of New

South Wales, due to the thinness and insecurity of the cover. 500 w. Eng & Min Jour—Nov. 18, 1905.

Tapered Props and Bars.—See **TIMBERING.**

Thick Seams.—Working a Thick Coal Seam in Bengal, India. Thomas Adamson. Describes a method by which it is claimed that ninety per cent. of the coal is obtained. Ill. 2400 w. Mines & Min—Aug., 1903.

Thin Seams.—The Working of Thin Coal Seams. Information from the presidential address of John Gerrard, before the Midland Inst. of Mining, Civil & Mech. Engs., showing the extent to which these seams are being worked in Great Britain. 1300 w. Col Guard—March 8, 1901.

See also **COAL MINE—Pittsburg Thin Vein.**

Timbering.—See **TIMBERING.**

United States.—See **COAL HANDLING; COAL MINING MACHINERY—American.**

U. S. Southwestern.—See also **COAL REGION.**

Wages and Profits.—See **COAL INDUSTRY—British.**

Waste Prevention.—The Waste in Working Coal in Great Britain. Walter S. Wardlaw. Prize essay. An illustrated article considering the two main systems of working coal, and the progress toward economy in working. 1700 w. Ir & Coal Trds Rev—Dec. 5, 1902.

Prevention of Loss and Waste in Coal-Working. John Brown. 2nd Prize Essay. Considers the causes of waste and offers suggestions for economy. 4000 w. Ir & Coal Trds Rev—Dec. 19, 1902.

Waste Removal.—Methods of Removing Sand at the Wilczek Mines in Polnisch-Ostrau (Mitteilungen aus der Praxis des Schlammversatzverfahrens auf dem Gräflich Wilczekschen Dreifaltigkeitschachte in Polnisch-Ostrau). J. Mauerhofer. Describing the method of removing the sand without choking the pipes. 2000 w. 1 plate. Oesterr Zeitschr f Berg p Hüttenwesen—Jan. 2, 1904.

Methods of Conveying Spoil at the Wilczek Mines in Polnisch-Ostrau (Mitteilungen aus der Praxis des Schlämmverfahrens am Gräflich Wilczeschen Dreifaltigkeitsschacte in Polnisch-Ostrau). J. Mauerhofer. The waste spoil of the mines is carried by the flow of water through pipes to the dump. Two articles. 1 plate. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 1, 8, 1905.

See also **Filling; Wilczek.**

Wilczek, Austria.—Mining Methods and Safety Measures in the Wilczek Mines in Polish Ostrawa (Ueber einige Baumethoden auf den Gräflich Wilczekschen Gruben in Polnisch-Ostrau und über Sicherheitsmassnahmen bei Denselben). Josef Mauerhofer. Illustrated description of timbering and other mining methods and safety appliances in Austrian coal mines. Serial. 2 Parts. 1 Plate. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 16 and 23, 1903.

Safety Appliance for Working Steep Seams. From "Zeitschrift für Berg-, Hütten-, und Salinenwesen." Brief illustrated description of arrangements used at the Wilczek coal mines in Polnisch-Ostrau, Austria. 300 w. Col Guard—July 3, 1903.

See also **Filling; Waste Removal; COAL WASHING.**

COAL-MINING MACHINERY.

See also **COAL MINING; ELECTRIC EQUIPMENT—Coal Mine; Mine; ELECTRIC PLANT—Coal Mine; MINE HAULAGE; MINING MACHINERY; ROCK DRILL.**

Coal Cutting by Machinery. Ernest Kilburn Scott. Contributed to the Inst. of Civ. Engrs. Reviews the history of mechanical coal cutting, giving illustrated descriptions of the various types of machines, and discussing the process used. 6500 w. Ir & Coal Trds Rev—Aug. 16, 1901.

Mechanical Appliances in Mines. R. H. Wainford. Calls attention to work which may be and is done at the coal face by drills and coal-cutters, as a means of economizing. 6000 w. Inst. of Mech Engrs—July 30, 1902.

Notes on Coal-Cutting by Machinery. A. Dury Mitten. Abstract of paper and discussion before the Manchester Geol. Soc. Considers the circumstances under which coal-cutting machines can be adopted; what machine and motive power is best; and the benefit. 2300 w. Ir & Coal Trds Rev—Feb. 13, 1903.

Notes on Coal-Cutting by Machinery. Abstract of a paper by A. Dury Mitten, and the discussion. Shows that the conditions of the present make the subject an important one, and discusses briefly the advantages and difficulties. 2000 w. Col Guard—Feb. 20, 1903.

On Coal-Cutting by Machinery. Owen Hughes. Read before the Manchester Geol. & Min Soc. Describes the system adopted with the machines, the timbering, average results of working, cost, and related matter. 6800 w. Ir & Coal Trds Rev—June 5, 1903.

Coal-Cutting by Machinery. Owen Hughes. Read before the Manchester Geol. & Min. Soc. A record of actual operations, under varying conditions, extending over a considerable period. 6800 w. Col Guard—June 12, 1903.

Notes on Percussive Coal-Cutters. Sir Thomas Wrightson and John Morison. Read at the Engng. Con. of the Inst. of Civ. Engrs. Discussion of why these machines which have proven profitable in America, have not been so considered in England. Describes a machine designed by the writers to meet British conditions. 1800 w. Engng—June 19, 1903.

Coal Cutting by Machinery. J. W. Chubb. Discusses the advantages of mechanical coal cutters, and reviews their history. Gives illustrated descriptions of various types. 5000 w. Feilden's Mag—July, 1903.

Coal-Cutting Machines (Haveuses Mécaniques Employées dans les Mines de Houille). J. Rosset. Illustrated descriptions of many kinds of drills and other coal-cutting machinery. Serial. Part I. 1600 w. Génie Civil—July 4, 1903.

Coal-Cutting Machinery. H. Baddeley. Read before the Nat. Assn. of Colliery Mgrs. Gives the writer's experience in this field, discussing the conditions favorable and unfavorable to the use of machinery and other points of interest. 3800 w. Ir & Coal Trds Rev—July 17, 1903.

Two Years' Experience in Winning Coal by Machinery. F. C. Kirkup. Read before the North of England Branch of the Nat. Assn. of Colliery Mgrs. An account of the writer's experience. Also discussion. 4000 w. Ir & Coal Trds Rev—Nov. 18, 1904.

America.—Mechanical Coal-Cutting in America. M. A. Bachellery. From a paper prepared for the Congress at Paris. Illustrates and describes machines and considers the results. 4300 w. Col Guard—Oct. 26, 1900.

Coal-Cutting by Machinery in America. Introduction to a series of articles giving interesting statistics concerning the cost of production. Also editorial. Serial. 1st part. 2800 w. Col Guard—July 5, 1901.

The Use of Coal Cutting Machinery in the United States (Ueber die Verwendung von Schrämmaschien beim Kohlbergbau der Vereinigten Staaten). Hr. Mellin. Describing the machines in general use and the extent to which they are used in America. 7500 w., 4 plates. Glückauf—Dec. 7, 1901.

American-German.—A German Report on Coal-Cutting Machinery in America. Excerpts from the report of Herr R. Mellin, which appeared in "Glückauf" of Dec. 7, 1901. Describes the conditions, methods of working, etc., and gives conclusions regarding the use of these machines in Germany. Comments also on various types. 3300 w. Col Guard—Jan. 17, 1902.

American vs. British.—A Comparison of Coal Resources and Coal Getting. A. S. E. Ackermann. A critical comparison of British and American coal mining practice, showing the cost reductions effected by mining machinery. 3000 w. Engineering Magazine—June, 1902.

British and American Coal-Cutting Machines. A. S. E. Ackermann. Abstract of a paper read before the Soc. of Engrs. Briefly reviews the history of these machines, describing British and American types, and giving statistics of interest. 5500 w. Ir & Coal Trds Rev—May 13, 1904.

British.—Coal-Cutting by Machinery. The first of a series of articles treating of the progress made as regards the introduction of this machinery in the United Kingdom, the difficulties and the conditions which conduce to success or failure. Serial. 1st part. Col Guard—Jan. 4, 1901.

Coal Cutting by Machinery in British Collieries.

Sydney F. Walker. Illustrated description of machines used. Serial. 1st part. 3000 w. Eng & Min Jour—March 8, 1902.

Coal-Cutting by Machinery. G. L. Kerr. Illustrates and describes types of machines used in the mines of the United Kingdom, their working, etc. Also discusses the conditions suitable for coal-cutting machines, timbering, motive power, cost, advantages and disadvantages. 18000 w. Ir & Coal Trds Revs—June 24, 1904.

British History.—Early History of Mining Machines in Great Britain. C. M. Percy. Describes some of the first coal-cutting machines and explains reasons why they did not succeed. 2800 w. Mines & Min—July, 1903.

Chain vs. Pick—Pick and Chain Machines. L. J. Daft. A comparison of the two types from the standpoint of an advocate of pick machines. 3300 w. Mines & Min—Sept., 1902.

Chain and Pick Coal Cutting Machines. An illustrated article comparing the two types from the standpoint of an advocate of chain machines. 2000 w. Min Rept—May 7, 1903.

The chain and the Pick Machines. H. S. Johnson. A comparison of the two types of coal-cutters from the standpoint of an advocate of chain machines. Ill. 1800 w. Mines & Min—June, 1903.

See also Pick.

Compressed Air.—Pneumatic Coal-Boring Machines and Tools. W. Lynch. Read before the S. Staffordshire and E. Worcestershire Inst. of Min. Engrs. (Abstract.) Briefly describes some of the tools and their operations. General discussion follows. Ill. 2500 w. Col Guard—Feb. 17, 1905.

Compressed Air Coal Cutters. L. T. Wightman. An illustrated description of the new Ingersoll type of puncher, also of the new "Radial" coal cutter. 3000 w. Mines & Min—May, 1905.

See also Electric vs. Compressed Air; COMPRESSED AIR; MINING MACHINERY; ROCK DRILL.

Deep Mining.—The Application of Coal-Cutting Machines to Deep Mining. W. E. Garforth. Read before the Midland Inst. of Min., Civ. and Mech. Engrs. An illustrated article claiming that the difficulties experienced in deep mining may be overcome, and the coal worked economically. Serial. 1st part. 2800 w. Col Guard—July 1, 1902.

The Application of Coal-Cutting Machines to Deep Mining. W. E. Garforth. Read at Nottingham Univ. College. An illustrated article comparing the method of working longwall packgate by hand and by machine, stating the advantages and disadvantages and the qualification a machine should possess. 6400 w. Ir & Coal Trds Rev—May 6, 1904.

Drill.—Use of Ratchet and Other Hand-Machine Drills in the Cleveland Mines. William Charlton. Read before the N. of Eng. Inst. of Mech & Min. Egrs. Brief account of the practice in these mines and the advantages. 1500 w. Ir & Coal Trds Rev—Sept. 19, 1902.

See also MINING MACHINERY.

Durham.—Electric Coal-Cutting Plant at the Lambton Collieries Co., Durham. An account of a visit of the N. of Eng. Inst. of Min. Engrs. to these collieries, with description of interesting methods observed. 2500 w. Col Guard—Sept. 12, 1902.

Eisenbeis.—The Champion Eisenbeis Coal-Cutter. Illustrated description of a machine of the pneumatic percussive type, fixed to a rigid vertical steel column. 1000 w. Col Guard—Feb. 7, 1902.

Electric.—Electric Coal-Mining Plants. S. B. Belden. Shows the process by which they have been developed to meet the various requirements in different seams of coal. 3200 w. Mines & Min—Sept., 1903.

Electric Coal-Cutting. W. Walker. Abstract of a paper read at the Nottingham meeting of the Inst. of Min. Engrs. Gives experience with coal-cutting machinery in the hard coal at Digby Colliery and the New London collieries. Discussion. Serial. 1st part. 2800 w. Col Guard—Sept. 18, 1903.

Electrical Mining Notes. Sydney F. Walker. Reviews the excursions of Inst. of Min. Engrs., of England, to Sherwood and Glapwell collieries, describing their electric plants. Serial. 1st part. 1400 w. Elec Rev, N Y—Nov. 14, 1903.

Electrical Apparatus for Coal Mining. W. B. Clarke. Discusses recent developments in connection with electrical apparatus for the mining of coal. 4000 w. Trans Am Inst of Min Engrs—Feb., 1903.

Electrical Apparatus for Coal Mining. A reply to the discussion by W. L. Saunders of the paper of W. B. Clarke presented at the Albany meeting, Feb., 1903. 3600 w. Trans Am Inst of Min Engrs—May 18, 1904.

See also ELECTRIC EQUIPMENT—Coal Mine; Mine; ELECTRIC PLANT; MINING MACHINERY.

Electric Polyphase.—Three-Phase Electric Driving Applied to Coal-Cutting. Roslyn Holiday, in the "Journal of the British Soc. of Min. Students." Gives reasons for adopting this system, and some of the experiences before success was assured. 1400 w. Col Guard—Oct. 31, 1902.

Electric, Tests.—See MINING MACHINERY.

Electric vs. Compressed Air.—Compressed Air and Electricity in Mining Operations. W. L. Saunders. A discussion of the paper of W. B. Clarke, on "Electrical Apparatus for Coal-Mining." 5000 w. Trans Am Inst of Min Engrs—Feb., 1903.

Electrical Apparatus for Coal-Mining. W. L. Saunders. Remarks made in discussing the paper on this subject by W. B. Clarke, at the Albany meeting of the Am. Inst. of Min. Engrs. 5000 w. Compressed Air—May, 1903.

Power for Coal Mining Machinery. G. B. Lynch. Considers the relative efficiencies and advantages of compressed air and electricity, and the machines and uses to which each is adapted. Ills. 4000 w. Mines & Min—June, 1905.

See also MINE HAULAGE.

Germany.—Machinery in Ruhr Coal District at the Beginning of the 20th Century (Das Maschinenwesen im Ruhrkohlenbergbau zu Beginn des 20 Jahrhunderts). Dr. H. Hoffmann. Discussing the present employment of electric hydraulic, and pneumatic machinery in the Prussian coal mines. 5000 w. Zeitschr d Ver Deutscher Ing—June 1, 1901.

Experiments with Coal-Cutting Machinery in the Ruhr District, Germany (Versuche mit Schrämmaschinen im Ruhrkohlenbecken). Hr. Kier. A discussion of coal cutting by machinery and illustrated descriptions of various machines. 3 plates. 7500 w. Glückauf—July 5, 1902.

Experiments with Coal-Cutting Machines in the Ruhr District. Bergassessor Kier, in "Glückauf." An illustrated account of experiments made with American and German machines, describing the machines and reporting results. 3500 w. Col Guard—Oct. 31, 1902.

History.—See British History.

Longwall.—See Deep Mining; COAL MINING.

Mechanical Engineering.—See COAL MINE.

Nuneaton, Eng.—See Stanley.

Percussive.—Experiments With Percussive Coal-Cutting Machines (Versuche mit Stossenden Schrämmaschinen). Hr. Brandl. An account of tests of coal-mining machines acting by percussion and using compressed air, in the Dortmund district, Germany. Tables. 1000 w. Glückauf—July 4, 1903.

Pick.—The Historical Development of the Pick Type of Mining Machine. L. J. Daft. Historical review noting the changes and improvements that have led to the present machine. General discussion. Ill. 9000 w. Pro Engrs' Soc of W. Penn—Nov., 1901.

Pick vs. Chain.—See Chain vs. Pick.

Pneumatic.—See Compressed Air; Electric vs. Compressed Air; COMPRESSED AIR; ROCK DRILL.

Ruhr District.—See Germany.

Stanley.—Opening-Out Coal Royalties by Machinery. Illustrates and describes the Stanley coal-heading machine used at the Nuneaton new colliery. 1100 w. Col Guard—Jan. 11, 1901.

The Use of Stanley Coal-Heading Machines in the Rapid Development and Working of the Nuneaton Colliery, Warwickshire. F. C. Swallow. On the geology of this district, the coal seams, the working and costs, with discussion. 2500 w. Col Guard—Sept. 11, 1903.

Tests.—Tests of a Coal Cutting Machine (Versuche miteiner Schrämmaschine mit Drehendem Schrämwerkzeug). Giving the time required to cut various areas, with a revolving spindle cutter driven by compressed air motor. 800 w. Glückauf—Jan. 28, 1905.

See also **MINING MACHINERY—Electric, Tests.**

United States.—See America.

COAL PIER.

See also **COAL HANDLING; COALING STATION; COAL STORAGE; PIER—Coal.**

Duluth, Minn.—See BLAST FURNACE.

COAL POCKET.

See **COAL BIN; COAL CHUTE; COAL HANDLING; COALING STATION; COAL STORAGE.**

COAL PREPARATION.

See also **COAL ANALYSIS; COAL BREAKER; COAL CRUSHER; COAL HANDLING; COAL MINING; COAL SCREENING; COAL WASHING.**

Alabama.—See COAL.

Alstaden, Germany.—The Screening, Washing and Briquetting Plant at Alstaden (Sieberei, Wäsche, und Brikettfabrik der Aktiengesellschaft Alstaden). An illustrated description of a modern coal handling and preparing plant recently installed near Oberhausen. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—May 14, 1904.

Anthracite.—The Screening of Anthracite. Diagram and description illustrating the system employed in the breakers of the D., L. & W. R. R. Co., and considered typical of the best practice. 1300 w. Col Guard—Sept. 20, 1901.

The Separation of Anthracite Coal from Slate. Guy H. Elmore. Address before the Engrs. Club of Scranton. Suggests applying ore concentration practice to coal washing or separating. 1000 w. Eng & Min Jour—Dec. 17, 1903.

Mechanical Slate-Pickers. Considers appliances used in the dry method of separating the slate from anthracite coal. Ill. 2500 w. Eng & Ming Jour—Feb. 25, 1904.

The Preparation of Anthracite in the Schuylkill Region of Pennsylvania. Illustrates and describes the methods and machinery employed at the Hammond breaker, near Shenandoah. 2000 w. Mines & Min—Jan., 1905.

The Preparation of Anthracite. Notes the changes that have taken place in the practice during the past twenty-five years. Ill. 2300 w. Mines & Min—March, 1905.

Anthracite-Washeries. George W. Harris. A discussion of the waste in the breaker, represented by the old culm-banks, and the steps taken to diminish it. 4000 w. Ills. Am Inst of Min Engrs—Nov., 1905.

Baum System.—Coal Washing and Screening Plants. Illustrates and describes the Baum system and its working. 3800 w. Ir & Coal Trds Rev—July 24, 1903.

Belgium.—New Coal-Screening and Washing Plant at a Belgian Colliery. J. de Jaer. From the "Annals des Mines de Belgique." Illustrated description. 800 w. Col Guard—Aug. 16, 1901.

Bethune, France.—The New Shaft Equipment and Washing Plant of the Bethune Mining Company (Bemerkungen über die Neueste Schachtanlage 10 und die Zentralwäsche der Bergwerksgesellschaft Bethune). Describing one of the latest coal mining plants in Northern France, with plate showing general arrangement. 2500 w. 1 plate. Glückauf—June 30, 1905.

Classifying.—The Schüchtermann & Kremer and Humboldt Coal-Classifying Plant. Illustrated description of the coal-classifying and washing plant in use at the Grillo shaft of the Monopol Colliery, for dealing with 100 tons of coal per hour. 1400 w. Col Guard—Dec. 5, 1902.

Dahlbush, Germany.—Coal Screening and Washing Plant at a German Colliery. Illustrated detailed description of a plant at the Dahlbusch Colliery. 1600 w. Col Guard—Jan. 8, 1904.

The New Separation and Washing Plant of the Dahlbusch Mine (Die Neue Separation und Wäsche des Schachtes VI. der Zeche Dahlbush). Illustrating the screens, conveyors and general arrangement of the entire plant. 1200 w. 1 plate. Glückauf—June 4, 1904.

The Electrically-Driven Preparation Plant of the Dahlbusch Mines (Untersuchung der Elektrisch Betriebenen Aufbereitungs-Anlagen auf Zeche Dahlbusch III-IV-VI). A general account of the results of tests of an electrically-driven coal cleaning plant, with tables and diagrams showing power consumption. 6000 w. Glückauf—March 31, 1905.

Dortmund, Germany.—The Screening and Washing of Coal in the Dortmund District of Germany. Abstracted from a paper by Herr Jungeblodt in the "Zeitschrift für das Berg, Hütten und Salinenwesen." The present article reviews the history of coal washing, tracing the improvements made since the beginning, 50 years ago. Ill. Serial. 1st part. 2800 w. Ir & Coal Trds Rev—Nov. 7, 1902.

Düsseldorf Exposition.—Coal Preparation at the Düsseldorf Exposition of 1902 (Ueber die Kohlenaufbereitung auf der Düsseldorfer Ausstellung 1902). C. Blömeke. Describing a number of systems and devices for washing, screening and classifying coal. Two articles. 6000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—June 4, 1904.

Germany.—The Preparation of Coal (Kohlenaufbereitung). Alfred Müller. A discussion of the methods employed in Germany to aid hand picking in the separation of slate, dirt and other impurities from coal. 1800 w. Zeitschr d Ver Deutscher Ing—Nov. 28, 1903.

Slate Picking.—See Anthracite.

COAL PROSPECTING.

See also **COAL REGION—France.**

Prospecting for Coal in the Western States. Prof. Arthur Lakes. Points of resemblance and points of difference between the western and eastern coal fields. 2500 w. Mines & Min—June, 1902.

Recent Practice in Examination of Coal Lands. George H. Ashley. States the main things to be determined, and outlines the methods now used. 1700 w. Min Wld—May 6, 1905.

COAL REGION.

See also **COAL; COAL GEOLOGY; COAL INDUSTRY; COAL MINE; COAL MINING; MINERAL REGION.**

Alabama.—The Warrior Coal Basin of Alabama. Henry McCalley. Its location, geological peculiarities, the thickness of the coal seams, and facilities for transportation. 2300 w. Mines & Min—Jan., 1900.

The Warrior Coal Basin. Henry McCalley. From reports of the Alabama Geol. Survey. Describes the basin area and the deposits. 2500 w. Ir & Coal Trds Rev—March 15, 1901.

The Alabama Coal Fields. Henry McCalley. Their location and characteristics with an account of the early discoveries and development and the present output. Ill. 4000 w. Mines & Min—May, 1901.

The Pratt Coal Mines in Alabama. W. R. Crane. Information concerning the production of coal in Alabama, its character, quality, etc., with illustrated description of the Pratt mines and methods of mining. 3500 w. Eng & Min Jour—Jan. 26, 1905.

Alaska.—The Kayak Coal and Oil Fields of Alaska. P. C. Stoess. Locates the district, describing the formations and deposits. 2000 w. Min & Sci Pr—Aug. 1, 1903.

Petroleum and Coal Fields of the Pacific Coast of Alaska. George C. Martin. From the Geol. Surv. Bul. on this subject. An illustrated article giving information of these fields, their development, deposits, etc. 2500 w. Sci Am Sup—June 24, 1905.

The Outlook for Coal-Mining in Alaska. Alfred H. Brooks. Information in regard to fuel-consumption in Alaska, the known coal-bearing rocks, the composition and fuel value of the coals, the coal fields, etc. 6000 w. Map. Am Inst of Min Engrs—July, 1905.

See also **Pacific Coast.**

Alberta, Canada.—The Alberta Coal Field. L. K. Armstrong. General information concerning the Canadian coal fields of Alberta and East Kootenay in British Columbia. Map. 1500 w. Min Rept—Nov. 24, 1904.

Geological Sketch of the Bankhead Coal Field. J. M. Turnbull. An illustrated article describing an unusual formation, and giving brief account of development, and other information. 2700 w. Can Min Rev—Nov. 30, 1904.

The Blairmore-Frank Coal Field, Alberta, Canada. E. Jacobs. A description of a comparatively new coal field that is being rapidly opened. Ills. 4000 w. Mines & Min—Feb., 1905.

Allegheny Valley, Pa.—The Allegheny Valley Coal Fields. William Gilbert Irwin. Concerning these productive fields as recently developed. 1200 w. Eng & Min Jour—Aug. 24, 1901.

Arkansas.—The Arkansas-Indian Territory Coal Field. Franklin Bache. Describes the deposits and gives an account of the workings. 2800 w. Eng & Min Jour—Sept. 12, 1903.

The Coal Fields of Arkansas and Indian Territory. Carl Scholz. Brief illustrated description. The coals are bituminous and semi-anthracite. 1200 w. Min Mag—June, 1903.

Coal Mining in Arkansas. W. R. Crane. Describes and illustrates the deposits, methods of mining, preparation of the coal, etc. 3300 w. Eng & Min Jour—Oct. 28, 1905.

Asia.—Coal and Petroleum in Central Asia. E. D. Levat. Translated from paper entitled "Richesses Minérales des Possessions Russes en Asia Centrale." Concerning the deposits, their location, geology, etc. 2300 w. Eng & Min Jour—April 7, 1904.

Assam.—The Makum Coal Field in Assam. George E. Harris. Abstract of a paper read before the Manchester Geol. Soc. Describes these fields in India, the deposits and collieries of this district, and the transportation facilities. 1200 w. Eng & Min Jour—Jan. 26, 1901.

Australia.—The Coal Resources of Australia. James Stirling. Report of a lecture in London. A review of the coal beds of the separate colonies, with illustrations. 2000 w. Col Guard—May 9, 1902.

See also **Queensland; Victoria; Western Australia.**

Austria.—The Rossitz Coal District (Das Rossitzer Kohlenrevier). J. Sauer. A description of the geology and methods of mining in this important coal district of Moravia, Austria. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 19, 1901.

B. & O. Seaboard.—Seaboard Coal Regions Along the Baltimore and Ohio Railroad. Beverley S. Randolph. Report of the Fairmont, Tunnelton, Georges Creek, and Meyersdale regions. Ills. 1500 w. Min Mag—March, 1905.

Belgium.—See **COAL GEOLOGY.**

Big Sandy.—The Norton Coals of the Big Sandy Basin. H. W. Althouse. An illustrated description of deposits in Virginia and Kentucky. 1400 w. Eng & Min Jour—Feb. 11, 1904.

Borneo.—The Government Mines, Sadong-Sarawak, Borneo. Extracts from a paper by B. Hart Huxham, read before the S.-Wales Inst. of Engrs. Information in regard to this coal field and its development. Serial. 1st part. 2000 w. Col Guard—April 28, 1905.

British.—British Coal Fields; Their Extent, Duration and Condition of Working. The first of a series of twenty or more articles on the most prominent features and the most recent phases of this industry. Serial. 1st part. 2000 w. Ir & Coal Trds Rev—Dec. 6, 1901.

British Columbia.—Coal Discoveries in British Columbia. An account of a recent trip into the center of the province, with particulars of the coal discoveries. 1800 w. Col Guard—Dec. 20, 1901.

British Columbia Coal Fields. William M. Brewer. Describes the various coal fields and collieries on Vancouver Island and the main land. 4800 w. Eng & Min Jour—March 22, 1902.

The Coal Fields of Crow's Nest Pass, British Columbia. E. Jacobs. A fully illustrated account of the district, describing its geology together with the equipment, methods, and importance of the mines. 4000 w. Engineering Magazine—April, 1904.

The Nicola-Coldwater Coal Beds. Horace F. Evans. A description of the geology of this valley in British Columbia. 2500 w. Min Wld—Aug. 19, 1905.

See also **Crow's Nest Pass; Queen Charlotte Islands; Vancouver; COAL MINE; IRON REGION.**

Buller, N. Z.—See **New Zealand.**

Canada.—The Coal and Iron Resources and Outlook of Canada. The present article is an introductory review. Serial. 1st part. 2000 w. Ir & Coal Trds Rev—Dec. 4, 1903.

The Coal and Iron Resources of the Dominion of Canada. An illustrated review of the resources, discussing their value, development, &c. 12800 w. Ir & Coal Trade Rev—May 6, 1904.

Canada's Fuel. On the location of the coal fields, character of the deposits, quantity mined and consumed, etc. 1500 w. Engr, Lond—Jan. 13, 1905.

See also **Alberta; British Columbia.**

China.—Anglo-Chinese Coal Developments. Editorial on the transfer of the Kia-ping coal mines in Northern China, from a native to an English company, and the immense deposits. 1200 w. Engng—Aug. 23, 1901.

The Coal Fields of Northeastern China. Noah Fields Drake. An account of the K'ai-p'ing, P'ing-Ting and Tsê Chou fields, with general remarks and illustrations. 5600 w. Trans Am Inst of Min Engrs—Feb., 1901.

The Kaiping Coal Mines and Coal Field, Chihle Province, North China. Herbert C. Hoover. Read before the Inst. of Min. & Met. Gives the location, history, geology, character of the coal, coking qualities, mines and methods, and general information. 2200 w. Col Guard—June 25, 1902.

Notes on the Coal and Iron Fields of Southeastern Shansi, China. William H. Shockley. A record of observations made in the service of the Pekin Syndicate during the first months of 1898, in one of the largest anthracite regions known. Ills. 10800 w. Trans. Am. Inst of Min Engrs—Oct., 1903.

Chinese Coal Developments. Information concerning these extensive deposits, their value and extent, and the development which is to be made possible by the approaching completion of the railway to Taokou. 1600 w. Engng—Dec. 30, 1904.

Colorado.—The Coal Fields of Routt County, Colorado. Describes a new field on the line of railroad being built between Denver and Salt Lake City, which will doubtless be greatly benefited by the construction of this road. Map. 2500 w. Eng & Min Jour—Nov. 1, 1902.

The Yampa Coal Fields. Prof. Arthur Lakes. An illustrated description of the anthracite, bituminous and lignite field traversed by the Moffat road in Routt County, Colorado. 1800 w. Mines & Min—Jan., 1904.

The Yampa Coal Field of Routt County, Colorado. A. Lakes. Brief description of this field which contains the largest area of workable anthracite known in the State. Ills. 900 w. Min Rept—April 20, 1905.

Coal Fields of Routt County, Colo. Describes one of the best coal fields of the Rocky Mountain region. 1500 w. Min Wld—Sept. 9, 1905.

Coal Resources Along the Line of the Moffat Road. Arthur Lakes. Describes the two principal sources of coal along the route of this railway in Colorado, the character and quality of the coal, and the general geology of the region. Serial. 1st part. 1600 w. Min Wld—Nov. 11, 1905.

Aguilar Coal and Oil District. Prof. Arthur Lakes. A description of the geology, the thickness and quality of the coal veins, and the indications of oil in this field in Colorado and New Mexico. 3300 w. Mines & Min—Dec., 1902.

The Trinidad or El Moro Coal Region of Colorado. Abstract of a monograph by Prof. R. G. Hills of U. S. Geol. Survey. Gives illustrated description of the geology of the region, its mines, etc. 2500 w. Mines & Min—Jan., 1903.

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Zwickau, Germany.—Map of the Zwickau Coal District (Uebersichts-Karte des Zwickauer Steinkohlenreviers). J. Treptow. General description of the district, with map showing the location of the collieries. 1800 w. 1 plate. Glückauf—Aug. 5, 1905.

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See also **COAL HANDLING; COAL PREPARATION; COAL WASHING.**

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Abrams, Pa.—The Largest Coal Storage Plant in the World. An illustrated description of the new plant of the Philadelphia & Reading Coal & Iron Company under construction at Abrams, Pa. It will have a capacity of 500,000 tons. 3000 w. Ir Age—Jan. 5, 1905.

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Boston, Edison.—See **COAL HANDLING.**

Concrete Reinforced.—See **Lowell Gas Co.**

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Manila.—See **HARBOR.**

Maryland Steel Co.—A Circular Storage System for 50,000 Tons of Coal. Illustrates and describes an interesting plant recently installed at the works of the Maryland Steel Co. at Sparrow Point, near Baltimore, for the handling and storage of soft coal. 800 w. Ir Age—June 4, 1903.

Neu Essen Coal Mine.—Coal-Bunker Plant at a German Colliery. Herr Stach, in "Glückauf." Brief description with illustration of the plant and its operation. It is claimed to give economical results and cleanliness. 600 w. Col Guard—Jan. 23, 1903.

New England Gas & Coke Co.—See **COAL HANDLING.**

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Shadyside, N. J.—The Shadyside Coal Storage Plant of the New York Edison Co. Illustrated description of the plant and its handling apparatus. It provides for 100,000 tons of anthracite and 50,000 tons of bituminous coal. 1500 w. Eng Rec—May 13, 1905.

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See **GAS MANUFACTURE; GAS, WATER; TAR.**

COAL TEST.

See **CALORIFIC VALUE; CALORIMETRY; COAL ANALYSIS; FUEL TEST.**

COAL TIPPLE.

See also **COAL MINE; HEAD FRAME.**

The Use of Steel for Coal Mine Tipples. George S. Rice. Abstract of a paper read before the W. Soc. of Engrs. A discussion of tipple construction, and the reasons why steel is better than wood; the vibrations caused by the introduction of shaking screens, &c. Constructional features are considered in detail. Ills. 3000 w. Eng News—June 16, 1904.

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Dumping Devices. W. R. Crane. Illustrates and describes dumping devices largely employed in discharging the contents of cars. 2000 w. Eng & Min Jour—April 13, 1905.

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Ocean.—The Leading and Carriage of Sea-Borne Coal. F. Seaton Snowden. A well illustrated account of modern colliers and coal-loading machinery, with references to America's growing export trade. 2500 w. The Engineering Magazine—Nov., 1900.

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River Fleet.—The Ohio River Coal Fleets. H. C. Fithian. An illustrated account of the methods of handling the vast quantities of coal distributed via the Ohio River to the West and South. 3000 w. Marine Engng—Oct., 1901.

The Coal Fleets of the Great Kanawha River. H. C. Fithian. An illustrated article giving particulars and describing unique features. 2800 w. Marine Engng—June, 1903.
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COAL WASHING.

See also **COAL HANDLING; COAL PREPARATION; COAL SCREENING.**
Principles of Coal Washing. Samuel Dieseller.

Why and to what extent classification as to sizes affects the separation of minerals of different specific gravity. 2500 w. Mines & Min—Aug., 1902.

Studies on Coal Washing. L. Moulan, in "Soc. Ingen. Ecole d'Industrie du Hainaut." Deals with the operation from the standpoint of the management of the washing water and the recovery of the sludge. Ill. 1800 w. Col Guard—Nov. 21, 1902.

Alabama.—Coal Washing in Alabama. Erskine Ramsay and Charles E. Bowron. Reports an increase in the use of the process, illustrating and describing plants using Stewart washers and Robinson-Ramsay washers. 3500 w. Mines & Min—Dec., 1904.

Aldridge, Montana.—Washing Montana Coal. J. V. Schaefer. An illustrated description of the washing of the Montana Coal & Coke Co., at Aldridge, Park Co., Montana. 1300 w. Mines & Min—Dec, 1903.

Anthracite.—See Scranton; **COAL PREPARATION.**

Bathgate, England.—Coal-Washing Plant at Bathgate. Illustrated particulars of the plant at the Mosside Colliery. 2000 w. Col Guard—Sept. 5, 1902.

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Bituminous.—Bituminous Coal Washing. L. A. Harding and G. R. Delamater. Illustrated article describing various methods employed. Serial. 1st part. 4300 w. Mines & Min—April, 1905.

British.—Coal Washing in Great Britain. James Tonge. A description of the various methods employed and the different types of jiggers, trough washers, and wasting tables, giving costs. Ills. 5800 w. Mines & Min—Dec., 1904.

Campbell.—The Campbell Coal-Washing Table. Clarence R. Claghorn. An illustrated description of an American washer. 1100 w. Ir & Coal Trds Rev—June 6, 1902.

A Modern Method of Coal Washing. C. A. Meissner. Read before the Nova Scotia Min. Soc. Illustrated description of the Campbell coal washing table. 1500 w. Eng & Min Jour—May 9, 1903.

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Cokedale, Kan.—The Eastern Coal and Coke Company's Washer at Cokedale, Kan. W. R. Crane. Illustrated detailed description. 1600 w. Eng & Min Jour—Sept. 20, 1902.

Collinsville, Ill.—Coal Washing. D. F. Cameron. An illustrated description of the coal-washing plant of the Donk Brothers Coal & Coke Co., at Collinsville, Ill. 3800 w. Mines & Min—Sept., 1901.

Colorado.—Tercio and Cuatro Mines. R. M. Hosea. An illustrated description of the coal washing and coking plants of the Colorado Fuel & Iron Co. 5500 w. Mines & Min—Dec., 1904.

Dahlbush, Germany.—See **COAL PREPARATION.**

Elliott System.—Coal-Washing Plant at an Austrian Colliery. H. Hofer, in "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Illustrated description of a plant using the Elliott system with six troughs. 900 w. Col Guard—Jan. 23, 1903.

Howe, Indian Teritory.—The Coal Washer at Howe, Indian Teritory. W. R. Crane. An illustrated description of the plant and of the methods of mining and handling the coal. 3500 w. Mines & Min—March, 1904.

Luhrig.—Washing of Bituminous Coals by the Luhrig Process. J. V. Schaefer. Briefly discusses coal-washing in general and the appliances used, and gives an illustrated detailed description of a Luhrig plant and its operation. Also discussion. 7500 w. Jour W Soc of Engrs—Dec., 1901.

Oberhausen, Germany.—See **BRIQUETTING.**

Scranton, Pa.—The Bellevue Washery of the D. L. & W. R. R. Co., Scranton, Pa. George W. Harris. Illustrates and describes the methods and machinery employed in handling and separating coal from culm banks. 3500 w. Mines & Min—June, 1903.

Small Coal.—See **GAS MANUFACTURE.**

Stewart System.—Coal Washing by the Stewart System. David T. Blakey. An illustrated description of the apparatus as installed for treating bituminous coal in Alabama. 1500 w. Mines & Min—Dec., 1903.

Völklingen, Germany.—The New Coal Washing Plant at the Röchlingen Works at Völklingen (Die Neue Kohlenwäsche der Röchlingen Eisen und Stahlwerke in Völklingen). An illustrated description of a recent installation, with results of the preparation of coals of the Saar district, Prussia. 2500 w. Glückauf—May 21, 1904.

Wilczek Mine, Austria.—The Coal Washing Plant at the Wilczek Mine in Polnisch-Ostrau (Die Kohlenwäscherei am Dreifaltigkeitsschachte in Polnisch-Ostrau). Hugo Hofer. Detailed description of a modern coal washing plant in Northern Austria. 1800 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 20, 1902.

COAST DEFENSE.

See also **GUN; NAVAL BATTERY; SUBMARINE MINE.**

Boston.—Emergency Engineering for Harbor Defense. Dr. Louis Bell. A brief review of work during the Spanish-American war in the harbor at Boston, and the lessons learned. 3500 w. Trans Am Inst of Elec Engrs—Oct, 1902.

Coaling Station. — See **COALING STATION — Defense.**

Earth vs. Armor.—Earth or Armor Protection for Seacoast Fortifications. W. Stavenhagen. Translated from "Marine Rundschau." A study of the question whether armor or earth give the best protection. 7000 w. Jour U S Art—May-June, 1903.

Electric Equipment.—Electricity in Permanent Seacoast Defenses. George W. Goethals. Explains the conditions of a military post on the coast, and the requirements of the electrical installation and its growing demands. 6500 w. Trans Am Inst of Elec Engrs—Oct., 1902.

Electricity in the Coast Defense. Illustrated description of the school at Fort Totten, N. Y., where officers of the artillery of the United States Army are taught how to use electricity in war. 1500 w. Elec Rev, N Y—July 29, 1905.

See also **SUBMARINE MINE.**

Storage Battery.—See **STORAGE BATTERY—Fortification.**

Submarine Mines.—See **SUBMARINE MINE.**

COAT OF MAIL.

See **ELECTRIC SHOCK.**

COBALT.

Australia.—Cobalt Mining in New Caledonia. Geo. M. Colvocoresses. Gives the history, formation and working of the ore, and general information. Ill. 2200 w. Eng & Min Jour—Nov. 28, 1903.

Metallurgy.—See **NICKEL.**

Mexico.—Note on the Occurrence of Cobaltiferous Quartz in the State of Jalisco, Mexico. Frederic Chisholm. Brief description of the deposit. 500 w. Eng & Min Jour—Oct. 26, 1901.

Ontario.—Cobalt Mining District, Ontario. W. O. Hotchkiss. Map, and illustrated account of this rich cobalt-silver district and its development. 3000 w. Min Wld—Dec. 9, 1905.

COCK.

Indicator.—See **INDICATOR COCK.**

COFFERDAM.

See also **BRIDGE FOUNDATION; BRIDGE PIER; FOUNDATION; HARBOR; PILE; RIVER REGULATION.**

The Construction and Use of Coffer Dams (Des Batardeaux et de Leurs Epuisements). M. Arana. Discussing methods of construction of coffer dams in connection with river improvement works, and especially with the pumping of the water from them. 3500 w. Revue Technique—Nov. 25, 1902.

Construction of Coffer-Dams. Thomas P. Roberts. A brief description of cofferdam construction, with general discussion. 5000 w. Pro Engrs' Soc of W Penn—July, 1905.

Chicago.—Cofferdam for the 39th Street Pumping Station at Chicago. Illustrates and describes what is believed to be the largest cofferdam ever built in open water. 500 w. Eng News—Dec. 17, 1903.

Concrete Reinforced.—Coffer Dams in Reinforced Concrete (Batardeaux en Béton Armé). M. Tricon. Describing especially the use of reinforced concrete for coffer dams in constructing canal locks and similar works. 1800 w. Revue Technique—March 25, 1905.

Interlocking Steel.—See Steel Sheet.

"Maine" Raising.—See SALVAGE.

Massena.—Repairing a Leaky Cofferdam. Briefly describes method used at Massena, N. Y. 600 w. Eng Rec—Aug. 23, 1902.

Sheet Pile and Canvas.—See PIER—Kilbourn, Wis.

Steel Sheet.—Interlocking Steel Sheeting in Cofferdam Construction. Illustrates and briefly describes a new method employed in the construction of the substructure of the Randolph St. bridge in Chicago. 500 w. Ry Age—May 2, 1902.

Steel Coffer-Dams in the Chicago River. E. James Fucik. Describes the conditions found in the Chicago River and the use of a steel sheeting for cofferdams, describing in detail the two types used. Ills. 1800 w. Technograph No. 19, 1904-1905.

Interlocking Metal Piling for Power House Foundations. An illustrated description of coffer dams of unusual construction used by the Union Electric Light & Power Co. of St. Louis in building their power house. 900 w. Eng Rec—Oct. 24, 1903.

Interlocking Steel Sheet Piles for Bridge Pier Cofferdams. Illustration with detailed description of substructure construction of the Cuivre River Bridge, about 60 miles from St. Louis. 1500 w. Eng Rec—April 30, 1904.

A Steel-Pile Caisson at Omaha. Description, with illustration, of a cofferdam constructed with Friestedt interlocking channel bar piles. 1000 w. Eng Rec—Aug. 1, 8, 1904.

See also PILE.

COHERER.

See also ELECTRO-PHYSICS; SPACE TELEGRAPHY.

Coherers—The Development, Construction, Operation and Function of Electric Wave Detectors. A. Frederick Collins. An illustrated article. 2000 w. Elec Wld & Engr—Aug. 17, 1901.

The Coherer. William A. Del Mar. A brief review of the history and theory and an illustrated description of how to make a modern coherer. 2300 w. Sci Am Sup—June 21, 1902.

Action.—Coherer Action. Dr. K. E. Guthe. Reviews experimental investigations made and the theories proposed for an explanation of coherer action, and formulates a theory, attemptong to show its agreement with phenomena observed. Also bibliography. 4500 w. Int Elec Cong of St. Louis—Sept., 1904.

The Mode of Action of Coherers and Auto-Decoherers (Remarques sur le Fonctionnement des Cohéreurs et des Auto Décohéreurs). O. Rochefort. A record of observation leading to the opinion that auto-decoherers can be made ordinary coherers by diminishing the pressure of the imperfect contacts. 400 w. Comptes Rendus—April 14, 1902.

Coherer Action Under the Microscope. G. T. Hanchett. Gives an experimental microscopic investigation, deducing the requirements for a good coherer. 700 w. Elec Rev, N. Y.—May 2, 1903.

See also Theory.

Bose.—On the Change of Conductivity of Metallic Particles Under Cyclic Electromotive Variation. Prof. Jagadis Chunder Bose. Read before the British Assn. Deals with those substances which show a diminution of resistance, with typical instances of non-recovering and self-recovering substances, describing the peculiarities of their cyclic characteristic curves. Serial. 1st part. 2500 w. Elect'n, Lond—Sept. 20, 1901.

Branly.—Single-Contact Radioconductors (Radioconducteurs à Contact Unique). E. Branly. A resumé of experiments with single contacts through a film of oxide. 1000 w. Comptes Rendus—Feb. 10, 1902.

The Branly Coherer. C. L. Durand. An account of the Branly-Popp aerial telegraphy system which is to supply news in Paris, to subscribers. Special description of the coherer used. Ill. 1600 w. Elec Rev, N Y—March 7, 1903.

Castelli.—The "Castelli" Coherer and the "Royal Italian Navy" Coherer. Prof. Angelo Banti. An explanation called out by observations on a previous article. Considers the Castelli Coherer, Solari's experiments, and the coherer adopted by Marconi in the transatlantic transmission. 1800 w. Elec Rev, Lond—July 11, 1902.

The Castelli Receiver for Wireless Telegraphy. H. W. Sullivan. Illustrated description with discussion of its advantages and disadvantages. 900 w. Elec Rev, Lond—July 18, 1902.

The Castelli Coherer. An illustrated review and history of this coherer, in which one or more drops of mercury are placed between iron or carbon electrodes. 1500 w. Elec Rev, Lond—Dec. 12, 1902.

Cut-Out.—See ELECTRIC PROTECTIVE APPARATUS.

Popoff.—Apparatus for the Detection and Regulation of Electrical Vibrations. A. C. Popoff. An account of experimental investigations on various kinds of "cohering" substances, with description of apparatus used. Serial. 1st part. 2200 w. Elec Rev, Lond—Nov. 23, 1900.

Steady E. M. F.—Some Experiments on Filings Coherers. W. H. Eccles. Describes investigations made to confirm or correct and to amplify the very meagre information available on the effects of steady e. m. f.'s on filings coherers. Serial. 1st part. 3800 w. Elect'n. Lond—Aug. 23, 1901.

Theory.—The Inherent Nature of Coherers. Edward P. Thompson. Gives experimental evidence to prove that sparks start a coherer into action. 2000 w. Elec Rev, N Y—Aug. 2, 1902.

Theory of Coherer Action. From the "English Mechanic and World of Science." Briefly discusses the theories advanced by Lodge, Branly, Bose and Dr. Guthe, especially the last named. Also the theory developed by Dr. Lee de Forest, and gives a description of two of the coherers used in wireless telegraphy. 4000 w. Sci Am Sup—Nov. 11, 1905.

See also Action.

Varley.—Electrical Coherence. S. Alfred Varley. An account of the researches of the writer. 2800 w. Elec Rev, Lond—Nov. 1, 1901.

COINAGE.

How Money Is Made. Marcus Benjamin. A brief summary of the principal steps in transforming ore into coin. Ill. 2000 w. Sci Am—Sept. 7, 1901.

Minting Machinery and Appliances. Edwin S. Church. An outline of the mechanical operations involved in the coinage of money, with a brief description of the various electrical installations. Ill. 4000 w. Jour Fr Inst—Dec., 1901.

China.—Coining Machinery in Chinese Mints. Oberlin Smith and Henry A. Janvier. An account of the installation of plants for producing certain issues of coins for the Chinese Government. Gives information in regard to the customs of the country, describing journey into the interior. Ill. 3400 w. Cassier's Mag—May, 1903.

Philadelphia.—Coining at the New Mint at Philadelphia. Joseph V. Woodworth. A brief description of the different processes. 3200 w. Am Mach—Jan. 8, 1903.

COKE.

See also COAL; COAL INDUSTRY; COKE MANUFACTURE.

Coke as a Substitute for Anthracite Coal. Alton D. Adams. Gives facts showing that a large plant producing coke and coal gas would be able to offer the products much lower than existing prices and that it would supply much of the demand now met by anthracite. 1100 w. Sci Am—May 6, 1901.

The Coke Industry. Fred C. Keighley. An explanation of the present situation due to inadequate transportation facilities, discussing some features of the trouble. 2500 w. Ir Age—Jan. 1, 1903.

Alabama.—See COAL.

Arsenic.—Arsenic in Coke. A summary of recent researches, showing the occurrence to be general though in small quantities. 1300 w. Col Guard—Nov. 7, 1902.

See also COAL ANALYSIS.

Australia.—The Coke Industry in Australia. A report of the various works, with general information. 4500 w. Ir & Coal Trds Rev—Feb. 7, 1902.

Blast Furnace Fuel.—Coke as a Blast-Furnace Fuel—Its Manufacture and Characteristic Properties. Edward A. Uehling. An illustrated article explaining the making of coke, the wastefulness of the beehive coke-ovens, and of the early methods used, and the better results obtained by retort ovens. 3000 w. Stevens Ind—Oct., 1905.

British Columbia.—See **COAL INDUSTRY.**

Brown-Coal Dust.—See **BRIQUETTING—Brown Coal; COKE MANUFACTURE—Compressed Fuel.**

Buying.—See **Disposal; PIG IRON.**

Chihuahua.—A Coking Coal in Chihuahua. William B. Phillips. Describes this seam of coking coal, giving information of its coking quality. 900 w. Eng & Min Jour—April 6, 1905.

Connellsville, Pa.—The Connellsville Region. Howard N. Eavenson. Read before the W. Penn Cent. Min. Inst. Information concerning its mineral resources, various industries, all of which are overshadowed by the coke industry, its methods by mining, amount of output, etc. 5200 w. Mines & Min—Aug., 1902.

The Connellsville Coke Region. Thomas W. Keighley. A description of this region, the deposits, method of mining, the coke ovens, and report of a flourishing condition. 3800 w. Min Mag—March, 1905.

See also **COKE MANUFACTURE—Costs.**

Depreciation.—See **COAL TRANSPORTATION.**

Disposal.—The Disposal of Coke. W. Whatmough. Read before the Manchester Dist. Inst. of Gas Engrs. Discusses the trade situation due to decrease in prices obtained for coke, and the remedy. General discussion follows. 4500 w. Jour Gas Lgt—March 4, 1902.

Düsseldorf Exposition.—Ore Concentration, Coal Preparation, Briquetting and Coke Manufacture with the Winning of By-Products (Der Bergbau auf der Düsseldorfer Ausstellung, 1902. Aufbereitung, Brikettierung und Kokereibetrieb mit Einschluss der Gewinnung von Nebenprodukten). Hr. Wendt. A general illustrated review of the exhibits in these departments of mining and metallurgy. 8 plates. 12000 w. Glückauf—July 12, 1902.

Foundry.—Estimating the Value of Coke for Foundry Use. Walter J. May. On the testing of coke, and things to be considered in determining the economy. 1200 w. Prac Engr—Dec. 4, 1903.

The Structure of Coke and Its Applications in the Foundry (Der Koks, seine Struktur und seine Verwendung zu Giessereizwecken). Friedrich Schreiber. A study of foundry coke, with especial reference to the effect of the method of coking upon the product. 2500 w. Stahl u Eisen—May 1, 1904.

By-Product Foundry Coke. Charles Schwerin. Read before the A. F. A. Remarks on the process of its manufacture and its utilization, particularly for cupola purposes. 2000 w. Foundry—Jan., 1905.

See also **Retort vs, Beehive; FOUNDRY; IRON ANALYSIS.**

Fuel.—Coke as a Fuel. George L. Fowler. Considers it only in its application to steam making, and regards it as an almost ideal fuel for locomotive or stationary work, its use being merely a matter of price and supply. 1700 w. Engr, U S A—April 1, 1903.

See also **FOUNDRY; COKE BREEZE.**

Gas Works.—Notes on the Industrial Use of Gas Works Coke. Alexander Lencouches. Read at meeting of the Société Technique d Gas en France. Discusses how to burn gas coke, the heating of water and raising of steam, making producer gas, etc., etc. Ill. 3500 w. Gas Wld—July 12, 1902.

See also **Disposal; COKE HANDLING; GAS MANUFACTURE.**

German Syndicate.—The German Coke Industry. Concerning the Rhenish-Westphalian Coke Syndicate and the price of blast furnace coke. 1400 w. Col Guard——Dec. 5, 1902.

Germany.—The German Coke Industry in the Last Ten Years (Die Deutsche Koksindustrie in den Letzten Zehn Jahren). Oskar Simmersbach. With statistics and diagrams showing the output of the various districts. 3000 w. Stahl u Eisen—Oct. 15, 1904.

See also **IRON INDUSTRY.**

History.—Coke. N. P. Hyndman. Read before the Pittsburg Foundrymen's Assn. Reviews its history since 1885, its mode of manufacture, quality, etc. 1700 w. Ir Age—Nov. 13, 1902.

The Beginnings of Coke Manufacture (Die Anfänge der Koksfabrikation). Oskar Simmersbach. An historical review, with sketches of early coke ovens used in Germany and England. 4000 w. Glückauf—July 8, 1905.

Klondike, Pa.—The New Klondike Coking Field, Pennsylvania. William Gilbert Irwin. Brief account of one of the most important new coke regions. 700 w. Eng & Min Jour—Nov. 3, 1900.

Lamp-Black Oil.—See **COKE MANUFACTURE—..Oakland, Cal.**

Latrobe, Pa.—See **COAL REGION—Pennsylvania.**

1903.—Coke in 1903. E. W. Parker. A record of the work in the principal producing states. 6000 w. Ir Age—Jan. 7, 1904.

Production.—The Demand for Coke.—Frederick E. Saward. Gives facts in regard to the production and discusses its possible increase. 1300 w. Ir Age—March 12, 1903.

Retort vs. Beehive.—Retort Oven Coke for Foundry Use. W. J. Keep. Describes briefly the old fashioned bee-hive oven and the newer retort oven, and givs the writer's experience with retort oven coke. 1200 w. Jour Am Found Assn—June, 1903.

Comparative Test of Beehive and Retort Coke. E. A. Uehling. A study of their relative merits as a blast-furnace fuel, giving the procedure and results of a test. 4800 w. Ir Age—June 11, 1903.

Selenium.—See **SELENIUM—Coke.**

Sulphur.—Sulphur in Coke and Its Behavior in the Blast Furnace. Prof. F. Wuest, and P. Wolff. A report of investigations and conclusions. 3300 w. Ir & Coal Trds Rev—May 12, 1905.

The Presence of Coke-Sulphur in the Blast Furnace (Das Verhalten des Koksschwefel im Hochofen). F. Wüst and P. Wolff. An examination of the proportion of sulphur carried into the blast furnace with the coke fuel. 3000 w. Stahl u Eisen—May 15, 1905.

Theory.—See **COAL— Composition; Origin.**

Transportation Depreciation.—See **COAL TRANSPORTATION.**

U. S. Census.—The Coke Industry in the United States. An advance summary of a report about to be issued by the Census Office, compiled by E. W. Parker. 2400 w. Ir Age—May 2, 1901.

The Manufacture of Coke. Edward W. Parker. Abstracted from the special report of the U. S. Census. Refers principally to the manufacture during 1899, and is limited to the product usually termed "oven cake." 3000 w. Pro Age—May 15, 1901.

Valuation.—The Valuation of Furnace and Foundry Coke (Die Bewertung von Hochofen und Giessereikoks). Oskar Simmersbach. A discussion of the various properties of coke which should be considered in estimating its value. 3500 w. Stahl u Eisen—Feb. 1, 1904.

Virginia.—See **COAL MINE.**

West Virginia.—See **COAL INDUSTRY.**

COKE BREEZE.

Fuel.—I. Burning Coke Breeze with Underfeed Stokers. N. E. Malone. II. Burning Coke Breeze on Hollow Grates. C. H. Williams. Two papers read before the Ohio Gas Lgt. Assn. on the utilization of coke breeze as fuel. The first reports results of tests in Denver. The second reports a test at the gas plant of the Madison Gas & Electric Co. 4000 w. Pro Age—May 2, 1904.

Washing Machine.—A Machine for Sorting and Washing Pan-Breeze. Illustrates and describes a washing and screening plant by which this work is done automatically and with economy. 1400 w. Gas Wld—June 6, 1903.

COKE HANDLING.

See also **COAL HANDLING; COKE MANUFACTURE; GAS RETORT—Inclined vs. Horizontal; MECHANICAL HANDLING.**

Cassel Gas Works.—A New Coke-Conveyor at the Cassel Gas Works. Illustrated abstract translation of a description in the "Journal für Gasbeleuchtung," by Herr E. Merz, of a recent installation of a modified De Brouwer conveyor. 2000 w. Jour Gas Lgt—July 1, 1902.

Dunfermline Gas Works.—See **COAL HANDLING.**

France and Germany.—Recent Coke Handling Machinery (Ueber Neuere Koksofen-Beschickungsanlagen). O. Simmersbach. Describing recent installations of conveyors, and handling machinery in France and Germany. 2000 w. 1 plate. Stahl u Eisen—Dec. 15, 1903.

French Gas Works.—Coke-Handling in French Gas Works. Illustrates and describes the very complete plant installed by the Compagnie Parisienne d'Eclairage and de Chauffage par le Gas, which includes a number of electrically driven machines for breaking, screening and drying the coke. 2000 w. Engng—July 17, 1903.

Electric Power in French Gas Works. Illustrates and describes the construction and methods of operating electrically-operated machines for charging retorts and removing coke. 800 w. Elec Wld & Engr—Jan. 21, 1905.

See also **Paris Gas Works.**

Ipswich.—See **GAS RETORT—Charging.**

Lebanon, Pa.—See **COKE MANUFACTURE.**

Leeds Gas Works.—New Hot-Coke Conveying Plant at the Leeds Gas-Works. Illustrated detailed description. 2000 w. Jour of Gas Lgt—March 19, 1901.

Paris Gas Works.—Mechanical Conveyance of Coke in the Paris Gas Company's Works. M. Louvel. Read before the Gas Congress at Paris. Illustrated description of these mechanical arrangements. 5000 w. Jour Gas Lgt—Oct. 23, 1900.

Smethwick Gas Works.—The Coke Plant at the Smethwick Gas-Works. Illustrated description of a gravity bucket conveyor for feeding a water-gas plant. 4500 w. Jour Gas Lgt—March 3, 1903.

COKE MANUFACTURE.

See also **COKE; COKE OVEN GAS.**

Gleanings from Coke-Oven Practice. Abstract Translation of paper by Herr Hilgenstock, before the German Assn. of Gas & Water Engrs. 4000 w. Jour Gas Lgt—Oct. 28, 1902.

Ammonia.—The Production of Sulphate of Ammonia from Coke Oven Wastes (Zur Herstellung von Schwefelsaurem Ammoniak auf den Destillations-Kokereien). A discussion of the value of coke oven wastes, and the manner in which they can be utilised. 2000 w. Glückauf—March 15, 1902.

By Product.—See also **OPEN HEARTH PROCESS —Gas and Tar Fuel.**

Badly Caking Coal.—Coking Badly Caking Coal. Illustrates apparatus and describes a new mechanical process for coking such coal. 800 w. Ir & Coal Trds Rev—April 3, 1903.

Bauer.—The Bauer Coke Oven. An illustrated description of an oven claiming a large yield of coke of good quality, and an economical utilization of the volatile constituents. 2500 w. Col Guard—June 12, 1903.

See also **Temperature.**

Bee-Hive Oven.—Coking in Bee-Hive Ovens with Reference to Yield. Charles Catlett. Calls attention to the waste, the need of careful records, and what the records should show to determine where improvements are needed. 3800 w. Trans Am Inst of Min Engrs—Oct., 1902.

Coking in Bee-Hive Ovens with Reference to Yield. Charles Catlett. A discussion of the factors affecting the yield. 3300 w. Am Gas Lgt Jour—Feb. 2, 1903.

Notes on the Manufacture of Coke. John Bell. Abstract of a paper read before the British Soc. of Min. Students. Deals only with ovens of the beehive type. Ills. 2500 w. Ir & Coal Trd Rev—Oct. 7, 1904.

Birmingham, Eng.—See **GAS WORKS.**

Briquettes.—See **Compressed Fuel.**

Brunck.—The Brunck System of By-Product Coke Ovens. Illustrates and describes the construction principles and operation of these ovens. 3000 w. Ir & Coal Trds Rev—Dec. 5, 1902.

See also **Temperature.**

By-Product.—By-Product Coke Ovens. George Blake-Walker. A paper contributed to the Inst. of Civ. Engs., England. Considers the attempts made to recover the products, the design of by-product coke-ovens, etc. Ill. Serial. 1st part. 2300 w. Col Guard—Dec. 7, 1900.

The Development of the By-Product Coking Industry. William Gilbert Irwin. An illustrated article reviewing the systems evolved in Europe and recently in America. 5200 w. The Engineering Magazine—Oct., 1901.

Recent Developments in By-Product Coke Ovens. Communications from Dr. F. Schniewind. Thomas Littlehales, and C. W. Andrews, to the Ohio Gas Lgt. Assn., with discussion. 9500 w. Am Gas Lgt Jour—April 28, 1902.

By-Product Oven Coke Making in 1901. Edward W. Parker. From the Mineral Resources of the United States report on the Manufacture of Coke. 1800 w. Pro Age—Oct. 1, 1902.

The Development of the Modern By-Product Coke-Oven. Christopher G. Atwater. Describes and discusses the progress made to the present date, in the development of the modern by-product coke-oven. Ill. 3300 w. Trans Am Inst of Min Engrs—Oct., 1902.

The Development of the By-Product Coke Oven. Curtis C. Myers. Aims to give a general idea of the coke industry at present, and a brief outline of what it may be reasonable to expect in the future with the development and more general adoption of the by-product or retort coke oven. 4000 w. Sib Jour of Engng—March, 1904.

The Making of By-Product Coke. Edwin A. Moore. Abstract of an address to the Phila. Found. Assn. Remarks on the rapid replacement of beehive ovens by-product ovens, describing the operation of a plant at Camden, N. J. 1100 w. Eng & Min Jour—March 2, 1905.

The By-Product Coke Oven. W. H. Blauvelt. Explains the differences in structure and method of operation between the old beehive oven and the retort oven, arranged for the saving of the by-products, illustrating the most prominent systems of the latter. Gives a description of the operation of by-product coke ovens, and other information. Discussion. Ills. 9000 w. Jour W Soc of Engrs—Aug., 1905.

A New By-Product Coke-Oven. R. Schorr. Illustrated description of an oven especially designed to coke lean coals and also non-coking fuels with the addition of oil, oil residues, coal-tar, molasses, etc. 500 w. Eng & Min Jour—Dec. 16, 1905.

See also **Temperature,** and under names of places and processes.

Camden, N. J.—By-Product Coke as Made by the Coke Oven Plant of the Otto-Hoffman and United-Otto Types, Camden, N. J. Edwin A. Moore. Read before the Philadelphia Found. Assn. Describes the method of manufacturing coke and the recovery of the by-products from the coal by means of the Otto-Hoffman system. 8700 w. Ir Trd Rev—Feb. 9, 1905.

By-Product Coke. Edwin A. Moore. Describes the method of manufacturing coke and the recovery of the by-products from the coal by means of the Otto-Hoffman system. Describes the plant of the Camden Coke Co., Camden, N. J. Ills. 8500 w. Mines & Min—July, 1905.

Carnap, Germany.—Plant for Saving Coke By-Products. Abstract translation of an article by Dr. Bertelsmann, in the "Zeitschrift für Berg-Hutten und Salinenwesen. Describes the extension of the coal distillation plant at the Matthias Stinnes mine in Carnap, Germany. 2800 w. Mines & Min—Dec., 1902.

Charger, Méguin.—The Méguin Coke Oven Charger. O. Simmersbach, in "Stahl und Eisen." Illustrates and describes the distinctive features; the chief is the stamping mechanism, by means of which the charge is compressed before introducing into the ovens. 900 w. Col Guard—April 8, 1904.

China.—The Manufacture of Coke in Northern China. Yang Tsang Woo. Brief illustrated description of the coke-kilns and method used. 700 w. Am Inst of Min Engrs—Nov., 1905.

Clarence, Middlesbrough.—The Manufacture of Coke in the Hüssener Oven at the Clarence Ironworks, and Its Value in the Blast-furnace. C. Lowthian Bell. Read before the Iron & Steel Inst. Describes experiments made and the way the question of retort-oven coke was solved at Clarence, Middlesbrough, Eng., giving results. Ills. 4000 w. Ir & Coal Trds Rev—May 6, 1904.

Collin.—The Collin Coke Oven (Koksöfen, Bauart Collin). Fr. Frölich. Giving sectional details of continuous ovens arranged for recovery of by-products, either with or without regenerators. 2000 w. Zeitschr d Ver Deutscher Ing—Jan. 21, 1905.

Colorado.—See **COAL WASHING.**

Compressed Fuel.—The Charging of Coke Ovens with Compressed Fuel. Illustrates and describes appliances invented by John H. Darby for compressing fuel before coking, thus improving the quality and making it possible to obtain satisfactory results from some lean fuels. 1200 w. Col Guard—Feb. 28, 1902.

Kuhn's Coal-Stamping Machinery. Illustrated description of a coal-compressing machine used in coking with explanation of its operation and statement of its advantages. 3800 w. Ir & Coal Trds Rev—Feb. 28, 1902.

The Manufacture of Coke from Compressed Fuel. John H. Darby. An account of results obtained with compressed fuel and the benefits derived. 2300 w. Ir & Coal Trds Rev—May 9, 1902.

The Coking of Lignite at Zsiltale in Hungary (Die Verkokung der Braunkohle im Zsiltale in Ungarn). A. Semlitsch. Describing the successful production of blast-furnace coke by coking compressed briquettes of lignite. Analyses of the lignites given and details of the oven and furnaces. Two articles, 1 plate. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 12, 19, 1904.

Costs.—Estimated Costs of Mining and Coking and Relative Commercial Returns from Operating in the Connellsville and Waltson-Reynoldsville Districts, Pennsylvania. Eduard V. D'Invilliers. 4500 w. Trans Am Inst of Min Engrs—Feb., 1904.

Crushing.—See Compressed Fuel; **COAL CRUSHER.**

Drawing Machine.—The Hebb Coke-Drawing Machine. Illustrates and describes a device recently built for mechanically removing the coke from the coke ovens. 1300 w. Mines & Min—Feb., 1904.

A Machine for Drawing Coke from Bee-Hive Ovens. George T. Wickes. Illustrates and describes a machine put in operation in Uniontown, Pa., and reported to have met successfully all the tests to which it has been subjected. States its advantages. 2000 w. Am Inst of Min Engrs—July, 1905.

Duluth, Minn.—See **BLAST FURNACE.**

Electric Equipment.—See Orlau-Lazy; Wigan; **BLAST FURNACE.**

Eureka Co., Pa.—The New Coke Plant of the Eureka Fuel Company in the Klondike Region, Pennsylvania. J. P. Brennen. Illustrates and describes a complete modern plant. 2300 w. Mines & Min—April, 1901.

Fabry-Linard.—A Modern Coke Oven. Illustrates and describes the by-product ovens, ordinary and patent ovens of the Fabry-Linard System, stating the advantages claimed. 2000 w. Ir & Coal Trds Rev—March 20, 1903.

German Practice.—The Progress of the Recovery Coke-Oven in Germany. Digest of a recent article in the "Zeitschrift für Beleuchtungswesen" supplementing the paper of Herr Hilgenstock on "German Coke-Oven Practice," and showing the present trend of affairs in Germany in regard to the manufacture and importation of tar and ammonia. 1100 w. Jour Gas Lgt—Feb. 10, 1903.

Hard Coal.—The Coking of Hard Coal (Zur Frage der Steinkohlenverkokung). Oscar Simmersbach. An examination of the behaviour of coal in the operation of coking, with especial reference to the nature of the coal. 3500 w. Stahl u Eisen—April 15, 1904.

Heating.—Progress in the Heating of Horizontal Coke Ovens in the Last Twenty Years (Fortschritte in der Beheizung der Liegenden Koksöfen in den Letzten Zwanzig Jahren). An account of the construction of coke ovens and the methods of firing, heating and conducting the air and gases. 3000 w. Stahl u Eisen—March 15, 1903.

Heminway.—Improved Heminway Process of Coking Coal in Beehive Coke Ovens. R. S. Moss. Illustrates and describes the process as used at the plant of the Universal Fuel Co., Chicago, Ill 3400 w. Mines & Min—April, 1901.

Hennebutte.—The Hennebutte System of Coke-Making. M. Warolus. Describes this system and reports its application at the Houssu Colliery. 900 w. Col Guard—May 29, 1903.

Hüssener.—See Clarence.

Indiana Co., Pa.—Beehive Coke Ovens. Gives plans, specifications, and costs of ovens as constructed recently in Indiana Co., Pa. 1700 w. Mines & Min—Aug., 1903.

Lebanon, Pa.—By-Product Coke Plant. Dr. W. B. Rothberg. An illustrated general description of the installment of 232 Otto-Hoffman ovens at Lebanon, Penn., by the Lackawanna Iron & Steel Co. 1700 w. Mines & Min—March, 1904.

Coal and Coke Handling. Alfred Ernst. Illustrated description of the improved machinery for stamping and charging the coal in the coke plant of the Lackawanna Iron & Steel Co., at Lebanon, Penn. 2200 w. Mines & Min—March, 1904.

Loup Creek, W. Va.—See **COAL MINE.**

Oakland, California.—Lamp-Black Oil Coke. Robert Schorr. Gives information in regard to the use made of lampblack by the California Gas & Electric Corporation, at Oakland. 900 w. Eng & Min Jour—Feb. 16, 1905.

Olion, Pa.—Coke-Making at the Olion Coke-Works. Fred C. Keighley. Illustrates and describes these works in Pennsylvania. 2200 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Oliver & Snyder Co.—The New No. 3 Coke Plant of the Oliver & Snyder Steel Co. An illustrated description of a complete modern plant and its equipment in Union Township, Fayette Co., Pa. 1200 w. Mines & Min—Sept., 1904.

Orlau-Lazy, Austria.—Electrical Plant at an Ausrian Coke Factory. A. Hartmann, in "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Illustrated description of the coking plant at the Orlau-Lazy Colliery. 1000 w. Col Guard—May 10, 1901.

The Electric Plant at the Orlau-Lazy Coke Works (Die Elektrische Anlage in der Koksanstalt Orlau-Lazy). A. Hartmann. An account of a modern coke plant with by-product, ovens and electric charging machinery in Silesia. 1200 w. 1 plate. Oesterr Zeitschr f Berg- u Hüttenwesen—May 4, 1901.

The Electric Installation at the Orlau-Lazy Coke Ovens (Die Elektrische Anlage in der Koksanstalt Orlau-Lazy). A. Hartmann. With illustrations of the extensive coke handling plant in Austrian Silesia, including electrically driven charging, handling and washing machinery. 1800 w. Elektrotech Zeitschr—May 30, 1901.

Ostrau, Austria.—The New Coking Plant at the Theresa Mine in Polnisch-Ostrau (Die Neue Koksanstalt am Theresienschachte in Polnisch-Ostrau). Dr. A. Fillunger. A description of important by-product coking works in Northern Austria. The gases are used for motive power. Two articles, 2 plates. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 28, March 7, 1903.

Otto-Hilgenstock.—The Recovery of By-Products in Coke-Making. J. Thiry. On the advantages of the Otto-Hilgenstock coke-oven, with report of tests with regard to temperature, draught and duration of the coking process. 3500 w. Ir & Coal Trds Rev—May 9, 1902.

Otto-Hoffmann.—See Camden; Lebanon.

Otto, Underfired.—The Installation of an Underfired Coke-Oven Plant (Die Inbetriebsetzung einer Unterfeuerungs-Koksofenanlage). Alois Czermak. Describing the operation of a by-product coke oven designed for a hard-coking coal. Two articles. 3000 w. Oesterr Zeitschr f. Berg u Hüttenwesen—Aug. 27, Sept. 3, 1904.

Peat.—See **PEAT.**

Peru.—The Manufacture of Coke in Peru. J. Morgan Clements. Brief illustrated description of the method of coking. 500 w. Trans Am Inst of Min Engrs—Sept., 1904.

Pit Water Purification.—See **WATER PURIFICATION**—Coke Works.

Reactions.—See Temperature.

Saar, Germany.—The Progress of Coke Manufacture in the Saar District (Die Fortschritte der Koksfabrikation im Saargebiet). Oskar Simmersbach. An account of the operation of by-product coke ovens, with tabulated data of dimensions and performance. 3000 w. Stahl u Eisen—Dec. 1, 1905.

Schnablegger.—Schnablegger's Process for Coking Saw Dust, Peat and Brown Coal (Schnablegger's Verfahren, Sägespäne, Torf, Lignit und Braunkohle zu Verkoken). F. Toldt. An account of a process part of which is still secret, with illustrations of the coke. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 12, 1902.

Schwarz.—Coking Process for Poorly Coking Coal (Verkokungsverfahren für Schlechtbackende Kohle). Oskar Simmersbach. Illustrated description of the Schwarz process. 800 w. Stahl u Eisen—Sept. 15, 1905.

Segundo, Col.—Segundo Coke Plant. R. M. Hosea. An illustrated description of the ovens and coal washing plant of the Colorado Fuel & Iron Co. 5000 w. Mines and Min—Aug., 1904.

Temperature.—The Regulation of the Combustion and Distribution of the Temperature in Coke Oven Practice. D. A. Louis. Brief illustrated descriptions of a number of ovens and the practice followed, especially the Brunck system and the Bauer system. Ill. 4400 w. Ir & Coal Trds Rev—Sept. 4, 1903.

Reactions and Temperatures in By-Product Coke Ovens. Describes some of the pecularities in the progress of coking through the charge. 1200 w. Ir & Coal Trds Rev—Oct. 30, 1903.

Waste Gas Utilization.—See **COKE OVEN GAS; GAS ENGINE—Blast Furnace Gas.**

Westphalia.—By-Product Coke Ovens in Westphalia (Zur Frage der Nebenproduktgewinnung beim Kokereibetriebe in Westfalen). W. Fritz. Describing the construction of the Otto coke ovens in the Westphalia district, and the recovery of sulphate of ammonia as a by-product. Serial. Part I. 1500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 5, 1905.

Wigan, Eng. — Electrically-Served Semet-Solvay Coke Plant at the Works of the Wigan Coal & Iron Company, Limited. Illustrates and describes a battery of forty-four coke ovens installed to secure a more economical supply of coke for use in the blast furnaces of this company. 2500 w. Ir & Coal Trds Rev—April 7, 1905.

The Electrically Driven Semet-Solvay Coke Plant of the Wigan Coal and Iron Co., Ltd. Illustrated description of a plant the greater part of which is electrically driven. 2300 w. Elec Rev, Lond—May 12, 1905.

Zailtal, Hungary.—See Compressed Fuel.

COKE-OVEN GAS.

See also **BLAST-FURNACE GAS; COKE MANUFACTURE; GAS ENGINE.**

Coke-Ovens as Gas-Works. From an article by Dr. H. Wiechell, in the "Journal für Gasbeleuchtung." Examines the financial aspects of the question. 1900 w. Jour Gas Lgt—Nov. 6, 1900.

Retort Ovens as Producers of Illuminating Gas. T. Littlehales. Read at meeting of the Am. Gas. Lgt. Assn. An extended discussion of this subject concluding that in gas works of even moderate size, operating with coke ovens, and turning out first-class foundry coke, good profits can be made with gas at prices impossible for retort methods to compete with. Ill. 7500 w. Am Gas Lgt Jour—Nov. 11, 1901.

Retort Ovens as Producers of Illuminating Gas. Discussion of Mr. Thomas Littlehale's paper. 2000 w. Am Gas Lgt Jour—Nov. 25, 1901.

The Production of Illuminating Gas from Coke-Coke-Ovens. F. Schniewind. Read before the Glasgow Congress. Describes the progress made in the United States and Canada in recovering illuminating gas from by-product coke-ovens, discussing its bearing on the smoke problems. Discussion. Ill. 17000 w. Jour Gas Lgt—Sept. 17, 1901.

The Production of Illuminating Gas from Coke-Ovens. The reply of F. Schniewind to the discussion on his paper at the Glasgow Gas Congress. 3300 w. Jour Gas Lgt—Nov. 12, 1901.

Coal Mine Electric Plant.—See **ELECTRIC EQUIPMENT—Coal Mine, Carnaux, France.**

Everett, Mass.—Coke Oven Gas for Lighting, Heating and Power (Ueber die Verwendung von Koksofengas zu Leucht, Wärme- und Kraftzwecken und die Verbesserung desselben durch Benzolcarburation). Hugo Kutscher. An account of the manufacture and use of coke oven gas and its enrichment by benzol, with a description of the plant at Everett, Mass. 3000 w. Glückauf—Dec. 28, 1901.

Cheap Gas and Fuel Without Smoke. Alton D. Adams. Describes the results obtained in gas and coke production by by-product ovens at Everett, Mass. 2700 w. Mines & Min—June, 1902.

Gas Engine.—See Power; **GAS ENGINE—Blast Furnace Gas; Test.**

Gas Works Compared.—By-Product Coke Ovens or Improved Coal Gas Works for a City Supply—A Comparison. Frederic Egner. A discussion of this subject, especially presenting the other side of the coke oven or gas works question. 1900 w. Am Gas Lgt Jour—April 22, 1901.

Power.—Power from Coke-Oven Gases (Die Verwertung des Kokosofengases). H. Baum. An exhaustive discussion of the composition, purification and utilization of the waste gases from coke ovens; with details of construction of ovens; purifiers and large gas engines. Serial. Part I. 5000 w. Glückauf—April 16, 1904.

The Use of Coke Oven Gas in Gas Engines. An illustrated article explaining the operation of the by-product oven, the coking, the power available, its adaptability for use in engines, etc. 4500 w. Power—March, 1905.

Power Generation at Coal Mines in Connection with Coke Ovens (Krafterzeugung auf Kohlengruben im Anschluss an Koksöfen). H. Iffland. An examination of the cost of power generated at the mine, including the use of coke-oven gases in gas engines. 3000 w. Glückauf—March 25, 1905.

Steam Generation.—The Utilization of Waste Heat from Coke Ovens. Considers the heat available and methods and apparatus best suited for using it for the generation of steam. 2500 w. Mines & Min—Feb., 1905.

The Firing of Babcock and Other Boilers by Waste-Heat from Coke-Ovens. T. Y. Greener. Gives details of evaporation tests of boilers attached to coke-ovens at various collieries, with descriptions of boilers, ovens, chimneys, etc. Discussion at London meeting of the Inst of Min. Engrs. 3500 w. Ir & Coal Trds Rev—June 2, 1905.

Method of Using Waste Heat. Howard N. Eavenson. Describes and illustrates the method of using waste heat from coke ovens for firing boilers at the No. 1 works of the Continental Coke Co. 1500 w. Mines & Min—July, 1905.

COLD STORAGE.

See **DOCK—Southampton; REFRIGERATION.**

COLLEGE.

See also **EDUCATION; SCHOOL.**

Entrance Requirements.—See **EDUCATION—College Entrance Requirements.**

Hackettstown, N. J.—The Centenary Collegiate Institute, Hackettstown, N. J. Gives the first-floor plans of interesting new buildings, with information concerning them. 1200 w. Eng Rec—Dec. 28, 1901.

COLLIER.

See also **COALING; COALING-AT-SEA; COAL TRANSPORTATION**

Steam Colliers. Reviews the development of the cargo steamer from the steam colliers employed in coasting and cross-channel work. 2500 w. Col Guard—April 1, 1904.

British Navy.—Fast Colliers for the British Navy. E. H. T. d'Eyncourt. Presents arguments showing the need of these vessels, and some suggestions regarding them. Ill. 1800 w. Cassier's Mag—July, 1903.

Ohio River.—See. **COAL. TRANSPORTATION—River Fleet.**

COLLIERY.

See **COAL MINE.**

COLLISION.

See **RAILWAY ACCIDENT; WRECK.**

COLOMBIA.

See also **CANAL—Isthmian; Panama; GOLD; PANAMA.**

Panama Canal.—The Republic of Colombia and the Panama Canal. John George Leigh. A handsomely illustrated account of the industrial and political conditions in the mainland state, showing the general character of the country as a whole. 4000 w. Engineering Magazine—Oct., 1903.

COLOR WORKS.

Leverkusen, Elberfeld.—See **MECHANICAL PLANT—Color Works.**

COLUMN.

See also **BUILDING CONSTRUCTION; CONCRETE REINFORCED; MATERIALS' STRENGTH; STEEL CONSTRUCTION.**

Ball Joint.—Computations for a Ball Joint (Beitrag zur Berechnung eines Kugelgelenks). M. Marcus. A mathematical discussion of the stresses in the end of a column provided with a spherical bearing. 800 w. Schweizerische Bauzeitung—Aug. 9, 1902.

Buckling.—See Wooden; **MATERIALS' STRENGTH.**

Cast Iron.—Diagrams for Calculating the Safe Load on Cast-Iron Columns According to the New York Building Code. A. Samuel Berquist. Gives diagram and explanation of the method of using. It gives also the radius of gyration and sectional area and all information needed in designing cast iron columns. 1400 w. Eng News—Aug. 15, 1901.

Experiences with Cast Iron Columns in Two English Spinning Mill Fires. Gives report of these fires which seem to indicate that the destruction of the buildings was due to the breaking of the cast-iron posts. 1000 w. Eng News—Jan. 1, 1903.

Composite Timber.—Composite Timber Columns. Halbert Powers Gillette. Gives deductions which seem to indicate that under certain conditions composite columns may be considered as acting like a single solid stick. 1000 w. Eng News—June 13, 1901.

Concrete Filled.—Columns for Buildings. John Stephen Sewell. Describes the concrete-filled columns in the new Government Printing Office at Washington, and gives the writer's views. Also editorial and letters. 6600 w. Eng News—Oct. 23, 1902.

Concrete Reinforced.—Concrete-Steel Columns for Reinforcing an Old Building. Keith O. Guthrie. Illustrated description of method adopted to strengthen 10th sub-station of the Louisville Lighting Co. 1000 w. Eng News—Dec. 17, 1903.

Construction and Strength of Reinforced Concrete Columns. W. Dunn. Considers the necessary tests to secure reliable material and the strength of the material in place, giving results of experiments, etc. 9800 w. Jour Roy Inst of Brit Archts—Nov. 26, 1904.

See also **CONCRETE REINFORCED—Considère.**

Concrete vs. Reinforced Concrete.—Results of Comparative Tests of Plain and Reinforced Concrete Columns. E. J. McCaustland. A record of tests made to determine the behavior of concrete and steel in combination. 1200 w. Eng News—June 15, 1905.

Granite.—The Production and Transportation of the Granite Columns for St. John's Cathedral, New York City. An illustrated article describing this difficult work and explaining the methods adopted. 2800 w. Eng News—Dec. 3, 1903.

Raising 90-Ton Columns at the Cathedral of St. John the Divine, New York City. Illustrations with brief description of the method used. 500 w. Eng News—Sept. 1, 1904.

Hall of Records, N. Y.—See **BUILDING CONSTRUCTION.**

Lateral Pressure.—The Influence of Lateral Pressure upon the Crushing Resistance of Solids (Influence des Pressions Latérales sur la Résistance des Solides a l'Ecrasement). A. Considère. Data of tests made upon cylinders of mortar, surrounded by hydraulic pressure, and subjected to axial crushing. 1800 w. Comptes Rendus—April 18, 1904.

Long.—Formulas for the Resistance of Long Columns. A discussion on the assumptions at the base of various theoretical formulas for the resistance of long columns and a statement of reasons for preferring a curve based on results of tests of full size columns. 1500 w. Eng Rec—May 18, 1901.

Seat.—See Ball Joint; **BUILDING CONSTRUCTION—Column Seat.**

Stresses.—The Practical Column Under Central or Eccentric Loads. Albert I. Frye. Continued discussion of paper by J. M. Moncrieff. 500 w. Pro Am Soc of Civ Engs—Jan., 1901.

Stresses in Columns Subject to Combined Axial and Transverse Loading. Charles Worthington. Considers the conditions which generally exist in the designing of columns of this class, deducing formulas, etc. Ill. 2500 w. Pro Am Soc of Civ Engrs—March, 1902.

Resistance of Materials. The Stability of Loaded Columns (Résistance des Matériaux Etude sur la Stabilité des Pièces Chargées Debout). Gus L. Gérard. A mathematical discussion of the theory of long straight pieces under compression. Diagrams. 10,000 w. Rev Univ d Mines—March, 1902.

The Dimensions of Centrally and Eccentrically Loaded Columns (Einige Bemerkungen über die Bestimmung der Abmessung Exzentrisch und Zentrisch Beanspruchter Säulen). A. Ostenfeld. A review of Tetmajer's recent treatment of the subject, deriving coefficients for various sections. 2500 w. Zeitschr d Ver Deutscher Ing—Dec. 6, 1902.

The Construction of the Deflection Line of Straight Pillars, and their Applications in Statics (Die Konstruktion der Biegungslinie Gerader Stäbe und ihre anwendung in der Statik). L. Vianello. A graphical treatment of flexure in struts and pillars, with practical applications. 2500 w. Zeitschr d Ver Deutschr Ing—Jan. 17, 1903.

See also Lateral Pressure; Long; Test; **BEAM; CONCRETE REINFORCED; MATERIALS' STRENGTH; PILE.**

Test.—The Strength of Columns. Prof. W. E. Lilly. Read before the Inst. of Mech. Engrs. An account of experiments carried out to determine the conditions under which failure takes place either by primary or secondary flexure, and to obtain information as to the values of the areas and radii of the gyration of economic cross-sections. Serial. 1st part. 1500 w. Mech Engr—July 8, 1905.

See also Concrete vs. Reinforced Concrete; Lateral Pressure; **CONCRETE REINFORCED; MATERIALS' STRENGTH; TESTING.**

Wooden.—The Computation of Wooden Columns with Regard to Buckling (Berechnung der Hölzernen Säulen auf Knickfestigkeit). Max R. v. Thullie. With tables and curves computed from Tetmajer's formula. 1000 w. Zeitschr d Oesterr u Arch Ver—Nov. 8, 1901.

Wrought Iron and Mild Steel.—Practical Strength of Columns or Struts of Wrought Iron and Mild Steel. J. M. Moncrieff. Calls attention to the results of experiments on wrought iron and mild steel and applies to them the final formula deduced in an earlier paper, without dealing with the principles upon which it is based. 3800 w. Engng—June 6, 1902.

COMBUSTION.

See also **CALORIFIC VALUE; BOILER; FIRING; FUEL; FURNACE; MECHANICAL DRAFT; MECHANICAL STOKING; SMOKE PREVENTION; STEAM ENGINEERING; STEAM GENERATION.**

Combustion and Heat. Angus Sinclair. An explanation of the natural laws that regulate combustion and the theories of heat. Serial. 1st part. 1800 w. Loc Engng—July, 1901.

A Simple Method of Determining Condition of Combustion, with Suggestions on Working Furnaces. A. Bement. Explanation of a method especially suited to the requirements of regular work. Also discussion. 4000 w. Jour W Soc of Engrs—June, 1901.

Loss in Economy by the Inefficient Combustion of Fuel. A. Bement. On the importance of gas analysis, with illustrated descriptions of instruments used. 3500 w. Am Elect'n—Oct., 1901.

Combustion. C. C. Major. Analytical study of the chemical and thermal changes in the combustion of fuels, deriving formulas for the computation of the mechanical energy evolved. 5500 w. Power—Feb., 1905.

Bituminous Coal.—Furnace Temperatures. W. H. Booth. Discusses points in the combustion of bituminous fuels. 2500 w. Elec Rev, Lond—Aug. 30, 1901.

Burning Bituminous Coal. W. H. Booth. Discusses the difficulties encountered in effecting complete combustion, their causes, and means for remedying them. 3000 w. Mines & Min—Nov., 1901.

See also **LOCOMOTIVE OPERATION.**

Carbon in Oxygen.—See **CARBON—Combustion Temperature.**

Chemistry.—Chemistry of Combustion. John C. Olsen. Describes the changes during the burning of different fuels and the causes of the variation in calorific power. 2000 w. Engr, U S A—April 1, 1903.

The Chemistry of Combustion. An explanation of the chemistry of the petrol engine. 1600 w. Autocar—July 9, 1904.

Coke Breeze.—See COKE BREEZE.

Damper Regulator.—See DAMPER—Automatic Regulator.

Experiments.—Combustion. W. D. Spooner. Gives results of some experiments made in an attempt to secure economy. 5400 w. Engr, U S A—Feb. 16, 1903.

Gasoline Engine.—See Chemistry; GAGSOLINE ENGINE.

Incomplete.—See FUEL TEST.

Instruction.—A System of Teaching Combustion to Engineers and Firemen. Mr. Buell. Outlines the system taught by the International Correspondence School of Scranton, Pa., explaining how the fuel burns, what the products of combustion are, and how to secure the proper conditions. General discussion. 8500 w. S & S W Ry Club—Nov., 1904.

Locomotives.—See LOCOMOTIVE OPERATION.

Low-Grade Coal.—See BOILER TEST.

Mechanism.—The Mechanism of Combustion. Harold B. Dixon. Lecture before the Inst. of Gas Engrs. Reviews the theories advanced and discusses the subject in detail. Ills. 11,000 w. Gas Wld—June 11, 1904.

Pressure.—Burning of Fuel Under Pressure. Charles E. Lucke. Considers the means of obtaining good combustion. 1200 w. Engr, U S A—April 1, 1903.

Recording Apparatus.—The Control of Furnace Combustion. Illustrates and describes the Krell-Schultze apparatus for determining the resulting carbon-dioxide and other quantities. Refers also to other systems. 2000 w. Engng—May 6, 1904.

Soft Coal. — See Bituminous; FIRING; SMOKE PREVENTION.

Volume of Gas.—The Relation of the Volume of Hot Gases to the Heat Generated (Abhängigkeit des Rauchgasvolumens von der Erzeugten Wärmemenge und ihre Anwendung). A. Dosch. An examination of the conditions of combustion in boiler furnaces, with especial reference to the influence of the volume of gases to the transfer of heat. Two articles. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 18, 25, 1904.

Wasted Heat.—Wasted Heat. A. M. Wickens. Discusses some points relating to economical combustion. 1600 w. Can Engr—Sept., 1901.

COMBUSTION APPARATUS.

Shimer.—Shimer's Combustion Apparatus. Report of the Franklin Institute on the improved crucible device of P. W. Shimer, to whom was awarded the John Scott Legacy medal and premium. 900 w. Jour Fr Inst—Dec., 1901.

COMBUSTION MOTOR.

See GAS ENGINE; GASOLINE ENGINE; GAS TURBINE; MOTOR; OIL ENGINE.

COMMERCE.

See also ENGINEERING ECONOMICS; INDUSTRIAL ENGINEERING; INDUSTRY; LABOR; WORKS MANAGEMENT.

The Evolution of the Commerce of the World (L'Evolution du Commerce du Monde). M. Bichon. A study of the influence of scientific discovery upon the development of commerce in the nineteenth century. 6000 w. Rev Gen des Sciences—Dec. 15, 1903.

American.—Our Foreign Commerce in 1901. Extracts from the "Review of the World's Commerce," introductory to Commercial Relations of the United States, 1901. 3700 w. U S Cons Repts, No. 1269—Feb. 18, 1902.

Commercial Expansion. Mr. James J. Hill on the development of the United States, and the influence of the Lake Superior iron country. 4400 w. Marine Rev—June 12, 1902.

The Development of American Trade. James Dredge. Begins a review of progress, giving diagrams, tables, and information of value. Serial. 1st part. 8200 w. Trac & Trans—Jan., 1904.

A Comparison of American and European Commercial Conditions. W. J. Clark. A discussion of the economic and industrial factors affecting trade with the United States and other parts of the world. 4000 w. Engineering Magazine—May, 1904.

The Commerce of the United States. Reviews a recent report issued by the Treasury Department at Washington on the foreign commerce and home trade, showing the rapid growth of industries. 2300 w. Engng—April 28, 1905.

The Development of American Commerce (Le Développement du Commerce des Etats-Unis). A. Dumas. A study of the exports, imports and manufactures of the past 30 years and the influence of the Panama Canal and the Pan-American Railroad upon American commerce. 2500 w. Génie Civil—May 27, 1905.

See also ELECTRIC INDUSTRY.

American vs. British.—American Engineering Competition. Discusses the economic effects and their duration, the elements of success attending the management of large business concerns in the United States, and the difference between the spirit animating the working classes on either side of the Atlantic. Serial. 1st part. 2200 w. Jour Gas Lgt—Jan. 29, 1901.

Some Reflections Upon American Competition. George Harrison Sheffield. Paper read before the Newcastle-upon-Tyne Assn. of Students of the Inst. of Civil Engs. Discusses causes which are the outcome of American competition, and British conditions and tendencies. 6000 w. Engng—Feb. 1, 1901.

The Invasion of British Markets (L'Invasion du Marché Britannique). A report of the French consul M. Jean Perier, concerning the extent to which American products have entered into British trade. Serial. Part I. 3000 w. Revue Technique—Nov. 25, 1901.

American Competition with Britain, from a Canadian Point of View. A discussion of trade conditions and the contrast between English and American methods. 4500 w. Engng—April 3, 1903.

American vs. German.—An Engineering Problem (Eine Ingenieuraufgabe). H. Häbich. A discussion of the industrial problems in connection with manufacturing in various countries, dealing especially with the effect of American competition with Germany. 4500 w. Zeitschr d Ver Deutscher Ing—Sept. 17, 1904.

Anglo-American Supremacy.—Industrial Ascendency of the Anglo-American Peoples. C. L. Redfield. A discussion of the racial, educational, and territorial advantages which assure Anglo-American industrial supremacy. 3000 w. Engineering Magazine—Feb., 1901.

British.—British Trade and Foreign Competition. T. Good. Aims to give an impartial statement. 2000 w. Cassier's Mag—March, 1904.

The Systematic Promotion of British Trade. Ben H. Morgan. Discusses the relations of the state and trade, the control of shipping monopolies, consular service, &c., &c. Discussion. 8800 w. Jour Soc of Arts—Nov. 25, 1904.

British vs. American.—See American vs. British.

Carnegie.—Andrew Carnegie's Rectorial Address. Extracts from an address delivered at St. Andrews University, Scotland, on the subject of "Europe vs. America." 2200 w. Ir Age—Oct. 30, 1902.

Consular Report.—A Neglected Factor in Our Commercial Expansion. Albert Halstead. On the value of American consular service and the reports published. 3300 w. N Am Rev—Jan., 1902.

Great Lakes.—See CANAL—Sault Ste. Marie; ELECTRIC INDUSTRY; IRON ORE HANDLING; IRON ORE TRANSPORTATION.

Japan.—The Commerce and Mineral Industry of Japan (Le Japon: Son Commerce—Son Industrie Minière). Francis Marre. A tabulated review of Japanese commerce and metallurgical products. 1800 w. Revue Technique—Jan. 25, 1905.

Pacific.—Problems of the Pacific—The Commerce of the Great Ocean. O. P. Austin. Shows reasons why the United States will always possess exceptional facilities for commerce with the countries touched by the Pacific Ocean. Ill. 6000 w. Nat Geog Mag—Aug., 1902.

Parry Address.—See **LABOR.**

Persia.—New Highway of Commerce in Persia. Concerning improved facilities for communication and circulation of traffic. 1600 w. U S Cons Repts, No. 1841—Jan. 4, 1904.

United States.—See **American.**

COMMERCIAL ENGINEERING.

See also **COMMERCE; ENGINEERING ECONOMICS; INDUSTRIAL ENGINEERING; LABOR; WORKS MANAGEMENT.**

COMMUTATION.

See also **ELECTRIC GENERATOR; ELECTRIC GENERATOR DESIGN; ELECTRIC MOTOR.**

The Requirements of Good Commutation. John H. Hertner. Explains the theory and practice of commutation. 2300 w. Engr, U. S. A.—Jan. 1, 1901.

Designing of Continuous-Current Dynamos. Aubrey Clayton. Discusses the subject of commutation. 1800 w. Elec Rev, Lond—Feb. 21, 1902.

Commutation. H. St. Hill Mawdsley. Briefly considers methods for improving commutation. Ill. 1000 w. Elec Rev, Lond—Dec. 5, 1902.

Commutation of Continuous-Current Generators and Motors. G. A. Neild and P. E. Banting. Read before the Rugby Engng Soc. Deals only with machines having slot-wound armatures and carbon brushes. Discusses the effect of weakening the fields of dynamos and motors, reactance voltage, crane motors, and errors of construction. Ills. 5500 w. Elec Engr, Lond—Sept. 23, 1904.

Commutation Theory. A. Press. Mathematical discussion leading to working rules for preventing sparking at brushes. 800 w. Elec Wld & Engr—Dec. 16, 1905.

Alternating-Current Motor.—Commutation in Alternating-Current Motors at Starting. Marius Latour. Presents some precise considerations relating to the special conditions of commutation at starting. 1200 w. Elec Wld & Engr—Dec. 3, 1904.

Commutation at Starting of Alternating-Current Motors with Commutator. Marius Latour. Discusses a special construction for commutator armatures, in which resistance leads are used between the winding and the commutator, in connection with the starting of the single-phase motor. 1200 w. Elec Wld & Engr—Jan. 14, 1905. See also **ELECTRIC MOTOR.**

Arnold.—Notes on Commutation and Pole-Changing (Einiges über Kommutation und Wendepole). E. Arnold. A review of the discussion of Müller and of Pichelmayer, deriving formulas for computing the effects of commutation. 3000 w. Zeitschr f Elektrotechnik—Nov. 26, 1905.

Arrangement.—The Arrangement of Commutators and Collecting Rings (Behandlung von Kollektoren und Schleifringen). R. Hellmund. A discussion of the best arrangement of brushes and collecting and commutating rings for dynamos, with diagrams showing the effect of lubrication. 2500 w. Elektrotech Zeitschr—Sept. 11, 1902.

Brushes.—Why Use Carbon Brushes on the Modern Dynamos? J. W. Burleigh. Discusses the substituton of metal for carbon brushes, giving some designs. Ills. 700 w. Elec Rev, Lond—June 10, 1904.

Brushes, Carbon.—Experiments on the Resistance of Carbon Brushes (Essais sur la Resistance au Contact des Balais en Charbon). M. Bourguignon. Data and results of exhaustive tests of the contact resistance of carbon brushes for dynamos, with discussion by the Société. 5000 w. Bull Soc Int d Electriciens—Jan., 1903.

Commutation of Continuous-Current Generators. G. A. Neild and P. E. Banting. Read before the Rugby Engng Soc. Deals only with machines having slot-wound armatures and carbon brushes. 4500 w. Mech Engr—Feb. 27, 1904.

Casting Segments.—See **CASTING—Commutator Segments.**

Design.—Some Notes on Commutator Design. T. Square. Considers the electrical conditions to be satisfied, and also the mechanical features. Ill. 4200 w. Elec Engr, Lond—March 13, 1903.

Reactance E. M. F. and the Design of Commutating Machines. C. A. Adams. Explains a formula developed by the writer which makes possible a rational determination of the minimum safe number of commutator bars, and shows the manner in which the several fundamental design constants affect the commutation. 2000 w. Elec Wld & Engr—Aug. 26, 1905.

Limits.—Modern Commutating Dynamo Machinery, with Special Reference to the Commutating Limits. H. M. Hobart. Read before the International Engng. Con., Glasgow, 1901. Views regarding continuous-current machines, describing designs. Ill. Serial. 1st part. 3200 w. Engng—Feb. 7, 1902.

Losses.—Commutator Losses. W. B. Hird. Read before the Glasgow Soc. of the Inst. of Elec. Engrs. A discussion of these losses and their causes, showing that some general statements assumed to be correct, are quite incorrect. 2500 w. Mech Engr—June 6, 1903.

Müller and Pichelmayer.—See **Arnold; Pichelmayer.**

Oil Insulated.—Commutator Brushes Running under Oil (Unter Oel Laufende Kommutatorbürsten). M. Osnos. Giving designs by use of which oil insulation may be used for commutators, with reduction of losses and avoidance of sparking. 1800 w. Zeit für Elektrotechnik—Oct. 11, 1903.

Oscillograph.—See **OSCILLOGRAPH.**

Pichelmayer.—The Commutation of Currents (Zur Theorie der Stromwendung). K. Pichelmayer. A brief mathematical examination of the conditions necessary to avoid sparking of commutators. 1000 w. Elektrotech Zeitschr—Nov. 21, 1901.

The Theory of Commutation (Zur Theorie der Stromwendung). Karl Pichelmayer. Illustrated discussion of sparking at the commutators of direct-current machines and of commutation theories. 800 w. Elektrotech Zeitschr—Dec. 31, 1903.

The Commutation of Current in Dynamos (Die Stromwendung in Kommutierenden Maschinen). Karl Pichelmayer. Paper before the Vienna Elektrotechnischer Verein, on sparking at the commutators of direct-current machines and means for preventing it, with diagrams and discussion. 4000 w. Zeitschr f Elektrotechnik—Jan. 3, 1904.

See also **Arnold.**

Pole Pieces.—See **ELECTRIC GENERATOR DESIGN.**

Refilling.—The Commutator. Norman G. Meade. Suggestions for refilling commutators. Ills. 1200 w. Mach, N Y—Dec., 1904.

Repairing.—Repairing Commutators. Norman G. Meade. Gives detailed instructions for repairing and refilling commutators with the facilities that may be found in a manufacturing plant. Ills. 1800 w. Power—Jan., 1905.

Refilling and Repairing Commutators. Arthur B. Weeks. Gives an instance illustrating the importance of using the best material, describing methods of repair. 1600 w. Am Elect'n—Feb., 1905.

Rothert.—The Theory of Current Commutation (Beitrag zur Theorie der Stromwendung). A. Rothert. An elaborate mathematical discussion, deriving formulas for computation, and accompanied with tables and diagrams for practical application. Two articles. 7500 w. Elektrotech Zeitschr—Sept. 25, Oct. 2, 1902.

A Contribution to the Theory of Commutation. Alexander Rothert. Translated from the "Elektrotechnische Zeitschrift." Serial. 1st part. 2500 w. Elec Engr, Lond—Nov. 14, 1902.

Segment Number.—How Many Commutator Segments Should Be Used in a Continuous-Current Dynamo? (Wieviel Kollektorlamellen Soll eine Gleichstrommaschine Haben?) A. Rothert. An examination of the construction of the commutators of continuous-current dynamos, showing the method of computing the proper number of sections. 6000 w. Elektrotech Zeitschr—April 10, 1902.

Sparking.—Sparking Produced by Defective Commutators, and the Remedy. William Baxter, Jr. Discusses the requirements in order that commutator brushes may run without sparking and gives suggestions for correcting defects. Ill. 2000 w. Marine Engng—Jan., 1902.

Sparking—Its Cause and Cure. Arthur L. Rice. A study of injurious sparking considering its cause, effects, and location of the trouble. Ill. 2500 w. Engr, U S A—April 1, 1902.

Continuous-Current Dynamos for Direct Connection with Steam Turbines (Gleichstrommaschinen in Direkter Kupplung mit Dampf-Turbinen). Maximilian Zinner. Discussing the modifications of the commutator necessary to prevent sparking at high rotative speeds. 2500 w. Zeitsch f Electrotech—Nov. 29, 1903.

What Ailed the Dynamo? D. H. Browne. An amusing account of dynamo troubles and the search for the cause, with editorial. 2500 w. Elec-Chem Ind—March, 1904.

The Computation of Equipotential Connections (Ueber die Berechnung von Aequipotentialverbindungen). Arthur Müller. A discussion of methods for the prevention of sparking of commutators. Two articles. 5000 w. Zeitschr f Elektrotecknisch—April 17, 24, 1904.

Predetermination of Sparking in Direct-Current Machines. W. L. Waters. Considers the most important conditions which effect the sparking, deducing a formula that will give fairly accurate results when applied to machines similarly designed, and some idea when applied to different designs. 3000 w. Trans Am Inst of Elec Engrs—May 17, 1904.

Discussion on "Predetermination of Sparking in Direct Current Machines" and on the "Effect of Self-Induction on Railway-Motor Commutation." The first paper was by W. L. Waters; th second by E. H. Anderson. 10800 w. Trans Am Inst of Elec Engrs—June, 1904.

Limits of Injurious Sparking in Direct-Current Commutation. Thorburn Reid. Considers in detail what happens to a commutator segment while the machine is running, and aims to prove that the question of sparking is simply a question of the temperature of the segment while it is under the brush. 7200 w. Am Inst of Elec Engrs—May, 1905.

Discussion on "Limits of Injurious Sparking in Direct-Current Commutation," at Asheville, N. C. 3000 w. Am Inst of Elec Engrs—Sept., 1905.

External Causes of Sparking in Direct-Current Machinery. Sydney Woodfield. Discusses in detail the more common causes of sparking. 3200 w. Elec Rev, Lond—June 30, 1905.

See also **ELECTRIC GENERATOR; ELECTRIC MOTOR.**

Spark Prevention.—Sparkless Commutation with Fixed Brushes. Claude W. Hill. Reviews the method of calculation which gave satisfactory results with the older forms of machine having copper brushes, and indicates the modification necessary to obtain satisfactory working with fixed carbon brushes and minimum gap excitation, by which means a minimum weight of machine may be obtained. 2500 w. Elec Rev, Lond—Jan. 10, 1902.

Sparkless Commutation How to Obtain It. F. W. Davies. Deals with those points in ordinary designing by attention to which it is possible to obtain good collection. 2000 w. Elec Engr, Lond—Aug. 15, 1902.

Sparkless Commutation (Ueber Funkenfreies Kommutiren). P. Prenslin. A discussion of the arrangement of the carbon brushes of a continuous current dynamo so as to secure sparkless commutation when running in either direction. Two articles. 7500 w. Elektrotech Zeitschr—Oct. 23, 30, 1902.

See also **ELECTRIC GENERATOR—Auxiliary Poles; Troubles.**

Stray Field.—Commutation and Straying (Ueber Kommutation und Streuung). F. Niethammer. A discussion of the conditions for sparkless commutation in continuous-current dynamos, and of the more precise determination of the stray field of induction motors. 2000 w. Zeitschr f Elektrotechnik—Nov. 20, 1904.

Test.—A Practical Test on Commutation. Arthur Keller. Discussion of commutation phenomena, and account of tests made by measuring the voltage drop between the brush and different commutator bars under it, with diagrams. Also editorial. 1500 w. Elec Wld & Engr—Aug. 20, 1904.

Truing Up.—The Maintenance of Commutators and Brushes. S. Lees. An illustrated article discussing in the present number, the methods of truing up commutators. Serial. 2 parts. 3700 w. Elec Engr, Lond—Aug. 25, and Sept. 1, 1905.

COMMUTATOR.

See **COMMUTATION.**

COMPASS.

See also **NAVIGATION; SURVEYING INSTRUMENT.**

A Study of the Compass (Studio sulla Bussola). G. Pes. A theoretical and mathematical investigation of the magnetic deviation of the compass. 7000 w. Rivista Marittima—Aug.-Sept., 1901.

Importance of a Correct Ship's Compass. Lieut. W. H. Faust. Reprinted from 1903 edition of Ship-Masters' directory. On compensating or adjusting the compass; deviations and their causes. 3000 w. Marine Rev—April 23, 1903.

Iron Ships.—See **STEAMSHIP—Channel Service.**

Mining.—See **SURVEYING INSTRUMENT.**

COMPASS CARD.

New Design for Compass Card. A proposition to do away with compass points, and to use a card graduated in a circle of degrees continuously to the right. Ill. 1000 w. Marine Rev—Jan. 10, 1901.

Another Form of Compass Card. A proposal to embody both the degree system and the point system in one card, with a view to bringing about gradually the adoption of the former. 1200 w. Marine Rev—May 23, 1901.

COMPASS INDICATOR.

The Indication of Compass Positions at a Distance (Fernübertragung von Kompassstellungen). A description of a method, based on the Wheatstone bridge principle, or indicating the position of a ship's compass at any distance. Diagrams. 700 w. Elektrotech Rundschau—July 1, 1903.

COMPETITION.

See also **COMMERCE.**

Principles for the Government of Competitions (Grundsätze für Preisbewerbungen). A report of a committee of the Oesterr Ing. und Arch Verein on the principles which should govern architectural and engineering competition. 5500 w. Supplement to Zeitschr d Oester Ing u Arch Ver—May 9, 1902.

COMPOUND LOCOMOTIVE.

See **LOCOMOTIVE, COMPOUND.**

COMPRESSED AIR.

See also **AIR COMPRESSOR; BLOWING ENGINE; CAISSON; COMPRESSED AIR PLANT; PNEUMATIC TOOL; PNEUMATIC TUBE.**

Compressed Air. Considers its compression, storage and distribution, and its use as a motive power. Serial. 1st part. 2500 w. Auto Jour—March, 1901.

Compressed Air. J. J. Swann. A lecture before the Brooklyn Engs' Club. Briefly reviews the history of compressed air, its production, transmission and use. 5000 w. Compressed Air—May, 1901.

Compressed Air. W. L. Saunders. Discusses the subject of compression, cooling, oil, etc., and concludes with a number of "Don'ts" bearing on this subject. 3000 w. Can Min Rev—April 30, 1902.

Air-Brake Storage.—See **AIR BRAKE—Storage.**

Altitude.—Air Compression at Altitude. Frederick M. Hitchcock. Showing the increase of power required at altitude to compress a volume of air equivalent in effect to a given volume at sea level. 1200 w. Mines & Min—May, 1905.

Boyle's Law.—Graphics of Boyle's Law. E. F. Schaefer. A discussion of the law of the relations of pressure and volume of compressed air and other gases, showing the method of plotting them as a graphical diagram. 1500 w. Air Power—April, 1905.

Calculations.—Compressed Air Calculations. W. C. Popplewell. The first of a series of articles discussing how the necessary calculations are to be made. Serial. 1st part. 1700 w. Mech Engr—Aug. 23, 1902.

Air Compressors and Blowing Engines. C. H. Innes. A mathematical demonstration of the work done in compressing air, illustrating by examples, is given in the present number. Serial. 1st part. 2800 w. Prac Engr—April 22, 1904.

Carpet Cleaning.—See **CARPET CLEANING.**

Cost.—See **AIR COMPRESSOR—Electric vs. Steam; PNEUMATIC TOOL.**

Diagram.—Diagram for Calculating Compressed Air Pressure. Presents and explains a graphic table intended to facilitate calculations in power transmission. 200 w. Min & Sci Pr—April 27, 1901.

Dredge.—See **DREDGE—Clamshell.**

Düsseldorf Exposition.—Machinery Department of the Düsseldorf Exposition. H. L. Terwilliger. A review of the interesting exhibits, especially those using compressed air. 1600 w. Compressed Air—Oct., 1902.

Electric Railway Shop.—Compressed Air in Electric Railway Shop, Power House and Track Work. An illustrated article reviewing the uses to which air under compression can be applied, and the methods and devices used. Serial. 1st part. 7000 w. St Ry Rev—March 20, 1904.

See also **ELECTRIC RAILWAY SHOP.**

Explosion.—Explosion in Compressed Air Pipes at Aberberg Colliery, Monmouthshire. R. Jordan. An account of this explosion and the damage, discussing the cause, and the precautions to avoid explosions. 2500 w. Ir & Coal Trds Rev—Jan. 8, 1904.

See also **AIR COMPRESSOR.**

Foundry.—Pneumatic Tools and Appliances in Foundry Service. W. P. Pressinger. Reviews briefly the various appliances which have lightened labor and reduced costs, that are dependent upon compressed air for their power. Ill. 2500 w. Jour Am Found Assn—Jan., 1901.

Compressed Air in the Foundry and Machine Shop. W. L. Saunders. An exhaustive study of the numerous uses of compressed air for sand blast, ramming, hammers, hoists, pneumatic tools, molding machines, and other uses in machine works and foundries. 5000 w. Compressed Air—Dec., 1902.

Freezing.—The Freezing of Moisture Deposited from Compressed Air. Robert Peele. Considers the conditions that cause freezing, and devices to remedy the trouble. 1600 w. Mines & Min—April, 1902.

Glass Manufacture.—See **GLASS MANUFACTURE—Compressed Air.**

Grain Shoveling.—See **GRAIN HANDLING.**

Harris System.—See **AIR LIFT.**

Hoists.—See **HOISTING—Compressed Air.**

Lubrication.—See **LUBRICATION.**

Machine Tools.—See **MACHINE TOOL—Power.**

Machine Works.—See **Foundry; Workshop.**

Marking Machine.—See **MARKING MACHINE.**

Mining.—Compressed Air Plant at a German Colliery. C. Jüngst, in "Zeitschrift für Berg, Hütten und Salinenwesen." Illustrated description of plant at the Royal Camphausen Colliery, for driving the pumps, ventilating fans and winches. 2000 w. Col Guard—Feb. 8, 1901.

Compressed Air in Mining. J. E. Bell, in "Mining and Metallurgy." On the cost of compressed air per indicated horse-power, claiming that a large air-compressing plant could be made with a conservative estimate of 75 per cent. of the cost of an electric plant of a like size. 4800 w. Compressed Air—April, 1901.

Underground Compressed Air Mine Plant. Robert Peele. Considers the application of compressed aid to rock drills, pumps, hoisting engines, and coal cutters. 5000 w. Mines & Min—March, 1902.

The Use of Compressed Air in Mining. T. W. Barber. States its special advantages and applications, discussing methods, the installation and improvements needed. 2600 w. Ir & Coal Trds Rev—April 4, 1902.

The Operation of Compressed Air Motors with Expansion (Betrieb von Druckluftmotoren mit Expansion). H. Althans. An examination of the practicable increase in efficiency of compressed-air motors for mining service. 1500 w. Glückauf—Jan. 30, 1904.

Compressed Air in Mine Operation. Lucius I. Wightman. An advocacy of compressed air for mining work, presenting its advantages. Ills. 2500 w. Min Mag—Oct., 1904.

See also **Freezing; Power Transmission; AIR COMPRESSOR; COAL MINING MACHINERY; COMPRESSED AIR LOCOMOTIVE; COMPRESSED AIR PLANT; ELECTRIC EQUIPMENT—Mine, Compressed Air Compared; MINE HAULAGE; MINING MACHINERY; POWER TRANSMISSION; ROCK DRILL.**

Mining, California.—Compressed Air Traction Plant, Red Point Mine, Placer County, Cal. Outlines the method of mining in this gold placer. It is a horizontal deposit beneath a volcanic deposit, and the drift mining method consists in driving tunnels. Describes the traction installation. Ill. 1300 w. Min & Sci Pr—Aug. 31, 1901.

Mining, England.—Compressed Air in English Mines. Sydney F. Walker. Discusses arrangements which result in losses, and the methods of overcoming them. 2200 w. Mines & Min—Nov., 1902.

Mining, South Africa.—South African Mining. Fred E. Norton. On the extent to which compressed air is used, describing the peculiar conditions and the type of compressors. 3200 w. Mines & Min—July, 1905.

Moisture.—Moisture in Compressed Air. D. W. Hering. Discusses the statements made concerning air compressed hydraulically, and explains the process. 2000 w. Compressed Air—March, 1902.

Motive Power.—See **COMPRESSED-AIR LOCOMOTIVE; COMPRESSED-AIR RAILWAY; MINE HAULAGE.**

Pacific Coast.—See **AIR COMPRESSOR—Water-Wheel Driven.**

Pipes and Accessories.—Pipes and Accessories Used in the Transmission of Power by Compressed Air. W. C. Popplewell. Discusses the sources of loss in the present article. Ill. Serial. 1st part. 1800 w. Mech Engr—July 26, 1902.

Power Plant.—See **COMPRESSED-AIR PLANT.**

Power Transmission.—Compressed Air for the Transmission of Power. J. H. Ronaldson. Read before the N. S. W. Chamber of Mines. Considers the laws affecting the compression of air, compressors, efficiency, methods of using and dangers. 3500 w. Compressed Air—Nov., 1900.

Transmission of Gas and Air Through Pipes and the Transmission of Power by Compressed Air. Frederick W. Gordon. Considers the compression, transmission and expansion. General discussion. Ill. 3400 w. Pro Engrs' Club of Phila—Nov., 1900.

Transmission of Power by Compressed Air. W. C. Popplewell. Considers the uses to which it can be applied, its economy, objections to its use, and related matters. 4000 w. Mech Engr—April 18, 1903.

Transmission of Compressed Air for Power. L. C. Bayles. Explains the method of determining the most economical size of pipe to use for the transmission. 700 w. Compressed Air—Nov., 1903.

Power Transmission by Compressed Air. Lucius I. Wightman. Illustrates and describes a system at a North Amherst, Ohio, quarry, where the power is used by the same machines which originally were run by steam. 5000 w. Power—Aug., 1904.

See also **AIR FLOW—Pipes; POWER TRANSMISSION.**

Pumping.—Pumping by Compressed Air. Edward A. Rix. The object of the paper is to discuss some neglected points, suggest some new methods, and encourage the designing of pumps especially adapted to the use of compressed air. Ill. 14000 w. Jour Assn of Engng Socs—Oct., 1900.

Compressed Air for Pumps. Frank Richards. Some remarks on means of determining the sizes of air compressors for operating pumps. 600 w. Am Mach—June 4, 1903.

See also **AIR LIFT.**

Quarrying.—Compressed Air in Quarrying. Claims economies obtained by substituting air for steam power. Ills. 1800 w. Mines and Min—Aug., 1904.

See also **COMPRESSED AIR PLANT.**

Railway Shops, Omaha.—Air Power in the Union Pacific Shops at Omaha, Neb. Illustrates and describes some of the applications of compressed air. 1000 w. Mod Mach—Dec., 1905.

Railway Shops, Wabash.—Air Appliances in the Wabash Shops. An illustrated description of modern appliances for utilizing compressed air. 2300 w. Ry Age—Nov. 7, 1902.

Railway Work.—I. Railroad Uses of Pneumatic Tools. Ill. Thomas Aldcorn. II. Compressed Air in Railroad Service. W. P. Pressinger. Two papers, discussed together, on the uses for compressed air in railroad work. 12800 w. N Y R R Club—March 21, 1901.

Pneumatic Tools and Compressed Air for General Railroad Work. W. P. Pressinger. Considers some of the latest devices, particularly appliances not in general use. General discussion. 11200 w. Ry Club of Pittsburg—Dec., 1903.

Compressed Air and Pneumatic Tools in Railroad Service. Thomas Aldcorn. Suggestions for the care of tools, discussing the uses to which they are applied, the troubles met with, etc. General discussion follows. 8000 w. Pro Cent Ry Club—May 13, 1904.

See also **Electric Railway Shop; COMPRESSED-AIR PLANT; PNEUMATIC TOOL; RAILWAY SHOP.**

Receiver.—The Location of the Compressed Air Receiver. Frank Richards. At a meeting of the N. Y. R. R. Club it was suggested that the receiver be placed in the warmest place convenient; the writer gives reasons for thinking the reverse would be the best advice. 1000 w. Am Mach—April 25, 1901.

Re-Heating.—Economy Due to Re-Heating Compressed Air. An illustrated account of experimental tests performed by W. G. Edmondson and E. L. Walker, students in the Ry Engng. Dept. of Cornell Univ. 1500 w. Am Mach—July 31, 1902.

Internal Reheating of Compressed Air. C. A. Dawley and A. W. Stone. Discusses methods of reheating, explaining the theory of dry reheating, and of wet heating, and examining some heaters. Ills. Serial. 1st part. 4000 w. Sib Jour of Engng—Jan., 1905.

Reheaters and Reheating. States the advantages gained by reheating, giving illustrated descriptions of different types of reheaters. 1800 w. Mines & Min—May, 1905.

St. Louis Exposition.—Compressed Air at the Louisiana Purchase Exposition. A review of the field diversity of applications. 3500 w. Compressed Air—Nov., 1904.

See also **COMPRESSED-AIR PLANT.**

Sawing.—Sawing by Compressed Air. Illustrated detailed description of a pneumatic saw, known as the Redfield pneumatic engine and frame. 800 w. Compressed Air—Feb., 1904.

Shaft Sinking.—See **SHAFT SINKING—Compressed Air.**

Test.—Efficiency Tests of Compressed Air Machinery. W. C. Popplewell. Gives an illustrated detailed description of the methods employed and appliances necessary for tests of the different branches of a compressed air installation. Serial. 1st part. 2300 w. Mech Engr—Jan. 10, 1903.

Tool.—See **COMPRESSED-AIR PLANT; PNEUMATIC TOOL.**

Unhealthfulness.—Abuse in the Use of Compressed Air. W. L. Saunders. Calling attention to the unhealthfulness of discharged compressed air when impregnated with bad oils, and suggesting remedies. 1400 w. Compressed Air—Sept., 1902.

Volumetric Efficiency.—Compression of Air and Volumetric Efficiency. E. A. Rix. Gives theoretical data and their application to practical problems of compressed air machinery. 4800 w. Mines & Min—May, 1905.

Wachusett Dam.—The Use of Compressed Air for Operating the Contractor's Plant at the Wachusett Dam. An account of the use of compressed air on a large scale in contract work noting some of its advantages. Ill. 1200 w. Eng News—Nov. 26, 1903.

Water Raising.—See **Pumping; AIR LIFT.**

Workshops.—Compressed Air and Pneumatic Tools in Engineering Works. Frank Fielden. On the advantages and uses of compressed air in the shop. 2500 w. Engng—Aug. 19, 1904.

See also **PNEUMATIC TOOL—Structural Work.**

COMPRESSED-AIR HAULAGE.

See **COMPRESSED-AIR LOCOMOTIVE; COMPRESSED-AIR PLANT; COMPRESSED-AIR RAILWAY; MINE HAULAGE.**

COMPRESSED AIR ILLNESS.

See **CAISSON DISEASE.**

COMPRESSED-AIR LOCOMOTIVE.

See also **COMPRESSED-AIR RAILWAY; MINE HAULAGE.**

Compressed-Air Locomotives (Druckluftlokomotiven). M. Buhle and G. Schimpff. A well illustrated description of various compressed-air locomotives, particularly the system in use on the Western Railway of France, in and about Paris. 1 plate. 4000 w. Zeitschr d Ver Deutscher Ing—April 26, 1902.

Mekarski.—Mekarski System of Compressed-Air Locomotives as Used on Suburban Lines in Paris. Illustrated description of this system. 1600 w. Sci Am Sup—Oct. 17, 1903.

Mine.—Compressed Air Locomotives. H. K. Myers. Considers principles governing their construction, and gives some of the reasons why they are often preferred in mines. Ill. 2500 w. Mines & Min—Nov., 1900.

Electric versus Compressed Air Mining Locomotives. Frank C. Perkins. The present article is mostly devoted to the compressed air locomotives and their advantages. Ill. Serial. 1st part. 800 w. Min Rept—Feb. 17, 1902.

Electric and Compressed Air Mining Locomotives. Frank C. Perkins. Considers the details of leading types, comparing their working advantages and disadvantages, etc. 1800 w. Min & Sci Pr—March 8, 1902.

Pneumatic Traction in Mines in the United States (La Traction Pneumatique dans les Mines des Etats Unis). A. de Gennes. With illustrations of compressors and compressed-air locomotives and data as to efficiency and cost. 5000 w. 1 plate. Mem Soc Ing Civ de France—June, 1904.

See also **COMPRESSED AIR—Mining; MINE HAULAGE.**

Norway, Mich.—See **AIR COMPRESSOR—Four-Stage.**

Paris.—Compressed-Air Locomotives. Illustrated description of locomotives for yard service in the Invalides Station in Paris. 1200 w. Sci Am Sup—June 28, 1902.

COMPRESSED-AIR MOTOR.

See **COMPRESSED AIR; COMPRESSED-AIR LOCOMOTIVE; COMPRESSED-AIR RAILWAY.**

COMPRESSED-AIR PLANT.

See also **AIR COMPRESSOR; COMPRESSED AIR.**

Billancourt, Paris.—The Billancourt Compressed Air Station (Usine de Billancourt pour la Production de l'Air Comprimé). G. Boeto. A fully illustrated description of the compressing station of the Paris Omnibus Company. 4000 w. 1 plate. Génie Civil—July 20, 1901.

The Billancourt Compressed Air Plant, Paris. Illustrated description of plant of 7000 H. P. for furnishing compressed air at 1,140 lbs. for the use of cars operated by compressed air. 1400 w. Eng Rec—May 3, 1902.

See also **COMPRESSED-AIR RAILWAY—Paris.**

Boston Transit Commission.—Efficiency and Capacity Test of the Ingersoll-Sergeant Drill Co.'s Plant Installed for the Boston Transit Commission, Boston, Mass. R. S. Carter. Illustrated description of air-compressor plant to be used in driving a tunnel by the shield method, and record of tests. 1800 w. Compressed Air—Dec., 1902.

Bradford, Eng.—Compressed Air Equipment at Bradford Corporation Tramways, Car Shed and Workshops. An illustrated detailed description of the uses to which compressed air is put. 1700 w. Tram & Ry Wld—Oct. 8, 1903.

British Mines.—Air Compressión in Great Britain. James Tonge. Illustrated description of a number of the leading compressor plants at mines. 4000 w. Mines & Min—June, 1905.

Central.—Central Compressed-Air Power Plants. From "Granite." Reviews briefly the conditions that have made these plants necessary, describing a typical installation. 2800 w. Compressed Air—Jan., 1902.

Chicago, Ill.—Air Compressor Plant at Marshall Field Store, Chicago, Ill. Illustrated detailed description of this plant. 1700 w. Compressed Air—April, 1904.

Cleveland Stone Co.—The Compressed-Air Power Transmission Plant of the Cleveland Stone Company. Lucius I. Wightman. An illustrated detailed description of a central power plant, transmitting power by air pipe lines to various machines throughout the quarry. 6500 w. Eng News—July 7, 1904.

Defective Installation.—Compressed Air and Defective Installation of Air Plants. William Wilhelm. Gives facts useful to engineers in the installation of air equipment. 1300 w. Mines & Min—Sept., 1905.

Explosion.—See **COMPRESSED AIR; EXPLOSION.**

Mining.—See **AIR COMPRESSOR; COMPRESSED AIR; COMPRESSED-AIR LOCOMOTIVE; MINE HAULAGE; POWER TRANSMISION.**

N. Y. Tunnels.—The Compressed Air Power Plants for the Pennsylvania Railroad Tunnels, New York. Brief outline of the plants for the work of constructing tunnels under the North and East Rivers, at New York City. 1000 w. Eng Rec—Jan. 28, 1905.

Compressed-Air Power Plants for the Pennsylvania Railroad Tunnel. A general description of the four Ingersoll-Sergeant plants installed in connection with the tunnelling operations under the North and the East rivers at New York. 1200 w. Compressed Air—Feb., 1905.

New York Underground Ry.—The Contractor's Power Plants on the New York Rapid Transit Railway. Illustrated descriptions of eight stations, built as a rule in cramped situations, for supplying compressed air for hoisting engines, drills and other apparatus. 4200 w. Eng Rec—Aug. 3, 1901.

Norwich, Conn.—See **AIR COMPRESSOR—Hydraulic.**

Paris.—See **Billancourt.**

Pennsylvania R. R.—A Central Compressed Air Power Plant for Heavy Railroad Construction. Lucious I. Wightman. Illustrates and describes the plant for carrying out the heavy work on the low-grade freight line of the P. R. R. near Safe Harbor, Pa. 2500 w. Compressed Air—Nov., 1905.

Pribram, Bohemia.—See **AIR COMPRESSOR.**

Quarrying.—A Central Compressed-Air Power Plant for Quarrying. Illustrates and describes a recently installed plant for furnishing power to drive machinery in quarries. 1500 w. Ir Age—Sept. 5, 1901.

Safe Harbor, Pa.—A Central Compressed-Air Power Plant for Heavy Railroad Construction. Lucius I. Wightman. Description, with illustrations, of the central station located near Safe Harbor, for carrying on extensive railway work on the low grade freight line of the Pennsylvania R. R. 3000 w. Eng Rec—Oct. 28, 1905.

St. Louis Exposition.—The Compressed-Air Power Plant at the St. Louis Exposition. Illustrated description of one of the compressors. 750 w. Compressed Air—March, 1904.

See also **COMPRESSED AIR.**

St. Louis Terminal.—The St. Louis Union Terminal Station. Illustrates and describes the plant for supplying compressed air and notes the applications made. 450 w. Compressed Air—March, 1904.

The Central Compressed-Air Power Plant of the St. Louis Terminal Station. A description of the extensive Ingersoll-Sergeant plant used for the signal system, for charging brake reservoirs, and for general power purposes at the Union Terminal at St. Louis. 2000 w. Compressed Air—Feb., 1905.

COMPRESSED-AIR RAILWAY.

See also **COMPRESSED-AIR LOCOMOTIVE; COMPRESSED-AIR PLANT; MINE HAULAGE.**

Compressed Air for Street Railway Operation. H. D. Cooke. Read at meeting of N. Y. State St. Ry. Assn. Briefly describes the construction and operation of the air car. 2500 w. Compressed Air—Nov., 1900.

Compressed Air—the Ideal Motive Power. Henry D. Cooke. Reviews the history of its application to tramways, and for other uses, and discusses the outlook. 2000 w. St Ry Rev—Jan. 15, 1901.

The New Compressed Air Motors for City Traction. An illustrated account of the changes and improvements recently made, with report of their successful working. 1800 w. R R Gaz—Sept. 6, 1901.

Compressed-Air Haulage Plants. Richard Hirsch. An illustrated general description of plant locomotives, etc., and their operation, with discussion. 6800 w. Pro Engrs Soc of W Penn—Dec., 1901.

Compressed Air as a Transportation Agent. Waldon Fawcett. Considers some of the fields where this form of mechanical haulage is especially useful, giving illustrated descriptions of the locomotives used. 900 w. Sci Am—Dec. 13, 1902.

Anaconda, Mon.—An Industrial Compressed Air Railway. C. B. Hodges. Illustrated description of the compressed-air system of transportation at the new reduction works of the Anaconda Copper Mining Company, at Anaconda, Montana. 3000 w. Cassier's Mag—Oct., 1905.

Hardie.—See **New York.**

New York.—Compressed-Air Traction in New York City. A summary of the recent developments of this mode of traction in New York City. Ill. 2500 w. R R Gaz—Nov. 23, 1900.

Report on the New Hardie Air-Motor Cars Now in Use on the 28th and 29th Street Line, New York City. W. L. Hoffecker. Letter giving favorable report of inspection. 1200 w. Compressed Air—Nov., 1900.

The Compressed-Air Motor in Street Car Service. A review of 28th and 29th sts. line in New York. An official statement of the running of the cars. 1900 w. Compressed Air—Jan., 1901.

Paris.—New Compressed-Air Vehicles (Nouvelles Voitures à Air Comprimé). G. Boŝto. Illustrating and describing the improved compressed-air tram cars introduced on the lines of the General Omnibus Company at Paris. Serial. Part I. 3000 w. 1 plate. Génie Civil—July 13, 1901.

COMPRESSED GAS.

See **COMPRESSED AIR; GAS—Compression; OXYGEN.**

COMPRESSOR.

See also **AIR COMPRESSOR.**

Carbonic Acid Gas.—A 150-Horse-Power Three-Stage Compressor. Description of a new type of compressor for carbonic acid gas, to work against a pressure of 1,200 lbs. 500 w. Eng Rec—Nov. 3, 1900.

Cylinder Temperatures.—See **AIR COMPRESSOR.**

Natural Gas—See **GAS ENGINE—Gas Compressor Plant.**

Refrigerating Plant.—See **REFRIGERATION.**

COMPUTING.

See **CALCULATING; CALCULATING MACHINE; COUNTING APPARATUS; SLIDE RULE.**

CONCENTRATION.

See also **COPPER METALLURGY; GOLD METALLURGY; GOLD MILLING; MAGNETIC SEPARATION; METALLURGY; ORE TREATMENT.**

CONCRETE.

See also **CEMENT; CONCRETE REINFORCED; FIREPROOF CONSTRUCTION; FLOOR; MASONRY.**

The Use of Concrete. Victor K. Hendricks. Gives instructions and suggestions for obtaining good work. 9000 w. Indiana Engng Soc—1901.

The Concrete Question. William B. Smith. Information relating to the use of concrete by a writer of experience. 1800 w. Ry & Engng Rev—Jan. 26, 1901.

Wet, Dry, or Medium Concrete. H. W. Parkhurst. A tabular comparison of two sets of experiments and conclusions, drawn from them. Illustrations and discussion. 5500 w. Jour W Soc of Engrs—June, 1902.

The Uses of Concrete in Recent Engineering Practice. Samuel H. Lea. Read before the Scranton Engineers' Club. Considers the materials from which it is made and the purpose to which it has been applied. 4800 w. Mines & Min—Sept., 1903.

More Light on the Theory of Concrete. Spencer B. Newberry. Read before the Indiana Engng Soc. Discusses materials, proportions, &c. 1800 w. Eng Rec—Feb. 6, 1904.

Concrete: Its Properties and Applications. A topical discussion introduced by Edgar Marburg. 13000 w. Pro Engrs' Club of Phila—April, 1904.

Concrete Construction. Edward Everett. Reviews briefly the history of the early use of concrete, the present use, reinforced concrete, government use of concrete, and gives illustrated description of plans for a concrete warehouse, tests of concrete, &c. 4500 w. Ice & Refrig—Feb., 1905.

Notes on Concrete. C. E. P. Sankey. On specifications for concrete, discussing the percentage of voids, quality and quantity of mortar and other ingredients, and methods of determining them, the making of concrete, etc. 2000 w. Engng—Sept. 1, 1905.

Arches.—Concrete. Acheson Smith. Considers chiefly concrete arches, and the quality of concrete. Short discussion. Ill. 2400 w. Pro Engrs' Soc of W Penn—April, 1903.

See also **BRIDGE—Concrete; CULVERT.**

Architecture.—The Use of Concrete in Architecture. David Gibson. Calls attention to some of the uses made of this material, and gives suggestions for its treatment. 1300 w. Munic Engng—April, 1903.

Beam.—Note on the Coefficient of Elasticity of Concrete and Mortar Beams During Flexure. Myron S. Falk. Gives valuable results for concrete and mortar beams tested to the point of failure. 600 w. Pro Am Soc of Civ Engrs—Feb., 1903.

Note on the Coefficient of Elasticity of Concrete and Mortar Beams During Flexure. E. J. McCaustland. Discussion of paper by Myron S. Falk, Jr. 1800 w. Pro Am Soc of Civ Engrs—April, 1903.

See also **CONCRETE REINFORCED.**

Berlin, N. H.—See **PAPER MILL.**

Block.—Concrete Block Manufacture. Considers the underlying principles which should govern the development of this industry. 1800 w. Munic Engng—June, 1904.

The Manufacture and Use of Concrete Blocks. F. W. Hagloch. Considers the selection of material, proportioning and curing of concrete blocks. 3000 w. Eng News—Aug. 31, 1905.

The Philadelphia Specifications for Concrete Building Blocks. Gives the regulations in force in the Borough of Manhattan, New York, and the rules and regulations covering the manufacture and use of concrete building blocks in the city of Philadelphia. 4200 w. Cement Age—Sept., 1905.

The Manufacture of Concrete Blocks and Their Use in Building Construction. H. H. Rice. (Prize Paper.) Considers the materials, mixing, and manufacture of concrete blocks, the curing, facing, testing and cost, with suggestions for their use in construction. 7500 w. Eng News—Oct. 5, 1905.

The Manufacture of Concrete Blocks and Their Use in Building Construction. William M. Torrance. (Second prize paper.) Discusses the proper ingredients, forms of blocks, cost, engineering and architectural considerations, &c. Ills. 10000 w. Eng News—Oct. 12, 1905.

The Manufacture of Concrete Blocks and Their Use in Building Construction. H. G. Richey. Third prize paper. Considers points of importance in the manufacture and construction. Ills. 7000 w. Cement Age—Nov., 1905.

The Manufacture of Concrete Blocks and Their Use in Building Construction. Extracts from papers submitted to the "Engineering News" competition and not receiving prizes. Ills. 6000 w. Eng News—Oct. 26, 1905.

Concrete Block Construction and the Architects. Editorial discussion of this material, the shortcomings of the block maker, and the neglect of the architect. 1700 w. Eng News—Nov. 23, 1905.

See also **BREAKWATER—Concrete Blocks; BRICK — Sand Lime; CRANE; HARBOR — Bizerta; WEIR.**

Blocks, Curing.—Curing Concrete Blocks. H. H. Rice. Discusses some points of importance in securing strength in these blocks, with remarks on their value as a building material. 1000 w. Ing Rec—July 29, 1905.

Block, Waterproofing.—See **Waterproofing.**

Buffalo Breakwater.—Materials for the Concrete of the Buffalo Breakwater. Emile Low. Illustrated article giving details of this work, which is a departure from ordinary methods as usually practiced in concrete construction. 2500 w. Eng News—Sept. 11, 1902.

See also **Mixing; BREAKWATER.**

Canal Lock.—The Concrete Lock Near St. Paul. Description of a concrete plant of 300 yds. daily capacity, constructed on the top and slope of a bluff and operated largely by compressed air. 2100 w. Eng Rec—Dec. 22, 1900.

Construction of Concrete Masonry of a Canal Lock on the Eastern Section of the Illinois & Mississippi Canal. Jas. C. Long. Illustrates and describes the construction work, materials used, tests, etc. Also discussion. 5000 w. Jour W Soc of Engrs—April, 1901.

See also **CANAL LOCK.**

China.—Concrete Masonry on the Lu Han Railway. Extract from a paper by Thomas J. Bourne, read before the Inst. of Civ. Engrs. of Great Britain, describing some interesting work in China. 900 w. R R Gaz—Nov. 6, 1903.

Clay.—Effect of Clay on the Strength of Concrete. J. J. Richey and B. H. Prater. Experimental investigations with tabulated results and general conclusions. 1200 w. Technograph—1902-3.

Effect of Clay on the Strength of Concrete. From "The Stone Trades Journal." Gives results of tests for the comparative strength of Portland-cement concrete containing various portions of clay. 1000 w. Am Archt—Feb. 27, 1904.

Clay and Loam.—Loam and Clay in Sand for Concrete. G. J. Griesenauer. Gives a record of tests made, with remarks on the results. 1200 w. Eng News—April 28, 1904.

Columbian Cordage Co.—A Concrete Measuring, Feeding, and Mixing Plant. Describes and illustrates the concrete apparatus of the Columbian Cordage Co. at Auburn, N. Y. 1500 w. Eng Rec—Aug. 15, 1903.

Composition.—Concrete. Brysson Cunningham. Considers its composition, giving a detailed discussion of its preparation and uses. Ills. 3500 w. Sci Am Sup—July 29, 1905.

Concrete Reinforced Work.—The Quality and Consistency of Concrete for Concrete-Steel Work. Editorial discussion of the importance of excellence of materials and manufacture in this work and the proper composition, and the practical advantages of wet mixtures. 1600 w. Eng News—June 9, 1904.

See also **CONCRETE REINFORCED.**

Construction.—Concrete Construction. Edward Atkinson. Discusses the use of concrete construction for factories, shops and other works, and for dwelling houses and warehouses. 2400 w. Cement Age—April, 1905.

Coping.—See **COPING—Concrete.**

Cost.—Estimating the Cost of Concrete. Halbert Powers Gillette. Discusses the old theory and why it fails, and presents a new theory. 3500 w. Eng News—Dec. 5, 1901.

Cost of Concrete Structures. H. M. Jones. Extracts from a paper presented to the Engng. Assn. of the South. A detailed statement of cost for concrete culverts and other small structures. 3500 w. R R Gaz—Vol. XXXVII., No. 19.

Crack.—Hair Cracks, Crazing and Map Cracks on Concrete Surfaces. Albert Moyer. Gives results of investigations made to determine the cause and remedy. 1500 w. Eng Rec—Dec. 16, 1905.

See also **CONCRETE REINFORCED.**

Cuba.—Concrete Work in Cuba and Yucatan. C. E. McDowell. Gives illustrations of work, with descriptive notes. 1100 w. Munic Engng—April, 1904.

Decoration.—The Decoration of Concrete with Colored Clays. Henry C. Mercer. Read before the Assn. of Am. Port. Cem. Mfrs. Suggestions for the artistic treatment of concrete, with editorial. 2500 w. Eng News—Dec. 28, 1905.

Efflorescence.—How Can Efflorescence on Concrete Be Prevented? An explanation of the phenomenon of efflorescence, with a discussion of methods of prevention or cure. 1300 w. Eng News—Dec. 22, 1904.

Elastic Limit.—The Maximum Permissible Compression Streses upon Concrete (Die Zulässigkeit Hoher Druckspannungen in Beton). Fritz v. Emperger. With diagrams showing the elastic limit of concrete as compared with other materials of construction. 3000 w. Beton & Eisen—1 Heft, 1903.

Electric Conduit.—See **ELECTRIC CONDUIT.**

Expansion.—The Coefficient of Expansion of Concrete. William D. Pence. Describes the scope and method of investigations made, giving results of tests. General discussion. 12500 w. Jour W Soc of Engrs—Dec, 1901.

Fatigue.—See **CEMENT.**

Finishing.—A New System of Finishing Concrete Structures. Describes a method by which a fine concrete facing when roughened is made to have the appearance of stone. Ill. 1100 w. Eng News—May 21, 1903.

Facing and Finishing Exposed Concrete Surfaces. Extracts from a forthcoming book on "Reinforced Concrete" by A. W. Buel and Charles S. Hill. 6000 w. Eng News—Aug. 25, 1904.

Fire Test.—Investigation of the Effect of Heat Upon the Crushing Strength and Elastic Properties of Concrete. Ira H. Woolson. Read before the Am. Soc. for Test. Materials. Reports investigation made of this subject with details of experiments. Ills. 3800 w. Eng News—July 13, 1905.

The Fire Resistance of Different Concretes. Reports the results of tests made by the Committee on Cement for Building Construction of the National Fire Protection Association. 1700 w. Eng Rec—July 22, 1905.

Tests to Determine the Fire Resistance and Heat Conductivity of Concrete. Abstract of a special committee report presented at the meeting of the Nat. Fire Protection Association. Describes tests based on the theory that the fire resistance depends on the ability to withstand cracking and its heat insulating value. 2000 w. Eng News—Aug. 3, 1905.

An Interpretation of Recent Tests on the Fire Resistance of Concrete. Examines the tests made by Prof. Ira H. Woolson, and tests made by the committee of the National Fire Protection Association. 2500 w. Eng News—Aug. 24, 1905.

See also **FIREPROOF CONSTRUCTION; FLOOR.**

Form.—Forms for Concrete Work. G. R. Wadsworth. Illustrates and describes types used. 600 w. R R Gas—July 8, 1904.

Fortifications.—Notes on Cement and Concrete Construction in the U. S. Government Fortification Work for 1902. Extracts from the report of the Chief of Engineers, U. S. A., showing devices and methods adopted by army engineers to meet severe requirements. Ill. 4800 w. Eng News—April 2, 1903.

Freezing Safeguards.—Important Concrete Construction in Zero Weather. Describes the methods used in putting in heavy foundations for a grain elevator in Buffalo in mid-winter. 700 w. Eng Rec—Dec. 7, 1901.

Safeguards for Laying Concrete in Frosty Weather. Describes methods used in constructing large buildings of reinforced concrete near Rochester, N. Y., in winter weather. 2000 w. Eng Rec—March 4, 1905.

A System of Safeguards Against Freezing in Concrete Building Construction. Illustrates and describes the means adopted to prevent damage by frost in constructing the shops of the Foster-Armstrong Piano Co., at Rochester, N. Y., which proved entirely successful. Also editorial. 2500 w. Eng. News. Sept. 7, 1905.

See also **Mixing and Placing.**

Gravel Screenings vs. Limestone.—Comparative Tests of Limestone and Gravel Screenings and Torpedo Sand for Concrete. G. J. Griesenauer. Gives report of tests the result of which are uniformly in favor of screenings. 1400 w. Eng News—April 16, 1903.

Gravel vs. Broken Stone.—Relative Compressive Strength of Gravel and Broken-Stone Concretes. Sanford E. Thompson. Outlines tests, made in Boston, in 1906, giving interesting comparison between the comparative strength of concrete made with gravel and the strength of similarly proportioned concrete made with broken stone. 2000 w. Am Archt—Nov. 1, 1902.

Hair Cracks.—See **Crack.**

Heat Conductivity.—See **Fire Test.**

Hollow Block.—Hollow Concrete Block Building Construction. S. B. Newberry. Discusses these blocks as a building material, their manufacture, properties, cost, etc., giving two designs illustrating their use. 2200 w. Cement—Sept., 1905.

See also **BUILDING CONSTRUCTION; FIREPROOF CONSTRUCTION.**

Hollow Wall.—Concrete Hollow Wall Construction. Illustrates and describes this system of construction, claiming that it hastens drying and drainage, saves material and labor, and other advantages. 1500 w. Min & Sci Pr—Jan 30, 1904.

Long Island City.—A Concrete Mixing Plant for a Power House Foundation. Illustrated description of the plant for mixing and placing concrete in foundations of power house at Long Island City. 1500 w. Eng Rec—April 9, 1904.

Machine.—See **Mixing.**

Manhattan Bridge.—Concrete Plant for the Brooklyn Anchorage of the Manhattan Bridge. An illustrated account of the concrete machinery and special plant which has been installed at a great cost with the aim of executing the work with the greatest economy and rapidity. 2500 w. Eng Rec—Sept. 9, 1905.

Manhattan Power Station.—Some Recent Experiments with Cements, Mortar and Concrete. Thomas S. Clark. An account of tests made of the material used in the construction of the Manhattan Ry. Co.'s Power Station, N. Y. 3000 w. Eng News—July 24, 1902.

Manhole.—The Use of Concrete Blocks in Manhole Construction. Hugh C. Baker, Jr. Illustrates and describes a type of manhole construction used for subways for electrical cables. 1500 w. Eng News—Jan. 21, 1904.

Manipulation.—Practical Notes on Concrete Manipulation. From a paper by Charles A. Matcham, before the Nat. Bldrs.' Sup. Assn. Describes methods of constructing buildings of concrete. Ills. 3300 w. Eng Rec—April 15, 1905.

Mine Shaft.—See **MINE SHAFT—Concrete Lining.**

Mining.—Use of Concrete in Mining. Marcel Habets. From a Communication to the Soc. des Ing. de Liege. On its adaptability for lining shafts and drifts, and for making stoppings, illustrating the methods of putting it in place. 2200 w. Mines & Min—Jan., 1901.

Mining and Metallurgy.—Concrete in Mining and Metallurgical Engineering. Henry W. Edwards. Information concerning the ingredients and construction of concrete, cost, treatment, uses, etc. Ills. 6500 w. Trans Am Inst of Min Engrs—Feb., 1904.

Mississippi, St. Paul—See **Canal Lock.**

Mixing.—Concrete Mixing and Depositing Machine. Illustrates and describes the concrete train for making and depositing concrete for retaining walls used on the Chicago & Western Indiana R. R. 1200 w. Eng News—Feb. 28, 1901.

The Efficiency of Concrete Mixing Machines. Clarence Coleman. Reports investigations made to determine the comparative efficiency of these machines. Ill. 3200 w. Eng News—Aug. 27, 1903.

Mixing and Placing Concrete Composition. S. H. Lea. Information concerning the physical characteristics of its ingredients, proportions best suited for different purposes, hand mixing, etc. Serial. 1st part. 6400 w. Mines & Min—Oct., 1903.

Some Methods and Costs of Concrete Mixing on the Buffalo, N. Y., Breakwater. Emile Low. Gives information as to the kind and size of mixers used, quantity and quality of concrete, cost, etc. Ill. 2500 w. Eng News—Oct. 8, 1903.

Concrete Mixer with Automatic Measuring Device. Illustrated detailed description of an invention of Henry Campbell, of Milwaukee, Wis. 1500 w. Eng News—June 2, 1904.

Concrete Mixers. Joseph Horner. Brief review of the development in these mixers and the cause, the designs and latest improvements. Ills. 3000 w. Public Works—Oct. 15, 1904.

Mixing and Placing.—Mixing and Placing Concrete. Samuel H. Lea. Discusses placing forms, facing, methods of handling under water or in freezing weather, waterproofing, etc. Ill. 6000 w. Mines & Min. Dec., 1903.

New York Specifications.—The Revised Concrete Specifications of the New York State Canals. An outline of requirements which permit balancing the aggregate, call for machine mixing except in small work and give minute directions for placing the concrete in molds. 1400 w. Eng Rec—April 27, 1901.

The Production of Concrete Under New York State Specifications. Discussion of the requirements most likely to ensure a uniform quality of cement, thorough mixing of the cement and sand, and the most economical proportions of mortar and stone. 1500 w. Eng Rec—May 11, 1901.

Permeability.—See **Waterproof.**

Port Antonio.—Description of a Concrete Residence at Port Antonio, Jamaica Islands. E. S. Larned. Ills. Also gives particulars of the construction. 2500 w. Cement Age—June, 1905.

Portland.—Some Primary Causes of Expansion and Contraction in Portland Cement Concrete and Mortars. H. Howard Humphreys. Examines in detail the causes that produce disruptive stresses and disintegration. 3800 w. Builder—Oct. 5, 1901.

The Proportions of Ingredients in Portland Concrete. Richard T. Dana. Gives diagrams showing amounts of cement, sand and stone or gravel in concrete for different percentages of voids; explaining method of use. 2400 w. Eng News—April 20, 1905.

See also **CEMENT.**

Railway Shops.—See **RAILWAY SHOP—Elizabeth.**

Railway Station.—See **RAILWAY STATION—Bismarck, N. D.**

Railway Structures.—The Use of Concrete in Railway Structures. Editorial on the varied purposes to which concrete is now applied, either alone or in combination with steel. 3800 w. Eng News—Aug. 15, 1901.

Concrete Structures for Railways. W. A. Rogers. Abstract of a paper presented to the Illinois Soc. of Engrs. & Surv's. Review of current practice on United States railways in building culverts, abutments and short bridges of concrete. 1700 w. Eng Rec—Feb. 8, 1902.

See also **BRIDGE—Concrete; CULVERT; MASONRY.**

Retaining Wall.—See **RETAINING WALL.**

Rubble.—The Merits of Rubble Concrete. Editorial discussion of the advantages and disadvantages of concrete, concluding that except in places where cut stone would be used, concrete has no economic advantage over stone masonry. Shows the value of rubble concrete when great strength is required. 1200 w. Eng News—July 16, 1903.

Setting.—Effect of Water and Combinations of Sand on the Setting and Strength of Concrete. E. S. Larned. Abstract of a paper read before the Am. Soc. for Test. Materials. Reports a series of tests made by the writer, considering the results. 2200 w. Eng News—Aug. 6, 1903.

See also **CEMENT; CEMENT TEST.**

Specifications.—German Specifications for Designing, Constructing and Testing Concrete Structures. Leon S. Moisseiff. Gives the full set of specifications recommended for adoption by a committee of the German Concrete Society. 4500 w. Eng News—Nov. 9, 1905.

See also **Block; New York; CONCRETE REINFORCED—Bridge and Culvert.**

Steel Protection.—See **CONCRETE REINFORCED; FIREPROOF CONSTRUCTION; METAL PROTECTION.**

Stone, Sizes.—Reducing the Voids in Broken Stone for Concrete by Mixing Different Sizes. E. J. McCaustland. Gives results of tests on mixtures of stones of various sizes. 700 w. Eng News—Dec. 7, 1905.

Strength.—The Relative Strength of Wet and Dry Concrete. James W. Sussex. An account of experimental investigation. 800 w. Technograph—1902-3.

The Strength of Concrete as Affected by Different Percentages of Water. T. L. Doyle and E. R. Justice. Abstract of a thesis at the Univ. of Penna. Describes experimental investigations to determine the relation of strength between dry, medium wet, and wet mixtures. 800 w. Eng News—July 30, 1903.

The Strength of Concrete. Sanford E. Thompson. A study of the practical tests that have been made on plain concrete and the laws that seem to govern the strength, giving much information of value. General discussion. 15800 w. Jour Assn of Engng Soc's—April, 1905.

See also **Elastic Limit; Test.**

Submarine.—See **Buffalo Breakwater; Canal Lock; BREAKWATER; CANAL LOCK—Nussdorf; HARBOR; WEIR.**

Subway.—Concrete in Subway Work. George W. Rice. An illustrated account of interesting concrete work, and methods of construction. 1200 w. Cement Age—Sept., 1904.

Tank, Acid Liquors.—See **TANK—Concrete, Acid Liquors.**

Tests.—Tests of Concrete for Elastic Properties and Ultimate Strength. W. H. Henby. Gives results of tests and conclusions derived from them, and considers briefly some of the factors entering into the mixing and placing of concrete which affect its efficiency. 2800 w. Jour Assn of Engng Socs—Sept., 1900.

Strength of Concrete with Various Aggregates. Gives tables showing the strength of concrete made of various materials, with description of tests from which the results were derived. 1700 w. Munic Engng—Jan., 1903.

The Constituent Parts of Concrete. Abstract of a paper by Charles M. Crawford, read before the Connecticut Soc. of Civ. Engrs. Considers methods of testing followed by various engineers, the mixtures used, etc. 2300 w. Eng Rec—March 7, 1903.

Some Recent Tests of Concrete in Tension and Compression at the Columbia University Laboratories. Ira H. Woolson. Gives results of tests made for the Astoria Light, Heat & Power Co. Ills. 3500 w. Eng News—June 1, 1905.

Some Remarkable Tests Indicating "Flow" of Concrete Under Pressure. Ira H. Woolson. Illustrated account of some rather extraordinary results obtained in the Columbia Univ. Test. Laboratory. 600 w. Eng News—Nov. 2, 1905.

The Compressive Resistance of Blocks and Columns of Concrete and Stone. Describes tests made which show the importance of considering the lateral and tensile stresses as well as the compressive force. Ills. 2400 w. Cement—Nov., 1905.

Some Experiments for Determining the Elastic and Ultimate Strength of Brickwork Piers and Pillars of Portland-Cement Concrete. William Charles Popplewell. Describes tests carried out and gives conclusions. 3800 w. (No. 3549). Inst of Civ Engrs.

See also **Beam; Fire Test; Manhattan Power Station; Strength; CEMENT TEST; CONCRETE REINFORCED; FIREPROOF CONSTRUCTION; FLOOR.**

Test, St. Louis Exposition.—See **CEMENT TEST—St. Louis Exposition.**

Timber Adhesion.—See **PILE—Timber Concrete.**

Tunnel.—See **Subway; TUNNEL—Boston Harbor.**

Washington Filtration Plant.—Concrete Work on the Washington Filtration Plant. E. D. Hardy. An illustrated description of the work of placing the concrete masonry. 1200 w. Eng Rec—June 25, 1904.

Water, Percentage.—See **Strength.**

Waterproof.—The Permeability of Concrete Under High Water Pressures. J. B. McIntyre and A. L. True. Abstract of a graduating thesis to the Thayer School of Civil Engng. An account of experimental investigations. 1500 w. Eng News—June 26, 1902.

Water Tightness in Concrete. Thomas P. Roberts. A short paper citing an instance where water came through the roof of a concrete magazine, rather than through sandy loam descending with considerable slope, and discussing the cause. 1200 w. Pro Engrs' Soc of W Penn—April, 1903.

Impervious Concrete. An informal discussion of the subject—"Is it possible to make concrete which will be impervious to water? If so, what is the best method?" 7000 w. Pro Am Soc of Civ Engrs—Aug., 1903.

Impervious Concrete. Sanford E. Thompson. A contribution to the discussion as to whether it is possible to make a concrete which will be impervious to water. 1100 w. Pro Am Soc of Civ Engrs—Oct., 1903.

Making Concrete Water Tight. Editorial discussion giving conclusions drawn from experiments of various investigators. 2200 w. Eng News—May 19, 1904.

Waterproofing Concrete Structures. W. H. Finley. Read before the Cement Users' Assn. On the necessity of waterproofing concrete, the importance of drainage, and the methods used by the writer. 2000 w. Eng Rec—Jan. 21, 1905.

The Waterproofing of Concrete Blocks. G. B. Kirwan. Read before the Nat. Assn. of Cement-Users. Explains why concrete block buildings are damp, and the necessity of waterproofing. 2500 w. Munic Engng—Feb., 1905.

Waterproofing Concrete Structures. W. H. Finley. Read before the Nat. Assn of Cement Users. Gives information showing the need of waterproofing and gives specifications used by the writer with good results. 3000 w. Munic Engng—Feb., 1905.

Water Tightness of Concrete. Frederick W. Taylor and Sanford E. Thompson. Selected from Taylor and Thompson's Treatise on Concrete, Plain and Reinforced. Information on methods of securing water tight work. 3500 w. Munic Engng—April, 1905.

The Waterproofing of Concrete Blocks and Walls. H. H. Rice. Discusses the causes of permeability and the remedies. Ills. 1500 w. Cement Age—Dec., 1905.

See also **Mixing and Placing.**

Winter Laying.—See Freezing Safeguards.

Yellowstone Park.—Concrete Construction in Yellowstone National Park. Brief description of work in the roads, bridges and other structures in which concrete has been used. 1800 w. Eng Rec—April 2, 1904.

Yucatan.—See Cuba.

CONCRETE REINFORCED.

See also **BRIDGE; BUILDING CONSTRUCTION; CONCRETE; FIREPROOF CONSTRUCTION; FLOOR; PILES; RAILWAY SHOP; SEWER.**

Concrete Construction. C. R. Neher. Practical Suggestions from the standpoint of the purchaser and contractor, as well as the engineer. Ill. 3000 w. Jour Assn of Engng Socs—April, 1901.

A General Study of Structures in Reinforced Concrete (Considerations Générales sur les Ouvrages en Ciment Armé). J. Résal. A discussion of the principles of proportion, showing the method of obtaining the proper relations of elasticity between the metal and concrete. 6000 w. Revue Technique—June 10, 1901.

A New System of Reinforced Concrete (Ein Neues System von Armiertem Beton). B. Recordon. Describing a system of built-up construction composed of concrete beams, reinforced with imbedded metal rods. 2 articles. 2000 w. Schweizerische Bauzeitung—June 15, 22, 1901.

Steel-Concrete Construction. An informal discussion at the annual convention, Ill. 12500 w. Pro Am Soc of Civ Engrs—June 26, 1901.

Cement-Iron - Construction (Cement-Ijzercon structies). L. A. Sanders. A discussion of the Hennebique, Monier, and other systems, with especial reference to bridge construction. 3000 w. De Ingenieur—Aug. 24, 1901.

Use of Steel in Concrete Construction. Illustrated description of forms in which this material is used. 900 w. Sci Am Sup—Oct. 12, 1901.

Practical Applications of Reinforced Concrete. Jacques Boyer. A review of the principal systems, showing characteristic structures and methods of reinforcing concrete by imbedded metallic members. 4000 w. Engineering Magazine—Jan., 1902.

Practical Applications of Reinforced Concrete. Jacques Boyer. Prof. Boyer's second article discusses the materials, methods and industrial applications of concrete-steel construction, with numerous illustrations. 4000 w. Engineering Magazine—Feb., 1902.

Development of Reinforced Concrete Construction from the Beginning to the Present (Entwicklung des Betoneisenbaues vom Beginn bis zur eral review of the subject, with a particular account of some experiments made at Vienna in 1898. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 31, 1902.

Recent Structures in Concrete and Iron (Neuere Bauwerke und Bauwesen aus Beton und Eisen). Fritz v. Emperger. An illustrated account of the use of reinforced concrete construction in reservoirs, canals and all kinds of hydraulic work, at the time of the Paris Exposition of 1900. Two parts. 1 plate. 6500 w. Zeitscher d Oesterr Ing u Arch Vereines—June 13 and 20, 1902.

The Theory of Structures of Combined Concrete and Iron (Zur Theorie der Verbund Körper aus Beton und Eisen). K. Haberkalt. A mathematical discussion of the theory of reinforced concrete structures; with practical applications. Two articles. 7500 w. Oesterr Wochenschr f d Oeffent Baudienst—Nov. 29, Dec. 6, 1902.

Some Hints as to Reinforced Concrete Construction. Discusses the trustworthiness of this combination of steel and concrete so much used as a structural material. 1200 w. Jour Gas Lgt—Dec. 16, 1902.

Reinforced Concrete (Der Eisenverstärkte Beton). W. Linse. The first installment of a general review of the subject, with data showing the increase in its use since 1892. Serial. Part 1. 2000 w. Stahl u Eisen—Jan. 1, 1903.

A Neglected Point in the Theory of Concrete Steel. John Stephen Sewell. A study of the stresses that give trouble in this material, and their causes and remedies. Ill. 1800 w. Eng News—Jan. 29, 1903.

Reinforced Concrete Construction (Betoneisenbau). Norbert Korzinek. An illustrated general review of reinforced concrete construction. 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 2, 1903.

The Theory of Reinforced-Concrete Construction (Theorie der Betoneisen-Konstruktionen). E. Mörsch. An address before the "Deutscher Betonverein," giving a general discussion of concrete-iron construction and its principles. Diagrams. 5000 w. Serial. 3 parts. Deutsche Bauzeitung—April 25, May 2 and 6, 1903.

Notes on Compound Structures (Einiges über Verbundkörper). Adolf Francke. A mathematical study of the combined resistance of the two materials in structures of concrete and iron. 5000 w. Beton und Eisen—No. III., 1903.

A Plea for a Committee on Steel-Concrete. Ross Francis Tucker. Showing the need of rules and regulations for the guidance of engineers using this material. 1200 w. Eng Rec—Feb. 6, 1904.

Concrete Steel Construction. Leonard C. Wason. Abstract of a lecture before the Civ. Eng. Soc. of W. P. I. Information concerning cements and their manufacture, their strength, elasticity, etc., with points in construction work, showing that concrete steel is an economical and durable material. Ills. 3300 w. Jour Worcester Poly Inst—May, 1904.

Reinforced Concrete in Building Construction. Condensed from a paper read by Emile G. Perrot before the School of Architecture, University of Pennsylvania. Considers various important questions in regard to its reliability, its advantages, etc. 2800 w. Eng Rec—May 28, 1904.

Some Phenomena of the Adhesion of Steel and Concrete. J. W. Schaub. Extract from a lecture on "Reinforced Concrete" delivered at Armour Institute, Chicago. Gives results of experimental investigations. 1300 w. Eng News—June 16, 1904.

Suggestions for Steel-Concrete Construction. John C. Anderson. Paper before the Louisiana Engineering Society, giving brief general discussion, with illustrations. 800 w. Jour Assn of Engng Socs—July, 1904.

Reinforced Concrete. John Monash. Read before the Royal Victorian Inst. of Archts. An explanation of the principal characteristics of this construction, and some of its applications. 8000 w. Archt, Lond—Sept. 16, 1904.

Construction and Strength of Reinforced Concrete. W. Dunn. Read before the Roy. Inst. of Brit. Archts. Abstract. Deals with the essentials of reliable material, the process of mixing, the strength, method of construction, etc. 1800 w. Archt, Lond—Nov. 25, 1904.

Reinforced Concrete Construction Theoretically Considered. Sidney B. Williamson. Some of the general principles on which this material is based, with theoretical analysis by Prof. W. K. Hatt, as the result of tests made, and information from other authorities. Ills. 2000 w. Cement—Jan., 1905.

Typical Structures in Concrete-Steel. Describes and illustrates details of some typical buildings and other structures in concrete-steel. Serial. 1st part. 2500 w. Builder—Jan. 7, 1905.

Concrete-Steel Construction. C. A. P. Turner. An illustrated article considering the action of concrete with steel, the function of each in the combination, the problems presented by beams, slabs and columns separately, and the mixture of concrete, and the cost. 1800 w. Jour Assn of Engng Socs—Feb., 1905.

Reinforced Concrete. Editorial discussion of this building material and its use. 2200 w. Engng—April 28, 1905.

Reinforced Concrete—Some of Its Principles, with Practical Illustrations. Walter Loring Webb. Discusses some satisfactory uses of this material, its economy, effect of elastic limit of the steel, stresses, expansion joints, steel-concrete tanks, protection of steel from rusting by concrete, etc. General discussion. 8000 w. Pro Engrs' Club of Phila—July, 1905.

Reinforced Concrete. Begins an illustrated description of the most important and fundamental systems. Serial. 1st part. 1500 w. Sci Am Sup—Aug. 26, 1905.

Comment on the Advantages and Limitations of Reinforced Concrete. Charles S. Hill. Read before the Assn. of Portland Cement Mfrs. Deals with the principle of reinforced concrete; its claims as a structural material; the qualities of design and workmanship; and the evils attending it. 2000 w. Min Rept—Sept. 14, 1905.

Reinforced Concrete Construction. Lewis A. Hicks. Read at the Pac. Coast Eng. Cong., Portland. An examination of available data pertaining to the design of reinforced concrete cage construction. 9000 w. Jour of Elec—Oct., 1905.

Adhesion.—Experiments with Reinforced Concrete (Experiences sur le Ciment Armé). M. Breuillé. Giving data and results of tests showing especially the nature and extent of the adherence of the metal to the concrete. 3500 w. Ann des Ponts et Chaussées—1 Trimestre, 1902.

See also **Frictional Resistance.**

Adhesion and Stress.—Tests of the Adhesion and Initial Stress of Steel in Concrete. Sam. W. Emerson. A summary of results from a series of tests made. 1000 w. Eng News—March 10, 1904.

America.—Reinforced Concrete Construction. George Hill. An illustrated description of American methods of using this material, discussing its advantages and applications and also its economy. 3300 w. Arch Rec—Sept., 1902.

Concrete Steel. M. C. Couchot. A short description of this system of construction, its recent applications in the United States and its advantages. 1800 w. Jour Assn of Engng Socs—Sept., 1904.

Analysis.—An analysis of Concrete-Steel Construction. F. C. Slade. Aims to develop an analysis for the design of concrete-steel structures and to so put the matter in shape that it can be readily understood by the layman. 1200 w. Am Gas Lgt Jour—Feb. 6, 1905.

Arch.—See **BRIDGE.**

Arch, Destructive Test.—See **Test, Blaubeuren.**

Babbitt Soap Factory.—Concrete Construction for the B. T. Babbitt Works. Illustrates and describes the construction of extensive works for the manufacture of soap, about nine miles from Jersey City. 1400 w. Eng Rec—Dec. 30, 1905.

Beam.—Economical Construction of Reinforced Concrete Beams and Floor Slabs. Charles R. Steiner. Gives a table, submitted as a fair review of the most suitable sizes for varying maximum moments, with explanatory notes. 800 w. Eng News—March 9, 1905.

See also **Floor Test;** and under subhead names of systems.

Beam Design.—Steel Concrete Construction. A. L. Johnson. Setting forth the great advantages of reinforced concrete construction, and giving convenient working formulas for beams. 1800 w. R R Gaz—March 13, 1903.

The Graphical Computation of Reinforced Concrete Beams (Die Graphiche Berechnung von Balken aus Eisenbeton) F. von Emperger. Discussing the application of grapho-statics to reinforced concrete structures with a general diagram for practical use for beams. 4000 w. Beton u Eisen—No. V., 1903.

The Determination of the Lines of Influence in a Beam Secured at One End and Free at the Other (Bestimmung der Einflusslinien eines Trägers welcher an dem einen Ende Eingeklemmt ist und am anderen Ende Frei Aufliegt). Prof. Ramisch. A mathematical analysis for an overhang beam of reinforced concrete. 2500 w. Beton u Eisen—4 Heft, 1903.

The Determination of the Rectangular Section of a Reinforced-Concrete Beam (Bestimmung des Rechteckigen Querschnittes eines Armierten Betonträgers). G. Ramisch. A mathematical discussion deriving general equations for beams of reinforced concrete, with practical applications. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 6, 1903.

The Computation of Reinforced Concrete Beams and Plates (Beitrag zur Berechnung Armierter Betonbalken und Platten). J. Melan. Deriving formulas for beams and ribbed plates, together with a diagram of curves for practical us. 2000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 17, 1904.

The Design of Reinforced Concrete Beams from the Economic Point of View. Translation of an article by E. Elwitz, published in "Beton und Eisen," on the design of rectangular and tee-shaped reinforced-concrete beams, arranging the formulas so as to facilitate, by the aid of tables, the most economic arrangement of proportions. Serial. 1st part. 2000 w. Cement—March, 1905.

The Design of Reinforced-Concrete Beams. George H. Blakeley. Presents some formulas for transverse strength of the simple case of reinforced concrete slabs for floor construction. Serial. 1st part. 4000 w. Eng Rec—May 27, 1905.

Beam, Double Reinforcement.—The Computation of Double-Reinforced Concrete Beams (Ueber die Berechnung von Beiderseits Armierten Betonbalken). F. von Emperger. Data and results of tests of beams of concrete reinforced with iron rods near both upper and lower edges. 12000 w. Beton und Eisen—No. III., 1903.

Beam Flexure.—Flexure of Reinforced Concrete Beams. Arthur N. Talbot. A summary of tests made in the Laboratory of Applied Mechanics of the University of Illinois, discussing some of the analytical phases of the resistance of such beams to flexure. Ills. 7500 w. Jour W. Socs of Engrs—Aug., 1904.

Beam Strength.—Computing the Strength of Concrete Steel Beams. A simple mathematical discussion on beams built of these materials. 700 w. Eng News—April 25, 1901.

Theory of the Strength of Beams of Reinforced Concrete. W. Kendrick Hatt. Abstract of a paper presented to the Indiana Engng. Soc. A computation of the strength of such beams. Mathematical. 3000 w. Eng News—Feb. 27, 1902.

Theory of the Strength of Beams of Reinforced Concrete. W. Kendrick Hatt. Abstract of a paper read before the Indiana Engng Soc. An illustrated article explaining different theories of the strength of concrete steel construction and comparing the results of computations from the same data following these different theories. 2500 w. Eng Rec—May 10, 1902.

Computing the Strength of Concrete Steel Beams. Louis F. Brayton. Table for the moment of resistance of reinforced concrete computed according to theory "B" presented by Prof. Hatt, with explanatory notes. 500 w. Eng News—May 15, 1902.

Concrete-Steel Theory and Computations. Editorial discussion of the experimental facts available for testing the value of formulas for the strength of concrete steel beams and posts, and of the best form of formulas for practical use. 1400 w. Eng Rec—Sept. 13, 1902.

Rational Formulas for the Strength of a Concrete-Steel Beam. S. E. Slocum. Aims to develop a method of simple, rational analysis of a simple form of concrete-steel beam. 3000 w. Eng News—July 30, 1903.

The Strength of Reinforced Concrete. T. L. Condron. A comparative study of recent scientifically conducted tests of reinforced concrete beams. Discussion. 10800 w. Jour W Soc of Engrs—June, 1905.

Beam Stresses.—The Initial Stresses in Reinforced Concrete Beams (Die Anfangsspannungen in Beton-Eisenträgern). Karl Haberkalt. An analytical examination of the manner in which imbedded rods of iron act to reinforce beams of concrete against deflection. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 30, 1903.

The Shearing Stresses in Reinforced-Concrete Beams (Die Schubspannungen in Betoneisenträgern). Dr. Max v. Thullie. A mathematical and graphical discussion of the shearing stresses in reinforced-concrete beams and of the results of some tests. 2500 w. Beton & Eisen—2 Heft, 1903.

The Influence Lines of a Beam Fixed at Both Ends and Their Application to Compound Beams (Die Einflusslinien eines an den Beiden Enden Eingeklemmten Balkens und Ihre Anwendung auf Verbundbalken). Prof. G. Ramisch. A mathematical and graphical discussion of the bending moments and stresses in beams and the application of the results to reinforced-concrete beams. Diagrams. 4000 w. Beton & Eisen—2 Heft, 1903.

Static Investigation of a Curved Prismatic Compound Beam (Statische Untersuchung eines Einfach Gekrümmten Stabförmigen Verbundkörpers). G. Ramisch. An examination of the distribution of stresses between the iron and concrete in a deflected beam. 3500 w. Oesterr Wochenschr f d Oeffent Baudienst—April 29, 1905.

Distribution of Shear Over Section, for Reinforced Concrete Beams. John G. Little. Gives solution. 300 w. Eng News—May 25, 1905.

Bending Moments in Continuous Reinforced Concrete Beams. Translated from "Beton u. Eisen." O. Gottschalk. An interesting discussion of the bending moments in a continuous beam over three supports, especially at the mid-support. 1000 w. Cement—July, 1905.

See also **Stresses.**

Beam, T-Shaped.—The Computations for T-Shaped Floor Beams of Reinforced Concrete (Beitrag zur Berechnung der Plattenbalken von T-förmigen Querschnitten aus Eisenbeton). G. Ramisch. Deriving formulas for beams of T section, reinforced with round rods near the lower edge. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 17, 1905.

See also **Test.**

Beam, Vertical Stirrups.—Tests of the Efficiency of Vertical Stirrups in Reinforced Concrete Beams. An illustrated report of tests made at the yards of the Bush Terminal Co., Brooklyn, N. Y., to determine the behavior of beams provided with vertical stirrups in place of inclined metal. 1500 w. Eng News—July 6, 1905.

Belgium.—Ferro-Concrete in Belgium. Ed Noaillon. Read before the Inst. of Mech. Engrs., at Liége. States the properties of this material, and describes applications made of it in Belgium. Ills. 8000 w. Engng—June 23, 1905.

Bending Forces. — A Statical Investigation of a Curved Prismatic Body of Reinforced Concrete (Statische Untersuchung eines Einfach Gekrümmten, Stabförmigen Verbundkörpers). Prof. Ramisch. A mathematical study showing the action of forces to effect bending. 3500 w. Oesterr Wochenschr f d Oeff Baudienst—July 9, 1904.

See also **Beam; Test Beam.**

Bour Building, Toledo.—The Reinforced Concrete Building of the J. M. Bour Co., Toledo. George V. Rhines. Illustrations, with description of a warehouse and roasting plant constructed entirely of concrete reinforced with plain steel rods. 2700 w. Eng Rec—Dec. 24, 1904.

Boussiron.—The Boussiron System of Reinforced Concrete (Note sur les Constructions en Cement Armé Systéme Boussiron). J. Boussiron. An extended illustrated account of a reinforced concrete system using straight, round, rough iron rods. Serial. 1st part. 6000 w. Revue Technique—May 10, 1902.

Brick.—Brick and Concrete Metal Construction. Papers presented at the October meeting of the Boston Soc. of Civ. Engs. Deals with the economy, strength, various uses, etc., reviewing the systems. Ill. 6000 w. Jour Assn of Engng Socs—Feb., 1901.

Concrete and Brick Construction with Continuous Interwoven Metallic Cores. H. E. P. Cottrell. Illustrated description of a construction which introduces into concrete and brick structures a series of thin rods or bars, which are carried from foundations to roofs, stating the advantages claimed. Also describes works built on this system. 2800 w. Builder—Jan. 11, 1902.

Bridge.—See **Nantes; BRIDGE.**

Bridge and Culvert.—Concrete—Steel Bridge and Culvert Construction on the Illinois Central R. R. Illustrations and specifications of interestlug structures being carried ont in connection with the extensive improvements of this railroad. 9400 w. Eug News—July 18, 1901.

Structures in Armed Cement (Il Cemento Armato). A description of the construction of culverts and viaducts in reinforced concrete on the line of the Southern Railway of Italy. 2500 w. Il Monitore Tecnico—Oct. 10, 1902.

See also **Nantes; ARCH; BRIDGE; CULVERT.**

Bridge Pier.—See **BRIDGE PIER.**

Bridge Test.—See **CONCRETE REINFORCED—Test.**

Buckling.—More Accurate Formulas for Buckling (Genauere Formeln für Knickkraft) Adolf Francke. With especial reference to pillars and struts of reinforced concrete giving a mathematical analysis. 3000 w. Beton u Eisen—No. V, 1903.

Building .Construction.—Reinforced Concrete in Building Construction. Emile G. Perrot. Calls attention to the application of this material to building construction, particularly to factory or mill building, discussing it from the architects' standpoint, and showing the advantages and drawbacks incident to its use. General discussion. Ills. 6800 w. Pro Engrs' Club of Phila—April, 1904.

Canal Facing.—Canal Facing in Reinforced Concrete (Revêtement en Béton de Ciment Armé). MM. Barbet & Hausser. A description of the use of reinforced concrete on the Canal de l'Est, at Epinal, with details of the computations. 3500 w. 1 plate. Ann des Ponts et Chaussées—2 Trimestre, 1901.

Canal Lining of Reinforced Concrete (Revêtement en Béton de Ciment Armé un Plafond de Canal). An illustrated description of a lining for the bottom and sides of a canal at Epinal, France. 800 w. Génie Civil—April 26, 1902.

Car Barn, Youngstown.—A Re-enforced Concrete Floor Used in the Youngstown Car Barn. G. M. Scofield. Describes the construction. Discussion follows. 2800 w. Pro Eng'r Soc of W Penn—April, 1903.

Ceilings.—The Construction of Flat Ceilings for Houses (Note sur les Planchers à Plafond Plat des Maisons d'Habitation). Illustrating and describing the systems of Hennebique, Boussiron, and Matrai. 2000 w. 1 plate. Beton und Eisen—No. III., 1903.

See also **Eggert; Floor and Ceilings.**

Chapel, U. S. Naval Academy.—The Chapel of the U.S. Naval Academy, Annapolis. Illustrates and describes an interesting building under construction, in which reinforced concrete is extensively used. 800 w. Eng Rec—Jan. 14, 1905.

Reinforced Concrete Chapel Building, U. S. Naval Academy, Annapolis, Md. An illustrated description of the reinforced concrete work on this new chapel building. 1800 w. Eng News—July 13, 1905.

Chimney.—See **CHIMNEY.**

College of Music.—An Armored Concrete Building for the College of Music, Cincinnati. Brief description of moderate cost, fire-resisting building with illustrations of details. 1000 w. Eng Rec—Nov. 28, 1903.

Column.—See **Considère; COLUMN—Concrete Reinforced.**

Concrete, Quality.—See **CONCRETE—Concrete Reinforced Work.**

Considère.—The Resistance of Reinforced Concrete to Tension (Résistance à la Traction du Béton Armé). M. Considère. A discussion of the tests made by the Department of Public Works, showing the influence of the metallic reinforcement upon the elasticity. 1500 w. Comptes Rendus—Aug. 18, 1902.

The Resistance of Reinforced Concrete to Compression (Etude Theorique de la Résistance à la Compression du Béton Frette). M. Considère. A study of the increase produced in pillars of concrete by surrounding them with metallic hoops. 1800 w. Comptes Rendus—Aug. 25, 1902.

Experimental Researches upon the Resistance of Reinforced Concrete to Compression (Etude Experimentale de la Resistance à la Compression du Beton Fretté). M. Considère. An account of experiments made to show the relation between the computed and actual crushing strength of hooped prisms. 1800 w. Comptes Rendus—Sept. 8, 1902.

The Resistance of Reinforced Concrete to Compression (Résistance à la Compression du Béton Armé). M. Considère. Discussing recent experiments, showing the extent to which pillars of concrete are strengthened by metallic hoops. Serial. Part I. 2500 w. Génie Civil—Nov. 1, 1902.

Compressive Resistance of Concrete-Steel and Hooped Concrete. A translation of an important paper by M. Considère, in "Le Génie Civil," and in "Beton und Eisen," on his recent experiments on concrete-steel in compression, showing the superiority of reinforcing concrete prisms by wire wound helically. Two articles. 6500 w. Eng Rec—Dec. 20, 27, 1902.

Destruction Test of a Considère Parabolic Girder (Essai à Outrance d'une Poutre Parabolique du Système Considère). Henry Lossier. Results of a test of a 20-metre span with wire-wrapped members, showing the high resistance of the system. 2000 w. Schweiz Bauzeitung—March 12, 1904.

The Compressive Resistance of Hooped Concrete (Die Druckfestigkeit des Umschnürten Betons). Dr. R. Saliger. A mathematical examination of the strength of concrete pillars wrapped with wire, according to the method of Considère. 2000 w. Oesterr Wochenschr f d Oeff Baudienst—June 18, 1904.

Considère's Theory of Reinforced Concrete in the Light of Recent Beam Tests. Reviews Mr. Considère's experiments and conclusions, and the light thrown on this subject by the recent tests of Prof. A. N. Talbot, and of Prof. F. E. Turneaure. 1600 w. Eng News—Sept. 15, 1904.

The Extensibility of Reinforced Concrete Faculté que le Béton Armé possede de Supporter de Grands Allongements). A. Considère. A review of experimental tests confirming the author's contention as to the great increase in extensibility given to concrete by reinforcement. 1500 w. Comptes Rendus—Jan. 30, 1905.

Concrete and Concrete-Steel. Abstract of a paper by A. Considère, presented before the Int. Engng. Cong., St. Louis. Discusses the materials used, arrangement, calculations of bending moments and shears, of sizes and deformations of reinforced beams, etc. 2700 w. R. R. Gaz—Vol. XXXVII., No. 20.
See also **Elasticity; Transverse vs. Hooped; COLUMN—Lateral Pressure.**

Consistency.—Consistency in the Reinforcement of Concrete. Louis F. Brayton. Discusses the use of this material and the important things to be considered in the designs submitted. 6000 w. Technograph—No. 19, 1904-1905.

Cottancin.—The Cottancin System of Reinforced Construction. Brief description of this system of steel-cored brick and steel-cored cement construction which is largely employed in France. 900 w. Arch't, Lond—Dec. 19, 1902.

The Cottancin System of Armoured Construction. A. R. Galbraith. From a paper read before the Society of Architects. States the advantages claimed for these methods of armoured construction, the uses to which they are applied, results, etc. 3800 w. Archt, Lond—April 29, 1904.

Court House.—See **COURT HOUSE—Nassau Co., N. Y.**

Cracks.—Expansion and Contraction Cracks in a Reinforced-Concrete Structure. George W. Blodgett. Detailed description of the buildings of the United Shoe Machinery Co., at Beverly, Mass., with report of the cracks, especially in the floors, and the method of making repairs. Ills. 2200 w. R R Gaz—Vol. XXXVIII., No. 24.

See also **CONCRETE.**

Cross Bending.—See **Beam; Bending Forces; Test Beam.**

Cross Tie.—See **CROSS TIE—Steel.**

De Valliere, Test.—Static and Dynamic Load Tests of De Valliere Fireproof Floor Construction. E. S. Powers. Explains the methods of construction and gives the results of statical and drop tests. Ill. 1400 w. Eng News—Nov. 27, 1902.

Dresden Exposition.—The German Municipal Exposition in Dresden, 1903 (Die Deutsche Städte-Ausstellung in Dresden, 1903). H. Bastine. Giving illustrations of a variety of reinforced concrete structures erected on the exposition grounds. 2500 w. 1 plate. Beton u Eisen—4 Heft, 1903.

Eggert Ceiling.—The Eggert Ceiling (Eggert Decke). Describing a flat combination floor and ceiling in reinforced concrete, with data and illustrations of tests. 1500 w. Beton u Eisen—4 Heft, 1903.

Elasticity.—The Extension and Elasticity of Reinforced Concrete (Allongement et Elasticité du Beton dan les Pièces Armées). G. Considère. A discussion of the results of experiments made in the laboratory of the Ponts et Chaussées with especial reference to the elasticity of the concrete itself. A parallel translation in German is given. 3000 w. Beton u Eisen—No. V., 1903.

Elswick Works, Newcastle.—Reinforced Concrete Floors Constructed with Expanded Metal (Les Planchers in Béton Armé de Métal Déployé). With details of construction, strength, and cost, based upon work at the Elswick Works, Newcastle-on-Tyne. 1000 w. Revue Technique—Nov. 25, 1901.

Europe.—The Development of Reinforced Concrete in Europe. E. Probst. An illustrated article reviewing the development and describing types of construction. General discussion. 5000 w. Jour W. Soc of Engrs—Dec., 1904.

Expanded Metal.—Test of a Concrete Slab Reinforced with expanded Metal. O. W. Connet. Describes method of testing a six-inch slab, and gives results. Ill. 600 w. Eng Rec—Aug. 2, 1902.

See also **Elswick Works; Gas-Purifier Boxes; Municipal Structures; EXPANDED METAL.**

Extensibility.—See **Considère.**

Factory.—A Concrete-Steel Factory Building with Fifty-two Foot Roof Girders. Illustrated description of a building in Long Island City, built entirely of reinforced concrete. 3300 w. Eng Rec—Jan. 16, 1904.

See also **Wall Girder.**

Factory, Bayonne, N. J.—Reinforced Concrete Construction in a Factory Extension at Bayonne, N. J. An illustrated description of extensions made to the factory of the Pacific Coast Borax Company, describing the work. 4400 w. Eng Rec—July 2, 1904.

Factory, Brooklyn.—Six-Story Reinforced-Concrete Factory Building in Brooklyn. Illustrates and describes a fireproof structure designed to carry light machinery on every floor. 1800 w. Eng Rec—Dec. 10, 1904.

The Robert Gair Reinforced-Concrete Factory and Warehouse. Illustrated description of a building under construction in Brooklyn, N. Y. 1400 w. Eng Rec—March 4, 1905.

Factory, Jersey City.—A Jersey City Concrete Factory Building. Illustrated description of large concrete steel cantilever floor supports and of the method of handling the concrete. 1500 w. Eng Rec—March 22, 1902.

Factory, Kelly & Jones.—See **Ransome.**

Factory, Shoe, Beverly, Mass.—The Construction of the Steel-Concrete Shops at Beverly, Mass. Illustrated detailed description of the construction of buildings for the new plant of the United Shoe Machinery Co. 3000 w. Eng Rec—March 4, 1905.

Reinforced Concrete Building Work for the United Shoe Machinery Co., Beverly, Mass. George P. Carver. Illustrated detailed description of a plant consisting of ten buildings, all built of reinforced concrete. The construction work is fully described. 5000 w. Eng News—May 25, 1905.

Failure, Causes.—Some of the Causes of Recent Failures of Reinforced Concrete. Julius Kahn. The writer's views as to the causes of failure of a material in which he has the utmost confidence. 4200 w. Eng News—Jan. 21, 1904.

Fireproof Qualities.—Reinforced Concrete as a Fire-Resistant. Reviews the rules of the Fire Offices Committee in London, and discusses their importance. 2400 w. Engng—Oct. 6, 1905.

The Economical Design of Reinforced Concrete Floor Systems for Fire-Resisting Structures. John S. Sewell. Aims to present simple and accurate formulas, with methods of applying them, to designs of minimum cost, and to show the value of certain little used features of design, from a fire-resisting and economical point of view. 10400 w. Pro Am Soc of Civ Engrs—Dec., 1905.

The Fire-Resisting Qualities of Reinforced Concrete. Capt. John Stephen Sewell. An engineer's views on the requirements of fireproof construction and the adaptability of reinforced concrete. Ills. 4000 w. Ins Engng—Dec., 1905.

See also **FIREPROOF CONSTRUCTION.**

Fire Test.—A Successful Fire Test of Concrete-Steel Factory Construction. Describes the condition of a 200x250 ft. concrete-steel building after a serious fire within it. 1000 w. Eng Rec—April 12, 1902.

See also **Test.**

Floor.—Concrete-Iron Construction (Ueber Betoneisen Konstruktionen). S. Rappaport. A discussion of the stresses in floor construction, showing the lateral strains induced upon the walls of the building. 2000 w. Schweizerische Bauzeitung—Nov. 2, 1901.

The Strength of Flat-Plates, with an Application to Concrete-Steel Floor Panels. S. E. Slocum. Develops a rational theory of stress distribution, involving only elementary mathematical principles, and applying the results to the case of a crete-steel floor panel in actual use. 3500 w. Eng News—July 7, 1904.

Graphical Calculation of the Moment of Resistance of Reinforced-Concrete Plates and Plate Girders (Graphische Berechnung des Widerstandsmomentes von Eisenbeton-Platten und Plattenbalken). P. Weiske. Mathematical discussion. 1000 w. Beton u Eisen—No. 9, Sept., 1905.

See also **Beam; Fireproof; Test;** and under subhead names of systems; **FIREPROOF CONSTRUCTION; FLOOR.**

Floor and Ceiling.—The Relation of the Ceiling to the Strength of the Girders in Reinforced Concrete Construction (Note sur la Participation du Hourdis à la Résistance des Nervures dans les Constructions en Béton Armé). Henry Lossier. An examination of floor and ceiling construction in reinforced concrete, showing the extent to which the ceiling itself aids in supporting the load. 1500 w. Schweiz Bauzeitung—Sept. 24, 1904.

Formulae.—I. Re-enforced Concrete. Robert A. Cummings. II. A Comparison of Reinforced Concrete Formulas. L. D. Cornish. Two short papers discussed together. 3900 w. Pro Engrs' Soc of W Penn—Jan., 1905.

French.—A New French Method of Cement Construction. Jean Schopfer. Concerning the uses to which reinforced concrete has been put in France, describing and illustrating some buildings constructed of this material. Serial. 1st part. 1800 w. Arch Rec—Aug., 1902.

Frictional Resistance.—The Frictional Resistance of Iron in Concrete (Versuche über den Gleitwiderstand Einbetonierten Eisens). C. Bach. Data and results of tests to determine the force required to cause reinforcing rods of various sections to slip in concrete mass. 1200 w. Zeitschr d Ver Deutscher Ing—June 3, 1905.

See also **Adhesion.**

Gas Purifier Boxes.—Expanded Metal for the Construction of Purifier-Boxes. P. Bachelay. Read at meeting of the Société Technique. A note on the use of this material and its advantages. Ill. 800 w. Jour Gas Lgt—July 30, 1901.

Giletti System.—See **BUILDING CONSTRUCTION.**

Grain Elevator.—See **GRAIN ELEVATOR.**

Harrison Building, Cincinnati.—The Harrison Building. Cliff M. Stegner. Illustrated description of an eight-story reinforced concrete skeleton building being erected in Cincinati, O. 3000 w. Trans Assn of Civ Engrs of Cornell Univ—1905.

Hennebique.—The Computations for Reinforced Concrete (Lois de Déformation, Principles de Calcul, et Regles d'Emploi Scientifiques du Béton Armé). M. Rabut. A summary of the laws deduced from experiments over a period of 5 years by M. Hennebique. 1500 w. Comptes Rendus—April 21, 1902.

Applications of the Hennebique System (Toepassing van Hennebique Constructies). H. F. Beijerman, H. van Oordt, and C. E. W. van Panhuys. An official report upon the Hennebique system of reinforced concrete, showing its application to public works. 10000 w. 7 plates. Tidschr v h Kijk Inst van Ing—May 26, 1902.

The Hennebique System of Armored Concrete Construction. Leopold Mensch. Reviews early uses of concrete showing its durability, and discusses the value of combinations of concrete and steel, and the things to be guarded against in their use, its applications and value as a building material. Ill. 4800 w. Jour Assn of Engng Socs—Sept., 1902.

Recent Experiments with Hennebique Beams at Lemberg (Neue Versuche mit Hennebiqueträgern in Lemberg). Dr. Max R. v. Thullie. Data and results of concrete beams reinforced with iron rods according to the Hennebique system. A mathematical analysis of the application of the results to future computation is appended. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 12, 1902.

Hennebique Fireproof Construction in New York and Cleveland. Gives particulars of this system, comparing it with the Ransome, and describing its use in buildings in the cities named. 2000 w. Eng Rec—Jan. 31, 1903.

Ferro-Concrete Warehouse at Newcastle-on-Tyne. An illustrated description of a recently built warehouse on the Hennebique system. 1400 w. Engng—April 17, 1903.

Monolithic Constructions in Hennebique's Ferro-Concrete. L. G. Mouchel. An illustrated discussion of ferro-concrete constructions and the general principles on which they are based, the theory of the Hennebique system, the use of this material, and related matters. Ills. 7500 w. Jour Roy Inst of Brit Archts—Nov. 26, 1904.

Notes on European Reinforced Concrete Structures. Remarks on papers recently read at a meeting of the Royal Inst. of British Archts. on Hennebique reinforced concrete structures. 1700 w. Eng Rec—Jan. 14, 1905.

See also **Hydraulic Works; Patents; BRIDGE—Concrete Reinforced; Soissons; PILE; WATER TOWER.**

Hennebique Test.—Rupture Tests upon Hennebique Floors of the "Palais de Costume" (Bruchversuche mit Zwei Deckplatten, System Hennebique, im "Palais de Costume"). M. Rabut. Giving details of the tests of reinforced-concrete floors made during the removal of certain buildings of the Paris exposition of 1900. 4000 w. Beton & Eisen—1 Heft, 1903.

Holland.—Concrete and Concrete-Steel in Holland. J. J. L. Bourdrer. Reviews the progress made in the use of this material in Holland, considering new uses to which it has been applied, important works completed and under construction. Ills. 5000 w. Cement Age—July 1, 1905.

See also **Test, Beam.**

Hooped Columns.—See **Considère; Test; Transverse vs. Hooped.**

Hotel, Atlantic City.—Reinforced Concrete and Tile Construction in an Atlantic City Hotel. Illustrated detailed description of the construction of the annex of the Hotel Marlborough, built entirely of hollow tiles, combined with reinforced concrete and terra cotta, without any structural steel, brick or timber work. Serial. 1st part. 3000 w. Eng Rec—Dec. 23, 1905.

Hydraulic Works.—Applications of the Hennebique System of Reinforced-Concrete Construction in Hydraulic Works (Anwendung von Betoneisen, System Hennebique, im Wasserbau). A. v. Horn. An illustrated description of quay walls and structures in and under water, built of reinforced concrete. 1 plate. 2000 w. Oesterr Wochenschr f d Oeffent Baudienst—June 27, 1903.

Ingalls Building, Cincinnati.—A Tall Concrete-Steel Office Building. An illustrated detailed description of the Ingalls building, Cincinnati, Ohio. 3200 w. Eng Rec—May 23, 1903.

The Erection of a Tall Concrete Office Building. An illustrated description of the construction of the Ingalls building, in Cincinnati. 4000 w. Eng Rec—July 18, 1903.

Sixteen-Story Concrete-Steel Office Building at Cincinnati, Ohio. An illustrated detailed description of the construction work of the Ingalls building. 5000 w. Eng News—July 30, 1903.

Kahn.—Concrete Re-enforcement. Julius Kahn. Illustrates and describes a system of concrete re-enforcement designed to resist vertical shear, stating the principles of the type recommended. 2500 w. R R Gaz—Oct. 16, 1903.

Kahn Floor Test.—Report of Fire, Load and Water Test Made at the Fire-Testing Station, Columbia University, N. Y., upon a Kahn System, 15-Foot Span, Reinforced Concrete Floor, Constructed by the Trussed Concrete Steel Company. Ira H. Woolson. Ils. 1300 w. Cement—Jan., 1905.

Lockwoven Floor Test.—Test of a Floor System. Digest from the official report of a test made by the Dept. of Bldgs., Borough of Manhattan, of the Lockwoven Metal Concrete Floor Arch. Ill. 1200 w. Ins Engng—May, 1902.

Machine Shop.—Reinforced Concrete Applied to Modern Shop Construction. E. N. Hunting. States the advantages of this material, showing how well it is adapted to shop construction; also gives some data on actual work of this class. Ils. 1800 w. Trans Am Soc of Mech Engrs (No. 068)—Dec., 1905.

Machine Shop, Philadelphia.—A Reinforced-Concrete Machine Shop in Philadelphia. Illustrated detailed description of the Hugo Bilgram machine shop, and its construction. 1400 w. Eng Rec—Feb. 4, 1905.

A Five Story Machine Shop of Reinforced Concrete. Illustrates and describes the interesting building, and method of erection, now in progress in Philadelphia, for Mr. Hugo Bilgram. 900 w. Am Mach—July 2, 1903.

Machine Works, Reading, Pa.—Visintini Reinforced Concrete Construction, Textile Machine Works, Reading, Pa. Leon S. Moisseiff. Illustrated description of a four-story building nearing completion for The Textile Machine Works, of Reading, Pa., on a system used for the first time in this country. 2200 w. Eng News—March 2, 1905.

Masonic Temple, Toledo, O.—Masonic Temple of Reinforced Concrete Construction at Toledo, O. Illustrated detailed description. 1200 w. Eng News—March 16, 1905.

Medical Laboratory, Brooklyn Navy Yard.—Reinforced Concrete Medical Laboratory: Brooklyn Navy Yard. Illustrated description of this building. The walls are of brick, the floors, interior columns and roof of reinforced concrete. 1400 w. Eng News—March 23, 1905.

Melan.—See **Beam Design; BRIDGE.**

Melan Test.—Loading Tests of a Reinforced Concrete Plate (Belastungsversuch an einer Armierten Betonplatte). Prof. Melan. A graphical examination of the stresses and strains in a plate of reinforced concrete, showing the importance of the proper location of the metallic reinforcement. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 19, 1902.

Metal Protection.—See **METAL PROTECTION—Steel.**

Mine Shaft.—See **MINE SHAFT—Lining.**

Monier.—Monier Constructions. E. Lee Heidenreich. Gives the different formulae used in the calculations, also papers and discussion of this subject containing matter of interest. Ill. 3500 w. Jour W Soc of Engs—Oct., 1900.

Notes on Fireproof Construction Under the System Monier. E. Lee Heidenreich. An illustrated article describing important uses made of this construction in the United States. 1200 w. Ry & Engng Rev—March 15, 1902.

The Computation of Monier Beams (Beitrag zur Berechnung der Monierplatten). Max R. v. Thullie. A review of the methods of Barkhausen and Considère, with application of computations of actual examples of concrete steel construction. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—March 28, 1902.

See also Patents; Test, Beam; BRIDGE; FIRE-PROOF CONSTRUCTION.

Municipal Structures.—Some Examples of Concrete and Expanded Metal in Municipal Structures. Illustrated description of concrete-steel work in the foundations of pavements for water conduits and for outlet sewers. 1200 w. Eng Rec—Oct. 26, 1901.

Music Hall.—The Strasburg Music Hall (Das Sängerhaus in Strassburg). E. Züblin. Illustrated description of large auditorium and club house built in reinforced concrete. 8000 w. 3 plates. Beton und Eisen—No. III., 1903.

See also College of Music.

Nantes, France.—The Applications of Reinforced Concrete (Des Applications du Ciment Arme). G. Liébeaux. Giving data concerning methods of construction and erection, with especial reference to works in and near Nantes, including the bridge over the Vienne at Chatellerault. 10000 w. Rev Gen des Chem de Fer—Dec., 1901.

Office Building.—See under subhead names of buildings.

Paris Exposition.—Recent Structures in Concrete and Iron (Neuere Bauweisen und Bauwerke aus Beton und Eisen). F. von Emperger. A fully illustrated description of the later combinations of iron and concrete construction with special reference to the buildings at the Paris Exposition. Two articles. 7500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Feb. 15, 22, 1901.

Paris-Orleans.—See **Test, Paris Orleans.**

Patents.—Origin and Development of Armored Concrete. An account of a lawsuit in France concerning the Monier and Hennebique patents, and also the patents of other inventors. 800 w. Engr, Lond—Oct. 9, 1903.

Paterson, N. J.—Concrete-Steel Foundry and Power Station Floors. Illustrated detailed description of floors in a machine shop and foundry at Paterson, N. J. 1400 w. Eng Rec—Aug. 17, 1901.

Piers.—Recent Examples of Concrete-Iron Construction (Neuere Bauweisen und Bauwerke in Beton und Eisen). F. v. Emperger. With illustrations of pier and wharf construction. Serial. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 25, 1901.

See also PIER.

Pile.—See **PILE.**

Pile Sheathing.—On the Use of Monier Pipes as a Pile Covering, and in Place of Cast Iron for Cylinder Foundations. Ernest Macartney de Burgh. An illustrated article favoring the use of reinforced concrete sheathing constructed on the Monier principle, to protect piles from attacks of the Teredo navalis. 1400 w. Prac Engr—Jan. 4, 1901.

Pipes.—Water Conduits and Sewers in "Sidero-Cement" (Conduites d'Eau Egouts Cylindriques en "Sidero-Cement"). Describing large concrete mains with longitudinal and circumferential reinforcements of round rods and rolled sections. Serial. Part I. 2000 w. Beton u Eisen—4 Heft, 1903.

See also SEWER; WATER PIPE.

Port Antonio, Jamaica.—Reinforced Concrete Residence at Port Antonio, Jamaica Island. Illustrates and describes an unusual winter home recently completed. 1400 w. Eng Rec—April 8, 1905.

Printing House, Philadelphia.—A Reinforced Concrete Building for a Philadelphia Printing Company. Illustrates and describes interesting work in the reconstruction of a brick building, to render it more nearly fireproof. 1300 w. Eng Rec—May 13, 1905.

Prison Cell.—See **PRISON—Boston Navy Yard.**

Pugh Building, Cincinnati.—The Reinforced Concrete Pugh Power Building, Cincinnati, O. Illustrates and describes a building of this material, to be used for manufacturing purposes. 1500 w. Eng Rec—April 15, 1905.

A Prominent Building of Reinforced Concrete Construction. Illustrated description of the Pugh Power Building, in course of construction in Cincinnati. 2000 w. Cement—May, 1905.

The Pugh Power Building, in Cincinnati, O., constructed of Reinforced Concrete (The Pugh Power Building, ein Hohes Gebäude aus Eisenbeton in Cincinnati, O.). Illustrated description. 1 plate. 700 w. Beton u Eisen—No. 9, Sept., 1905.

Rabut Theory.—The Theory of Iron Concrete Construction (Theorie van Cement Ijserconstruction). L. A. Sanders. A review of the theory of Rabut, with data and results of experiments upon reinforced concrete beams. Three articles. 9000 w. De Ingenieur—Oct. 25, Nov. 1, 8, 1902.

Railway Congress.—On the Question of Concrete and Imbedded Metal (Subject IV. for Discussion at the Seventh Session of the Railway Congress). W. Ast. Report (No. 2) for all countries except America and Russia. 22400 w. 4 tables and figs. Bul Int Ry Cong—Feb., 1905.

On the Question of Concrete and Imbedded Metal (Subject IV. for Discussion at the Seventh Session of the Railway Congress). J. F. Wallace. Report (No. 3) for America. 32000 w. 10 tables and figs. Bul Int Ry Cong—Feb., 1905.

On the Question of Concrete and Imbedded Metal (Subject IV. for Discussion at the Seventh Session of the Railway Congress). Serge de Kareischa. Report for Russia. 18300 w. 10 tables. Bul Int Ry Cong (2d part)—Feb., 1905.

Railway Shop.—See **RAILWAY SHOP—Elizabethport, N. J.**

Raiway Station.—See **RAILWAY STATION—Washington, D. C.**

Railway Structures.—Reinforced Concrete Structures for Railroads. A. O. Cunningham. States the advantages of this material, discussing some of its applications, especially to bridge construction, and particulars in regard to the system, with stresses, etc. 4000 w. Ils. Trans Assn of Civ Engrs of Cornell Univ—1905.

See also **Culverts and Bridges; Railway Congress; Wabash; CONCRETE; CULVERT; RAILWAY SHOP; RAILWAY STATION.**

Ransome.—The Kelly & Jones Company's Concrete-Steel Factory Building. An illustrated description of the Ransome system of construction; some of the details are of special interest. Serial. 1st part. 1600 w. Eng Rec—Feb. 6, 1904.

See also **Hennebique.**

Ransome Floor Test.—Loading Tests of Ransome Concrete-Steel Floor Construction. An illustrated account of comparative tests of full-size floor panels, of different spans and construction, made for the Building Department of the Borough of Richmond, New York City. 1200 w. Eng Rec—Dec. 20, 1902.

Regulations, Prussian.—Prussian Regulations for Reinforced Concrete in Building Construction. A copy of the regulations sent to the building authorities April 16, 1904. 2200 w. Eng Rec July 2, 1904.

Regulations, N. Y.—Regulations in Regard to the Use of Concrete Steel. Issued by the Bureau of Buildings, Borough of Manhattan, New York. Also editorial. 2200 w. Eng Rec—Oct. 10, 1903.

Retaining Wall.—See **RETAINING WALL.**

Ribbed Rods.—Waved-Iron Bars (Welleneisen). Alexander Sattman. Describing an improved form of rod with corrugated ribs, especially adapted for use in reinforced concrete, by reason of the impossibility of slippage. 1200 w. Stahl u Eisen—March 1, 1905.

Roof.—See **ROOF—Concrete Reinforced; Melan.**

School, N. Y.—A Reinforced Concrete School Building. Illustrates and describes a very beautiful private school building in New York. 1400 w. Archts' & Bldrs' Mag—Nov., 1905.

Sea Wall.—See **Wharf.**

Sewer.—See **SEWER.**

Shoe Factory, Beverly, Mass.—See **Factory, Shoe.**

Shop.—See **Factory; Machine Shop.**

Siegwart Beam.—New Flooring Material. Illustrates and describes a system of concrete flooring, consisting of hollow tubes of mortar and iron. The Siegwart beam. 900 w. U S Cons Repts, No. 1802—Nov. 16, 1903.

The Siegwart Ferro-Concrete Floor Beams. Illustrates and describes this type of floor construction. The beams are made in the factory. Reports tests made. 1200 w. Engng—Jan. 29, 1904.

Tests of the Siegwart Beam (Erprobung von Siegwart Balken). F. Schule. Describing tests of a special form of reinforced concrete beam upon a testing machine arranged for distributed transverse loads. 1000 w. Schweiz Bauzeitung—Aug. 27, 1904.

Stable, N. Y.—A Reinforced Concrete Stable. Illustrated description of a stable recently built in New York. 2000 w. Eng Rec—March 19, 1904.

Stable, Scarsdale, N. Y.—Reinforced Concrete Stable. Illustration and brief description of a stable at Scarsdale, N. Y. 1500 w. Eng Rec—June 10. 1905.

Stadium, Harvard.—See **STADIUM—Harvard.**

Stairway.—A Suspended Curved Double Stairway of Reinforced Concrete. Illustrates and describes a winding stairway being built in the New York residence of Mr. George W. Vanderbilt. 1500 w. Eng Rec—Dec. 12, 1903.

Concrete-Steel Stairway Construction; New York Rapid Transit Railway. Illustrated detailed description of the exit stairways. 700 w. Eng News—June 30, 1904.

Staten Island Sand Plant.—Reinforced Concrete Construction in a Commercial Sand Plant. Illustrates and describes the interesting features of a plant at New Brighton, Staten Island. Serial. 1st part. 3300 w. Eng Rec—July 30, 1904.

Steel Construction Compared.—Economy in the Use of Steel Concrete. John B. Warren. Describes structures of steel-concrete construction with solid floors to show the saving in first cost as compared with the ordinary steel I-beam construction. Ils. 1800 w. Eng Rec—Oct. 15, 1904.

Stirrups.—See **Beam, Vertical Stirrups.**

Store, Chicago.—A Reinforced Concrete Store Building in Chicago. Illustrated detailed description of the construction of a seven-story building. 1200 w. Eng Rec—June 4, 1904.

Stresses.—The Permissible Stresses in Reinforced Concrete Construction (Ueber die Zulässige Beanspruchung der Baustoffe in Cement-Eisenconstructionen). J. E. Brik. An examination of the manner in which the elastic limit of the material is reached in the various portions of a structure. 5000 w. Oesterr Wochenschr f d Oeffent Baudienst—July 26, 1902.

Concrete-Steel. Condensed from a paper by Prof. Brik in the "Oesterr-Wochenschr f d Oeffent Baudienst." Gives results of experimental investigations of this material by others, and methods of computation of stresses. 4200 w. Eng Rec—Aug. 23, 1902.

A Graphostatical Investigation of Compound Bodies of Concrete and Iron (Graphostatische Untersuchung der Verbundkörper aus Beton und Eisen). Robert Bortsch. A theoretical graphical discussion of the stresses in steel-concrete structures. 1 plate. 2000 w. Oesterr Wochenschr f d Oeffent Baudienst—July 4, 1903.

The Calculation of the Stresses and the Practical Design of Structures of Steel Concrete. Walter W. Colpitts. Considers the properties which render it adaptable to railway structures, discussing its applications and describing designs and calculations. Ill. 6600 w. Ry Age—Jan. 8, 1904.

The Compression and Shearing Resistance of Concrete (Schub und Scherfestigkeit des Betons). H. Morsch. Experimental investigations in connection with the proportions of members of reinforced concrete. Two articles, 4000 w. Schweiz Bauzeitung—Dec. 24, 31, 1904.

See also **Beam; Floor; Test.**

Substation, Brooklyn.—The Parkville Concrete-Steel Substation of the Brooklyn Rapid Transit Co. Illustrated detailed description. 3000 w. Eng Rec —Nov. 26, 1904.

See also **ELECTRIC SUB-STATION—Brooklyn.**

Subway.—A Brief Mention of Some Minor Uses of Reinforced Cement in Subway Construction. Alfred Craven. A brief illustrated description of several adaptations of this material. 1000 w. Cement Age—Sept., 1904.

Tests.—Tests of Concrete and Concrete-Iron Construction (Ueber Versuchsergebnisse bei Erprobung von Beton und Beton-Eisen Konstructionen).

J. A. Spitzer. With data and results of a number of tests of beams, plates, etc., including diagrams of loads and deflection. 5000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Oct. 11, 1901.

Fire and Load Tests of Concrete Steel Floors. Illustrated descriptions of tests of the White floor system and the American floor system. 1200 w. Eng Rec—Nov. 1, 1902.

A Test for Reinforced Concrete (Eine Güteprobe für Eisen-Beton). Fritz v. Emperger. A discussion of tests of reinforced concrete and a plea for their standardization. Diagram and illustrations. 2800 w. Beton & Eisen—2 Heft, 1903.

Test of a Reinforced Concrete Slab. Sanford E. Thompson. Describes a test made by the writer. 600 w. Eng Rec—Sept. 12, 1903.

See also under subhead names of systems.

Test, Beam.—Breaking Test of a Reinforced-Concrete Beam (Epreuve j'usqua la Rupture d'une Poutre en Ciment Armé). N. de Tedesco. An illustrated account of tests of reinforced concrete for an infantry barracks at Gorinchem, Holland. 1200 w. Revue Technique—Dec. 10, 1901.

Tests of Reinforced Concrete Beams (Epreuves sur des Poutres en Ciment Armé). An illustrated account of tests of Monier beams made by the Wittenburg Company of Amsterdam. 800 w. Génie Civil—March 8, 1902.

Tests of Reinforced Concrete Beams. W. Kendrick Hatt. Read before the Am. Sec. International Assn. for Test. Materials. Describes the methods and records the results of tests made to determine the reliability of the theory advanced by the writer. 4800 w. Eng Rec—June 28, 1902.

Recent Experiments with Concrete-Iron Beams (Neue Versuche mit Betoneisen Balken). Dr. Max V. Thullie. An examination of tests recently made in Holland showing the distribution of the stresses in the concrete and in the metal. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 17, 1902.

Computing the Strength of Concrete Steel Beams. Edwin Thacher. Refers to a recent paper by Prof. W. K. Hatt and the tests reported, and gives an account of the writer's investigations with formulas. 3500 w. Eng News—Feb. 12, 1903.

Comparative Tests upon Reinforced Concrete Beams (Vergleichende Proben mit Verbund Balken). L. A. Sanders. Data and results of exhaustive tests upon T beams in the direct and inverted positions; with numerous illustrations. 3000 w. Beton & Eisen—1 Heft 1903.

Comparative Tests of Beams of Reinforced Concrete (Essais Comparatifs de Poutres en Beton Armé). Data and results of tests of beams of the Maciachini type and ordinary reinforced concrete beams. 3000 w. Beton und Eisen—No. III., 1903.

Cross-Bending Tests on Beams of Reinforced Concrete. Malverd A. Howe. Gives results of a series of tests. The object was to obtain the actual strength in cross-bending of full-size concrete beams reinforced with corrugated bars, according to the formula of A. L. Johnson. 1800 w. Jour W Soc of Engrs—June, 1904.

Cross-Bending Tests on Steel-Concrete Beams. Illustrates and describes tests made by Prof. Malverd A. Howe of concrete beams reinforced with corrugated steel bars. 1500 w. R R Gaz—April 8, 1904.

Reinforced Concrete Beams. Discussion of papers by W. K. Hatt and Malverd A. Howe on tests made of reinforced concrete beams. 18000 w. Ill. Jour W Soc of Engrs—June, 1904.

Flexure of Reinforced Concrete Beams. W. K. Hatt. An account of experimental tests made by the writer, giving a straight-line formula and a diagram representing equations, with explanations of their use. 4000 w. Jour W Soc of Engrs—June, 1904.

A Study of the Properties of Reinforced Concrete (Een Onderzoek naar de Eigenschappen van Gwapend Beton). A. C. C. G. van Hemert. Describing tests upon reinforced concrete beams, with determinations of coefficients for various combinations. 7500 w. De Ingenieur—June 4, 1904.

Tests of Steel-Concrete Beams. Prof. Edgar Marburg. Read before the Am. Soc. for Test. Materials. A report of tests made under the direction of the writer. 3500 w. Eng Rec—July 9, 1904.

Tests of Reinforced Concrete Beams. Prof. Arthur N. Talbot. Illustrated paper before the American Society for Testing Materials, giving description and results of tests made at the University of Illinois. Table: Diagrams. 4000 w. Eng News—Aug. 11, 1904. Also, Eng Rec—Aug. 13, 1904.

A Résumé of Some Tests on Concrete Steel Beams. J. Kahn. A report of tests made by the writer, repeating tests made by Prof. A. M. Talbot. 2500 w. Cement—Nov., 1904.

Tests of Reinforced Concrete Beams. Prof. F. E. Turneaure. Read before the Am. Soc for Test. Mat. Describes investigations made of the strength of beams reinforced by different methods and loaded in different ways. 2400 w. Eng Rec—Sept. 3, 1904.

Some Further Tests of Reinforced-Concrete Beams, C. M. & St. P. Ry. J. J. Harding. Describes tests made by the Bridge & Building Dept. of the road named with a study of the results and statement of conclusions. General discussion. Ills. 10500 w. Jour W Soc of Engrs—Dec., 1905.

Bending Tests on Reinforced Concrete Beams (Biegungsversuche mit Armierten Betonbalken). E. Mörsch. Giving diagrams of deflections and extensions, showing the relative action of the concrete and metal. 2000 w. Schweiz Bauzeitung—Dec. 16, 1905.

Tests of Reinforced Concrete Beams. From the report of the Boston Transit Commission. An illustrated report of tests, giving size of beams and methods of reinforcing them. 1100 w. R R Gaz—Vol. XXXVIII, No. 3.

Test, Blaubeuren, Germany.—Concrete Test Arch of the Stuttgart Cement Works at Blaubeuren near Ehingen (Beton Probebogen der Stuttgarter Zementfabrik Blaubeuren in Ehingen). H. Hoch. Illustrated description of a test of a reinforced concrete arch of 20 metres span by loading it to destruction. 2000 w. Zeitschr d Ver Deutscher Ing—Sept. 24, 1904.

Test, Dresden.—Breaking Tests of Reinforced Concrete Structures. Illustrated report of tests made of various structures at the exhibition of the German Municipalities at Dresden, at the time of their removal. 3000 w. Cement—Nov., 1905.

Test, Fire.—See Fire Test; **CONCRETE; FIREPROOF CONSTRUCTION.**

Test, Laboratory.—Aims and Scope of Laboratory Tests of Reinforced Concrete. Prof. F. H. Constant. An account of aims and methods and the work being accomplished. 4500 w. Munic Engng—March, 1905.

Test, Mass. Inst. of Tech.—Tests upon the Bond of Union between Concrete and Steel. C. W. Spofford. Tabulated report of tests made at the Mass. Inst. of Technology. The rods used were of the Ransome, Thacher, and Johnson types. 1800 w. Beton und Eisen—No. III., 1903.

Test, Moisture.—International Association for Testing Materials (Association Internationale pour l'Étude et l'Essai des Matériaux). Note by M. Maynard on changes of volume of cement when subjected to moisture and immersed in water, and on reinforced-concrete tests and phenomena. Diagrams and curves. 3000 w. Rev Tech—June 10, 1905.

Test, Paris-Orleans Ry.—See Test, Truss.

Test, Truss.—Tests to Destruction of a Ferro-Concrete Truss. From "Annales des Ponts et Chaussées." Describes tests of a regular open-work truss built entirely of ferro-concrete at Ivry, and tested to destruction. 1200 w. Engng—April 22, 1904.

Test to Destruction of a 65-ft. Truss Bridge Span of Reinforced Concrete. Abstract from "Annals des Ponts et Chaussées," concerning a test made by Mr. Considère, describing the test structure, and giving results of tests. Ills. 2000 w. Eng News—May 5, 1904.

A French Breaking Test of Reinforced Concrete Bridge Trusses. Leon S. Moisseiff. Describes the construction and breaking test of the bridge built by the Paris-Orleans Ry Co. for this purpose. Ills. 4000 w. Eng Rec—June 4, 1904.

Test, Zurich.—The Resistance of Reinforced Concrete to Flexure (Résistance et Déformations du Béton Armé Sollicité à la Flexion). F. Schüle. A complete account of exhaustive tests made at the Zurich Polytechnic, using the Amsler testing machine and the Bauschinger mirror apparatus. Three articles. 8000 w. Schweiz Bauzeitung, Nov. 29, Dec. 6, 13, 1902.

Transverse vs. Hooped.—Concrete with Transverse Reinforcement Compared with Hooped Reinforced Concrete (Beton mit Querarmatur, Verglichen mit "Béton Fretté"). L. A. Sanders. A description, with illustrations and table, of tests of concrete blocks reinforced transversely with many small bars. 1000 w. Beton & Eisen—2 Heft, 1903.

Tunnel.—See **TUNNEL.**

United States.—See **America.**

Unit Frame.—A Unit Frame Reinforcement System of Concrete Steel Construction. Illustrates and describes a unit frame reinforcement for concrete girder and floor construction. 1200 w. Eng News—Aug. 31, 1905.

Vault-Light Slab.—See **VAULT-LIGHT SLAB.**

Vertical Shear.—See **Beam, Vertical Stirrups; Kahn.**

Viaducts, France.—Concrete Steel Details of French Viaducts. Brief illustrated descriptions of brackets and parapets, as given in "Génie Civil." 850 w. Eng Rec—Dec. 28, 1901.

Visintini.—The Visintini System (Das System Visintini). A system of reinforced concrete beams of open lattice work of concrete with metal rods imbedded. 1800 w. Beton und Eisen—No. III., 1903.

Tests upon Lattice Beams, Visintini System (Einige Versuche mit Gitterbalken, System Visintini). Illustrated account of tests of reinforced-concrete beams of the Visintini type by direct leading. 4000 w. Beton und Eisen—No. III., 1903.

See also **Machine Works, Reading.**

Wabash Railway.—Wabash Steel-Concrete Construction. An illustrated description of viaduct at Monticello, Ill., and other work under way or completed on this railway, noting details of interest. 1200 w. Ry Age—Dec. 11, 1903.

Walls.—Quay Walls and Retaining Walls of Concrete and Iron (Quaimauern und Futtermauern aus Beton und Eisen). A description of the use of the Hennebique system in England and in France. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 9, 1901.

Wall Girders.—A Factory Building with Reinforced Concrete Wall Girders. Illustrated description of construction work at Passaic, N. J. 1300 w. Eng Rec—June 18, 1904.

Warehouse, Brooklyn.—See **Factory.**

Warehouse, Minneapolis.—Reinforced Concrete Warehouse for North-west Knitting Co., Minneapolis, Minn. Drawings and description of building with novel features. 900 w. Eng News—June 8, 1905.

Water Pipe.—See **Pipe; WATER PIPE.**

Well.—Construction of a Well in Reinforced Concrete 20 Metres Deep (Erbauung eines 20 M. tiefen Brunnens aus Eisenbeton). L. Zöllner. Describing the sinking of a well 8 metres in diameter, 20 metrs deep, lining it with reinforced concrete walls. 1000 w. Beton u Eisen—4 Heft, 1903.

Wharf.—Concrete Metal Construction. Emile Villet. An illustrated description of work in the art of armored cement construction, discussing the wharf at the port of Novorossisk, on the Black Sea, Russia; the wharf for the Department of Docks, of New York; and a proposed sea-wall for San Francisco. 3700 w. Jour Assn of Engng Soc's—Oct., 1903.

See also **Wall; WHARF—Ymuiden, Holland.**

CONDENSER.

See also **AIR PUMP; COOLING TOWER; DISTILLING; EVAPORATOR; FEED WATER; STEAM ENGINE; STEAM ENGINEERING; STEAM PLANT.**

Condensers for Steam Engines (Les Condenseurs de Machines à Vapeur). J. Nadal. The first portion of an exhaustive study of the advantages of the use of condensers, and a description of modern condensing machinery for use with steam engines. Serial. Part I. 7500 w. Revue de Mécanique—Feb., 1901.

Steam Condensers. Charles L. Hubbard. Presents the fundamental principles upon which a condenser operates, and gives descriptions of some of the standard types in use. Ill. 2000 w. Am Elect'n—May, 1902.

Condensing vs. Non-Condensing. Charles L. Hubbard. A discussion of this subject showing that the value of a condenser depends entirely upon existing conditions, and to a great extent upon the relative cost of water and coal. 2000 w. Am Elect'n—June, 1902.

Condensers and Cooling Towers. Charles L. Hubbard. The first of a series of articles showing the gain in power and economy by condensing operation. Serial. 1st part. 2800 w. Steam Engng—April 10, 1903.

Condensing Machinery. William Edward Storey. Read before the Society of Engineers. Illustrates and describes the various types of condensers, tracing the development. Serial. 1st part. 2300 w. Mech Engr—Dec. 24, 1904.

Air Cooling.—A Novel Method of Air-Cooling. Arthur Pennell. Illustrates and describes a large surface condenser using air as a cooling agent, at the Armour Packing Co., Kansas City. 2200 w. Engr, U S A—July 15, 1903.

See also **COOLING TOWER.**

Air Pump.—See **Jet; AIR PUMP—Condenser.**

Atlanta, Ga.—See **COOLING TOWER.**

Automobiles.—Steam Condensers. Arthur L. Stevens. Considers the application to automobiles, the advantages and disadvantages. 1000 w. Horseless Age—May 14, 1902.

Atmospheric Steam Condensers. J. S. V. Bickford. An article objecting to some statements made by Mr. Stevens in regard to the efficiency of air condensers, and giving a report of experiments made and their results. 1800 w. Horseless Age—June 25, 1902.

British.—Condensing Plant. W. H. Booth. Illustrates and describes types of British condensers and accessories. Serial. 1st part. 5000 w. Cassier's Mag—Oct., 1904.

Burbach Iron Works.—The Central Condensing Plant of the Burbach Iron Works (Zentralkondensation der Burbacher Hütte in Burbach). Illustrating details of condenser, cooling tower, pumps, and general arrangement for condensing 30,000 kilogrammes of steam per hour. 2000 w. Stahl u Eisen—March 1, 1904.

Casting.—See **CASTING—Jet Condenser.**

Central Plant.—The Centralization of the Steam-Condensing Plant. Harry G. V. Oldham. A second installment of a fully illustrated description of modern cooling towers, evaporative condensers and general arrangement of central condensing plant. 2000 w. Eng Mag—Nov., 1900.

Experience with Centarl Condensers in Mine Power Plants (Versuche und Beobachtungen an Central-Kondensationen auf Steinkohlenzechen). E. Stach. A very complete series of trials, showing the advantages of condensation, and the conditions under which the best results may be attained. 5000 w. 3 plates. Glückauf—March 29, 1902.

Central Condensation (Les Condensations Centrales). A. Abraham. A description of the advantages of central condensation and of the various forms of condensers in use in that connection. Serial. Part I. 1200 w. Revue Technique—Feb. 25, 1903.

Central Condensing Systems. Louis R. Alberger. An illustrated detailed description of this system. 2200 w. Ir Age—Jan. 7, 1904.

Central Condensing Plant at Neuves Maisons (Zentral-Oberflächenkondensation in Neuves Maisons). Fr. Frölich. Illustrated description of the new central condensing plant of the Chatillon, Commentry Co., capable of condensing 125,000 kilogrammes of steam per hour. 3000 w. Zeitschr d Ver Deutscher Ing—Feb. 18, 1905.

See also **COOLING TOWER.**

Colwell.—See **ROTARY ENGINE.**

Conover.—A 6,000 Horse-Power Conover Jet Condenser. Illustrated description. 1700 w. Power—Sept., 1903.

Cooling Apparatus.—The Cooling of Condensing Water. Gives results of experience and observation in respect to the cooling of injection water for condensing and other purposes, indicating points that should be considered. 1500 w. Prac Engr—Sept. 26, 1902.

Water Cooling Appliances for Condensers (Kühlwasserakkumulator für Kondensatoren). F. J. Weiss. A review of the various methods of cooling condenser water for repeated use. Serial.

Part I. 3500 w. Zeitschr d Ver Deutscher Ing—Sept. 27, 1902.

A "Towerless Cooling Tower" and Surface Condenser Combined. Illustrated description of a novel system of condensing for steam engines, particularly applicable where the supply of condensing water is limited, and where space available forbids the use of a cooling tower. 1200 w. Eng News—Dec. 25, 1902.

Cooling Tower.—See **COOLING TOWER.**

Corrosion.—Condenser Tube Electrolysis and Corrosion. James F. Hobart. An explanation of what takes place and suggestions of remedies. Ill. 2500 w. Power—Nov., 1902.

See also **METAL CORROSION.**

Design.—Condensing Plant Design. Illustrates and describes the design of a surface plant. 2500 w. Prac Engr—Aug. 11, 1905.

Condensers for Steam Engines and Turbines. Frank Foster. Points out the general principle underlying condenser design, showing how the working conditions affect the design; especially considering the most economical vacuum. Ills. Serial. 1st part. 3500 w. Mech Engr—Oct. 28, 1905.

See also **AIR PUMP.**

Düsseldorf Exposition.—Central Condensers (Zentral-Kondensationen). H. Dubbel. An illustrated description of the central condensing system shown at the Düsseldorf exposition. 1800 w. Zeitschr d Ver Deutscher Ing—Nov. 29, 1902.

Central Condensation Plants at the Düsseldorf Exposition (Les Condensations Centrales à l'Exposition de Düsseldorf). P. F. Dujardin. A well illustrated description of cooling towers and other steam-condensing apparatus. 1 plate. 2200 w. Génie Civil—May 30, 1903.

Economy.—See **STEAM ENGINE.**

Ejector.—The Theory of the Ejector-Condenser and Experiments with a New Type (Théorie des Ejecto-Condenseurs et Expériences sur un Nouveau Type de ces Appareils). A. Rateau. Illustrated discussion of the theory of the Morton ejecto-condenser for steam engines, and account of experiments with a type designed by the author. 8500 w. Rev d Mécanique—June, 1902.

Electric Stations.—Condensing Plant for Central Electric Stations. R. D. Summerfield. Illustrates and describes some of the modern arrangements and discusses the subject generally. Serial. 1st part. 2200 w. Engng—July 17, 1903.

See also **Glasgow; New York.**

Exhaust Heating Compared.—See **HEATING—Exhaust Steam.**

Glasgow-Electric Station.—The Condenser Plant at Glasgow Electric Power Station. Illustrated description. 1000 w. Power—Jan., 1904.

High Vacuum.—Condensing Plant for High Vacuum with Limited Water Supply. W. H. Roy. Read before the Manchester Assn. of Engrs. Discusses the best type of cooler and the theory and limits of condensing plant efficiency, especially in relation to high vacuum. Serial. 1st part. 3500 w. Mech Engr—Dec. 12, 1903.

High Vacuum Condensing Plants. Ernest Kilburn Scott. Discusses condensers arranged on what is known as the contra flow principle. 1200 w. Aust Min Stand—March 22, 1905.

Condensing Plants for High Vacuums. The first of an illustrated series of articles describing the arrangement of the condensing apparatus in several kinds of turbines. Serial. 1st part. 1800 w. Mach, N. Y.—Oct., 1905.

Jet.—Jet Condensers and Air Pumps (Condenseurs par Mélange et Pumpes à Air). M. J. Nadal. A general study of the various forms of steam condensers which act by the direct contact of the steam with water, as distinguished from surface condensers. Serial. Part I. 4500 w. Revue de Mécanique—June 30, 1901.

See also **Conover.**

Kalgoorlie.—Evaporative Condenser of 4500 Horse Power (Aérocondenseur de 4500 Chevaux). F. Fouché. Illustrated description of a large evaporative surface condenser erected at Kalgoorlie, Western Australia. 4000 w. Mem Soc Ing Civ de France—Oct., 1901:

Ljungström.—See **Marine Engines.**

Longton, Staffordshire.—Surface Condensing Plant for Coal and Iron Works. Illustrates and describes an interesting plant recently installed at Longton, Staffordshire, England, designed to deal with the exhaust from two winding engines, one fan engine, and two Parsons turbine electrical generators. 1600 w. Engng—Sept. 4, 1903.

Marine Engines.—The Ljungström Condenser as Applied to Marine Engines. William Cross. Abstract of a paper read before the Inst. of Naval Archts. Brief illustrated description. 800 w. Engr, Lond—April 3, 1903.

Molding.—See **MOLDING—Jet Condenser.**

New York Interborough.—The Condensing Plant of the New York Rapid Transit Power House. An illustrated detailed description of this interesting plant. 1800 w. Power—June, 1903.

New York-Manhattan.—The Reorganization of the Condensing System of the Manhattan Station. Explains why the system first installed was not satisfactory and gives an illustrated description of the changes made. The new apparatus has given satisfactory results. 1800 w. Power—Aug., 1903.

Practice.—Condensing Engine Practice. Alex. Dow. An illustrated description of the Edwards pump, and reference to other points in condenser practice. 3300 w. Jour Assn of Engng Socs—March, 1902.

Pribram Mines.—The Central Condenser Plant at the Maria Mine at Pribram (Die Zentral Kondensationsanlage. System Balcke, am Mariaschachte in Pribram). Julius Divis. Describing a condenser plant receiving the exhaust of all the engines of the mine; Balcke cooling towers are used, and 43,000 kilograms of steam condensed in 24 hours. 3000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 31, 1903.

Saarbruck.—The Central Condensation Plant of the Heinitz Mine at Saarbruck (Die Zentral Kondensation der Königlichen Heinitzgrube bei Saarbrücken). G. W. Koehler. Illustrated description of a central condensing plant with Klein cooling towers, for handling 12,000 kilogrammes of steam per hour. 2000 w. 1 plate. Glückauf—Jan. 17, 1903.

Saturated Air vs. Brass Tube.—Saturated Air Condensers. Statistics of tests comparing the relative efficiency and current expense of a saturated air surface condenser and a standard brass tube condenser. 2000 w. Power—Dec., 1903.

Self-Cooling.—The Self-Cooling Condenser. Thomas L. Wilkinson. A contribution to steam economics. Serial. 1st part. 1200 w. Min Rept—May 28, 1903.

Steam Turbine.—Condensers for Steam Turbines. George I. Rockwood. On the designs for condenser systems, their cost, and especially a description of the injector or ejector condenser. 2200 w. Trans Am Soc of Mech Engrs, No. 056—Dec., 1904.

See also **High Vacuum.**

Surface.—A Rational Determination of the Dimensions of Surface Condensers (Determinazione Razionale delle Dimensione Principali dei Condensatori a Superficie). Natale Matteucci. A review of the existing formulas and the development of new rules based on the actual heat exchanges. Rivista Marittima—Aug.-Sept., 1902.

Surface.—Surface Condensers. C. G. Robbins. Discusses the formulas of J. M. Whitham and C. P. Poole, and illustrates their application by an example. 1800 w. Marine Engng—Oct., 1902.

Thomas and Marsland.—See **AIR PUMP—Mars.**

Tubing.—Tubing a Condenser. Joseph G. Horner. Illustrates and describes a method of tubing a surface condenser made for a small horizontal engine. 600 w. Am Mach—Dec. 31, 1903.

Tunnel.—See **TUNNEL—Condensing Water.**

Vacuum.—The Effect of Vacuum on Steam-Engine Economy. R. M. Neilson. The first of three articles, discussing the important influence of vacuum upon the economical performance of steam engines and steam turbines. 3500 w. Engineering Magazine—May, 1905.

The Effects of Vacuum on Steam-Engine Economy. R. M. Neilson. Mr. Neilson's second paper describes the leading types of condensing apparatus, and their operation. 3000 w. Engineering Magazine—June, 1905.

The Effects of Vacuum on Steam-Engine Economy. R. M. Neilson. An illustrated review of central-condensing systems, cooling towers, and the auxiliary machinery of the condensing plant. Ills. Third paper. 3600 w. Engineering Magazine—July, 1905.

Vacuum Measurement.—See **VACUUM—Measurement.**

Water.—Cooling Water for Condensers. Ernest R. Briggs. Discusses methods in use and explains a method for finding correctly the quantity of water required for condensing purposes. Ills. 1600 w. Am Mach—Vol. 28, No. 20.

Water Disposal.—Disposing of the Water of Condensation. C. W. Obert. Illustrates and describes various methods of draining off the water. 1400 w. Am Elect'n—May, 1901.

CONDUCTIVITY.

Electric.—See **ELECTRIC CONDUCTIVITY; ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE.**

Heat.—See **ELECTRIC CABLE—Heat Conductivity; HEAT; HEAT TRANSMISSION.**

CONDUIT.

See also **ELECTRIC CONDUIT; SUBWAY; WATER PIPE.**

Chicago Freight and Telephone.—See **SUBWAY.**

Condensing Water.—See **TUNNEL.**

Electric.—See **ELECTRIC CONDUIT.**

CONDUIT RAILWAY.

See **ELECTRIC RAILWAY, CONDUIT.**

CONE PULLEY.

See **PULLEY—Cone.**

CONNECTING ROD.

See also **STEAM ENGINE.**

The Problem of the Connecting Rod. W. F. Durand. A mathematical investigation of the motion of the connecting rod, including its acceleration, plus and minus during a revolution, together with the forces which are manifested as a result of much variable movement. Serial. 1st part. 2000 w. Sib Jour of Engng—Feb., 1901.

Boring Machine.—See **BORING MACHINE—Connecting Rods.**

End.—A New Connecting Rod End. C. W. Hunt. Brief illustrated description. 800 w. Trans Am Soc of Mech Engrs, No. 903—May, 1901.

Influence.—Influence of the Connecting Rod Upon Engine Forces. Sanford A. Moss. Deduces a method for simply and yet exactly taking account of the influence of the weight and inertia of the connecting rod upon the forces transmitted by the ordinary slider crank-chain, such as is used in steam and gas engines. 3800 w. Trans Am Soc of Mech Engrs, No. 018—Dec., 1904.

Locomotive.—Locomotive Connecting and Side Rods. George Willans. An illustrated investigation of the designs of modern rods, comparing them with earlier practice. Serial. 1st part. 2200 w. Prac Engr—Nov. 13, 1903.

Manufacture.—Manufacturing Connecting Rods for Steam Engines. Descries the methods used in the manufacture. 1300 w. Am Mach—Nov. 15, 1900.

Milling Machine Made.—See **MILLING MACHINE.**

Stress.—The Stress Produced in a Connecting Rod by Its Motion. C. H. Innes. Read before the N. E. Coast Inst. of Engs. & Shipbuilders. Shows the method of mathematically computing the stress. 1100 w. Engs' Gaz—Dec., 1900.

On the Stress Produced in a Connecting Rod by Its Motion. C. H. Innes. Showing a method of arriving mathematically at the stress, and the point of greatest stress, and to give simple algebraic formulae for calculating it for various forms of rod. Serial. 1st part. 900 w. Prac Engr—Jan. 11, 1901.

Investigation of the Stresses in a Connecting Rod, Due to the Inertia Forces. J. H. Wallace. Describes the investigation of such stresses in a particular case. Ill. 1200 w. Technograph—1902-3.

The Acceleration Stresses on Connecting Rods (Der Beschleunigungsdruck der Schubstange). Dr. R. Mollier. An analytical and graphical examination of the stresses produced in connecting rods by the acceleration changes at various parts of the stroke. 1800 w. Zeitschr d Ver Deutscher Ing—Nov. 7, 1903.

CONNING TOWER.

See also **ARMORED CRUISER; BATTLESHIP; NAVY; WARSHIP.**

The Conning Tower of a War Ship (La Torra di Comando nelle Navi da Guerra). Edwin Cerio. A criticism of present conning towers on various battleships, with suggestions for improvements by subdivision. 2500 w. Rivista Marittima—Dec., 1904.

CONSERVATION OF ENERGY.

The Conservatism of Energy from the Standpoint of the Engineer (Die Erhaltung der Energie vom Standpunkt des Ingenieurs). An examination of the manner in which mechanical energy is transformed in the course of various engineering operations. 2500 w. Zeitschr d Ver Deutscher Ing—Dec. 7, 1901.

CONSULAR REPORT.

See **COMMERCE.**

CONSULTING ENGINEER.

See **ENGINEER—Consulting.**

CONTAGION.

Car.—See **CAR—Sanitation.**

CONTRACT.

See also **INSPECTION; SPECIFICATIONS.**

Clients, Engineers, and Contractors. An editorial discussion of the legal rights in the business relations, and the extent of the engineer's authority. 3000 w. Engng—April 19, 1901.

The Engineer in Construction Contracts. John C. Wait. Indicates some defects and weaknesses in contracts, the correction of which will avert much unpleasantness and labor. 8500 w. Trans Assn of Civ Engrs of Cornell Univ—1902.

The Duties of Engineers in Enforcing Contracts. Albert J. Himes. A discussion of this subject. 2000 w. Eng News—July 17, 1902.

Baltimore.—Municipal Contract System. Thomas G. Hayes. Read before the League of Am. Munic. Describes the Baltimore system and gives reasons for favoring the method adopted. 1500 w. Munic Jour & Engr—Sept., 1902.

British-American.—American Contractors and British Contracts. Editorial on Sir Alfred Hickman's remarks in the House of Commons regarding the American railway contracts for India, and Lord George Hamilton's reply. 2500 w. Engng—June 7, 1901.

Construction.—The Construction of Contracts. Reginald Pelham Bolton. Suggestions designed to lead to the preparation of a more suitable form of contract than is now usually available. 3800 w. Trans Am Soc of Mech Engs, No. 885—Dec., 1900.

Cost-Keeping. — See **COST-KEEPING — Contract Work.**

Design and Construction.—The Effect of Design on Methods of Construction from a Contractor's Point of View. R. W. Newman. Read before the Jr Inst of Engrs. Shows how various small deficiencies in design cause the cost of construction to vary over a wide range. Ill. Serial. 1st part. 2400 w. Engr, Lond—June 5, 1903.

Electrical.—The Institution and Its Proposed Model Contracts. Gives the more important of the draft clauses of the proposed form for use in connection with contracts for plant, mains, and apparatus for electricity works, with comments. 6000 w. Elect'n, Lond—April 25, 1902.

The Status of the Electric Contractor. A. H. Scott. Reviews the history of the organization and growth of the National Electrical Contractors' Association of the United States. 2500 w. Elec Wld & Engr—Sept. 10, 1904.

See also **WORKS MANAGEMENT.**

Enforcement.—See **INSPECTION—Contract.**

Engineer's Fault.—The Engineer's Fault: A Discussion of Specifications, Contracts and Law Suits. John Cassan Wait. Condensed from a paper before the Soc. of Munic. Engrs. of N. Y. City. 6500 w. Eng News—June 8, 1905.

English Law.—See **Uncompleted Work.**

General vs. Separate.—See **Separate vs. General.**

Highway Bridges.—See **BRIDGE.**

Legal Obligation.—The Legal Obligations of a Contractor. Considers the rights and liabilities of those who enter upon the duty of carrying out large undertakings in England. Serial. 1st part. 2000 w. Engr, Lond—Aug. 19, 1904.

Letting.—Letting Contracts Without Competition. An editorial discussion of the subject as illustrated by the armor-plate contracts. 2200 w. Eng News—Nov. 22, 1900.

Mathews vs. People.—The Illinois Supreme Court on Freedom of Contract for Labor. George W. Shaw. A defense of the right of contract. Discussion in the case of Mathews v. the People. 700 w. Eng & Min Jour—May 30, 1903.

Penalties.—The Penalty Clause in Engineering Contracts. W. Valentine Ball. A clear statement of the law relating to penalties, with examples from numerous cases and decisions. 3500 w. Engineering Magazine—Feb., 1904.

Philippines, Sanitary.—Sanitary Conditions as Affecting Contracts for Works, in the Philippine Islands. Maj. E. C. Carter. An authoritative report of present conditions. 2000 w. Eng News—Nov. 23, 1905.

Separate vs. General.—Separate versus General Contracts. Informal discussion of whether in contract work, either public or private, it is preferable to make contracts for the different branches of trade involved, or to combine all under one general contract. 6000 w. Pro Am Soc of Civ Engrs—Aug., 1902.

Specifications.—See **SPECIFICATION — Contractor's Hardship.**

Uncompleted Work.—Uncompleted Works. Discusses questions in English law affecting contracts. 1800 w. Elec Rev, Lond—April 1, 1904.

U. S. Government.—A New and Important Law Affecting Sub-Contractors and Sellers of Material to Parties Holding Government Contracts. An explanation of a recent law passed by the U. S. Congress. 1500 w. Eng News—March 30, 1905.

Government Contracts; Legal Pitfalls and How to Avoid Them. George A. King and William B. King. Gives the rules of importance in guiding contractors entering into contracts with the United States, in the present number. Serial. 1st part. 3500 w. Eng Rec—Dec. 16, 1905.

Unreasonable.—Unreasonable Contract Requirements by the Government., A discussion of the futility and unreasonableness of specifications forcing all the risk of a difficult work on the contractor without giving him reasonable compensation. 1700 w. Eng Rec—Sept. 20, 1902.

CONTRACTOR.

See **CONTRACT.**

CONTRACTOR'S PLANT.

Electric Equipment.—See **ELECTRIC EQUIPMENT —Bridge Contractor.**

N. Y. Underground Ry.—See **UNDERGROUND RAILWAY.**

CONTROLLER.

See also **AUTOMOBILE ELECTRIC; ELECTRIC CAR; ELECTRIC MOTOR; ELECTRIC RAILWAY; ELECTRIC SWITCH; RHEOSTAT.**

The Regulation of Street Railway Motors (Ueber Regelung von Strassenbahnmotoren). K. Sieber. An examination of the various forms of controllers, with diagrams of their action. Elektrotech Zeitschr—Jan. 10, 1901.

The Control of Tramway Motors. K. Sieber, in "Elektrotechnische Zeitschrift." Considers the advantages and disadvantages of the several systems of connection. Ill. 2500 w. Elec Engr, Lond—Jan. 25, 1901.

The Use and Abuse of Controlling Mechanism. D. F. Carver. On the importance of watchfulness, care and systematic inspection. General discussion. 4500 w. St Ry Rev (Daily Ed)—Sept. 4, 1903.

Apparatus for Starting and Controlling Electric Motors (Dispositif de Mise en Marche et de Changement de Marche pour Electro-Moteurs). Illustrating and describing an improved form of controller. 1800 w. L'Electricien—Jan. 14, 1905.

Automatic, Motor.—See **Induction Motor.**

Automobiles.—See **AUTOMOBILE — Controlling Mechanism; AUTOMOBILE, ELECTRIC.**

Burning Out.—The Burning Out of Electric Street-Car Controllers. Sydney W. Ashe. Gives an account of experimental investigations to study the behavior of an arc during the time that elapses for a fuse to blow, and discusses the remedy. 1500 w. Eng News—April 20, 1905.

Cranes.—The Design of Controllers with Shifting Contacts (Ueber den Entwurf von Kontrollern mit Wanderkontakten). Robert Edler. Describing the design of special forms of controllers for use with electric cranes. 3000 w. Zeitschr f Elektrotechnik—May 7, 1905.

Design.—Notes on the Design of Controllers (Weitere Beiträge zum Entwurf von Kontrollern). Robert Edler. Discussing especially the application of cams in the design of controllers for heavy hoisting and conveying machinery. Two articles. 6000 w. Zeitschr f Elektrotechnik—Aug. 21, 28, 1904.

Electric Elevator.—See **ELEVATOR—Electric Control.**

Handle.—Restrictions on the Controller Handle. J. R. Cravath. Discusses the principles involved in the appliances for regulating the rate at which current is turned on, their advantages and disadvantages. 2000 w. St Ry Jour—May 24, 1902.

Induction Motor.—Automatic Controller for Induction Motors. William Main. Illustrates and describes a motor controller for a three-phase sixty-cycle General Electric induction motor. 800 w. Am Mach—Vol. 28, No. 20.

Induction Regulator.—See **INDUCTION REGULATOR.**

K Type.—The Surface Car Controller—Its Performance, Inspection and Efficiency. Edward Taylor. Treats of the type known as the K controllers, discussing explosions, the remedy, effect of operating conditions, &c. 8500 w. St Ry Jour—Jan. 7, 1905.

Mine Locomotive.—See **ELECTRIC LOCOMOTIVE—Speed Control.**

"M Type."—"Type M" Control. W. O. Mundy. Brief description, with remarks on the uses of this controller and its advantages. Short discussion. 2400 w. St Ry Rev ,Daily Ed)—Sept. 3, 1903.

Multiple Unit.—Traction Controllers (Zugsteuerungen). M. Kubierschky. A description of a system of controlling a number of motor cars from one controller on the Sprague principle, this being by the Union Electric Works of Berlin. 4000 w. Elektrotech Zeitschr—July 11, 1901.

See also **ELECTRIC RAILWAY.**

New York Subway.—See **ELECTRIC MOTOR—New York Subway.**

Ore Unloaders.—Magnetic Switch Controllers on Electrically Operated Automatic Ore Unloaders at Lorain, O. R. I. Wright. Gives a brief description of the control equipment, with illustrations of some typical elements of the equipment. The unloaders are of the Hulett type. 1200 w. Eng News—Nov. 9, 1905.

Polyphase.—Improved Controller for Polphase Currents (Neue Drehstrom Kontroller). W. Ephraim. Diagrams and views of the controller of the "Helios" Company, for use with polyphase motors. 1200 w. Elektrotech Zeitschr—June 6, 1901.

Simplified Polyphase Current Controller (Ueber Vereinfachte Drehstromkontroller). Eugen Klein. An illustrated description of a form of controller in which the number of contact pieces and connections is greatly reduced. 800 w. Elektrotech Zeitschr—Jan. 23, 1902.

Safety Device.—Electric Train Safety Device. E. C. Parham. Illustrates and describes an automatic device on the controller that will not only cut off the current in case of accident, but will also apply the brake. 1400 w. Am Elect'n—July, 1903.

Series-Parallel.—The Series-Parallel Railway Controller. W. A. Pearson. Read before the Am. Ry., Mech., & Elec. Assn. Reviews the development of the series-parallel controller for street-car service, and describes the methods of making the series to parallel change. 2500 w. St Ry Jour—Sept. 30, 1905.

Single-Phase.—Single-Phase Alternating-Current Car Control. R. P. Jackson. Illustrated detailed description of a system of control adapted for the operation of cars or locomotives of any size. 1600 w. Elec Jour—Sept., 1905.

See also **ELECTRIC MOTOR; ELECTRIC RAILWAY; INDUCTION REGULATOR.**

CONVERTER.

See **BESSEMER PROCESS; COPPER METALLURGY; ELECTRIC CURRENT CONVERTER; IRON METALLURGY; STEEL CASTING; STEEL METALLURGY.**

CONVEYING MACHINERY.

See **CONVEYOR; EXCAVATING MACHINERY; MECHANICAL HANDLING.**

CONVEYOR.

See also **BLAST FURNACE—Charging Apparatus; CABLEWAY; COAL HANDLING; HOIST; COKE HANDLING; IRON ORE HANDLING; MECHANICAL HANDLING; TELPHERAGE.**

Recent Developments in Conveying Machinery. A. Little. Abstract of a paper read before the Birmingham Assn. of Mech. Engrs. Describes briefly installations showing the progress made. 2700 w. Prac Engr—Nov. 13, 1903.

Aerial.—See **CABLEWAY; COAL HANDLING—Aerial Tramway.**

Bag.—A Successful Bag-Conveying System. Illustrated description of a plant in Milton, Mass. 1000 w. Eng News—Jan. 30, 1902.

Belt.—See **Chain Belt; Loose Material; COAL HANDLING.**

Belt, Transvaal.—The Belt Conveyor as an Elevator. An explanation of the use made of belt conveyors in the Transvaal, giving information in regard to efficiency, horse-power, &c. 2000 w. Engr, Lond—Jan. 13, 1905.

Blackett.—See **COAL HANDLING.**

Breslau Harbor.—See **MECHANICAL HANDLING.**

Brown.—Rapid Transit of Material. Day Allen Willey. Illustrated description of various processes of the Brown hoist, explaining their merits. 2000 w. Sci Am—July 5, 1902.

Brown Coal.—A Cableway for Conveying Waste Material to the Dump Pile (Ueber die Aufstellung eines Seilbahnkrahnes zum Transporte des Tauben Materiales auf die Holde). Hans Haberfelner. An illustrated description of a Brown conveying plant at the surface of a brown coal mine at Fohnsdorf, Austria. 1 plate. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 3, 1902.

Bucket.—See **Loose Material.**

Cable.—See **CABLEWAY; COAL HANDLING—Electric.**

Chain-Belt.—Chain-Belt Conveyors for Wood-Working Plants. Illustrates and describes two special forms of conveyors for the handling of materials. 600 w. Eng News—Aug. 8, 1901.

Cinder Pit.—Cinder Pit Conveyor. An illustrated description of a device that has proved a great money-saver. 500 w. Ry Mas Mech—Feb., 1902.

Coal and Ash.—Coal and Ash Conveying Gear. R. A. Chattock. Read before the Incor. Munic. Elec. Assn., Glasgow. Describes the conveying apparatus most in use, pointing out their advantages and defects. 3000 w. Elec Rev, Lond—July 12, 1901.

Coal and Ash Conveying Gear. R. A. Chattock. Describes conveying apparatus most in use, pointing out their advantages and defects. 3000 w. Ir & Coal Trds Rev—March 28, 1902.

Coal-Conveying Plant at a Manchester Power Station. Illustrated description of the coal and ash-handling arrangements. 1000 w. Engr, Lond—Oct. 7, 1904.

Coal and Ash Conveying Machinery for Power Plants. Brief illustrated descriptions of many types. 10200 w. Engr, U S A—Jan. 1, 1905. (Special.)

See also **COAL HANDLING; MECHANICAL HANDLING.**

Coal, Paris.—See **COAL HANDLING—Paris Gas Works.**

Coke.—See **COKE HANDLING; GAS RETORT—Charging, Ipswich; Inclined vs. Horizontal; GAS WORKS—Birmingham, Eng.**

De Brouwer.—More About the "De Brouwer" Conveyor. Extracts from an article by P. Bolsius describing improvements made in this apparatus. Ill. 1500 w. Jour Gas Lgt—March 25, 1902.

Düsseldorf Exposition.—See **MECHANICAL HANDLING.**

Elba Docks.—See **IRON ORE HANDLING.**

Electric Overhead.—See **TELPHERAGE.**

Grain Elevator.—See **GRAIN ELEVATOR—Buffalo.**

Helical.—See **Screw.**

Hickman, Ky.—See **GRAIN HANDLING.**

Hunt and Bradley.—See **COAL HANDLING—Germany.**

Kreiss.—See **Oscillating.**

Loose Material.—Conveying Machinery for Loose Material (Technische Hilfsmittel zur Beförderung und Lagerung von Sammelkörpern. Prof. M. Buhle. Illustrated description of bucket and belt conveyors and their performance. 2000 w. Stahl u Eisen—Sept. 15, 1905.

McCabe Electric.—Electric Freight Conveyors for Loading and Unloading Vessels. Illustrated description of the McCabe electric conveyor. 600 w. Sci Am—Dec. 15, 1900.

Metallurgical Works.—See **MECHANICAL HANDLING.**

Mine Hoist.—Underground Hoisting in Deep Level Mines. G. A. Denny. Describes briefly a scheme of utilising conveyor belts for this purpose on inclines of an angle of 20 to 23 degrees. Also discussion. 11000 w. Jour S Af Assn of Engrs—Oct., 1904.

Modern.—See **MECHANICAL HANDLING.**

Ore.—Mechanical Conveyors. Walter Renton Ingalls. Deals with the use of conveyors for the transportation of ore and other mineral substances. Serial. 1st part. 2500 w. Eng & Min Jour—April 21, 1904.

Oscillating.—The Kreiss Oscillating Conveyor (Die Kreiss Schwinge-Förder-Rinne). Prof. M. Buhle. Illustrating and describing a form of trough conveyor mounted on springs, and given an oscillating movement which cause the material to travel continuously in one direction. 1600 w. Glückauf—July 16, 1904.

A Vibrating Conveyor System (Propellerrinnen und Wurfgetriebe). H. Marcus. An illustrated description of a device for conveying coal, grain and similar materials in a vibrating open trough operated by a quick return crank movement. 3000 w. Zeitschr d Ver Deutscher Ing.—Nov. 29, 1902.

Pig Iron.—See **CASTING MACHINE.**

Power House.—Conveyors in Modern British Power Houses. Arch. J. S. B. Little. Describes improved methods of transporting materials in large power houses. Ill. 2000 w. St Ry Jour—Jan. 2, 1904.

Ramsay.—See **CASTING MACHINE.**

Robins.—See **Belt; COAL HANDLING—N. Y. Interborough.**

Screw.—Computations for Screw Conveyors (Calculs Relatifs aux Transports par vis d'Archimède). J. E. Delliac. With practical examples, showing the transporting capacity of helical screw conveyors, for various dimensions and speeds. 1200 w. Revue Technique—Dec. 25, 1902.

A 650-foot Screw Conveyor (Transport par Hélices à 200 Mètres de Distance). An illustrated description of a helical conveyor, worked in sections by a steel cable, for transporting the pressed material from a beet-sugar factory to canal boats or wagons. 1000 w. Génie Civil—May 30, 1903.

Slag.—A New Cupola Slag Conveyor. Thomas D. West. Brief illustrated description. 300 w. Jour Am Found Assn—June, 1903.

Sugar Factory.—See **Screw.**

Water.—Improved Pipe and Mixer System for Water Conveyors (Neue Konstruktionen für die Anlage von Rohrleitungen und Mischtrichtern beim Spülversatzverfahren). Details of pipes, connections, hoppers, etc., for use in conveying ashes and débris by water. 1200 d. Glückauf—Feb. 11, 1905.

The Waste Conveying Plant of the Schedewitz Coal Company at Zwickau, in Saxony (Das Spülversatzverfahren beim Erzgebirgischen Steinkohlen-Aktienverein in Schedewitz bei Zwickau in Sachsen). H. Jobst. Illustrating and describing the use of conveyor bands and water jets for carrying débris, ashes, etc. Two articles. 6000 w. Glückauf—Jan. 28, Feb. 4, 1905.

COOLING.

See also **COLD STORAGE; REFRIGERATION.**

Air. — See **AIR COOLING; AUTOMOBILE, GASOLINE; CONDENSER.**

Closed Rooms.—The Cooling-Off and Heating of

Closed Spaces (Ueber Abkühlung und Erwärmung geschlossener Räume). Dr. G. Recknagel. A theoretical, mathematical article. This part discusses the loss of heat from closed rooms, taking into account interior and external temperatures, fall of temperature in the walls, etc. 6000 w. eltschr d Ver Deutschr Ing—Dec. 21, 1901.
See also **HEAT TRANSMISSION—Building Materials.**

N. Y. Stock Exchange.—Cooling the New York Stock Exchange. Illustrates and describes a system by which a continuous supply of fresh air is cooled and dried by apparatus of 450 tons refrigerating capacity. 2700 w. Met Work—Aug, 5. 1905.

Theatre, Cologne.—Cooling Plant in Cologne Theater. Joseph Musmacher. Describes the refrigerating plant in a new city theater in Germany, in which heating, cooling and ventilating are all through the same conduits. Ills. 2400 w. Ice & Refrig—May, 1904.

COOLING TOWER.

See also **CONDENSER.**

Commercial Forms of Cooling Tower. C. W. Obert. Illustrated descriptions of various types. 3000 w. Am Elect'n—Oct., 1901.

Water Cooling Towers. B. Franklin Hart, Jr. Explains the use of cooling towers and the principle upon which they operate. 2000 w. Am Elect'n—Oct., 1901.

Devices for Cooling Condensing Water (Rückkühlwerke). Otto H. Mueller. A description of various forms of cooling towers and other devices for extracting the heat from condensing water in order that it may be used again. Serial. Part I. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 7, 1905.

Atlanta, Ga.—Cooling Tower and Condensing Equipment in an Atlanta Plant. Illustrations and description of a cooling tower installation designed to handle 260,000 gallons of water per hour, and a condensing equipment, including a beam-type quadruple expansion pump. 1700 w. Eng Rec—July 9, 1904.

Balcke.—See **CONDENSER—Pribram Mines.**

Burbach Iron Works.—See **CONDENSER.**

Düsseldorf Exposition.—See **CONDENSER.**

Electric Station.—The Modern Power House, Including the Use of Cooling Towers for Condensing Purposes. J. H. Vail. Calls attention to improvements aiming at economy which may with advantage be introduced. 2500 w. St Ry Rev—Oct. 12, 1901.

Notes on the Construction and Operation of Cooling Towers. J. R. Bibbins. Description and tests of an experimental tower, for cooling circulating water in a steam power plant, recently put into service by the Edison Illuminating Co., of Detroit, with opinions on questions of design. 3000 w. Eng News—March 20, 1902.

Klein.—The Klein Water-Cooling Tower. (Réfrigérants à Cheminée, Système Klein). An illustrated description of these cooling towers for condenser water, built entirely of wood. 800 w. Génie Civil—March 23, 1901.

See also **CONDENSER—Saarbruck.**

Longton, Staffordshire.—See **CONDENSER.**

Oil Removal.—Positive Steam and Oil Separating and Water Cooling Towers. Francis H. Boyer. Read at meeting of the New England Cotton Mfrs. Assn. Illustrates and describes a method of reclaiming water from exhaust steam in almost absolute purity and removing the oil. 1500 w. Power—Oct., 1901.

Cooling Towers and the Removal of Oil from Exhaust Steam. A description of a plant reclaiming water in a nearly pure condition, read by F. H. Boyer, before the New England Cotton Mfrs. Assn. 1000 w. Eng Rec—April 27, 1901.
See also **FEED WATER PURIFICATION; OIL SEPARATOR.**

Zschocke.—The Zschocke Cooling Tower for Condensing Water. An illustrated description of a tower erected at the station of the Birkenhead Corporation Electric Tramways, which works very successfully. 800 w. Engng—May 10, 1901.

CO-OPERATION.

See **LABOR; WORKS MANAGEMENT.**

COOPER-HEWITT LAMP.

See **MERCURY VAPOR LAMP.**

COPING.

Concrete.—Some Hints on Making Concrete Coping. Indicates how good looking and yet inexpensive concrete coping may be made. 800 w. Eng News—July 9, 1903.

COPPER.

See also **ALLOY; COPPER ALLOY; COPPER ASSAY; COPPER CASTING; COPPER METALLURGY; MINERAL REGION; MINING INDUSTRY; ORE DEPOSIT.**

Alaska.—The Copper Deposits of the White, Tanana, and Copper River Regions of Alaska. Alfred H. Brooks. From the reports of the U. S. Geol. Survey, describing these regions and giving maps, and general information. 1200 w. Eng & Min Jour—July 5, 1902.

The Copper River Country. Alaska. W. R. Abercrombie. An interesting account of exploration work in this region. Ills. Serial. 1st part. 7500 w. Jour Fr Inst—Oct., 1904.

Central Copper Region, Alaska. Information from the report of Walter C. Mendenhall concerning this interesting region. 800 w. Min Wld—Sept. 30, 1905.
See also Yukon.

Alloys.—See **ALLOY; BRASS; BRONZE; COPPER ALLOY.**

America.—Copper Mining in the United States. Waldon Fawcett. Historical review of the development of this industry, the progress and improvement of methods and facilities, briefly describing the equipment of the Calumet and Hecla Mine, as an example of present practice. Ill. 1700 w. Am Mfr—Jan. 24, 1901.

Copper Mining in America. Waldon Fawcett. A review of the rapid development of this industry, the improvement in methods and facilities for mining, etc. Ill. 1600 w. Sci Am—June 8, 1901.

American Copper Production. Editorial discussing the copper districts of the United States and the production for 1901, with some of the causes affecting it. 1700 w. Engng—March 7, 1902.

The American Copper Industry. Horace J. Stevens. A review of the past year, the production, prices, etc. 2500 w. Ir Age—Jan. 7, 1904.

Occurrence and Distribution of Copper in the United States. Walter Harvey Weed. An illustrated article giving information in regard to the location, value, and production of the deposits. Maps. 2800 w. Min Mag—Sept., 1904.

The American Copper Trade. Horace J. Stevens. Information concerning the sources of supply, the features of individual mines, foreign trade, etc. 3000 w. Ir Age—Jan. 5. 1905.

Anaconda.—See **Montana; COPPER METALLURGY.**

Ancient Miners.—Ancient Miners of Lake Superior. Information concerning the traces of a race which antedates the memory of the Indians, and of their workings, and their familiarity with the copper deposits. 3800 w. Marine Rev—March 14, 1901.

Arizona.—The Copper Queen. Leslie Gillett, in the "Arizona Republican." Describes these mines of copper-bearing iron ore, methods of mining, etc. 1700 w. Min Rept—July 18, 1901.

The Verde Mining District, Arizona. John Jewett. Reviews the situation and prospects of the copper mines of this district. Ill. 2000 w. Eng & Min Jour—Aug. 10, 1901.

The Verde Mining District. Yavapai County, Arizona. Illustrated description of this famous copper mining district. 1300 w. Min & Sci Pr—Jan. 31, 1903.

Arizona Copper. Joseph Hyde Pratt. An illustrated article. Part first deals with the general occurrences. Serial. 1st part. 2500 w. Min & Met—Sept. 1, 1901.

The Geology and Copper-Deposits of Bisbee, Arizona. F. L. Ransome. Abstract of an official report of a detailed geological study of this region. Ill. 7500 w. Trans Am Inst of Min Engrs—Feb., 1903.

Developments Near Bisbee, Arizona. D. E. Woodbridge. Report of this valuable copper district. 1200 w. Eng & Min Jour—Feb. 7, 1903.

The Copper Deposits of Bisbee, Arizona. F. L. Ransome. A preliminary outline published by permission of the Director of the U. S. Geol. Survey. Considers the early history, geological features, character of ores, their origin, etc. Ill. 2200 w. Eng & Min Jour—March 21, 1903.

Copper Deposits of Bisbee, Arizona. Condensed from Ransome's contribution to U. S. Geol. Survey. Describes the geology of the district and occurrence of ores. 1500 w. Min Rept—Oct. 1, 1903.

The Ore Deposits of Bisbee, Arizona. F. L. Ransome. Information in regard to these mines, which produce principally copper. Serial. 1st part. 2200 w. Min & Sci Pr—July 16, 1904.

Notes on the Bisbee District, Arizona. Dwight E. Woodbridge. Account of copper mines and companies. 2000 w. Eng & Min Jour—Aug. 25, 1904.

The Warren District, Arizona. An illustrated article describing recent developments which have made Bisbee one of the largest copper mining camps in the United States, and giving information in regard to the deposits. 2500 w. Eng & Min Jour—Oct. 6, 1904.

The Copper Deposits of Clifton, Arizona. Waldemar Lindgren. Describes the topography, geology, structure, ore deposits, and fissure veins. Ill. 2800 w. Eng & Min Jour—May 9, 1903.

Copper Deposits at Clifton, Arizona. From Waldemar Lindgren's contribution to the United States geological survey. Describes the geological features and the deposits. 2500 w. Min Rept—Dec. 31, 1903.

The Clifton District, Arizona. An illustrated report of this district which has an output of about 60,000,000 lb. of copper a year. 2200 w. Eng & Min Jour—April 28, 1904.

The Mines of Clifton District, Graham Co., Arizona. General description of copper mines, with illustrations of smelting plants. 1000 w. Min & Sci Pr—Aug. 13, 1904.

The Genesis of the Copper-Deposits of Clifton-Morenci, Arizona. Waldemar Lindgren. A résumé of some of the conclusions reached during a study of the copper-deposits near Clifton. 14000 w. Trans Am Inst of Min Engrs—Sept., 1904.

The Shannon Copper Mine and Other Properties. T. F. Swanwick. Illustrations and description of the mines in the Clifton region. 2500 w. Pacific C Min—July 4, 1903.

The Copper-Deposits of the Kaibab Plateau, Arizona. E. P. Jennings. Describes the formation of the plateau, the ores, deposits, etc. 1000 w. Trans Am Inst of Min Engrs—Oct., 1903.

Faulting in the Globe District. Frederick Leslie Ransome. Abstracted from "The Geology of the Globe Copper District, Arizona." Illustrates and describes this faulted region. 1700 w. Eng & Min Jour—May 19, 1904.

Notes on Geology of Mineral Creek District, Pinal County, Arizona. F. A. Gowing. Describes the topography, giving geologic facts, and describing copper and lead deposits. 3000 w. Min Rept—May 19, 1904.

Southwestern Copper Developments. Dwight E. Woodbridge. A summary of the leading camps of Arizona and Northwestern Sonora, and a discussion of the future outlook. 5000 w. Ir Age—June 2, 1904.

The Phelps-Dodge Copper Interests. Dwight E. Woodbridge. Information of interest in regard to the Copper-Queen and other property. 3500 w. Ir Age—June 23, 1904.

The Planet Copper Mines. H. L. McCarn. A section of the Planet gulch and hill in Arizona, with description of the iron and copper deposits. 1500 w. Eng & Min Jour—July 7, 1904.

The Silverbell Mountains, Arizona. W. G. Barney. Describes this region brought into notice by the recent building of the Arizona Southern R. R., and the copper deposits being developed. 1300 w. Eng & Min Jour—Nov. 10, 1904.

The United Verde Copper Mine. Dwight E. Woodbridge. An illustrated description of this valuable property in Central Arizona. 2000 w. Ir Age—Jan. 12, 1905.

The Globe District of Arizona. Brief illustrated description of an interesting copper district. 800 w. Min & Sci Pr—April 15, 1905.

Geology of the Cochise Mining District, Arizona. Robert P. Franke. Illustrated description of this copper district and its ores. 700 w. Min Rept—May 18, 1905.

In the Chiricahuas-Cochise County, Arizona. Brief description of the development of properties in Paradise Camp, recently attracting attention for the copper deposits. Ills. 1400 w. Min Rept—June 22, 1905.

See also **DRILL—Diamond; GOLD; MINERAL REGION.**

Ashio, Japan.—See **Japan.**

Assay.—See **ASSAYING; COPPER ASSAY.**

Australia.—Australian Copper Production. Concerning the production and development of the copper mines. 1500 w. Engng—April 11, 1902.

See also **New South Wales; Queensland; Victoria; Western Australia.**

Bingham, Utah.—See **Utah.**

Bisbee, Ariz.—See **Arizona.**

Bohemia.—See **SILVER GEOLOGY.**

British Columbia.—The British Columbia Copper Company's Mines. E. Jacobs. Illustrations and description of some of the work done by this company. 1800 w. Eng & Min Jour—May 18, 1901.

The Production of Copper in the Boundary District, B. C. Dr. Albert R. Ledoux. Describes the characteristics of the ore deposits, and gives costs and general information. 2500 w. Can Min Rev—April 30, 1902.

The Ore Deposits of the Boundary District, B. C. R. W. Brock. Read before the Can. Min. Inst. The district treated of occupies a foremost place in British Columbia lode mining and is one of the most important districts in Canada in the production of copper. 3500 w. B C Min Rec—May, 1902.

British Columbia—Boundary Mining District—Progress in Mining and Smelting. William M. Brewer. Illustrated description of interesting features of this district where mining and smelting are carried on at less cost than at any other place in North America. 4800 w. Eng & Min Jour—May 3, 1902.

The Ore Deposits of the Boundary (Creek) District, B. C. R. W. Brock. Describes the geology of the region very briefly, discussing the low-grade copper-bearing sulphide deposits, the oxydized copper veins, and the small gold and silver bearing quartz veins. 5500 w. Can Min Rev—June 30, 1902.

The Granby Mines of Phoenix, B. C. C. M. Campbell. An illustrated article describing the development and methods employed. The ores are copper, gold and silver; the chief values being in the copper pyrites. Serial. 1st part. 3600 w. B C Min Rec—Nov., 1902.

Ore Quarrying in the Boundary District, British Columbia. E. Jacobs. A well illustrated description of the open copper mines of the district, showing the great field for new methods and machinery. 4000 w. Engineering Magazine—Nov., 1903.

The British Columbia-Snowshoe Consolidation. E. Jacobs. An account of the uniting of two low-grade copper mines to the mutual interest, with description of the properties. Ill. 2000 w. Eng & Min Jour—Jan. 28, 1904.

The Granby Copper Mine. Dwight E. Woodbridge. An illustrated account of the location and special features, methods of mining, the smelter, etc. 2500 w. Ir Age—Dec. 1, 1904.

The Ore Deposits of Copper Mountain, Similkameen District, B. C. O. N. Scott. Gives a description of these ore deposits, discussing their origin, mining and treatment. 2500 w. Can Min Rev—July 31, 1902.

Copper Deposits of the Aspen Grove Camp Similkameen, British Columbia. Frank Bailey. An illustrated description of this camp, its geological features, deposits, development, etc., with an outline of its history. 1400 w. Min Rept—Feb. 23, 1905.

Mount Sicker Mining District, British Columbia. W. M. Brewer. Gives the history of these copper mines, their development, geology, treatment, etc. 3800 w. Min & Sci Pr—July 4, 1903.

Britannia Mines, Howe Sound, B. C. William M. Brewer. An account of the development of mines near Vancouver, carrying high values in copper. 4500 w. Min & Sci Pr—Dec. 17, 1904.

Copper Mountain, British Columbia. Jules Catherinet. An illustrated article dealing with the genesis of these ores and also with their alteration, based chiefly on microscopic study. 2800 w. Eng & Min Jour—Jan. 19, 1905.

Britannia Copper Syndicates, Mines and Concentrating Works at Howe Sound, B. C. E. Jacobs. Illustrates and describes the mines, concentrating plant, etc., giving the history. 7500 w. B C Min Rec—Nov., 1905.

See also **GOLD MINE; GOLD MINING—Low-Grade Ore; MINERAL REGION.**

Butte, Mont.—See Montana; GEOLOGY.

Cactus.—See Utah.

California.—The Copper Region of Northern California. J. S. Diller. Read before the Geological Soc. of Washington. An account of this region, which ranks fourth in importance in the copper-producing regions of the United States, and of its ore deposits. 2500 w. Eng & Min Jour—June 21, 1902.

Copper in Northern California. J. S. Diller. Describes this copper region which is growing in importance. Serial. 1st part. 1100 w. Min & Sci Pr—Aug. 2, 1902.

The Greenback Copper Mine, Kern County, California. H. W. Turner. A description of this lode. 1100 w. Eng & Min Jour—Oct. 25, 1902.

The Copper Mines of Shasta County, Cal. Dwight E. Woodbridge. An interesting account of mines which have yielded nearly $30,000,000 worth of copper, and over half the silver mined in California. 2800 w. Ir Age—Aug. 11, 1904.

Cananea, Mexico.—See Mexico; COPPER METALLURGY.

Cape Colony, S. A.—See South Africa.

Caucasia.—The Trans-Caucasus Copper Industry. Concerning the deposits and why the copper smelting works are so few in number. Also general information. 800 w. Engr, Lond—Feb. 7, 1902.

The Kedabeg Copper Mines. Gustav Köller. Gives location, history and description of these mines, situated in Elisabetpol, Transcaucasia, the methods of working, treatment, etc. Ills. 13700 w. Inst of Min & Met—May 18 1905.

The Copper Industry of the Trans-Caucasus. Gives the more important deposits so far investigated. The information is from a recent Russian report. 700 w. Engng—Aug. 4, 1905.

Chile.—A Curious Copper Deposit in Chile. J. A. W. Murdoch. Illustrated description of a deposit in the Desert of Atacama, over 7,400 ft. above sea level. 900 w.. Engng & Min Jour—May 11, 1901.

A Curious Copper Deposit. Arthur Lakes. Abstract from a paper by J. A. W. Murdoch, describing low-grade ore worked at a profit without capital in a waterless district; and also the perfect preservation of a human body by impregnation of copper salts, probably as old as 1600 A. D. 700 w. Min Rept—May 26, 1904.

See also **CHILE; MINERAL REGION.**

Clifton, Ariz.—See Arizona.

Colorado.—Copper Mining in the Encampment Wyoming, and Pearl, Colorado, Districts. Thomas T. Read. Considers these districts on the Wyoming-Colorado boundary, describing the development. 800 w. Min Rept—Nov. 3, 1904.

See also **SILVER.**

Colorado Caves.—See SILVER.

Conductivity.—See ELECTRIC CONDUCTIVITY.

Copper-Queen.—See Arizona.

Corrosion.—See METAL CORROSION—Sea Water.

Crystals on Mine Timbers.—See New Zealand.

Cuba.—The Copper Mines of Santa Clara Province, Cuba. T. Weyland Vaughan. Describes the mines and the general geology, giving also an outline of the topographical features. Ill. 3700 w. Eng & Min Jour—Dec. 21, 1901.

El Cobre Copper Mines, Santiago de Cuba. A. E. Heighway. A brief account of the history and present development of these mines which produced $48,000,000 during a period of 18 years. Ill. 1000 w. Eng & Min Jour—Feb. 7, 1903.

Copper Mines Near Havana, Cuba. Walter Harvey Weed. Brief description of the Minas district, with illustration. 1500 w. Eng & Min Jour—Jan. 26, 1905.

Diseases.—See IRON.

Electric Conductivity.—See ELECTRIC CONDUCTIVITY.

Engineering Practice.—Some Applications of Copper in Engineering Practice. W. Ed. Storey. Abstract of a paper read before the Manchester Assn. of Engrs. Discusses the qualities most desirable in engineer's work, studying the structure and considering applications and points that make for utility. 2500 w. Prac Engr—Dec. 18, 1903.

The Use of Copper in Engineering Practice. W. Ed. Storey. Abstract of a paper read before the Manchester Ass'n of Engrs. Considers the virtues and faults of copper as a material for the use of engineers. Serial. 1st part. 3800 w. Mech Engr—Feb. 20, 1904.

Garnet.—See GARNET.

Germany.—Production and Consumption of Copper in Germany. Gives expert's estimates of the yield of various countries, the uses to which the product is applied in Germany, the price, etc. 700 w. U. S. Con Repts, No. 1082—May 9, 1901.

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See also **ALLOY—Industrial.**

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Antimony.—Alloys of Copper and Antimony (Les Alliages de Cuivre et d'Antimoine). M. Baykoff. A study of the properties of these alloys when cooling rapidly and slowly, with micrographs and diagrams. 1800 w. Bull Soc d'Encour—May 31, 1903.

Arsenic.—Alloys of Copper and Arsenic. Arthur H. Hiorns. Experiments made to ascertain the exact relation between copper and arsenic in binary alloys, and the limit of proportion of arsenic that can be retained in copper in the cold solid state. Ills. 2800 w. Elec-Chem & Met—April, 1904.

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Iron.—See **ALLOY—Copper-Iron.**

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COPPER ASSAY.

See also **ASSAYING.**

The Estimation of Copper in Ores, Mattes, etc. O. H. Packer. Considers methods for the quantitative analysis of copper ores and products, especially commending and describing the aluminum strip, cyanide method. 2500 w. Elec Rev, N Y—March 14, 1903.

Some Experiences of an Analyst. Dr. J. Ohly. A report of the analysis of some copper ores, showing that the fire assay was very reliable in the three cases investigated. 1500 w. Min Rept—Jan. 5, 1905.

Calcined Ores.—The Analysis of Calcines. John P. Walker. An account of a new method of determining the chemical composition of calcined copper ores. 2000 w. Eng & Min Jour—June 9, 1904.

Commercial.—The Commercial Analysis of Copper Ore. Russell L. Dunn. Gives some interesting figures of profit and loss, and discusses the problem of profitable reduction. 3000 w. Pacific Coast Miner—May 9, 1903.

Cyanide.—The Cyanide-Assay for Copper. Harry Huntington Miller. Describes a method used in employing the cyanide-assay to make a large number of determinations of very low-grade materials whose accuracy within one or two hundredths per cent. was necessary. 1800 w. Trans Am Inst of Min Engrs—Nov., 1901.

The Cyanide Assay for Copper. Harry Huntington Miller. A discussion by Edward Keller of this paper which was presented at the Mexican meeting. 9000 w. Trans Am Inst of Min Engrs—Nov., 1901.

Improvements in the Cyanide Assay for Copper. Thorn Smith. Describes the methods now used by the writer, which he considers "the best by far of the volumetric methods." 1200 w. Eng & Min Jour—Oct. 17, 1903.

The Double Cyanides of Copper. Leonard M. Green. Explains tests for determining the cupric and cuprous-potassium cyanides. 900 w. Eng & Min Jour—Nov. 18, 1905.

Notes on Technical Determination of Copper by the Cyanide Method. Irving Miller. Gives a few of the practical details of manipulation in connection with the cyanide assay of copper ores and products. 1200 w. Cal Jour of Tech—Dec., 1905.

Electrolytic.—The Electrolytic Determination of Copper. Thorn Smith. A description of a laboratory method of electrolytic assay. 1700 w. Eng & Min Jour—May 25, 1901.

The Electrolytic Assay of Lead and Copper. George A. Guess. An illustrated description of the writer's method. 1500 w. Am Inst of Min Engrs—Nov., 1905.

See also **COPPER ALLOY—Muntz's Metal.**

Iodimetric.—The Copper Assay by the Iodide Method. Albert H. Low. From the "Jour. Am. Chem. Soc." A description of the assay as now carried out, improvement in details leaving little to be desired on the score of accuracy. 1800 w. Eng & Min Jour—Dec. 27, 1902.

The Iodimetric Determination of Copper. Andrew M. Fairlie. Describes a method which claims to have eliminated all the objectionable features of the precipitation by aluminum. 1400 w. Eng & Min Jour—Nov. 17, 1904.

A Modification of the Iodide Method for the Determination of Copper. J. H. Burfeind. Gives a general description of the method suitable for all ores and furnace materials under all conditions. 1600 w. Min Rept—Dec. 15, 1904.

The Iodimetric Determination of Copper. T. Brown, Jr. A discussion of the methods used. 1400 w. Eng Min Jour—June 8, 1905.

Litharge.—The Litharge Process of Assaying Copper-Bearing Ores and Products, and the Method of Calculating Charges. Walter G. Perkins. Describes this method which has been severely tested and has never failed hitherto, in the assay of any ore or product to which it has been applied, though it may not be universally applicable. 1600 w. Trans Am Inst of Min Engrs—Nov., 1901.

Slag.—Report on a Co-operative Chemical Analysis of a Copper Slag. Thorn Smith. Gives the methods of analysis and results, discussing them in detail. 4500 w. Eng & Min Jour—Feb. 21, 1903.

A Co-operative Analysis of a Copper Slag. Thorn Smith. A report showing the need of better chemical work by practical demonstration. Serial. 1st part. 4000 w. Elec-Chem & Met Ind—Nov., 1905.

Volumetric.—The Volumetric Estimation of Copper as the Oxalate, with Separation from Cadmium, Arsenic, Tin and Zinc. Charles A. Peters. Shows that moderate amounts of copper may be determined quantitatively as the oxalate by precipitation with oxalic acid and titration of the precipitate by potassium permanganate, and also that moderate amounts may be separated from other metals in the presence of nitric acid, by the addition of oxalic acid. 2500 w. Am Jour of Sci—Nov., 1900.

Volumetric Estimation of Copper. Describes a method by which copper may be determined in its ores and metallurgic products in the shortest time and with the greatest accuracy possible. 1300 w. Aust Min Stand—Oct. 31, 1901.

A New Volumetric Method for Copper and the Ores of Copper. Alfred Adair. The method is based on the precipitation of sub-sulphocyanide of copper from its solutions under conditions which have been found to give constant results. 2000 w. Jour Chem, Met & Min Soc of S. Africa—Dec., 1905.

COPPER CASTING.

Making Sand Castings of Copper. C. Vickers. Gives methods of making copper castings solid, and the effect of various alloys. 1200 w. Am Mach—Jan. 24, 1901.

Copper Castings. Walter J. May. Directions for casting sound castings of this metal. 800 w. Prac Engr—March 15, 1901.

COPPER METALLURGY.

See also **COPPER; COPPER CASTING; MAGNETIC SEPARATION; METALLURGY; ORE TREATMENT; SMELTING; WIRE.**

Reduction of Copper Ores in Mexico, Chile, Canada, and Other Countries. Brief notes describing the treatment. 1300 w. U S Cons Repts, No. 1084—July 11, 1901.

The Wet Process and Cementation in the Metallurgy of Copper (La Metallurgie du Cuivre par Voie Humide et la Cementation). Paul Chalon. A review of copper metallurgical methods. 4000 w. Rev Univ d Mines—Feb., 1902.

The Chemistry and Metallurgy of Copper. Charles D. Palmer. The first of a series of papers. The present number considers the meaning of the word metal, and its two lines of properties, the physical and the chemical. Serial. 1st part. 4000 w. Eng & Min Jour—Oct. 20, 1904.

Metallurgy of Copper. Horace J. Stevens. An interesting discussion of the methods of copper refining. 5500 w. Ores & Metals—April 15, 1905.

Ammonia Cyanidation.—See **CYANIDE PROCESS—Copper, Ammonia.**

Anaconda.—Anaconda Copper Mining Company's New Reduction Works. An illustrated description of recently completed works, which are probably the largest, most complete and up-to-date of any of their kind. 4000 w. Eng & Min Jour—March 1, 1902.

Reverberatory Furnaces for Smelting Copper. E. P. Mathewson. Brief illustratied description of the plant of the Washoe Copper Co. at Anaconda, Mont. 1100 w. Eng & Min Jour—Aug. 1, 1903.

Method of Concentrating at Anaconda. M. Schwerin. Descries the method, the object being to produce a concentrate with a greater percentage of copper and iron and less silica than the crude ore. 2000 w. Eng & Min Jour—Sept. 12, 1903.

The New Flues and Stack at Anaconda. An illustrated description of new reduction works of the Washoe Copper Company, built to overcome trouble caused by smoke. 2200 w. Eng & Min Jour—Dec. 24, 1903.

The Casual Observer at Anaconda. Charles S. Palmer. Illustrated brief description of this copper reduction plant, the largest in the world—The Washoe smelter. 2500 w. Eng & Min Jour—Sept. 22, 1904.

Some Notes on the Electrolytic Refining of Copper at Anaconda, Montana. E. C. Sickles. Description and general information of one of the most economical and complete electrolytic plants. Ills. 1400 w. Sib Jour of Engng—Oct., 1904.

The Washoe Reduction Works. An illustrated description of the concentrator at the plant of the Anaconda Copper Mining Co. at Anaconda, Montana. 1800 w. Mines & Min—Dec., 1904.

Washoe Reduction Works, Anaconda, Montana. Illustrated detailed description of the most extensive plant of its kind in the world, treating about 5500 tons of ore in 24 hours. 3800 w. Min Wld—Dec. 24, 1904.

The Metallurgy of Copper at Anaconda, Montana. A. P. Mallon. Outlines the rather complicated treatment of the ore, tracing its changes from the concentrator to the shipping from the refinery. 1500 w. Min & Sci Pr—May 20, 1905.

See also **Butte.**

Argo, Colo.—Improved Method of Slag-Treatment at Argo. Harold V. Pearce. Describes the improved copper smelting practice at this plant in Colorado. Ills. 2800 w. Am Inst of Min Engrs—May, 1905.

Arizona.—Concentrating Methods at the Arizona Copper Company, Clifton, Arizona. A. Morrison. An illustrated article describing the methods. 900 w. Min Rept—July 6, 1905.

See also **Low Grade Ores.**

Arlington, N. J.—The Extraction Plant of the Arlington Copper Company. A. Von Zwaluwenberg. Briefly describes the method of treating the ore at Arlington, N. J. 600 w. Eng & Min Jour—May 25, 1901.

Arsenic, Antimony and Bismuth.—The Elimination of Arsenic, Antimony and Bismuth from Copper. Allan Gibb. A study of the elimination effected in the various metallurgical operations. 4800 w. Trans. Am Inst of Min Engrs—Oct., 1902.

Australia.—English and Australian Copper Co. Donald Clark. Describes the works, processes and ores dealt with by this company. Serial. 1st part. 2000 w. Aust Min Stand—April 7, 1904.

Austria.—See **Spain and Austria.**

Balbach Works.—See **Electrolytic, Newark, N. J.**

Bessemer.—Relative Elimination of Impurities in Bessemerizing Copper-Matte. Allan Gibb. Discussion of the paper of W. Randolph Van Liew. 1700 w. Trans Am Inst of Min Engrs—Oct., 1903.

Relative Elimination of the Impurities in Bessemerising Copper-Matte. W. Randolph Van Liew. Gives results obtained in determining the relative rate and in finding the point where different impurities are eliminated. 700 w. Trans Am Inst. of Min Engrs—October, 1903.

Smelting Copper by the Converter Process (Die Kupfergewinnung mit Hilfe des Konverter-Prozesses). Gustav Kroupa. A review of the experience with the converter in copper smelting, with an examination of the chemical reactions. Two articles. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 12, 19, 1903.

Bessemer Copper Converters. C. H. Glasser. Refers to the trough or barrel type of converter, discussing its advantages and disadvantages, stating the objections to the hydraulic systems that have developed in actual practice, and presenting supposed advantages by substituting the electric for the hydraulic equipment. 3500 w. Eng & Min Jour—March 17, 1904.

See also **David; Rio Tinto.**

Blast Furnace.—Some Notes on High Blast Furnace Duties. Herbert Lang. Comments on the work done in copper smelting by Messrs. Heywood and Johnson. 3300 w. Eng & Min Jour—Nov. 8, 1902.

Blast Furnace Dimensions.—Width of Furnace Relative to Tonnage in Copper Matte Blast Furnace Practice. W. Randolph Van Liew. Reports results of a five days' trial and compares with other reports relating to furnaces of different widths, favoring the narrower furnace. 2200 w. Eng & Min Jour—March 21, 1903.

British Columbia.—The British Columbia Copper Company's Smelting Works at Greenwood. B. C. Paul Johnson. Illustrated detailed description. 1800 w. Eng & Min Jour—Feb. 16, 1901.

Copper Smelting in British Columbia. A. B. W. Hodges. An illustrated review of the operations of the Granby smelter and proposed improvements. 1800 w. Can Min Rev—June 30, 1901.

Metallurgical Progress in the Boundary District. W. A. Harkin. Describes the Granby Works, the largest copper smelting works in Canada. 2500 w. B C Min Rec—April, 1902.

Butte, Montana.—Copper Precipitation Plants at Butte. An account of the commercial extraction of copper from mine and tailings seepage waters by the use of scrap iron and tin as precipitants. 2000 w. Min Rept—Dec. 21, 1905.

See also **Anaconda.**

California.—See also **Small Works.**

Canadian Co.—The Canadian Copper Company's Plant at Copper Cliff. An illustrated description of a 1,000-ton smelter, stating the conditions to be met. 1500 w. Eng and Min Jour—Dec. 31, 1903.

See also **Orford, Bayonne.**

Cananea.—Method of Concentrating at La Cananea. Martin Schwerin. Describes the concentrating plant of the Greene Consolidated Copper Co. in Mexico, designed for a capacity of 600 tons per day. 1500 w. Eng & Min Jour—Sept. 26, 1903.

Concentrating Methods at La Cananea, Sonora, Mexico. D. Cole. Describes the plant and the flow of material in a single section of concentrator. Copper. Ills. 1200 w. Min Rept—April 14, 1904.

Ore Dressing at Cananea. Dwight E. Woodbridge. Describes the new concentration mill of the Greene Consolidated Copper Company, the ores, and the methods used. Ills. 1200 w. Eng & Min Jour—June 30, 1904.

Collins.—New Methods for the Extraction of Copper and Zinc. Dr. J. Ohly. Describes the process recently invented by C. G. Collins, employing the "nitre cake" and the process invented by Nicolas Leblanc employing the "salt-cake." 2700 w. Min & Sci Pr—Dec. 29, 1900.

Converter.—See **Bessemer; David; Rio Tinto.**

Cyanide Method.—See **CYANIDE PROCESS—Copper Ores.**

David.—The David Copper Process. Illustrates and describes a special converter called a "selector," explaining the principle and manner of operating and stating the advantages of the process. 3000 w. Engng—Nov. 22, 1901.

The David Selector and the Metallurgy of Copper. Illustrates and describes an invention that has brought success in the application of the Bessemer process to the metallurgy of copper. 700 w. Sci Am Sup—Jan. 25, 1902.

Copper Converters (Les Convertisseurs pour Cuivre). P. Jannetaz. An extended review of the theory and practice of converters used in copper metallurgy, with particular account of the Manhes and David system, and the "selecting" process of the latter. 1 plate. 8000 w. Mem Soc Ing Civils de France—Feb., 1902.

The Bessemer Copper Process. Describes briefly the latest method of copper converting, under the improved process of Paul David. Ill. 900 w. Sci Am—Sept. 26, 1903.

Distillation.—The Distillation of Copper (Sur la Distillation du Cuivre). Henri Moissan. A discussion of the volatilization of copper in the electric furnace, and the nature of the condensed vapor. 2000 w. Comptes Rendus—Nov. 27, 1905.

Doetsch Process.—Treatment of Low-Grade Copper Ores. An account of the Doetsch process used at the Rio Tinto mines in Spain. 900 w. Min Rept—Aug. 1, 1901.

Electric.—Some Notes on the Electrolytic Deposition of Copper. H. Sayer and F. S. Spiers. Discusses some of the details which affect the commercial efficiency of copper refining. Serial. 1st part. 900 w. Elec Chem & Met—April, 1901.

Notes on the Deposition of Copper from Various Electrolytes. A. A. Beadle. Gives results of a series of experiments conducted with the object of seeing what difference of structure copper deposited from various electrolytes under varying conditions showed from that deposited from the sulphate. 600 w. Elec Chem & Met—July, 1901.

Electric Copper Refining. George E. Walsh. On the processes employed and the further preparation for commercial purposes. 1800 w. Elec Rev, N. Y.—Aug. 24, 1901.

Electrolytic Refining of Copper. Illustrated description of the largest copper refining works in the world, located at Raritan, N. J. 1700 w. Sci Am—March 15, 1902.

Electrolytic Recovery of Copper from Low-Grade Ores. N. S. Keith. States the conditions and considerations applied in the planning and erecting of works for the electrolytic method of recovering copper from the ores of a mine near New York city. The article is limited to the consideration of the variety of wet method in which electrolysis is used to effect the final deposition of the copper. 3400 w. Elec Rev, N Y—March 22, 1902.

Electrolytic Recovery of Copper from Low-Grade Ores. N. S. Keith. Gives the conditions and considerations applied in the planning and erecting of works for the electrolytic method of recovering copper from the ores of a mine near New York City. 3300 w. Trans Am Inst of Elec Engrs—June & July, 1902.

Electro-Metallurgical Problems. Alec. A. Beadle. The present article considers the problems relating to copper. Serial. 1st part. 1700 w. Elec Rev, Lond—Sept. 26, 1902.

Needed Electrometallurgical Processes. The two problems referred to are a process for extracting copper from sulphide ores, and a process for treating zinc and lead ores. 900 w. Elec Rev, N Y —Oct. 25, 1902.

Electrolytic Refining of Copper. An illustrated description of the method, translated from "La Nature." 1200 w. Sci Am Sup—Dec. 6, 1902.

Progress in the Electrolytic Refining of Copper in 1902. Titus Ulke. A review, giving tables showing the electrolytic copper refineries operated during the year in the United States and in Europe. 2000 w. Eng & Min Jour—March 14, 1903.

Experiments in the Electric Smelting of Copper (Expériences Industrielles Electro-Metallurgiques pour la Fonte de Minerais de Cuivre). Ch. Vattier. Describing experiments made on a large scale in smelting copper ores by the electric furnace at Livet, near Grenoble, with data as to costs. 5000 w. Mem Soc Ing Civ de France—July, 1903.

Practical Notes on the Electro-Depositing of Copper on Iron, Carbon and Zinc. Sherard Cowper-Coles. A review of apparatus and methods used and applications made. Ill. 6500 w. Elec-Chem and Met—Nov., 1903.

The Rapid Electro Deposition of Copper (Infringement Processes). Discusses what has been accomplished by this method. 1100 w. Elec-Chem and Met—Nov., 1903.

Electrolytic Copper Refining. Wilder D. Bancroft. Abstract of a paper read at the Niagara Falls meeting of the Am. Elec. Chem. Soc. A report of tests made to determine the relation between voltage, current density and temperature for pure copper plates set definite distances apart in four solutions of compositions used in practice. Also other data. 1500 w. Eng & Min Jour—Nov. 14, 1903.

Some Notes on the Rapid Electro-Deposition of Copper. Sherard Cowper-Coles. Abstract of a paper before the Faraday Soc. Reports results of experiments on the electrolytic production of copper tubes; also considers the production of copper wire by electrolytic means. 900 w. Elec Rev, N Y—Oct. 7, 1905.

Electric Furnace for the Metallurgy of Copper. Translated from "La Nature." Brief, illustrated account of the invention of M. Imbert de Vanoy. 600 w. Sci Am Sup—Nov. 26, 1904.

The Rapid Electro-Deposition of Copper. Sherard Cowper-Coles. Read before the Faraday Soc. An illustrated discussion of the various processes tried for increasing the current desired by using mechanical means for keeping the copper from getting rough. Serial. 1st part. 2200 w. Min Jour—Aug. 5, 1905.

Treatment of Copper Ore by the Electric Furnace. Ch. Vattier. Translated from the French. An account of experiments made in the metallurgy of copper where water power is available, by substituting electricity for coke, coal or charcoal. Describes the operations and methods used. 2200 w. Min & Sci Pr—Sept. 23, 1905.

Electrolytic Copper. Lawrence Addicks. Discusses the subject of the electrolytic refining of copper, especially from the point of view of the multiple system of refining. 4000 w. Jour Fr Inst—Dec., 1905.

See also **ELECTRIC FURNACE; ELECTRO-METALLURGY.**

Electric Leakage.—Contact Resistances and Current Leakages in an Electrolytic Copper Refinery. Benjamin Magnus. Gives results of tests on tank leakges. Ill. 800 w. Elec-Chem Ind—Dec., 1903.

Electric, Newark, N. J.—The Pioneer Electrolytic Copper Refinery of the United States. An illustrated description of the works of the Balbach Smelting and Refinery Co., in Newark, N. J. 2000 w. Elec-Chem Ind—Aug., 1904.

Elmore Oil Process.—The Elmore Oil Concentration Plant. Arthur W. Sancton. Plan and description of the method and machinery used in concentrating copper ores at St. David's Mine, North Wales. 3000 w. Mines & Min—Aug., 1903.

Concentration of Low-Grade Copper Ores. W. J. Adams. Gives results obtained in a series of tests made on the concentration of copper ores by the Elmore oil process. Serial. 1st part. 1700 w. Min & Sci Pr—May 7, 1904.

England and Norway.—Reduction of Copper Ores in England and Norway. A report of the treatment of these ores as practiced in the countries named. 1400 w. U S Cons Repts, No. 1080—July 6, 1901.

Ferrous Salts.—The Reduction of Copper by Solutions of Ferrous Salts. H. O. Biddle. Abstracted from "American Chemical Journal." Describes the method of reduction. 1500 w. Min Rept—April 17, 1902.

Fire vs. Water.—Comparison of Fire with Water for Concentration. S. E. Bretherton. Claims that in copper smelting the "fire process" is driving the wet concentration process to handle only extremely siliceous ores low in values. 1200 w. Min & Sci Pr—Aug. 24, 1901.

France.—Reduction of Conper Ores in France. Report in answer to Department inquiries, concerning the treatment of low-grade copper ores. 4200 w. U S Cons Repts, No. 1081—July 8, 1901.

See also **Electric.**

Germany.—Reduction of Copper Ores in Germany. Information concerning the processes used. Illustrates and describes the dry process, the wet process, reduction and refining by electrolysis, &c. 4000 w. U S Cons Repts, No. 1079—July 5, 1901.

Gold Separation.—See **GOLD METALLURGY—Copper Separation.**

Greene Mines.—See **Cananea; COPPER—Mexico.**

Greenwood, B. C.—Metallurgical Practice at the Greenwood Smelter. Paul Johnson. From the report of the Minister of Mines, giving an account of work at the B. C. Copper Co.'s smelter. 1800 w. B C Min Rec—Sept., 1902.

Hot Blast.—Hot Blast Generation. Herbert Haas. On the use of the hot-blast stove in copper smelting, with critical discussion of various types, and illustrated description of the design by the author. 2500 w. Eng & Min Jour—Dec. 29, 1904.

Laboratory Refining.—A Laboratory Study of the Stages in the Refining of Copper. H. O. Hofman, C. K. Green and R. B. Yerxa. An account of investigations, with illustrations. 5000 w. Trans. Am Inst of Min Engrs—Oct., 1903.

Lake Superior.—The History of Copper Smelting in the Lake Superior Region. James B. Cooper. Abstract of a paper read before the Lake Superior Min. Inst., reviewing this industry. 1100 w. Eng & Min Jour—April 27, 1901.

Leaching.—The Leaching of Copper Ores. J. Ohly. Suggestions and facts of value in working these deposits. Serial. 1st part. 2100 w. Min & Sci Pr—Jan. 19, 1901.

Leaching Copper Ores by Sulphurous Acid. E. P. Jennings. Read before the Canadian Min. Inst. Describes the process patented in the United States by James W. Neill, suitable both for sulphide and oxidised ores, the former being first roasted to expel the sulphur and convert the copper compounds into oxides. 900 w. Can Min Rev—Feb. 28, 1901.

Some Notes on the Leaching of Oxidized Copper Ores. L. J. Charles. Reviews somewhat the history of the copper industry in the United States, the mode and place of occurrence of the ores, and the leaching. 900 w. Min Rept—Aug. 21, 1902.

The Neill Leaching Process for Copper Ores. J. H. Burfeind. Describes this process, giving information concerning the cost, a statement of advantages claimed, etc. 3000 w. Min Rept—Sept. 11, 1902.

Leaching Low-Grade Copper Ore. Considers the successful treatment by the cost process when the ores are susceptible of leaching. 3500 w. Min & Sci Pr—Sept. 12, 1903.

Leblanc.—See **Collins.**

Livet, Grenoble.—See **Electric.**

Losses.—Losses in Copper Smelting. Ronald C. Campbell-Johnston. Discusses the methods employed at Swansea, in Wales, and the modifications that have to be adopted in new countries. 1200 w. B C Min Rec—Oct., 1901.

Low Grade Ores.—Treatment of Low Grade Copper Ores. Dr. Edward Dyer Peters. Read before the Inst. of Min. Engrs., England. Enumerates and briefly considers the methods of treating these ores, with suggestions. Serial. 1st part. 1300 w. Min Rept—June 4, 1903.

A Proposed Process for Extracting Copper from Low Grade Ores. G. D. Van Arsdale. Notes on some reactions in which sulphur-dioxide is used as a precipitant of copper from sulphate solutions, and as a means of producing sulphuric acid for leaching. 1000 w. Eng & Min Jour—June 6, 1903.

A Point in Concentration. M. A. Knapp. Diagram, with explanation, of the effect of cutting out concentrates and middlings at seven different points, on a table which is handling low-grade copper ore carrying 3.1 per cent. of copper. 1700 w. Eng & Min Jour—June 20, 1903.

Concentration of Copper Ore. Frank H. Probert. An illustrated article giving results of experiments at Arizona mines, concerning the economical concentration of low grade copper ore. Serial. 1st part. 2000 w. Eng & Min Jour—June 8, 1905.

New Methods in the Metallurgical Treatment of Copper Ores. N. S. Keith. Describes a method for the utilisation of low-grade copper ores. 3500 w. Jour Fr Inst—Aug., 1905.

Magnetic Concentration.—See **MAGNETIC SEPARATION.**

Manhes.—See **David.**

Mansfeld, Germany.—Copper Smelting at Mansfeld. Translation of an article in "Metallurgie, giving an account of metallurgical operations at this great German copper mine. 1500 w. Eng & Min Jour—Aug. 11, 1904.

See also **COPPER—Germany.**

Martin's Method.—Martin's Improved Method of Manufacturing Copper by Direct Rolling with the Initial Refinery Heat. H. J. Martin. A description of this process with detailed plan of plant. 2000 w. Ir & Coal Trds Rev—Dec. 9, 1904.

Matting.—Some Personal Experience on Matting of Ores at Leadville and Robinson, Colo. Gives results obtained, with the view of counteracting some ideas prevalent concerning capacity of furnace. 1700 w. Eng & Min Jour—April 11, 1903.

Mexico.—Ancient Copper Smelting in Mexico. C. W. Pritchett. Illustrates and describes a crude copper smelting plant, showing the methods used several hundred years ago. 600 w. Eng & Min Jour—Feb. 15, 1902.

See also **Cananea; COPPER.**

Montana.—Notes on the Metallurgy of Copper of Montana. Prof. H. O. Hofman. Condensed account of past and present plants, the ores, metallurgical treatment, melting, converting copper-matte, electrolytic refining, etc. 1800 w. Trans Am Inst of Min Engrs—February, 1903.

See also **Anaconda; Butte.**

Mt. Lyell, Tasmania.—Smelting at Mt. Lyell, Tasmania. Abstracted from the report of the Secretary for Mines, Tasmania. Description, with illustration of works for smelting ores containing copper, with some silver and gold. 3200 w. Eng & Min Jour—May 30, 1903.

Neill.—See **Leaching.**

Norway.—See **England and Norway.**

Orford, Bayonne, N. J.—Improvements in Nickel-Copper Separation. Ambrose Monell describes an improvement in the method of separating nickel and copper sulphides, as practiced at the Orford works, Bayonne, N. J. 1200 w. Eng & Min Jour—Dec. 16, 1905.

Payne-Gillies.—The Payne-Gillies Process for the Treatment of Copper Ores. James Taylor. Describes a process designed to deal with cupriferous ores, concentrates and tailings in cases where smelting would be inadmissible. 1500 w. N Z Mines Rec—Feb. 16, 1903.

The Payne-Gillies Copper Process. F. Danvers Power. Describes this process which is suitable for the extraction of copper from poor ores which are too silicious for smelting purposes and which cannot be concentrated mechanically at a profit. 1200 w. Eng & Min Jour—March 3, 1904.

Pneumatic Process.—See **ORE TREATMENT.**

Potter.—The Potter Process. Donald Clark. Illustrates and describes a machine for the separation of sulphides from gangue by this process. 1400 w. Eng & Min Jour—Sept. 8, 1904.

Precipitation.—Precipitation of Copper from Its Solutions. Arthur W. Warwick. Notes on the precipitation of copper from its solution by iron. Serial. 1st part. 600 w. Min Rept—Feb. 7, 1901.

Copper Precipitation. Detailed account of the processes used in the artificial or mechanical precipitation of copper. 1800 w. Min & Met—Oct. 1, 1901.

Pyritic Smelting.—Costs and Profits in Pyritic Smelting of Low-Grade Copper Ores. F. H. Prentiss. Describes method used and gives calculations and the data on which they were based. Serial. 1st part. 1100 w. Min & Sci Pr—May 10, 1902.

Queensland.—Wet Processes of Copper Extraction. Lionel C. Ball. Brief descriptions of the different wet processes likely to be suitable for Queensland ores. Serial. 1st part. 8000 w. Queens Gov Min Jour—May 14, 1904.

Quincy Mills, Mich.—The Treatment of Copper Rock at the Quincy Mills, Hubbell, Mich. C. K. Hitchcock, Jr. Describes the rock, and the method of treatment used, which aims to reduce, as far as practicable, the loss in the tailings. Plate. 2500 w. Sch of Mines Qr—July, 1905.

Reverberatory Smelting. — Reverberatory Copper Smelting. L. J. Charles. Gives a synopsis of the reverberatory method and discusses details. Serial. 1st part. 900 w. Min Rept—Oct. 23, 1902.

Reverberatory Furnace.—See also **Anaconda.**

Rio Tinto, Spain.—New Copper Smelting Plant at Rio Tinto. Illustrations of the blast furnaces and converters, with brief description of plant. 1100 w. Ir & Coal Trds Rev—Mar 20, 1903.

Wet Methods of Extracting Copper at Rio Tinto, Spain. Charles H. Jones. Describes the methods of leaching and precipitation now used at Rio Tinto. Ills. 2700 w. Trans Am Inst of Min Engrs—Feb., 1904.

Rolling.—Improved Method of Manufacturing Copper, Yellow Metal, and Naval Brass. H. J. Martin. Describes a process consisting of the utilization of the heat, resulting from the refining operation, for the purpose of carrying out the rolling in the "breaking-down" and "drawing-on" stages, thus doing away entirely with any re-heating. 1600 w. Ir & Coal Trds Rev—Sept. 20, 1901.

Improved Method of Manufacturing Copper, Yellow Metal, and Naval Brass. H. J. Martin. Describes a new process which utilizes the heat contained in the charge for the purpose of rolling the metal in the "breaking down" and "drawing on" stages. 2500 w. Can Engr—Nov., 1902.

Sampling.—See **SAMPLING.**

St. Davids, Wales.—See **Elmore Oil Process.**

Sheets, Tube and Wire.—A New Process for the Manufacture of Copper Sheets, Tubes and Wire. Sherard Cowper-Coles. Revised paper, recently read before the Faraday Society. Illustrates and describes the various processes used to increase the current density by using mechanical means for keeping the copper from getting rough. Serial. 1st part. 1500 w. Prac Engr—Aug. 25, 1905.

Siemens.—Studies on Siemens' Process for Winning Copper. M. DeK. Thompson, Jr. Abstract of an investigation performed at the electrochemical laboratory of the Polytechnikum at Zurich. 6000 w. Elec-Chem Ind—June, 1904.

Slag.—See also **COPPER ASSAY.**

Small Works.—Small Smelting Works.—Herbert Lang. Illustrates and describes a copper smelter in Southern California, and discusses the requirements of small smelters, and related matters. 3000 w. Min Sci Pr—May 3, 1902.

Spain and Austria.—Reduction of Copper Ores in Spain and Austria. Report in answer to Department instruction concerning the treatment in the countries named. 2600 w. U. S. Cons Repts, No. 1062—July 9, 1901.

Stamp Mill.—See **STAMP MILL—Copper.**

Sulphide Ores.—Review of the Recent Progress in the Metallurgy of Copper. Stuart Croasdale. Remarks on the metallurgy of the sulphide ores of Copper. 4800 w. Pacific C Min—June 27, 1903.

Sulphur Dioxide.—See **Low-Grade Ores.**

Tennessee.—The Tennessee Copper Company's New Plant. A brief description of a plant in the Ducktown District for the development of copper ore deposits. 1000 w. Eng & Min Jour—Feb. 16, 1901.

United States.—Copper Metallurgy in the United States (La Métallurgie du Cuivre aux Etats-Unis). F. Glaizot. General account of copper production and metallurgy, with illustrations and curves. 18000 w. Mem Soc Ing Civils de France—July, 1905.

See also **LEAD METALLURGY.**

Val Verde, Ariz.—The Elimination of Arsenic, Antimony, Lead and Zinc from Copper Mattes. S. E. Bretherton. A brief description of the smelting practice at the Val Verde Copper Co.'s works, showing that it is not necessary to do any preliminary roasting, as the objectionable elements are sufficiently eliminated in blast furnace smelting. 1800 w. Min & Sci Pr—April 4, 1903.

Vancouver.—Ore-Roasting at the Tyree Copper Company's Smelter on Vancouver Island. E. Jacobs. Describes the manner of dealing with the bulk of the ore before it reaches the furnace, particularly the arrangement, appointments and operating methods of the ore-roasting yard. Ills. 1800 w. B C Min Rec—Oct., 1904.

Wire.—See **WIRE—Copper, Electrolytic.**

Ziervogel.—The Reactions of the Ziervogel Process and Their Temperature Limits. Robert Henry Bradford. Investigations of this process for extracting silver from copper mattes. 10200 w. Trans Am Inst of Min Engrs—Feb. and May, 1902.

COPPER MINE.—See **COPPER.**

COPPER MINING.—See **COPPER.**

COPPER PLATING.

Steel Parts.—Notes on Copper Plating of Steel Parts of Sights at the Naval Gun Factory. Titus Ulke. Gives briefly the data on which good practice in copper plating is based. 600 w. Am Mach—Vol. 28. No. 23.

COPPER REFINING.

See **COPPER METALLURGY.**

COPPER SMELTING.

See **COPPER METALLURGY.**

COPPERSMITHING.

Marine Practice.—Coppersmithing, with Special Reference to Marine Practice. William Weigman. Suggestions of methods producing satisfactory results. Ill. 700 w. Marine Engng—June, 1901.

COPPER WIRE.

See **COPPER METALLURGY; ELECTRIC CONDUCTIVITY; ELECTRIC CONDUCTOR; WIRE—Copper.**

CORAL.

See **MARINE DEPOSITS.**

CORE.

See **MOLDING.**

CORE BENCH.

See **MOLDING.**

CORE-MAKING MACHINE.

See **MOLDING.**

CORKSCREW MACHINE.

A Machine for Twisting Corkscrews. Joseph V. Woodworth. Illustrated description of the machine and its operation. 400 w. Am Mach—Sept. 25, 1902.

CORROSION.

See **METAL CORROSION.**

CORRUGATED METAL.

See also **BOILER.**

The Moments of Inertia and of Resistance of Corrugated Sheet Metal (Zur Berechnung der Trägheits- und Widerstandsmomente von Wellblechen). Leopold Pfeffer. Article with diagrams and tables founded on formulae due to the late Prof. R. F. Mayer, of Vienna. 1500 w. Oesterr Wochenschr f d Oeffent Baudienst—April 12, 1902.

CORT.

The Case of Henry Cort. Charles H. Morgan. On the nature of his inventions of the mechanical puddling furnace, the rolling mill, etc., their value to England and to mankind, the meagre remuneration received by him and his family, and the suitable permanent record and recognition of his services. 3300 w. Ils. Am Inst of Min Engrs—March, 1905.

CORUNDUM.

Corundum. John L. Cowan. Information as to where found, the production, varieties, preparation for market, etc. 1400 w. Engr, U S A—April 15, 1904.

Abrasive.—See **ABRASIVE—Corundum.**

Canada.—Corundum Deposits of Canada. Information concerning valuable and easily worked deposits recently discovered. 300 w. U. S. Cons Repts, No. 1102—Aug. 1, 1901.

Mining and Concentration of Corundum in Ontario. M. F. Fairlie. A description of the mining of the ore and method of concentration as at present practiced by the Canada Corundum Company, with discussion of other methods in use. 3000 w. Can Min Rev—April 30, 1902.

Montana.—Montana Corundum. Leverett S. Ropes. Brief description of the deposits. 900 w. Eng & Min Jour—Dec. 14, 1901.

North Carolina and Georgia.—Occurrence and Distribution in North Carolina and Georgia. Joseph Hyde Pratt. Abstract from Bulletin 180 of the U. S. Geol. Survey. Illustrated description of the deposits and information concerning them. 2500 w. Sci Am Sup—June 14, 1902.

COST-KEEPING.

See also **ACCOUNTING; ELECTRIC RAILWAY SHOP; MINE MANAGEMENT; RAILWAY SHOP; STREET RAILWAY MANAGEMENT; WAGES; WORKS MANAGEMENT.**

Cost Keeping: A Subject of Fundamental Importance. J. N. Gunn. A discussion of the fundamental principles essential to the establishment of a satisfactory system, with especial reference to engineering works. 3000 w. Engineering Magazine—Jan., 1901.

The Principles of Cost Accounting. F. A. Halsey. A discussion of cost systems, the importance and object. 8000 w. Sib Jour of Engng—April, 1901.

The Principles of Cost Accounting. F. A. Halsey. Lecture before the mechanical engineering students of Cornell Univ. Discusses the objects of cost accounting, the principles involved, methods, etc. Serial. 7200 w. Am Mach—June 20 and 27, 1901.

Workshop Records. A Review and Comparison of Existing Methods, with Special Reference to the Use of Cards and Files Instead of Books. George Parker. Read before the meeting in South Shields. Also discussion and 2 plates. 13400 w. Trans of N E Coast Inst of Engrs & Shipbldrs—July, 1902.

Workshop Records in Cards and Files. George Parker. Read before the Northeast Coast Inst. of Engrs. & Shipbuilders (Great Britain). Describes applications of cards for various purposes, and gives the origin of the system. 7700 w. Ir Trd Rev—May 1, 1902.

Cost Finding for Moderate-Sized Shops. Hugo Diemer. An example of the successful application of the premium system to a shop employing about 400 men in the manufacture of machine tools. 2500 w. Engineering Magazine—January, 1903.

Card Systems and Diagrams—Keeping Track of Stock—Factory Management. J. S. V. Bickford. An interesting discussion of the topics named. 2200 w. Am Mach—April 14, 1904.

The Methodical Distribution of Shop Costs. H. H. Kress. Description of a cost-keeping system in operation in a large manufacturing plant, with many forms used. Serial. 1st part. 2500 w. Ir Age—Aug. 18, 1904.

The Cost System of an Engineering Works. H. Deighton. Detailed description of a successful working system, including cost keeping, stock tracing, stores control, and general accounting. 4500 w. Engineering Magazine—April, 1905.

Bancroft.—A New Factory Cost Accounting System. Wilfred Bancroft. Describes a method devised to furnish the fullest possible information about every operation, on every piece, in a machine containing some 1,500 pieces. 3800 w. Am Mach—July 24, 1902.

Bigelow Boiler Co.—Cost-Finding Methods for Moderate Sized Shops. H. L. Arnold. The present article deals with the methods of the Bigelow Company, of New Haven, Conn., employing about 200 men in the manufacture of steam boilers. 3000 w. Engineering Magazine—Dec., 1902.

Brass Foundry.—Brass-Foundry Records and Costs. H. Deighton. General discussion, with forms for a moderate-sized foundry. 2000 w. Engineering Magazine—Oct., 1905.

Bullock Co.—See **ELECTRIC WORKS.**

Canadian Composing Co.—Cost-Finding Methods for Moderate-Sized Shops. Kenneth Falconer. A general account of the system used by the Canadian Composing Company, engaged in the manufacture of type composing machines; giving details and forms used. 2500 w. Engineering Magazine—April, 1903.

Car Repairs.—See **CAR—Repair Costs.**

Cataloging Machine Parts.—See **WORKS MANAGEMENT.**

Construction Work.—See **Contract Work.**

Contract Work.—Recording Unit Costs of Contract Work. Emile Low. Considers the keeping of such accounts very desirable, and gives experience and methods used. 1500 w. Eng News—March 26, 1903.

Cost Keeping on General Contract Work. A. W. Buel. Describing methods for use in outdoor and general construction work, showing their value in furnishing prompt and accurate information. 3500 w. Engineering Magazine—March, 1905.

Cost Keeping on General Contract Work. A. W. Buel. Mr. Buel's second paper reviews the working systems of several sucessful contractors with forms and detailed examples of their application. 3500 w. Engineering Magazine—May, 1905.

Contract Keeping in General Construction and Contract Work. A. W. Buel. The third and concluding paper discusses the elements of an improved cost-keeping system for an extensive contracting company. 3500 w. Engineering Magazine—August, 1905.

Cost Keeping in Construction and Contract Work. John P. Cowing. A description of the practical methods employed in keeping the cost accounts in bridge construction work, with forms and records. 2000 w. Engineering Magazine—Sept., 1905.

See also **Unit Costs; CONTRACT.**

Core Rooms.—Core Room Records. R. W. McDowell. On the importance of keeping accurate cost records for core rooms, explaining a method of keeping records of a radiator plant. 2000 w. Foundry—April, 1905.

Cottrell Printing Press.—Cost Finding Methods for Moderate-Sized Shops. H. L. Arnold. A description of the system in practical use at the Cottrell printing press works, Westerly, R. I. 3500 w. Engineering Magazine—February, 1903.

Duca Card System.—The "Duca" Card System. Robert Grimshaw. Gives card forms used by a German machinery manufacturer for keeping an account of office and shop items, with explanatory notes. 1900 w. Ir Trd Rev—Jan. 1, 1903.

Dynamo Manufacture.—Some Conditions Affecting the Costs of Manufacturing (Einige Erwägungen in der Frage der Selbstkostenbestimmung). S. St. Recsei. Deriving formulas and diagrams for use in determining the costs in the manufacture of dynamos. 3500 w. Zeitschr f Elektrotechnik—June 19, 1904.

Electric Plant.—See ELECTRIC PLANT—Economy.

Electric Railway Shop.—See Railway Shop; ELECTRIC RAILWAY SHOP; STREET RAILWAY MANAGEMENT.

Electric Stations.—See ELECTRIC STATION MANAGEMENT—Costs; Sherwin-Williams System.

Expense-Distribution.—The Expense Account of the Machine Shop. Horace L. Arnold. A discussion of an important element in cost keeping, showing the true method of treating indirect factory expenditures. 3500 w. Engineering Magazine—Dec., 1900.

The Proper Distribution of the Factory Expense Burden. A. Hamilton Church. The first of a series of papers dealing with this important subject, treats of the interlocking of general expense with price costs. 3500 w. Engineering Magazine—July, 1901.

The Proper Distribution of Establishment Charges. A. Hamilton Church. A comparison of the various methods of apportioning expense to work, showing the dependence of the method to the character of the work. 4000 w. Engineering Magazine—Aug., 1901.

The Proper Distribution of Establishment Charges. A. Hamilton Church. This third article discusses the scientific machine rate and the supplementary rate, and develops an accurate system. 3300 w. Engineering Magazine—Sept., 1901.

The Proper Distribution of Establishment Charges. A. Hamilton Church. The present article deals with the classification and dissection of shop charges, showing the method and its advantages. 4500 w. The Engineering Magazine—Oct., 1901.

The Proper Distribution of the Factory Expense Burden. A. Hamilton Church. Mr. Church's fifth paper is devoted to factory and mass production, and the new machine rate. 3500 w. Engineering Magazine—Nov., 1901.

The Proper Distribution of the Factory Expense Burden. A. Hamilton Church. In his sixth and closing paper, Mr. Church discusses the proper apportionment of office and selling expense, and also makes a summary of the whole series of articles. 4000 w. Engineering Magazine—Dec., 1901.

Foundry.—Foundry Accounting. J. G. Stewart. Examines in detail methods of keeping records and remarks on the importance of knowing accurately the cost of work, etc. 5000 w. Jour Am Found Assn—June, 1902.

The Recording and Interpreting of Foundry Costs. Percy Longmuir. A discussion of practical methods from the point of view of the manager; with numerous tables and diagrams. 2000 w. Engineering Magazine—September, 1902.

The Cost-Keeping Systems of an Ohio Jobbing Foundry. Outlines the system used in a foundry employing a large force of workmen on a great variety of work. 1200 w. Ir Trd Rev—Sept. 4, 1902.

Cost-Keeping in Foundries. Edward Kirk. Arguing that nothing of value is gained, and the labor really adds to the cost of castings. 2800 w. Foundry—Feb., 1903.

Foundry Accounting and Methods of Estimating Cost of Castings. O. C. Barrows. Read at meeting of the N. Eng. Found. Assn. Describes a method that has proved satisfactory. 3500 w. Ir Trd Rev—April 16, 1903.

Foundry Accounting. Kenneth Falconer. Describes a foundry "cost system" representing a part of a complete system designed for large brass works, with remarks on the subject in general. 1500 w. Am Found Assn—June, 1904.

Foundry Casting Accounts. J. Davidson. Gives forms used, with explanatory remarks. 700 w. Foundry—Sept., 1904.

Economy in Foundry Cost-Finding. Jas. C. Loughry. Read at the A. F. A. Convention, June, 1904. A brief explanation of a ledger balance system and the results obtained, with remarks. 3400 w. Foundry—Nov., 1904.

Radiator Costs. R. W. M'Dowell. An example of foundry cost accounting, explaining the system. 2300 w. Foundry—Feb., 1905.

Foundry Cost Accounts. John A. Makens. Read before the Phila. Found. Assn. Discusses the principles involved. 3500 w. Ir Age—April 13, 1905.

Cost Keeping for the Foundry. R. W. M'Dowell. Read before the Am. Found. Assn. Outlines a system of a general nature, showing the main features of foundry cost accounting. 1700 w. Ir Age—June 8, 1905.

Cost-Keeping for the Foundry. R. W. McDowell. Read before the A. F. A. Convention. Outlines a general system showing the main features of foundry cost accounting. 1400 w. Foundry—Oct., 1905.

Accounting.—An Influence Towards Lessening Costs and Increased Efficiency. Kenneth Falconer. Read at the A. F. A. convention. Suggestions for planning methods of accounting. 1200 w. Foundry—Sept., 1905.

Cost-Keeping. Dr. Edward Kirk. Does not consider the card system of much value in the foundry. 1800 w. Foundry. Sept., 1905.

See also Brass Foundry; Core Rooms; FOUNDRY—Costs.

Fraser & Chalmers.—Cost Keeping at the Chicago Works of Fraser & Chalmers. Describes a system that has been in satisfactory operation for four years. Serial. 1st part. 2200 w. Am Mach—Nov. 1, 1900.

Gillette Lecture.—Gathering Engineering Cost Data. Halbert P. Gillette. Abstracted from a lecture before the civil and mining engineering students of Columbia University. Suggestions on the methods of securing and using cost data. 4000 w. Sch of Mines Qr—July, 1904.

Graphical Analysis.—See WORKS MANAGEMENT.

Graphic System.—See Railway Shops.

Hammack.—Two Card Systems for the Shop. H. C. Hammack. Explains a card index method of keeping employees' records, and outlines a "follow up" system for manufacturers and jobbers. 2500 w. Ir Trd Rev—Feb. 4, 1904.

Inventory, Machine Shop.—Aids in Taking the Machine-Shop Inventory. Hugo Diemer. Discussing a simple method of employing a card index and showing its advantages for inventory purposes. 2500 w. Engineering Magazine—Feb., 1902.

Locomotive Repairs.—See LOCOMOTIVE SHOP—Repair Records.

Ludwig Loewe & Co.—The Cost Keeping System of Ludwig Loewe & Co., Berlin (Die Berechnung der Lohnkosten in der Fabrick von Ludwig Loewe & Co., A.-G. in Berlin). M. Chr. Elsner. Giving reproductions of the forms and the methods of using them for obtaining the flat factory cost of manufacture. 2000 w. Zeitschr d Ver Deutscher Ing—Jan. 9, 1904.

Machinery Making.—Analyzing the Cost of Machinery Making. Oberlin Smith. Considering cost keeping in the manufacture of machinery. 2800 w. Ir. Trd Rev—April 3, 1902.

Methods of Calculation in Machine Construction (Ueber Kalkulations-Methoden im Maschinenbau). Sigm. Stephan Récsei. A discussion of the fundamental methods of computing factory costs in machine building, deriving formulas, and comparing methods of wages, depreciation, inventory, etc. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 7, 14, 1903.

Mechanical Aids.—Co-operation and Mechanical Aids to Work-Shop Cost-Keeping. R. P. Link. Read before the Inst. in Sunderland. Calls attention to the method of utilising automatic machines to control the keeping of costs in shops. Also discussion. 4800 w. Trans of N E Coast Inst of Engrs & Shipbldrs—April 18, 1902. Vol. XVIII., page 311.

Co-operation and Mechanical Aids to Work-Shop Cost-Keeping. R. P. Link. Read before the Northeast Coast Inst. of Engrs & Shipbuilders, in Sunderland, Eng., April 18, 1902. Aims to show the superiority of the machine control system over the board system. 4000 w. Mech Engr—April 26, 1902.

The Electrical Tabulating Machine Applied to Cost Accounting. An illustrated article explaining the method of utilizing this machine in manufacturing establishments. 2000 w. Am Mach—July 31, 1902.

Tabulating-Machine Cost-Accounting for Factories of Diversified Product. Morrell W. Gaines. An examination of mechanical methods of analyzing and tabulating records. 4000 w. Engineering Magazine—Dec., 1905.

See also CALCULATING MACHINE.

Mine.—Principles and Methods of Profitably Working the Mine. A. G. Charleton. A discussion of office organization, cost-keeping, and records of work done, with numerous examples from actual successful practice. 6000 w. Engineering Magazine—Jan., 1901.

Mine Account Keeping and the Monthly Statement of Costs, as adapted to the Business of Metalliferous Mining. Charles V. Jenkins. Describes a thorough system of bookkeeping showing its value. 10300 w. Mines & Min—Aug., 1901.

The General Principles of Mine Accounting. E. Jacobs. A comparison of the engineering methods of mining with the corresponding business principles applicable to the recording and accounting work of the commercial side. 3000 w. Engineering Magazine—April, 1903.

A Practical System of Mine Accounting. E. Jacobs. The methods of the Le Roi, B. C., Mines, with reproduction of all the forms, blanks, book rulings, and record sheets. 3000 w. Engineering Magazine—May, 1903.

Mine Accounting. Walter M. Jeffrey. Read before the Lake Superior Min. Inst. Shows the importance of uniform systems for all mines under same ownership. 3400 w. Mines & Min—Oct., 1903.

A Card System for Mine Supply Accounts. F. W. Denton. Read before the Lake Superior Min. Inst. Describes a method by which the amount and value of supplies on hand can always be known. 1800 w. Mines & Min—Oct., 1903.

See also MINE MANAGEMENT.

Mine Supplies.—An Accounting System for Mining Supplies. W. M. Jeffrey. Read before the Lake Superior Min. Inst. Describes a system that the writer considers the most satisfactory of the various systems under his notice. 4500 w. Ir Age —Oct. 26, 1905.

The Card System for Mine Supplies. W. M. Jeffrey. Read before the L. Sup. Min. Inst. Outlines a card system of accounting, stating its advantages. 4000 w. Eng & Min Jour—Oct. 28, 1905.

Non-Productive Labor.—A Card Index System for Obtaining the Cost and Distribution of the Non-Productive Labor. George P. Pearce. An explanation of a system of the writer's, which is for all practical purposes, accurate. 2300 w. Am Mach—Feb. 11, 1904.

Patterns.—Pattern Costs. R. W. MacDowell. Explains a system of keeping accurate costs of patterns, giving forms used. 1500 w. Ir Trd Rev —May 5, 1904.

See also PATTERN; PATTERN SHOP.

Pearson Machine Co.—Shop Record System of the Pearson Machine Company. Describes methods in use in a shop which manufactures turret lathes, screw machines, forming and drilling machines, and horizontal boring machinery. 1300 w. Ir Trd Rev—July 3, 1902.

Percentage Method.—Percentage Method of Determining Production Costs. Harrington Emerson. Describes a percentage method of working from a basis of elementary labor and material costs. 1700 w. Foundry—Oct., 1904.

Plow Manufacturing.—Methods of Figuring Costs. C. E. Bement. Read before the Mich. Engng. Soc. Explains briefly the method used in a shop manufacturing "gang plows." 1800 w. Eng Rec —Jan. 21, 1905.

Pratt's Record Scroll.—Pratt's Record Scroll. Horace L. Arnold. Illustrates and describes this scroll for recording all the details in the manufacture of automatic elevators. 1400 w. Am Mach—Sept. 17, 1903.

Radiator.—See Foundry.

Railway Material.—See RAILWAY MATERIAL.

Railway Shop.—Report of the Joint Committee of the American Railway Mechanical & Electrical Association and the Street Railway Accountants' Association of America on Blanks for Shop Records and Accounts. 3300 w. St Ry Jour—Oct. 15, 1904.

Mechanical Department Records—The Graphic System. L. A. Larsen. Presents the merits of the graphic system, explaining its use in railway shops. 2000 w. Am Engr & R R Jour—Dec., 1905.

See also LOCOMOTIVE SHOP; RAILWAY SHOP; WORKS MANAGEMENT.

Repair Shop.—Cost Keeping and Shop Statistics for a Repair Shop. A. W. Thompson. Describing the working of a practical system in the repair shops attached to a large mill corporation and well adapted for recording a varied line of work. 3000 w. Engineering Magazine—May, 1904.

Southern Engine and Boiler Works.—Cost Finding Methods for Moderate-Sized Shops. William Magrutor. A description of the system of the Southern Engine and Boiler Works, employing about 300 men on engines, boilers, and saw-mill machinery. 2500 w. Engineering Magazine—March, 1903.

Stillwell-Bierce & Smith-Vaile Co.—Cost-Keeping and Wage Systems of the Stillwell-Bierce & Smith-Vaile Co. Descriptive articles outlining the system of the purchasing department. 2800 w. Ir Trd Rev—June 5, 1902.

Taylor, Birmingham.—Cost Keeping in an English Machine Tool Works. J. William Chubb. An account of a system put in practice by an English firm, and planned by Mr. Charles Taylor, of Birmingham. 2500 w. Am Mach—Vol. 28, No. 4.

Timing Operations.—See WAGES; WORKS MANAGEMENT.

Unit Costs.—Unit Costs of Work in Progress. Informal discussion of whether it is possible and desirable to keep accounts of cost of work in such a manner as to ascertain unit costs on each class of work. 3800 w. Pro Am Soc of Civ Engrs—Aug., 1902.

See also Contract Work; Gillette Lecture.

Wood System.—A Shop System. Lin. Wood. Describes a system for finding and keeping the shop cost of work produced, which may be applied to almost any shop. 1400 w. Am Mach—Aug. 27, 1903.

Work in Progress.—A Work in Progress Record. Horace L. Arnold. Describes two forms in use in the Cottrell works for historical records of events. 2200 w. Am Mach—April 23, 1903.

A Work in Progress Record. Kenneth Falconer. Gives forms used by the writer to furnish a history of each productive order. 1000 w. Am Mach—May 28, 1903.

A Work in Progress Record. H. B. McCabe. Describes a shop system for use where large quantities of the same article are made. 2200 w. Am Mach—Sept. 22, 1904.

See also Unit Costs.

COTTON.

Baling.—See BALING COTTON.

COTTON FACTORY.

See also ELECTRIC DRIVING; ELECTRIC PLANT.

Danville, Va.—See HYDRO-ELECTRIC PLANT.

COUNTING APPARATUS.

Casks.—Automatic Apparatus for Counting and Registering Casks. Illustrates and describes an invention of Thomas Forsyth designed for the accurate counting, measuring and registering of casks or barrels and recording the result. 800 w. Engng—Oct. 16, 1903.

Electric Meter.—See CALCULATING MACHINE.

COUNTING MACHINE.

Cars.—See RAILWAY TRAFFIC—Car Recording.

COUPLING.

See also CAR COUPLER; CLUTCH; SHAFTING.

Flanged.—See Shaft.

Lovekin Outboard.—The Lovekin Improved Outboard Loose Coupling. Robert S. Riley. Illustrates and describes a type of outboard loose coupling designed with a view to overcoming some of the objections inherent in the sleeve type. 2500 w. Jour Am Soc of Nav Engrs—May, 1905.

Shaft.—Dimensions for Flanged Shaft Couplings. S. H. Bunnell. Describes method used by a small shop in revising their whole set of patterns for flanged couplings with a view to consistency. 500 w. Am Mach—July 16, 1903.

Universal.—Universal of Flexible Joint Couplings. An illustrated article considering the principles, construction and limitations. 3000 w. Mach, N Y—April, 1902.

COURT HOUSE.

Nassau Co., N. Y.—The Nassau County Steel-Concrete Court-House. Illustrated description of a 176 x 37-ft. building with 60 x 52 ft. extension, built with concrete-steel walls, columns, floors, roof. central dome, and ceilings. The details of design are explained and the method of construction briefly outlined. 2400 w. Eng Rec—Dec. 7, 1901.

CRANE.

See also **CRANE, ELECTRIC; DOCK; HARBOR; HOISTING; MACHINE SHOP: MECHANICAL HANDLING; SHIPYARD.**

Modern Crane Construction. George William Rushworth. An illustrated article describing various types. 4500 w. Serial. 1st part. Feilden's Mag—May, 1903.

Some Examples of Present Practice in Cranes and Lifting Machinery. Edward C. R. Marks. An illustrated description of various types. Serial. 1st part. 1200 w. Prac Engr—May 20, 1904.

Anchors.—Anchors for Crane Chains—Casting Hoisting Drums. G. E. Flanagan. Illustrates the right and wrong methods and explains the advantages of methods recommended. 1400 w. Am Mach—Oct. 23, 1902.

Balanced Cable.—See **MECHANICAL HANDLING—Excavated Material.**

"Barbarossa."—The Hydraulic Crane System on the Steamer Barbarossa (Die Hydraulische Krananlage auf dem Dampfer Barbarossa des Norddeutschen Lloyds). W. Gentsch. With illustrations showing the pumps, accumulators and general arrangements. 1000 w. Zeitschr d Ver Deutscher Ing—Nov. 12, 1904.

Block-Setting.—Forty-Ton Block-Setting Titan. Illustrated description of a "Titan" crane just completed for Table Bay harbor, which works at a radius of 115 ft. Report of tests. 600 w. Engng—Aug. 25, 1905.

An Interesting 40-Ton Block-Setting Crane for Harbor Construction. Illustrated description of a crane with a radius of 115 feet, recently built in Great Britain for the construction of the harbor at Table Bay in South Africa. 900 w. Sci Am Sup—Nov. 4, 1905.

See also **BREAKWATER; CONCRETE—Block; HARBOR.**

Boat.—The Construction of Boat Cranes (Beitrag zur Konstruktion von Bootskränen). J. Stieghorst. A discussion of the construction of davit cranes on ships for the most convenient lowering and hoisting of boats at sea. Serial. Part I. 2500 w. Schiffbau—Dec. 8, 1902.

Brake.—See also **BRAKE—Crane; Magnetic.**

Breakdown.—Twenty-Ton Breakdown Crane. Illustrated description. 600 w. Engr, Lond—Nov. 20, 1903.

Breslau Harbor.—See **MECHANICAL HANDLING.**

Buffalo Dry Dock.—See **Gantry.**

Cantilever.—See **CRANE, ELECTRIC.**

Chatham Shipyard.—See **Shear Legs.**

Cologne Wharf.—See **CRANE, ELECTRIC—Single-Phase.**

Design.—Notes on Crane Design. A. D. Williams. Discusses the loads, stresses, strains, bending moment, etc., and the types in use. 2400 w. Am Mach—June 12, 1902.

Notes on Crane Design. Concerning the advantages and disadvantages of wire rope and chains, and other points in crane machinery. 1000 w. Am Mach—July 17. 1902.

Notes on Crane Design. A. D. Williams. A discussion of points relating to crane wheels. Ill. 1000 w. Am Mach—Sept. 11, 1902.

Notes on Crane Design—Load Brakes. A. D. Williams. Illustrates and describes several designs of load brakes. 2000 w. Am Mach—Aug. 20, 1903.

See also **CRANE, ELECTRIC.**

Dover Pier.—Cranes on Dover Pier. An illustrated description of the special cranes installed to facilitate the handling of baggage and mails, with report of the official trials. 1100 w. Engr, Lond—July 17, 1903.

20-Ton Steam Jib Crane. Illustrated description of a type in operation on the new harbor works at Dover. 1000 w. Engr, Lond—Oct. 2, 1903.

Drums.—The Construction of Crane Drums. Joseph Horner. Illustrations and discussion of plain drums, grooved drums, &c., and their manufacture. 1600 w. Am Mach—Vol. 28, No. 40.

See also **HOISTING DRUM.**

Düsseldorf Exposition.—See **HOISTING.**

Floating.—See also **Hamburg; Harbor.**

Floating, Dantzig.—Floating Crane of 100 Tons Capacity (Schwimmkran von 100 t. Tragfähigkeit und 150 t. Probelast). Describing and illustrating an improved form of shears with trussed members as built for the harbor of Dantzig. A test load of 150 tons was applied. 2000 w. 1 plate. Zeitschr d Ver Deutscher Ing—July 2, 1904.

Sixty-Ton Floating Crane (Schwimmkran von 60 t. Tragfähigkeit). W. Pickersgill. Illustrating a powerful pontoon bridge crane for service in the harbor of Danzig. Details of the framing and machinery are given. 2000 w. Zeitschr d Ver Deutscher Ing—Sept. 30, 1905.

Floating, New York.—One-Hundred-Ton Steel Floating Crane. Lieut. Jos. S. Shultz. Illustration, with description of the pontoon crane at the New York Navy Yard. 1200 w. Eng Rec—Dec. 19, 1903.

A New One-Hundred Ton Floating Crane. Illustrates and describes this powerful machine for the New York Navy Yard, and gives an account of some of the work it has already accomplished. 2000 w. Marine Engng—Jan., 1905.

Floating, Norfolk.—The 120-Ton Floating Derrick for the Norfolk Navy Yard. An illustrated description of the construction and operation of one of the largest floating derricks ever built. 1800 w. Eng News—June 25, 1903.

Floating, Riga.—Floating Crane for the Harbor of Riga (Schwimmkran für den Hafen der Stadt Riga). L. Müller. Describing a powerful shear crane of 66 tons capacity arranged on a self-propelled float for harbor service. 2500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Jan. 7, 1905.

Floating Shears for the Port of Riga (Bigue Blottante du Port de Riga). Illustrated description of floating pontoon carrying a 65-ton shears and a 7-ton radial crane. 1000 w. 1 plate. Génie Civil—Jan. 28, 1905.

Floating, Rio Janeiro.—Floating Crane for Rio de Janeiro (Schwimmender Mastenkrahn für den Hafen von Rio de Janeiro). H. Frahm. Illustrated description of 80-ton floating shears built for the Brazilian government. 1200 w. Stahl u Eisen—Nov. 15, 1901.

Floating, Santos.—80-Ton Floating Crane. Two-page plate and engraving of a crane intended for the Santos Harbor Works, with brief description. 400 w. Engng—Aug. 9, 1901.

Forge.—See **CRANE, ELECTRIC.**

Foundry.—See **CRANE, ELECTRIC—Ladle.**

Furnace Charging.—Furnace Charging Cranes. Illustrates and describes modern types of cranes for this purpose. 2500 w. Ir & Coal Trds Rev—April 1, 1904.

See also **CHARGING MACHINE.**

Gantry.—Gantry Crane of the Buffalo Dry-Dock Company. Illustrated description of a large cantilever crane for handling material. 900 w. Marine Engng—Nov., 1903.

Notes on Cranes—Gantries. A. D. Williams. Illustrates and describes various types. 3500 w. Am Mach—Vol. 28, No. 31.
See also **CRANE, ELECTRIC.**

Germany.—The Development of Crane Building in Germany (Die Entwicklung des Kranbaues in Deutschland). Heinr. Rupprecht. Showing how the use of English-built cranes in Germany has been largely superseded by machines of German design and construction. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 12, 1903.

Some Recent Examples of German Crane Construction. Illustrates and describes wharf cranes, revolving cranes, derrick, hammer and other types. 2800 w. Ir and Coal Trds Rev—Dec. 25, 1903.

Modern Cranes (Neuere Krane). A. Müller. Illustrating improved gantry and titan cranes, of recent German design. Serial. Part I. 1500 w. Zeitschr d Ver Deutscher Ing—May 7, 1904.

See also CRANE, ELECTRIC.

German Dockyards.—New Cranes in German Dockyards. Illustrates and describes recent equipments of these yards for handling large and heavy weights. 1300 w. Engr, Lond—April 25, 1902.

Guérigny, France.—See CRANE, ELECTRIC.

Hamburg.—European Floating and Dock Cranes. Frank C. Perkins. Illustrated description of cranes used in Hamburg harbor. 900 w. Sci Am —Oct. 3, 1903.

Harbor.—See Dover; Hamburg; Wharf; CRANE, ELECTRIC; MECHANICAL HANDLING.

Havre.—Erection of 120 Ton Shears at the Port of Havre (Mise en Place d'une Bigue de 120 Tonnes dans le Port de Havre). Ch. Dantin. Illustrated description of the powerful new shears recently erected at Havre, with photograph showing the method of erection. 1800 w. 1 plate. Génie Civil—Nov. 9, 1901.

Hydraulic.—Hydraulic Warehouse Cranes. Illustrates and describes types made in Liverpool. 600 w. Engng—April 4, 1902.

Notes on Cranes—Hydraulic Cranes. A. D. Williams. Briefly describes types. 1000 w. Am Mach—Vol. 28, No. 4.

See also Barbarossa; HYDRAULIC MACHINERY —Wharf Installation.

Hydro-Electric.—50-Ton Hydo-Electric Overhead Crane. Illustration, with brief description of cranes in use at Swindon. 350 w. Engr, Lond—Dec. 25, 1903.

Jib.—The Graphical Analysis of a Simple Jib Crane. A. L. Westcott. An explanation of graphic statics as applied to a jib crane. 800 w. Am Mach—Vol. 28, No. 12.

See also Dover Pier; Locomotive.

Kiel, Germany.—See Shipyard.

Ladle.—Revolving Crane for Ladle (Giess-Rollkrahn). Ad. Schuchart, Sr. An illustrated description of a revolving crane carrying a pouring ladle serving two open-hearth furnaces at the Harkort works at Wetter-on-the-Ruhr, Germany. 1 plate. 500 w. Stahl u Eisen—Jan. 15, 1902.

See also CRANE, ELECTRIC.

Liege Exposition.—See CRANE, ELECTRIC.

Lloyds Arsenal, Trieste.—See CRANE, ELECTRIC.

Loads.—Calculation of Loads on the Rollers of a Large Locomotive Crane. A. L. Westcott. Gives sketch showing a portion of the plan of the roller track of a 40-ton locomotive crane, and explains method of calculating the loads. 900 w. Am Mach—Vol. 28, No. 34.

See also Design.

Locomotive.—A 45-Ton Locomotive Jib Crane. Illustrated description of a crane recently built for the naval station at Port Royal, S. C. 600 w. Eng Rec—June 1, 1901.

20-Ton Locomotive Steam Crane. Illustration with brief description of a powerful tool built in England for use in Mexico. 500 w. Engng—Nov. 8, 1901.

Counterbalances for Locomotive Cranes. Robert H. Kirk. Gives a graphical method of determining the quantity of counterweight for locomotive cranes. 1200 w. Am Mach—Sept. 18, 1902.

Steam Locomotive Crane of Three Tons Capacity (Fahrbarer Dampfkran von 3000 kg. Tragfähigkeit). W. Pickersgill. With details of construction, including arrangement of friction clutches and of variable radius gear. 2000 w. Zeitschr d Ver Deutscher Ing—Feb. 20, 1904.

Locomotive Cranes as Labor Savers. Lewis Glasgow Howlett. Illustrates and describes some of these cranes and their operation, and the uses to which they have been applied. 2500 w. Cassier's Mag—Nov., 1905.

See also CRANE, ELECTRIC; LOCOMOTIVE—Special, British.

Mast.—The Strength of Derrick Masts (Die Festigkeit von Lademasten). H. Sellentin. An analytical examination of the stresses upon the masts of hoisting derricks under various conditions of loading. Serial. Part I. 2000 w. Schiffbau—Aug. 23, 1902.

Molding.—See MOLDING—Crane Girder.

Novel.—Novel Cranes. Waldon Fawcett. Describes some recent modifications and improvements. Ill. 1100 w. Am Mfr—Aug. 15, 1901.

Pillar.—See Traveling.

Pneumatic.—Portable Pneumatic Revolving Cranes. Illustrates and describes a special form of locomotive crane designed to be operated with compressed air. 900 w. Eng News—July 23, 1903.

Revolving.—Steam and Electric Cranes. Illustrated descriptions of a revolving steam crane having a capacity of 3 tons, and a 50-ton electric crane. 1800 w. Engng—Jan. 30, 1903.

Riveter Towers.—Electric vs. Hydraulic Cranes for Riveter Towers. Frank B. Kleinhans. Claims the electric crane to possess advantages for this work. 1500 w. Elec Wld & Engr—July 2, 1904.

St. Triphon Quarries, Switzerland.—See CRANE, ELECTRIC.

Santos Harbor, Brazil.—See Floating.

Screw Hoist.—See HOISTING.

Shear Legs, Chatham Shipyard.—180-Ton Shear Legs for the British Naval Dockyard. Illustration, with description, of the largest shear legs in the world, erected at the dockyard at Chatham. 700 w. Sci Am—Sept. 30, 1905.

Shears.—See also Havre.

Shipyard.—The Development of Shipyard Crane Service. Henry P. Jones. An illustrated discussion of those cranes used in carrying on the work at the fitting-out wharf. 2500 w. Eng News—Nov. 28, 1901.

Shipbuilding Cranes at Kiel. Illustrated descriptions of cranes in use in the Krupp shipyard at Kiel. 1100 w. Engr, Lond—Oct. 9, 1903.

Shipyard Cranes and their Functions in Marine Construction. Jos. S. Shultz. A fully illustrated review of the principal types, showing their applications and performance as labor saving machines. 3500 w. Engineering Magazine—April, 1905.

Shipyard.—See also CRANE, ELECTRIC; MECHANICAL HANDLING.

Slip Way.—Modern Slip Cranes (Neuere Helling Krane). Illustrating recent installations of traveling and derrick cranes for use on the slip ways of shipbuilding yards. 1200 w. Schiffbau—Sept. 27, 1905.

See also CRANE, ELECTRIC—Wallsend.

Solenoid.—See CRANE, ELECTRIC—Design.

Southampton.—See CRANE, ELECTRIC—Dock.

Special Forms.—Special Forms of Cranes. Joseph Horner. Illustrates and describes recent types for special demands. Serial. 1st part. 3000 w. Cassier's Mag—Feb., 1905.

Speed.—Economical Speeds of Cranes. Archibald Potter Head. Read before the Engng. Con. of the Inst. of Civ. Engrs. On the speeds of overhead and other cranes as a factor in economical handling of material in working, dealing with the different designs seriatim. 2000 w. Engng—June 19, 1903.

Steel Works.—See Forge; MECHANICAL HANDLING; STEEL WORKS—Antwerp.

Table Bay, South Africa.—See Block-Setting.

Tower, Karlsruhe.—See CRANE, ELECTRIC.

Traveling.—Traveling Inverted Pillar Crane. Illustrated description of a new form of crane with novel features. 1000 w. Engr, Lond—Jan. 15, 1904.

See also CRANE, ELECTRIC.

Trinity Building, N. Y.—See FOUNDATION.

Vulcan Shipyard, Vegesack.—See CRANE, ELECTRIC; SHIPYARD.

Wharf.—Modern Heavy Harbor Cranes (Moderne Hafen- und Werftkrane—Schwerster Konstruktion). H. Mehlis. With details and illustrations of the latest heavy wharf cranes at Hamburg, Bremen and other places. 2500 w. 2 plates. Glasers Annalen—Aug. 15, 1901.

Foreign Types of Steam and Electric Harbor Cranes. Frank C. Perkins. Illustrated detailed descriptions of electric cranes for dock work. 2300 w. Marine Engng—July, 1904.

The Wharf Cranes of the Pennsylvania Railroad Company at Greenville, N. J. John Lyle Harrington. Illustrations, with detailed description of cranes for handling freight, both bulk and package, between the railway cars and the vessels. 3000 w. Can Soc of Civ Engrs—Nov. 16, 1905.

See also Dover; Hamburg; CRANE ELECTRIC; HYDRAULIC MACHINERY.

CRANE, ELECTRIC.

See also CRANE; ELECTRIC EQUIPMENT; HOISTING.

Electrically Driven Cranes (Ueber Elektrisch Betriebene Hebezeuge). A. Kolben. With details of motors, gearing and general construction of traveling cranes, hoists, etc., showing the progress made in the past five years. 3000 w. Elektrotech Zeitschr—Feb. 14, 1901.

Electrically Driven Cranes (Elektrisch Betriebene Hebezeuge). P. Uellner. A description of electric travelling cranes, gantries, and cantilevers, built by the "Compagnie Internationale d'Electricité," of Liége, Belgium. 4000 w. 1 plate. Zeitschr d Ver Deutschr Ing—March 2, 1901.

Electric Equipment of Cranes. Will Rung. Deals with the various types of motor applicable to crane work, having reference also to the nature of the supply current. Also the controlling gear. Ill. Serial. 1st part. 2000 w. Elec Rev, Lond—Sept. 6, 1901.

Continuous-Current Motors and Apparatus for Electric Hoists (Gelijkstroommotoren en Bijbehoorende Apparaten voor Elektrisch Gedreven Hijschwerktuigen). H. Lohr. A general, illustrated discussion of the electrical equipment of cranes and other hoisting machinery. 4500 w. De Ingenieur—April 19, 1902.

Electric Cranes. Waldon Fawcett. Illustrates and describes various types. 2400 w. Elec Rev, N Y—Sept. 13, 1902.

Electric Crane Experiences. A. D. Williams. Discusses the care and operation, repairs, accidents, etc. 1300 w. Am Mach—July 23, 1903.

Recent Installations of Electric Cranes (Neue Ausführungen Elektrischer Krane). Richard Kann. With illustrations of methods of wiring and operating, together with numerous examples of recent designs and installations. Two articles. 5000 w. Zeitschr f Elektrotechnik—March 20, 27, 1904.

Recent Cranes (Neuere Krane). A. Müller. Illustrating and describing some recent, electrically-driven traveling cranes for machine shops and iron works. 3000 w. Zeitschr d Ver Deutscher Ing—Feb. 11, 1905.

Benrath Machine Co.—New Electric Cranes (Neuere Elektrisch Betriebene Hebezeuge). An illustrated account of movable cranes for shops and wharves, built by the Benrath Machine Co., and driven by polyphase motors. 1500 w. Zeitschr d Ver Deutschr Ing—March 30, 1901.

Recent Electric Cranes (Neuere Elektrisch Betriebene Hebezeuge). Illustrated description of 100-ton electric wharf crane at Bremen. 1500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Nov. 2, 1901.

Bremen.—See Benrath; CRANE—Wharf.

Bremerhaven.—150-Ton Electric Crane at Bremerhaven Harbor (Elektrischer 150t-Krahn im Bremerhavener Hafen). An illustrated article from "Uhlands Verkehrszeitung," giving a description of this large cantilever crane for use on the wharves. 800 w. Oesterr Wochenschrift f d Oeffent Baudienst—March 30, 1901.

A 150-Ton Electric Crane. Illustrated description of the powerful hoisting apparatus installed at the entrance of the new repair basins of the port of Bremerhaven, 36 miles below Bremen. 800 w. Sci Am Sup—Oct. 19, 1901.

The Giant Crane at Bremerhaven. Illustrated description. 800 w. Sci Am Sup—May 31, 1902.

Bridge.—Electric Bridge Crane of Ten Tons Capacity (Elektrisch Angetriebener Portal Drehkran von 10,000 kg. Tragfähigkeit). Heinrich Rupprecht. Illustrating a powerful crane recently erected in the harbor of Stettin. An electric radial crane is mounted upon a fixed bridge spanning the railway tracks. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 19, 1904.

Cantilever.—Cantilever Cranes at the Yard of William Cramp & Sons' Ship and Engine Building Company. Illustrated description of new equipment for handling materials consisting of three cantilever cranes driven by electricity and covering six shipways. 500 w. Marine Engng—Aug., 1901.

Case Mfg. Co.—A New Line of Electric Traveling Cranes. Illustrates and describes the interesting features of special types recently made by the Case Mfg. Co. 1800 w. Ir Age—Jan. 7, 1904.

Cologne-Deutz.—The Electric Cranes in the Harbor of Cologne and Deutz (Die Elektrisch Betriebenen Krane im Cöln-Deutzer Hafen). Kurt Perlewitz. With views and details of the traveling portal cranes used on the Rhine front, using the 50-cycle current of the city supply direct. 3500 w. Elektrotech Zeitschr—Aug. 10, 1905.

Cranes Driven by Single-Phase Motors. Illustrates and describes a four-ton single-phase electric traveling wharf-crane installed at Cologne, Germany. 1000 w. Engng—Dec. 22, 1905.

Design.—Notes on Crane Design. A. D. Williams. Discusses points in the design of electric cranes and their motors. 1300 w. Am Mach—Nov. 28, 1901.

Notes on Crane Design—Solenoids. A. D. Williams. On the use of solenoids in electric hoisting appliances. Gives manner of working at a solenoid to suit an assumed case. 2800 w. Am Mach—Nov. 20, 1902.

Notes on Crane Design. A. D. Williams. Wiring diagram and particulars relating to the electrical equipment of cranes. 1000 w. Am Mach—Nov. 27, 1902.

Fundamental Principles of Electric Crane Design (Grundbedingungen für den Bau von Elektrisch Betriebenen Laufkranen). S. Herzog. A very complete discussion of the detailed design of the modern three-motor electric traveling crane. 3500 w. Zeitschr f Elektrotechnik—May 14, 1905.

Electric Cranes. Claude William Hill. States the requirements where large quantities of material must be handled, and the advantages of electrical driving, discussing the worm-gear, bearings, motors and controllers, etc. Diagrams. 4800 w. (No. 3515.) Inst of Civ Engrs.

Dock.—See Harbor; London: Southampton; CRANE—Dover; Hamburg; Wharf.

Dublin.—Electric 100-Ton Crane at Dublin. Illustrations and descriptive notes showing the general construction and electrical details of a new crane for the Port and Docks Board of Dublin. 1800 w. Elec Engr, Lond—Aug. 11, 1905.

Duisburg.—New Electric Cranes (Neuere Krane mit Elektrischem Antrieb). An illustrated description of various kinds of cranes operated electrically and manufactured by the Duisburg Machine Company. Serial. Part I. 1000 w. Zeitschr d Ver Deutscher Ing—June 28, 1902.

Equipment.—Notes on Equipment for Electric Cranes. W. H. Wakeman. Suggestions for selecting cranes for a foundry or shop. 1500 w. Elec, N Y—Aug. 30, 1905.

Forge.—Electric Power for Forge Cranes (Elektrische Drehvorrichtung für Schmiedekrähne). A. Willaredt. A description of a new electric crane for use in connection with forging presses at the Cockerill Works at Seraing. 1200 w. Stahl u Eisen—April 1, 1902.

Improvements in Electrically Operated Forge Cranes (Neuerungen an Elektrisch Betriebenen Schmiede-Kranen). E. Becker. With details of bridge, trolley, and hoisting gear, together with special forms of blocks and chain connections. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 5, 1903.

Gantry.—Electric Gantry Cranes (Fahrbare Bockkrane mit Elektrischem Antrieb). W. Müller. Illustrated descriptions of two powerful gantries. The various functions in each crane are obtained by gearing driven by single electric motor. 1000 w. Zeitschr d Ver Deutscher Ing—May 18, 1901.

Five-Ton Electric Traveling Gantry Crane. Illustrated description of a large gantry crane made in Cleveland, Ohio. 1000 w. Engng—Feb. 7, 1902.

Ganz.—Twenty-Ton Electric Crane at the Paris Exposition (Der 20 Tonnen Elektrische Laufkrahn auf der Weltausstellung in Paris). Todor Kende. A general description of the electric crane built by Ganz & Co., of Budapest. 2000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Nov. 30, 1900.

Electric Traveling Crane of 20 Tons Capacity (Pont Roulant Electrique de 20 Tonnes). Illustrated description of 5-motor crane built by Ganz & Co., of Budapest, and exhibited at Paris. There are two trolleys, and three-phase motors are used. 1 plate. 1200 w. Génie Civil—Dec. 15, 1900.

Germany.—Modern Cranes (Neuere Krane). A. Müller. Illustrating and describing locomotive, bridge and gantry cranes, operated by electric power, recently installed in important workshops in Germany. 2000 w. Zeitschr d Ver Deutscher Ing—Nov. 28, 1903.

Guérigny.—Sixty-ton Electric Traveling Crane (Pont Roulant Electrique de Soixante Tonnes). Ch. Dantin. Illustrated description of an electric traveling crane of 30 metres span, and 60 metric tons capacity, at the Chaussade steel works at Guérigny, France. 1500 w. 1 plate. Génie Civil—Aug. 16, 1902.

Harbor.—Electric Harbor Cranes (Ueber Elektrische Hafenkräne). J. Rothmüller. Illustrating and describing various forms of cranes for use on docks, quays and other harbor service, showing the extent to which electricity has replaced hydraulic power. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—July 17, 1903.

Electrically Driven Harbor Crane (Elektrisch Betriebener Werft-Drehkran). Illustrating and describing a 120 ton radial harbor crane, constructed for the Austrian Lloyds. 3000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Aug. 5, 1905.

See also Cologne; London; Southampton; CRANE; DOCK; ELECTRIC EQUIPMENT—Dock.

Harbor, Mannheim.—A Forty-Ton Electric Crane (Electrisch Betriebener Portalkran von 4,000 kg. Tragkraft). H. Koll. An illustrated description of a jib crane carried on a traveling bridge running on tracks, used for loading and unloading in Mannheim harbor, on the Rhine. 1200 w. Zeitschr d Ver Deutscher Ing—June 20, 1903.

Hydraulic Compared.—See CRANE—Riveter Towers.

Hydro.—See CRANE—Hydro-Electric.

Ladle.—100-Ton Electric Ladle Crane. An illustrated detailed description of a crane recently erected in an open-hearth shop for handling a ladle for making large ingots for gun forgings. 1500 w. Engr, Lond—March 8, 1901.

A Special Form of Electric Travelling Crane (Elektrisch Betriebener Speziallaufkran). A. Dondelinger. Illustrating a travelling ladle crane made for the Chatillon-Commentry works in connection with its basic steel plant. 2000 w. Stahl u Eisen—Jan. 1, 1904.

100-Ton Ladle Crane. Illustrates and describes a high powered overhead electric ladle crane built for the Ebbro Vale Steel Works. 1600 w. Engr, Lond—Feb. 10, 1905.

Liége Exhibition.—10-Ton Electric Travelling Jib-Crane. Illustrated detailed description of a jib-crane shown at the Liége Exhibition, and constructed for the Maritime Station, Brussels. 800 w. Engng—June 30, 1905.

10-Ton Electric Overhead Traveller at the Liége Exhibition. Illustrated detailed description, showing the use of three-phase current by placing a motor-generator on the crane. 800 w. Engng—July 14, 1905.

Electric Traveling Crane of 30 Tons Capacity (Pont Roulant Electrique de 30 Tonnes). Illustrated description of a crane of 79 feet span, built by the Stuckenholz Works and exhibited in the machinery building at the Liége Exposition. 1 plate. 700 w. Génie Civ—Sept. 2, 1905.

Hoisting Machinery at the Liége Exposition (Les Appareils de Levage à l'Exposition de Liége). L. Ramakers. Illustrations and details of electric traveling cranes exhibited in operation at Liége. 2000 w. 1 plate. Génie Civil—Sept. 23, 1905.

Electric Traveling Crane at the Liége Exposition (Elektrisch Betriebener Laufkran auf der Weltausstellung in Lüttich, 1905). Andreas Stamm. Illustrated description of 30-ton traveling crane of 79 feet span. 1200 w. Zeitschr d Ver Deutscher Ing—Nov. 11, 1905.

Link Belt Co.—A Novel Electric Traveling Crane. Illustrated description of a novel crane in use at the yards of the Link Belt Engng. Co., Nicetown, Philadelphia, for loading and unloading cars, handling heavy castings and materials, etc. 900 w. Eng Rec—Aug. 26, 1905.

Locomotive.—Electric Locomotive Crane (Ein Elektrisch Betriebener Locomotivguss Krahn). G. Machacek. An illustrated description of a traveling locomotive crane operated by electric power taken from an overhead trolley. 2500 w. 2 plates. Oesterr Zeitschr f Berg u Hüttenwesen—March 15, 1902.

Electric Locomotive Cranes. Illustrates four different types of electrically worked locomotive cranes, giving brief descriptions. 600 w. Engr, Lond—April 21, 1905.

Electrically Driven Locomotive Crane (Lokomotivkran mit Elektrischen Antrieb). C. Herrm. Findeisen. With details of hoisting and propelling mechanism, wiring, and control. 1200 w. Zeitschr d Ver Deutschr Ing—June 3, 1905.

See also CRANE.

London Dock.—Electrical Wharf Cranes. Illustrated description of a set of cranes recently supplied for the Limekiln Dock, in London. 1400 w. Engr, Lond—May 23, 1902.

Middlesbrough.—See ELECTRIC EQUIPMENT—Docks, Middlesbrough.

Natal.—Seventy-Ton Electric Traveling Crane. Illustrated description of an electric traveler and gantry which has been constructed for the Natal Government. 500 w. Eng, Lond—March 10, 1905.

Revolving.—See CRANE.

St. Triphon Quarries.—Electric Crane at the St. Triphon Quarries, Switzerland. C. L. Durand. Illustrates and describes the new electric lifting and conveying apparatus and its working. 1100 w. Elec Rev, N Y—April 1, 1905.

Shaw.—The Shaw Electric Crane at the World's Fair. Illustrated description, with details of special features of the crane awarded the grand prize in Group 64. 800 w. Ir Age—Dec. 1, 1904.

Shipyard.—See Trieste; Vulcan; CRANE; ELECTRIC EQUIPMENT; SHIPYARD.

Single-Phase.—See Cologne-Deutz.

Southampton Dock.—50-Ton Electric Crane. Description and illustration of a revolving, traveling crane, for the Southampton docks. 600 w. Engng—Aug. 12, 1904.

A Fifty-Ton Electric Crane. Illustrated description of the mammoth electric crane for the new graving dock at Southampton. 900 w. Sci Am Sup—Nov. 25, 1905.

Steel Works.—Electric Traveling Crane for a Steel Foundry (Elektrisch Betriebener Laufkran für eine Stahlwerk-Giesshalle). A. Kolben. With details of the hoisting gear and scheme of the wiring for a 10-ton crane of 11 metres span. 3000 w. Zeitschr d Ver Deutscher Ing—Oct. 26, 1901.

See also Ladle; CHARGING MACHINE; MECHANICAL HANDLING; STEEL WORKS.

Tests.—The Current Consumption of Electric Wharf Cranes (Stromverbrauch Elektrischer Hafenkrane). E. Krautschopp. Data and results of trials of the electrically driven wharf cranes of various builders in use at the port of Hamburg. 2500 w. Zeitschr d Ver Deutscher Ing—May 11, 1901.

Tower.—A New German Tower Electric Crane. Frank C. Perkins. Brief illustrated description of an interesting electrically operated tower crane constructed at Karlsruhe. 700 w. Sci Am—Aug. 20, 1904.

Traveling.—The Electrical Equipment of Overhead Traveling Cranes. J. W. Warr. An illustrated description of a crane with separate motors for each motion, the wiring and fitting. 900 w. Elec Rev, Lond—July 15, 1904.

Large, High-Speed Electric Traveling Crane (Elektrisch Betriebener Laufkran Grosser Dimensionen und Hoher Geschwindigkeiten). E. Egger. Illustrated description of crane driven by polyphase current, and of 80 feet span and 10 tons capacity. 1 plate. 1600 w. Zeitschr f Elektrotech—Sept. 10, 1905.

See also Gantry; Ganz; Liége; Natal; Shaw; Vulcan; COAL HANDLING—Electric; CRANE; HOISTING.

Trieste.—A Gigantic Electric Shipyard Crane. Dr. Alfred Gradenwitz. Illustration of the powerful electric crane recently erected at Lloyd's arsenal in Trieste, with description. 900 w. Sci Am Sup—Feb. 11, 1905.

Vulcan Shipyard.—Traveling Shipyard Crane at Vulcan Works, Bredon. Stettin. Illustrated description of an electric crane of great size designed for transporting armor plates and other heavy parts from the rolling-mill to the ships. 600 w. Engng—May 20, 1904.

Shipbuilding Cranes (Hellingkrane). Illustrating electrically driven traveling tower cranes in the Vulcan shipyards at Vegesack, near Bremen. 1000 w. Schiffbau—May 24, 1905.

See also **SHIPYARD.**

Vaughan.—125-Ton Four-Motor Overhead Electric Traveler. Sectional illustrations, with details embodying many new features and description. 1400 w. Engr, Lond—Nov. 29, 1901.

Wallsend Slipway Co.—Details of Electric Traveling Cranes. Illustrates and describes the arrangement and details of the electric cranes for the Wallsend Slipway Company. 1800 w. Engng—Sept. 1, 1905.

CRANE HOOK.

See also **CRANE; CRANE, ELECTRIC.**

The Strength of Drop-Forged Crane Hooks. John Goodman. An account of tests made of a complete set of crane hooks and the results. Ill. 1600 w. Engng—Oct. 18, 1901.

Crane Hooks. A. E. Holcomb. Table and formulas with directions for use. 400 w. Am Mach—Oct. 31, 1901.

150-Ton Crane Hook with Conical Roller Bearing. Ulrich Peters. Brief illustrated description. 200 w. Am Mach—Oct. 29, 1903.

CRANK.

See also **MARINE ENGINE—Balancing; STEAM ENGINE.**

Dynamics.—The Dynamics of Crank Driving (Dynamik der Kurbelgetriebe). Dr. H. Lorenz. An analytical study of the relations of the tangential and rotative forces in driving a crank by a connecting rod. 25000 w. Schiffbau—June 8, 1901.

Three-Headed.—A Three-Headed, or Triangular Crank (Biellé à Trois Têtes ou Bielles Triangulaires). M. Chaud. An illustrated description of transmitting mechanism in which, besides the cranks on the two working shafts, there is a crank on an idle shaft, the three being connected by a three-armed rigid piece. 600 w. Revue Technique—April 25, 1902.

Velocity Ratios.—The Velocity Relations of a Cranked Quadrangle (Ueber den Beschleunigungszustand eines Kurbelvierecks). Dr. A. Herzog. A geometrical analysis of velocity ratios in a four-sided linkage, using the method of instantaneous centers. 1200 w. Schweizerische Bauzeitung—May 11, 1901.

CRANK AXLE.

Oblique Type.—Oblique Type Crank Axles. Gives a stress diagram and explains the mtehod of calculating graphically the stresses in a locomotive crank axle. 600 w. Engr, Lond—April 15, 1904.

CRANK PINS.

Care and Repair of Crank Pins. Suggestions for methods of keying, repairing, etc. 2500 w. Power—Dec., 1901.

Bearing.—Crank Pin Bearing. C. H. Bierbaum. Remarks on the conditions and performance of a crank-pin bearing with explanation. Ills. 1400 w. Engr, U S A—April 1, 1904.

Keying Up.—Keying Up Crank Pins. William Kavanagh. Describes various methods, and considers the causes of heating. 1200 w. Power—Nov., 1903.

Turning Machine.—Capitaine's Crank-Pin Turning Machine. Illustrations with brief description. 600 w. Engng—Feb. 12, 1904.

CRANK SHAFT.

See also **CRANK AXLE; MARINE ENGINE; SHAFT; STEAM ENGINE.**

Bearings.—See **BEARINGS.**

Machining.—Turning Torpedo-Boat Crank Shafts. Illustrated description of method used. 900 w. Am Mach—May 23, 1901.

The Machining of Single-Throw Crank Shafts. Illustrates and describes special tools used for this work. 600 w. Am Mach—Jan. 7, 1904.

The Machining of Multiple-Throw Crank Shafts. Illustrated description of the Tindel-Albrecht crank shaft lathe and its operation. 1000 w. Am Mach—Jan. 14, 1904.

Rapid Machining of Crank Shafts. An illustrated article describing advanced methods employed at the Eddystone Works of the Tindel-Morris Company. Serial. 1st part. 1700 w. Ir Age—Jan. 7, 1904.

Machining Crank Shafts for Motor Wagons. Illustrates and describes jigs and fixtures designed at an English shop for this work. 1400 w. Am Mach—Vol. 28, No. 35.

Schlick System.—Crank Shaft (Kurbelwelle). Brief description, with full detailed drawing of a four-crank shaft for a marine engine made by the Oberbilk Steel Works, Düsseldorf, for Blohm & Voss. The cranks are arranged for counter balancing on the Schlick system. 500 w. 1 plate. Schiffbau—July 23, 1901.

See also **MARINE ENGINE—Balancing.**

Strains.—Strains on Crank Shafts. Prof. S. Dunkerley. Read before the Inst. of Naval Archts. Considers the straining action on the different parts of a crank shaft, illustrating by an actual case of a four-cranked marine shaft. Ill. Serial. 1st part. 3700 w. Engng—March 28, 1902.

See also **Vibrations; SHAFT—Torsion.**

Turning.—See **Machining.**

Vibrations.—The Vibrations of Crank Shafts (Schwingungen von Kurbelwellen). P. Roth. A mathematical investigation of the manner in which the forces upon engine shafts produce vibrations in the shaft; discussing especially a gas engine driving a dynamo. 2000 w. Zeitschr d Ver Deutscher Ing—April 16, 1904.

See also **MARINE ENGINE; SHAFT—Torsion.**

CREAMERY.

Power Plant.—See **POWER PLANT—Creamery.**

CRIBWORK.

See also **BRIDGE FOUNDATION; FOUNDATION.**

Duluth, Minn.—Holding Power of Ballast in Timber Cribs. An account of experiments made at Duluth, Minn., and described in the Report of the Chief of Engineers, U. S. A., for 1902. 1000 w. Eng Rec—Nov. 7, 1903.

CRITICAL POINT.

Gas Compression.—See **GAS—Compression.**

Steel.—See **STEEL—Segregation.**

CROSS TIE.

See also **RAIL; RAIL FASTENING; RAILWAY PERMANENT WAY; TIMBER PRESERVATION; TRACK.**

Ties. The subject is divided into 8 subheads discussed by members of the Com. of the Am. Ry. Engng & Main. of Way Assn. and discussed. 10500 w. Ry Age (Spe. No.)—March 15, 1901.

Ties. Report of the American Railway Engineering and Maintenance of Way Association, with discussion at the Chicago convention. 17200 w. Ry Age, Special No—March 21, 1902.

Ties. From a report of the committee on ties to Am. Ry. Engng. and Maintenance of Way Assn. 2500 w. Ry & Engng Rev—March 21, 1903.

A Review of the Railway Tie Question. Editorial discussion of the present condition and future prospects in regard to wooden ties, and brief review of other materials used. 3000 w. Eng News—Sept. 10, 1903.

The Railway Tie Question. Gives abstracts of reports, addresses and discussion of this subject at the recent convention of the Roadmasters & Maintenance of Way Assn. in Kansas City. 3800 w. Eng News—Nov. 19, 1903.

The Railroad Cross-Tie Problem. S. Whinery. Considers the subject of cross-ties and other forms of support for tracks, giving a summary of the conclusions reached and some of the reasons leading to them. Ills. Serial. 1st part. 2500 w. R R Gaz—Vol. XXXVII, No. 21.

Australian Hardwood.—See **Timber.**

Buhrer Steel.—See **Steel.**

Cast-Iron.—Cast-Iron Sleepers on the Madras Ry. Extracts from the report of E. W. Stoney on the relative life and cost of timber and cast-iron pot sleepers, with illustration of details of the design used. 1200 w. Ry & Engng Rev—April 6, 1901.

Concrete.—See Concrete Reinforced.

Concrete Reinforced.—Combination Concrete and Steel Railway Ties. Illustrates and explains the construction of a tie designed by G. H. Kimball now being tried on the Pere Marquette R. R. 1100 w. Eng News—April 3, 1902.

The Tie Problem. With Special Reference to Concrete Ties. G. H. Kimball. Reviews past practice, discussing the question of unequal settlement because of eccentric pressure, and giving illustrated description of a two-part tie with parts rigidly connected, designed by the writer, made of concrete. The form of construction is given in detail, and advantages stated. Discussion. 1600 w. Jour W Soc of Engrs—Oct., 1903.

New Concrete Ties and Steel Ties. Brief illustrated descriptions of two forms of reinforced concrete ties now being tested, and a new design of steel tie which is now in service under exceptionally heavy traffic. 900 w. Eng News—Oct. 5, 1905.

See also Steel.

Creosoting Works.—See **TIMBER PRESERVATION.**

Electric Railway.—Track and Roadbed Construction and Maintenance with Particular Reference to the Life and Chemical Preservation of Ties. Thomas B. McMath. Read before the Indiana Elec. Ry. Assn. Gives information concerning ties treated with creosote and methods of track laying and paving. 1700 w. St Ry Jour—Jan. 21, 1905.

Hardy Catalpa.—See **POST.**

Life.—See **TIMBER PRESERVATION**—Cross Tie.

Making.—The Making of Railroad Ties. Aloysius Coll. Information in regard to the cutting and preparation of the ties, their transportation, etc. 2200 w. Am Mfr—May 30, 1901.

Metal.—See also Cast-Iron; Steel.

Metal German.—Metal Ties in Germany. Translated extract from "Das Eisenbahngleis," by A. Haarmann. Describes metal ties used on the Georgs-Marien-Hutten Railroad. Ill. 600 w. R R Gaz—May 15, 1903.

Notching Machine.—See **NOTCHING MACHINE.**

Plantations.—Railway Ties and Tie Plantations in Mexico and South Africa. Gives information relative to the experience of two counties which have not a sufficient supply of suitable timber for ties. 2500 w. Eng News—Sept. 10, 1903.

Preservation.—See also Railway Congress; Von Schrenk; **TIMBER PRESERVATION.**

Railway Congress.—Wooden Ties: Selection of Kinds and Processes of Preservation. Mr. Hausser. Report to be presented at the meeting of the International Railway Congress. On the kinds of wood used, various methods of treatment, deterioration, influence of ballast and subgrade, etc. 8000 w. Ry Age—Sept. 9, 1904.

On the Question of Wooden Sleepers or Cross Ties. Mr. Hausser. Report for all countries except America. Selection of species of timber used and processes of preservation. (Subject 1-A, for discussion at the seventh session of the Railway Congress). 7000 w. Bul Int Ry Cong—Sept., 1904.

On the Question of Wooden Sleepers or Cross-ties. Selection of Species of Timber Used and Processes of Preservation (Subject I-A, for discussion at the seventh session of the Railway Congress). J. W. Kendrick. Ou the selection of the kinds of wood and the processes of preservation of railway ties. For America. 18000 w. Tables and fig. Bul Int Ry Cong—Jan., 1905.

Southern Pacific Ry.—See **TIMBER PRESERVATION.**

Steel.—Steel Railroad Ties in Europe. Foster Crowell. A comparison of experimentation in this field in America and Europe. Ill. 4200 w. R R Gaz—Aug. 30, 1901.

Buhrer Steel Ties on the Lake Shore & Michigan Southern Ry. A statement of the efficiency, serviceability and cost of these ties. 1500 w. Ry & Engng Rev—March 15, 1902.

Experiments with Steel and Reinforced Concrete Ties. Illustrates and describes the experiments made by C. Buhrer on the L. S. & M. S. Ry. and on other roads. 3000 w. Ry & Engng Rev—Aug. 1, 1903.

Further Use of Steel and Reinforced Concrete Ties. Information regarding recent experiments made with ties other than wood. Also editorial. 4000 w. Ry & Engng Rev—Sept. 10, 1904.

Steel Ties Coming. Remarks on the growing scarcity of wood, and its displacement by steel, with brief notice of works being erected for the manufacture of steel ties on a large scale. 900 w. Loc Engng—June, 1902.

See also Concrete Reinforced.

Steel, Gouchet.—Railway Cross Ties of Cast Steel (Traverses de Chemin de Fer en Acier Moulé). Ph. Rousseau. Illustrated description of steel cross ties and rail fastenings invented by A. Gouchet, and used in France. 1500 w. Rev Tech—June 10, 1905.

Swiss, Steel.—See also **RAILWAY PERMANENT WAY**—Switzerland.

Texas R. R.—See **TIMBER PRESERVATION.**

Timber Preservation.—See Railway Congress; Von Schrenck; **TIMBER PRESERVATION.**

Treated.—See Railway Congress; Von Schrenk; **TIMBER PRESERVATION**—Cross Tie.

Trenail.—See **RAIL FASTENING.**

Von Schrenk.—The Cutting and Laying of Ties. Hermann von Schrenk. The importance of laying the tie so that the convex side of the annular rings is on the upper side. Ill. 600 w. R R Gaz—July 17, 1903.

Some Problems in the Use of Timber by Railroads. Hermann von Schrenck. Discusses the tie problem of supply, and timber preservation. 2000 w. Jour Worcester Poly Inst—May, 1904.

Proposed Improvements in Ties and Rail Fastenings. Abstract of Bulletin No. 50, published by the Bureau of Forestry, dealing with economical features of the production and use of ties and of forms of rail fastenings, prepared by Hermann von Schrenck. Ills. Also editorial. 9000 w. Ry & Engng Rev—June 11, 1904.

Ties and Timber Treatment. Hermann von Schrenck. A review of the best American practice at the present time. 2800 w. R R Gaz—Vol. XXXVIII., No. 18.

See also **TIMBER PRESERVATION.**

CROWDS.

Weight.—Some Recent Tests of the Weight of Crowds. L. J. Johnson. Describes in detail a series of three tests made to determine the weight of crowds per sq. ft. of surface. 1600 w. Eng News—April 14, 1904.

New Data on the Weight of a Crowd of People. Lewis J. Johnson. An account of experimental investigations, with illustrations, proving that the weight often reaches above 150 lbs. per sq. ft. 1800 w. Jour Assn Engng Soc's—Jan., 1905.

CROWN BOLT.

See **STAYBOLT.**

CRUCIBLE.

See also **ASSAYING; FOUNDRY; STEEL CASTING; STEEL METALLURGY.**

How Crucibles Are Made. H. C. Hovey. Interesting information relating to the process of manufacture, materials used, etc. 2000 w. Sci Am Sup—Nov. 24, 1900.

Clay.—Clays and Clay Crucibles. Percy Longmuir. Concerning the composition of crucibles, the apparatus required for making them, their life, etc. 2000 w. Ir Trd Rev—April 3, 1902.

Foundry.—Crucible Furnaces for Foundry Work (Tiegelöfen im Giessereibetriebe). C. Inesberger. Showing recent forms of crucible furnaces for making brass, bronze, gray-iron and steel castings. Serial. Part I. 3000 w. Stahl u Eisen—Feb. 1, 1904.

Old.—Some Uses for Old Crucibles. J. F. Buchanan. Remarks on the treatment of crucibles, with suggestions for their profitable use when old. 1700 w. Foundry—May, 1904.

CRUCIBLE STEEL.

See **STEEL**—Crucible.

CRUISER.

See also **ARMOURED CRUISER; NAVY; WARSHIP.**

The Cruiser. Com. William Hovgaard. Gives a brief historical review with a view to studying the relation between the development and the causes which have produced and governed it, and discusses the type and design of cruisers most suitable to existing conditions. 9500 w. 4 plates. (No. 5). Soc. Nav Archts & Marine Engrs—Nov. 16, 1905.

"Abdul Hamid."—See **ARMORED CRUISER**—"Hampshire."

"Adventure."—Notes on the Trials of H. M. S. Adventure. Illustrates and describes this vessel, of the scout class, and its equipment, giving tabulated results of the official trials. 2700 w. Engr, Lond—Aug. 4, 1905.

"Amazone."—German Third-Class Cruiser "Amazone." Brief description, with illustration. 500 w. Engr, Lond—Nov. 2, 1900.

American.—Comment on the New Type of United States Protected Cruisers. T. H. Thomas. Brief review of the history of the cruisers, St. Louis, Milwaukee and Charleston, the bids for construction of which were received on February 1. Ill. 1500 w. Marine Engng—March, 1901.

I. Armored Cruisers of the "Maryland" Class—"California." II. The Semi-Armored Cruisers of the "St. Louis" Class. III. The Sheathed Semi-Protected Cruisers of the "Denver" Class. Illustrated discussion of these vessels, noting features of special interest. 2500 w. Sci Am—Dec. 14, 1901.

See also **ARMORED CRUISER**; and under individual names.

"Askold."—The Russian Cruiser Askold. Illustration, with description, of a 6500-ton, 23-knot, protected cruiser. 1400 w. Engr, Lond—July 4, 1902.

"Attentive."—H. M. S. Attentive. Illustration, description, and report of trial. 700 w. Engr, Lond—Dec. 22, 1905.

"Birmingham."—See "Chester."

"Bogatyr."—New Russian First-Rate Protected Cruisers—Improved Bogatyr Type. An illustrated description of a vessel accepted as the standard for all future big protected cruisers in Russia. 1200 w. Engr, Lond—Feb. 8, 1901.

The New Russian High-Speed Cruisers. Facts concerning the four new cruisers ordered, which follow exactly the lines laid down for the Bogatyr. Elevation, deck plan and cross-section are given. 1700 w. Engr—May 24, 1901.

The Protected Cruiser "Bogatyr" (Der Geschützte Kreuser, "Bogatyr"). A detailed description of the protected cruiser built by the Vulkan Works at Stettin for the Russian government, giving especially details of the propelling machinery, water-tube boilers, etc. 4000 w. 8 plates. Zeitschr d Ver Deutscher Ing—Nov. 22, 1902.

The Russian First Class Cruiser "Bogatyr." Illustrated detailed description of vessel designed to meet conditions required by the Russian Government, and of the armament, its protection, etc. Serial. 1st part. 4200 w. Engng—Feb. 13, 1903.

"Cécille" and **"Suchet."**—The French Cruisers "Cécille" and "Suchet" at New York. Illustrations, with brief descriptions of these vessels. 800 w. Sci Am—Nov. 3, 1900.

"Charleston."—U. S. S. Charleston. M. E. Reed. Description and report of official trial. Ills. 15700 w. Jour Am Soc of Nav Engrs—Aug., 1905.

"Chattanooga."—The U. S. S. Chattanooga. W. W. White. General description of the vessel and its equipment, with report of standardisation and official trials. 8000 w. Jour Am Soc of Nav Engrs—Feb., 1905.

See also **LAUNCHING**.

"Chester."—New Scout Cruisers Chester, Birmingham and Salem. W. F. Sicard. A detailed description of this class of vessels and the equipment, with comparison with the new British scouts. 4000 w. Jour Am Soc of Nav Engrs—May. 1905.

"Cleveland."—The U. S. S. Cleveland. F. C. Bowers. General description, with illustrations and report of official trial. 10800 w. Jour Am Soc of Nav Engrs—Nov., 1903.

"Denver."—The U. S. S. Denver. Com. W. H. Naumann. Illustrations, general description, and report of official trial. 8800 w. Jour Am Soc of Nav Engrs—Feb., 1904.

"Des Moines."—Launch of the Des Moines. Illustration with particulars relating to the construction and equipment of this cruiser. 2000 w. Naut Gaz—Sept. 25, 1902.

U. S. S. Des Moines. Lieut. Walter Ball. General description, with report of official trial. 2300 w. Jour Am Soc of Nav Engrs—Feb., 1904.

"Europa" and **"Spartiate."**—See **BOILER, MARINE.**

"Forward."—H. M. Scout "Forward." An illustrated description of this vessel and its equipment, with a report of her most satisfactory performance. 1800 w. Engng—May 19, 1905.

"Galveston."—The U. S. S. Galveston. General description, with report of standardisation, official, and endurance trials. 2000 w. Jour Am Soc of Nav Engrs—Aug., 1905.

See also **LAUNCHING—Side.**

"Jurien de la Gravière."—The French Cruiser Jurien de la Gravière. Illustration, and a comparison with the British vessel "Hyacinth." 1000 w. Engr, Lond—Nov. 15, 1901.

Lines.—On the "Lines" of Fast Cruisers. C. C. P. Fitz Gerald. Read before the Inst. of Naval Archts. A discussion of this subject, with some comparisons. Ill. 1500 w. Engng—April 3, 1903.

"Medjidieh."—Official Trial and Description of the Imperial Ottoman Cruiser Medjidieh. Illustrated. 1800 w. Marine Engng—March, 1904.

Mercantile.—On Mercantile Cruisers Fitted with Housing Propellers. James Hamilton. Read before the Inst. of Nav. Archts. (England). Suggests a means by which it may be possible, when on passenger service, by holding in reserve a part of the total power provided in the ship, to save a large portion of the proposed subsidies, or the portions connected with running the vessels on passenger service. Also discussion. 2800 w. Engng—July 3, 1903.

Military Capabilities.—The Military Capabilities of Cruisers (La Guerra di Crociera). Romeo Bernotti. An examination of the strength and weakness of high-speed cruisers in modern naval warfare. 10000 w. Rivista Marittima—Jan., 1904.

"Minerva" and **"Hyacinth" Trials.**—See **BOILER, MARINE.**

"Niitaka" and **"Tsushima."**—New Japanese Cruisers Niitaka and Tsushima. Illustrates and describes these absolutely Japanese vessels; designed and built by Japanese, and all their material, armor, machinery, ammunition and guns obtained from the Japanese factories. 1400 w. Eng, Lond—Jan. 24, 1902.

"Novik."—The Russian Warship "Novik." A discussion of this fast cruiser and of torpedo boats and craft built to prey upon them. Also a description of the vessel. Ill. 2000 w. Engr, Lond—Nov. 16, 1900.

The Russian 25-Knot Cruiser Novik. A critical discussion of the value of this class of vessels, with illustrations. 2000 w. Engr, Lond—Oct. 11, 1901.

The Novik, the Swiftest Cruiser in the World (Nowik, der Schnellste Kreuzer der Welt). Illustrated description of the 3000 ton cruiser built by Schichau for the Russian government, and which has made a trial speed of 26 knots on a 6 hour run and 27 knots on a measured mile. 1200 w. Schiffbau—Jan. 8, 1903.

"Olympia."—Repairs and Alterations to the U. S. S. Olympia. William P. Robert. An illustrated article describing the extensive repairs made to bring the vessel thoroughly up to its fighting efficiency, and to refit and adorn it in memory of the prominent part it took at Manila. 5000 w. Marine Engng—April, 1902.

Russian High Speed.—See **"Askold"**; **"Bogatyr"** Type; **"Novik."**

"Salem."—See "Chester."

Scout.—A Design for a Fast Scout. C. C. P. Fitzgerald. Read before the Brit. Inst. of Naval Archts. Describes a design for a scout of high speed and good sea-going qualities, and gives reasons for proposing such a vessel. 1400 w. Engng—March 29, 1901.

Naval Scouting and Despatch Vessels. Rear-Admiral S. Eardlay-Wilmot. Remarks called out by the paper on "A Design for a Fast Scout," by Vice-Admiral Fitzgerald, and its discussion, and not favorable to special vessels. 1400 w. Engr, Lond—April 26, 1901.

Sea Scouting. Editorial explaining the importance of these vessels, their use in warfare, and the requirements. 2800 w. Engng—April 22, 1904.

Scouts. Gives comparative data of some typical cruisers intended for scouting purposes, with information concerning this type of vessel, and remarks on its value as a warship. 1500 w. Engr, Lond—March 17, 1905.

Bids for Scout Cruisers. Gives the bidders and their proposals, with description of the cruisers. 3000 w. Marine Rev—April 20, 1905.
See also "Adventure"; "Attentive"; "Chester"; "Forward"; "Novik"; "Sentinel."

"Sentinel."—The New Scouts for the King's Navy. Illustrated description of the "Sentinel," with report of the trials, and discussion of designs for this class of vessels. 2500 w. Engng—Feb. 3, 1905.

The English Scout-Cruiser Sentinel. Emile Guarini. Illustrated general description of 25-knot, 2920-ton, 17500 horse power vessel, 340 feet long, built by Vickers Sons & Maxim, Ltd., and her trial trip. 800 w. Marine Engng—Sept., 1905.

Steam Turbine.—See STEAM TURBINE—"Amethyst" Trials.

"Suchet."—See "Cécille" and "Suchet."

Swedish.—Swedish Cruisers with Superposed Turrets. Illustrated description of a vessel embodying novel features in gun placing. 800 w. Engr, Lond—April 19, 1901.

"Tacoma."—The U. S. S. Tacoma. Lieut. U. T. Holmes. General description, with report of official trial. 9000 w. Jour Am Soc of Nav Engrs—Feb., 1904.

Trial Trip of the U. S. Protected Cruiser Tacoma. Illustration, with description of the vessel and its machinery and report of trial. 1000 w. Marine Engng—May, 1904.

"Tsushima."—See "Niitaka."

"Variag" Trials.—Speed Trials of the "Variag." An account of the contract performance, which exceeded the requirement by 1-4 knot, maintaining a speed of 23 1-4 knots for twelve consecutive hours, under natural draft. Ill. 1500 w. Jour Am Soc of Nav Engs—Nov., 1900.

"Vineta."—His Imperial German Majesty's Cruiser "Vineta." Richard Inch. Describes the main engines, auxiliary machinery, boilers, etc. Ill. 3800 w. Jour Am Soc of Naval Engrs—Feb., 1902.

CRUSHED STEEL.

See ABRASIVE—Steel.

CRUSHING.

See also BRIQUETTING; COKE MANUFACTURE; CYANIDE PROCESS; GOLD MILLING; ORE TREATMENT; STAMP MILL.

Quarrying and Crushing Stone. J. Crow Taylor. Information of interest in regard to the stone-crushing industry, giving figures relating to the quarrying and crushing of limestone. 2000 w. Munic Engng—May, 1905.

Ball Mill.—The Action of Ball Mills (Der Arbeitsvorgang in Kugelmühlen). Hermann Fischer. An examination of the action of pulverizers in which steel balls are used in a revolving cylinder. Photographs at various speeds are given. 2500 w. Zeitschr d Ver Deutscher Ing—March 26, 1904.

Ball Mill, Ferraris.—The Ferraris Ball Mill. Walter Renton Ingalls. An illustrated detailed description of a new device, designed especially for wet crushing, with remarks. 1400 w. Eng & Min Jour—Nov. 28, 1903.

Blake.—Crushing for Concentrating Work. Discussing the process of crushing; the types of machines, with special reference to the Blake crusher. Ills. 3000 w. Mines & Min—Dec., 1904.

Coal.—See BRIQUETTING; COAL CRUSHING; COKE MANUFACTURE; POWDERED COAL.

Cyanide Process.—See CYANIDE PROCESS—Black Hills; Crushing.

Kalgoorlie.—See GOLD METALLURGY.

Roll.—Elements in the Design of Roll Crushing Plants. Jesse Scobey. Considers improvements made in rolls since they have been used for fine crushing, and results obtained. 2500 w. Min & Sci Pr—June 1, 1901.

Crushing with Rolls. R. K. Humphrey. Remarks on methods of crushing, with a discussion of the modern crushing rolls, and their troubles. 2200 w. Eng & Min Jour—Jan. 12, 1905.

Springs on Crushing Rolls. Lewis Searing. Considers the disadvantages of the spring rolls, and the superiority of rigid rolls. 900 w. Eng & Min Jour—April 6, 1905.

Sectional.—A Sectional Rock Crusher for Mining Work. Description, with illustrations of details of ore crusher weighing 7300 lbs., the heaviest parts only 300 lbs. 600 w. Eng News—Aug. 18, 1904.

Speed Variation.—The Effect of Variation in the Speed of Crushing Machinery Upon the Production of Undersized Material. H. W. Gartrell. An investigation of this subject showing that while decrease of speed tends to decrease the production of undersized material, it does so in a degree so small that it is disproportionate to the disadvantage of decreased capacity. 1200 w. Sch of Mines Qr—Nov., 1905.

Stages.—I. A System of Crushing Rock in Stages by Wet Process and Suggestions as to How This Object Can Best Be Achieved. Edward D. Chester. II. A Further System of Crushing Rock in Two Stages, by Dry Process, with High-Class Cross-Grinding Rolls. Wegerif Type. Two papers with discussion. Ill. 7400 w. Jour Chem & Met Soc of S Africa—June, 1903.

A System of Crushing Rock in Stages by Wet Process and Suggestions as to How This Object Can Best Be Achieved. Edward D. Chester. A discussion of this paper taken as read. 1500 w. Jour Chem, Met & Min Soc of S. Africa—July, 1903.

A System of Crushing Rock in Stages by Wet Process and Suggestions as to How This Object Can Best be Achieved. Continued discussion of paper by Edward D. Chester, taken as read. 800 w. Jour Chem, Met & Min Soc of S Africa—Oct, 1903.

Modern Crushing and Grinding Machinery. Philip Argall. Explains the writer's reasons for advocating crushing by "sucessive comminution." 1500 w. Eng & Min Jour—May 11, 1905.

Stamp Mill. — See GOLD MILLING— Transvaal, STAMP MILL.

Tube Mill.—See GOLD MILLING.

Water Power. — Rock Crushing by Water Power. R. T. Mishler. Describes experiments made with the object of developing a method of calculating the horse power of a water motor, and determining the work required to crush different ores when the crusher is run at different speeds. 1700 w. Cal Jour of Tech—Nov., 1904.

CRYSTAL PALACE.

See also AUTOMOBILE EXHIBITION.

London.—Engineering Details at the Crystal Palace. An illustrated description of work representing the practice of a generation ago by men of professional eminence. Serial. 1st part. 3000 w. Engr, Lond—Feb. 1, 1901.

CRYSTOPHENES.

See ICE SHEETS.

CUBA.

See also COPPER; IRON REGION; MINERAL REGION.

The Situation in Cuba. Marrion Wilcox. The attitude of the United States is discussed and severely criticised. 4000 w. N Am Rev—Dec., 1902.

Notes on Cuba. W. J. Morgan. An illustrated article giving information of roads and railroads, climate, soil, etc. 1800 w. Ry & Loc Engng June, 1905.

CULVERT.

See also ARCH; BRIDGE—Railway Standards; CONCRETE REINFORCED; RAILWAY CONSTRUCTION.

An Eighteen-foot Culvert, Bangor & Aroostook Railroad. Moses Burpee. An illustrated description, explaining the reason for making the span large, and also describing the construction. 800 w. Eng Rec—July 23, 1904.

The Design of Arch Culverts. Daniel B. Luten. Illustrates and describes the standard designs adopted by most American railways and presents the advantages of the flat arch. 1400 w. Eng News—June 13, 1901.

Brick-Arch.—The Design and Construction of a 50-ft. Brick Arch Culvert Across Rock Creek, Washington, D. C. W. J. Douglas. An illustrated article giving the history of the work and an account of its design and construction. 5200 w. Eng News—Dec. 25, 1902.

Concrete.—Concrete Arch Culvert, L. E. & D. R. Ry. Plans, illustrations and specifications for a culvert of 20 ft. space, recently constructed over Little Cedar Creek, on the Lake Erie & Detroit Ry. 700 w. Ry & Engng Rev—Dec. 15, 1900.

See also **CONCRETE.**

Concrete—Reinforced.—Design of a Concrete-Steel Arch Culvert. Daniel B. Luten. On the treatment of this material, and discussion of principles of construction. Ill. 2500 w. R R Gaz—Aug. 1, 1902.

Directions for Making Concrete-Steel Slab Culverts and Bridges. Abstracted from Bul. No. 7, N. Y. State Engineer. Directions for the work, illustrating details. 800 w. Eng News—Dec. 29, 1904.

The Iowa State Highway Commission's Designs for Culverts. T. E. McDonald. Read before the Iowa Cement Users' Assn. On designs for reinforced concrete box culverts, and their construction. 2500 w. Munic Engng—May, 1905.

See also **Kalamazoo; CONCRETE REINFORCED—Bridge and Culvert.**

Concrete Surfacing.—Methods of Surfacing Concrete Culverts. George W. Lee. Illustrates and describes the new culverts on the Pennsylvania Division of the New York Central R. R., and the methods of construction. 700 w. Eng News—March 19, 1903.

Italian Railway.—See **CONCRETE REINFORCED—Bridge and Culvert.**

Kalamazoo.—A Concrete-Steel Culvert for Stream Diversion at Kalamazoo, Mich. George S. Pierson. A statement of the conditions and an illustrated description of the work. 2100 w. Eng News—Feb. 12, 1903.

Rail Top.—Rail Top Culverts. Albert Reichmann. Illustrates and describes the class of culverts built by the Chicago, Milwaukee St. Paul Ry. Co. Discussion. 2700 w. Jour W Soc of Engs—Feb., 1901.

Rock Creek, Washington, D. C.—See **Brick Arch.**

Size.—Determining the Size of Railroad Culverts. S. Whinery. Discusses the elements that must enter into such a computation, and method of arriving at the proper capacity. 4000 w. R R Gaz—Dec. 26, 1902.

Warped Ends.—Warped Ends for Concrete Arch Culverts. Daniel B. Luten. Illustrates and describes four structures built under the writer's supervision in which wings and parapets were omitted, the arched ring being finished in the warped-end style, giving reasons for the adoption. 1700 w. R R Gaz—Oct. 3, 1902.

CUPEL.

See **ASSAYING.**

CUPOLA.

See **DOME; FOUNDRY.**

CUPRO-SILICON.

See **COPPER ALLOY—Silicon.**

CURB.

See **CEMENT PAVEMENT—Curb.**

CURLING.

Sheet Metal:—See **SHEET METAL—Punching and Curling.**

CURRENTS.

Electric.—See **ELECTRIC CURRENT.**

Ocean.—See **OCEAN CURRENTS.**

CURVE.

Alternating Currents.—See **ELECTRIC CURRENT, ALTERNATING—Wave.**

Compound.—See **RAILWAY CURVE.**

Formulae.—Special Methods of Determining Groups of Curves Representing Engineering Formulae. W. F. Durand. Describes methods the use of which where applicable, will effect a great saving of labor. 3000 w. Sib Jour of Engng—May, 1903.

Railway.—See **RAILWAY CURVE.**

CUT-OUT.

See **ELECTRIC PROTECTIVE APPARATUS—Cut-Outs.**

CUTTER.

Gear.—See **GEAR CUTTING.**

Grinder.—See **GRINDING—Walker.**

Hardening.—See **HARDENING—Cutters.**

Steam.—See **BOAT, STEAM.**

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See also **Hendryx; Riecken.**

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See also **FILTER PRESS; GOLD METALLURGY.**

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Hidden Fortune.—See Black Hills.

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Lime.—Use of Lime as an Alkaline Reagent in Cyaniding. Ernest Gayford. An account of tests made at the Mercur Mill, Manning, Utah, to ascertain the cause of the abnormal consumption of cyanide, giving results. 1200 w. Min & Sci Pr—Jan. 3, 1903.

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See also Slimes; **GOLD METALLURGY.**

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The Extraction of Gold from Cyanide House Slimes by a Wet Method. John Fleming. Sketches a process tried by the writer, describing two experiments made, and discussing results. Ill. 5000 w. Jour Chem & Met Soc of S Africa—April, 1903.

See also **Filter Press; ELECTRO-METALLURGY; GOLD METALLURGY.**

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See also **Black Hills; Crushing; Maitland.**

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Sulpho-Telluride Ores.—Cyaniding Sulpho-Telluride Ores. Philip Argall. Compares the method of working ores in the raw state, by means of fine grinding and subsequent treatment with bromo-cyanide, known as the Diehl process, with the roasting method as practiced on the ores of Cripple Creek. 2000 w. Eng & Min Jour—July 11, 1903.

Sumatra.—Estimation of the Chief Constituents in Cyanide Solution. J. E. Clennell. Describes a method which has been in successful use in testing the solutions obtained in the treatment of gold and silver bearing ore at the Redjang Lebong mine, Sumatra. 2500 w. Eng & Min Jour—June 29, 1905.

Tailings.—When to Begin Treatment of Cyanide Tailings. Henry M. Crowther. Suggests a profitable method of retreatment when conditions are favorable. 1500 w. Eng & Min Jour—Dec. 22, 1900.

The treatment of Highly Acidic Tailings by the Cyanide Process. F. B. Stevens. An account of difficulties encountered in treating the large heaps of accumulated tailings of the Transvaal gold fields. 1700 w. N Z Mines Rec—Jan. 16, 1901.

Cyaniding Stamp Mill Tailings in Western America. William Magenau. A description of the Dexter Gold Mining Company's plant at Tuscarora, Nevada. 8300 w. Mines & Min—Feb., 1901.

The Tailings Cyanide Plant of the Homestake Mine, South Dakota. Charles H. Fulton. Abstract from Bulletin No. 5, South Dakota School of Mines. Describes a plant which satisfactorily treats the tailings pulp of three mills. The company does not print the disclosure of information concerning the technical working of their plant. Ill. 1200 w. Min Rept—March 13, 1902.

Cyaniding Tailings in Sierra Co., Cal. H. R. Case. An account of treatment at the Young America quartz mine, near Sierra City. 1000 w. Min & Sci Pr—May 16, 1903.

Some Suggestions on the Cyaniding of the Tailings. Prof. A. Prister. Describes a proposed working method which the writer considers worth a serious discussion. 2000 w Jour Chem, Met & Min Soc of S Africa—June, 1905.

See also **ELEVATOR.**

Testing Ores.—Testing Ores for Cyanide Treatment. R. Stuart Browne. Remarks on the value of laboratory work and on the tests for cyanide treatment. Serial. 1st part. 1800 w. Min & Sci Pr—Jan. 2, 1904.

Synthetic.—The Synthetic Cyanide Process. Dr. Fritz Roessler. Extract from a paper read at the Berlin International Cong. of Ap. Chem. Brief comment on the four processes furnishing mainly the world's supply—the Siepermann, the Beilby, the Raschen, and the improved Castner process. 500 w. Jour Gas Lgt—July 14, 1903.

Tonopah.—See **GOLD MILLING.**

Transvaal.—Some Further Improvements in Appliances for the Cyanide Clean-Up. D. V. Burnett. Describes the process as adopted at the present time on the Crown Deep, Ltd. Ills. 1500 w. Jour Chem, Met & Min Soc of S Africa—Dec., 1904.

See also **GOLD METALLURGY.**

Victoria.—See **GOLD METALLURGY.**

Virginia City, Nev.—See **Sand.**

Wet-Crushing.—See **Black Hills, S. D.; Crushing.**

Witwatersrand.—See **Transvaal; GOLD METALLURGY—Transvaal.**

Zinc Box Residue.—See **ASSAYING; CYANIDE.**

Zinc Consumption.—Consumption of Zinc on Cyanide Plants. Walter H. Virgoe. Considers the loss due to mechanical and to chemical causes, and the excessive losses, discussing questions bearing upon this subject and defending the use of zincic potassic-cyanide. 9000 w. Jour Chem & Met Soc of S Africa—Aug., 1903.

Zinc Precipitates.—The Refining of the Precipitates Obtained by Means of Zinc in the Cyanide Process of Gold and Silver Extraction. G. Howell Clevenger. Explains the nature of precipitates, giving a report of experimental work upon alloys; reviews the present methods of refining, concluding that smelting with lead, after the removal of the zinc, is best. 8500 w. Trans Am Inst of Min Engrs—Oct., 1903.

Some Studies on "the White Precipitate" Formed in the Zinc Boxes of the Cyanide Works. Prof. A. Prister and Dr. B. Bay. Gives analyses made to determine the total cyanide, and the bases present in the white precipitate. Brief discussion. 4500 w. Jour of Chem, Met & Min Soc of S Africa—Sept., 1904.

Zinc Solutions.—A Method of Testing Cyanide Solutions Containing Zinc. Leonard M. Green. Read before the Inst. of Min. & Met., London. Proposes a method of analysis by which satisfactory technical results can be obtained with a fair degree of accuracy and in a reasonably short time. Serial. 1st part. 1100 w. Min Rept—Dec., 1901.

CYANOGEN.

See **CYANIDE; CYANIDE PROCESS.**

CYLINDER.

See also **GAS ENGINE; GASOLINE ENGINE; LOCOMOTIVE CYLINDER; STEAM ENGINE; STEAM ENGINEERING.**

Accident.—See **STEAM ENGINE ACCIDENT—Water in Cylinder.**

Boring.—See **BORING—Cylinder.**

Breakage at Sea.—The Breakage and Renewal of a Large Cylinder. Hector MacColl. An account of a cylinder broken at sea, the work of renewal, and the lessons learned from the occurrence. Plate. 1200 w. Trans Inst of Engrs & Shipbuilders of Scotland—Oct. 25, 1904.

Castings.—See **CASTING—Cylinder; Gas Engine Cylinder.**

Computations.—Thick Cylinders. John S. Holliday. Gives a set of curves designed to save time and mathematical work involved in the solution of problems of Lamé's formula. 800 w. Mach, N Y—Sept., 1905.

Cutting.—Cutting of Cylinders. Charles H. Garlick. Discusses the causes of cutting. 1500 w. Engr, U S A—Sept. 1, 1903.

Dimensions.—Cylinder Dimensions and Engine Economy. Sterling H. Bunnell. Gives diagrams, illustrating the principles governing the wire selection of the dimensions for an engine, with explanatory remarks. 2400 w. Power—March, 1905.

Gas Engine.—Size of Gas and Oil Engine Cylinders. Gives calculations for ordinary four-cycle single-acting engines. 700 w. Prac Engr—Aug. 11, 1905.

Handling.—Moving a Cylinder. Illustrated directions for loading and unloading on cars or wagons. 2000 w. Power—Aug., 1901.

Hollow Tests.—Tests of Hollow Cylinders Subjected to Internal Pressure (Essais à la Traction sur Cylindres Creux Soumis a des Pressions Intérieures). Dr. C. de Sally. Paper before the Budapest Congress of the International Assoc. for the Testing of Materials, giving the theory and results of experiments. Serial. 1st part. 4000 w. Revue Technique—Jan. 10, 1902.

Hydraulic.—The Strength and Proportion of Hydraulic Cylinders. Frank B. Kleinhans. Considers method of determining the thickness of the wall needed. Ill. 900 w. Am Mach—March 26, 1903.

Joy Assistant.—See **MARINE ENGINE—Assistant Cylinder.**

Locomotive.—See **LOCOMOTIVE CYLINDER.**

Oil Engine.—See **Gas Engine; OIL ENGINE.**

Repairing.—Repairing a Broken Cylinder. H. M. Lane. An illustrated description of the work. 1000 w. Trans Am Soc of Mech Engrs, No. 0940—May, 1902.

Steam Engine.—See **STEAM ENGINE—Cylinder.**

CYLINDER CONDENSATION.

See **STEAM ENGINEERING.**

CYLINDER HEAD.

See **MATERIALS' STRENGTH; PLATE.**

CYLINDER OIL.

Testing.—See **LUBRICATION.**

D

DAM.

See also **DAM FAILURE; HYDRO-ELECTRIC PLANT; IRRIGATION; RESERVOIR; RETAINING WALL; RIVER REGULATION; SPILLWAY; WATER TOWER; WATER WORKS; WEIR.**

Amsterdam, N. Y.—A New Dam and Storage Reservoir at Amsterdam, N. Y. An illustrated description of a curved dam, 450 feet long, with a cement masonry core wall 63 1-2 feet high, making a reservoir with an area of 180 acres and a capacity of 1,200,000,000 gallons. 1500 w. Eng Rec—Dec. 27, 1902.

Arched Concrete.—See **Barossa, Australia.**

Assuan.—The Assuan Dam and Reservoir on the River Nile. Clarence T. Johnston. Brief illustrated description, with information relating to the operation, cost, etc. 2200 w. Eng News—Aug. 14, 1902.

The Nile Irrigation Works. An illustrated article describing the great dam at Assouan, the locks, sluices, etc. 2000 w. Sci Am—Sept. 20, 1902.

The Assouan Dam and the Assiout Weir. A general history of these great reservoir works on the Nile, with illustrations. Serial. Part I. 2000 w. Engr, Lond—Dec. 12, 1902.

The Assuan Dam. An editorial review of this great engineering work for regulating the flow of the Nile and supplying irrigation water. 3000 w. Engng—Dec. 12, 1902.

The Opening of the Assouan Dam. An illustrated account of this recently completed work, with a review of the great engineering works of Egypt, the condition of the land, etc. 3300 w. Sci Am Sup—Jan. 10, 1903.

Completion of the Nile Dams. John Ward. An illustrated article describing interesting features of these recently completed reservoirs, with information in regard to the region. 2000 w. Cassier's Mag—Feb., 1903.

The Nile Reservoir. Some particulars relating to the construction of this great engineering work and the effect it will have on the country. 700 w. U S Cons Repts, No. 1568—Feb. 11, 1903.

The Assuan Dam and the Irrigation of Egypt (Das Stauwerk bei Assuan und die Bewässerung Aegyptens). Karl Grünhut. An illustrated historical and descriptive review of projects for irrigating Egypt, and particularly of the Assuan dam. Maps. 1 plate. 3500 w. Oesterr Wochenschr f d Oeff Baudienst—April 11, 1903.

The Nile Dams (Die Stauwerke des Nils). A general account of the works at Assouan and Assiout, with map, sections, and photographs. Two articles. 3000 w. Schweiz Bauzeitung—April 16, 23, 1904.

Masonry Dams. An editorial reviewing the paper of Atcherly and Pearson upon disregarded points in the stability of masonry dams, showing the relation of the theory to the Assouan dam. 2000 w. Engr, Lond—March 31, 1905.

The Safety of the Assuan Dam. Reviews facts concerning the structure, and the recently printed opinions of Mr. Atcherly. 2000 w. Eng Rec—April 22, 1905.

The Stability of Masonry Dams. A review of the application of the theory of Atcherly and Pearson to the stability of the Assouan dam, showing the importance of considering the vertical stresses. 1800 w. Engng—March 31, 1905.

The Assuan Dam. Reports an interview with Sir William Willcocks, discussing the difficulties due to erosion, and other matters relating to the design. 1200 w. Engr, Lond—June 9, 1905.

See also **IRRIGATION—Egypt; RIVER REGULATION—Nile; WATERWAY—Nile.**

Assuan Sluice Gates.—Great Sluice Gates of the Nile Irrigation Works. Brief illustrated description of the device employed. 700 w. Sci Am—Oct. 12, 1901.

Atcherly Theory.—See **Assuan.**

Atlanta, Ga.—Rubble Concrete Dam for the Atlanta Water & Electric Power Co. Illustrated detailed description of an interesting construction. 1800 w. Eng News—July 7, 1904.

Austin, Texas.—See **DAM FAILURE.**

Avignonnet, France.—The Avignonnet Dam (Die Talsperre von Avignonnet). C. Andrae. A description of the dam across the river Drac in the Avignonnet valley, Isère, France, in connection with the development of hydraulic power. The entire structure is of concrete. Two articles. 3000 w. Schweiz Bauzeitung—Dec. 19, 26, 1903.

See also **HYDRO-ELECTRIC PLANT.**

Baker, Milton, Boston.—Concrete Dam and Concrete Steel Subway for Walter Baker & Company, Limited. Drawings and description of interesting concrete work at Milton, near Boston, Mass. 1500 w. Eng Rec—Aug. 6, 1904.

Baltimore Waterworks.—The High Earth Dam Forming Druid Lake, Baltimore Waterworks. Alfred M. Quick. An illustrated description of this dam, supposed to be the highest earth dam in the world, and the unusual plan followed in its construction. 1500 w. Eng News—Feb. 20, 1902.

Barossa, Australia.—The Barossa Arched Concrete Dam in South Australia. Alex. B. Moncrieff. Illustrated description of the highest arched concrete dam in Australia, with information concerning it. 1000 w. Eng News—April 7, 1904.

Memorandum in re Arched Concrete Dam at Barossa, South Australia. Alex. B. Montcrieff. An illustrated article especially dealing with the details of the concrete used in the construction.

2500 w. Trans Assn of Civ Engrs of Cornell Univ—1905.

The Barossa Dam, Southern Australia. Emile Guarini. Illustrations, with brief description, of a curved concrete dam recently finished. 700 w. Sci Am—April 1, 1905.

Beaver, Ohio.—See **Movable.**

Benton Mills, Cal.—The Benton Mills Dam, Mariposa County Cal. Diagrams, illustrations and description of the method of construction. 1000 w. Min Sci Pr—Jan. 18, 1902.

Betwa, India.—Automatic Drop Shutters for the Betwa Irrigation Dam, India. Herbert M. Wilson. A brief outline of the works with an illustrated description of these shutters and their action. 1000 w. Eng News—June 4, 1903.

Beverly, Mass.—Dams for the New Plant of the United Shoe Machinery Co., Beverly, Mass. Describes the construction of two concrete and one earth dam. 3000 w. Eng Rec—Sept. 2, 1905.

Bohio.—The Bohio Dam. George S. Morison. Concerning the dam by which the summit level must be maintained on the route of the Panama Canal, describing the formation of the country and the engineering difficulties, and discussing three methods of taking cars of the Chagres floods while the dam is building. Ill. 6500 w. Pro Am Soc of Civ Engrs—Jan., 1902.

The Bohio Dam. Continued discussion of pa- George S. Morison. Maps. 10,800 w. Pro Am Soc of Civ Engrs—March, 1902.

The Bohio Dam. Discussion of the paper by per on this subject, by George S. Morison. Ill. 10300 w. Pro Am Soc of Civ Engrs—April, 1902.

A Plan for Constructing Dams at Great Depth in Water-Bearing Material, With Especial Reference to the Bohio Dam. J. T. Ford. An illuslustrated description of the method of construction proposed by the writer, with reasons why other proposed plans are not approved. 2000 w. Eng News—Nov. 6, 1902.

See also **Wachusett North Dike; CANAL—Panama.**

Bohio, Borings.—The Borings for the Bohio Dam for the Panama Canal. R. C. Smith. An illustrated article giving a brief description of the method of making these borings, the difficulties encountered, and the results obtained. Also discussion. 8000 w. Jour W. Soc of Engrs—Aug., 1903.

Boonton, N. J.—The New Water-Works of Jersey City. An illustrated article giving information of work on the Boonton dam of the Jersey City water-works, and detailed description. Also describes the building of the core wall at the Parsippany dyke. 4800 w. Eng Rec—Aug. 8, 1903.

Boston, Mass.—See **Charles River.**

California, Southern.—The Five Dams and Wood Stave Conduit of the Southern California Mountain Water Co. An outline of the completed and projected works of this company, describing the five dams and giving details of the wood stave conduit. Map and illustrations. 2000 w. Eng News—April 7, 1904.

Castlewood, Colo.—Reconstruction of the Castlewood Dam. Illustrated description of a method of reinforcing a high rock-fill dam by means of an earth embankment on its up-stream face. 500 w. Eng Rec—July 12, 1902.

Charles River, Boston.—A Study of the Geology of the Charles River Estuary and Boston Harbor, with Special Reference to the Building of the Proposed Dam Across the Tidal Portion of the River. W. O. Crosby. Investigations made to learn how far these channels had their origin in tidal scour, and to learn the character of the ground on which the dam would have to be built. 13000 w. Tech Quar—June, 1903.

Review of the Report of the Charles River Dam Commission. Leonard Metcalf. Substance of the very interesting report of the Massachusetts Commission. 5000 w. Tech Rev—Oct., 1903.

The New Charles River Dam and Basin at Boston, Mass. J. Albert Holmes. An account of the plans being matured for the construction of this dam, stating the conditions. 1100 w. Eng News—Oct. 6, 1904.

The Charles River Dam and Lock at Boston. John N. Ferguson. Illustrated article showing the location, arrangement and style of construction of the dam and work in connection. 2500 w. Eng Rec—Nov. 26, 1904.

The Charles River Dam and Basin at Boston and Cambridge, Mass. J. Albert Holmes. Treats principally of the foundations of the lock and sluices and the proposed shut-off dam. Ills. 2500 w. Eng News—Jan. 12, 1905.

See also **EARTH MOVEMENT—Boston.**

Cheesman.—See **WATERWORKS—Denver, Colo.**

Chesuncook, Me.—The Chesuncook Timber Dam. J. W. Tower. Illustrated description of the construction of a dam in Maine. 900 w. Eng Rec—July 16, 1904.

Timber Dam at the Outlet of Chesuncook Lake, Penobscot River. J. W. Tower. Illustrates and describes the construction. 800 w. Eng News—Sept. 1, 1904.

Cheyenne, Wyo.—Masonry Dam for the Granite Springs Reservoir, Cheyenne, Wyo. A. J. Wiley. An illustrated article explaining conditions at Cheyenne, and describing this dam and the methods of construction and appliances. 4800 w. Eng Rec—June 24, 1905.

Masonry Dam for the Granite Springs Reservoir, Cheyenne Water-Works. A. J. Wiley. Slightly condensed from the author's report to the city of Cheyenne, Wyo. Illustrated detailed description of this dam, the methods of construction, and conditions. 5500 w. Eng News—June 29, 1905.

Clinton, Mass.—See **Wachusett.**

Columbus, O.—The Scioto River Storage Dam at Columbus, Ohio. John H. Gregory. An explanation of conditions at Columbus, and the need of additional supply, describing the dam and reservoir which are now under construction. Ills. 4000 w. Eng Rec—Sept. 9, 1905.

Concrete.—See **London, Ont.; Lynchburg, Va.; Middle Falls, N. Y.**

Concrete Arched.—See **Barossa, Australia.**

Concrete Core.—A Remarkable Core Wall for an Earth Dam. Describes the building of a concrete and puddle core wall to a depth of 105 ft. below the surface of the ground for a dam rising but 23 ft. above the surface, near Plymouth, Eng. 1900 w. Eng Rec—Dec. 21, 1901.

Earth Dams with Concrete Core Walls. Clemens Herschel. Gives the writer's views and methods on this subject as expressed in a discussion, with a history of, and justification of this form of constructure. 2800 w. Eng News—Sept. 7, 1905.

Concrete Reinforced.—See **Danville, Ky.; Fenelon Falls; Redridge.**

Concrete Reinforced, Hollow.—A Hollow Concrete-Steel Dam at Theresa, N. Y. Sectional drawing photographs and brief description of a dam of reinforced concrete. 450 w. Eng News—Nov. 5, 1903.

A Hollow Reinforced Concrete Dam at Schuylerville, N. Y.—Illustrated detailed description. 2000 w. Eng News—April 27, 1905.

Copper Age, Colo.—See **RESERVOIR.**

Core.—See **Concrete Core; Earth; Macadam Core.**

Croton.—The Croton Dam for the Water Supply of New York City. Illustrations and brief description of this work, and discussion of some changes that may be considered desirable. 1200 w. Sci Am—Sept. 21, 1901.

Report Recommending Changes in the New Croton Dam and Jerome Park Reservoir. Report submitted to the Croton Aqueduct Commissioners, with a statement relating to the matters covered by the report, signed by Mr. Sweet. Ill. 8800 w. Eng News—Nov. 28, 1901.

Criticism of the Masonry Portion of the New Croton Dam. Letters from John D. Van Buren and Elnathan Sweet, with illustrations. 1800 w. Eng News—Dec. 26, 1901.

A General Review of the Discussion on Proposed Changes in the New Croton Dam. A letter from Alfred Craven, with illustrations. 3000 w. Eng News—Jan. 9, 1902.

Chief Engineer Hill's Report on Proposed Changes in the New Croton Dam and Jerome Park Reservoir. Official report of William R. Hill. Ill. Also A Special Report of Changes in the Jerome Park Reservoir, by Edwin F. Smith. 8000 w. Eng News—Jan. 16, 1902.

The New Croton Dam. An illustrated article describing work of interest, made necessary by the change of design, and the methods of construction. 2800 w. Eng Rec—Aug. 16, 1902.

Report on Bad Foundations Beneath the Core-Wall of the Earth Portion of the New Croton Dam. A report by Wm. R. Hill in regard to the disintegration of the limestone foundations beneath the core-wall of the earth section. Ill. 700 w. Eng News—May 14, 1903.

The Conditions at the New Croton Dam. Editorial comment on the conditions existing at the site of this dam. 1200 w. Eng Rec—May 30, 1903.

The Problem of the Great Croton Dam—New York City Water Supply. An illustrated article explaining the defects which have caused public alarm, and what has been done to remedy them. 1400 w. Sci Am—May 30, 1903.

Work on the Great Croton Dam. Arthur H. Battey. A review of the work, the expense, difficulties, and the plans for further increasing the water supply. Ill. 2500 w. Munic Jour Engr—June, 1903.

Progress of the Construction of the New Croton Dam. Describes the work, the changes made, present conditions, etc., with portions of the construction work. Ill. 3000 w. Eng Rec—June 20, 1903.

Concrete Work on the New Croton Dam Extension. Illustrated description of the construction work. 2800 w. Eng Rec—July 9, 1904.

Recent Progress on the New Croton Dam. An illustrated account of work on this dam which is to impound an additional water supply of 32,000,000,000 gals. for New York City. 3800 w. Eng Rec—Sept. 10, 1904.

Completing the New Croton Dam. Illustrations, with description of construction work on the dam for the New York water supply. 1600 w. Sci Am—Sept. 24, 1904.

Completing the New Croton Dam. An illustrated description of methods of closing the river tunnel which had been left to provide for the passage of the normal flow of the Croton River. 3200 w. Eng Rec—March 4, 1905.

The Changes at the New Croton Dam. Charles S. Gowen. An expression of the writer's views in regard to the necessity of removing the embankment section, at the south and replacing with an extension of the masonry section. Does not think the rock foundation of the core-wall was unsafe. Ills. 3500 w. Pro Am Soc of Civ Engrs—Dec., 1905.

See also **Muscoot, N. Y.; WATER SUPPLY—New York; WATERWORKS—New York.**

Danville, Ky.—A Concrete Steel Dam at Danville, Ky. Illustrated description of an interesting dam built across the Dix River to impound a water supply. 700 w. Eng Rec—Dec. 3, 1904.

Danville, Ill.—See **WATERWORKS.**

Denver Waterworks.—See **Great Goose Creek; WATERWORKS—Denver.**

Derwent Valley, Eng.—See **WATERWORKS.**

Design.—The Design of American Dams. A discussion of the value of masonry as a material for core walls. 1100 w. Eng Rec—Feb. 15, 1902.

Essential Elements in the Design of Dams. John S. Fielding. Considers matters pertaining to these structures, their stability, economy, etc. Serial. 1st part. 2200 w. Can Engr—Jan., 1905.

See also **Earth; Masonry; Stability; Stresses.**

Des Moines, Iowa.—See **HYDRO-ELECTRIC PLANT.**

Drop Shutter.—See **Betwa, India.**

Earth.—The Limiting Heights of Earth Dams. An editorial discussion on the effect of the percolation of water through dams. 1300 w. Eng Rec—Dec. 7, 1901.

British Practice in the Building of Earth Dams. Letter from E. Sherman Gould on the relative merits of masonry and puddle for core walls, and one from C. F. Marsh, with illustration, on the construction of an earth dam over 100 ft. high. 1000 w. Eng Rec—Feb. 8, 1902.

The Limiting Height of Earth Dams. A letter from E. Sherman Gould, assuming 70 ft. as the maximum height yet attained, and discussing causes of destruction, construction, &c. 1600 w. Eng News—Feb. 20, 1902.

Concerning the Design of Earth Dams and Reservoir Embankments. Editorial discussion of various constructions, presenting one that is especially recommended for security and tightness as well as cheapness. 2500 w. Eng News—Feb. 20, 1902.

Earthen Dams. Reginald E. Middleton. A letter on the relative merits of masonry and puddle for the cores of high dams. 1600 w. Eng Rec—March 29, 1902.

See also **Baltimore Waterworks; Ellsworth, Me.; Tabeaud; Wachusett South Dike.**

Earth Solidification.—See **EARTHWORK—Rellers.**

East Canyon Creek.—A Rock-Fill Dam with Steel Core Across East Canyon Creek, Utah. W. P. Hardesty. Illustrated description of this work, with comments on country irrigated. 3500 w. Eng News—Jan. 2, 1902.

Ellsworth, Me.—A Proposed Earth Dam with a Steel Core and a Reinforced Concrete Spillway at Ellsworth, Me. J. A. Leonard. Brief description, with illustrations. 400 w. Eng News—Sept. 22, 1904.

Elmhurst-Scranton.—A severe Test of a Dam. Illustration with brief description of the flood at the Elmhurst dam of the Scranton Gas and Water Co. 600 w. Eng News—March 20, 1902.

Fenelon Falls, Ont.—A Quickly Erected Reinforced Concrete Dam at Fenelon Falls, Ont. Brief illustrated description of an application of concrete-steel to the construction of dams of moderate height. A dam 194 ft. long and about 10 ft. high was built in 22 ordinary working days. 700 w. Eng News—Feb. 9, 1905.

Friction Coefficient.—See **DAM FAILURE—Austin.**

Fulda River, Germany.—The Reconstruction of a Needle Dam on the Fulda River, Germany (Wiederherstellung eines Nadelwehres an der Fulda). Julius Greve. An illustrated description of repair work on a needle dam built to improve the navigation of the Fulda. 2400 w. Zentralblatt d Bauverwaltung—April 29, 1903.

Gamboa.—See **CANAL—Panama.**

Garvin's Falls, N. H.—See **HYDRO-ELECTRIC PLANT.**

Gatun, Panama.—The Gatun Dam. C. D. Ward. Map and suggestions for a dam at this point on Panama Canal, if investigations show it to be more desirable than the Bohio project. 2000 w. Pro Am Soc of Civ Engrs—April, 1904.

The Gatun Dam. Discussion on paper by C. D. Ward on a dam for controlling the Chagres River, Panama. 1600 w. Pro Am Soc of Civ Engrs—Aug., 1904.

See also **CANAL—Panama.**

Gloucester, Mass.—See **RESERVOIR.**

Great Goose Creek.—The Great Goose Creek Dam for the Denver Water Supply. An illustrated description of one of the most notable dams in the world, having a height of 231 ft., and, when filled, impounding about 30,000,000,000 gallons of water. 700 w. Sci Am—July 4, 1903.

Grobois.—The Reinforcement of the Grobois Dam (Consolidation du Barrage de Grobois). M. Galliot. Describing the manner in which a second dam, with intermediate auxiliary reservoir, was constructed to relieve the stresses on an older structure. 5000 w. 1 plate. Ann des Ponts et Chaussées—3 Trimestre, 1905.

India.—See **Betwa; Pereyar; WEIR.**

Irrigation Reservoir.—See **Masonry; IRRIGATION.**

Ithaca, N. Y.—An Interesting Test of an Unfinished Arch Dam. Describes the Six-Mile Creek Dam of the Ithaca Waterworks Company, and gives a report of the test by a flood before the dam was completed. Ill. 900 w. Eng Rec—July 18, 1903.

Keokuk, Iowa.—See **WATER POWER.**

Kubel, Switzerland. — See **HYDRO-ELECTRIC PLANT.**

Laguna, Colorado River.—The Laguna Dam, Yuma Irrigation Project, California. Information concerning a dam about to be built across the Colorado River in Arizona by the U. S. Reclamation Service. Ills. 1200 w. Eng News—Feb. 9, 1905.

Lauchensee.—Construction of the Lauchensee Dam. Condensed from the "Zeitschrift für Bauwesen." H. Frecht. An outline of construction methods used in a difficult and expensive masonry dam built to increase the low-water flow in the streams of the Vosges Mountains. 2700 w. Ill. Eng Rec—Aug. 30, 1902.

London, Ont.—Description of a Dam and Accompanying Works Built for the Water Commissioners, London, Ont., at Springbank. J. A. Heaman. Description and drawings showing the nature of the works, which consist of a concrete dam, retaining walls, etc. 2500 w. Can Soc of Civ Engrs, Adv. Proof—April 24, 1902.

A Concrete Dam Near London, Ontario. Illustrated description of a concrete dam with flashboards and an unusual crib apron. 800 w. Eng Rec—July 26, 1902.

Lynchburg, Va.—Concrete Dam and Wood-Stone Conduit for Lynchburg Waterworks. An account of steps being taken to furnish a gravity supply of better quality than the river water now used. Begins an illustrated detailed description of the dam. Serial. 1st part. 3000 w. Eng Rec—July 23, 1904.

Lynn, Mass.—The Walden Pond Dam of the Lynn Waterworks. George I. Leland. Reviews the history of the supply, and gives an illustrated description of the work of raising this dam 20 feet. 3000 w. Eng Rec—Dec. 19, 1903.

Macadam.—Macadam as a Core for Dams and Reservoir Embankments. Editorial on the advantages of this material for the uses named, its cost being less than concrete. 1200 w. Eng News—June 25, 1903.

Masonry.—The Resistance of Masonry Dams (Résistance des Barrages en Maçonnerie). R. Ruffieux. An elaborate mathematical study of masonry dam construction with diagrams of profiles and pressure curves. 10000 w. 1 plate. Ann des Ponts et Chaussées—1 Trimestre, 1901.

A Proposed New Type of Masonry Dam. George L. Dillman. States the definite requirements of masonry dams, and suggests a new type, according to these requirements, which will contain less masonry, for the same factor of safety, than any of the recognized "standard types." 2000 w. Pro Am Soc of Civ Engrs—April, 1902.

A Proposed New Type of Masonry Dam. Discussion of the paper by George L. Dillman. 2700 w. Pro Am Soc of Civ Engrs—Aug., 1902.

The Correct Design and Stability of High Masonry Dams. George Y. Wisner. Prepared for the Nat. Irrigation Cong. Discusses the problem of constructing dams to withstand the great pressure of water stored for the irrigation of arid lands. 3000 w. Eng News—Oct. 1, 1903.

An Improved Formula for the High Masonry Dam. F. W. Crocker. Devises a method by which the processes of the American formula may be abbreviated. 4200 w. Cal Jour of Tech—Sept., 1904.

Note on the Theory of Unsymmetrical Masonry Dams. Prof. W. C. Unwin. Explains a method of determining the distribtuion of the shearing stress on horizontal sections. 1600 w. Engng—April 21, 1905.

Further Note on the Theory of Unsymmetrical Masonry Dams. Prof. W. C. Unwin. Examines the stresses in a triangular dam, by the method already given. 1200 w. Engng—May 12, 1905.

On the Distribution of Shearing Stress in Masonry Dams. Prof. W. C. Unwin. An examination of shearing stress in dams of various forms. 900 w. Engng—June 30, 1905.

On the Stability of Masonry Dams. Karl Pearson. A reply to critical papers by Prof. W. C. Unwin. 2500 w. Engng—July 14, 1905.

On the Stability of Masonry Dams. Karl Pearson. A reply to Mr. Dilley's criticisms of an earlier article on this subject. 2200 w. Engng—Aug. 11, 1905.

The Determination of Pressures on Masonry Dams (Zur Ermittlung von Kantenpressungen bei Sperrmauern). F. Stupecky. Diagrams and discussion of formulae and methods. 1500 w. Oest Wochenschr f d Oeff Baudienst—Aug. 19, 1905.

Internal Stresses in Masonry Dams. S. D. Bleich. Walls containing water only are considered as illustrative of all others. A mathematical study of the distribution of shear along horizontal and vertical planes. 1200 w. Sch of Mines Qr—Nov., 1905.

Notes on Stresses in Masonry Dams. Max am Ende. A study of the distribution of compression and shearing stresses, deriving formulas for tracing the trajectories of the maximum tensile, compression, and shearing stresses in a masonry dam. 2800 w. Engng—Dec. 8, 1905.

See also **Croton; Pathfinder; RETAINING WALL.**

Mauerry, Germany.—See **Urft River.**

Meeker Island, Minn.—See **RIVER REGULATION—Mississipi, Minneapolis.**

Mermentau River, La.—Movable Dam and Lock of the Rice Irrigation and Improvement Association, Mermentau River, La. Illustrates and describes work carried out to effectually shut out the salt water, which injured the rice crops, and for preventing overflow of the adjacent low lands. 600 w. Eng News—Sept. 28, 1905.

Middle Falls, N. Y.—A Concrete Power Dam at Middle Falls, N. Y. Illustrated description of a dam having long spillways at each side at right angles to its axis. 1200 w. Eng Rec—Oct. 4, 1902.

Milford, Mass.—The Echo Lake Dam, at Milford, Mass. Leonard Metcalf. An illustrated account of the construction work in raising this dam to increase the storage capacity. States fully the conditions, and gives related information. 3200 w. Jour N E Water Wks Assn—June, 1903.

Mine.—See **MINE DAM.**

Morgan Falls, Ga.—See **HYDRO-ELECTRIC PLANT.**

Movable.—The Foating Shutter Weir (Das Schwimmkappenwehr, ein Neues Bewegliches Stauwerk). Emil Grohmann. An illustrated paper giving a description of a weir in which the shutters are moved by pumping water in and out of the lower part which is hollow. 1 plate. 9000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 7, 1902.

Rolling Moveable Dams (Ueber Walzenwehre). M. Carstanjen. The dam is made in the form of a large cylindrical drum, which can be rolled up inclined ways to permit the free passage of flood water. Details and illustrations of existing installations are given. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 11, 1903.

The Beaver Movable Dam. W. H. Chadbourn, Jr. Illustrates and escribes a movable dam in the Ohio River, about 31 miles from Pittsburg, which was opened in August, 1904. 3000 w. Eng Rec—March 11, 1905.

See also **Fulda River; Mermentau River, La.; Winnibigoshish.**

Movable, Aar River.—See **HYDRO-ELECTRIC PLANT.**

Movable Automatic.—A New Automatic Movable Dam. Illustrated description of automatic wickets on top of a masonry dam which close during low water and open during floods. 1500 w. Eng Rec—March 8, 1902.

Movable, McMechen, W. Va.—See **FOUNDATION—Dam, McMechen.**

Movable Schweinfurth.—Large Rolling Dams (Barrages Mobiles Cylindriques à Grand Portée). René Koechlin. Illustrating and describing the movable dams across the arms of the Main at Schweinfurth, Germany. Each dam is a cylinder of riveted sheet iron, which can be rolled up in time of flood. 2500 w. 1 plate. Génie Civil—Feb. 27, 1904.

Roller Dams (Ueber Walzenwehre). K. E. Hilgard. Illustrated description of the rolling movable dams at Schweinfurt-on-the-Main. Two articles. 2500 w. Schweiz Bauzeitung—Feb. 6, 13, 1904.

The Cylindrical Movable Dams at Schweinfurt, Germany. A. Steens. Brief illustrated description of a novel type built in a river subject to heavy floods, where a rapid discharge of freshet water was often necessary. 900 w. Sci Am—April 16, 1904.

Rolling Dams at Schweinfurt, Bavaria. Emile Guarini. Illustrated description of interesting movable dams and their working. 7000 w. Eng News—Jan. 19, 1905.

Muscoot, N. Y.—The Muscoot Dam in the Croton Valley, New York. An illustrated description of a masonry dam, 950 feet long, being constructed near the middle of the projected Croton Lake, so that the bottom of the upper end of the lake will not be exposed at low water. 1200 w. Eng Rec—Dec. 20, 1902.

Needle, Germany.—See **Fulda Fiver.**

Newcastle, Pa.—A Severe Flood Test of an Earth Dam at Newcastle, Pa. G. B. Zahniser. Illustrates this dam and describes its construction and the severe test due to an unusual storm. 800 w. Eng News—Sept. 24, 1903.

Niagara.—To Dam Niagara. Discusses briefly the scheme under consideration of the International Waterways Commission for raising the level of Lake Erie by putting a dam across its outlet in the Niagara River. 1300 w. Engr, Lond—Aug. 25, 1905.

Damming the Niagara River at Buffalo. J. H. Massie. Remarks on the report of Maj. Thomas W. Symons favoring the building of a ship canal round the shoals and rapids, the causes of lowering of the water in Lake Erie, and the proposed remedy by damming the river. Ill. 1800 w. Eng Rec—April 18, 1903.

Nicaragua.—See **CANAL.**

Nile.—See **Assuan; IRRIGATION—Egypt; RIVER REGULATION; WATERWAY; WEIR.**

Oakland.—See **San Leandro.**

Parsippany, N. J.—See **Boonton.**

Pathfinder, Wyoming.—Investigation of Stresses in High Masonry Dams of Short Spans. George Y. Wisner and Edgar T. Wheeler. A report made to F. H. Newall, Chief Engineer of the U. S. Reclamation Service. Gives a general discussion by Mr. Wisner and Mr. Wheeler's analysis of stresses in the proposed Pathfinder Dam, Wyoming. 4000 w. Eng News—Aug. 10, 1905.

Pearson Theory.—See **Assuan.**

Periyar, India.—The Periyar Dam and Irrigation Works, Southern India. A full presentation of this important engineering work, its plan and purpose, construction, material, power plant, etc. Ill. 7500 w. Eng News—Oct. 24, 1901.

Pile Foundation, Concrete.—See **St. Johns Lake.**

Plymouth, Eng.—See **Concrete Core.**

Portman, S. C.—Rebuilding the Portman Dam near Anderson, S. C. John L. Sheppard, Jr. Describes the first dam built and its enlargement, and the failure of the composite dam, giving an illustrated description of the rebuilding. 3500 w. Eng Rec—April 2, 1904.

Pribram.—See **RESERVOIR.**

Redridge, Mich.—The Redridge Dam. An illustrated detailed description of a gravity dam of combined concrete and steel construction, built in the copper region of Michigan, to furnish water to the stamp mills. 3200 w. Eng News—Aug. 15, 1901.

Reinforcement.—See **Grebois.**

Reservoir.—Reservoir Dams. A discussion of the disputed features in the design of high dams, both earth and masonry, referring particularly to hydrostatic pressures within the mass of the dam. 1500 w. Eng Rec—Feb. 9, 1901.

The Proportions of Reservoir Dams (Beitrag zur Dimensionierung der Thalsperrenmauern). G. Ramisch. Developing formulas for the stability of masonry dams, tabulating the values for various dimensions. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—April 4, 1902.

See also **DAM FAILURE; RESERVOIR.**

Rock-Fill.—A Small Rock-Fill Dam. H. deB. Parsons. Illustrated description of a dam designed to impound a gravity water supply on an estate in New Jersey and of its construction. 1500 w. Pro Am Soc of Civ Engrs—March, 1903.

See also **RAILWAY CONSTRUCTION.**

Rollers.—See **EARTHWORK.**

Roosevelt, Arizona.—See **Salt River.**

Rubble Concrete.—See **Atlanta; Concrete Core.**

St. Johns Lake, Long Island.—A Concrete Dam on a Pile Foundation at St. John's Lake, Long Island, New York. An illustrated description of a dam and spillway founded on piles, a cut-off wall of sheet piling being used to prevent percolation through the strata into which the piles are driven. 1500 w. Eng News—Feb. 9, 1905.

Salt River, Arizona.—The Roosevelt Masonry Dam, on Salt River, Arizona. Description of a high masonry dam, which is to form a reservoir of 320,000,000,000 gallons capacity. Ills. 2500 w. Eng News—Jan. 12, 1905.

The Salt River Project. U. S. Reclamation Service. Illustrated description of the Roosevelt dam, Salt River, in connection with the irrigation development. 1800 w. Eng Rec—Oct. 14, 1905.

The Roosevelt Irrigation Dam in Arizona. Information concerning this extensive engineering work, with illustrations showing the substantial character of the concrete work. 1000 w. Sci Am —Dec. 16, 1905.

San Leandro, Cal.—The San Leandro Earth Dam of the Oakland Water Works. Burr Bassell. An illustrated description of a high earth dam originally built in 1874-5, but since raised to a height of 125 ft. above the original surface, 155 ft. above the bottom of the central puddle trench, and 156 ft. above the bottom of the concrete-filled secondary trenches. A large part of the embankment was sluiced in by the hydraulic process. 1600 w. Eng News—Sept. 11, 1902.

Schuylerville, N. Y.—See **HYDRO-ELECTRIC PLANT.**

Schweinfurth, Germany.—See **Movable, Schweinfurth.**

Scioto River, O.—See **Columbus.**

Shearing Stress.—See **Masonry.**

Silt-Bearing Streams.—See **RIVER REGULATION.**

Six-Mile Creek.—See **Ithaca, N. Y.**

Solingen, Prussia.—The New Reservoir Dams at Solingen (Les Nouveaux Barrages-Réservoirs de Solingen). M. Jacquinot. A comparison of some recently constructed reservoir dams in Germany with similar structures in France. 2000 w. Génie Civil—Feb. 25, 1905.

See also **HYDRO-ELECTRIC PLANT.**

Spier Falls, N. Y.—The Spier Falls Dam of the Hudson River Water Power Company. An illustrated description of the construction of this very large dam, now nearly completed. 2 page plate. 3300 w. Eng News—June 18, 1903.

See also **HYDRO-ELECTRIC PLANT.**

Spillway.—See **SPILLWAY.**

Spring Brook, Pa.—Some Dams Recently Constructed by the Spring Brook Water Supply Company. John H. Lance. Description of the larger of these dams and the methods employed. 5700 w. Trans Assn of Civ Engrs of Cornell Univ—1901.

Some Dams Recently Built by the Spring Brook Water Supply Company. Describes masonry dams 73 and 104 ft. high, of unusually heavy cross-section, and explains the method of carrying pipes through a 37-ft. earth dam on heavy masonry foundations. 2800 w. Eng Rec—June 15, 1901.

Round Hill Dam, Spring Brook, Pennsylvania. Marshall O. Leighton. Describes the construction work, all of which was performed by the water supply company's own laborers working by the day. Ills. 1200 w. Eng Rec—June 11, 1904.

Stability.—Stability of Small Dams. John H. Gregory. Gives a series of formulas used by the writer, which give by the solution of one equation the width of the base. Explanations. 2000 w. Eng Rec—Sept. 21, 1901.

See also **Design; Masonry.**

Stanislaus River, Cal.—The Melones M. Co. Dam, Stanislaus River, Cal. Plans of the site and plan and elevation of the dam, with views of the construction at several stages, and of the flume leading from the dam to the mill, with descriptive notes. 900 w. Min & Sci Pr—March 8, 1902.

Straight-Faced.—Straight-Faced Dams (Barrages à Parements Rectilignes). G. Cadart. A discussion of the distribution of pressure in masonry dams, and the construction of rectilinear sections of stability and economy. 9000 w. Ann des Ponts et Chaussées—3 Trimestre, 1902.

Stresses.—Stresses in Dams. J. S. Wilson and W. Gore. Gives an experimental method of investigating the distribution of stress in dams, etc. Ills. 1800 w. Engng—Aug. 4, 1905.

Stresses, Masonry.—See **Masonry; Pathfinder, Wyoming.**

Sydney, Australia.—Cataract Dam for the Additional Water Supply of Sydney, N. S. W. Illustrates and describes new works to increase the supply for this Australian city, and the methods of construction. 2700 w. Eng Rec—Nov. 5, 1904.

Tabeaud, Cal.—The Tabeaud High Earth Dam, Near Jackson, Cal. An illustrated detailed description. 3000 w. Eng News—July 10, 1902.

Tainter Type.—See **Winnibigoshish.**

Theresa, N. Y.—See **Concrete Reinforced.**

Urft, Germany.—The Construction of a Dam Across the Urft River, near Gemünd, Rhenish-Prussia (Vom Bau der Urft-Thalsperre bei Gemünd in der Eifel). An illustrated description of a great dam, with masonry core, designed by Prof. O. Intze, for the purpose of preventing floods, forming a reserve supply of water for irrigation, and furnishing power to a hydro-electric station. Serial.

2 parts. 1 plate. 2500 w. Deutsche Bauzeitung—March 14 and 21, 1903.

A High Masonry Dam in Germany. Illustrations and brief description of an unusually high dam being built across the small river Urft. 700 w. Eng News—July 16, 1903.

Dams for Providing Water Supply (L'Alimentation d'Eau par les Barrages). H. Peter. A description of several recent artificial reservoirs and illustrations of the dam across the valley of the Urve, near Aix-la-Chapelle. 2500 w. Bull Tech de la Suisse Rom—Dec. 25, 1904.

Wachusett, Mass.—Building of the Great Wachusett Dam. J. A. Stewart. An illustrated account of a dam that will provide the city of Boston with an extensive storage basin of capacity only surpassed by one other in the world. 1100 w. Sci Am Sup—Dec. 15, 1900.

The Construction of the Wachusett Dam. Illustrated description of the plant and methods employed in constructing a masonry dam 850 ft. long and 207 ft. high. 4300 w. Eng Rec—April 5, 1902.

Progress on the Wachusett Dam of the Metropolitan Waterworks, Massachusetts. An illustrated article giving information concerning this large dam at Clinton, Mass. 2000 w. Eng Rec—March 5, 1904.

The Wachusett Dam of the Metropolitan Water Works. George W. Blodgett. Illustrates and describes some of the principal features of the design of this great masonry dam, and the methods of construction. Also editorial. 4000 w. R R Gaz—Vol. XXXIX. No. 5.

See also **RESERVOIR.**

Wachusett North Dike.—The North Dike of the Wachusett Reservoir, Metropolitan Water Works. Frederic P. Stearns. Reprinted from the "Pro. Am. Soc. of Civ. Engrs.," from the discussion on the Bohio Dam. Description of the design and construction. 7800 w. Eng News—May 8, 1902.

Wachusett South Dike.—An Earth Dam with Loam Core, at Clinton, Mass. Illustrated description of the south dike of the Wacuksett Reservoir, 3,000 ft. long, 620 ft. wide and 60 ft. high. Serial. 1st part. 1800 w. Eng Rec—Aug. 20, 1904.

Waterbury, Conn.—The Wigwam Reservoir Masonry Dam of the Waterworks of Waterbury, Conn. R. A. Cairns. An illustrated account of the construction and the growth of the city that made the work necessary. 2400 w. Eng News—May 7, 1903.

Winnibigoshish.—Reconstruction of the Lake Winnibigoshish Dam. Illustrated description of a movable dam having five drum gates of the Tainter type and a reversed bear-trap gate. 3200 w. Eng Rec—Sept. 13, 1902.

Yuba River, Cal.—See **HYDRAULIC MINING.**

DAM FAILURE.

Accidents to Reservoir Dams. C. Baillarge. Describes the washouts at the reservoir dam at Middlefield, Mass., and that at Chicoutimi, Que. 1600 w. Can Archt—June, 1901.

Dam Construction and Failures During the Last Thirty Years. C. Baillarge. Gives an analysis of the failures, showing where faulty construction was the cause. 5500 w. Can Soc of Civ Engrs, Adv Proof—March, 1903.

America.—A Classified Review of Dam and Reservoir Failures in the United States. William R. Hill. Abstract of presidential address at the Chicago Convention of the Am. W. Wks. Assn. Calls attention to faulty construction resulting in disaster. 4000 w. Eng News—June 19, 1902.

A List of Failures of American Dams. W. R. Hill. An annotated list from the presidential address before the Am. W. Wks. Assn. 4400 w. Eng Rec—Sept. 27, 1902.

Austin, Texas.—The Latest Soundings at the Break in the Austin Dam. Thomas U. Taylor. A report of investigations made in Oct. and Nov., 1900. Ill. 1400 w. Eng News—Dec. 6, 1900.

Coefficient of Friction in Dam Design, and the Failure of the Dam at Austin, Tex. H. P. Gillette. Discusses the theories advanced to explain the failure of this dam. 2800 w. Eng News—May 30, 1901.

An Estimate for Rebuilding the Austin Dam. Interesting part of a report and estimate submitted on March 24 to the Board of Water & Light Commissioners of Austin, Tex. 1500 w. Eng News—April 3, 1902.

Chambly, Quebec.—The Accident to the Chambly Dam. Illustrated description of a coffer-dam constructed to permit the operation of a hydraulic power plant pending the replacement of a washed-out section of a masonry dam. 600 w. Eng Rec—Feb. 16, 1901.

Danielson, Conn.—Failure of Bulkhead at Dyer Dam, Danielson, Conn. Ernest H. Brownell. Describes the accident and explains its probable cause. Ill. 800 w. Eng News—March 28, 1901.

Fort Pitt, Pa.—See **Jeanette.**

Jeanette, Pa.—The Failure of the Oakford Park and Fort Pitt Dams, Near Jeannette, Pa. Willis Whited. Brief illustrated account of these two disasters. 1000 w. Eng News—July 23, 1903.

Failure of Oakford Park Dam Across Brush Creek, Near Jeannette, Pennsylvania. Harrison Souder. An illustrated description of the dam and the accident, with suggestions for safer construction. General discussion. 3500 w. Pro Engrs' Club of Phila—July, 1904.

Lake Avalon, N. M.—Failure of Lake Avalon Dam, near Carlsbad, N. M. E. C. Murphy. Describes the construction and gives a brief account of the two failures of this dam, discussing the cause of the second failure. Ills. 1000 w. Eng News—July 6, 1905.

Leech Lake, Minn.—See **RESERVOIR.**

Middlefield, Mass.—The Washout of a Dam at Middlefield, Mass. M. J. Gibbons. Illustrated description of a heavy earth and masonry dam destroyed by a flood over its crest, which occurred through inability to operate waste gates. 1000 w. Eng Rec—May 4, 1901.

Oakford Park, Pa.—See **Jeanette.**

Phoenix, Arizona.—Construction, Repairs and Subsequent Partial Destruction of the Arizona Canal dam, Near Phoenix, Ariz. H. F. Robinson. Illustrated report. 1000 w. Eng News—April 27, 1905.

Portman, S. C.—See **DAM.**

Providence, R. I.—The Failure of Two Earth Dams at Providence, R. I. Ernest H. Brownell. An illustrated account of a recent disaster. 1300 w. Eng News—March 21, 1901.

U. S. Southern.—Remarks on the Recent Failures of Masonry Dams in the South. B. H. Haraway. Discusses the designs used, and the causes of failure. Ill. 1800 w. Eng News—Feb. 6, 1902.

Some Thoughts Suggested by the Recent Failures of Dams in the South. Robert L. Johnson. In the writer's opinion the failures were due to too light a section. 1700 w. Eng News—March 20, 1902.

Utica, N. Y.—The Break in the Utica Reservoir. Illustrated description of the manner in which a 70 ft. earth dam failed. 600 w. Eng Rec—Sept. 27, 1902.

The Failure of the Waterworks Dam at Utica, N. Y. Particulars of the accident, with photographs. The cause seems to be in the material used in making the upper 25 ft. at the north end of the dam. 700 w. Eng News—Oct. 9, 1902.

DAMPER.

See also **COMBUSTION; FIRING.**

Automatic Regulator.—Automatic Damper Regulators. R. T. Strohm. Illustrates and describes several types and explains their advantages. 3000 w. Am Elect'n—March, 1904.

DEBRIS BARRIER.

Yuba River, Cal.—See **HYDRAULIC MINING.**

DECIMAL SYSTEM.

See **MEASUREMENT; METRIC SYSTEM; WEIGHTS AND MEASURES.**

DECORATION.

Electric.—See **ELECTRIC LIGHTING—Decorative.**

Sheet Steel Painted Ware.—The Decorating of Sheet Steel Painted Ware by Machine Methods. Horace E. Whitney. Describes a method where the labor is decreased and the quality and character of the design raised to a higher standard. 3800 w. Ir Age—Dec. 26, 1901.

DELIVERY WAGON.

See **AUTOMOBILE—Industrial; AUTOMOBILE, ELECTRIC—Industrial.**

DEPRECIATION.

See also **GAS WORKS; WORKS MANAGEMENT.**

Depreciation as Affecting Engineered Structures. Horace A. Foster. The object of the paper is to set forth some of the usual methods of treating depreciation, and some that are less commonly considered. Also discussion. 8000 w. Pro Engrs Club of Phila—Oct., 1902.

The Depreciation Problem. John L. Bronson. Discusses briefly methods of getting an idea of the depreciation of a plant, and the problem of reconstruction. 1200 w. Cassier's Mag—July, 1905.

Coal.—See **COAL TRANSPORTATION—Depreciation.**

Coal Mines and Iron Works.—Depreciation as Affecting Collieries and Iron Works. H. A. Foster. Considers some of the usual methods of treating depreciation, and some that are less commonly considered. 3700 w. Ir & Coal Trds Rev—Nov. 21, 1902.

Gas Works.—See **GAS WORKS—Depreciation.**

Sinking Fund.—Sinking Fund Charges. W. H. Booth. A discussion of the best method of dealing with depreciation of a plant and buildings, and related matters. 3300 w. Tram & Ry Wld—April 9, 1903.

DEPTHOMETER.

See **WATER GAUGE—Depthometer.**

DERAIL.

The Derail—Its Past, Present and Possible Future. E. D. Wileman. Discusses the faults of derails in general use, and the perfect derail, its requirements, &c. Ill. 1700 w. R R Gaz—Oct. 11, 1901.

Sand Track.—The Stopping of Trains at Terminal Stations (Ueber das Aufhalten von Bahnzügen in Endbahnhöfen). Hr. Köpcke. An illustrated article advocating switching trains on to a sand track when they reach a station at too high a speed. 800 w. Deutsche Bauzeitung—Jan. 4, 1902.

DERAILMENT.

See **RAILWAY ACCIDENT—Derailment.**

DERRICK.—See **CRANE.**

DESTROYER.

See **TORPEDO-BOAT DESTROYER.**

DESTRUCTOR.

See **REFUSE DISPOSAL.**

DIAMOND.

See also **PRECIOUS STONE.**

Diamonds and the Diamond Industry. W. R. Matthews. Facts concerning the diamond industry in South Africa and New South Wales, showing the many inducements to an exploitation of the latter areas. 2500 w. Aust Min Stand—Oct. 25, 1900.

About Diamonds. Archibald Blue, in "Canadian Mining Reports." Some account of diamonds found around the Great Lake and in other parts of the United States; also in South Africa. Ill. 2000 w. Min Rept—May 2, 1901.

The Genesis of the Diamond. Gardner F. Williams. Describes the physical properties of the diamond; where they are found, the theories as to their origin and the weak spots in them are considered. 5000 w. Trans Am Inst of Min Engrs—Sept., 1904.

Artificial.—See **Crookes; Electric Furnace.**

Australia.—Australia's Largest Diamond. John Plummer. Information concerning the discovery, with description of the gem, and discussion of its source. &c. 1200 w. Min Wld—Oct. 21, 1905.

See also New South Wales; Volcanic Breccia.

Australian Washing.—Australian Diamond Washing. Describes the care taken in the washing of diamondiferous gravels. 900 w. Min Rept—June 27, 1901.

Bahia.—See **Brazil.**

Borts and Carbons.—Borts and Carbons, Their Occurrence, Uses, Etc. D. Dessau. An illustrated description of these two minerals, which are pure carbon and entitled to the name of diamonds. 2300 w. Min Wld—Dec. 31, 1904.

Brazil.—The Diamond Deposits of Salobro, Brazil. Prof. F. de Paulo Oliveira. Describes the region and what is known of the deposits, giving an account of the discovery. 2800 w. Eng & Min Jour—Nov. 16, 1901.

Diamonds and Carbons in Bahia. Information concerning the deposits, method of mining, labor conditions, state regulations, method of selling, etc. 4300 w. U S Cons Repts, No. 1423—Aug. 20, 1902.

Brazilian Diamonds and Carbons. An account of the discovery. Geological formation, methods of mining, etc. 1700 w. Jour Soc of Arts—Nov. 14, 1902.

The Geology of the Diamond and Carbonado Washings of Bahia, Brazil. Orville A. Derby. Translation of a report to the Governor, and the most important paper thus far published on the geology of this region. 3000 w. Ec Geol—Nov., 1905.

Crookes.—The Genesis and Physical Properties of Diamonds. Sir William Crookes. Abstract of a paper read before the Asn. Describes the mines of South Africa and the deposits, and discusses the theory of formation and origin. Serial. 1st part. 3000 w. Min Jour—Sept. 9, 1905.

Diamonds. Sir Wm. Crookes. Abstract of lecture before British Assoc. describing the making of artificial diamonds, experiments on diamonds, etc. 4000 w. Elect'n, Lond—Sept. 8, 1905.

Drill.—See **DRILLING—Diamond.**

Electric Furnace.—Formation of the Diamond by the Electric Furnace. An illustrated description of the process used by M. Moissan, giving the results attained. 1500 w. Sci Am—Aug. 30, 1902.

The Production of Diamonds in the Electric Furnace. C. L. Durand. Describes the work of Prof. Henri Moissan in this field, illustrating the furnace used. 2500 w. Elec Rev, N. Y.—June 27, 1903.

The Increase in Volume of Liquid Iron, Saturated with Carbon in the Electric Furnace, at the Moment of Solidification (Sur l'Augmentation de Volume de la Fonte Liquide, Saturée de Carbone au Four Electrique au Moment de la Solidification). Henri Moissan. Data and results in connection with the artificial production of diamonds, showing that iron of small carbon content contracts, and with large carbon content expands, on solidification. 2500 w. Comptes Rendus—Jan. 23, 1905.

See also ELECTRIC FURNACE—Gems.

German Southwest Africa.—Do Diamonds Occur in German Southwest Africa? (Kommen in Deutsch-Südwestafrika Diamanten Vor?) Hr. Mentzel. A comparison of analyses of minerals from Gibeon, in German Southwest Africa, and from Kimberley, showing the similarity, and a discussion of the probability of diamonds occuring at the former place. 1200 w. Glückauf—June 13, 1903.

Great Premier.—The Great Premier Diamond Concerning the mammoth gem recently found in South Africa, with illustrations showing the actual size of the 18 largest diamonds in the world. 1600 w. Sci Am—April 8, 1905.

Kimberley.—Diamond Mining in Kimberley. An illustrated description of the De Beers group of mines, and the methods used in deep mining. Also reviews early methods and gives information of interest. Serial. 1st part. 3400 w. Engr, Lond—Jan. 16, 1903.

Kimberley Notes. T. Lane Carter. Illustrated article containing information of interest concerning these important diamond mines. 3700 w. Eng & Min Jour—Aug. 15, 1903.

Diamond Mining in the Kimberley Field. Charles V. Allen. An illustrated account of the modern methods employed in working the diamond mines of South Africa. 4000 w. Engineering Magazine —Oct., 1903.

The Mechanical Equipment of the Kimberley Diamond Mines. Charles V. Allen. Mr. Allen's second article deals with the electric, pneumatic, steam and general machinery of advanced design in use at Kimberley. 4000 w. Engineering Magazine—Nov., 1903.

The Kimberley Diamond Mines. H. V. Conrad. Illustrations, with brief description of the De Beers Consolidated mines. 500 w. Ir Age—Nov. 19, 1903.

Kimberley Notes. T. Lane Carter. Information of interest in regard to conditions at these diamond mines, the growing use of electricity, working costs, etc. 1600 w. Eng & Min Jour—Jan. 19, 1905.

New South Wales.—Diamonds in New South Wales. Information concerning the diamond fields, the stones found, etc. 500 w. U S Cons Repts, No. 1102—Aug. 1, 1901.

Diamonds in New South Wales. Llewellyn Parker. Description, with figures, of an occurrence of diamonds at Oakley Creek, near Copeton, whose source is a dike. 300 w. Eng & Min Jour—Aug. 25, 1904.

South Africa.—The Mining of Diamonds. A brief account of mining in South Africa. 1200 w. Min & Sci Pr—June 27, 1903.

See also German Southwest Africa; Great Premier; Kimberley; Transvaal; Vaal River.

Tool Making.—See TOOL—Manufacture.

Transvaal.—Diamond Mining in the Transvaal. From the London "Economist." The effect of the development of the Premier Diamond Mine on the diamond market. 2000 w. Aust Min Stand—July 21, 1904.

The Premier Diamond Mine. T. Lane Carter. Greater account of a large diamond mine in successful operation, 21 miles east of Pretoria, Transvaal. 2000 w. Eng & Min Jour—Aug. 25, 1904.

The Premier (Transvaal) Diamond Mine. Stafford Ransome. A description of this mine with information concerning its working, the quality of the stones found, &c. 1800 w. Engr, Lond—Dec. 16, 1904.

Vaal River.—The Diamond District of the Vaal River. T. Lane Carter. A description of the methods of working, and of these deposits in South Africa. Ill. 1400 w. Eng & Min Jour—Sept. 5, 1903.

Volcanic Breccia.—Diamonds in Volcanic Breccia. E. F. Pittman. Describes the discovery of diamonds in the breccia taken out of a shaft on Ruby Hill in Australia, and the conclusions drawn. 1800 w. Aust Min Stand—Dec. 20, 1900.

Wire Manufacture.—See WIRE MANUFACTURE—Diamond.

DIAMOND DRILL.

See DRILLING—Diamond; ROCK DRILL.

DIAMOND TOOL.

See also TOOL—Manufacture.

Diamond Tools. G. C. Henning. A short illustrated description of these tools, used for cutting hard rubber, paper and hardened steel and also hard stone. 1400 w. Trans Am Soc of Mech Engrs, No. 052—Dec., 1904.

DICTIONARY.

Drawing.—See DRAWING—Dictionary.

Technical.—The Technolexicon (Technolexikon). The progress report of the editor, Dr. Hubert Jansen, upon the new technical dictionary in English, French and German, now being prepared by the Society of German Engineers. 6000 w. Zeitschr d Ver Deutscher Ing—Aug. 30, 1902.

DIE.

See also FORGING; METAL WORKING; PRESS; PUNCHING; SHEET METAL; TOOL; TWISTING.

Drawing, Forming and Beading Shells. Joseph V. Woodworth. Illustrates and describes a set of dies for reducing a flat blank of soft sheet brass to the finished shape shown. 1300 w. Am Mach—Jan. 31, 1901.

Solid and Built Up Dies. G. Schneider. Illustrates and describes a proposed die and its substitute. 900 w. Am Mach—March 14, 1901.

An Improved Blanking and Piercing Die, and Two Bending Dies. William Doran. Illustrations showing how a rather intricate job in blanking, piercing and bending sheet metal may be accomplished by the use of dies which are simple and inexpensive to construct. 1800 w. Am Mach—June 27, 1901.

Punching and Forming Heavy Blanks in One Operation. William Doran. Illustrates and describes a die for producing blanks from heavy sheet metal, blanking and bending them to the shape required in one operation. 1200 w. Am Mach—July 11, 1901.

A Cutting Off and End Finishing Die, and an Accurate Sectional Die with a Chute Feed, and Finger Stripper. Joseph V. Woodworth. Illustrated detailed descriptions. 1100 w. Am Mach—Feb. 6, 1902.

A Punch and Die for End Finishing, Cutting Off and Bending Sheet Metal from the Strip Without Waste. Also Two Dies for Metal Corner Fasteners. Joseph V. Woodworth. Illustrated description of dies and their operation. 1100 w. Am Mach—Aug. 21, 1902.

A Piercing and Blanking Die, and a Novel Bending and Forming Die. William Doran. Illustrated descriptions. 1600 w. Am Mach—Feb. 6, 1902.

A Punching, Drawing and Forming Die. Illustrates and describes a die in constant use in a small brass factory, doing work at the rate of 12,000 to 15,000 pieces in nine hours. 1100 w. Am Mach—May 29, 1902.

The Making and Use of Simple Dies. Peter Chiampon. Illustrated description of a number of dies found very useful in the average machine shop. 1200 w. Am Mach—Sept. 25, 1902.

A Cutting, Bending and Forming Die. R. Lewis. Illustrated description of the die and its operation. 800 w. Am Mach—Oct. 15, 1903.

Aluminum Box.—See Combination.

Artistic.—Artistic Die-Making. Joseph V. Woodworth. Illustrates and describes dies made in a small Brooklyn shop, and shows examples of work. 1200 w. Am Mach—May 15, 1902.

Automatic.—An Automatic Combination Piercing, Bending and Twisting Die for Box Corner Fasteners. Joseph V. Woodworth. Illustrates and describes the die used, which produces these fasteners at so small a cost that they are used instead of nails or screws. 800 w. Am Mach—Aug. 7, 1902.

An automatic Push Feed and Gang Die. Jack Marks. Illustrates and describes an automatic die for making a scalloped cap of IC tin. 900 w. Am Mach—May 5, 1904.

Automatic Slide.—A Quadruplicate, Automatic-Slide Die for Piercing Conical Shells. William Doran. Illustrates and describes a die designed for the economic production of a pierced brass shell which formed the draft regulator of a new burner of the "Bunsen" type. 1900 w. Am Mach—March 6, 1902.

Automatic Slide Die for Piercing, Blanking and Drawing in One Operation. Joseph V. Woodworth. Illustrates and describes tools of improved design. 800 w. Am Mach—Oct. 22, 1903.

Bag Clasps.—Dies for Sheet Metal Bag Clasps. Joseph V. Woodworth. Illustrates and describes the use of these dies. 1000 w. Am Mach—June 11, 1903.

Bending.—Bending Dies. Jos. V. Woodworth. Illustrated description of punch and dies. 600 w. Am Mach—May 30, 1901.

Folding or Bending Dies. Carroll Ashley. Illustrates and describes dies which will not stretch or distort the metal. 1000 w. Am Mach—Vol. 28, No. 49.

Bending and Cutting.—A Novel and Ingenious Cutting and Bending Die. George W. Freeman. Illustrated description of the making of the die and its operation. 500 w. Am Mach—Jan. 24, 1901.

Bending and Forming.—A Bending and Forming Die. C. H. Rowe. Illustrated description of die and punch. 600 w. Am Mach—July 24, 1902.

A Nice Job in Bending and Forming. Joseph V. Woodworth. Illustrated description of dies and work. 600 w. Am Mach—Sept. 3, 1903.

Bicycle Rim Washer.—Cut and Carry Dies. G. Schneider. Describes and illustrates a die for making washers for bicycle rims, and its operation. 500 w. Am Mach—Jan. 1, 1903.

Blanking.—A Combination Blanking Die. William Doran. Illustrated description. 600 w. Am Mach—July 10, 1902.

Blanking Dies. Joseph V. Woodworth. Concerning the making and using of piercing and blanking dies. Ill. 2500 w. Mach, N Y—Sept., 1902.

A Novel Blanking and Piercing Die. C. F. Emerson. Illustrated explanation of a useful die. 900 w. Am Mach—Vol. 28. No. 24.

Bolt Heading.—Bolt Heading Dies. Thomas Beasley. Directions for the making of these dies. 1400 w. Am Mach—Jan. 7, 1904.

Boxes.—A Set of Dies for Rectangular Tin Boxes. Joseph V. Woodworth. Description and illustrations of dies for the production of vaseline boxes and covers. 1800 w. Am Mach—July 17, 1902.

Bracket.—Dies for a Sheet Metal Bracket. Joseph V. Woodworth. Illustrated description of four dies and their use. 1100 w. Am Mach—Feb. 20, 1902.

Brass Shells.—Die for Piercing Brass Shells. Illustrates and describes a die for punching three holes in the side of a drawn brass shell. 1000 w. Am Mach—April 2, 1903.

See also Shell Work.

Circuit Breaker Clips.—Die and Bender for Circuit Breaker Clips. W. F. Hoffman. Illustrated description. 400 w. Am Mach—Vol. 28, No. 11.

Clock Gears.—See PUNCHING.

Combination.—A Combination Die for Shallow Rectangular Shells. William Doran. Illustrates and describes the design and construction. 2300 w. Am Mach—Aug. 29, 1901.

A Small Blanking, Drawing and Bending Die. Describes a tool with a base of only 2 1-2 x 2 inches which performs three distinct operations—blanking, drawing and bending. Ill. 1200 w. Am Mach—Nov. 14, 1901.

Blanking, Drawing and Half-Wiring. William Doran. Illustrates and describes a combination die. 1400 w. Am Mach—Dec. 19, 1901.

Combination Dies for an Aluminum Box. H. Robinson. Illustrations of the dies with description of the operation. 800 w. Am Mach—Oct. 30, 1902.

A Combination Cutting, Drawing and Two-Hole Perforating Die. Jack Marks. Illustrated detailed description. 800 w. Am Mach—April 7, 1904.

Cutting.—Machines and Tools Employed for Die-Cutting. Joseph Horner. The first of a series of articles on machines for cutting forging dies. Ill. Serial. 1st part. 2500 w. Engng—Jan. 1, 1904.

Dial Feed.—An Improved Dial Feed Armature Disk Die. Joseph V. Woodworth. Illustrated description of die and attachments which can be used on any simple-acting power press to which a connecting rod for operating the feed can be connected. 900 w. Am Mach—Dec. 19, 1901.

Drop, Hardening.—Hardening Drop Dies. E. R. Markham. Suggestions for this work, showing that methods must vary according to the stock in the die, its size and outline, the work it must do, etc. 1100 w. Am Mach—April 7, 1904.

Eye-Glass Strap.—Eye-Glass Strap Dies. Frank Greiner. Drawings and descriptions of dies used in manufacturing these straps. 1500 w. Am Mach—Dec. 4, 1902.

Follow.—Four "Follow" Dies. Joseph V. Woodworth. Illustrated description of four applications of the gang and follow principle for articles of sheet metal to be pierced, bent, formed or drawn, and finished in one operation. 900 w. Am Mach—Feb. 13, 1902.

A "Follow-Die" Which Draws, Pierces, End-Finishes, Cuts Off and Bends in One Operation. Joseph V. Woodworth. Illustrates and describes the die and its operation. 600 w. Am Mach—June 26, 1902.

Forging.—Forging-Machine Dies. Thomas Beasley. Illustrates and describes the making of a number of dies. 1200 w. Am Mach—Feb. 18, 1904.

Forging Dies. Thomas Beasley. Illustrates and describes dies for "pin ends," for "head rods," and for eye bolts. 800 w. Am Mach—March 10, 1904.

A Set of Forging Dies. P. Sandieson. Illustrates and describes forging dies for use on a pneumatic and on a steam hammer, which serve as an example of methods used to obtain results in a modern forge. 600 w. Am Mach—Vol. 28, No. 33.

See also FORGING—Die; DROP HAMMER; HAMMER.

Forming.—A Forming Die. William M. Spry. Illustrates the bending die and a sample of the bent-up punching, giving description. 900 w. Am Mach—Feb. 7, 1901.

Gang.—A Gang Die and Its Work. William Doran. Illustrated description of a punch and die adapted for the production of a variety of pierced and formed articles. 1000 w. Am Mach—Oct. 31, 1901.

Head.—A New Die Head. Illustrated detailed description, with details in regard to the making. 2000 w. Engr, Lond—Feb. 26, 1904.

Hinges.—A Complete Set of Dies for the Manufacture of Sheet Metal Hinges. Joseph V. Woodworth. Illustrated description of dies used for manufacturing sheet metal hinges and latches for grape crates at a minimum cost. 1200 w. Am Mach—July 3, 1902.

Jewelry.—Die Work for Medals, Jewelry, and Art Goods. Joseph V. Woodworth. Describes methods used. 2300 w. Am Mach—Aug. 27, 1903.

Leather Shoe Tips.—Dies for Punching Leather Shoe Tips. Joseph V. Woodworth. Illustrates and describes means employed for punching elaborate designs in leather. 900 w. Am Mach—April 3, 1902.

Manufacture.—A Large Sectional Punch and Die. A. A. F. Horton. Illustration with details of the method used in manufacturing these large dies. 2200 w. Ir Trd Rev—April 7, 1904.

Notes on Die Making. Frank E. Shailor. Illustrates a die containing several novel features, and describes the construction. 1600 w. Mach, N Y—Aug., 1904.

See also Cutting; FILING MACHINE.

Perforating.—See SHEET METAL.

Piercing.—See Blanking.

Push Feed.—See Automatic.

Quadruplicate.—See Automatic Slide.

Relieving.—See TOOL—Taps and Dies.

Round Work.—Bending and Forming Dies for Round Work. Joseph V. Woodworth. Illustrates and describes circular bending and forming dies and the methods of using them. 900 w. Am Mach—Dec. 13, 1900.

Safety Pin.—Making a Large "Safety" Pin. William Doran. Describes and illustrates the dies and fixtures used in the manufacture of safety pins for horse blankets. 1100 w. Am Mach—Feb. 20, 1902.

Sheet Metal Ferrule.—Dies for Making a Sheet Metal Ferrule. William Doran. Illustrates and describes dies which produce in two operations results which would usualy require four. 2500 w. Am Mach—Sept. 19, 1901.

Shell Work.—Wiring Dies for Shell Work. Joseph V. Woodworth. Illustrated description of dies for forming a sheet-brass shell. 600 w. Am Mach—March 14, 1901.
See also Brass Shell; Combination; Triple Action.

Tacks.—Dies for Making and Driving Double-Pointed Tacks. S. A. Worcester. Illustrated description. 700 w. Am Mach—Vol. 28, No. 19.

Telephone Parts.—Compound Dies for Parts of Telephone Transmitter Cases. Joseph V. Woodworth. Illustrates and describes dies used in producing these parts. 2000 w. Ir Trd Rev—Oct. 1, 1903.

Trimming.—A Sectional Trimming Die. Gives plan, and side and sectional views of die, with description. 600 w. Am Mach—Vol. 28, No. 32.

Triple-Action.—A Triple-Action Die for Blanking. Drawing and Embossing an Aluminum Shell in One Operation. Joseph V. Woodworth. Illustrated description. 1000 w. Am Mach—June 18, 1903.

Turret Lathe Work.—A New Opening Die. Illustrates a new die intended for turret lathe work and possessing novel features. 1100 w. Am Mach—May 7, 1903.

Twisting.—A Twisting Die. C. H. Rowe. Drawings and description of a die made for twisting the ends of sheet brass 1-16 inch thick and 3-16 inch wide, but also adapted for other work. 700 w. Am Mach—Aug. 1, 1901.

Umbrella Rib Tips.—Dies for Umbrella Rib Tips. William Doran. Illustrated description of dies for the work named and adapted for the rapid production of other small sheet-metal parts. 900 w. Am Mach—Aug. 1, 1901.

Wire.—Dies for Drawing Wire: Their Manufacture and Use. William D. Pierson. Information concerning materials used for dies, and the methods of wire drawing. 900 w. Stevens Ind—Jan., 1901.

Wire Bending and Forming Dies. William Doran. Illustrates and describes work showing what can be accomplished in the bending and forming of comparatively heavy stock in two operations by the use of simple dies. 1000 w. Am Mach—Oct. 3, 1901.

See also WIRE.

DIELECTRIC.

See also ELECTRIC CABLE; ELECTRIC DISCHARGE; ELECTRO-PHYSICS; ELECTROSTATIC CAPACITY; INSULATION.

Contributions to the Study of Dielectric Bodies (Neuere Beiträge zur Naturgeschichte Dielektrischer Körper). Dr. Moritz von Hoor. An elaborate study of condensers, using various materials as dielectrics. Many tables and diagrams are given. Three articles. 10000 w. Elektrotech Zeitschr—Feb. 21, 28, March 7, 1901.

Recent Investigations upon Dielectric Bodies (Neuere Beiträge zur Naturgeschichte Dielektrischer Körper). Dr. M. von Hoor. An exhaustive study of the various materials suitable for condenser dielectrics, giving details of experiments, and forming a continuation of the author's former researches. Serial. Part I. 4000 w. Elektrotech Zeitschr—Sept. 5, 1901.

Cables.—See Losses; Strength; Testing; ELECTRIC CABLE; ELECTRIC TESTING; ELECTROSTATIC CAPACITY; INSULATION; SUBMARINE CABLE.

Changes.—The Heat of a Change in Connection with Changes in Dielectric Constants and in Volumes. C. L. Speyers. Gives an account of experimental investigations with a study of results. 4500 w. Am Jour of Sci—July, 1903.

Conductivity. — See RADIOACTIVITY — Dielectric Conductivity.

Contact.—Contact with Dieletrics. Rollo Appleyard. Communicated to the "Philosophical Mag." by the Physical Soc. A report of experimental investigations with results and conclusions. 4000 w. Elect'n, Lond—Oct. 6, 1905.

Gases.—See INSULATION—Compressed Gas.

Liquid.—A Contribution to the Study of Liquid Dielectrics (Contributions à l'Etude des Diélectriques Liquides). P. Gourée de Villemontée. Experiments upon the behavior of petroleum and of paraffine oil when used as a dielectric in electrical condensers. 1200 w. Comptes Rendus—July 17, 1905.

See also RADIOACTIVITY—Dielectric Conductivity.

Hysteresis.—See Losses.

Losses.—Measurements of Dielectric Hysteresis. W. E. Ayrton. A discussion of the results obtained by Mr. Mordey and by Mr. Mather for the County of London cable. Ill. 1500 w. Elec Rev, Lond—Feb. 22, 1901.

Dielectric Losses in Condensers and Cables and Their Bearing on Electrical Supply. Charles V. Drysdale. Gives a summary of the advantages and disadvantages of polyphase as compared with single-phase systems, and an account of tests made on cables and condensers. 2500 w. Elect'n, Lond—April 5, 1901.

Some Notes on Dielectric Losses. Charles Proteus Steinmetz. Gives results of some determination of the loss of power in electrostatic condensers on an alternating-current circuit, and at various frequencies and voltages. 800 w. Elec Wld & Engr—June 22, 1901.

Energy Loss in Commercial Insulating Materials when Subjected to High Potential Stress. Charles Edward Skinner. Discusses the effects of this loss, describing some of the methods employed, and giving some of the characteristic results obtained from tests made on various materials used in commercial manufacture, and also on the insulation of finished apparatus. 5000 w. Trans Am Inst of Elec Engrs—June 20, 1902.

Losses from Dielectric Hysteresis and the Capacity of High Pressure Machines (Ueber den Dielektrischen Hysteresisverlust und die Kapacität von Hochspannungsmachinen). Dr. Paul Holitscher. An experimental investigation of the losses under high electric stresses in the micanite insulating tubes of motors and generators. 5000 w. Elektrotech Zeitschr—Aug. 18, 1903.

Losses in High Pressure Cables (Arbeitsverluste in Hochspannungskabeln). Dr. R. Apt and C. Mauritius. Data and results of tests of dielectric losses in transmission cables operated at pressures of 20,000 to 80,000 volts. 5000 w. Elektrotech Zeitschr—Oct. 22, 1903.

Mica.—Effect of High Potential Discharge on Mica Insulation. John Härdén. Reports investigations which show that a solid insulation combined with mica in condensers, or similar apparatus, would be most effective without the use of oil. 1200 w. Elec Wld & Engr—April 18, 1903.

The Dielectric Strength of Certain Specimens of Mica. Ernest Wilson and W. H. Wilson. Gives results of experiments, describing method of testing. 1000 w. Elect'n, Lond—Dec. 16, 1904.

See also MICA.

Resistance.—See Strength; Testing; ELECTRIC DISCHARGE—Striking Distance.

Solid. — Experiments with Solid Dielectrics (Recherches sur les Diélectriques. Solides). MM. V. Crémieu and L. Malclès. A discussion of experiments showing the existence of reactive charges in the interior of solid dielectrics. 1200 w. Comptes Rendus—Dec. 5, 1904.

Strength.—On the Electric Strength of Insulating Materials. C. Baur. Notes one some investigations for determining the electrical breaking strengths. 1800 w. Elect'n, Lond—Sept. 6, 1901.

A Method for Determining the Electrical Disruptive Strength of High Insulating Substances (Ein Verfahren zur Bestimmung der Elektrischen Durchschlagsfestigkeit Hochisolierender Substanzen). Dr. B. Walter. Discussing the breaking-down resistance of glass, hard rubber and similar substances, with data and results of experiments. 10000 w. Elektrotech Zeitschr—Sept. 24, 1903.

The Law of Electric Puncture (Das Gesetz der Elektrischen Durchschläge). C. Bauer. A simple law for determining the voltages which will puncture different thicknesses of various dielectrics, and records of experiments. 800 w. Elektrotech Zeitschr—Jan 7, 1904.

The Breaking Down Strength of Cables (Die Durchschlagspannung von Kabeln). Dr. Hubert Kath. An examination of the electrical pressures required to break down the insulation of cables, showing the influence of the length of the cable. 5000 w. Elektrotech Zeitschr—July 7, 1904.

See also Mica; Testing; ELECTRIC DISCHARGE—Striking Distance; INSULATION—Compressed Gas.

Testing.—Notes on the Testing of Modern Dielectrics at High Voltages. J. Wright. On the present system of testing to guarantee the insulation of the core. 1600 w. Elec Rev, Lond—Oct. 26, 1900.

The Testing of Electrical Apparatus for Dielectric Strength. P. H. Thomas. A brief dissension of objections to the present method of over potential tests, especially in regard to insulation tests upon very high tension apparatus. 8000 w. Trans Am Inst of Elec Engrs—July, 1903.

Insulation Testing. C. E. Skinner. Read before the Nat. Elec. Lgt. Assn. An illustrated article discussing the elements that should be considered in the design, selection and use of apparatus for making dielectric tests. Serial. 1st part. 2400 w. Elec Jour—Sept., 1905.

The Testing of High-Tension Insulating Materials.C. Kinzbrunner. An account of very complete experiment made at the Municipal School of Technology, Manchester, with curves and diagrams. Serial. Part I. 2500 w. Elect'n, Lond—Sept. 8, 1905.

The Testing of High-Pressure Insulating Materials (Die Prüfung von Hochspannungs-Isolationsmaterialien). C. Kinzbrunner. Giving curves showing the time endurance of various insulating materials under different voltages. 2000 w. Zeitschr f Elektrotechnik—Sept. 17, 1905.

On the Ratio Between Thickness and Dielectric Strength of High-Tension Insulating Materials. C. Kinzbrunner. Describes experimental investigations. Serial. 1st part. 1500 w. Elect'n, Lond—Sept. 29, 1905.

See also Mica; Strength; ELECTRIC TESTING; INSULATION.

DIESEL MOTOR.

See OIL ENGINE—Diesel.

DIKE.

See BREAKWATER; DRAINAGE; SEA WALL; SHORE PROTECTION.

DISC.

Rolling.—See MECHANICS—Rolling Disc.

Stresses.—See **MATERIALS' STRENGTH—Rotating Bodies; STEAM TURBINE—Discs.**

DISTILLATION.

See also **EVAPORATION.**

Goss Series.—The Goss Series Distilling Apparatus. Charles Ducas. An illustrated description of an apparatus by which it is practicable to obtain between 70 and 80 lbs. of water per lb. of coal burned. 2800 w. R R Gaz—June 19, 1903.

A Series Distilling Apparatus of High Efficiency. W. F. M. Goss. Illustrates and describes apparatus designed to purify water or other liquids by distillation. 3000 w. Trans Am Soc of Mech Engrs, No. 03—Dec., 1903.

Ice-Making.—The Production of Distilled Water for Ice-Making Plants. Hal Williams. Read at meeting of the Cold Storage and Ice Assn., England. Illustrated description of apparatus used, and of the process. 3800 w. Engr, Lond—Dec. 28, 1900.

"Iris."—Fresh Water Distilling Plant on the U. S. Store Ship "Iris." Illustrated description of this vessel of the U. S. Navy, and the arrangement for distilling. 1500 w. Marine Engng—May, 1901.

Quiggin Evaporator.—Tests of Quiggin Evaporators, in Single, Double and Triple Effect. W. Everett Parsons. An account of tests made to determine the economy of producing distilled water for ice-making purposes. 2200 w. Stevens' Ind—April, 1901.

Running Evaporator. — Running Evaporators. Earl N. Percy. Remarks on the operation and care of evaporators, describing various methods. 2500 w. Marine Engng—July, 1903.

Series.—See **Goss.**

Ships.—Evaporators and Distillers. W. W. Edwards. Modern means of securing fresh water at sea. Various types are illustrated and described. 5300 w. Marine Engng—Nov., 1903.

Suakim, Egypt.—Water-Distilling Plant for Egypt. Illustrated description of two exceptionally large plants for erection and service at Suakim, where they will supply pure water for drinking and boiler use. 1200 w. Engr, Lond—March 4, 1904.

DITCHER.

See **EXCAVATING MACHINERY—Ditcher.**

DIVERS' PALSY.

See **CAISSON DISEASE.**

DIVIDING.

See also **INDEXING.**

Circles.—The Dividing of Circles in Mechanical Work (Die Ausführung von Kreisteilungen in der Maschinentechnik). F. von Handorff. A thesis at the Hanover Technical Highschool giving an illustrated description of methods and machines for dividing circles. Serial. 5 parts. 18000 w. Zeitsch f Werkzeugmaschinen u Werkzeuger—June 5, 15, 25, July 5 and 15, 1903.

Index Plate.—Making Accurate Index Plates. Jos. M. Stabel. Illustrates and describes methods used by the writer. 1400 w. Am Mach—Nov. 19, 1903.

Generating a Large Index Plate. A. L. de Leeuw. Illustrates and describes the method used. 3500 w. Mach, N. Y.—Aug., 1905.

Making an Accurate Index Plate. Otto Eckelt. An illustrated description of method. 500 w. Am Mach—Vol. 28. No. 24.

See also **INDEXING.**

Table.—A Large Dividing Table. H. G. Knoderer. Illustrated description. 1200 w. Amer Mach—June 23, 1904.

Universal.—A Scheme for Making the Universal Dividing Head Universal. W. A. Warman. Sketches and description of a device that gives accuracy. 600 w. Am Mach—May 15, 1902.

DIVING APPARATUS.

See also **SALVAGE.**

Notes on Diving Machinery (Considérations sur les Scaphandres). M. Dibos. A discussion of recent forms of diving suits and apparatus for wrecking, and for submarine work generally. 3500 w. Mem Soc Ing Civ de France—March, 1904.

DOCK.

See also **CRANE; DRY DOCK; FLOATING DOCK; HARBOR; IRON ORE HANDLING; MECHANICAL HANDLING; PIER; WHARF.**

Avonmouth.—Avonmouth Docks. Plan of this new dock which is to be constructed. It provides for the reclamation of a large tract of tidal flats. 700 w. Engr, Lond—March 7, 1902.

Barrow, Eng.—Barrow Docks and Approaches by Land and Sea. Frank Stileman. Describes these docks, owned by the Furness Railway Company. Illustrated by 5 plates and 8 figures. 2400 w. Inst Mech Engrs—Aug., 1901.

Bombay.—The New Bombay Docks. Information concerning the work in progress for increasing the dock facilities, and some of the difficulties to be overcome. 2500 w. Engr, Lond—Nov. 10, 1905.

Bremerhaven.—The Extension Works at the Port of Bremerhaven (Les Travaux d'Extension du Port de Bremerhaven). A. Boudon. An illustrated account of the new docks and power station at this important German port on the Weser. 2500 w. 1 plate. Génie Civil—April 20, 1901.

Bristol, Eng.—The Port of Bristol. An account of the proposed improvements in docks, with a review of the history of this port. Maps. 4500 w. Builder—March 30, 1901.

Dock Extensions in the Bristol Channel. Information concerning proposed extensions at various ports. 2200 w. Engr, Lond—Dec. 14, 1900.

Brooklyn.—The Bush Docks in Brooklyn. An illustrated account of this terminal for ocean steamships, which seems highly satisfactory to both ship owners and freight agents, and all interested. 1800 w. Ry & Engng Rev—Aug. 15, 1903.

Buffalo.—Dock Construction in and Around Buffalo. S. M. Kielland. Briefly considers excursion docks, lumber docks, docks for rails, stone and heavy materials, ore docks, and retaining docks. 3300 w. Jour Assn of Engng Soc's—June, 1902.

Burnt Island, Scotland.—The Dock at Burnt Island. An illustrated description of a new dock on the Firth of Forth, at an important coal port. 2000 w. Transport—Oct. 18, 1901.

Bush.—See **Brooklyn.**

Clyde Trust.—Clyde Trust New Works. A description of new works in progress and new features recently introduced. 2500 w. Engr, Lond—Sept. 12, 1902.

Conneaut, O.—Conneaut Harbor Ore Docks. Illustrated detailed description of this property and its management. 4500 w. R R Gaz—Feb. 22, 1901. See also **IRON-ORE HANDLING.**

Construction.—The Construction of Docks. Alexander MacLachlan. An article dealing with typical forms of modern docks and discussing details. Ill. Serial. 1st part. 3300 w. Feilden's Mag—May, 1903.

Dry Dock.—See **DRY DOCK; FLOATING DOCK.**

Electric Equipment.—See **Mechanical Equipment; CRANE; ELECTRIC EQUIPMENT—Dock.**

Escanaba, Mich.—New C. M. & St. P. Ore Dock at Escanaba, Mich. Illustrated description of a recently completed dock of great capacity and modern design. 1500 w. Ry & Engng Rev—March 16, 1901.

A Large Ore Dock at Escanaba, Mich.; Chicago & Northwestern Railway. An illustrated description of the new dock, No. 6, which takes the place of the old No. 2 dock. 1400 w. Eng News—July 30, 1903.

Europe.—Notes Collected in Relation to Docks and Harbors in Great Britain, France and Belgium in the Summer of 1900. Frank W. Hodgdon. A summary of information collected during a trip. Ill. 10000 w. Jour Ass nof Engng Socs—March, 1902.

Fire Protection.—See **New Orleans; FIRE PROTECTION—Dock; PIER—Hoboken.**

Floating.—See **FLOATING DOCK.**

Glasgow.—See **HARBOR.**

Leith.—Ten Years of Dock Developments at Leith. An article on the port of Leith, with plan and illustrations. Principally a description of the new Imperial Dock. 2400 w. Transport—July 4, 1902.

Liverpool.—Dock Improvements at Liverpool. George Cecil Kenyon. Illustrates and describes works in progress in connection with the construction of new deep-water entrances at Brunswick dock. 11200 w. Pro Am Soc of Civ Engrs—Sept., 1903.

Dock Improvements at Liverpool. Discussion of a paper by George Cecil Kenyon. 1200 w. Pro Am Soc of Civ Engrs—Dec., 1903.

See also **HARBOR; HYDRAULIC MACHINERY.**

Lome, Africa.—See **LANDING STAGE.**

London.—See **HARBOR.**

Lorain, O.—Ore Docks with Metal Piling. Brief illustrated description of one of the ore docks of the Cleveland, Lorain & Wheeling Ry., in which metal piles are used in its construction; the piles of part of the dock are of wrought-iron pipe, while for the rest of the length they are of steel I-beams. 700 w. Eng News—Aug. 22, 1901.

Manchester, Eng.—Manchester Dock Extension. An illustrated description of extensions made necessary by the increasing activity in traffic and circumstances connected. 1300 w. Builder—Oct. 27, 1900.

New Dock at Manchester. An illustrated article describing the interesting features. 1200 w. Engr, Lond—July 28, 1905.

See also **FIRE PROTECTION—Dock.**

Mechanical Equipment.—The Modern Equipment of Docks, with Special Reference to Hydraulic and Electric Appliances. Walter Pitt. Read before the Engng. Con. of the Inst. of Civ. Engrs. Also abstract of discussion. Advocates the substitution of electric for hydraulic power transmission and compares the relative costs. 2000 w. Elect'n, Lond—July 3, 1903.

See also **ELECTRIC EQUIPMENT; IRON ORE HANDLING; MECHANICAL HANDLING.**

Middlesbrough.—See **ELECTRIC EQUIPMENT; POWER PLANT.**

Modern.—The Modern Development of Docks. Brysson Cunningham. Discusses the accommodation for modern ships, recent improvements in docks, etc. Ills. 3500 w. Cassier's Mag—April, 1904.

The Modernization of Ancient Docks. Brysson Cunningham. States the changes which have necessitated the enlargement of docks, and discusses the problems in connection with the work. Ills. 4000 w. Engng—Dec. 30, 1904.

New Orleans.—The Stuyvesant Docks at New Orleans. An illustrated detailed description, with general plan of docks and yards. 800 w. R R Gaz—May 13, 1904.

Fire Protection of the Stuyvesant Docks. H. W. Parkhurst. Illustrations of the destruction by fire of these New Orleans docks, with remarks on the provisions for fighting fire and preventing its spreading. 1000 w. R R Gaz—Vol. XXXVIII. No. 13.

Fire Protection Precautions at the Stuyvesant Docks. H. W. Parkhurst. An illustrated article explaining the changes that have been made and their object, in these terminal facilities of the Illinois Central at New Orleans. 3500 w. R R Gaz—Vol. XXXIX., No. 25.

Ore.—See **Conneaut; Escanaba, Mich.; Lorain; West Superior; IRON ORE HANDLING.**

Penarth, Wales.—The Progress of Penarth Dock. Illustrated description of the movable coal tips recently opened, and their operation. 2800 w. Engr, Lond—July 26, 1901.

Prague, Bohemia.—See **HARBOR.**

Preston, Eng.—See **RIVER REGULATION—Ribble, Eng.**

Railway Assn. Report.—See **BRIDGE.**

Rotterdam.—See **COAL HANDLING—Electric, Rotterdam.**

Scotland.—See **Burnt Island; Leith; HARBOR.**

Singapore.—Reconstruction of Singapore Docks and Wharves. Describes the proposed reconstruction of wharves and extension of dock accommodations, and other improvements under consideration. 5000 w. Far East Rev—March, 1905.

Southampton, Eng.—The Southampton Docks and Cold Storage Plant of the London and Southwestern Railway. Illustrated detailed description of one of the finest docks in the world and one of the most complete cold-storage warehouses. 6000 w. Ry Age—July 1, 1904.
See also **DRY DOCK.**

West Superior, Wis.—40,000-Ton Capacity Ore Dock of the Great Northern Ry., at West Superior, Wis. Drawings, and brief statement of dimensions, with comment on the excellence of the work. 700 w. Eng News—Dec. 20, 1900.

Zaandam, Holland.—Dock Construction at Zaandam (Sluis bouw te Zaandam). J. E. Van Niftrik. A general description of the harbor improvement work at Zaandam, begun in 1901, and to be completed in 1903. 2000 w. De Ingenieur—June 28, 1902.

DOCK GATE.

Mersey.—See **HYDRAULIC MACHINERY—Dock Gates.**

DOCKYARD.

See **NAVY YARD; SHIPBUILDING; SHIPYARD.**

DODGE.

Biographical Notice of William Earl Dodge. James Douglas. Especially reviews the influence and interest in mining and metallurgical work. Photograph. 2000 w. Trans Am Inst of Min Engrs—Oct., 1903.

DOME.

See also **BUILDING CONSTRUCTION.**

Bern.—The Iron Construction of the Dome of the New Government Building at Bern (Die Eisenkonstrucktionen der Kuppel auf dem neuen Bundeshause in Bern). F. Schüle. An interesting example of structural building construction, with plans and details and a view of the completed work. 1800 w. Schweizerische Bauzeitung—June 1, 1901.

Chicago Post Office.—The Dome Framing of the Chicago Post-Office Building. Illustrated description of the general details of construction of a steel framework dome 100 ft. in its greatest diameter. 900 w. Eng News—April 23, 1903.

Columbia University.—The Students' Hall Dome, Columbia University. Illustrates and describes the construction of a tile dome 48 1-3 feet in diameter inside, with a total rise of about 68 feet. It is of the Guastivino construction. 700 w. Eng Rec—Nov. 23, 1901.

Concrete Reinforced.—See **Theory.**

Design.—Notes on the Stresses in Framed Spires and Domes. W. Dunn. An explanation of the method of determining the nature of the stresses, giving stress diagrams. 7500 w. Jour R Inst of Brit Archts—May 21, 1904.

Developing the Surface of Spherical Roofs by Calculation. Jas. Clark. Describes the method used by the writer. 700 w. Am Mach—June 23, 1904.

Reichstag, Berlin.—The Cupola of the Reichstag Building in Berlin (Die Kuppel des Reichstagshauses in Berlin). A. Zschetzsche. An exhaustive mathematical investigation of the stresses in the framework of the octagonal cupola upon the Reichstag building in Berlin. Three articles, 2 plates. 12000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 25, Feb. 1, 8, 1901.

The Dome of the Reichstag Building in Berlin (Die Kuppel des Reichstagshauses in Berlin). A discussion between H. Zimmermann and Hr. Zschetzsche about the design of this dome. With diagrams and formulae. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 27, 1901.

Steel.—See **West Baden, Ind.**

Stone.—The Construction of a Stone Dome. James S. Boyd. Read before the Glasgow and W. of Scotland Tech. Col. Archt. Crafts Soc. Illustrates and describes the constructional and practical part of the work connected with a dome of moderate size, and the principles of stone dome construction. 2800 w. Am Archt—July 22, 1905.

Theory.—Theory of the Spherical Dome with a Homogeneous Surface, and of the Framed Dome; Also Notes on the Construction of Masonry and Metal Domes. E. Schmitt. Gives original information and shows the relation between the principal stresses in domes, and their magnitude; and presents a method of framed dome construction. Ill. 8000 w. Pro Am Soc of Civ Engrs—Dec., 1903.

Theory of the Spherical Dome with a Homogeneous Surface, and of the Framed Dome; also Notes on the Construction of Masonry and Metal Domes. Irving P. Church. Discussion of E. Schmitt. 2200 w. Pro Am Soc of Civ Engrs—Feb., 1904.

Theory of the Spherical Dome with a Homogeneous Surface, and of the Framed Dome; Also Notes on the Construction of Masonry and Metal Domes. Continued discussion of paper on this subject by E. Schmitt. 3200 w. Pro Am Soc of Civ Engrs—March, 1904.

Theory of the Spherical or Conical Dome of

Reinforced Concrete or Metal. William Cain. The domes considered are supposed to be solids of revolutions, as to figure, and to be constructed of material such as metal or reinforced concrete, capable of sustaining either tensile or compressive stresses. 7800 w. Ills. Pro Am Soc of Civ Engrs—April, 1905.

West Baden, Ind.—Steel Dome for West Baden, Ind., Hotel; the Largest Dome in the World. Views, drawings and description of this great structure. 1000 w. Eng News—Sept. 4, 1902.

DOOR.

Balanced.—A Novel Balanced Door. Illustrated description of the invention of Joseph Henry Dierickx, a Belgian inventor, which consists of two leaves so pivoted that they will slide into partitions. 500 w. Sci Am—May 6, 1905.

Bulkhead.—See **WATERTIGHT DOOR.**

Dierickx.—See **Balanced.**

Folding.—Folding Doors for Freight Houses and Warehouses. Illustrates and describes the Ritter door, and the Cross door, two types which fold vertically. 600 w. Eng News—May 4, 1904.

Münger Automatic.—See **MINE SHAFT—Automatic Doors.**

DORY.

See **BOAT, GASOLINE—Dory.**

DRAFT.

See also **CHIMNEY; COMBUSTION; DAMPER; FIRING; MECHANICAL DRAFT; MINE VENTILATION; VENTILATION.**

Notes on Draft. A. E. Dixon. Discusses chimneys, natural draft and the conditions affecting it, economical combustion, etc. 2000 w. Ir Age—Sept. 14, 1905.

Natural and Induced Draught. John W. Cobb. Explains briefly the mode of action of a chimney, and the production of forced draught, comparing their efficiency and things that should influence the choice of draught. 2500 w. Eng & Min Jour—Oct. 14, 1905.

Natural and Induced Draft. John W. Cobb. Read before the Yorkshire Sec. of the Soc. of Chem. Ind. An explanation of how a chimney does its work, and also a discussion of induced draft and its advantages. Serial. 1st part. 2500 w. Prac Engr—Oct. 27, 1905.

Ash Pans.. Draft in Ash Pans. Presented before the North-West Ry. Club. Extracts from replies to a letter of inquiry, with report of tests. 4000 w. Ry & Engng Rev—Nov. 26, 1904.

Chimney vs. Mechanical.—See **MECHANICAL DRAFT—Tests.**

Marine Boilers.—See **BOILER, MARINE—Induced Draft.**

DRAFT GEAR.

See also **CAR; CAR COUPLER; CAR TRUCK.**

The Draft Gear Situation. Edward Graftstrom. Discusses recent tests and what they demonstrate; also a reply to this article in a letter from E. M. Herr. 2400 w. Am Engr & R R Jour—June, 1901.

Report of Committee on Draft-Rigging in Relation to the Whole Cars. Report and general discussion. 4700 w. W Ry Club—May 20, 1902.

Some Modern Draft Gears. Brief illustrated descriptions of various types. 1200 w. R R Gas—June 13, 1902.

The Essentials of a Good Draft Gear. E. M. Herr. Defines the term "Draft gear" and discusses as essentials the draw bar, adjustable yielding resistance, and fixed attachments. 1200 w. Pro of Ry Club of Pittsburg—Dec. 26, 1902.

The Essentials of a Good Draft Gear. Roy V. Wright. Considers some of the essentials to be a capacity of at least 100,000 pounds; a draw-bar movement of at least two inches; small amount of recoil; simple and substantial design. 700 w. Pro of Ry Club of Pittsburg—Dec. 26, 1902.

Buffer Rods.—Through Buffer Rods for Cars (Durchgehende Stossvorrichtung für Eisenbahnfahrzeuge). Ludwig Ritter v. Stockert. An illustrated description of the Alma-Weiss system of double buffers, in which the rods extend right through under the car and powerful springs under the center of the cars take up shocks. Record of tests. 1 plate. 2000 w. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 25, 1902.

Elasticity.—Elasticity in Draft Gear. Extracts from a paper by R. A. Parke, presented at meeting of the Ry. Club of Pittsburg. Discusses the influence of draft gear upon train operation. Gives diagrams taken from the recording apparatus of a dynamometer car arranged to record the compression and recoil strains transmitted through the draft gear. 2300 w. R. R. Gaz—April 4, 1902.

Elasticity in Draft Gear. R. A. Parke. Presented at meeting of the Ry. Club of Pittsburg. Suggestions presented with a view of considering some of the various demands upon a satisfactory draft-gear and the character of the service rendered. Serial. 1st part. 2200 w. Ry & Engng Rev—April 26, 1902.

Electric Car.—Some Experiences with Draw-Bars for Electric Cars. W. T. Van Dorn. Gives facts from the writer's experience, showing that it is not wise to use a draw-bar lighter than 3 ins. x 3 ins. stem. Also discusses couplers. Ills. 2700 w. St Ry Jour—Aug. 12, 1905.

Farlow.—The Farlow Draft Gear. Illustrates and describes a new type of draft gear and attachment. 900 w. R R Gaz—Nov. 6, 1903.

Friction.—Draft Gear—The Most Important Present Question in Car Construction. Report of trials of the Westinghouse friction draft gear, and the results. 1200 w. Am Engr & R R Jour—Nov., 1900.

The Sessions-Standard Friction Draft Gear—Type C. Illustrations with records of laboratory and drop tests. 2000 w. R R Gas—Nov. 29, 1901.

Westinghouse Friction Draft Gear (Westinghouse-Reibungs-Zugvorrichtung). An illustrated account of this draft gear and its successful operation. 3000 w. Glasers Ann—Jan. 1, 1902.

The Friction Draft Gear Problem. R. A. Parke. Extracts from a paper read before the New England Ry. Club. Discusses this subject, showing how difficult is the problem. 2200 w. R R Gaz—Feb. 13, 1903.

Friction Draft Gear. R. H. Blackall. Reviews the development, discussing the uses, advantages, cost, etc., comparing the results of twin and friction gears in service. 3000 w. 1 table and fig. Bul Int Ry Cong—Oct., 1905.

Friction Draft Gear. R. H. Blackall. Discusses the special advantages, uses and cost, and gives comparative results of twin and friction gears in service. 3000 w. R R Gaz—Vol. XXXVIII., No. 24.

See also **Test; CAR—Coal.**

Locomotive.—Radial Spring Buffer Between Engine and Tender. Brief illustrated description of a design of the Phila., Wilmington and Baltimore R. R. The locomotives equipped with it are intended to run upon curves of 70-foot radius. 500 w. Loc Engng—May, 1903.

Drawbar and Buffer Attachments for Use Between Engine and Tender. Henry Bartlett. Read at convention of Am. Ry. Mas. Mechs. Assn. A discussion of the best arrangement, the form and relative strength of the drawbar to tractive power of the engine, etc. Ill. 2800 w. Ry Age—June 27, 1903.

M. C. B.—Draft Gear. From a committee report to the Master Car Builders' Assn. at the Saratoga meeting. Considers design, materials, tests, etc. Ill. 2600 w. Ry & Engng Rev—June 29, 1901.

The Master Car Builders' Draft Gear Tests. A copy of the plant of draft rigging tests agreed upon. Ill. 1800 w. R R Gaz—Dec. 13, 1901.

Steel Frame.—See also **CAR TRUCK.**

Test.—The Drop Test as a Means of Showing Relative Strength of Draft Gears. R. P. C. Sanderson. Extracts from a paper before the Western Ry. Club. Gives an account of the A., T. & S. F. draft-gear drop tests, and points related. 1600 w. R R Gaz—Nov. 23, 1900.

Draft-Rigging Tests on the Atchison, Topeka & Santa Fe. Interesting information of road tests, subjecting trains to extraordinary shocks without damage to the draft-riggings or the trains. Also editorial. 2600 w. R R Gaz—Feb. 22, 1901.

Road Tests of Draft Gears. A report of tests made on the Chicago division of the Atchison, Topeka and Santa Fe Railrway. 1000 w. Am Engr & R R Jour—April, 1901.

The Atchison Draft-Gear Tests. H. H. Westinghouse. A letter disagreeing with the conclusions editorially expressed concerning the results of these tests. 1100 w. R R Gaz—April 19, 1901.

Draft Gear. Clement F. Street. A letter criticising statements and theories in a communication from H. H. Westinghouse. 1200 w. R R Gaz—May 17, 1901.

Road Tests of Spring and Friction Draft Gears. Remarks on the tests on the Lake Shore & Michigan Southern, and the Bessemer and Lake Erie, made with a view to determine the amount of shocks in ordinary service, and the behavior of the two types of gears. Conclusions from the results. 2200 w. R R Gaz—June 13, 1902.

. Relative Efficiency Tests of Friction and Spring Draft Gear. Illustrated description of testing machine and tests made at the Appliance Exhibition in Washington. 600 w. R R Gaz—Vol. XXXVIII., No. 23.

See also **AIR BRAKE—Triple Valve Test.**

Test, Berlin.—Some Remarks on the Drawbar Trials Carried Out by the Royal Berlin Management. J. Doyen. Remarks on the conclusions reached, drawing attention to weak points in the Berlin trials. 1600 w. Bul Int Ry Cong—Vol. XIX., No. 6.

Von Borries.—Experiments on the Behavior of Elastic Drawbars, on the von Borries and Wick Systems. Mr. Fischer. Describes experimental investigations made by the Royal Berlin Railway Management, stating their object, describing trials, and giving results. 9000 w. 9 tables and figs. Bul Int Ry Cong—Vol. XIX., No. 6.

Westinghouse.—Draft Gear and Couplers for Heavy Service. A letter from George Westinghouse, with editorial discussion of the subject. 1700 w. R R Gaz—Nov. 16, 1900.

Westinghouse Friction.—See Friction; **CAR—Coal.**

Wick.—See Von Borries.

DRAFTING.

See **DRAWING.**

DRAFT RIGGING.

See **CAR COUPLING; DRAFT GEAR.**

DRAFTSMEN.

U. S. Navy Dept.—Rules Governing the Employment of Draftsmen by the U. S. Navy Department. Nearly a full reprint of the recently issued order. 4500 w. Eng News—July 11, 1901.

DRAIN.

See **DRAINAGE; IRRIGATION; PLUMBING; SEWER.**

DRAINAGE.

See also **IRRIGATION; PLUMBING; RIVER REGULATION; RURAL ENGINEERING; SANITATION; SEWAGE DISPOSAL; SEWERAGE; SHORE PROTECTION.**

Some Engineering Features of Drainage. C. G. Elliott. From the "Year Book" of Department of Agriculture. Considers briefly drainage of rainfall, surface storage, irrigated lands, etc., etc. Ill 6000 w. Sci Am Sup—Dec. 5, 1903.

Aramingo System.—See **SEWER—Philadelphia.**

Bouldin Island, Cal.—See California.

California.—Description of a California Reclamation District. E. D. Van Loben Sels. Describes the lands, crops, methods of reclaiming a swamp land protected from overflow by levees and drained by a system of ditches. Ills. 5800 w. Cal Jour of Tech—May, 1905.

The Reclamation of One Million Acres of Swamp Land in California. Rufus P. Jennings. States the conditions of the Sacramento River and the proposed plan recommended by a commission of engineers for concentrating the flow. Map and Ills. 2000 w. Eng Rec—May 6, 1905.

Reclaiming of Bouldin Island, Cal. John A. Yeatman. Illustrated account of a very difficult piece of reclamation work. 2000 w. Min & Sci Pr—July 8, 1905.

Cemetery, Saaz.—Drainage of the Cemetery at Saaz, Bohemia (Entwässerung des Friedhofes in Saaz). Friedrich Krivanec. An illustrated description of the work and of the drains and underground conduits. 1 plate. 1200 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 21, 1901.

Channels, Rainfall.—See **RAINFALL—Sewer Proportions.**

Dredging.—Drainage Improvement by Dredging. E. E. Watts. Abstract of a paper read before the Indiana Engng Soc. Discusses drainage improvement works, methods and cost. 2500 w. Eng News—Feb. 13, 1902.

Earthwork.—See Pillar; **EARTHWORK—Slips.**

Electric Power.—The Application of Electric Power to the Drainage of Marshes in the Netherlands (Entwässerung von Marschländereien durch Elektrische Kraftübertragung in den Niederlanden). A description of the use of electric motors and centrifugal pumps for draining polders in the vicinity of Geertruidenberg. 2500 w. Glasers Annalen—Sept. 15, 1904.

Embankment.—See **EMBANKMENT; SHORE PROTECTION.**

Florida Everglades.—The Florida Everglades: Their Legal Status, Their Drainage, Their Future Value. S. L. Lupfer. Describes these marshes, and discusses what has been done toward reclaiming them, and the legal causes of trouble. Map. 5000 w. Eng News—Sept. 14, 1905.

Fresh Pond Marshes, Mass.—On the Drainage, Reclamation and Sanitary Improvement of Certain Marsh Lands in the Immediate Vicinity of Boston. William Lyman Underwood. Describes and illustrates the condition of the "Fresh Pond Marshes" as they now exist, and as they existed before certain sanitary improvements, recently made, were carried out. 8200 w. Tech Quar—March, 1901.

Hanau, Germany.—See **PUMPING PLANT.**

Havana.—See **MUNICIPAL ENGINEERING; SANITATION; SEWERAGE.**

House.—See **PLUMBING; SANITATION; SEWAGE DISPOSAL; SEWER; SEWERAGE.**

Inlet Swamp, Ill.—The Inlet Swamp District, Illinois. A. M. Shaw. Abstract of a paper read before the Illinois Soc. of Engrs & Survs. Discusses the principal difficulties with which the district has to contend. 1600 w. Eng News—Jan. 26, 1905.

Irrigation.—See **IRRIGATION.**

Italy.—Land Improvement in Italy (Bodenmeliorationen in Italien). Adolf Friedrich. A well illustrated account of several great drainage and land reclamation enterprises and some irrigation work, visited by a party of students from Vienna. 2 plates. 1200 w. Oester Wochenschr f d Oeffent Baudienst—Jan. 18, 1902.

Kistna Delta, India.—See **IRRIGATION.**

Lake Copais.—See **HYDRO-ELECTRIC PLANT—Greece.**

Lowland Protections.—See **SHORE PROTECTION.**

Marajo Island.—The Drainage of Marajo Island (De Afwateringskwestie van het Eiland Marajo). H. L. van Hooff. An examination of the topography of Marajo Island, at the mouth of the Amazon, showing the engineering work necessary for its reclamation by drainage. 15000 w. Tidschr v h Kiink Inst van Ing—Feb. 9, 1901.

Mareosiphon.—The Mareosiphon (Le Mareosiphon). G. Willems. A description of a form of siphon overflow for the relief of low lands from tidal submergence. 8000 w. 1 plate. Ann des Ponts et Chaussées—2 Trimestre 1902.

Mexico.—The Drainage of the Valley of Mexico. Illustrated paper by John B. Body before the Inst. of Civ Engrs., describing the method of excavating a 29 1-2 mile canal by hand labor, ladder dredges and a cableway. 8600 w. Eng Rec—Aug. 10, 1901.

Mississippi Levee System.—The Drainage of Inner Basins, Mississippi Levee System. Charles Le Vasseur. Slightly condensed from a paper published in the "Journal of the Memphis Engineers' Society." Considers the drainage of the areas inclosed by the completion of the levees, and having no outlet. Describes the method of disposing of this water. 1800 w. Eng News—Oct. 27, 1904.

New Jersey Marsh.—Reclamation of the Marshes of New Jersey and Staten Island. Henry Clay Weeks. Explains the present conditions, the value of this land if reclaimed, plans suggested, and a proposed plan of improvement, discussing objections. Map. 3800 w. Eng News—April 7, 1904.

New Orleans.—See **PUMPING STATION—Electric; Sewage, New Orleans; SANITARY ENGINEERING; SEWERAGE.**

Philadelphia.—See **SEWER.**

Pillar for Banks.—Pillar Drains for Holding Banks. W. J. Cudworth. States the conditions which indicate a need of better drainage, and illustrates and describes the pillar drains used in England. 1000 w. R R Gaz—March 11, 1904.

Prako Swamp, N. Z.—The Drainage of the Prako Swamp, Thames. H. D. M. Hassard. Calls attention to the importance of reclaiming this district in New Zealand, and its value to the goldfields. 1000 w. N Z Mines Rec—April 16, 1902.

Red River Valley, Minn.—Red River Valley Drainage Ditches; Their Repair and Maintenance. Prof. W. R. Hoag. Discusses some things to be considered in the construction of ditches for the removal of excess of water, especially referring to this valley in Minnesota, Ill. 8500 w. Jour Assn of Engng Socs—April, 1903.

St. Francis Levee.—The St. Francis Levee Districts of Arkansas and Missouri. Harry N. Pharr. An interesting account, with maps, of the important engineering work now in progress for reclaiming the land of this basin. 5000 w. Eng News—Jan 9, 1902.

Seattle, Wash.—Filling in Tide-Water Flats at Seattle, Wash. Brief account of the work in progress. 1000 w. Eng News—June 13, 1901.

Staten Island Marsh.—See New Jersey Marsh.

Sudbury,. Mass.—The Drainage of Swamps for Watershed Improvement. Edward S. Larned. An illustrated article explaining methods used in draining the Sudbury watershed in Massachusetts, giving costs. Also discussion. 5000 w. Jour N E Water Wks Assn—March, 1902.

Surface Water.—See SEWER—Storm Flow.

Tile.—Tile Drainage. F. L. Knight. On locating systems of tiling and matters related. 5000 w. Brick—June, 1904.

Tile Drain Laying. 2nd Prize Paper. F. N. Pitkin. Describes methods, instruments used. Ills. Serial. 1st part. 5200 w. Brick—Aug., 1904.

Drain Tile Laying. Gilmer Siler. The present article considers the essential characteristics of a good drain tile, the various sizes and their capacity of flow, how lands should be drained and best practice in laying tile. Serial. 1st part. 2500 w. Brick—Oct., 1905.

Tunnel, Harlem River.—See TUNNEL—Harlem River, Drainage.

Watershed.—See Sudbury.

Wheaton, Ill.—See SEWERAGE.

Zuider Zee.—The Drainage and Reclamation of the Zuider Zee (Afsluiting en Droogmaking van de Zuiderzee). A review of the financial and commercial conditions involved in the conversion of the Zuider Zee into available land. 2000 w. De Ingenieur—May 25, 1901.

Reclaiming the Zuider Zee. A brief account of how this great work is to be carried out, with a estimate of the cost. 1100 w. Engr, Lond—May 31, 1901.

The Drainage of the Zuider Zee (Desséchment du Zuider Zée). A review of the latest plans for the recovery of successive portions of the Zuider Zee as provided in the scheme now before the government of Holland. 1500 w. Revue Technique—Sept. 25, 1901.

The Zuider Zee. An outline of the scheme for enclosing this large area of the sea and reclaiming the land. 1200 w. Engr, Lond—Sept. 27, 1901.

The Closing up and Drainage of the Zuider Zee (Abschliessung und Trockenlegung der Zuidersee). A general account of this proposed undertaking, with estimate of the cost. Map. 1800 w. Oesterr Wochenschr f d Oeffent Baudienst—Nov. 30, 1901.

The Draining of the Zuider Zee. Prof. J. H. Gore. Describes the proposed work and the methods of carrying it out, giving related information. 2500 w. Pop Sci M—April, 1902.

DRAINAGE AREA.

Spillways.—See SPILLWAY.

DRAUGHT.

See **DRAFT.**

DRAWBRIDGE.

See **BRIDGE—Drawbridge**; and under name of locality.

DRAWING.

See also **BLUE PRINT; DRAFTSMEN; DRAWING ROOM.**

Decimal Index.—See DRAWING ROOM.

Dictionary.—A Proposed Universal Dictionary of Mechanical Drawing. George H. Follows. The first of a series of articles aiming to furnish an acceptable "drawing dictionary." Ills. Serial. 1st part. 1800 w. Eng News—July 14, 1904.

Ellipse.—See ELLIPSE.

Lettering.—See LETTERING.

Mineral Veins.—Sketching Mineral Veins. Prof. Arthur Lakes. An illustrated article on the methods of representing different rocks and minerals on sketches. 1200 w. Mines & Min—Oct., 1904.

Mining Sketches.—The Use of Sketches in the Mining Field. Arthur Lakes. Shows the advantages of sketching illustrations to accompany a mining report. Ills. 1200 w. Min Wld—July 22, 1905.

Mining Sketches. Prof. Arthur Lakes. Describes the making of geological and topographical drawings of a large district, and perspective underground sketching. 2300 w. Ills. Mines & Min—Oct., 1905.

Ovals.—A New Method of Drawing Ovals (Un Nouveau Tracé des Ovales). M. LeClerc de Pulligny. Deriving a method of drawing an arch of five circular arcs closely approximating a true ellipse. 1200 w. Ann des Ponts et Chaussées—1 Trimestre, 1903.

Reproduction.—See BLUE PRINT.

Structural Details.—Shop Detailing for Structural Steel. F. A. Mitchell. An outline of the principles to be observed in making shop drawings for structural steel work. 3200 w. Technograph—1902-3.

DRAWING INSTRUMENT.

Eccentrolinead.—The Eccentrolinead. M. S. Smith. Illustrated description of this instrument, showing its usefulness. 800 w. Mach, N. Y.—June, 1904.

Gear Teeth.—An Instrument for Drawing the Teeth of Gear Wheels (Zahnkurven-Zeichenmaschine). Franz Haas. An illustrated description of a convenient instrument, like a beam compass, for drawing teeth which have practically correct forms. 2500 w. Zeitschr d Ver Deutscher Ing—May 16, 1903.

Tooth Curve Drawing Instrument. Franz Haas. Translated and abridged from the "Zeitschrift des Vereines Deutscher Ingenieure." Illustrated description of the method and instrument. 1100 w. Am Mach—Nov. 19, 1903.

Truing Up.—Truing Up Drawing Instruments. Frank B. Kleinhans. Directions for truing the various instruments. 1500 w. Ir Trd Rev—Dec. 3, 1903.

DRAWING ROOM.

See also **DRAWING; WORKS MANAGEMENT.**

Drafting-Room and Shop Systems. Frederick O. Ball. A description of systems, with illustrations. 4000 w. Trans Am Soc of Mech Engrs, No. 909—May, 1901.

Average Drawing Room Practice. C. E. Coolidge. Gives questions sent out by Prof. Barr, of Sibley College, and the replies received, with a view of forming an average system. 1600 w. Am Mach—June 19, 1902.

A Modern Drawing Office. Joseph Horner. Considers the requirements, giving hints on the filing of drawings and plans, and discusses the equipment of the pattern shop and allied questions. 2400 w. Page's Mag—Dec., 1903.

Drafting Room Practice. Ralph E. Flanders. Shows some of the ways in which the drafting room may lighten the labors of the workmen, and advance the industry. Considers the routine office work of a typical shop. 6000 w. Mach, N. Y.—March, 1905.

Instructions for Draftsmen. Edwin W. Beardsley. Instructions, mostly confined to principles, intended to be applicable to the practice of the average drafting room. 1500 w. Mach, N Y—Sept., 1905.

The Organization of a Drawing Office. W. O. Horsnaill. Describes a system applicable to drawing-offices dealing with all kinds of engineering work. Ills. Serial. 1st part. 2500 w. Engr, Lond—Dec. 1, 1905.

Bridge Office Rules.—Bridge Office Drafting Rules. H. G. Tyrrell. Gives rules drawn up as a general guide, which may be modified to suit particular cases. 5500 w. Eng News—March 23, 1905.

Bridge Tracings.—See Filing.

Decimal Index.—A Decimal System for Numbering Working Drawings. Henry L. Hutson. Describes a system similar to the Dewey Decimal System used for numbering books in libraries. Also editorial. 2000 w. Am Mach—Dec. 26, 1901.

See also **Railway Maps and Drawings.**

Equipment.—Drawing Office Equipment. John McGeorge. Discusses light, natural and artificial, space allotted to each man, types of drafting boards, sanitary arrangements, blue-print facilities, etc. 3000 w. Ill. Trans Am Soc of Mech Engrs—June, 1903.

Filing.—Numbering and Filing Drawings. S. A. Worcester. An outline of a system recommended, with a brief comparison with other methods. 1800 w. Am Mach —April 16, 1903.

A Filing and Indexing System for Drawings. E. C. de Wolfe. Describes the system used by the Dodge Mfg. Co. at Mishawaka, Ind. Serial. 1st part. 3000 w. Am Mach—Nov. 12, 1903.

Filing and Indexing Tracings of Railroad Bridges. Explains a system adopted in the office of the bridge engineer of the Erie R. R. Co., New York. Ills. 2000 w. Eng Rec—Feb. 18, 1905.

General Electric Co.—An Outline of the Drawing Office System of the General Electric Co. S. L. G. Knox. Describes a system found satisfactory in a concern employing over three hundred draftsmen and having a total of over twelve thousand men. Ill. 3000 w. Am Mach—July 25, 1901.

Group System.—The Group Drawing Office System. Walter Ferris. Describes this system as used by the Bucyrus Company. 3400 w. Am Mach—Jan. 28, 1904.

Hunt Co.—Some Features of the Drawing Office System of the C. W. Hunt Company. Description, with illustrations. 1600 w. Am Mach—July 9, 1903.

Hyde Park, Mass.—Drafting Room of the B. F. Sturtevant Co. Illustrated description of the drafting room at the new plant in Hyde Park, Mass. 2000 w. Mach, N Y—Sept., 1905.

Lodge & Shipley.—The Lodge & Shipley Drawing Room. Illustrated description of a well arranged office having features of interest. 1500 w. Mach, N Y—Oct., 1902.

Pittsburg & Lake Erie R. R.—Drawing Room: Chief Engineer's Office; Pittsburg & Lake Erie R. R. Pittsburg, Pa. R. P. Forsberg. Illustrated description of the room, tables, card index system, drawings, filing cases, blue print room, etc. 3200 w. Eng News—Jan. 2, 1902.

Railway Maps and Drawings.—Indexing Railway Maps and Drawings. R. C. Vial. Describes a system which has proved satisfactory in the drafting-room of the Chicago & Western Indiana R R., based on the decimal system. 5000 w. Eng News —Sept. 5, 1901.

Rowan and Co.—Shop Drawings. A full description of the system in use at the shops of Messrs. David Rowan & Co. 3000 w. Engng—July 27, 1902.

Rules.—Rules for a Drawing Office. A. W. Robinson. A copy of revised rules. 1500 w. Trans Am Soc of Mech Engrs, No. 897—May, 1901.

Shipyards.—Shipyard Draughting Rooms. Theodore Lucas. An account of the work done there; the general designing of the vessels and machinery, recording, etc. 2500 w. Naut Gaz—June 19, 1902.

Shop Relations.—The Relations of the Draughtsman to the Workshop. W. H. Booth. A discussion of this fundamental question of efficient shop organization including the preparation and execution of designs for engineering work. 3000 w. Engineering Magazine—October, 1902.

Mechanical Drawing and Its Relation to Practical Shop Work. L. D. Burlingame. An address before the Eastern Manual Training Assn. Considers the drafting department as the interpreter to the shop, of the shop, and for the shop. 4000 w. Am Mach—July 30, 1903.

The Drafting Department as a Factor in Economical Shop Management. L. D. Burlingame. With numerous illustrations of the drafting rooms of important works and a discussion of the conditions of efficient operation. 3000 w. Engineering Magazine—July, 1904.

Standards.—Standard Drawings. Warren E. Willis. Gives suggestions for drafting-room standards. 1600 w. Mach, N Y—Aug., 1902.

Systematising Drawing-Office Standards. The first of a series of articles intended to illustrate a method of organized work when engaged upon a general class of engineering work, especially in that connected with stationary steam engine plants. Serial. 1st part. 1200 w. Prac Engr —Dec. 18, 1903.

DREDGE.

See **DREDGING.**

DREDGING.

See also **DRAINAGE; EXCAVATING MACHINERY; GOLD DREDGING; HARBOR; RIVER REGULATION; SOUNDING; STEAM SHOVEL.**

Dredging Machinery (Baggerwerktuigen). C. H. Holst. A review of modern dredging machinery, both bucket and suction; also barges and auxiliary machinery in dredging work. 4000 w. De Ingenieur—Nov. 30, 1901.

Dredging Machines. John Bogart. Read before the International Nav. Cong. at Düsseldorf. Deals with the construction, capactiy, and cost of operating dredging machines of several types in recent excavations of large magnitude. 5600 w. Engng —Aug 29, 1902.

The Cost of Dredging with Different Classes of Plant. John Bogart. Condensed paper read before the International Nav. Cong. at Düsseldorf. Describes centrifugal pump, dipper and vacuum pump dredgers employed in excavating 1,500,000 cu. yds. of clay and earth, and gives itemized cost of excavation with each class. 5000 w. Eng Rec—Sept. 13, 1902.

European and American Dredges. Frank C. Perkins. Illustrates and describes various types used. 2000 w. Min Rept—April 18, 1905.

Dredges (Les Dragues). A. Baril. A general review, with illustrations of various types of river and seagoing dredges and their parts, partly taken from "Engineering." 4000 w. Rev de Mécanique—Aug. 31, 1905.

Dredging and Dredging Appliances. Brysson Cunningham. The present article illustrates and describes types of dipper and ladder dredges. A concluding article will be devoted to grab and hydraulic dredges. Serial. 1st part. 2500 w. Cassier's Mag—Nov., 1905.

Anglo-American.—New Dredger Built in Great Britain. Description of a trial trip of a new suction dredger, built on the Tyne on an American system. 1200 w. U S Cons Repts, No. 890—Nov. 19, 1900.

Baltimore.—Dredging at Loch Raven, Baltimore. Alfred M. Quick. Gives an illustrated description of the dredging plant, with an account of the troubles that led to the city doing its own dredging, and report of the amount saved. 2800 w. Eng Rec—March 5, 1904.

"Barnard."—United States Dredge Barnard. Robert S. Riley. Illustrated detailed description of a dredge designed to help open and maintain the new channel for navigation through the delta of the Mississippi River. 4000 w. Marine Engng —Oct., 1905.

Bates.—The Bates Hydraulic Dredger. An illustrated description of a dredger for the port of Rockhampton, Queensland. 2000 w. Engng—Jan. 11, 1901.

See also "Beta."

"Benyuard."—See **Launching—Side.**

"Beta."—Hydraulic Suction Dredge on the Mississippi. Day Allen Willey. Illustrations showing the arrangement of the pumping and other machinery on the dredge "Beta," with description and account of service. 1000 w. Sci Am—Sept. 23, 1905.

Boom-Ladder.—Boom Dredge and Conveyors (Drague à Bras et à Transporteurs de Deblais). H. E. Jeanin. Illustrating a special form of ladder dredge with projecting boom, designed for cutting irrigation channels in China. 1500 w. 1 plate. Mem Soc Ing Civ de France—May, 1904.

Bucket.—See **Smulders.**

Bucket Suction.—See also **Hydraulic; Suction; Suction-Bucket.**

Buffalo.—See **EXCAVATION.**

Centrifugal Pump.—See **Hydraulic.**

Chaquette.—A New Clam Shell Dredge Operated by Compressed Air. Illustrates and describes a recent invention of E. Chaquette for closing and opening a clam shell for subaqueous excavation. 1100 w. Compressed Air—Oct., 1902.

The Chaquette Pneumatic Ddredge. An illustrated description of a power-clam-shell dredge, invented by Ehraiem Chaquette. 1000 w. R R Gaz—Sept. 11, 1903.

The Chaquette Pneumatic Dredge. C. E. Davenport. An illustrated detailed description of a power clamshell for dredging or excavating. 2700 w. Compressed Air—Dec., 1903.

Clam Shell.—Evolution of the California Clam-Shell Dredger. H. A. Crafts. Illustrations, with remarks on the recent improvements in this type of dredger, which is especially adapted to river and reclamation work. 700 w. Sci Am—Sept. 30, 1905.

See also **Chaquette.**

Clay.—See **Cutting Machinery.**

Clyde.—Dredging Plant and Clyde Improvement. Illustrated description of a powerful twin-screw barge-loading dredge built for work on the Clyde. 1200 w. Engr Lond—Dec. 18, 1903.

Coal.—See **COAL DREDGING.**

Compressed Air.—See **Chaquette.**

Conrad.—Bucket, Suction, and Pressure Dredge (Selbstladender Eimer Druck und Saugbagger). A description of the new dredge built by Conrad, of Haarlem, Holland, for the Russian government for the harbor of Riga. 1000 w. Glasers Annalen—Feb. 1, 1903.

"Coronation."—See **Sand Pump, Mersey; Sea Going.**

Cumberland Sound.—See **HARBOR.**

Cutting Machinery.—A New Method of Applying Cutting Machinery to Suction Dredges. George Higgins. Read before the Victoria Inst. of Engs. Explains the need of cutters in dealing with certain material, and gives illustrated description of machinery to be applied to a suction dredge in New South Wales. Serial. 1st part. 3500 w. Prac Engr—Nov. 23, 1900.

Cutting Machinery for Suction Dredgers. Illustrates and describes cutting machinery designed for breaking up beds of clay, or of indurated sand, into lumps small enough to pass through the pipes and pump. 1500 w. Engng—May 23, 1902.

Dredging, with Special Reference to Rotary Cutters. James Henry Apjohn. Read at Engng. Con. of the Inst. of Civ. Engrs. Describes dredges used for dredging clay. 1000 w. Engng—June 19, 1903.

See also **DRILLING—Submarine Rock.**

Danube.—The Work on the Lower Danube between Tultscha and the Sulina Mouth (Die Arbeiten an der Unteren Donau Zwischen Tultscha und der Sulinamündung). Data concerning the dredging and other improvement works on the lower Danube in Roumania. 2500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 28, 1903.

Deep Sea.—See **SOUNDING.**

Delaware River.—Government Dredge for Delaware River. Illustrated detailed description. 1200 w. Marine Engng—Nov., 1905.

Dipper.—A Large Single-Rope Dipper Dredge. Illustrates and describes a large dipper dredge recently put in service at Chicago, for river and harbor improvements. 1400 w. Eng News—Feb. 28, 1901.

See also **Hydraulic Dipper; STEAM SHOVEL—Dipper Dredge.**

Dipper, N. Y.—The 15-Cu. Yd. Dipper Dredge for the New York Harbor Improvements. Illustrated description of the construction and operation of the largest and most powerful dipper dredge in the world. 600 w. Eng News—May 14, 1903.

See **DRAINAGE—Dredging.**

Dublin Harbor.—See **Smit.**

Electric.—Electrically Driven Ladder Dredge. Illustrated description of a ladder dredge in use on the river Esla, in Spain, which is electrically driven throughout. 800 w. Marine Engng—Aug., 1903.

"Florida."—United States Dredger "Florida." Illustrated description of an interesting shallow draught dredger and snag-boat for government use in improving the channels of small rivers. 1200 w. Engr, Lond—Jan. 24, 1902.

Stern-Wheel Government Dredge for Florida Waters. Illustrated description of the dredge snag-boat "Florida," built for service on the St. John and other Florida rivers. 2800 w. Naut Gaz—April 13, 1905.

French.—New French Dredges. From "La Nature." Illustrated description of dredges which embrace the most recent improvements, and are moved under their own power. 1000 w. Sci Am Sup—June 7, 1902.

Gold.—See **GOLD DREDGING.**

Havana.—Heavy Dredging with Light Machinery at Havana. A. H. Weber. A description of heavy rock and clay excavation with machinery too light for the work, causing delays by breakdowns and large sums for repairs. 1100 w. Eng Rec—Nov. 23, 1901.

"Hephaestos."—Sea-Going Bucket Dredge "Hephaestos" with Floating Pipe Line (Seetüchtiger Eimerbagger "Hephaestos" mit Schwimmender Rohrleitung). E. Kleinrath. A well illustrated description of a dredge built by Smulders for service in China, with a pipe line for discharging the dredged material supported on iron casks. 1 plate. 3000 w. Zeitschr d Ver Deutscher Ing—April 19, 1902.

Hoogli River, India.—See **RIVER REGULATION.**

Hydraulic.—The Maintenance of Centrifugal Dredging Pumps. A statement of the results of experience with the hydraulic dredges of the Mississippi River Commission. 1000 w. Eng Rec—April 20, 1901.

Modern Dredging Machinery (Neuere Baggerkonstruktionen). R. Weis. Describing especially the improved suction dredges used in America, Russia, Australia and elsewhere. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—March 22, 29, 1902.

Dredging by Hydraulic Method. G. W. Catt. Briefly describes various types of dredges used for excavating in rivers and harbors, and gives illustrated description of methods and apparatus used in hydraulic dredging. 3500 w. Iowa Engr—March, 1905.

See also **Suction; WATERWORKS—St. Louis;** and under specific names of dredges.

Hydraulic Dipper.—Combination Hydraulic and Dipper Dredge for the Mexican Government Drawings and particulars of construction furnished by the builders of the dredge "El Chijol." 2500 w. Eng News—April 21, 1904.

Hydraulic, St. Louis.—See **WATERWORKS—St. Louis.**

"J. Israel Tarte." — Canadian-Built Hydraulic Dredge. Illustrated description of the modern steel hydraulic dredge, J. Israel Tarte, built by the Polson Iron Works, Toronto, Ont., for the Dominion Government. One of the largest and most powerful dredges ever built. 1400 w. Marine Engng—June, 1903.

The Hydraulic Dredge. "J. Israel Tarte." A. W. Robinson. An illustrated detailed account of this dredge and of the work on which it is engaged on the St. Lawrence River. 6000 w. Can Soc of Civ Engrs—Feb. 25th, 1904.

The Hydraulic Dredger. "J. Israel Tarte." A. W. Robinson. Read before the Canadian Soc. of Civ. Engrs. A detailed account of the dredger and its work, with illustrated description. 7500 w. Engng—Oct. 21, 1904.

Jet Submerged.—See **Submerged Jet.**

"King Edward."—Twenty-Inch Hydraulic Dredge "King Edward." A. W. Robinson. Read before the Can. Soc. of Civ. Engrs. Illustration, with description of this dredge which is to be used for work on the Pacific coast. 2800 w. Can Engr—March, 1903.

Ladder.—See **Boom; Electric.**

Levee Building.—Dredges for Levee Building. Enos Brown. Illustrated description of a giant dredger. The bucket holds 25 tons, and the boom is 155 feet long. 500 w. Sci Am—Dec. 20, 1902.

Light Draft.—Light Draft Hydraulic Dredge. Illustrated detailed description of a dredge designed for special work on the coast of the Gulf of Mexico. Also describes the dredging machinery, propelling machinery and steam plant. 2000 w. Marine Engng—April, 1902.

Liverpool.—See **"Vulcan;" HARBOR.**

Loch Raven.—See **Baltimore.**

Massena Canal.—The Cost of Dredging on the Massena Canal. Abstract from a recent paper by John Bogart before the International Nav. Cong. Gives data of cost of dredging in this canal. 1100 w. Eng News—Oct. 30, 1902.

Mississippi.—See "Barnard;" Hydraulic; Levee.

Modern Machinery.—Modern Machinery for Excavating and Dredging. A. W. Robinson. The first of two articles discussing the artificial methods of deepening and maintaining channels by dredging, with illustrations of modern powerful dredges and excavators. 4000 w. Engineering Magazine—March, 1903.

Modern Machinery for Excavating and Dredging. A. W. Robinson. The second article describes, with many illustrations, the heavier types of dredges, adapted to tidal harbors and deep waterways. 3500 w. Engineering Magazine—April, 1903.

Monte Video, Uruguay.—See Smulders.

Montreal Harbor Fleet.—The Dredging Fleet of Montreal Harbor. H. A. Bayfield. A discussion of such points in the operation of a dredging fleet as are of interest to dredging men. 4900 w. Can Soc of Civ Engrs—Jan. 14, 1904.

New South Wales.—Dredging in New South Wales. Cecil West Darley. Read at Engng. Con. of the Inst. of Civ. Engrs. On the extensive river improvement that conditions have made necessary and the dredges used. 1200 w. Engng—June, 1903.

New York Harbor.—Plant and Methods Employed in Excavating Ambrose Channel, New York Harbor. Describes the dredges, and manner of operation, with general comments. 2500 w. Eng News—Feb. 12, 1903.

Government Dredges for New York Harbor. Illustrated detailed description of two large suction sea dredges intended for deepening the channel. 1500 w. Marine Engng—July, 1904.
See also Dipper; "Thomas;" "Thomas" and "Mills;" HARBOR—New York.

Petroleum Motor.—Petroleum Driven Dredge (Drague à Petrole). M. Wender. Describing a bucket dredge driven by a petroleum motor, and adapted for the requirements of harbor maintenance. 3500 w. Ann des Ponts et Chaussées—1 Trimestre, 1901.

Pneumatic.—See Chaquette.

Portland, Ore.—The New 30-in. Hydraulic Dredge for the Port of Portland, Oregon. Two-page plate, illustrations and description of one of the most noteworthy dredges yet built, its construction and operation. 4500 w. Eng News—April 30, 1903.

Reservoir.—See RESERVOIR—Cleaning, Pittsburg.

Riga, Russia.—See Conrad.

River Bars.—A Desirable Method of Dredging Channels Through River Bars. S. Maximoff. A short description of the present conditions of river navigation in Russia and of the Government's dredging fleet, with detailed description of method proposed by the writer. Ill. 4300 w. Pro Am Soc of Civ Engrs—Oct., 1903.

A Desirable Method of Dredging Channels Through River Bars. Discussion by Messrs. Rudolph Hering and W. W. Harts, of a paper by S. Maximoff. 1500 w. Pro Am Soc of Civ Engrs—Dec., 1903.

A Desirable Method of Dredging Channels Through River Bars. Continued discussion of a paper by S. Maximoff on this subject. 5500 w. Pro Am Soc of Civ Engrs—Jan., 1904.

Rock.—See DRILLING—Submarine Rock.

Rotary Cutter.—See Cutting Machinery.

Roumania.—See Danube.

Sabine Pass, Tex.—Suction Dredge for Harbor at Sabine Pass. Illustrated detailed description of a seagoing twin screw suction dredge to be used for harbor improvement. 1100 w. Marine Engng—Oct., 1901.

Sand Pump, Mersey.—Sand-Pump Dredging on the Mersey. The present article is mainly an illustrated description of the latest sand-pump dredger, 'Coronation,'' and its working. Serial. 1st part. 4000 w. Engng—March 10, 1905.

Satre.—See Seine Suction.

"Savannah."—See Sea-Going.

Sea-Going.—Modern Sea-Going Dredgers. Illustrations, with description of the dredgers "Savannah" and "Coronation," the latter a British dredger. 2500 w. Naut Gaz—April 6, 1905.

New Sea-Going Dredges. Day Allen Willey. Illustrates and describes the dredges used in improving the ship channel leading into New York harbor. 1200 w. Sci Am Sup—Sept. 2, 1905.

Sea-Going Suction.—Two Sea-Going Suction Dredges. Illustrated general description of two powerful machines to be used in the Southwest pass and Cumberland Sound, South Carolina. 900 w. Marine Rev—Aug. 29, 1901.

Seine Suction.—New Satre Dredges for Service on the Lower Seine. Illustrated description of seaworthy suction dredges built for the improvement of this river. 1100 w. Engng—Nov. 22, 1901.

Suction Dredging in the Estuary of the Seine (Les Dragages par Succion dans l'Estuaire de la Seine). L. Sekutowicz. An account of the deepening of the channel at the entrance to the Seine, with illustrations of the suction dredge used. 2000 w. 1 plate. Génie Civil—Feb. 14, 1903.

Smit.—Smit and Sons' Dredgers. Illustrated description of a dredge, and its operation, in use in connection with the Dublin Harbor improvements. 1800 w. Engng—May 3, 1901.

Marine Suction Dredge (Drague Marine Porteuse à Succion et à Refoulement). An illustrated description of a sea-going dredging vessel, built by L. Smit and Son, Holland. 1 plate. 1800 w. Génie Civil—Jan. 4, 1902.

Smulders.—A Bucket and Suction Dredge for Monte Video, South America (Drague Marine Porteuse à Godets et à Succion, du Port de Montevideo). Ch. Dantin. An illustrated description of a large marine dredge built by Smulders, of Rotterdam. 1 plate. 1500 w. Génie Civil—May 23, 1903.

Marine Bucket Dredge for Tsingtau, China (Drague Marine à Godets pour le Port de Tsingtau, Chine). A. de Riva-Berni. A well illustrated description of a Smulders dredge for the harbor of Tsingtau, on Kiaochau Bay, and the floating pipe line for discharging material. 1 plate. 1500 w. Génie Civil—June 14, 1902.

Stern Wheel.—See "Florida."

Submerged Jet.—The Submerged Jet Dredge. H. L. Lewis. Description of J. T. Johnson's patent, giving plan of pressure pipes and floats. 900 w. Min Jour—April 29, 1905.

Suction.—See "Beta;" Hydraulic; N. Y. Harbor; Sea-Going; Seine; Smulders; Suction—Bucket.

Suction—Bucket.—Combined Bucket and Suction Dredger for Monte Video. An illustrated description of a dredger built for harbor works in progress on behalf of the Government of Uruguay. 1200 w. Engng—April 3, 1903.

Bucket and Suction Dredge (Drague Marine Porteuse et à Refoulement). Ch. Dantin. Illustrated description of a sea-going dredge built for Tunis by Smulders of Rotterdam. 1500 w. 1 plate. Génie Civil Civil—Aug. 29, 1903.

Combined Suction and Bucket Dredger. Illustrated description of a high-powered dredger for the port of MonteVideo. 400 w. Engr, Lond—Nov. 13, 1903.

Combined Bucket and Suction Dredge Constructed for the Government of Uruguay. Illustrated description of this interesting self-propelled suction dredge. 1000 w. Marine Engng—Nov., 1904.

Combined Bucket and Suction Dredge. Illustrated description of an interesting dredging vessel built in Holland for service at Monte Video, Uruguay. 1000 w. Naut Gaz—Oct. 19, 1905.

Surabaya Strait.—See STRAIT—Surabaya.

"Thomas."—Dredges for the New 40-Foot Channels of New York Harbor. Describes the work proposed, giving map, and gives illustrated description of the dredge "Thomas," specially constructed for this work. 1400 w. Sci Am—Jan. 12, 1901.

"Thomas" and "Mills."—Hydraulic Hopper Dredges for Harbor Improvement at New York. Illustrated description. 1400 w. Marine Engng—June, 1901.

Sea-Going Hydraulic Dredges for the East Channel Improvement, New York Harbor. Brief illustrated description of two of the largest and most thoroughly equipped dredges ever constructed in America. 1400 w. Eng News—Feb. 14, 1901.

"Vulcan."—The Steam Dredge Vulcan. Illustrated description of a powerful dredger designed to meet the requirements of the Mersey Dock and Harbor Board for deep dredging in hard material, and for working close up to the dock and quay walls. 1200 w. Engr, Lond—Oct. 28, 1904.

An Interesting Powerful Steam Dredger for Harbor Work. Illustration, with brief description of the 'Vulcan," a powerful dredger in use at Liverpool. 700 w. Sci Am—Jan. 14, 1905.

"Walter Bibby."—See **SALVAGE.**

DRESDEN.

Public Works.—See **PUBLIC WORKS.**

DRILL.

See also **BORING; DRILLING; DRILLING MACHINE; ROCK DRILL.**

Action.—See **Manufacture.**

Ajax, Sharpener.—See **ROCK DRILL.**

Dynamometer.—See **DYNAMOMETER—Twist Drill.**

Electric Portable.—An Ingenious Portable Electric Drill. Brief illustrated description of a portable electric drill, suitable for all descriptions of engineering work. 600 w. Sci Am Sup—Sept. 5, 1903.

Portable Electric Drilling and Riveting Machines. Frank C. Perkins. Illustrations of various types with descriptions. 1600 w. Cassier's Mag—Feb., 1904.

Electrically Driven Portable Tools. Dr. Alfred Gradenwitz. Illustrates and describes electrically driven portable drills, and their applications. 1200 w. Mach, N Y—Aug., 1904.

Fromholt.—See **ROCK DRILL—Electric.**

Grinding.—See **GRINDING—Drill.**

Jig.—See **JIG.**

Manufacture.—Drills and Drill Making (Bohrer und Bohrerfabrikation). G. Niedecker). A discussion of the action of flat and twist drills, with suggestions as to the best forms and processes of manufacture. Three articles. 4000 w. Zeitschr f Werkzeugmach u Werkzeuge—Nov. 25, Dec. 5, 15, 1904.

Mine.—See **BORING; COAL MINING MACHINERY; DRILLING; MINING MACHINERY; ROCK DRILL.**

Pattberg.—See **SHAFT SINKING—Rheinpreussen.**

Rock.—See **DRILLING; ROCK DRILL.**

Simplon Tunnel.—See **ROCK DRILL—Brandt Hydraulic.**

Testing.—Twist Drill Tests. Eugene C. Peck. Description of a testing apparatus which automatically records the feed pressure and the torsional stress on a drill in operation. 1000 w. Am Mach —May 30, 1901.

Turning Tool.—The Flat Drill as a Turning Tool. F. W. Shaw. Describes the use of the flat drill as a turning tool, illustrating the methods for straight and circular work. 2500 w. Am Mach —June 5, 1902.

Twist.—Twist Drills. Cornell Ridderhof. Considers points relating to drills, their grinding, the stresses, etc. 2000 w. Am Mach—Jan. 1, 1903.

See also **DYNAMOMETER.**

DRILL HALL.

Armory, N. Y.—See **ARMORY.**

DRILLING.

See also **BORING; COAL MINING MACHINERY; DRILL; MINING MACHINERY; PETROLEUM WELL; ROCK DRILL; WELL BORING.**

Ahnapee Harbor, Wis.—See **RIVER REGULATION.**

Alluvial Deposits.—Measurements Relating to Alluvial Deposits. Ralph L. Montagu. Illustrates a drill-hole computer, explaining its use. 1000 w. Min & Sci Pr—June 27, 1903.

Core.—Core Drilling Without Diamonds. An illustrated description of core drilling by the steel-shot process. 800 w. Sci Am—July 18, 1903.

See also **Davis Calyx.**

Davis "Calyx."—The Davis "Calyx" Core-Drill. Illustrated detailed description of a rotating drill with annular cutter; also by means of the "calyx" it furnishes the chips cut from the rock in regular sequence as they are cut. 1200 w. Eng News—May 9, 1901.

Core Drilling with the Davis Calyx Drill. L. V. Emanuel. Illustrates and describes this drill and the method of operating. 3500 w. Sch of Mines Qr—April, 1902.

Recent Improvements in Core Drilling Without Diamonds. Lucius I. Wightman. Briefly describes the Davis system, and improvements added. Ills. 1200 w. Eng & Min Jour—Nov. 4, 1905.

Deep Hole.—Deep Hole Drilling. A collection of useful data covering both large and small work, with illustrations. 4800 w. Mach, N Y—Dec., 1901.

Deep Waterways Survey.—Experience in Diamond Drill Work on the Deep Waterways Survey. Information from the Report of the Board of Engrs. on Deep Waterways, giving reliable data of costs of drilling 25 holes each averaging about 100 ft. deep. 2000 w. Eng News—July 23, 1903.

Diamond.—The Diamond Drill in Exploration Work. Dr. Emil E. Lungwitz. Discusses the conditions favorable to the use of these drills, and the results. Serial. 1st part. 1500 w. Min Jour—Jan. 26, 1901.

The Cost of Diamond Drill Borings in the Colorado River Valley and at St. Mary's lake, Montana. A. P. Davis. Gives extract from report of John T. Whistler describing work and giving costs, with comparison and general remarks. 1800 w. Eng News—April 30, 1903.

Diamond Drilling. J. N. Justice. Abstract of paper read before the Inst. of Min. & Met. Illustrates and describes boring operations in West Africa to prove the continuity of the ore chutes in depth, and to obtain information as to the dip of the formation. 2300 w. Ir & Coal Trds Rev—April 24, 1903.

Diamond Drilling in an Arizona Copper District. Dwight E. Woodbridge. A report of the diamond drill work. 1100 w. Eng & Min Jour—June 2, 1904.

Diamond Drilling from the Bottom of a 2,500 ft. Shaft Full of Water. S. C. Thomson. Describes the method of carrying out the work. Plate. 1400 w. Jour S African Assn ofEngrs—Jan.,1905.

Diamond Drilling Under Difficulty. S. C. Thomson. Abstracted from a paper before the S. African Assn. of Engrs. Describes a drilling operation started at the bottom of a shaft of 2,525 ft., full of water, with no fixed guide for the drill rods in the last 95 ft. 1400 w. Eng & Min Jour —May 4, 1905.

The Diamond Drill in Missouri. R. D. O. Johnson. Describes the method of drilling in south-eastern Missouri, and the great deposits of lead ore discovered and worked. 2000 w. Eng & Min Jour—Aug. 12, 1905.

See also **Deep Waterways Survey; LEAD—Missouri; ROCK DRILL—Electric.**

Diamond Crown Recovery.—The Recovery of a Diamond Crown from a Deep Bore-hole. Cuthbert Baring Horwood. Describes a recovery from a depth of 3,233 feet. Ill. 800 w. (No. 3478.) Inst of Civ Engrs.

See also **Diamond; ROCK DRILL.**

Gun.—See **GUN—Manufacture.**

Mesabi Iron Range.—Test Drilling on the Mesabi Iron Range. Kirby Thomas. An illustrated account of the exploration work in progress. About 250 drills, of all classes, are employed. 2000 w. Eng & Min Jour—June 13, 1903.

Petroleum Well.—See **PETROLEUM WELL.**

Power.—C. C. Hansen. An illustrated description of some of the better known types. 1700 w. Can Min Rev—July 31, 1902.

Subaqueous.—See also **Diamond.**

Submarine Rock.—Rock-Cutting Machines. An illustrated description of two recent examples of ingenious machines for breaking up rock under water, which have proved their value by executing an immense amount of subaqueous excavation. 800 w. Engng—Jan. 9, 1903.

A Submarine Rock Excavator. From a paper by C. G. Hepburn, published by the Inst. of Civ. Engrs. Illustrated description of a drilling apparatus used in Australian harbor improvements. 1000 w. Eng Rec—Sept. 16, 1905.

A Submarine Rock Excavator. Charles Graham Hepburn. Describes an apparatus, designed and built in New South Wales, for the purpose of wharf-building and operations on submarine rock. Ills. 1000 w. (No. 3469). Inst of Civ Engrs.

Vermilion Range.—Test Drilling on the Vermilion Iron Range. Kirby Thomas. Describes the methods of test drilling adopted. Ill. 1700 w. Eng & Min Jour—June 27, 1903.

West Africa.—See **Diamond.**

DRILLING MACHINE.

See also **BORING MACHINE; DRILL; MACHINE TOOL.**

Attachments.—A High Speed and Two Tapping Attachments for Drillers. Herman Isler. Illustrated descriptions. 600 w. Am Mach—Nov. 28, 1901.

Electric.—An Electrically Driven Radial Drill. Illustrated description of a drill designed by Charles E. Willey. 600 w. Am Mach—May 2, 1901.

Electric Portable.—See **DRILL; MACHINE TOOL.**

English.—A Large Drilling Machine. General view and brief description of a fine machine recently made in England. 500 w. Engr, Lond—May 8, 1903.

Fosdick and Holloway.—The Fosdick and Holloway Drilling Machine. Illustrated detailed description. 1800 w. Ir Age—Oct. 24, 1901.

High Speed.—High-Speed Radial Drilling and Tapping Machines. Illustrates and describes machines designed to meet the requirements as to speed, power, and stiffness called for in the use of modern high-speed tool steel. 1000 w. Engng—Sept. 29, 1905.

Indexing Fixture.—See **MILLING.**

Indexing Gang.—Converting an Old Planer Into an Indexing Gang Driller. W. G. Luper. Illustrated description of a machine used for drilling and tapping condenser heads in a western navy yard. 900 w. Am Mach—April 11, 1901.

Multiple.—Multiple Drill Press (Der Serienbohrapparat). Wm. C. Wachholtz. An illustrated description of a multiple drill chuck which can be applied to any drill press, and used to drill holes in pipe flanges, cylinder heads, etc. 600 w. Technologist—Jan., 1902.

Multiple-Drilling Machines. Illustrations, with brief description of electrically driven machines for bridge work. 600 w. Engng—March 13, 1903.

Power Consumption.—Electrical Tests of Power Required for Drilling Cast-Iron from the Solid. Data obtained in a series of tests to determine the power required to operate drilling machines with different sizes of drills. 1000 w. Am Mach—Sept. 18, 1902.

Experiments upon the Work of Machine Tools—Drilling (Expériences sur le Travail des Machines-Outils—Forage). M. Codron. A study of the power required for various forms of drills, their efficiency and operation, forming a continuation of the author's investigations on machine tools. 12000 w. Bull Soc d'Encour—Jan. 31, 1903.

Experiments Upon the Work of Machine Tools. Forces and Work in Drilling (Experiences sur le Travail des Machines-Outils. Efforts et Energies de Forage). M. Codron. A continuation of the author's researches, containing a mathematical study, with many diagrams, of drilling and the power required to drill in various materials. 8000 w. Bull Soc d'Encour—June 30, 1903.
See also **Shavings; MACHINE TOOL.**

Radial.—An English Two-Spindle Radial Drill and Some Workshop Gages. I. William Chubb. Illustrated descriptions. 600 w. Am Mach—Vol. 28. No. 26.

See also **Electric; MILLING MACHINE—Cam.**

Shavings.—Experiments upon the Work of Machine Tools—Drill Shavings (Expériences sur le Travail des Machines-Outils—Copeaux de Forage). M. Codron. A profusely illustrated study of the shavings cut by different kinds of drills from various metals, forming a continuation of the author's investigations on machine tools. 5000 w. Bull Soc d'Encour—April 30, 1903.

Six Spindle.—Six-Spindle Special Driller. Illustrated description of a machine built for drilling the spanner holes in small hardware and machine parts all at one operation. 600 w. Am Mach—Vol. 28, No. 46.

DRILL JIG.

See **JIG.**

DRILL PRESS.

See **DRILLING MACHINE.**

DRIP.

Steam.—See **STEAM DRIP.**

DROP FORGING.

See **DIE; FORGING; HAMMER.**

DROP HAMMER.

See **HAMMER; STEAM HAMMER.**

DRUM.

Crane.—See **CRANE—Drum.**

Hoisting.—See **HOISTING DRUM.**

DRY DOCK.

See also **FLOATING DOCK; NAVY YARD; SHIPBUILDING; SHIPYARD.**

Docking of Ships. Theodore Lucas. Describes graving docks, floating docks, and marine railways, considering the advantages of each, and discussing blocking and all the arrangements in docking. 2200 w. Naut Gaz—March 13, 1902.

Dry Docks—Their Origin and Development. Parker H. Kemble in the "Boston Evening Transcript." Reviews the various systems of reaching the bottoms of vessels for repairs, especially the docking of vessels. 2500 w. Marine Rev—July 24, 1902.

Baltimore.—A New Dry-Dock at Baltimore. Illustrated description of a large timber drydock with concrete abutments constructed on a very unfavorable site. 1300 w. Eng Rec—March 16, 1901.

Construction of the New Dry-Dock at the Skinner Shipyard, Baltimore. Plans and sectional drawings showing the methods of construction, with an account of the difficulties which have been met in the work. 1200 w. Marine Engng—April, 1901.

New Dry Dock at Baltimore. An illustrated description. 2500 w. Marine Rev—Dec. 19, 1901.

A New Dry Dock at Baltimore, Md. Illustrated description of one of the largest dry docks in the United States, capable of docking a vessel of 600 ft. in length and 70 ft. beam, with a draft of 22 1-2 ft. 1300 w. Eng News—Jan. 9, 1902.

The Construction of a Timber Dry Dock. G. B. Ashcroft. Plates and detailed description of a dry dock in Baltimore which has been in satisfactory operation since 1901. Ills. 8000 w. Can Soc of Civ Engrs—April 20, 1905.

Battleships.—See **BATTLESHIP—Docking.**

Boston Navy Yard.—New Masonry Dry Dock at the Boston Navy Yard. Illustrated description of the fine stone-and-concrete dry dock recently completed. It is one of the largest in the world and embodies all the modern improvements. 1200 w. Sci Am—April 29, 1905.

Brest.—Reconstruction of the Pontanion Dry Docks at the Brest Arsenal (Reconstruction des Formes de Radoub de Pontanion dans l'Arsenal de Brest par M. Adrian Hallier). G. Richou. An illustrated account of the work of enlarging and modernizing dry docks for large naval vessels. 1 plate. 5000 w. Mem Soc Ing Civils de France—Feb., 1902.

Reconstruction of the Pontanion Dry Docks at the Brest Arsenal, France (Reconstruction des Formes de Radoub de Pontanion dans l'Arsenal de Brest). G. Richou. Illustrated description of enlargement and modernization of old dry docks for battleships and cruisers. 1 plate. 8500 w. Génie Civil—May 3, 1902.

Carena, Argentine.—The Carena Dry Dock, Argentine Republic. Describes a dock recently finished, proportioned to receive the largest ships yet built. Ill. 1200 w. Eng Rec—Nov. 14, 1903.

Charleston, S. C.—The Construction of the Charleston Dry Dock. An illustrated detailed description of difficult foundation work. 2400 w. Eng Rec—March 4, 1905.

See also **SPECIFICATIONS.**

Design.—The Design of a Dry Dock. Alfred W. Young. Read before the Junior Inst. of Engrs. Considers the subject chiefly in regard to stability of structure rather than the elements affecting the outline. Ills. 5000 w. Engng—Sept. 30, 1904.

Electric, Brooklyn.—The Largest Electrically Operated Dry Dock in the World. An illustrated description of the recently completed electric dry dock of South Brooklyn, N. Y. 1200 w. Elec Wld & Engr—June 22, 1901.

Floating.—See **Floating vs. Graving; FLOATING DOCK.**

Floating vs. Graving.—The Comparative Merits of Floating Docks and Graving Docks. From the report of the Massachusetts State Board of Harbor and Land Commissioners concerning the relative merits of graving docks and floating docks. 4500 w. Eng News—July 20, 1905.

Helburn, Eng.—New Graving Dock at Helburn. Illustrated detailed description. 1500 w. Engr, Lond—Oct. 21, 1904.

Hong Kong.—The Graving Docks of Hong Kong. Albert Denison. Short descriptions of the docks built and under construction. 1000 w. (No. 3492.) Inst of Civ Engrs.

Hunter's Point, Cal.—See **San Francisco Bay.**

Kawasaki Company.—See **Kobe, Japan.**

Kiel.—See **CAISSON.**

Kobe, Japan.—A New Japanese Dry Dock. Illustrates and describes the Kawasaki Company's dry dock at Kobe, built wholly under the direction of native trained experts. Many difficulties were met, but the construction seems practically perfect. 2400 w. Engng—Aug. 22, 1902.

The New Graving Dock of the Kawasaki Dock-Yard Company, Kobe. An illustrated detailed description of the construction of a dock which accommodates vessels up to 5,000 tons. 4700 w. Engng—July 24, 1903.

The New Graving Dock of the Kawasaki Dock Yard Co. at Kobe, Japan. Dr. Genjiro Yamasaki. An illustrated detailed description. 4500 w. Eng News—Sept. 24, 1903.

Nagasaki.—A New Graving Dock at Nagasaki, Japan. Naoji Shiraishi. Dimensions, general information, and illustrated description. 1800 w. Pro Am Soc of Civ Engrs—Oct., 1905.

Portsmouth, N. H.—The Portsmouth Dry Dock. Illustrated description of the method of excavating rock for a 75x130 ft. masonry dock, where the site was spanned by special truss conveyors delivering the spoil from the pit on either side of the site. 2800 w. Eng Rec—March 23, 1901.

Pumping Machinery.—The Development of Dry-Dock Pumping Machinery. J. S. Shultz. With numerous illustrations showing the increasing and advantageous use of centrifugal pumps in dry-dock operation. 3500 w. Engineering Magazine—Dec., 1904.

San Francisco Bay.—The New 750-ft. Dry-Dock of the San Francisco Dry-Dock Co., at Hunter's Point, Cal. Illustrated detailed description of a proposed addition to the dry-dock facilities of the Pacific Coast, its equipment, power plant, etc. 3000 w. Eng News—Oct. 25, 1900.

Docking Facilities on the Pacific Coast. William H. Crawford, Jr. Illustrations with descriptions of the new and old dry-docks at Hunter's Point, near San Francisco, and at Mare Island Navy Yard. 1100 w. Marine Engng—Aug., 1902.

Sectional.—See **FLOATING DOCK.**

Southampton, Eng.—New Graving Dock at Southampton. Illustrated detailed description of this new dock, which is one of the largest of the kind in Europe and in the world. 1800 w. Engr, Lond—Oct. 20, 1905.

New Graving Dock at Southampton. Brief description, with cross-section, of the recently completed dock for the London and South-Western Railway Company. 1100 w. Engng—Oct. 20, 1905.

See also **DOCK.**

Temporary.—Temporary Dry-Docks for Rapid Construction. V. E. Timonoff. Read before the Int. Engng. Cong. at St. Louis. Indicates one of the possible solutions of repairing damaged vessels, describing a method of constructing a temporary dry-dock. 2800 w. Marine Engng—Nov., 1904.

Uraga, Japan.—The Uraga Docks, Japan. Description, with illustrations, of a second set of docks nearing completion. 1400 w. Engr, Lond—Nov. 2, 1900.

DRYING.

The Principles and Design of Modern Drying Plant. Shows the demand for artificial drying apparatus, and studies the relations between the vaporized water and the heat required, also other important points. Serial. 1st part. 2600 w. Engr, Lond—Oct. 4, 1901.

Drying with Direct Heat (Tracknen mit Direktem Feuer). E. Hausbrand. An inquiry as to the amount of water which can be evaporated by the gases of combustion when passing directly over the material to be dried. Table. 2500 w. Gesundheits Ing—Nov. 30, 1901.

Drying by Steam, Hot Air, and Waste Gases. Hugh J. Barron. A discussion of the best practice for drying various materials. 3300 w. Am Soc of Heat & Ven Engrs—July, 1905.

Notes on Drying Plants (Einiges über Trockenanlagen). Karl Reyscher. A discussion of the best method of arranging the air circulation in the design of drying kilns. 30000 w. Zeitschr d Ver Deutscher Ing—Dec. 23, 1905.

Clay Ware.—A Modern Steam Dry Floor. C. M. Hurt. Illustrated description of the construction and regulation of floors for drying clay workers' wares, and a statement of their advantages. 2500 w. Brick—Nov. 1, 1900.

Electric Oven.—An Improved Drying Oven. Edmund S. Smith. Brief illustrated description of an electric oven, simple and easily constructed. 600 w. Sci Am—Sept. 20, 1902.

Minerals.—The Mechanical Drying of Minerals. C. O. Bartlett. Read at Mining Congress, Deadwood. Considers products of value now coming into use and the treatment they require. Especially considers Portland cement, and methods of drying minerals. 2000 w. Min Rept—Sept. 17, 1903.

Sand.—See **SAND DRYER.**

DUSSELDORF EXPOSITION.

See also **EXPOSITION—Düsseldorf**; and under specific machines and apparatus.

Navigation Congress.—See **NAVIGATION CONGRESS.**

Steam Engines.—See **STEAM ENGINE—Düsseldorf Exposition.**

DUST.

See also **COAL DUST; ROAD—Oil Sprinkling; STREET CLEANING; STREET SPRINKLING.**

Automobile.—The Dust Problem. Col. R. E. Crompton, and C. W. S. Crawley. Excerpt from a paper read before the Automobile Club. Gives facts observed during a test, and conclusions reached. 3000 w. Auto Jour—Dec. 5, 1903.

Motor Cars and Dust. On the effect of design on the raising of dust, stating the conditions and discussing how far they may be eliminated. 2300 w. Engr, Lond—June 16, 1905.

Cause and Prevention of Dust from Automobiles. W. R. Cooper. Considers what has been accomplished in the special treatment of roads, and discusses the effect of the design of the car, and means of checking the dust. Ills. 4300 w. Nature—Sept. 14, 1905.

Blast-Furnace Gas.—See **BLAST-FURNACE GAS—Purification.**

Carpet Cleaning.—See **CARPET CLEANING.**

Crichton-Browne Address. — The Dust Problem. Sir James Crichton-Browne. Atmospheric dust, its sources, the injurious effects, and remedies. 13300 w. Jour San Inst—Oct., 1902.

The Evils of Coal, Ganister and Slag Dust. Review of an address by Sir James Crichton Browne on the hygiene of certain occupations. 1000 w. Col Guard—Oct. 3, 1902.

Deposits.—Dust Deposition in Relation to the Heating of Buildings. W. F. Barrett. Extract from a paper recently read before the British Inst. of Heat. & Ven. Engrs. Discusses the cause of dust deposits on room walls. Serial. 1st part. 1300 w. Met Work—July 22, 1905.

Grinding Machinery.—See **GRINDING—Dust Collecting.**

Liverpool Experiments.—Dust-Laying Experiments at Liverpool. A. Lyle Rathbone. From a paper read before the Liverpool Self-Propelled Traffic Assn. On the experiments with oil sprinkling and with various kinds of pavements, made in Liverpool during the past three or four years. 2400 w. Autocar—April 29, 1905.

Mines.—Prevention of Dust in Mines. Charles B. Brodigan. From the "Pro. S. African Assn. of Engrs." Describes the method of drilling used in constructing the Simplon Tunnel. 2500 w. N Z Mines Rec—March 16, 1904.

See also **COAL DUST.**

Oil Sprinkling.—See **Liverpool Experiments; ROAD.**

Pneumatic Suction.—Dust Prevention (La Lutte Contre les Poussières). A discussion of the dangers and inconveniences of dust, and an illustrated description of a pneumatic suction apparatus for removing dust. 1200 w. Revue Mineralurgique. June, 1903.

Prevention.—Methods of Dust Abatement and Prevention (Les Moyens de Combattre ou d'Empêcher la Poussière). G. Forestier. A discussion of sprinkling and of preventing the formation of dust on streets and highways. 7000 w. Mem Soc Ing Civ de France—Dec., 1904.

See also **Liverpool Experiments; Road, France; ROAD — Oil Sprinkling; STREET — Oiled; STREET SPRINKLING.**

Roads, France.—Methods of Preventing Dust on Roads (Moyens de Combattre la Poussière sur les Routes). Dr. Guglielminetti. Describing especially the appliances used for sprinkling the roads between Nice, Monte Carlo and Mentone. 3000 w. Génie Civil—June 24, 1905.

Sawdust Removal.—See **WOODWORKING MACHINERY.**

DUST CHAMBER.

Blast Furnace.—See **BLAST FURNACE—Dust Chamber; BLAST-FURNACE GAS—Purification.**

DUST GUARD.

Symington.—The Symington Dust Guard. An illustrated detailed description of a device to protect railway axles from dust. 1000 w. R R Gaz—June 26, 1903.

DYKE.

See **BREAKWATER; DRAINAGE; SEA WALL; SHORE PROTECTION.**

DYNAMITE.

See **EXPLOSIVE; HEATING—Dynamite Storage.**

DYNAMO.

See **ELECTRIC GENERATING SET; ELECTRIC GENERATOR.**

DYNAMO DESIGN.

See **ELECTRIC GENERATOR DESIGN.**

DYNAMOMETER.

See also **ELECTRIC TESTING.**

Air Resistance.—See **Renard; AIR RESISTANCE—Renard Dynamometer.**

Alden Absorption.—The Design and Installation of an Alden Absorption Dynamometer. C. M. Allen. Illustrates and describes this apparatus and its operation. It is compact, easily handled and automatic in regulation. 1400 w. Jour Worcester Poly Inst—March, 1901.

Automobile.—See **Hele-Shaw; TRACTION.**

Brake.—Design for a 15-Horse-Power Brake Dynamometer. Nathaniel R. Craighill. Working drawings and description of a friction brake intended for use in testing electric motors, gas engines, or other machines, the capacity of which does not exceed 15 H. P. 1800 w. Am Elect'n—April, 1903.

See also **Prony Brake.**

Canadian Pac. Ry.—Dynamometer Tests on the Canadian Pacific Railway. L. J. Houston, Jr. An illustrated article giving an account of tests made between Fort William and Winnipeg, with information concerning the traffic. Tables and plates. 3000 w. Trans Assn of Civ Engrs of Cornell Univ—1903.

Car.—See **Canadian Pac. Ry.; CAR—Dynamometer; Test; ELECTRIC CAR—Dynamometer.**

Constant Moment.—A Dynamometer Brake Permitting the Obtaining of a Constant Moment. Ed. Noaillon. Translated from "Bul. Sci. de l'Univ de Liége." Presents an arrangement claiming that it permits a moment of resistance to act, which is strictly constant, whatever may be the variations in speed. Critical note by editor. 700 w. Sib Jour of Engng—March, 1903.

Eddy-Current Brake.—Eddy-Current Brakes (Wirbelstrombremse). Dr. K. Feussner. A description of the use of the eddy-current brake as an absorption dynamometer for testing small electric motors. 4500 w. Elektrotech Zeitschr—July 25, 1901.

The Eddy-Current Brake for Testing Motors. D. K. Morris, and G.A. Lister. Abstract of a paper read before the Birmingham Sec. of the Inst. of Elect. Engrs. States the advantages of eddy-current brakes, and describes a new design. Ills. 1800 w. Mech Engr—April 29, 1905.

The Eddy Current Brake for Testing Motors. D. K. Morris, and G. A. Lister. The present number reviews the methods of motor-testing in use, presents the advantages of Eddy-current brakes, giving detailed description of new design and some results obtained. Illus. Serial. 1st part. 2000 w. Elec Engr, Lond—Sept. 15, 1905.

Electric.—An Electric Instrument for Measuring Couples, Power and Work (Mesureur Electrique du Couple, de la Puissance et du Travail Mécanique, de MM. Gaiffe et Gunther). M. Gaiffe. A paper giving a description of an electric apparatus for quickly and conveniently observing the indications of a transmission dynamometer, designed by MM. Gaiffe and Gunther. 1000 w. Bull Soc Internat des Elect—May, 1903.

See also **ELECTRIC INSTRUMENT—Electro-Dynamometer.**

Electric Brake.—Electric Precision Brake-Dynamometer (Elektrisches Präcisions Bremsdynamometer). E. H. Rieter. The device is similar to a Prony brake, with the friction band replaced by a ring magnetic field. The heat generated dissipated by air-cooled ribs. 2000 w. Elektrotech Zeitschr—Feb. 28, 1901.

An Electric Brake-Dynamometer (Ein Elektrisches Bremsdynamometer). A. Grau. Describing a brake used in the Technological Institute at Vienna. The energy is absorbed by the action of electromagnets upon a rotating disc. 1800 w. Elektrotech Zeitschr—May 29, 1902.

A Dynamometric Brake for the Measurement of the Power of Motors (Sur un Frein Dynamométrique Destiné à la Mesure de la Puissance de Moteurs). A. Krebs. Describing a form of electric brake permitting the utilisation of the greater portion of the power developed. 1500 w. Comptes Rendus—Nov. 13, 1905.

See also **Eddy-Current Brake.**

Electric Car.—See **ELECTRIC CAR—Dynamometer.**

Electromagnetic.—The Electromagnetic Absorption Dynamometer. C. Arthur Conant and Clifton R. Hayes. Describes this novel piece of apparatus showing its good qualities and its faults. Ill. 3000 w. Jour Worcester Poly Inst—Jan., 1902.

The Electromagnetic Absorption Dynamometer. C. Arthur Conant, and Clifton R. Hayes. Illustrated description of a novel piece of apparatus in the Electrical Laboratory of the Worcester Polytechnic Inst. 3200 w. Jour Worcester Polytechnic—Jan., 1903.

European Designs.—European Designs of Dynamometers. E. P. Buffet. Illustrated descriptions derived from articles in the "Revue Industrielle" and "Kraft." 1500 w. Am Mach—Nov. 26, 1903.

Fan.—See **Renard; AIR RESISTANCE—Renard.**

Fan Testing.—A Dynamometer and Revolution Counter for Fan Testing. D. W. Taylor. Illustrated description of an instrument designed and built for the purpose of making experimental investigation of the capacity and efficiency of ventilating fans which has been found quite satisfactory. 2000 w. Am Mach—June 11, 1903.

Hele-Shaw.—New Dynamometer for Road Traction Experiments. An illustrated description of a dynamometer fitted to an automobile, used by a British Association committee in traction experiments. 2000 w. Feilden's Mag—Jan., 1903.

A New Apparatus for Determining the Resistance of Road Vehicles to Traction. Illustrates and describes the new dynamometer devised by Prof. Hele-Shaw for experimental investigation concerning the resistance of road vehicles to traction. 1700 w. Sci Am—June 6, 1903.

See also **TRACTION.**

Hydraulic.—Hydrodynamometers. R. Grimshaw. Describes an instrument peculiarly adapted to measuring the torsion or rotative effect of marine shafts and the lengthwise push on them exerted by the screw which they drive. Ill. 700 w. Am Mach—July 25, 1901.

A Water Dynamometer. Illustrates and describes a machine originally designed by William Froude for use in experiments on the propulsion of ships, but since modified for use with stationary engines. 1400 w. Engr, Lond—June 20, 1902.

A New Hydraulic Belt Dynamometer. Victor L. Sheldon. An illustrated detailed description of the machine, explaining principle upon which it is based and its use. 2000 w. Am Mach—Aug. 13, 1903.

Integrator.—See **INTEGRATOR—Dynamometer Car.**

Prony Brake.—Portable Prony Brake (Einstellbare

Bandbremse). F. Hubert. A simple form of Prony brake, arranged with release to prevent the band from gripping the pulley, and adapted for ready application to electric motors. 1200 w. Elektrotech Zeitschr—April 18, 1901.

Prony Brake Diagram.—Graphical Diagram for Brake Tests (Graphische Rechentafel für Bremsversuche). Dr. F. Prasil. Constructing a diagram enabling the efficiency and load curves to be compared in Prony-brake tests of turbine water wheels. 600 w. Schweiz Bauzeitung—Feb. 7, 1903.

Renard.—The Renard Dynamometric Fan for Measuring the Power of Gasoline Motors. Translated from "L'Automobile," with an excerpt from the "Horseless Age." Illustrated detailed description. 2800 w. Sci Am Sup—Dec. 26, 1903.

A New Device for Measuring the Power of Motors (Sur un Nouvel Appareil Destiné à la Mesure de la Puissance des Moteurs). Ch. Renard. The power of the motor is absorbed by the resistance of the air to the motion of vanes on the revolving shaft. The power is measured by the size of the vanes and the rotative speed. 1500 w. Comptes Rendus—May 2, 1904.

See also **AIR RESISTANCE—Renard Dynamometer.**

Road Traction.—See **Hele-Shaw; TRACTION.**

Sag of Wires.—See **ELECTRIC LINE.**

Spiro.—A Simple Dynamometer. W. J. Spiro. An illustrated detailed description of a dynamometer designed for use in testing a power transmission system in New York City. 3200 w. Sch of Mines Qr—July, 1904.

Swiss.—A New Swiss Dynamometer. Emile Guarini. Illustration, with description of a new type of geared dynamometer, having a capacity of 12 horse-power. 800 w. Am Mach—Vol. 28, No. 46.

Tool.—Experiments with a Lathe-Tool Dynamometer. J. T. Nicolson. A record of results of over 800 serial trials as the first installment of work required to give an understanding of the action of the tools used in a machine shop. 7500 w. Trans Am Soc of Mech Engrs. No. 040—June, 1904.

Experiments with a Lathe-Tool Dynamometer. J. T. Nicolson. A record of results of over 300 serial trials, each requiring the making, recording and reducing of from 50 to 100 observations. Ills. 8500 w. Inst of Mech Engrs—June, 1904.

Torsion Meter.—Torsion Meter for Recording the Horse Power of Steam Turbines. Illustrates and describes the apparatus invented by Archibald Denny and Charles Henry Johnson. 2000 w. Sci Am Sup—July 29, 1905.

Transmission.—A New Transmission Dynamometer. Discussion at Philadelphia, May 16, 1900, of paper by W. Elwell Goldsborough. 2500 w. Trans Am Inst of Elec Engs—Oct., 1900.

A Transmission Dynamometer. Fred S. English. Illustrated description of a form of dynamometer similar in principle to the Webber Balance Dynamometer but differently applied. 600 w. Am Mach—Feb. 12, 1903.

Twist Drill.—A Twist Drill Dynamometer. William W. Bird and Howard P. Fairchild. Illustrated description of a machine for measuring the twist or moment and the thrust of the drill, with some data acquired. 800 w. Trans Am Soc of Mech Engrs, No. 051—Dec., 1904.

Use.—The Use of Dynamometers. N. Ronneberg. An illustrated description of the manner of using these instruments for measuring power. 2000 w. Mod Mach—April, 1905.

Water.—See **Hydraulic.**

DYNAMOMETER CAR.

See **CAR—Dynamometer; Test; ELECTRIC CAR—Dynamometer.**

DYNAMO TEST.

See **ELECTRIC GENERATOR TEST.**

DYNAMOTOR.

See also **ELECTRIC CURRENT CONVERTER; MOTOR GENERATOR; ROTARY CONVERTER.**

Burleigh.—Continuous-Current Transformers. J. W. Burleigh. Explains the method adopted by the writer for designing these machines, with remarks. Ills. 1500 w. Elec Engr, Lond—April 29, 1904.

Diagram.—A Diagram of the Circuits of the Dynamotor. A. E. Kennelly and S. E. Whiting. Aims to show that the same principles of graphic representations apply to the circuits of the dynamotor, or direct current transformer, as to the alternating current transformer. 1000 w. Elec Wld & Engr—June 3, 1905.

DYNELECTRON.—See ELECTRICITY DIRECT—Reid Process.

E

EARTH CURRENT.

See **ELECTRIC CURRENT—Earth.**

EARTHENWARE.

Machinery.—Machinery Made of Earthenware (Maschinen aus Steinzeug). Georg Lindner. Describing plunger and centrifugal pumps, blowers, and other machines made of glazed earthenware to resist the action of acids and other corrosive fluids. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 12, 1905.

EARTH MOVEMENT.

See also **EARTHQUAKE; LANDSLIDE.**

Emergence and Submergence of Land. Abstract of an address by Sir Archibald Geikie, on the evidence supplied by the British Isles as to the problem of the causes of changes in the relative levels of sea and land. 6800 w. Nature—June 2, 1904.

Boston.—The Subsidence of the Land and of the Harbor Bottom at Boston. From advance pages of a report by John R. Freeman, on the proposed Charles River dam. Statement of conclusions, his proof, and reasons for the investigations are given. 1700 w. Eng News—June 18, 1903.

Canada.—Some Recent Rock Movements in the Laurentian and Huronian Areas. S. Dillon Mills. Read before the Can. Min. Inst. A statement of conclusions from a study of these regions. 3000 w. Can Min Rev—Sept. 30, 1904.

New York.—Recent Changes in the Elevation of Land and Sea in the Vicinity of New York. Abstract of a paper by George W. Tuttle. Gives conclusions reached as the result of a study of tidal observations—1500 w. Eng Rec—Dec. 12, 1903.

Rocky Mountains.—Recent Earth Movements. Prof. Arthur Lakes. An account of some movements in the Rocky Mts. as shown by effects on streams and mines. 1500 w. Mines & Min—Dec., 1902.

EARTH PRESSURE.

See also **DAM; EARTHWORK; RETAINING WALL.**

Lateral.—Lateral Earth Pressures and Related Phenomena. E. P. Goodrich. Describes experimental investigations made to obtain facts that may be relied upon. 9000 w. Pro Am Soc of Civ Engrs—March, 1904.

Lateral Earth Pressures and Related Phenomena. Discussion on paper by E. P. Goodrich. 4000 w. Pro Am Soc of Civ Engrs—Aug., 1904.

EARTHQUAKE.

See also **SEISMOGRAPH; VOLCANO.**

Natural Gas.—Gases Generated Within the Earth by Oils Occasionally Create Eruptions. Relates some instances that have been observed. Ill. 1000 w. Am Gas Lgt Jour—Nov. 30, 1903.

EARTHWORK.

See also **EARTH PRESSURE; EXCAVATION; RAILWAY CONSTRUCTION; RETAINING WALL; ROAD.**

Calculation.—Rapid Earthwork Calculation. H. P. Gillette. An explanation of method. 2500 w. Eng News—Dec. 12, 1900.

Freiburg, Switz.—A Novel Method of Constructing High Embankments. Illustration with brief description of a temporary suspension bridge used in constructing a high embankment near Freiburg, Switzerland. 350 w. Eng News—Aug. 21, 1902.

Graphical Computation.—An Exact Graphical Method for Computing Embankments and Cuttings (Genaue Zeichnerische Ermittelung des Flächenprofiles und des Grunderwerbes). R. Schönhöfer. Developing curves from which quantities may be taken out by direct scaling. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 27, 1903.

Lynn, Mass.—Highway Embankment Across Tidal Flats at Lynn, Mass. Illustrated description of a pleasure highway across the tidal flats and marshes near the mouth of the Saugus River, which requires an embankment averaging 12 or 18 feet in height. 1800 w. Eng Rec—Aug. 6, 1904.

Pillar Drain.—See **DRAINAGE.**

Prismoidal Formula.—A New Form of Procedure for Earthwork Computations and a Slide Rule Therefor. C. W. Crockett. Explains the use of the prismoidal formula and the cases to which it is applicable, indicating the process that led to the general rule, and the circular slide rule prepared by the writer. 2800 w. Eng News—Dec. 21, 1905.

Profile.—The Determination of Profiles in Excavation and Embankment Work of Trapezoidal Section (Beitrag zur Konstruktion des Flächenprofiles bei Trassierung von Verkehrswegen mit Trapezoidischem Querprofile des Kunstkörpers). Karl Allitsch. Deriving a graphical method, with table to facilitate the work. 2000 w. Oesterr Wochenschr f d Oeffent Baudienst—Nov. 4, 1905.

Rollers.—The Solidification of Earth Dams (Le Corroyage des Digues en Terre). M. Galliot. Describing improved forms of rollers driven by steam, by electricity and by petrol, for the solidification of dams constructed of earth. 3500 w. 1 plate. Ann des Ponts et Chaussées—1 Trimestre, 1902.

Electrical Driven Rollers (Rouleaux-Compresseurs à Traction Electrique). A. Dumas. A description of the electrically operated compressing rollers, used for solidifying the earthen dikes of Grosbois and Saint-Fargeau. 1800 w. 1 plate. Génie Civil —Feb. 7, 1903.

Embankment Consolidators. Abstracts from descriptions in "Le Génie Civil," of two rollers of special form which have been employed in France in the construction of the Grosbois and Saint Fargeau embankments, respectively. Ill. 1200 w. Engr, Lond—June 5, 1903.

See also **ROAD ROLLER.**

Slips.—Draining and Steadying Slips. Illustrates and describes the treatment of such troubles by British engineers. 700 w. R R Gaz—Vol. XXXVII. No. 18.

Washington Filtration.—Earthwork at the Washington Filtration Works. E. D. Hardy. A report of excavation work, filling, &c. Illustrated. 800 w. Eng Rec—April 16, 1904.

ECONOMICS.

See **COMMERCE; ENGINEERING ECONOMICS; INDUSTRIAL ENGINEERING.**

ECONOMIZER.

See also **FEED-WATER HEATER; STEAM ENGINEERING.**

Reclaiming Waste Heat from Flue Gases. C. G. Robbins. Illustrates and describes a typical economizer, also an arrangement for preheating the air before admitting it to the fire, discussing both systems. 2200 w. Engr, U S A—Sept. 15, 1902.

Economizers. H. F. Schmidt. Gives statements of advantages from the use of economizers. 1700 w. Am Elect'n—Nov., 1902.

Economizer Calculations. W. H. Booth. Discusses the action of economizers and methods of determining the efficiency. 1300 w. Power—June, 1904.

Efficiency.—The Efficiency of Fuel Economizers. George E. Walsh. A statement of the advantages and economy that should be expected by using economizers. 1800 w. Ir Ard Rev—June 2, 1904.

Green.—The Green Fuel Economizer. A. H. Blackburn. Read before the Phila. Found. Ass'n. Gives the history of this invention, the advantages claimed, applications, commercial value, and description of the apparatus. 2800 w. Ir Age—March 17, 1904.

Locomotive.—An Improved Fuel Economizer and Smoke Consumer. Illustrated detailed description, with results of tests of an improved device which is to be applied to all new passenger engines on the N. Y. C. & H. R. R. and also on other roads. 2000 w. Ry & Engng Rev—June 28, 1902.

A New Locomotive Fuel Economizer and Smoke Consumer. Illustrated detailed description of the new smoke consumers being placed on the locomotives of the N. Y. C. & H. R. R. R. 1100 w. Eng News—Aug. 28, 1902.

An Economiser Discussion. Edwin B. Katte. A basis for discussion of the advisability of installing fuel economizers. Followed by papers by A. H. Blackburn, William Downs, R. D. Tomlinson, J. E. Moulthrop, and general discussion. 11200 w. Pro N Y R R Club—Oct. 16, 1903.

EDDY-CURRENT.

See also **ELECTRIC MEASUREMENT; ELECTRIC TESTING; HYSTERESIS.**

Experiments on Eddy Currents. W. M. Thornton. An account of experiments on cast-iron and steel rings, tests on continuous and alternate current machines, magnetic field disturbance &c. 6000 w. Elec Engr, Lond—Dec. 18, 1903.

Eddy Current Losses (Ueber Wirbelstromverluste). F. Niethammer. Deriving working formulas for the computation of losses, wih practical applications. 1200 w. Zeitschr f Elektrotechnik —April 3, 1904.

Armature Conductors.—Eddy-Current Losses in the Armature Copper of Electrical Machines (Wirbelstromverluste im Ankerkupfer Elektrischer Maschinen). Bruno Loewenherz and A. H. van der Hoop. A description of experimental investigations, the results being plotted in curves. 3000 w. Elektrotech Zeitschr—Aug. 17, 1905.

Eddy-Current Losses in Armature Conductors. Gives details taken from an article in the "Elektrotechnische Zeitschrift" describing experiments carried out by B. Loewenherz and A. Van der Hoop. Ills. 700 w. Elec Engr, Lond—Sept. 29, 1905.

Eddy Currents in Large Slot-Wound Conductors. A. B. Field. A discussion of the more important causes of eddy currents in heavy conductors carrying alternating currents and surrounded on their sides by iron. 4500 w. Am Inst of Elec Engrs—June 21, 1905.

Armature Core.—Foucault Currents in the Armature Cores of Continuous-Curent Dynamos (Sur les Courants de Foucault dans le Fer Induit des Machines à Courant Continu). R. V. Picou. A mathematical examination, showing that the losses from eddy currents are greater than has hitherto been admitted. 3000 w. Bull Soc Int d Electriciens—Jan., 1905.

Brake.—See **DYNAMOMETER — Eddy-Current Brake.**

Cable Sheaths. — See **ELECTRIC CABLE — Sheath Losses.**

Dynamo.—Eddy Currents in Dynamo Machines. Michael B. Field. A discussion of Dr. Thornton's paper on this subject. 3800 w. Elect'n, Lond—Feb. 5, 1904.

Induction Motor.—See **ELECTRIC MOTOR—Induction, Losses.**

Iron Cylinder.—The Dissipation of Energy by Electric Currents Induced in an Iron Cylinder When Rotated in a Magnetic Field. Ernest Wilson. Read before the Royal Soc. A comparison between the results of experiment and theory. Serial. 1st part. 1800 w. Elec Rev, N Y—July 26, 1902.

The Dissipation of Energy by Electric Currents Induced in an Iron Cylinder When Rotated in a Magnetic Field. Ernest Wilson. Read before the Royal Society. A comparison is made between the results of experiment and theory. Ill. Serial. 1st part. 2000 w. Elec Engr, Lond—Aug. 15, 1902.

Iron Plate.—See **HYSTERESIS.**

Pole Construction.—Losses Due to Eddy Currents (Ueber Wirbelstromverluste). F. Niethammer. Discussing especially pole constructions intended to reduce eddy-curent losses to a minimum. 2000 w. Zeitschr f Elektrotechnik—Jan. 24, 1904.

Pole Shoe.—Eddy-Current Losses in Massive Pole Shoes (Wirbelstromverluste in Massiven Polschuhen). Reinhold Rüdenberg. Deriving formulas for the computation of the losses due to eddy currents, based upon the oscillation theory. 3500 w. Elektrotech Zeitschr—Feb. 23, 1905.

Wave Form Influence.—See HYSTERESIS.

EDUCATION.

See also **APPRENTICE; COLLEGE; LABORATORY; SCHOOL; UNIVERSITY.**

The Present Problem in Technical Education. Editorial, discussing the need of scientific instruction less extended in scope than that given in technical schools. 1400 w. Eng Rec—Jan. 26, 1901.

The Practical Mechanic vs. the Mechanical Engineer. Editorial discussing executive ability, where the college man falls short, where he should begin, etc. 800 w. Loc Engng—July, 1902.

The Training of Professional Engineers. Prof. John Goodman. A practical discussion of engineering education in both shop and college. 2000 w. Page's Mag—Dec., 1902.

The Training of an Engineer, or the Work of Students in a Technical School. Prof. W. F. M. Goss. An interesting discourse on the education and work of an accomplished engineer. Ill. Discussion. 6300 w. Pro St. Louis Ry Club—Dec. 12, 1902.

The Education of Engineers in America, Germany and Switzerland. W. E. Dalby. Gives facts in connection with the training of engineers in the countries named as a basis for a discussion as to what course of training is best. 5000 w. Inst of Mech Engrs—April 24, 1903.

The Potency of Engineering Schools and Their Imperfections. Dugald C. Jackson. A discussion of methods and their effects on students and on the public. 7000 w. Wisconsin Engr—May, 1903.

Problems for the Engineering School. James B. Stanwood. On the need of more practical education for engineers. 2700 w. Cassier's Mag—Jan., 1904.

Notes on Engineering Education (Considérations sur l'Enseignement de la Mécanique). Prof. J. Boulvin. A discussion of the importance of combining practical with theoretical training in the education of the engineer. Serial. Part I. 4000 w. Revue de Mécanique—Sept., 1904.

Agricultural Engineering.—Teaching Agricultural Engineering in Land Grant Colleges. C. J. Zintheo. Shows the need of a complete course of agricultural engineering and what it should include, comparing the United States with European countries, to the former's disadvantage. Especially discusses the need of instruction in the use and care of farm machinery. 2500 w. Eng News—Dec. 21, 1905.

Allen.—The Outlook for Engineering Education. C. Frank Allen. Extracts from the presidential address before the Society for the Promotion of Engineering Education. Discusses the fields open to men trained as engineers, and the preparation best suited to meet the requirements. 3500 w. Eng News—Sept. 15, 1904.

American.—The Needs of Industrial Education in America. A topical discussion. I. With Reference to the Schools. Edgar Marburg. II. With Reference to the Machine Trades. Samuel W. Vauclain. III. With Reference to the Building Trades. John M. Shrigley. Followed by general discussion. 14300 w. Pro Engrs' Club of Phila—Jan., 1902.

The Retrospect of a Quarter-Century of Progress. Robert H. Thurston. A review of the advance made in technical education and work, especially in America, and the part taken by this paper in the work. 2700 w. Am Mach—Nov. 6, 1902.

A Century's Progress in Engineering Education in the United States. Robert Heywood Fernald. Reviews the development of technical education from the earliest times. 9300 w. Jour Assn of Engng Socs—July, 1903.

Technical Education in the United States (Der Technische Schulunterricht in den Vereinigten Staaten). P. Kreuzpointner. A review of the curricula and methods of American technical schools by a German engineer, resident in the United States. 6000 w. Zeitschr d Ver Deutscher Ing—Jan. 23, 1904.

Technical Education in the United States. P. Krenspointer. Translated from "Zeitschrift des Vereines Deutscher Ingenieure." A general review of the educational system of the country. 3000 w. Bul Int Ry Cong—Sept., 1904.

Transatlantic Engineering Schools and Engineering. R. Mullineux Walmsley. On the educational methods and training adopted in the United States, as viewed during a recent trip of inspection, and a discussion of applications to Great Britain. 18300 w. Inst of Elec Engrs—Feb. 11, 1904.

Lessons in Engineering Education from America. Robert H. Smith. Reviews the paper of Dr. R. M. Walmsley, read before the Inst. of Elec. Engrs. 2400 w. Engr, Lond—March 11, 1904.

American vs. British.—American Educational Wisdom. Stuart Uttley. A comparison of the general attitude of the people in England and America toward technical education. 3500 w. Ir Age—Jan. 30, 1892.

American vs. German.—See German vs. American.

Apprentice.—See College vs. Apprentice; APPRENTICE.

Armour Institute, Chicago.—Armour Institute of Technology, Chicago. An illustrated description of the buildings and their equipment, with remarks on the scope of the instruction. 3200 w. Steam Engng—Nov. 10, 1902.

Beare.—The Education of an Engineer. T. Hudson Beare. Delivered before the students of the Univ. of Edinburgh, Glasgow, Scotland. Briefly describes the methods adopted in America, in Germany, and in England; stating also the writer's views. Gives an idea also of the great number being educated in technical colleges, and other information of interest. 5800 w. Naut Gaz—Jan. 16, 1902.

Birmingham.—The Birmingham University. An account of the history of this enterprise with illustrated description of the buildings is given in the present number. Serial. 1st part. 3500 w. Engng—Aug. 25, 1905.

See also **London vs. Birmingham; Mining, Birmingham.**

British.—The Technical Education and Practical Training of Mechanics and Engineers. Thomas Reid. Lecture before the Dundee Inst. of Engrs. A criticism of the present system in England and outlining two courses of technical training recommended by the author. 6300 w. Mech Engr—Aug. 9, 1902.

The Training of Engineers. Prof. Robert H. Smith. A discussion of the opportunities for scientific engineering education in Britain noting the chief difficulties and defects of the present system. 4200 w. Engr, Lond—May 8, 1903.

English Industry and Advanced Technical Education. Prof. H. I. Hannover. Extract from paper read before the Danish Inst. of Engrs. Impressions from a visit to English factories and colleges. 8000 w. Engng—Oct. 16, 1903.

Commercial and Industrial Education in England. Discusses the neglect of commercial and technical training until recently, and what is now being done. 2500 w. U S Cons Repts, No 1786—Oct 28, 1903.

Some Observations on Mechanical Training. D. Hamilton. Read before the Glasgow Tech. College Sci. Soc. Discusses methods of training, with special reference to Gt. Britain. 5500 w. Prac Engr—June 16, 1905.

British vs. German.—See Industrial Importance.

Chemist.—The Education of a Technical Chemist. Sir William Ramsay. Address before the Society of Chemical Industry. Suggestions of value. 5000 w. Sci Am Sup—Sept. 17, 1904.
See also **CHEMISTRY.**

Christ's Hospital School.—Science Workshops for Schools and Colleges. Prof. Henry E. Armstrong. Arguments for training in scientific method, illustrated by reference to the new buildings at Horsham for Christs' Hospital School, and their equipment. Illustrations and discussion. 12500 w. Jour Roy Inst of Brit Archts—Jan. 24, 1903.

Cincinnati.—Technical Education for Cincinnati. Herman Schneider. Also editorial. Address before the Cin. Soc. of Mech. Engrs. An interesting discussion of the qualifications an engineer should possess and suggestions for the development of such engineers. 3000 w. Am Mach—Vol. 28, No. 42.

Civil Engineer.—The Training of the Civil Engineer. Extracts from an article by George F. Swain in the "N. Y. Tribune." Considers the qualities that fit a man for success in this field, and the best preparation. 1500 w. R R Gaz—June 12, 1903.

College Electrical Courses.—See Electrical Engineer.

College Entrance Requirements.—Desirable Entrance Requirements for Enginering Colleges. William Kent. Read before the Am. Assn. for the Adv. of Science. Information in regard to recent changes made, in the requirements for entrance, with opinions from several writers and other remarks. 2500 w. Eng News—Feb. 2, 1905.

College vs. Apprentice.—College or Apprenticeship. Louis H. Ransome. A considération of the two systems of training, with a view to seeing in what direction improvements should be sought. 2000 w. Engr, Lond—Aug. 21, 1903.

College vs. Shop.—Technical Education vs. Shop Education. Egbert P. Watson. Arguments favoring the latter. 2300 w. Ir Age—March 20, 1902.

Combustion Instruction.—See COMBUSTION.

Commercial.—Commercial Training for Engineers. R. D. Summerfield. Outlines the training the writer considers essential for a successful engineer. especially the importance of a business education. 2000 w. Engng—Aug. 18, 1905.

See also INDUSTRIAL ENGINEERING.

Commercial, Europe.—Commercial Education in Europe. Reports of Switzerland, Netherlands, Austria-Hungary, Belgium, Norway and Sweden, and France, with remarks. 2000 w. U. S. Con Repts. No. 1672—June 15, 1903.

Commercial, Japan.—See Japan.

Cooper Union, N. Y.—A Workingman's College. An illustrated account of the educational work at Cooper Union, New York. 5300 w. Ir Age—Feb. 7, 1901.

Cornell.—The Training of Engineers at an American University. Frank Fayant. An illustrated description of the work at Cornell University. 8000 w. Engr, Lond—Nov. 14, 1902.

Correspondence Schools. — Theory and Practice of Correspondence Schools. Frank McManamy. An explanation of the methods of instruction, especially in railway work. 2100 w. St. Louis Ry Club—Feb. 13, 1903.

Corthell Report.—Report upon Engineering Education. Elmer L. Corthell. A digest of information gathered during an extended tour, and years of study, giving present methods of teaching engineering in various countries, and comparing with similar schools in the United States, with recommendations. 23800 w. Tech Qr—Sept., 1903.

Culture.—The Cultural Value of Engineering Education. F. O. Marvin. From the presidential address at the annual convention of the Society for the Promotion of Engineering Education. 2000 w. Eng News—July 4, 1901.

Education of Engineers and Machinists. Garret Van Arkel. Urging the higher development of the mind and the awakening of an interest in the best literature and in history, philosophy, economics, the sciences and fine arts. 2000 w. Am Mach—June 18, 1903.

Darmstadt Technical Institute.—The Technical High Schol at Darmstadt (Die Grossherzogliche Technische Hochschule in Darmstadt). O. Berndt. With plan of the buildings, view of the new electrical building, and an account of the growth of the school. 1200 w. Zeitschr d Ver Deutscher Ing—June 11, 1904.

The New Power House and Mechanical Laboratory of the Technical High School at Darmstadt (Das Neue Kraftwerk und das Neue Maschinenbaulaboratorium der Technischen Hochschule Darmstadt). Prof. M. F. Gutermuth. Describing especially the steam generating plant, and boilers, superheaters, etc. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—June 11, 1904.

Dewar.—Prof. James Dewar's Presidential Address to the British Association. Abstract. Discusses education, the importance of science, the value of applied chemistry, etc. Serial. 1st part. 5200 w. Elect'n, Lond—Sept. 12, 1902.

Differentiation.—The Evil of Excessive Differentiation in Engineering Courses. Edgar Marburg. Presented at meeting of the Soc. for the Promotion of Engng. Ed. Discussion limited to the bearing of the question on civil engineering. 1500 w. Eng News—July 3, 1902.

Dodge Address.—See Money Value.

Duncan Article.—Technical Education. What it Should Be. Dr. Louis Duncan. A discussion of the relation of technical education to commercial and industrial progress. Also editorial comment. 3000 w. Engineering Magazine—Nov., 1903.

Efficiency Factor.—The Efficiency Factor in Engineering Education. Robert Fletcher. Condensed from the presidential address before the Soc. for the Promotion of Engng. Ed. Brief discussion of the substance, methods, machinery and cost of engineering education. 2400 w. Eng News—July 3, 1902.

Electrical Engineer.—The Typical College Courses Dealing with the Professional and Theoretical phase of Electrical Engineering. Dugald C. Jackson. Shows the wide variance between the methods of the colleges and discusses the essentials preparatory to professional studies, the courses, etc. 4000 w. Trans Am Inst of Elec Engrs—Oct., 1903.

Trade Education of Central-Station Employees. D. C. Jackson, F. A. Copeland and H. L. Doherty. Abstract of a report of a committee of the N.-W. Elec. Assn., appointed to consider the advisability of encouraging employees to enroll themselves in correspondence schools. 6000 w. W Elect'n—Jan. 26, 1901.

Self-Instruction in Electrical Engineering. W. H. Radcliffe. Suggestions and lists of helpful literature for the aid of those wishing to study this subject. 1800 w. Elec Rev, N. Y.—Feb. 16, 1901.

On the Training of Electrical Engineers. John T. Nicolson. Abstract of a paper read before the Manchester Section of the Inst. of Elec. Engs. Urges the adoption of the laboratory in connection with schools of applied science, and gives suggestions as to the instruction desirable. 4200 w. Elect'n, Lond—Feb. 22, 1901.

The Education of the Electrical Engineer. H. W. Buck. Discusses the training needed. 1300 w. Trans Am Inst of Elec Engrs—June 21, 1902.

Presidential Address. Charles P. Steinmetz. A short outline of the writer's views of an electrical engineering course. 2000 w. Trans Am Inst of Elec Engrs—June 21, 1902.

Concerning Uniformity in the Electrical Engineering Courses in the United States. Dr. Samuel Sheldon. Discusses the selection of the curricula, gives a table showing the maximum, the minimum and the average time devoted to various institutions, and the aims of technical education. 1400 w. Trans Am Inst of Elec Engrs——June 21, 1902.

A Proposed Reform in Technical Training. Edward B. Raymond. The views of the writer are briefly given, advocating a strictly technical course in the training of electrical engineers. 1800 w. Trans Am Inst of Elec Engrs—May, 1902.

Electrical Engineering Courses at College and the Education of the Electrical Engineer. William Esty. Discussing electrical engineering education. 4000 w. Trans Am Inst of Elec Engrs—May, 1902.

Engineering Education. Charles H. Hines. Words of encouragement to the many who are striving to achieve success without being able to avail themselves of college or technical education, especially in the electrical field. 1500 w. Elec Wld & Engr—Aug. 23, 1902.

Papers by Charles P. Steinmetz, Dr. Samuel Sheldon, Prof. R. B. Owens, Prof. William Esty, Mr. Harold W. Buck, and Mr. R. B. Raymond, at Great Barrington, Mass. Papers on the education of electrical engineers. 13000 w. Trans Am Inst of Elec Engrs—Aug. & Sept., 1902.

The Engineers Who Will Be Wanted. Alfred H. Mayes. Considers the method of training that will best prepare students for electrical engineers. 1900 w. Elec Engr, Lond—Jan. 23, 1903.

Electrical Engineering Instruction at Columbia University. George F. Sever. Reviews the work in electricty at this university, and gives a chart showing the technical entrance requirements, the course of four years' study, etc. 1600 w. Elec Wld & Engr—June 27, 1903.

The Training of the High Tension Engineer. P. M. Lincoln. Read at the convention of the Can. Elec. Assn. On the relations which should exist between the colleges and outside work. Also discussion. 5800 w. Can Elec News—July, 1903.

Proper Qualifications of Electrical Engineering School Graduates, from the Manufacturer's Standpoint. L. A. Osborne. Considers the more important and most noticeable qualities lacking in the average technical graduate. 1800 w. Trans Am Inst. of Elec Engrs.—July, 1903.

The Education of an Electrical Engineer. Prof. F. G. Baily. Abstract of a paper read before the Glasgow Local Soc. of the Inst. of Elec. Engineers. Outlining a scheme of education. 1200 w. Elect'n, Lond—Dec. 11, 1903.

How to Educate an Electrical Engineer. E. Kilburn Scott. An outline of the training necessary, and related matters. 6000 w. Page's Mag—Jan., 1904.

The Education of the American Electrical Engineer. Prof. W. E. Ayrton. Reprint from the "Mosely Ed Com. Report." Information gathered during the recent visit to the United States. Serial. 1st part. 3000 w. Elec Engr, Lond—April 22, 1904.

The Tuition (?) of Electrical Engineering. James Pigg. Read before the Newcastle Soc. of the Inst. of Elec. Engrs. Considers some of the advantages of other methods than those in use, especially correspondence schools. Serial. 1st part. 5300 w. Elec Engr, Lond—June 3, 1904.

The Training of the Electrical Engineer. Dr. Louis Bell. A discussion of the qualties needed by a successful electrical engineer and the best means of acquiring them. 4400 w. Cassier's Mag—Jan., 1905.

See also **General Electric Co.; McGill University; Telephone Engineer; ELECTRIC ENGINEERING; ELECTRIC STATION MANAGEMENT—Instruction.**

Electrical Engineer, French.—Electrical Education in the French Universities (L'Enseignement Electrotechnique dans les Universités Françaises). C. Carmichael. A review of French educational methods in technology, with especial reference to electrical engineering. Serial. Part I. 3000 w. Revue Technique—Jan. 25, 1905.

Electrotechnical Institute, Vienna.—The Electrotechnical Institute of the Technical High School at Vienna (Das Elektrotechnische Institut der k. k. Technischen Hochschule in Wien). Prof. Karl Hochenegg. An illustrated account of the electrical laboratory of the Vienna technical high school. 4500 w. Zeitschr d Oesterr Ing a Arch Ver—May 13, 1904.

The Electrotechnical Institute at Vienna (Das Neue Elektrotechnische Institut in Wien). A general description of the establishment and its electrical equipment. 6000 w. Elektrotech Zeitschr—June 16, 1904.

English Language.—Engineering English. T. J. Johnston. Criticism on the use of the English language by engineers. 2000 w. Trans Am Inst of Elec Engrs—July, 1903.

English University.—Oxford and Science. Dr. John Perry. An address discussing the neglect of scientific training at the English universities, and its importance upon the international position of the country in political and commercial matters. 7500 w. Nature—Dec. 31, 1903.

Europe.—Industrial Education in Europe. Reviews progress made in Italy, Holland, Russia, Sweden, Norway, Switzerland, Austria and France. 3000 w. U S Cons Repts—Nov., 1903.

A Visit to English and Continental Engineering Schools and Commercial Establishments. Forrest Jones. A report of information gained during seven months spent in visiting foreign educational institutions. 7200 w. Sib Jour of Engng—Dec., 1903.

Factory Operatives.—Factory Education. O. M. Becker. An introductory article discussing the education of factory operatives. Serial. 1st part. 2500 w. Mach, N Y—Dec., 1905.

Firemen.—See **RAILWAY EMPLOYEE.**

Foundrymen.—Technical Education for Foundrymen. Prof. A. Humboldt Sexton. Read before the British Found. Assn. Discusses the subjects that should be included, and the advantages and value of the education acquired. 2800 w. Mech Engr—Aug. 19, 1905.

Foundry Practice.—See **FOUNDRY—Illinois University; School.**

Freeman.—Contemporary Technical Education. John R. Freeman. An address at the Case School of Applied Science. Remarks on technical graduates and their opportunities, with notes of interest. 6000 w. Jour W Soc of Engrs—Oct., 1904.

Gas Manufacture.—See **GAS MANUFACTURE—Education, Germany.**

Gas Works, Chemistry.—See **CHEMISTRY—Gas Works.**

General Electric Co.—The Training Course for Engineers of the General Electric Company. Thomas Howe. An account of the system of training employed. Ill. 2000 w. Sib Jour of Engng—May, 1901.

German Mining.—See **Mining, Germany.**

German vs. American.—Technical High Schools or Technical Universities (Technische Hochschulen oder Technische Fakultäten). O. Kammerer. A comparison between methods of technical education in Germany and America and the relation of the German technical high school to the university system. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 6, 1904.

German vs. British.—Technical Instruction in Germany. W. G. Rhodes. Discusses German methods, comparing them with English instruction. Confined to courses in electrical engineering. 1800 w. Elec Rev, Lond—Feb. 12, 1904.
See also **Industrial Importance.**

Germany.—Industrial Schools in Germany. A report on technical education in Germany. 2500 w. U S Cons Repts, No 1704—July 23, 1903.

Technical Education in Germany. Max Wurl. An explanation of the educational system in the German empire, followed by discussion. 10800 w. Trans N E Coast Inst of Engrs & Shipbldrs—Jan., 1904.

Resumed Discussion on Mr. Wax Wurl's Paper on "Technical Education in Germany." Plate. 11000 w. Trans N-E Coast Inst of Engrs & Shipbuilders—March, 1904.

Notes on the Technical Intermediate Schools (Betrachtungen über technische Mittelschulen). Adolf Lippmann. A review of the curriculum of the preparatory school, discussing the work of private institutions in Germany. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—Oct. 1, 1904.

Industrial Education in Germany. U. S. Deputy Consul Meyer. Abstract from Consular Reports, giving a general review of German industrial schools. Serial. 2 parts. 6000 w. Am Mach—Vol. 27. Nos. 33 and 34.

Haber Address. — See **ELECTRO-CHEMISTRY — United States.**

Industrial Importance.—The Present Industrial Importance of Technical Education. Sir Philip Magnus. A review of the relation of technical education to commercial supremacy, with reference to the foresight of Germany as compared with Great Britain. 4000 w. Engineering Magazine—November, 1902.

Japan.—Commercial Education in Japan. Information concerning the schools and their courses of study. 1800 w. Engng—July 4, 1902.

Judgment.—On the Need of the Education of the Judgment in Dealing with Technical Matters. George W. Dickie. Calls attention to the lack of sound judgment exhibited in dealing with engineering problems. 2700 w. Jour Assn of Engng Socs—Dec., 1900.

Kennedy.—The Academic Side of Technical Training. Abstract of an address delivered before the University College, London, Union Society, by Dr. Alex. B. W. Kennedy. Review of engineering training, with suggestions. 4000 w. Elect'n, Lond—June 30, 1905.

Kent.—University Education and the Education of the Engineer. William Kent. An interesting discussion of education and its aims, and the writer's views on the best way to educate an engineer. 4500 w. Sib Jour of Engng—Dec., 1903.

The College Education of the Engineer. William Kent. Presidential address before the Technology Club, Syracuse, N. Y. Outlines the course of most engineering colleges, discussing the results, and giving opinions of prominent educators and critics. 4700 w. Eng News—Oct. 19, 1905.

Laboratory.—The Laboratory Work of an Engineering School (Ueber Laboratoriumsarbeiten an der Bau-Ingenieurschule). Prof. Friedrich Steiner. Discussing especially the use of models for the study of framed structures. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 16, 1900.

The Technical High School and the Laboratory Question (Der · Technische Hochschul-Unterricht und die Laboratoriumsfrage). Ludwig v. Teknajer. A review of the work of technical instruction in connection with the mechanical laboratory. 5000 w. Zeitschr d Oester Ing u Arch Ver—Jan. 8, 1904.

The Function of Laboratory Courses in the Curriculum of Engineering Schools. Charles Edward Lucke. Discusses the methods of laboratory instruction, the aim, etc. 4700 w. Trans Am Soc of Mech Engrs, No. 066—June, 1905.

Laboratory Courses in Engineering Schools. Prof. D. S. Jacobus. Quotes from paper by Prof. Charles E. Lucke, before the A. S. M. E., and gives the discussion presented by the writer, which describes the work at Stevens Inst. 5000 w. Stevens Ind—Oct., 1905.

See also **LABORATORY; MINING LABORATORY.**

Laboratory vs. Shop.—Laboratory vs. Shop. Robert H. Smith. A reply to a criticism of Prof. M. P. Higgins, explaining the difference between the laboratory method of teaching and the shop method. 2200 w. Am. Mach—Jan. 21, 1904.

Lecture Accessories. — Technical Accessories for Academic Lectures on Machine Construction (Technische Mittel für Akademische Vorlesungen über Maschinenbau). Prof. Kammerer. A description of lantern pictures, models and other helps in lectures on technical subjects to large classes. Serial. Part 1. 2500 w. Zeitschr d Ver Deutschr Ing—May 23, 1903.

Locomotive Engineer.—See **RAILWAY EMPLOYEE.**

London University.—Technical Education in the University of London. J. D. Cormack. Considers some of the needs of the engineering department, the value of scientific training, etc. 5000 w. Engng—Oct. 31, 1902.

London vs. Birmingham.—Technical Education: London and Birmingham. C. Alfred Smith. Explains the systems to be given a trial at these two cities. The systems are entirely different, under almost similar conditions. 1400 w. Elec Rev, Lond—April 22, 1904.

McGill University.—Electrical Engineering at McGill University, Montreal, Canada. Charles T. Child. Illustrates and describes the equipment and facilities. 5600 w. Elec Rev, N Y—Dec. 12, 1900.

Machinists.—See **MATHEMATICS.**

Manchester.—The Manchester Municipal School of Technology. An elaborately illustrated article giving a detailed description of this new building and its fine equipment. 16000 w. Engng—Oct. 10, 1902.

Manchester School of Technology. Illustrated description of this recently completed school in England, the erection and equipment having occupied seven years. 3000 w. Elec Rev, Lond—Oct. 31, 1902.

Manchester Municipal School of Technology. From a paper by John T. Nicholsen before the Manchester Assn. of Engrs. Describes the steam engine laboratory in the present article. Ill Serial. 1st part. 2200 w. Mech Engr—May 9, 1903.

See also **APPRENTICE.**

Manual.—The Industrial Value of Manual Training. Frank T. Carlton. A discussion of the opportunities awaiting the pupil of the manual training school in the industrial operations of the United States. 2000 w. Engineering Magazine—September, 1904.

Manual and Technical.—The Practical Utility of Manual and Technical Training. William Barclay Parsons. An address before the Nat. Ed. Assn. Discussing the subject from the point of view of results achieved and of ends to be attained. 3800 w. Eng Rec—Aug. 12, 1905.

Mathematics.—See Perry Address; **MATHEMATICS.**

Mechanical Laboratory.—See **LABORATORY.**

Mining.—The Training of Mining Engineers. H. C. Jenkins. Read before the Australian Assn. for the Adv. of Science. Discusses what the engineer manager should be if fully equipped for his work. 3200 w. Aust Min Stand—Feb. 27, 1902.

The Making of Mining Engineers. T. H. Palmer. Abstract of a paper read before the Sydney Univ. Engng. Soc. Discusses the qualifications and training needed. Serial. 2 parts. 5000 w. Aust Min Stand—June 9 and 16, 1904.

The Training of a Mining Engineer. R. A. S. Redmayne. Read before the So. Staffordshire and E. Worcestershire Inst. of Min. Engrs. A comparison of the present status of colliery managers with the position and requirements of those in the early history of the coal trade, showing the ever growing necessity for further scientific education. 4000 w. Col Guard—Dec. 19, 1902.

The Education of Mining Engineers. J. B. Porter. Abstract of a lecture at Kimberley. Discusses the extent to which practical and technical training should enter into an engineering education, outlining a course recommended. 3000 w. Engng—Oct. 13, 1905.

English Mining Schools. E. P. Dunn. Information concerning the different schools, the objects at which they aim, etc. 4000 w. Aust Min Stand—April 11, 1901.

The Obligations of Mining Schools to the Industry. James Park. Discusses the knowledge of importance that should be required. 3200 w. N Z Mines Rec—Aug. 16, 1901.

See also **MINE VALUATION; MINING ENGINEER; MINING LABORATORY.**

Mining, Birmingham.—A New Departure in Technical Education. E. H. Roberton. Brief, illustrated description of the experimental mine at Birmingham University. 900 w. Page's Mag—Oct., 1904.

Mining, California.—The Hearst Memorial Mining Building, University of California. S. B. Christy. Description of this building for the University of California, for the instruction of students in mining and metallurgy. 1800 w. Eng & Min Jour—March 21, 1903.

Mining, England.—The History of the English School of Mines. Outlines the history of the Royal School of Mines, giving illustration of the building. Also editorial on the recent announcement that it was to become a part of the technical college at South Kensington, and protesting against such action. 1800 w. Eng & Min Jour—July 25, 1903.

Mining, Germany.—The Education of Mining Engineers, Surveyors, Metallurgists and Iron Metallurgists in Germany. J. J. Monaghan. A review of the mining schools and their courses. 8500 w. Mines & Min—June, 1902.

Mining Instruction in Germany. Particulars relating to the courses in mining at various educational institutions in Germany, extracted from report by Dr. Frederick Rose. 2500 w. Col Guard—Oct. 30, 1903.

Molding.—See **MOLDING—Education.**

Money Value.—The Money Value of Technical Training. James M. Dodge. President's address at meeting of the A. S. M. E. Also editorial. 5000 w. Eng Rec—Dec. 5, 1903.

Mullin Address.—Training an Artist in the Forces of Nature. E. H. Mullin. A discussion of the faults of present day technical education and its aims. 2800 w. Trans Am Inst of Elec Engrs—July, 1903.

Nautical.—See **NAVAL ENGINEER; SCHOOL SHIP.**

Nautical, Japan.—Nautical Education in Japan. Facts of interest from the prospectus of the Nautical College at Tokio, showing the provision made for the scientific training of officers and men. 1500 w. Nature—Feb. 4, 1904.

Naval Architecture.—See **NAVAL ARCHITECTURE—Massachusetts Inst. of Tech.**

Naval Engineer.—See **NAVAL ENGINEER.**

Northampton Institute. — The Northampton Institute. Illustrated detailed description of one of the chief of the polytechnic and technical institutes of England, and account of the work. 9500 w. Engng—Feb. 19, 1904.

North-East Coast.—Engineering Training and the North-East Coast. Editorial on the work being done by the North-East Coast Institution of Engineers and Shipbuilders. 3000 w. Engng—Jan. 8, 1904.

Oechelhaeuser Address.—New Powers and New Responsibilities (Neue Rechte—Neue Pflichten). W. v. Oechelhaeuser. The presidential address before the Düsseldorf meeting of the Verein Deutscher Ingenieure, dealing with problems of engineering education. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 23, 1902.

Paris Public Works.—Professional Instruction in Public Works (L'Enseignement Professionnel des Travaux Publics). Col. G. Espitallier. A description of the school at Paris and the annex now being constructed at Arcueil. 3000 w. 1 plate. Génie Civil—Aug. 12, 1905.

Perry Address.—Prof. John Perry's Presidential Address Before Section G of the British Association. Discusses the subject of education especially as applied to engineering. Serial. 1st part. 5000 w. Elect'n, Lond—Sept. 12, 1902.

Physics.—The Teaching of Physics to Engineering Students. W. S. Franklin. Suggestions and criticisms. 2000 w. Trans Am Inst of Elec Engrs—July, 1903.

Professors.—See **ENGINEER.**

Prussia.—Prussian Industrial Schools (Die Preussischen Maschinenbauschulen). Th. Peters. An account of the recent organisation of the trade and industrial schools, with a review of their development. 2400 w. Zeitschr d Ver Deutscher Ing—Jan. 11, 1902.

Railway Apprentices.—The Technical Education of Railway Apprentices in France. A description of the educational system afforded by apprenticeship classes of the Chemins de fer de l'Est. 4800 w. Engr, Lond—Jan. 24, 1902.

Railway Employees.—See **RAILWAY EMPLOYEE—Education.**

Railway Mechanical Engineers.—Education of Railway Mechanical Engineers. C. V. Kerr. Gives suggestions based on the successful practice of leading engineering schols. Followed by general discussion. 8500 w. W Ry Club—Jan. 21, 1902.

Research Institution, France. — Institution for Scientific Research (La Caisse des Recherches Scientifiques). Louis Rachou. An account of an institution founded and partly supported by the French government for promoting research work in medical, natural and physical science. 2500 w. Génie Civil—April 18, 1903.

Russia.—The Education of Mechanical Engineers and Chemists in the Higher Technical Schools of Russia. (Die Ausbildung der Maschineningenieure und Chemiker in den Höheren Technischen Lehranstalten Russlands). M. Sserebroffsky and G. v. Doepp. A general account of the Russian technical schools and their curricula. 4000 w. Zeitschr d Ver Deutscher Ing—April 6, 1901.

The Education of Mechanical Engineers and Chemists in the Higher Mechanical Schools of Russia. M. Sserebotfsky and G. von Doepp. An account of the schools at present devoted to this work, their regulations, courses of study, etc. 3000 w. Sib Jour of Engng—Jan., 1902.

Self.—Technical Reading and Formulas. C. F. Blake. General remarks on self-education. Serial. 1st part. 1700 w. Mach, N. Y.—Oct., 1905.

Shipbuilding.—See **North-East Coast; SHIPBUILDER—Education.**

Shop Superintendent.—The Training of the Modern Shop Superintendent. Charles C. Johnson. On the training given at technical schools, considering it as practical and in some ways superior to anything possible at a workshop. Ills. 1800 w. Sci Am—Aug. 26, 1905.

Shop vs. Laboratory.—See **Laboratory vs. Shop.**

Specialization.—See **Differentiation.**

Switzerland-United States.—The Economic Need of Technical Education. Victor C. Alderson. Describes the schools for technical education in Switzerland and discusses the need in the United States. 5400 w. Jour W Soc of Engrs—June, 1902.

Telephone Engineer.—The Telephone and the Technical School. J. C. Kelsey. Read before the convention of the Ind. Tel. Assn. of the U. S. Urging that a telephone course that will be of benefit to the industry be established in the universities. 1500 w. Elec Rev, N. Y.—July 11, 1903.

The Proper Qualifications of Electrical Engineering School Graduates from the Telephone Engineer's Standpoint. Bancroft Gherardi, Jr. Discusses education with reference to the providing the necessary qualifications needed in this work. 3500 w. Trans Am Inst of Elec Engrs—Oct., 1903.

Telephone Operator.—See **TELEPHONE OPERATOR.**

Thurston Address.—Functions of Technical Science in Education for Business and the Professions. Robert H. Thurston. An address at the dedication of Engng. Hall, Iowa State College. Serial. 2 parts. 8000 w. Sci Am Sup—Oct. 24, 31, 1903.

Toolmaking.—See **TOOL—Makers.**

Trade School.—Trade Schools. Edward Thomas Hewitt. Discusses the value of the trade school in fitting young men for useful lives, the present conditions, the instruction given in various schools, etc. 5000 w. Jour Assn of Engng Socs—March, 1905.

See also **TRADE UNION.**

Trade School, Springfield.—The Springfield (Mass.) Evening School of Trades. E. R. Markham. An illustrated description of the school and an account of the work done. 2500 w. Am Mach—Dec. 4, 1902.

Twentieth-Century Engineer.—See **ENGINEER.**

United States.—See **American.**

Wireless Telegraphy.—See **SPACE TELEGRAPHY—Navy School.**

Workshop Training.—Workshop Training for Young Engineers. R. D. Summerfield. Thinks workshops for technical schools harmful, and that they can never give the training obtained in practical workshops. 1800 w. Elec Engr, Lond —July 19, 1901.

EEL.

Waterworks.—See **WATERWORKS—Eels.**

EFFICIENCIES.

See also **MOTOR;** and under specific machines and processes.

Efficiencies. James Swinburne. Abstract of an address to the students of the Manchester local section of the Inst. of Elec. Engrs. 3500 w. Elec Rev, N Y—Dec. 30, 1905.

EGLESTON.

Biographical Notice of Thomas Egleston, Ph. D., L. L. D. George F. Kunz. 7500 w. Trans Am Inst of Min Engs—April, 1901.

EIGHT-HOUR DAY.

See **LABOR.**

ELASTICITY.

See **BEAM; CONCRETE REINFORCED; MATERIALS' STRENGTH; TESTING.**

ELBLIGHT.

See **ELECTRIC LIGHTING—Decorative.**

ELECTRIC ACCIDENT.

See also **ELECTRIC PROTECTIVE APPARATUS; ELECTRIC SHOCK; LIGHTNING PROTECTION.**

Electric Cable.—See **ELECTRIC CABLE.—Abnormal Voltage; Lightning Effects.**

ELECTRIC APPARATUS.

See also **ELECTRIC EQUIPMENT; ELECTRIC GENERATING SET; ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC INSTRUMENT; ELECTRIC MACHINERY; ELECTRIC MOTOR; ELECTRIC PROTECTIVE APPARATUS.**

Electric Appliances. A. Balsley. Gives experiences gained from the practical operation of electrical appliances, and apparatus, such as lamps, batteries, dynamos, rotaries and frequency changes. 2800 w. Pro S & S W Ry Club—April, 1905.

Automobile.—See **AUTOMOBILE, ELECTRIC; AUTOMOBILE GEAR—Electric Transmission.**

Balancer.—Regulation and Compounding of Lighting Balancers. Budd Frankenfield. A balancer consists of dynamotor or motor generator, to equalize pressures of a three-wire lighting system fed from a two-wire plant. Gives methods for determining regulation or the compounding. 2800 w. Elec Wld & Engr—Dec. 23, 1905.

See also **ELECTRIC DRIVING.**

Compensation.—See **ELECTRIC INSTRUMENT.**

Cut-Out.—See **ELECTRIC PROTECTIVE APPARATUS—Cut-Out; Relay.**

Eddy-Current Brake.—See **DYNAMOMETER.**

Equalizers.—Equalizers for Direct Current Dynamos. Alphonse A. Adler. Describes the methods found most satisfactory for transferring loads from one machine to another. 2300 w. Elec Age—Feb., 1903.

Fittings.—See **ELECTRIC FITTINGS.**

Frequency Change.—See **ELECTRIC STATION—Montreal.**

History.—Electrical Apparatus. A long illustrated review of the development of the electric motor from the earliest devices down to the present time. 1500 w. Engr, U S A—Jan. 15, 1901.

Iron Tests.—See **MAGNETIC TESTING.**

Lightning Protection.—See **LIGHTNING PROTECTION—Electric Apparatus.**

Magnetic Link.—See **ELECTRIC MEASUREMENT.**

Phase Regulator.—A Proposed Phase Regulator and Its Applications. P. G. Watmough, Jr. Presents only the general principles and applications of the device for adjusting the phase displacement of a generator or other alternating-current apparatus. 1800 w. Elec Wld & Engr—Oct. 21, 1905.

Projection. — See **PROJECTION APPARATUS; SEARCHLIGHT.**

Protective.—See **ELECTRIC PROTECTIVE APPARATUS.**

Railway.—Electric Railway Apparatus. Ernst J. Berg. Discusses the characteristics of the various apparatus, and to a certain extent, their limitations. The discussion of storage batteries is omitted. 7000 w. Trans Am Inst of Elec Engrs—Aug.-Sept., 1901.

Electric Railway Equipment. W. B. Potter. Read before the Am. Ry., Mech., & Elec. Assn. Considers a few of the features relating to the development of the past few years—steam turbines, motors, controlling, car wiring, fuses, etc. 3500 w. St Ry Jour—Sept. 30, 1905.

Selection and Operation of Street Railway Apparatus. A. G. Rakestraw. The present article considers motors, trucks, gears, and methods of control. Serial. 1st part. 3000 w. Sib Jour of Engng—Oct., 1905.

See also **ELECTRIC CAR; ELECTRIC MOTOR; ELECTRIC RAILWAY.**

Regulations, German.—See **Standardization.**

Regulator.—An Improved Automatic Regulator (Ein Neuer Automatischer Regulator). B. Krausse. Describing an improved automatic device for use with shunt regulators. 1200 w. Elektrotech Zeitschr—May 9, 1901.

Automatic Apparatus for Regulating Generator and Feeder Potentials. E. J. Bechtel. Describes types of automatic generator potential regulators using different methods to accomplish the result. Ill. 1000 w. Trans Am Inst of Elec Engrs—Dec. 18, 1903.

Compensated Potential Regulator for Single-Phase Current (Kompensierter Potentialregulator für Einphasenstrom). Dr. L. Fleischmann and Dr. F. Eichberg. Theory and description, with diagrams. 600 w. Zeitschr f Elektrotechnik—Jan. 10, 1904.

The Regulation of Transmission Lines. J. A. Lighthipe. Read before the Pacific Coast Elec. Trans. Assn. Illustrates and describes the Tirrill regulator which cuts resistance in and out of the field of the exciter of the generator and keeps the line voltage constant 1100 w. Jour of Elec—July, 1904.

See also **ELECTRIC DISTRIBUTION.**

Relay.—See also **ELECTRIC PROTECTIVE APPARATUS; ELECTRIC RELAY; TELEGRAPH; TELEPHONE.**

Standardization.—Report of the Committee on Standardisation of the American Institute of Electrical Engineers. A revised series of recommendations on the standardisation and testing of electrical apparatus. These embrace the committee's report of 1899, amended and brought up to date, and have not yet been adopted by the Institute. 6000 w. Trans Am Inst Elec Engrs—May, 1902.

Direct-Current Generators. Sidney H. Short. Read before the Manchester Section of the Inst. of Elect. Engrs. Discussion with a view to more nearly standardising this class of electrical machinery. 4000 w. Elec Engr, Lond—March 29, 1901.

The Standardization of Electrical Machinery. An interim report of the British Engineering Standards Committee on generators, motors and transformers. 1500 w. Elect'n, Lond—Aug. 12, 1904. Also Engng—Aug. 12, 1904.

Standards for the Testing of Electric Machinery (Normalien zur Prüfung von Elekstrischen Maschinen). The full text of the proposed code to be acted upon by the German Electrotechnical Society. 4000 w. Elektrotech Zeitschr—June 13, 1901.

Explanations of the Standards for Testing Electrical Machinery (Erläuterungen zu den Normalien zur Prüfung von Elektrischen Maschinen). G. Dettmar. Very full explanatory comments on the proposed standards of the German Electrotechnical Society. 9000 w. Elektrotech Zeitschr—June 20, 1901.

The Rating and Testing of Electrical Machinery. Gisbert Kapp. Gives the standards provisionally adopted by the German Assn. of Elec. Engrs., discussing the subject. 5400 w. Inst of Mech Engrs—Glasgow Congress, 1901.

Safety Regulations for Electric Tramways (Sicherheitsvorschriften für Elektrische Bahnanlagen). The adopted report of the committee of the German Electrotechnical Association, providing standards for tramway stations and plants. 2500 w. Elektrotech Zeitschr—Sept. 19, 1901.

Standards for Testing Electrical Machinery (Normalien zur Prüfung von Elektrischen Maschinen und Transformatoren). The preliminary report, presented at the Dresden meeting of the German Electrotechnical Association, for tentative use for one year. 3500 w. Elektrotech Zeitschr—Sept. 19, 1901.

Standard Specifications for the Installation of Heavy Current Electrical Systems (Vorschriften für die Errichtungen von Elektrischen Starkstromanlagen). The full text of the specifications and regulations proposed by the German Electrotechnical Society. 9000 w. Electrotech Zeitschr—Nov. 21, 1901.

Report on the New Safety Regulations of the Verband Deutscher Elektrotechniker (Bericht über die Neuen Sicherheitsvorschriften des Verbandes Deutscher Elektrotechniker). Dr. C. L. Weber. A review and discussion, at a meeting of the Elektrotechnische Verein, of the German electrical safety regulations. 2000 w. Elektrotech Zeitschr—Dec. 19, 1901.

Regulations for the Construction and Testing of Apparatus and Materials (Vorschiften für die Konstruktion und Prüfung von Installationsmaterial). Regulations and specifications for electrical apparatus and materials, proposed by a committee of the Verband Deutscher Elektrotechniker. 1500 w. Elektrotech Zeitschr—May 8, 1902.

Standards for Electrical Machinery and Transformers (Normalien für Elektrische Maschinen und Transformatoren). Text of the standards proposed at the Düsseldorf meeting of the Verband Deutscher Elektrotechniker; also editorial comment. 10000 w. Elektrotech Zeitschr—June 5, 1902.

Rules for Construction and Testing of Installation Material (Vorschriften für die Konstruktion und Prüfung von Installationsmaterial). The provisional rules of the Verband Deutscher Elektrotechniker, to be given a trial for one year. 2000 w. Elektrotech Zeitschr—Aug. 21, 1902.

Standards for Electrical Generators and Transformers (Normalien für Elektrische Maschinen und Transformatoren). The provisional standards of the Verband Deutscher Elektrotechniker, which have been under trial for the past year and are to be given another year's trial. 4000 w. Elektrotech Zeitschr—Aug. 21, 1902.

Standards for Electrical Machinery and Transformers (Normalien für Elektrische Maschinen und Transformatoren). A revision of the standards of the "Verband Deutscher Elektrotechniker" as set forth in 1901, and discussed at the recent convention at Düsseldorf in June, 1902. 4000 w. Zeitschr d Ver Deutscher Ing—Dec. 13, 1902.

Safety Regulations for the Installation of Heavy Currents (Sicherheitsvorschriften für die Errichtung Elektrischer Starkstromanlagen). The report of the commission of the Verband Deutscher Elektrotechniker. 10,000 w. Elektrotech Zeitschr—Feb. 19, 1903.

Explanations of the Standards for Classifying and Testing Electrical Machinery (Erläuterungen zu den Normalien für die Bewertung und Prüfung Elektrischer Maschinen und Transformatoren). G. Dettmar. A discussion of the standards of the "Verband Deutscher Elektrotechniker" for electric motors, generators and transformers. 1800 w. Elektrotech Zeitschr—Aug. 20, 1903.

The Regulations, Standards and Specifications of the German Electrotechnical Association (Die Vorschriften, Normalien, und Leitsätze des Verbandes Deutscher Elektrotechniker). G. Dettmar. A general description, by the secretary of the association, of the electrical standards and working regulations relating to wiring and installation of machinery. 4000 w. Zeitschr d Ver Deutscher Ing—Oct. 21, 1905.

Standardization of Electrical Apparatus. H. F. Parshall. From "Traction and Transmission," London. Suggests the standardization of the conditions of output, such as rise of temperature, regulation, efficiency, etc., and outlines the method. 3300 w. W Elect'n—April 27, 1901.

The Standardization of Electrical Apparatus. J. T. Broderick. The subject is discussed from the standpoint of the manufacturer mainly, showing its manifest advantages. 2600 w. The Engineering Magazine—Oct., 1901.

The Standardization of Electrical Apparatus. J. T. Broderick. Mr. Broderick's second paper deals with the utility, convenience, and economy of standardization to the purchaser of electrical apparatus. 3500 w. Engineering Magazine—Nov., 1901.

The Rating of Motors and Generators. Dr. M. G. Rasch. Read before the International Tramways Union, at Islington. A discussion of the basis that should be adopted in estimating the power. 4500 w. Elect'n, Lond—Aug. 8, 1902.

Temperature Curves and the Rating of Electrical Machinery. Rud. Goldschmidt. Discusses short-time rating; the temperature curve; heating and cooling; crane rating, etc., giving methods and examples. 7500 w. Inst of Elec Engrs—March 9, 1905.

See also ELECTRIC ENGINEER—German Society; ELECTRIC GENERATING SET; ELECTRIC INDUSTRY—Regulations; ELECTRIC RAILWAY; ELECTRIC TESTING; ELECTRIC UNIT; STEAM ENGINE TEST.

Station Indicator.—See STATION INDICATOR.

Steamship.—See ELECTRIC EQUIPMENT—Ship.

Symbol.—See ELECTRIC SYMBOL.

Synchronizing Devices.—See ELECTRIC INSTRUMENT.

Testing.—See Standardization; ELECTRIC GENERATOR TEST; ELECTRIC MACHINERY; ELECTRIC TESTING.

Voltameter.—See ELECTRIC MEASUREMENT.

ELECTRIC APPLIANCE.

See ELECTRIC APPARATUS; ELECTRIC INSTRUMENT; ELECTRIC MACHINERY; ELECTRIC PROTECTIVE APPARATUS.

ELECTRIC ARC.

See ARC LIGHT.

ELECTRIC BATTERY.

See ELECTRIC CELL; STORAGE BATTERY.

ELECTRIC BLEACHING.

See ELECTRO-CHEMISTRY—Bleaching.

ELECTRIC BOAT.

See BOAT, ELECTRIC.

ELECTRIC BOOSTER.

See BOOSTER; STORAGE BATTERY.

ELECTRIC BURNER.

Blast Furnace.—See BLAST FURNACE—Electric Burner.

ELECTRIC CABLE.

See also DIELECTRIC; ELECTRIC CONDUCTOR; ELECTRIC CONDUIT; ELECTRIC DISTRIBUTION; INSULATION; SUBMARINE CABLE; TELEGRAPH; TELEPHONE CABLE.

Abnormal Voltages.—The Question of Excess Pressure in Three-Phase Installations (Ein Beitrag zur Frage der Ueberspannungen in Dreiphasenstrom-Anlagen). P. Humann. A discussion of the danger to a cable by excess of pressure caused by the burning out of a fuse or other disturbance of balance. 2000 w. Elektrotech Zeitschr—Oct. 13, 1904.

See also ELECTRIC DISTRIBUTION.

Air-Spaced.—See TELEPHONE CABLE.

Berlin.—See Lightning Effects.

Capacity.—See Charging; ELECTROSTATIC CAPACITY.

Charging.—The Charging of a Cable Through a Condenser and Resistance. Oliver Heaviside. The object of the article is to promote the study of special cases numerically and graphically, especially as regards the inclusion of the self-induction of the cable. 2800 w. Elect'n, Lond—Dec. 23, 1904.

Choice.—See Selection.

Concentric Inductance.—See Inductance.

Coverings.—The Manufacture and Application of Coverings for Cables (Ueber Kabelschützhüllen, deren Herstellung und Verlegung). J. Schmidt. Describing various methods of protecting underground cables from injury, with illustrations and details of costs. 3000 w. Elektrotech Zeitschr—Oct. 5, 1905.

Cross-Section.—The Utilization of Space in Cable Strands (Ueber die Raumausnutzung von Litzen). Dr. Paul Holitscher. A discussion of the twisting of cable strands so as to secure the greatest cross section in a given space. 2500 w. Elektrotech Zeitschr—July 31, 1902.

Current Analysis.—See TELEGRAPH.

Dielectric Losses.—See DIELECTRIC—Losses.

Dielectric Strength.—See DIELECTRIC—Strength.

Faults.—See Lead Covered; ELECTRIC MEASUREMENT.

Germany.—Notes on the Cable Industry in Germany. Mervyn O'Gorman. Discusses German practice, concluding that it is not ahead of the English, but that seeds of important advance have been sown. 1100 w. Elec Rev, Lond—Jan. 17, 1902.

Heating.—The Heating of Buried Cables (Ueber die Edwärmung im Erdboden Verlegter Starkstromkabel). Paul Humann. Data and results of experiments made by Felten and Guillaume upon the heating of buried cables subjected to the passage of heavy currents. 3000 w. Elektrotech Zeitschr—July 30, 1903.

On the Heating of Three-Phase Cable Sheaths. M. B. Field. A discussion of the rotating field surrounding a three-phase cable, showing the existence of a torque between the conductors and sheath, with consequent losses. 2000 w. Elec Rev, Lond—Sept. 23, 1904.

The Theory of the Heating of Cables (Zur Theorie der Kabelerwärmung). J. Teichmüller. Deriving formulas for use in computing the rise in temperature of underground cables for various currents. 4000 w. Elektrotech Zeitschr—Nov. 3, 1904.

The Heating of Polyphase Underground Cables (Die Erwärmung Unterirdisch Verlegter Drehstromkabel). Dr. Richard Apt and Carl Mauritius. With numerous diagrams showing data and results of experiments. 3500 w. Elektrotech Zeitschr—Dec. 1, 1904.

The Heat Conductivity of Stranded Cables (Ueber die Wärmeleitung in einem Verseilten Kabel). Gustav Mie. A mathematical examination of the transmission of heat through cables made up of several strands, deducing precise and approximate formulas. 6000 w. Elektrotech Zeitschr—Feb. 6, 1905.

The Heating of Triple Underground Cables (Ueber die Erwärmung von Verseilten Dreifachkabeln in Erde Verlegt). Paul Humann. With tables and diagrams for computing the rise in temperature; comparing the computed results with experimental determinations. 4500 w. Elektrotech Zeitschr—June 8, 1905.

Highfield-Cater.—Highfield-Cater System of Underground Mains. An illustrated description of a novel system now undergoing a practical trial. Some of the points claimed are small space, no drawing boxes, cheapness and rapidity, through protection, etc. 2000 w. Elec Rev, Lond—Aug. 23, 1901.

High Tension.—High Tension Cables. E. Kilburn Scott. Discusses various kinds of insulation favoring the Brooks semi-solid system. 2500 w. Elec Rev, Lond—March 8, 1901.

High-Tension Cables. Oscar Schaefer. Describes experiments made at the works of the Kabelwerk Duisburg, Germany, in August, 1897, discussing results. 2800 w. Elect'n, Lond—Nov. 22, 1901.

The Use of High Tension Underground Conductors. Henry Floy. Discusses the slow introduction of high-tension cable, the cause, the advantages, etc. 2000 w. Elec Wld & Engr—March 7, 1903.

Electrical Transmission Under Land and Water. Alton D. Adams. On the use of cables in electrical transmission, discussing instances where high-voltage cables are desirable, and present practice. Serial. 1st part. 2500 w. Elec Rev, N Y—June 20, 1903.

Electric Cables for High Voltage Service. Henry W. Fischer. Discusses the manufacture of paper-insulated and rubber-insulated cables, their installation, and operation. 1200 w. Trans Am Inst of Elec Engrs—July, 1903.

The Operation and Maintenance of High Tension Underground Systems. Philip Torchio. Notes applying mainly to moderately high-tension system as installed in large cities in the last few years. Ill. 900 w. Trans Am Inst of Elec Engrs—July, 1903.

Insulating Materials in High-Tension Cables. E. Jona. Discusses the various materials used, their enduring qualities, tests made, etc. 6000 w. Int Elec Cong of St. Louis—Sept., 1904.

See also Insulation Paper; ELECTRIC DISTRIBUTION; ELECTRIC TRANSMISSION; INSULATION.

Inductance.—The Computation and Determination of Self-induction and Current Charge of Single and Polyphase Cables (Zur Berechnung und Experimentellen Bestimmung der Selbstinduktion und Stromrückleitung von Einphasen und Drehstromkabeln). Leo Lichtenstein. Substituting an ideal conductor in place of the actual one, for purposes of calculation. Two articles. 6000 w. Zeitschr f Elektrotechnik—July 31, Aug. 7, 1904.

See also Charging; TELEPHONE CABLE; TELEPHONE LINE.

Inductance, Concentric.—The Inductance of Concentric Cables. W. H. Everett. Gives results of investigations, showing that the interior field is not always negligible. 1200 w. Elec Rev, Lond—Nov. 9, 1900.

Installation.—The Installation of Electric Cables. H. W. Buck. Discusses general principles and suggests directions in which improvements can be made. Ills. 3000 w. Elec Club Jour—April, 1904.

Insulation.—Insulation on Cables. Mervyn O'Gorman. Abstract of a paper read before the Inst. of Elec. Engs. (Eng.), with editorial. On the manufacture of cables, and their design. 7000 w. Elect'n, Lond—March 15, 1901.

The Insulation of Cables (Ueber Kabelisolation). J. Schmidt. Discussing the materials employed for the insulation of cables carrying high voltage currents. 2000 w. Zeitschr f Elektrotechnik—Sept. 11, 1904.

See also High-Tension; DIELECTRIC; ELECTRIC MEASUREMENT; INSULATION.

Insulation Paper.—The Insulation Resistance of High-Pressure Cables with Impregnated Paper Insulation (Der Isolationswiderstand von Hochspannungskabeln mit Imprägnierter Papierisolation). P. Humann. Data and results of insulation tests on paper covered cables. 1800 w. Elektrotech Zeitschr—March 30, 1905.

Types of Electric Cables; Hints on Their Manipulation. J. H. C. Brooking. Notes applying more particularly to paper-insulated cables, and the troubles when used under bad conditions. 2800 w. Prac Engr—May 5, 1905.

See also TELEPHONE CABLE.

Insulation Resistance.—See ELECTRIC MEASUREMENT; INSULATION—Electric Cable.

Laying.—Notes on Some Systems of Laying Underground Cables. Arthur Devey. Abstract of paper read before the Glasgow Section of the Inst. of Elec. Engs. The discussion of armored or unarmored cables laid direct in the ground, and pipe, or conduit systems is presented in this number. Serial. 1st part. 2200 w. Elec Rev, Lond—April 5, 1901.

Underground Cable Laying. A. T. Stewart. Illustrates and describes various methods in use in electrical distribution. 3000 w. Elec Engr, Lond—Aug. 1, 1902.

How Cables Are Laid, Worked, and Mended. J. W. Davis. A descriptive account of the work. 3300 w. Gunton's Mag—April, 1903.

Methods of Cable-Laying. Leonard Andrews. A summary of the advantages and disadvantages of some of the systems that have been most largely used. 1400 w. Elec Engr, Lond—Nov. 18, 1904.

Lead Covered.—Are Lead-Covered Cables Doomed? J. H. C. Brooking. A discussion of the best system of cables to use for the classes of mains now in operation. 3400 w. Elec Mag—May 23, 1905.

See also ELECTRIC WIRING.

Lead-Covered Faults.—Notes on Faults in Small Lead-Covered Wires. Donald Smeaton Munro. Discusses dangers due to defects of manufacture, and disadvantages after installation. Ills. 1400 w. Elec Rev, Lond—Oct. 28, 1904.

Lightning Effects.—The Destruction of Cables by Lightning (Die Zerstörung von Kabelleitungen durch Blitzschlag). Karl Wilkens. A paper before the Elektrotechnischer Verein, giving an illustrated account of damage done to underground cables for heavy currents in Berlin. 2000 w. Elektrotech Zeitschr—June 26, 1902.

Load Tables.—Tables for the Loading of Simple Continuous-Current Cables (Belastungstabelle für Einfache Gleichstromkabel). Dr. Huberth Kath. Tables giving the maximum current permissible in continuos-current cables, according to the committee of the "Verband Deutscher Elektrotechniker." 6000 w. Elektrotech Zeitschr—Nov. 17, 1904.

London-Birmingham.—The Subterranean Cables to the North. Explains reasons for a continuation of the the London and Birmingham line to Manchester and Liverpool, and discusses the difficulties in the replacement of overhead telegraph lines by underground cables. 1400 w. Engr, Lond—Nov. 14, 1902.

London Measurements.—See DIELECTRIC—Losses.

Maintenance.—Trouble Prevention on Electric Mains. J. H. C. Brooking. Considers details needing attention and gives hints of use to central station engineers. 1800 w. Feilden's Mag—Oct., 1903.

Manila.—Cable Laying in Manila and a Trip Around the World. Lewis G. Martin. An illustrated account of a trip to lay land cables for the Commercial Pacific Cable Co. 1800 w. Elec Rev, N Y—Nov. 14, 1903.

See also SUBMARINE CABLE.

Manufacture.—See ELECTRIC CABLE WORKS.

Mending.—See Laying.

Mines.—See ELECTRIC DISTRIBUTION.

Paper Insulation.—See Insulation Paper.

Properties and Computations.—See ELECTRIC LINE.

Protection.—The Sheathing and Protection of Cables (Ueber Kabel Schutzhüllen und Abdeckung, deren Verwendung und Verlegung). J. Schmidt. A general and exhaustive discussion of the protection of underground electric cables and the conduits in which they are laid. Serial. Part I. 4000 w. Elektrotech Zeitschr—Jan. 22, 1903.

Protection of Cables from Arcs Due to the Failure of Adjacent Cables. W. G. Carlton. Briefly considers the methods of protection used for high-pressure cables, particularly in manholes. 1300 w. Trans Am Inst of Elec Engrs—June 21, 1904.

The Arrangement and Installation of Cable Protection Devices (Ueber Kabelschutzhüllen, deren Herstellung und Verlegen). J. Schmidt. With especial reference to the construction of underground conduits and methods of underground conduits and methods of providing external protection for cables laid beneath the surface. Two articles—8000 w. Electrotech Zeitschr—April 16, 13, 1905.

See also ELECTRIC PROTECTIVE APPARATUS.

Railway Distribution.—See ELECTRIC DISTRIBUTION—Railway; ELECTRIC RAILWAY.

St. Gothard Tunnel.—See TELEPHONE LINE.

Selection.—The Selection of Electric Cables. L. B. Atkinson and C. J. Beaver. Read before the Manchester Sec. of the Inst. of Elec. Engrs. The present part deals with rubber insulated cables, the tests of materials, &c. Gives hints for the selection of cables. Serial. 1st part. 3500 w. Elect'n, Lond—Feb. 17, 1904.

Some Points on the Selection of Electric Cables. L. B. Atkinson and C. J. Beaver. Abstract of a paper read before the Manchester Sec. of Elec. Engrs. Deals with the subject from the standpoint of the buyer, and user, describing the insulation of cables principally. Short discussion. 4800 w. Elec Engr, Lond—Feb. 10, 1905.

The Choice of an Insulated Cable. Wallace S. Clark. Read before the Nat. Elec. Lgt. Assn. Gives points to assist in making a wire selection. 4000 w. Elec Rev, N Y—June 10, 1905.

Shanghai-Woosung.—See TELEGRAPH.

Sheath Losses.—Experiments on Sheath Losses of Three-Core Cables. J. T. Morris. An account of experiments carried out by the author to determine experimentally the magnitude of some of these losses in cables conveying polyphase currents. 3000 w. Elect'n, Lond—Sept. 2, 1904.

Eddy Currents in Cable Sheats. M. B. Field. Read before the Inst. of Elec. Engrs. A theoretical consideration of the currents induced in cable sheaths and the losses occasioned thereby. Serial. 1st part. 4700 w. Elect'n, Lond—April 15, 1904.

Eddy-Current Losses in Three-Phase Cable Sheaths. M. B. Field. Read before the British Assn. Gives calculations of self-induced eddy currents and mutually induced eddy currents. 1000 w. Elec Engr, Lond—Sept. 16, 1904.

Street.—Street Cable Systems. S. J. Watson. Abstract of a paper read before the Manchester Loc. Sec. of the Inst. of Elec. Engrs. and of the discussion. Discusses the design and arrangement of both the draw-in systems and the solid systems, cost of construction, &c. 4800 w. Elect'n, Lond—Dec. 8, 1905.

Telegraph Disturbances. — See TELEGRAPH — Shanghai.

Telegraph, Induction.—See TELEPHONE CABLE—Induction.

Telephone.—See TELEPHONE CABLE.

Testing.—See also ELECTRIC MEASUREMENT; ELECTRIC TESTING—Cable.

Testing Wagon.—See ELECTRIC TESTING—Wagon.

Woosung-Shanghai.—See TELEGRAPH —Shanghai.

ELECTRIC CABLE WORKS.

Manchester.—Messrs. W. T. Glover & Co.'s Cable Works, Manchester. Illustrated detailed description of extensive works for the manufacture of electric conductors of various descriptions. 6300 w. Engng—Jan. 1, 1904.

Warrington.—Works' Visits. An illustrated description of the manufacture of electric cables and the preparation of the insulation in the Warrington factory of the St. Helens Cable Co., Ltd. Serial. 1st part. 3000 w. Elec Engr, Lond—Dec. 4, 1903.

ELECTRIC CAR.

See also CAR TRUCK; ELECTRIC RAILWAY; STREET CAR.

Tramway Rolling Stock. The first of a series of illustrated articles giving a general outline of various types of rolling stock. Serial. 1st part. 2800 w. Tram & Ry Wld—Sept. 11, 1902.

Suitable Cars for City and Suburban Service. T. W. Wilson. Read before the St. Ry. Assn. of the State of N. Y. Discusses the size and arrangement of cars for interurban and for city service. 2200 w. St Ry Jour—July 8, 1905.

Acceleration.—See ELECTRIC RAILWAY; ELEVATED RAILWAY—Liverpool.

Air Brake.—See AIR BRAKE—Electric Car.

Alternating or Direct Current.—See ELECTRIC MOTOR—Winter-Eichberg.

Atlanta, Line.—See Line.

Bodies.—See Maintenance.

Body Framing.—Body Framing of Modern Interurban Cars. Edward C. Boynton. Illustrated description. 700 w. St Ry Jour—Aug. 13, 1904.

Boston Elevated.—The New Type of Elevated Car Without Platforms, Boston Elevated Railway Company. Illustrated description. 1000 w. St Ry Jour—Aug. 6, 1904.

Brakes.—See BRAKE.

Braking.—See BRAKE—Electric Motor.

Brooklyn Elevated.—New Open Cars for the Brooklyn Elevated. An illustrated description of open cars with center aisles and cross seats. 700 w. St Ry Jour—Dec. 20, 1902.

Open Elevated Motor Car—Brooklyn Heights Railroad. An illustrated detailed description. 600 w. R R Gaz—July 3, 1903.

Extensive Improvements in Elevated Car Equipments—Brooklyn Rapid Transit Company. Illustrated description of new platforms, brake rigging, electric equipment, fireproofing, and other features. Serial. 2 parts. 8000 w. St Ry Jour—Aug. 13 and 20, 1904.

Brooklyn Rapid Transit.—New Semi-Convertible Cars with Steel Underframes, for the Brooklyn Rapid Transit Company. Illustrated detailed description of the interesting features of construction in these new cars. 5500 w. St Ry Jour—May 6, 1905.

The Standard Surface Car of the Brooklyn Rapid Transit Company. Illustrated detailed description of a car recently adapted for service on surface lines, which is quite a departure from the usual type of semi-convertible cars. 2000 w. St Ry Jour—Nov. 18, 1905.

Buffalo-Lockport.—New 4000-Type Car for Buffalo. Illustrated detailed description of new cars placed in service between Buffalo, Niagara Falls, and Lockport. 1500 w. St Ry Jour—March 25, 1905.

Chicago.—New Standard Cars of the Chicago City Railway Company. Illustrated article describing the new features of these cars, with editorial comment. 6200 w. St Ry Jour—Sept. 16, 1905.

Chicago Elevated.—Improvements on the Motor Cars of the Metropolitan West Side Elevated Railway Company, Chicago. An illustrated article describing a number of important improvements, especially in wiring. 5500 w. St Ry Jour—April 22, 1905.

See also Steel, Chicago Elevated.

City Service.—The Best Form of Car for City Service. Eugene Chamberlin. Read before the N. Y. State Ry. Assn. An illustrated article discussing the most satisfactory vehicle for electric roads in regard to efficiency, economy, convenience and comfort. 2500 w. St Ry Jour—Oct. 12, 1901.

Cleveland, O.—See ELECTRIC RAILWAY.

Combination.—The "California" or Combination Car. W. E. Partridge. Illustrates and describes this type of car, which has a closed body with open ends or platforms, discussing also similar types. 2200 w. St Ry Rev—Jan. 15, 1902.

Construction.—Tramcar Construction. Illustrated description of the work taken from an interesting pamphlet issued by a British firm. 2200 w. Elec Engr, Lond—March 22, 1901.

See also Design.

Control.—Tram Car Driving. H. B. Phillimore. Describes the equipment for controlling the car, and its manipulation, giving suggestions for motor-drivers. 1700 w. Elec Rev, Lond—Oct. 10, 1902.

The Operation of a Four-Motor Equipment with a Two-Motor Controller. Edward Taylor. Gives a detailed analysis of the conditions of such operation, explaining the causes of troubles. 1200 w. St Ry Jour—Nov. 12, 1904.

See also London District Ry; CONTROLLER.

Convertible.—The Brill New Semi-Convertible Car. An illustrated description of a new type of semi-convertible car. 2000 w. Ry Mas Mech—Oct., 1901.

The Duplex Car for Summer and Winter Use (Der Duplexwagen, ein neuer Sommer- und Winter-Wagen). Hans Dominik. An illustrated description of a new convertible electric car. 700 w. Ill Zeitschr f Klein u Strassenbahnen—March 1, 1902.

Convertible Cars. W. E. Partridge. Illustrates and describes the forms of railway cars which aim to combine the leading features of open and closed cars. 1800 w. St Ry Rev—Aug. 20, 1902.

Standard Car in Denver. Brief illustrated description of a car differing materially from that of any other city, but very popular. It is both a combination and semi-convertible car. 3500 w. St Ry Jour—Feb. 7, 1903.

Novel Convertible Car. Illustrated description of a new car designed by Hermann Romünder, of Bloomsbury, N. J., having novel features. 900 w. St Ry Jour—Nov. 7, 1903.

New Style Open Cars in Montreal. Brief illustrated description of a novel type having one side open and the other closed. 700 w. St Ry Rev—Aug. 15, 1901.

A remarkable Combination Semi-Convertible and Convertible Car for City Service. Illustrated description of a car for the Montreal Street Railway. 700 w. St Ry Jour—Aug. 6, 1904.

Converting Summer to Winter Cars in Cleveland. Illustrated description of the alterations made. 1000 w. St Ry Jour—Nov. 19, 1904.

Design.—Car Designs and Carrying Capacity. John P. Fox. Discusses the seating arrangements of some 24 different types of cars, with suggestions. Editorial also. 7700 w. St Ry Jour—April 1, 1905.

Car Designs and Carrying Capacity. John P. Fox. A second article, discussing doors, vestibules, etc. Illustrated. 2700 w. St Ry Jour—July 1, 1905.

Design and Construction.—Tramcar Design and Construction. Elmer E. Cook and T. C. Elder. On the importance of first-class construction, discussing present day types. Ills. Serial. 1st part. 3200 w. Trac & Trans—Aug., 1904.

Double-Deck.—Double-Deck Cars in Great Britain. Discusses the popularity of these cars in Great Britain, giving opinions of various authorities explanatory of their use there, after being generally discarded in America and on the Continent. 2300 w. St Ry Jour—May 2, 1903.

A Double-Deck Car for Rapid Transit. Remarks on the advantages of the double-deck cars, with illustrated description of a design by James L. Getaz. 800 w. Sci Am—March 19, 1904.

Double-Deck Cars for Twin Cities. Illustrated description of a double-deck trolley car for use between St. Paul and Minneapolis. 500 w. St Ry Rev—Oct. 13, 1904. (Daily Ed.)

Double Deck Cars with Covered Tops. An illustrated review of current British practice. 4400 w. St Ry Rev—Nov. 20, 1904.

Double Truck.—Double Truck Cars How to Equip Them to Obtain Maximum Efficiency Under Varying Conditions. N. H. Heft. Discusses trucks, electric motors, and double truck car body and equipment. Followed by general discussion. 8800 w. St Ry Rev—Nov. 15, 1900.

Double-Truck Cars. N. H. Heft. Read at the Kansas City convention of the Am. St. Ry. Assn. How to construct and equip them to obtain maximum efficiency with minimum cost of maintenance. 1500 w. St Ry Jour—Dec. 1, 1900.

Dynamometer.—An Air-Resistance Dynamometer Car. Illustrated description of the air-resistance test car "Louisiana," constructed for the use of the Electric Railway Test Commission of the Louisiana Purchase Exposition. 1700 w. Eng News—March 23, 1905.

Recent Work of the Electric Railway Test Commission. Especially describing the work of the dynamometer car designed and constructed for the purpose of measuring directly the head and rear pressures and the side and roof resistances of car bodies. Ills. 1600 w. St Ry Jour—March 25, 1905.

Elevated Ry.—See **Boston; Brooklyn; Chicago; New York.**

Emergency Line.—See **Line.**

Energy Losses.—Energy Losses on Electric Cars. W. Park. Gives diagrams showing the distribution of the losses on an electric car, and suggests ways of effecting increased running efficiency. 1400 w. Tram & Ry Wld—June 11, 1903.

Equipments.—Electric Car Equipments and Their Maintenance. A. W. Wigram. Read before the Newcastle section of the Inst. of Elec. Engrs. A criticism on some constructional details prominent in modern practice, and a few notes on maintenance. 9300 w. Elec Engr, Lond—Dec. 27, 1901.

Electric Car Equipments and Their Maintenance. A. W. Wigram. Abstract of paper read before the Newcastle Sec. of the Inst. of Elec. Engrs. Discusses tracks, brakes, life guards, motor equipment, trolley heads, controllers, &c. 4000 w. Elect'n, Lond—Jan. 24, 1902.

Some Points in the Equipment of Electric Tram Cars. W. G. Rhodes. Abstract of a paper read before the Manchester section of the Inst. of Elec. Engrs. Discusses points of equipment that will enable one to select the most suitable type of car for a particular route. 5000 w. Mach Engr—March 22, 1902.

The Electrical Equipment of an Ordinary Street Car. A. B. Lambe, Jr. Read before the Canadian Elec. Assn. Discusses the principal parts comprising the modern electric car equipment. 8700 w. Can Elec News—July, 1902.

See also **Motor Equipment; ELECTRIC APPARATUS—Railway.**

Fender.—See **FENDER.**

Fire.—See **FIRE CAR.**

Fire Precautions.—Rules Governing Car Wiring and Equipment of Cars. Gives rules recently adopted by the Underwriters' Nat. Elec. Assn. as embodying the principal precautions necessary in safeguarding cars from fire hazard of their own electrical appliances. 3500 w. St Ry Jour—July 16, 1904.

Fireproof.—See **London Central; Steel.**

Flat.—Working Drawings for an Electric Flat Car. Arthur B. Weeks. Description with drawings. 700 w. St Ry Jour—April 25, 1903.

Fonda, Jamestown & Gloversville Ry.—See **Interurban.**

France.—Various Types of Cars for Electric Tramways (Different Types de Voitures Automotrices de Tramways Electriques). Gustave Lelarge. With illustrations of motors, controllers and trucks used on electric tramways in France. Serial. Part I. 10,000 w. 2 plates. Rev Gen des Chem de Fer—Jan., 1903.

Freight.—See **Flat; Induction Motor; ELECTRIC RAILWAY.**

Funeral Car.—Funeral Car at Buffalo. Brief illustrated description. 300 w. St Ry Jour—April 1, 1905.

Gasoline, Combined.—See **CAR, MOTOR-DRIVEN—Gasoline—Electric.**

Gearing.—Worm Reduction in Electric Tramway Equipments. O. F. Domon. Illustrates and describes a new car with worm reduction gear recently placed on the Seebach-Oerlikon-Zurich Electric Tramway for trial. 1000 w. Elec Rev, Lond—Oct. 21, 1904.

Gear Ratio.—The Effect of Changing the Gear Ratio on a Series of Railway Motor Equipment. J. C. Huffman. Considers a practical case, and concludes that the best gear ratio to use on a given equipment for a given schedule speed is the lowest gearing that with a fair margin will maintain the specified schedule. 1700 w. St Ry Jour—Oct. 29, 1904.

Gibbs, Steel.—See **Steel, N. Y. Subway.**

Heating.—See **CAR HEATING—Tramway.**

Helios Equipment.—Helios Electrical Equipment of Tramcars. E. M. Collins. An illustrated description of the 20 H. P. size which is typical of all others. 2000 w. Tram & Ry Wld—Oct. 9, 1902.

High-Speed Truck.—See **CAR TRUCK—High Speed Electric.**

Holland.—See **Sleeper.**

Hoods.—Street Car Hoods or Canopies. W. E. Partridge. Illustrates and describes the various forms in common use, discussing the designs. Also considers stem car hoods. 4300 w. St Ry Jour—March 2, 1901.

Induction Motor.—Construction and Operation of a Freight-Car Driven by Induction Motors. A. B. Weeks. Describes the method of supporting trolley wires, the supply circuit, controllers, etc., for operating a flat car in a factory. 2000 w. St Ry Jour—June 6, 1903.

Instruction.—Instruction Car on the New York Subway. Illustrated description of car and method of instructing 3000 motormen in anticipation of the opening of the rapid transit road. 1500 w. St Ry Jour—Aug. 20, 1904.

An Underground Instruction Car. Illustrated description of the car equipped for the Subway Division of the Interborough Rapid Transit Co., of New York. 900 w. Loc Engng—Oct., 1904.

New Instruction Car for the Brooklyn Rapid Transit Company. Illustrated detailed description of the car and its equipment. 2400 w. St Ry Jour—July 29, 1905.

See also MOTORMAN—Instruction.

Interurban.—Cars for High Speed Interurban Service. An illustrated study of some of the recent designs used by electric interurban railways. 3700 w. St Ry Jour—Oct. 4, 1902.

Interurban Electric Railway Car Equipment. W. B. Potter. Discusses some of the conditions met with in determining the equipment for various types of service, describing only such apparatus as has passed the experimental stage. 3500 w. St Ry Jour—Oct. 4, 1902.

General Design and Finish of the Modern Interurban Car. Edward C. Boynton. An illustrated description of recent improvement introduced in interurban cars. 1200 w. St Ry Jour —Oct. 1, 1904.

Types of Interurban Cars. J. N. Shannahan. Read before the St. Ry. Assn. of the State of N. Y. Describes two types of cars used on the Fonda, Johnstown & Gloversville R. R., pointing out the advantages and disadvantages of the service. 1500 w. St Ry Jour—July 1, 1905.

A Desirable Car for Interurban Service. P. J. Mitten. Read before the Indiana Elec. Ry. Assn. Gives the writer's views, and abstract of discussion. 3500 w. St Ry Jour—Dec. 23, 1905.

Lighting.—See CAR LIGHTING.

Line.—Line Car at Atlanta, Ga. Illustrated description of a construction and repair car for an electric railway. 700 w. St Ry Rev—Dec. 20, 1902.

New Emergency Line Car. James H. Creedon. Illustrated description of a car embodying several new ideas which has recently been constructed for the Old Colony St. Ry. Co. in Massachusetts. 800 w. St Ry Rev—May 20, 1903.

London Central.—New Coaches on the Central London Railway. Illustration with brief description of new electric cars adopted to lessen the vibration on this underground railway. 600 w. Engr, Lond—July 3, 1903.

Fireproof Cars on the Central London. Illustrated description of motor cars to replace the locomotives formerly used. 900 w. St Ry Jour —Nov. 7, 1903.

New Fireproof Rolling Stock for the Central London Underground Railway. Gives an illustrated abstract of the plans and specifications of the motor cars ad other parts of the equipment. 3000 w. St Ry Jour—Oct. 11, 1902.

See also UNDERGROUND RAILWAY.

London Conduit Railway.—See ELECTRIC CONDUIT RAILWAY—London.

London District.—The Electrically Equipped Trains for the District Railway. Illustrates and describes the equipment and the systems of electrical control. Serial. 1st part. 2500 w. Elect'n, Lond—April 24, 1903.

London, Great Northern.—The Rolling Stock of the Great Northern and City Railway. Illustrates and describes coaches to be used in the multiple-unit system. 700 w. Engr, Lond—Dec. 25, 1903.

Long vs. Short.—Relative Economy in the Operation of Long and Short Cars. W. J. Davis, Jr. Read before the Utica convention. A discussion of power consumption of cars of various sizes and weights and realtive cost of operation as applying to cities of 30,000 to 50,000 inhabitants. 1400 w. St Ry Jour—Sept. 24, 1904.

Maintenance.—Painting, Repainting and Maintenance of Street Car Bodies. F. T. C. Brydges. Read at Kansas City Convention. A discussion of methods and report of cost. 2200 w. St Ry Jour—Nov. 3, 1900.

Car Maintenance on the Metropolitan Street Railway, New York. Thomas Millen. An illustrated article concerning the types and equipment of the cars and their maintenance. 2300 w. St Ry Jour—Oct. 5, 1901.

Care and Maintenance of Car Bodies. C. F. Baker. The writer's views from experience in meeting the conditions at Boston. General discussion. 9500 w. St Ry Rev (Daily Ed)—Sept. 2, 1902.

Maintenance of Electric Cars and Their Equipment. H. A. Benedict. Read before the Utica convention. Discusses some of the problems in the operation of cars in large cities. 1700 w. St Ry Jour—Sept. 24, 1904.

Manhattan Elevated.—See New York Elevated.

Montreal.—See Convertible.

Motor Connections.—Mistakes in Motor Connections and Their Effects. Cale Gough. Gives a diagram showing all the misconnections possible of the No. 1 motor leads, with the effects produced, with explanatory notes. 1000 w. St Ry Jour—July 8, 1905.

Motor Equipment.—Four Motors v. Two. Reviews ideas advanced in the papers of Messrs. Pestell and Bigelow, and discusses the subject from the English viewpoint. 2300 w. Elec Rev, Lond—May 31, 1901.

Four-Motor Equipments. Gives reasons why many companies prefer to use four motors per car. Ill. 2400 w. Sci Am Sup—Nov. 2, 1901.

The Position of Motors on Bogie Carriages. B. Pontifax. A discussion of where the motors ought to be fixed, and where bogie cars should be placed on the trains. Introductory to a general discussion. 1200 w. Elec Engr, Lond—March 25, 1904.

Two-Motor versus Four-Motor Equipments. N. McD. Crawford. A report of an investigation made, describing the line and conditions of service on which the tests were made. 1200 w. Am Inst of Elec Engrs—Feb. 24, 1905.

Four Motors vs. Two. Robert N. Tweedy. Notes on tests reported in a recent paper before the Am. Inst. of Elec. Engrs., in New York, with remarks on cost and economy in operation. 2800 w. Elec Rev, Lond—July 21, 1905.

See also Equipment; ELECTRIC RAILWAY—Alternating Currents.

Multiple Unit.—See Boston Elevated; New York Elevated; Steel; ELECTRIC RAILWAY.

New York.—The Rolling Stock of Greater New York. Eugene Chamberlin. An illustrated description of the cars at present operated. 3500 w. St Ry Jour—Oct. 5, 1901.

New York Elevated.—The Rolling Stock of the Manhattan Railway Company. Full particulars, illustrations and working drawings of the cars and trucks of the new electric equipment. 3500 w. St Ry Jour—Dce. 6, 1902.

The Electric Cars of the New York Elevated Railway (Die Wagen der New Yorker Hochbahn). S. G. Freund. An illustrated description of the cars of the New York Elevated Railway, which is operated on the multiple-unit system. 1200 w. Elektrotech Zeitschr—May 7, 1903.

New York Subway.—See Steel; Subway, N. Y.

Nottingham, Eng.—Cars: Their Equipment and Maintenance. John Aldworth. Read at the Liverpool Congress of the Munic. Tram. Assn. of Gt. Britain. Considers the more important features, giving observations based on methods in operation on the Nottingham system. 3500 w. Elec Engr, Lond—Sept. 30, 1904.

Open.—See Brooklyn Elevated; Combination; Convertible.

Paris Exposition.—Tramway Rolling Stock at the Exposition of 1900 (Le Matériel Roulant des Tramways à l'Exposition de 1900). R. Godfernaux. A general review of the equipment for electric tramways as shown at Paris in 1900. 9000 w. 4 plates. Rev Gen de Chem de Fer—Dec., 1901.

See also ELECTRIC LOCOMOTIVE.

Paris-Orleans.—See ELECTRIC LOCOMOTIVE.

Platform.—Street Car Platforms. W. E. Partridge. Outlines the development of the modern car from the stage coach, and gives illustrated descriptions of the style and construction of the various platforms in use. 6000 w. St Ry Jour Sept. 7, 1901.

Street Car Platforms. W. E. Partridge. An illustrated review of the various types and the mechanical appliances with which it is equipped. 2800 w. St Ry Jour—Dec. 7, 1901.

Portable Sub-Station.—See ELECTRIC SUB-STATION—Portable.

Private.—A Unique Private Car. Illustrated description of a car built for the general manager of the Union Traction Co. of Indiana. It is an office and home on wheels. 500 w. Ry Age—June 14, 1901.

Public Safety.—See AUTOMOBILE.

Rack and Adhesion.—New Electric Cars for Adhesion and Rack Driving on the Stansstad-Engelberg Railway (Neuer Elektrischer Automobilwagen für Adhäsions und Zahnstangen-betrieb der Stansstad-Engelbergbahn). W. Burkard. With diagrams and photographs of the trucks, showing arrangement of motors and gearing. 2500 w. Schweiz Bauzeitung—May 20, 1905.

See also MOUNTAIN RAILWAY.

Regenerative Control.—See ELECTRIC RAILWAY.

Repair.—See Line.

St. Louis Exposition.—See Side Door.

St. Paul-Minneapolis.—See Double Deck.

San Francisco.—Miscellaneous Equipment of the United Railroads of San Francisco. An illustrated article briefly describing parlor cars, observation cars, funeral cars, electric mail car, cable mail cars, street sweeping cars, oil tank car, trolley tower cars, freight cars, oil-sprinkling car, wrecking cars, sand car, and instruction car. 2500 w. St Ry Rev—Jan. 15, 1905.

Sanitation.—The Sanitary Condition of Street Cars in New York. George A. Soper, in the "Medical News." Discusses ventilation, heating, crowding, etc. 3700 w. Sci Am Sup—May 3, 1902.

The Sanitary Condition of Street Cars in New York. George A. Soper, in "Medical News." The effects of poor ventilation, bacterial condition of the air in cars, and the condition in tunnels and subways are discussed, and the need of laws to prevent overcrowding, spitting, and proper ventilating and warming. 4000 w. Sanitarian —June, 1902.

Schenectady, N. Y.—New Cars for the Schenectady Railway Company. Illustrated description of fine interurban cars. 2000 w. St Ry Jour—July 16, 1904.

Semi-Convertible.—See Convertible.

Side Door.—Side-Door Coaches for World's Fair Service. Charles Alma Byers. Brief description with illustrations. 500 w. Sci Am—Aug. 27, 1904.

Single-Phase.—See ELECTRIC MOTOR; ELECTRIC RAILWAY.

Sleeper.—Plans of the Holland Sleeping Car. Illustrated description of a car intended for service on interurban lines, arranged to serve as a parlor car during the day and a compartment sleeper at night. 800 w. St Ry Jour—Aug. 15, 1903.

See also CAR.

Sprinkler.—Electric Sprinkler for the City of Cologne (Arroseuse de la Ville de Cologne). B. Géron. Illustrating an electric tram car carrying a water tank and sprinklers for watering the streets. 2000 w. Génie Civil—Jan. 7, 1905.

Sprinkling and Sweeping.—See STREET SPRINKLING; STREET SWEEPING.

Standard, City.—Standard Practice in Rolling Stock for City Service. Illustrates and describes the types of cars, showing the tendency to increase the length and weight, and the growing popularity of the semi-convertible car. 6500 w. St Ry Jour—Aug. 29, 1903.

Station Indicator.—See STATION INDICATOR.

Steel, Chicago Elevated.—Steel Passenger Cars on the Metropolitan Elevated Ry., Chicago. Illustrated description of cars of nearly all-steel construction. The only wood used is for interior finish. 500 w. Ry & Engng Rev—March 4, 1905.

Steel, N. Y.—Interborough Rapid Transit All-Steel Cars. Illustrated detailed description of an experimental car now in use on the Second Ave. line in New York, of a type proposed for the subway. 400 w. Ry Age—Feb. 19, 1904.

Steel, N. Y. Subway.—Steel Cars for the New York Subway. A statement of the conditions to be considered in designing cars for the subway, with brief description of the first cars built, and illustrated description of the later cars designed by George Gibbs, which are almost entirely of steel. 1500 w. R R Gaz—Sept. 30, 1904.

Fireproof Cars—New York Subway. Illustrated description of the steel passenger cars and the difficulties overcome in their construction. 1500 w. Am Engr & R R Jour—Oct., 1904.

The New Steel Cars for the Subway Division of the New York Interborough Rapid Transit Company. Reviews the development of the designs for the rolling stock equipment, stating the conditions, and giving an illustrated detailed description of the absolutely fire-proof cars finally evolved. 5500 w. St Ry Jour—Oct. 8, 1904.

The Electrical Equipment of the New Steel Cars for the New York Subway. L. B. Stillwell. Illustrates and describes an important development in methods of wiring for electric cars. 5400 w. St Ry Jour—March 4, 1905.

Gibbs Steel Railway Car. Illustrated detailed description of cars constructed for the New York Rapid Transit Subway, with remarks on the general purpose of the cars. 2000 w. Engng—April 21, 1905.

The Cars of the New York Subway (Die Wagen der New Yorker Untergrundbahn). S. G. Freund. Describing especially the Gibbs steel cars; also the wiring and general electrical arrangements. 6000 w. Elektrotech Zeitschr—Aug. 3, 1905.

Stephenson.—Electric Car with Six-Wheel Trucks and Motors of 800 Horse Power. Illustrated description of large car built by the John Stephenson Co. 500 w. Eng News—Aug. 25, 1904.

Storage.—See ELECTRIC CARHOUSE—Newark, N. J.

Storage Battery.—See ELECTRIC LOCOMOTIVE; STORAGE BATTERY RAILWAY.

Subway, New York.—New York Subway Cars. Gives plans and general description of the standard construction determined upon, 500 cars now being built. 1000 w. Am Engr & R R Jour—March, 1902.

Cars for the New York Subway. An illustrated description of two experimental cars built as samples for use in the subway. Also comparison with the Manhattan Elevated cars. 1200 w. St. Ry Jour—Sept. 20, 1902.

Cars for the New York Subway. An illustrated description of the first shipment of cars built for the new subway. 2200 w. St Ry Jour—Aug. 22, 1903.

See also Steel, Subway; CAR—Illinois Central.

Test.—Train Testing. Sydney W. Ashe. Considers such tests which are desirable to make when the car equipment is in an operative condition, such as insulation tests, motor capacity tests, speed time curves, &c. Ills. 2300 w. St Ry Jour—May 21, 1904.

Test, Berlin.—The Testing Car of the Berlin Tramways (Messwagen der Grossen Berliner Strassenbahn). Emil Björkegren. A fully illustrated description of a trolley car carrying a switchboard and complete set of instruments for local testing. 2000 w. Elektrotech Zeitschr—Jan. 28, 1904.

Test Car.—The Autographic Test Car. Albert B. Herrick. Illustrated description of a car for testing and making defective bonds automatically, and also providing a complete record of the electrical condition of the return circuit. 2000 w. St Ry Jour—Nov. 26, 1904.

New Testing Car of Berlin Traction Company. O. L. Durand. Illustrated description of a model testing and inspection car equipped for making all necessary measurements. 1200 w. Elec Rev, N Y—April 8, 1905.

Test, Indiana.—Interurban Car Tests. W. E. Goldsborough and P. E. Fansler. An illustrated account of car tests made on the cars of the Union Traction Company of Indiana. 10000 w. Trans Am Inst of Elec Engrs—July, 1903.

Tests of Interurban Cars of Union Traction Company of Indiana. Clarence Renshaw. A report of tests made between Muncie and Indianapolis, with curves showing results. Ill. 3800 w. St Ry Jour—Oct. 4, 1902.

Test Recorder.—See ELEVATED RAILWAY—Car Test Recorder.

Trailer.—The Desirability of Trail Cars in City Electric Railway Service. M. G. Pavie. Abstract of report prepared for the Vienna meeting of the International Street Railway and Light Railway Association. The opinions of different companies on the use of trail cars, with comments by the writer. 1700 w. St Ry Jour—Sept. 17, 1904.

Transporter.—See CAR TRANSPORTER.

Truck.—See CAR TRUCK.

Union Pacific.—See CAR, MOTOR-DRIVEN.

Zossen High Speed Experiments.—See ELECTRIC RAILWAY.

ELECTRIC CAR HOUSE.

See also ELECTRIC RAILWAY SHOP.

Car House Construction. Discusses design and construction, the need of getting as nearly complete fireproofing as possible, giving examples illustrating points discussed. Ill. 3500 w. St Ry Jour—March 14, 1903.

Birmingham, Ala.—See ELECTRIC RAILWAY SHOP.

Brooklyn.—A New Car House for Brooklyn of Novel Design. Illustrates and describes the proposed structure. 800 w. St Ry Jour—Aug. 3, 1901.

Concrete Reinforced.—See ELECTRIC RAILWAY SHOP.

Dubuque, Iowa.—See ELECTRIC RAILWAY SHOP.

Fire Hazards.—Electric Railway Car Houses—Construction and Hazards. Ralph Swetland. From Bulletin of the Committee of the Nat. Fire Pro. Assn. Suggestions for safety as given in recently adopted requirements of the New England Insurance Exchange. 6000 w. St Ry Jour—May 21, 1904.

The Fire Hazard in Car Barns. Joseph B. Finnegan. Discusses the proper construction, the hazards due to repair work, heating and lighting, use of oils and grease, lamp filling, sand drying, defective wiring, &c. 2500 w. St Ry Rev—Dec. 15, 1905.

Fire Test, Cleveland.—Car House Fire Test in Cleveland. Illustrated description of a remarkable and successful test of a fire-extinguisher outfit designed for the protection of car houses. 2000 w. St Ry Jour—Sept. 10, 1904.

Hartford, Conn.—See ELECTRIC STATION—Hartford Railway.

Lilas, France.—The Car House of the Eastern Tramway Company of Paris, at Lilas (Note sur le Dépôt de la Compagnie des Tramways de l'Est Parisien aux Lilas). G. Lelarge. A well-illustrated description of large car sheds of an electric railway and their complete equipment. 6000 w. Rev Gén d Chemins de Fer—July, 1902.

Manchester, England.—See ELECTRIC STATION.

Mill Construction.—The Application of Mill Construction to Car Houses. J. O. DeWolf. An illustrated detailed description of this construction, showing its advantages. 1800 w. St Ry Rev—Aug. 20, 1903.

Newark, N. J.—Car Storage Houses vs. Operating Barns. D. F. Carver. Discusses the plans for storing out-of-service cars, and gives an illustrated description of the car-house for storage purposes built in Newark, N. J. 1800 w. St Ry Jour—Feb. 4, 1905.

See also ELECTRIC RAILWAY SHOP.

New York Subway.—The Car House of the Subway Division, Interborough Rapid Transit Co. Illustrated detailed description of the building at 148th st. and 7th ave., New York. 2000 w. Eng Rec—Dec. 3, 1904.

Philadelphia.—Car Houses, Repair Shops and Rolling Stock. Illustrated descriptions. 1400 w. St Ry Jour—Sept. 23, 1905.

Rochester.—The Federal Street Car House of the Rochester Railway Company. I. E. Matthews. Gives plans and description of a building large enough to hold about 100 double-truck cars. 100 w. St Ry Jour—Dec. 2, 1905.

St. Paul, Minn.—See ELECTRIC RAILWAY SHOP.

Worcester, Mass.—Car House at Worcester, Mass. Brief description with plan and diagram. 700 w. St Ry Rev—Feb. 15, 1902.

ELECTRIC CAR SHOP.

See ELECTRIC CAR HOUSE; ELECTRIC RAILWAY SHOP.

ELECTRIC CELL.

See also COAL — Misuse; ELECTRICITY DIRECT; ELECTRO-CHEMISTRY; ELECTROLYSIS; STORAGE BATTERY.

Bichromate.—Bichromate Batteries. Alfred G. Dell. The writer's experience in the use of bichromate of potash batteries when used for induction coils. 800 w. Elec Rev, N Y—Dec. 5, 1900.

A New Form of Cell. Walter P. White. Calls attention to a device for supporting the zinc in such cells. Ills. 700 w. Sci Am Sup—Oct. 21, 1905.

Bousfield.—Experiments with a New Primary Cell. E. George P. Bousfield. Describes experiments carried out by the writer with a cell invented by W. R. Bousfield. Short discussion. 1200 w. Elec-Chem & Met—May, 1904.

Cadmium.—See Standard.

Carbon.—Electricity Direct from Carbon. Prof. Richard Lorenz. Abridged translation of a paper read before the Physical Society of Zurich. A study of the various methods, showing that the carbon cell is theoretically possible, and stating the difficulties involved. 4500 w. Elec-Chem Ind—Jan., 1904.

The Carbon Cell. Prof. Dr. F. Haber and L. Bruner. Theory and record of experiments with cells having carbon and iron or platinum electrodes and sodium hydrate electrolyte. 2500 w. Int Elec Cong of St Louis—Sept., 1904.

The Carbon Cell Considered as a Gas Battery (Das Kohlenelement eine Knallgaskette). F. Haber and L. Bruner. A study of the action of the cell consisting of carbon and iron plates in fused soda. 7500 w. Zeitschr f Elektrochemie—Sept. 9, 1904.

The Generator Gas Cell and the Carbon Cell (Das Generatorgas und das Kohlenelement). F. Haber and A. Moser. Description of laboratory experiments and results with gas batteries having the electrolyte of hot glass, and electrodes of carbon dioxide, carbonic oxide, oxygen and other gases. 7000 w. Zeitschr f Elektrochemie—Sept. 8, 1905.

See also ELECTRICITY DIRECT.

Clark.—See Standard.

Daniell.—Why the E. M. F. of the Daniell Cell Changes with the Density of the Solutions. Prof. Henry S. Carhart. A contribution to the autor's studies on concentration cells. 1200 w. Electro-Chem Ind—Jan., 1903.

The Electromotive Force of the Daniell Cell (Die Elektromotorische Kraft der Daniellschen Ketten). Ernst Cohen and J. W. Commelin. A communication from the Chemical Institute of Utrecht University, giving theoretical and experimental determinations of the e. m. f. of a Daniell cell under various conditions. 2000 w. Zeitschr f Elektrochemie—May 21, 1903.

Diaphragm.—See ELECTRO-CHEMISTRY; ELECTROLYSIS.

Discharge Cut-Off.—See STORAGE BATTERY.

"Dry."—Experiments with Commercial "Dry Cells" for Secondary Standards of E. M. F. Henry St. John Hyde. An account of experiments made in the Physical Laboratory of Columbia Univ. in order to ascertain the constancy of the E. M. F. under varying conditions. 2500 w. Sch of Mines Qr—April, 1901.

The Dry Cell. C. F. Burgess. Gives a summary of tests made at the University of Wisconsin, by A. A. Radtke. 1300 w. Elec Wld & Engr—Jan. 25, 1902.

How to Make a Dry Battery. William A. Del Mar. Instructions for making dry cells of the Burnley type. Ill. 500 w. Sci Am Sup—Aug. 2, 1902.

Practical Experience in Dry Battery Construction (Trockenelementbau nach Praktischen Versuchen). Walther Stöckigt. A brief, clear description of the general construction of successful working dry batteries. 1200 w. Elektrochem Zeitschr—Dec., 1904.

Electrode Terminology.—See ELECTRODE.

Electrolyte Solid.—See Dry; Solid Electrolyte.

Gas.—See Carbon; ELECTRICITY DIRECT.

High Voltage.—A Simple and Economical High-Voltage Battery. Charles J. Sullivan. Illustrates and describes an outfit which requires care for only five gravity cells. 800 w. Sci Am Sup—Oct. 24, 1903.

See also **Testing High Voltage.**

Hypochlorite.—The Haas and Oettel Hypochlorite Cell. John B. C. Kershaw. Illustrates and describes this cell, and gives figures supporting its claims for efficiency. 1100 w. Elect'n, Lond—May 10, 1901.

Laboratory.—New Batteries for the Electro-chemical Laboratory (Neue Batterien für das Elektrochemische Laboratorium). E. Weichmann. Illustrating and describing a variety of primary batteries suitable for laboratory research. 2000 w. Elektrochemische Zeitschr—June, 1904.

Maximum Current Grouping.—A Proof of the Law for Grouping Cells to Obtain Maximum Current. E. Dana Pierce. Gives an algebraic proof which is mathematically complete and capable of being understood by any one familiar with simple algebra. 500 w. Elec Wld & Engr—Oct. 3, 1903.

Grouping of Cells to Obtain Maximum Current. Dr. K. E. Guthe. Discussion of this subject, outlining the method of solving a stated problem. 900 w. Elec Wld & Engr—Dec. 12, 1903.

Railway.—Signal Batteries in Summer. H. S. Balliet. Discusses troubles due to the expansion of porcelain and glass and the evaporation of solutions. 1000 w. R R Gaz—Vol. XXXVII. No. 12.

See also **RAILWAY SIGNAL.**

Resistance.—See **ELECTRIC MEASUREMENT.—Battery Resistance.**

Solid Electrolyte.—Solid Electrolyte Cells. A. L. Marsh. Reviews briefly the results of various experimenters and the work of the writer. 1500 w. Electro-Chem Ind—March, 1903.

Solvay.—See **ELECTRO-CHEMISTRY.**

Standard.—The Various Determinations of the E. M. F. of the Clark Cell. Henry S. Carhart. Reviews the various determinations made of the E. M. F. of the Clark Cell. 2000 w. Elec-Chem & Met—Feb., 1901.

Investigations of Standard Cells (Einige Untersuchungen über Normal-Elemente). Dr. H. Rupp. Details of investigations of the Weston, Clark, cadmium, and other standard cells, made in the laboratory of the Technical High School at Stuttgart. Serial. Part I. 2500 w. Elektrotech Zeitschr—July 4, 1901.*

A Cadmium Standard Cell. Henry Tinsley. Illustrates and describes a cell which has been tested and is regarded as fairly satisfactory. 1300 w. Elect'n, Lond—Oct. 18, 1901.

Report of the Committee on the Cadmium Cell. Preliminary report of the committee appointed to report on the preparation of materials and the construction of the cadmium or Weston cell. 2500 w. Trans Am Inst of Elec Engrs—May 17, 1904.

A Study of the Materials Used in Standard Cells and Their Preparation. George A. Hulett. Considers mercurous sulphate and standard cells. Prof. Henry S. Carhart discusses the preparation of materials and construction of cells. 5700 w. Inst Elec Cong of St. Louis. Sept., 1904.

See also **ELECTRIC UNIT—International.**

Switch.—See **ELECTRIC SWITCH—Spark Preventing.**

Telephony.—Batteries Used in Telephony. P. Kerr Higgins. The present article treats of the primary battery, and the requirements of a good primary cell, describing several forms. Ill. 3000 w. Elec, N Y—June 12, 1901.

See also **TELEPHONE EXCHANGE—Common Battery.**

Testing High Voltage.—How to Make a High-Voltage Testing Battery. George T. Hanchett. Directions with illustrations. 1000 w. Am Elect'n—Sept., 1904.

Thermo-Electric. — See **THERMO-ELECTRICITY — Battery.**

Weston.—See **Standard.**

ELECTRIC CIRCUIT.

See **ELECTRIC CONDUCTOR; ELECTRIC CURRENT; ELECTRIC DISTRIBUTION; ELECTRIC LINE; ELECTRIC TRANSMISSION.**

ELECTRIC CIRCUIT BREAKER.

See **ELECTRIC PROTECTIVE APPARATUS—Circuit Breaker.**

ELECTRIC CLOCK.

See **CHRONOGRAPH; CLOCK.**

ELECTRIC CONDENSER.

See also **ELECTRO-PHYSICS; ELECTROSTATIC CAPACITY.**

Electrodynamic.—The Electrodynamic Condenser. James Swinburne. A further explanation of the principle of the "electro-magnetic condenser" referred to by the writer in his recent presidential address. 600 w. Elect'n, Lond—March 27, 1903.

Electrodynamic vs. Electrostatic.—The Electrodynamic Condenser (Der Elektrodynamische Kondensator). J. Seidener. A discussion of the electrodynamic condenser of Leblanc and Swinburne as compared with the ordinary electrostatic condenser. 2000 w. Zeitschr f Elektrotech—Nov. 22, 1903.

High-Voltage.—High-Pressure Condensers (Ueber Hochspannungs-Kondensatoren). J. Moscicki. A long study of condenser construction for commercial purposes, with data and results of experiments on dielectrics, and upon the nature and extent of the losses. Two articles. 10000 w. Elektrotech Zeitschr—June 23, 30, 1904.

High-Tension Electric Condensers (Les Condensateurs Electriques à Haute Tension). A. Schoenenberger. Describing the Moscicki condensers, made of glass tubes coated with electrically deposited silver. 2000 w. Bull Tech de la Suisse Rom—Nov. 10, 1905.

An Adjustable Condenser. Clyde C. Swayne. Illustrated description of brass-plate, air-insulated condenser for wireless telegraphy and other high-potential work. 600 w. Am Electr'n—Sept., 1905.

Leblanc.—See **Electrodynamic vs. Electrostatic.**

Measurements A. C.—The Application of Condensers in the Measurement of Alternating Current (Ueber die Verwendung von Kondensatoren bei Wechselstrommessungen). W. Peukert. Discussing the use of condensers for lowering the voltage in high-tension measurements. 2000 w. Elektrotech Zeitschr—March 24, 1904.

Moscicki.—See **High Voltage.**

Polyphase Motors.—The Application of Condensers in the Operation of Polyphase Motors (Anwendung der Kondensatoren bei Dauerndem Betrieb von Drehstrommotoren). J. Dalemont. Describing a method of operating three-phase motors from a single-phase main. 3000 w. Elektrotech Zeitschr—Nov. 2, 1905.

Swinburne.—See **Electrodynamic.**

ELECTRIC CONDUCTIVITY.

See also **ELECTRIC CONDUCTOR; ELECTRIC ELECTRIC TESTING; ELECTRO-CHEMISTRY; MEASUREMENT; ELECTRIC RESISTANCE; ELECTRO-PHYSICS.**

Air.—Some Experiments on the Electrical Conductivity of Atmospheric Air. J. C. McLennan and E. F. Burton. Read before the Am. Phys. Soc. An account of experimental investigations, showing the effect of different metals and other influences. 2200 w. Sci Am Sup—Nov. 7, 1903.

See also **ELECTRIC DISCHARGE—Transmission Lines.**

Aluminum Alloy.—Effect of the Atmosphere on the Conductivity of Aluminum Alloys. Ernest Wilson. Read at the British Assn. An account of experimental investigations. 700 w. Elect'n, Lond—Aug. 26, 1904.

Conductometer.—See **ELECTRIC INSTRUMENT.**

Copper.—The Electrical Conductivity of Copper. Rollo Appleyard. A study of Matthiessen's standard 100 per cent. conductivity copper, the errors due to density, the resistance of the foot grain, etc., aiming at the attainment of a precise quantity. Serial. 1st part. 2200 w. Elec Rev, Lond—June 19, 1903.

The Electrical Conductivity of Commercial Copper. Lawrence Addicks. Considers the physical characteristics and their influence upon the conductivity; also the chemical impurities. 1500 w. Trans Am Inst of Elec Engrs—Nov. 20, 1903.

The Effect of Impurities on the Electrical Conductivity of Copper. Lawrence Addicks. Gives results of experiments made with the idea of determining the amount of various elements which would lower the conductivity 3 or 4 per cent. 1500 w. Am Inst of Min Engrs—Feb., 1905.

Copper Electrolyte.—The Rapid Measurement of the Conductivity of Copper Electrolytes. Lawrence Addicks. An illustrated description of a method for quickly determining the conductivity of a solution which should be especially useful in electrolytic refining works. 1000 w. Elec-Chem Ind—Aug., 1904.

Electrolytic.—See **ELECTRIC CONDUCTOR; ELECTRO-CHEMISTRY.**

Electronic Theory.—Electric Conduction in Metals, from the Standpoint of the Electronic Theory. Prof. P. Drude. A treatment of this subject containing some hitherto unpublished ideas. 4500 w. Int Elec Cong of St. Louis—Sept., 1904.

See also **ELECTRO-PHYSICS.**

Firestream.—The Danger to Firemen When Directing a Stream of Water on Live Wires (Was Ist Ueber die Gefährdung der Feuerwehr beim Anspritzen Stromdurchflossener Drähte zu Sagen). Friedr. Heinicke. An account of experiments which determined the electromotive force between earth and the nozzle of a hose from which a stream of water played on wires carrying high and low tension polyphase and direct currents. Tables. 1500 w. Elektrotech Zeitschr—June 18, 1903.

Firestream.—The Danger of Shock to Firemen Through Squirting High-Tension Mains. Abstract of an article by F. Heinicke in the "Elektrotechnische Zeitschrift." An account of experiments carried out, with the conclusion that the danger from this source is not so great as supposed. 800 w. Elec Engr, Lond—Aug. 7, 1903.

Gases.—The Electrical Conductivity of Gases. Prof. Percival Lewis. Discussion of observed phenomena and of theories, principally ionization. 5400 w. Int Elec Cong of St. Louis—Sept., 1904. See also **ELECTRIC DISCHARGE—Conductivity of Gases.**

Mercury Vapor.—The Conductivity of Electricity in Mercury Vapor. A. P. Wills. Abstract of an article in the "Physical Review" of New York. Experimental investigation of the conducting properties of the "positive column." 3800 w. Elect'n, Lond—Oct. 21, 1904.

See also **ELECTRIC-CURRENT RECTIFIER; MERCURY VAPOR LAMP.**

Steel.—See **STEEL—Electric Conductivity.**

ELECTRIC CONDUCTOR.

See also **ELECTRIC CABLE; ELECTRIC CONDUIT; ELECTRIC DISTRIBUTION; ELECTRIC LINE; ELECTRIC RAILWAY—Overhead Construction; ELECTRIC TRANSMISSION; ELECTRIC WIRING; TROLLEY WIRE.**

The Computation of Simple Conductor Systems (Ueber die Berechnung von Leitungen ohne Knotenpunkte). Ernst Kronstein. Developing formulas for simple conductors, or feeder lines. 2500 w. Zeitschr f Elektrotechnik—July 17, 1904.

Data Relating to Electric Conductors and Cables. H. W. Fisher. Considers the copper conductor and the insulation, and the pressures that should be applied to different sizes of cables. 2800 w. Am Inst of Elec Engrs—June 19, 1905.

Alloys.—See **ALLOY—Constitution.**

Aluminum.—Aluminum Conductors for Electrical Power Distribution. William Hoopes. Gives data relating to cost, and briefly considers the reliability, durability and maintenance. 1100 w. St Ry Rev—Jan. 15, 1901.

The Use of Aluminum as an Electrical Conductor, with New Observations Upon the Durability of Aluminum and Other Metals Under Atmospheric Exposure. John B. C. Kershaw. Abstract of a paper read before the British Inst. of Elect. Engs. 2500 w. Elec Rev, Lond—Jan. 18, 1901.

The Use of Aluminum Line Wire and Some Constants for Transmission Lines. F .A. C. Perrine and F. G. Baum. Discussion of the above named paper. 3800 w. Trans Am Inst of Elec Engs—Feb., 1901.

Electrical Conductivity of Aluminum. W. Murray Morrison, in "Aluminum World.' Information concerning the conductivity of aluminum, and showing that under certain circumstances aluminum cables are considerably cheaper than copper. 1800 w. Am Mfr—May 29, 1902.

Aluminum Conductors of Electric Transmission Lines. Alton D. Adams. A comparison of the questions of the conductivity, cost and maintenance of aluminum lines and those of copper. 3000 w. Engineering Magazine—Sept., 1903.

The Use of Aluminum as an Electrical Conductor. John B. C. Kershaw. Read before the British Assn. A record of experimental observations to ascertain the resistance to corrosion offered by commercial aluminum rod and wire. 2000 w. Elec Rev, Lond—Sept. 18, 1903.

Aluminum Electrical Conductors. Roderick J. Parke. Summary of a paper before the Can. Elec. Assn. Reviews the advantages and disadvantages of aluminum. 4900 w. Can Engr—July, 1904.

Aluminum Electrical Conductors. Roderick J. Parke. Abstract of a paper before the Can. Elec. Assn. States the advantages and disadvantages of aluminum, discussing joints, sag, &c. 3300 w. Elec Rev, N Y—July 2, 1904.

Aluminum. W. Smith. Read before the Birmingham Electric Club. Reviews the history of this metal and discusses its value as an electrical conductor, and other uses. Ills. 2500 w. Elec Engr, Lond—Jan. 27, 1905.

On the Use of Aluminium for Overhead Power Lines. W. B. Esson. Gives facts in proof of the opinion that aluminium conductors are not, generally speaking, superior to copper conductors. 2000 w. Elect'n, Lond—June 2, 1905.

See also **ELECTRIC LINE; ELECTRIC TRANSMISSION—Niagara.**

Calculations.—See **ELECTRIC DISTRIBUTION—Network.**

Capacity.—Some Remarks Upon the Carrying Capacity, etc., of Copper Conductors. Gives results of experimental tests with short lengths of wire, with remarks. 1400 w. Elec Engr, Lond—Feb. 6, 1903.

See also **ELECTROSTATIC CAPACITY.**

Computation.—Approximate Methods of Computing Conductors for a Given Loss of Energy (Näherungsverfahren zur Berechnung Elektrischer Leitungen bei Gegebenem Arbeitsverlust). Léopold Rosenbaum. A mathematical discussion showing methods of abridging the work of computation. 2000 w. Zeitschr f Elektrotech—Oct. 2, 1904.

Copper Calculation.—Copper Calculations for Polyphase Circuits. George T. Hanchett. Gives methods of computing for various cases. 1300 w. Cent Sta—March, 1903.

Copper, Hard Drawn.—See **WIRE.**

Cost.—The Cost of Electrical Conductors (Beitrag zur Kostenberechnung Elektrischer Leitungen). L. W. Cohn. Discussing the use of a formula in which the unit cost and character of the conductor are given, and the cost for any required service may be determined. 1000 w. Elektrotech Zeitschr—March 27, 1902.

Economical Section.—See **Section.**

Electrolytic.—Electrolytic Conduction. Prof. Joseph W. Richards. The object of the paper is to present the thesis that, as far as the conduction of electricity through the body of the conductor is concerned, there is, as far as can be determined, complete identity between metallic conductors and so-called electrolytic conductors. 2200 w. Int Elec Cong of St. Louis—Sept., 1904.

See also **ELECTRO CHEMISTRY.**

Fire Protection.—The Inspection of Electrical Conductors, With Especial Reference to Fire Protection. Washington Devereux. A statement of the progress and present condition of the science of interior wiring for the protection of buildings from fire. 4000 w. Jour Fr Inst—April, 1905.

Flexible Cord.—Twin Flexibles. Donald Smeaton Munro. Notes on the uses and frailties of flexible cord conductors. 1700 w. Elec Rev, Lond—Nov. 24, 1905.

Hour Glass Section.—See **TROLLEY WIRE.**

Inside.—See **ELECTRIC WIRING.**

Long Span.—See **ELECTRIC LINE.**

Manufacture.—Electrical Conductors. A. J. Quigley. Points concerning the manufacture, use, and general characteristics of the various electrical conductors. Ills. 5000 w. Wis Engr—June, 1905.

Physical Properties.—A Résumé of Our Knowledge of the Physical Properties of Current-Bearing Matter. Dr. Paul R. Heyl. Considers the changes in matter produced by electricity, and cases where no such change occurs. A study of conductors and. electrolytes. 8800 w. Jour Fr Inst—March, 1904.

Protection.—See Fire Protection; ELECTRIC WIRING.

Railway.—The Design of Conductors for Electric Railways. Frank B. Lea. Abstract of a paper read before the Glasgow and West of Scotland Tech. Col. Sci. Soc. Considers the electric path, transmission or distribution circuit employed on electric railways. 8200 w. Tram & Ry Wld—June 12, 1902.

Safety Appliance.—See ELECTRIC PROTECTIVE APPARATUS; LIGHTNING ARRESTER; LIGHTNING PROTECTION.

Section.—The Economical Current Density for Small Conductors. James Whitcher. The present article is an argument favoring the use of Lord Kelvin's law in the design of electric wiring systems, to be followed by a discussion of its practical application. Serial. 1st part. 1500 w. Elec Rev, London—March 1, 1901.

The Economical Section of Conductors (Die Berechnung der Leitungen auf Wirthshaftlichkeit der Anlage). Prof. J. Teichmüller. A discussion of various formulae for the most economical size of conductor for a given power transmission plant, with an attempt to harmonize them. Diagrams. 5500 w. Elektrotech Zeitschr—March 6, 1902.

The Determination of the Section of Conductors (Détermination de la Section des Conducteurs). M. Warlusel. Giving formulas for the computation of electrical conductors for a great variety of arrangements, with examples of their application. 3000 w. Revue Technique—Sept. 25, 1902.

Standards.—Standards for Conductors (Normalien für Leitungen). Standards for electric conductors and cables for all kinds of purposes, proposed by a Committee of the Verband Deutscher Elektrotechniker. 2000 w. Elektrotech Zeitschr—May 7, 1903.

Three-Phase, Voltage Drop.—Voltage Drop in Three-Phase Systems. W. W. Wood. Gives a quick method of calculating the voltage drop in three-phase conductors, applicable whether the system is star or mesh connected. 500 w. Elec Engr—July 15, 1904.

Transmission Lines.—Conductors for Long-Distance High-Voltage Alternating Currents (Die Fernleitung Hochgespannter Wechselströme). G. Rössler. With diagrams for the proportions of conductors, and tables of results for various distances. 6000 w. Elektrotech Zeitschr—Aug. 3, 1905.

See also Aluminum; ELECTRIC LINE; ELECTRIC TRANSMISSION.

Trolley Wire.—See ELECTRIC RAILWAY—Overhead Construction; TROLLEY WIRE.

Tube.—An Improved System of Arranging Electrical Conductors (Eine Neue Verlegungsart für Leitungen). Ernst Kuhlo. Describing an improved form of metallic tube and connections for underground electric conductors. 2500 w. Elektrotech Zeitschr—Dec. 7, 1905.

Voltage Drop.—See Three-Phase.

Voltage Rise.—The Rise of Pressure in Electric Conductors and Apparatus (Ueber Spannungserhöhungen in Elektrischen Leitungen und Apparaten). Dr. Georg Seibt. An examination of the momentary rise in voltage which occurs upon the making or breaking of an electrical contract. 4000 w. Elektrotech Zeitschr—Jan. 12, 1905.

ELECTRIC CONDUIT.

See also ELECTRIC CABLE; ELECTRIC CONDUCTOR; ELECTRIC DISTRIBUTION; ELECTRIC WIRING; PIPE GALLERY; SUBWAY.

Underground Electrical Construction. Louis A. Ferguson. Describes particularly the drawing in system of cables and conduits, their operations, &c. Ills. 4500 w. Int Elec Cong of St Louis—Sept., 1904.

Some Hints on Conduit Work. T. F. McMackin. Illustrated discussion of some of the difficulties met with. 1100 w. Am Elect'n—Nov., 1904.

Brussels.—Conduit Construction in Brussels. Illustrated article showing the method of laying the conduit, which is laid on the side and forms one of the track rails. 1100 w. St Ry Jour—May 2, 1903.

Cable Drawing In.—See ELECTRIC CABLE.—Underground.

Cincinnati Construction.—Electric Conduit Construction at Cincinnati, O. Illustrated description of a very extensive underground conduit system for the purpose of supplying current to the street arc lamps. 2500 w. Eng News—Aug. 20, 1903.

Chicago.—See SUBWAY—Chicago Freight and Telephone.

Concrete.—Another Use for Cement Concrete. Illustrates and describes a method of making a cheap and efficient system of ducts for underground cables. 900 w. Cement Age—Aug., 1905.

Edison Station, Boston.—The Conduit Work at the New Power House of the Edison Electric Illuminating Company, Boston, Mass. Illustrates and describes the plan of a large system having 96 ducts. 1600 w. Elec Rev, N Y—March 5, 1904.

Erie, Pa.—The Municipal Conduit System of Erie, Pa. Benjamin E. Briggs. Map and sections, with description of underground conduits for electric wires and cables. 2500 w. Munic Engng—Jan., 1905.

Gas Explosion.—See GAS EXPLOSION—Electric Conduit.

Highfield-Cater.—See ELECTRIC CABLE.

High and Low Voltage.—Inadvisability of Placing High and Low Potential Wires Through the Same Conduits or Through the Same Manholes. William Brophy. Read before the International Assn of Munic. Elect'ns. Briefly describes the two underground systems in use, and discusses plans and methods for placing all wires underground, recommending the system adopted by the Massachusetts legislature. 8400 w. Elec Rev, N Y—Nov. 30, 1901.

The Practicability of Placing High and Low-Potential Wires in Separate Ducts in a Combined Conduit System. Charles F. Hopewell. A reply to an article by William Brophy. Discusses methods of construction and operation, and what is a safe distance for the separation. 2500 w. Elec Rev, N Y—Dec. 21, 1901.

Separate Conduits for High and Low Potential Wires. William Brophy. Abstract of a paper read before the International Assn. of Munic. Elect'ns. An account of the causes that led to placing all electric wires underground, and the systems of distribution in use. Considers also the losses due to the joint occupancy of conduits. Serial. 1st part. 5200 w. Am Tel Jour—Feb. 22, 1902.

The Joint Use of Underground Conduits for High and Low Tension Wires. Charles F. Hopewell. Abstract of a paper read before the International Assn. of Munic. Elect'ns. Considers the causes of explosions and burnouts, and what the requisite separation should be between the high and low-tension wires to ensure safety. 2200 w. Eng News—Oct 16, 1902.

High Voltage.—See ELECTRIC CABLE.

Interior.—See ELECTRIC WIRING.

Mains.—See ELECTRIC DISTRIBUTION.

Manhattan Ry., N. Y.—Conduit System of the Manhattan Railway. An illustrated description of the underground conduits and manholes for the electric cables of the high-tension distribution service of the New York elevated railways. 2200 w. St Ry Jour—Jan. 3, 1903.

Manhole.—See MANHOLE.

Memphis, Tenn.—Electric Conduit Construction at Memphis, Tenn. F. G. Proutt. Describes work done by day labor, the system, etc., giving costs and particulars. Ills. 8000 w. Eng News—April 14, 1904.

Metal.—Recent Development in Metal Conduits for Electric Light Installations. L. M. Waterhouse. Reviews the kinds of conduit used, and explains the advantages of metal conduits. 2500 w. Elec Rev, Lond—April 1, 1904.

Moisture.—Moisture in Conduits. W. H. F. Murdock. Calls attention to some of the difficulties in wiring, especially in damp places. 1200 w. Elect'n, Lond—July 10, 1903.

New Britain, Conn.—All Wires Put Underground. Illustrates and describes the arrangements for placing underground all the wires in New Britain, Conn. 2800 w. Munic Jour & Engr—July, 1902.

New Orleans.—Underground Electrical Conduit System in New Orleans. Illustrates and describes this work nearing completion, which required unusual care because of the character of the soil, the drainage system and climatic conditions. 1500 w. Elec Wld & Engr—May 13, 1905.

New York.—See POLE—Telephone Line.

Railway Distribution.—See ELECTRIC DISTRIBUTION—Railway.

Submarine & Underground.—Underground and Submarine Conduits for Electric Wires. D. A. Harrington. An illustrated article, describing the solid system, and the drawing in system, and discussing the materials used, methods of construction, etc. 7000 w. Jour Assn of Engng Socs—May, 1905.

Steel Tubes.—A New Electric Conduit System (Ueber ein Neues Installationssystem). A. Peschel. Paper before the Elektrotechnischer Verein, giving illustrated description of a conduit system consisting of split steel tubes which can be cut in any suitable length and whose ends fit tightly into connecting pieces. 4000 w. Elektrotech Zeitschr—March 6, 1902.

Telegraph, Chicago.—See SUBWAY—Chicago Freight and Telephone.

Telephone.—Underground Construction. D. R. Craig. The first of a series of illustrated articles dealing with this department of telephone work. Serial. 1st part. 1200 w. Telephony—Aug., 1901.

Conduits for Telephone Work. A full unabridged telephone conduit specification drawn up by A. V. Abbott. 14000 w. Elec Wld & Engr—June 21, 1902.

See also SUBWAY—Chicago Freight and Telephone.

ELECTRIC CONDUIT RAILWAY.

See ELECTRIC RAILWAY, CONDUIT.

ELECTRIC CONTRACTOR.

See CONTRACT—Electrical; WORKS MANAGEMENT—Electrical Contractors.

ELECTRIC CONTROLLER.

See AUTOMOBILE, ELECTRIC; CONTROLLER; ELECTRIC CAR; ELECTRIC SWITCH; ELECTRIC RAILWAY; RHEOSTAT.

ELECTRIC CONVECTION.

See ELECTRO-PHYSICS.

ELECTRIC CONVENTION.

See ELECTRIC ENGINEER; ELECTRIC ENGINEERING.

ELECTRIC COOKING.

See ELECTRIC HEATING.

ELECTRIC CRANE.

See CRANE, ELECTRIC.

ELECTRIC CURRENT.

See also ELECTRIC CIRCUIT; ELECTRIC CONDUCTIVITY; ELECTRIC CONDUCTOR; ELECTRIC CURRENT, ALTERNATING; ELECTRIC DISTRIBUTION; ELECTRIC TRANSMISSION; ELECTRO-PHYSICS.

Air Current Analogies.—See AIR CURRENTS.

Alternating.—See ELECTRIC CURRENT, ALTERNATING.

Earth.—The Investigation of Earth Currents (Die Erdstrom-Erforschung). Prof. Foerster. An address before the Elektrotechnischer Verein, giving an account of the research work on earth currents on German telegraph lines carried on by a committee of the above society. 3500 w. Elektrotech Zeitschr—April 11, 1901.

Experiment Investigation of Electric Earth Currents (Untersuchungsergebnisse über den Natürlichen Elektrischen Erdstrom). E. Jahr. A record of experiments in the vicinity of Berlin, showing the influence of the relative positions of the earth plates, etc. 2400 w. Elektrotech Zeitschr—March 6, 1902.

Atmospheric Electricity and Earth Currents. E. O. Walker. Reviews the opinions of various experimenters and gives an account of the writer's investigations. 2000 w. Elect'n, Lond—Sept. 12, 1902.

Electric Tides and Earth Currents. W. H. Sharp. Gives results of researches made with a view to determining the origin and laws of earth currents. Serial. 1st part. 1500 w. Elec Rev, Lond—Aug. 19, 1904.

Earth Currents and the Electro-Tellurograph. E. Guarini. Illustrated description of this apparatus for the study of earth currents. 800 w. Elec Rev, Lond—May 16, 1902.

The Earth Currents. Abstract of a lecture by E. Guarini before the Société Belge d'Astronomie. 400 w. Elec Rev, N Y—Aug. 20, 1904.

Telluric Currents. Reviews an article by E. Guarini to the Belgian Astronomical Society upon telluric currents, their origin, direction, their disadvantages and their possible utilization. 2400 w. Sci Am Sup—Nov. 18, 1905.

Leakage.—See COPPER METALLURGY—Electrolytic Leakage; ELECTRIC STATION MANAGEMENT—Lost Current.

Losses.—Lost and Unaccounted-for Current. C. W. Humphrey. Read before the Nat. Elec. Lgt. Assn. An explanation of the calculations of losses, known and unknown, for alternating and direct-current circuits, giving records of some of the results obtained. 3000 w. Elec Rev, N Y—June 4, 1904.

See also Theft; ELECTRIC DISTRIBUTION; ELECTRIC STATION MANAGEMENT.

Monocyclic from Three-Phase.—Monocyclic Current from Three-Phase System. F. Hardie Jeannin. Describes the situation and the scheme resorted to by the writer. Ill. 1000 w. Am Elect'n—July, 1903.

Telegraph Cables.—See ELECTRIC CABLE—Current Analysis.

Theft.—Theft of Current. Robert L. Elliott. Discusses some of the methods adopted by offenders, the discovery and prevention. 4800 w. Cent Sta—Dec., 1903.

Theft of Current: How to Detect, Prosecute and Prevent. J. H. Hallberg. A description of methods sucessfully employed, with references to specific cases of theft current. Ills. Serial. 1st part. 2200 w. Elec Wld & Engr—April 29, 1905.

Variability.—The Variability of Currents (Sur l'Etat Variable des Courants). A. Petot. An examination of the laws which govern the variability of electric currents opposed by varying resistances. 1200 w. Comptes Rendus—Sept. 30, 1901.

ELECTRIC CURRENT, ALTERNATING.

See also ELECTRIC DISTRIBUTION; ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC TRANSMISSION; ELECTRIC WAVE; ELECTRO-PHYSICS; OSCILLOGRAPH.

The Beginning of Alternating-Current Engineering. William Stanley. An interesting account of the introduction and development of the alternating system. Ill. 2500 w. Elec Rev, N Y—Feb. 15, 1902.

A Résumé of the Alternating-Current System. H. G. Reist. Considers the generators, motors, distribution, etc. 2500 w. Am Elect'n—June, 1902.

The Relation of Single Phase to Multiphase Alternating Current. Fred W. Ballard. An illustrated explanation of the difference. 1800 w. Engr, U S A—June 16, 1902.

A Discussion of Some Points in Alternating Current Theory. W. S. Franklin. Discusses polar coördinate vs. clock-diagram method; necessity of choosing signs in complicated networks; etc. 4800 w. Trans Am Inst of Elec Engrs—June and July, 1903.

The Elementary Principles of Alternating Currents of Electricity. Prof. Tell. Aims to give a simple explanation. Serial. 1st part. 2400 w. Engr, U S A—Sept. 15, 1903.

Alternating Current Principles. George T. Hanchett. Explanatery notes. 2800 w. Cent Sta—Dec., 1903.

Branched Circuits.—The Solution of Typical Branched Alternating Current Circuits by Complex Quantities. Harold B. Smith. Gives problems designed to illustrate the application of the complex quantity method of calculation. Mathematical. 1600 w. Jour Worcester Poly Inst—May, 1901.

Braun Tube.—See BRAUN TUBE.

Capacity and Frequency.—Capacity Currents as Influenced by Frequency. T. Mather. Gives results of experiments made on the influence of frequency on capacity currents supplied by a machine having a somewhat peaked E. M. F. wave, showing the wave forms of current and P. D. actually obtained. 1700 w. Elec Rev, Lond—May 31, 1901.

Circle Diagram.—See Diagram.

Contact Apparatus.—See ELECTRIC INSTRUMENT.

Curves.—See Wave; ELECTRIC MEASUREMENT—Two Wattmeter; ELECTRO-THERAPEUTICS—Current Curves; OSCILLOGRAPH.

Demagnetizing Effects.—Demagnetizing Effects of Electromagnetically Compensated Alternating Currents. Zeno E. Crook. Gives methods of studying the alternating current effect on hysteresis. Ill. 2500 w. Am Jour of Sci—Aug., 1902.

Demonstration.—Apparatus for the Demonstration of Alternating Currents (Apparat sur Demonstration von Wechselströmen). Dr. R. Heilbrun. Describing the construction of a lecture room model, with revolving arms and disc, enabling the sine-curve phenomena to be mechanically produced before an audience. 1000 w. Elektrotech Zeitschr—March 20, 1902.

Diagrams.—Geometrical Loci in Alternating-Current Diagrams (Geometrische Oerter in Wechselstromdiagrammen). M. Schenkel. A mathematical article showing the advantages of determining loci of quantities found by vector analysis. Diagrams. 1200 w. Elektrotech Zeitschr—Dec. 19, 1901.

A Study of Circuits Containing Resistance, Inductance, and Capacity by Means of the Circle-Diagram. J. S. Dow and F. Creedy. 2200 w. Elec Engr, Lond—Aug. 4, 1905.

See also ELECTRIC MOTOR.

Distribution.—See ELECTRIC DISTRIBUTION.

Electrolysis. — See ELECTROLYSIS — Alternating Current.

Electromagnetic Circuit.—The Calculation of Alternating-Current Electro-Magnetic Circuits. Harold B. Smith. Considers circuits in which the magnetic flux is periodically varying in both quantity and direction; hysteresis, eddy or Foucault currents, inductance, etc. Charts. Serial. 1st part. 2200 w. Jour Worcester Poly Inst—Jan., 1901.

Electromotive Force.—See ELECTRIC TRANSMISSION.

Five-Phase.—See ELECTRIC TRANSMISSION.

Form Factor.—Measurement of the Form Factor of an Alternating Current (Die Messung des Formfaktors einer Wechselspannung). P. Rose and A. Kühns. An examination of the relation of the effective to the mean pressure in alternating currents. 2000 w. Elektrotech Zeitschr—Dec. 3, 1903.

Frequency.—See ELECTRIC TRANSMISSION.

Frequency Measurement.—See ELECTRIC INSTRUMENT—Frequency; ELECTRIC MEASUREMENT.

Galvanometer, Recording.—See ELECTRIC INSTRUMENT—Galvanometer Recording.

High Frequency.—Suggestions for Producing High-Frequency Currents and Some of Their Phenomena. Edwin F. Northrup and Elliott Woods. An account of what the writers have done with high-frequency apparatus, how they constructed it, and the phenomena observed. Ills. Serial. 1st part. 2700 w. Elec Rev, N Y—March 19, 1904.

Laboratory Course.—Alternating Current Leboratory Experiments and Commercial Tests. Fitshugh Townsend. A description of a series of experiments which make up the alternating current laboratory course prescribed for the fourth year students in the electrical engineering department of Columbia University. 15800 w. Sch of Mines Quar—Nov., 1900.

Laboratory Testing.—See LABORATORY.

Lag and Lead.—Lag and Lead. W. G. Rhodes. An explanation of the phase relationship between periodic curves. Mathematical. 900 w. Elec Rev, Lond—June 13, 1902.

Line Characteristics.—See ELECTRIC LINE—Properties and Computations.

Mathematics.—Simple, Complex and Equivalent Harmonic Functions and the Application of Fourrier's Series in Alternating Current Circuits. Harold B. Smith. Mathematical, with diagrams. 4400 w. Jour Worcester Polytechnic Inst—Nov., 1900.

The Computation of Alternating Currents without the Assumption of a Constant Coefficient of Self-Induction (Die Berechnung von Wechselströmen ohne Annahme Konstanter Selbstinduktionskoeffizienten). F. Spielmann. An elaborate mathematical treatment, including variable coefficients for self-induction. 2000 w. Zeitschr f Elektrotechnik—Ang. 14, 1904.

See also Diagrams; Vector; ELECTRIC GENERATOR DESIGN.

Measurements.—See ELECTRIC INSTRUMENT—Alternating Current; ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE.

Microphone Transmitter.—The Production of Alternating Currents by a Microphone Transmitter (Ueber die Erregung von Wellenströmen durch eine Mikrophonanordung). R. v. Lieben and E. Reisz. A description of a method of exciting alternating currents of a definite frequency by means of a small iron plate attached to a microphone and in inductive relation to the microphone current. Diagrams. 600 w. Elektrotech Zeitschr—June 25, 1903.

See also TELEPHONE.

Oscillograph.—See OSCILLOGRAPH.

Phase Angle.—The Definition of the Phase Angle (Ueber die Definition der Phasenverchiebung). Dr. E. Orlich. A mathematical discussion of the proper way to designate and calculate the phase difference between current and electromotive force when the wave form differs from a sine curve. 500 w. Ekeltrotech Zeitschr—June 19, 1902.

Phase Displacement.—A Simple Demonstration of Phase Displacement in Alternating Circuits (Einfache Demonstration der Phasenverschiebung in Wechselstromkreise). W. Kohlrausch. Describing a mechanical model by means of which phase displacement may be given ocular demonstration. 1200 w. Elektrotech Zeitschr—Sept. 11, 1902.

Phenomena.—A Physical Conception of Some Alternating-Current Phenomena. Lamar Lyndon. Discussion with diagrams and curves, showing effects of inductance, resistance, etc. Serial. Part I. 2000 w. Elec Wld & Engr—Aug. 27, 1904.

Power Factor.—Power Factor in Alternating Current Circuits. Fred W. Ballard. An illustrated article discussing the effect of the power factor on the efficiency, and regulation, and describing a method for plotting the curves of current and electromotive force in alternating current circuits. 2500 w. Engr, U S A—Jan. 1, 1902. Special number.

Power Measurements.—See ELECTRIC MEASUREMENT—Alternating, Power.

Power Variation.—The Variation of Power with Resistance in an Alternating-Current Circuit. E. P. Hollis. Brief account of an investigation showing that the maximum power is obtained in an alternating-current circuit when the resistance is equal to the reactance. 400 w. Elec Engr, Lond—March 10, 1905.

Regulation.—See ELECTRIC APPARATUS; ELECTRIC DISTRIBUTION.

Regulation Calculation.—How to Calculate Regulation. J. S. Peck. Simple methods of calculating the regulation of alternating-current circuits are given. 700 w. Elec Jour—June, 1905.

Relay.—See ELECTRIC APPARATUS.

Resistance.—See ELECTRIC RESISTANCE—Alternating Current.

Rotations.—An Investigation of Rotations Produced by Current from a Single-Phase Alternator. Arthur Curtis Scott. Correlation of experimental data, facts and theories, with verification of principles evolved, and a general study of the subject. Ills. 30000 w. Bul Univ of Wis—No. 102—Sept., 1904.

Testing.—Practical Alternating Current Testing. Charles F. Smih. Begins a study of the application of general experimental laws to the case of alternating-current machinery. Serial. 1st part. 3000 w. Mech Engr—June 18, 1904.

See also ELECTRIC GENERATOR TEST; ELECTRIC TESTING.

Theory.—See ELECTRIC UNIT.

Theory.—See ELECTRIC UNIT; ELECTRO-PHYSICS.

Vector.—On the Complex Product of Electromotive Force, Current, and Other Vectors. Henry T. Eddy. On the multiplication of vectors, showing the differences between arithmetical and vector multiplication of two complex factors. 4000 w. Elec Wld & Engr—July 23, 1904.

Phase Difference and Vector Summation. George T. Hanchett. An explanation of the application of vector analysis to alternating-current calculations. Ill. 1200 w. Cent Sta—Jan., 1903.

The Graphical Treatment of Alternating Current Phenomena (Ueber die Graphische Behandlung von Wechselstromproblemen). Dr. E. Orlich. An elementary demonstration of the application of the vector analysis to the study of alternating currents. 1800 w. Elektrotech Zeitschr—Jan. 22, 1903.

Voltage Drop.—See ELECTRIC CONDUCTOR—Three-Phase, Voltage Drop.

Voltage Regulation.—See ELECTRIC DISTRIBUTION—Regulation.

Wattless.—Wattless Currents (Ueber Wattlose Ströme). C. P. Feldmann. A paper before the Electrotechnical Society of Cologne, discussing various phenomena of alternating-current circuits having capacity and inductance. 4000 w. Elektrotech Zeitschr—April 24, 1902.

A Protest on Behalf of Wattless Current. E. J. Willis. A discussion of the theory of alternating currents with diagrams showing how the expression for their energy should be regarded. 2400 w. Stevens Ind—Oct., 1904.

Wave.—Graphical Treatment of the Effect of Armature Current on Wave Form of Alternator. F. G. Baum. The effect is shown graphically and explained. 600 w. Elec Wld & Engr—Dec. 29, 1900.

How Alternating Currents Vary with the Shape of the E. M. F. Wave. Alexander Russell. Mathematical investigation showing how the shape of the current wave depends on the resistance in the circuit, and how its effective value depends on the shape of the E. M. F. wave. 1400 w. Elect Rev, Lond—May 30, 1902.

The Theoretical Determination of Power Curves. William J. Berry. A mathematical demonstration that with an impressed e. m. f. of sine-wave shape the resultant power curve is a sine curve of double frequency. 700 w. Elec Wld & Engr—Jan. 30, 1904.

Wave Form Variations of a Long-Distance Line. George H. Rowe. Gives a map showing the lines of the Standard Electric Co.'s system, in which the oscillographic curves were taken, describes the instrument and method of testing, and gives a summary of conclusions for consideration. 2200 w. Trans Am Inst of Elect Engrs—May 17, 1904.

The Influence of Armature Reaction upon the Wave Form of Alternators (Der Einfluss der Ankerrückwirkung auf die Wellenform von Wechselstrommaschinen). Dr. G. Benischke. A study of the causes of variation of wave forms from the true sine curve. 3000 w. Zeitschr f Elektrotechnik—Nov. 19, 1905.

See also ELECTRIC WAVE; ELECTRO-PHYSICS; OSCILLOGRAPH.

Wave Analysis.—Alternating-Current Wave Form Analysis. S. M. Kintner. Gives details of one of the methods of harmonic analysis, discussing the theory and giving such instructions as are needed to carry out the analysis. 2500 w. Elec Wld & Engr—May 28, 1904.

Methods of Analyzing Sine Waves (Methode der Zerlegung in Sinuswellen). C. Runge. A mathematical discussion of the analysis of periodic wave action and its separation into its simple elements. 4000 w. Elektrotech Zeitschr—March 16, 1905.

Harmonic Analyser. George H. Rowe. Describes a form of analyser for electric wave curves designed to be accurate and inexpensive and of sufficient range for all practical purposes. Also editorial. 2500 w. Elec Wld & Engr—March 25, 1905.

Wave Distortion.—Wave Distortion on Transmission Lines. William S. Franklin. Abstract of a lecture before the N. Y. Elec. Soc. on mechanical conceptions of electrical phenomena, particularly Maxwell's and Lodge's, with diagrams. 2500 w. Elec Rev, N Y—Feb. 11, 1905.

Electrical Waves and the Behavior of Long-distance Transmission in Lines. W. S. Franklin. Develops Maxwell's mechanical conceptions of electromagnetism and applies them to the discussion of electromagnetic waves. Also discusses wave distortion on telephone lines; the effect of line resistance and line leakage, etc. Ills. 5000 w. Jour Fr Inst—July, 1905.

See also TELEPHONE LINE.

Wave Indicator.—An Instrument for the Determination of Alternate--Current Curves. Rudolf Goldschmidt. Translated from the "Elektrotechnische Zeitschrift." Illustrated description of a simple instrument, explaining the principle upon which it is based. 600 w. Elec Engr, Lond—July 25, 1902.

Photography of Alternating-Current Waves by the Braun Tube (Demonstration und Photographie von Wechselstromkurven mittels der Braun'schen Röhre). A. Weinhold. With reproductions of photographs of monophase, biphase, and triphase waves. 2500 w. Elektrotech Zeitsch—May 16, 1901.

Apparatus for Constructing Alternating-Current Curves (Apparat zur Aufnahme von Wechselstromkurven). R. Goldschmidt. Describing a simple instrument for drawing the curves of alternating currents. 1200 w. Elektrotech Zeitschr—June 5, 1902.

A New Curve Tracing Instrument. Prof. R. B. Owens. Illustrated description of an instrument for accurately tracing current curves in circuits of small resistance and inductance without appreciably altering their time constants. 1800 w. Trans Am Inst of Elec Engrs—June 20, 1902.

The Cathode Tube Wave Indicator. George S. Macomber. Gives an illustrated description of a cathode ray tube outfit, indicating some of its uses. 1500 w. Sib Jour of Eng—April, 1903.

The Cathode Ray Alternating Current Wave Indicator. Harris J. Ryan. Describes a method of using the Braun type of cathode ray tube as an alternating current wave indicator. Discussion. Ill. 4500 w. Trans Am Inst of Elec Engrs—Oct., 1903.

The Wave Measurer and Its Application (Der Wellenmesser und Seine Anwendung). J. Donitz. The instrument acts by the self-induction of a closed circuit in connection with a capacity and a hot wire indicator. 4000 w. Elektrotech Zeitschr—Nov. 5, 1903.

See also OSCILLOGRAPH.

Wave in Transformer.—Wave Shapes in Three-Phase Transformers. R. C. Clinker. A study of the wave distortion produced in star-connected three-phase transformers, as shown by use of the Hospitalier ondograph. Editorial. 2000 w. Elect'n, Lond—Nov. 10, 1905.

See also ELECTRIC WAVE; TRANSFORMER.

Wave Photography.—See Wave Indicator.

Wave Recorder.—An Apparatus for Recording Alternating-Current Waves. Frank A. Laws. Illustrated description of an apparatus constructed at the Rogers' Laboratory; a modification of the "contact method," by which the record is rendered continuous and traced photographically. 800 w. Tech Quar—June, 1901.

ELECTRIC-CURRENT CONVERTER.

See also DYNAMOTOR; ELECTRIC-CURRENT RECTIFIER; MOTOR GENERATOR; ROTARY CONVERTER; TRANSFORMER.

A New Method of Obtaining Continuous Currents from Alternating Systems (Ueber ein Neues System der Entnahme von Gleichstrom aus Wechselstromnetzen). F. J. Koch. By the use of a synchronously revolving commutator in connection with storage batteries, alternating currents are conveniently and economically converted. 1500 w. Elektrotech Zeitschr—Oct. 10, 1901.

Continuous Currents from Alternating Supply Mains (Gleichstrom aus Wechselstromnetzen). K. Sterzel. Describing a form of apparatus for deriving a pulsating current of constant direction from an alternating circuit. The flow is equalized by a storage battery. 2500 w. Elektrotech Zeitschr—Oct. 8, 1903.

American Practice.—American Converters (Ueber Amerikanische Umformer). A. Hruschka. A review of American practice in the use of converters and transformers in electric tramway service. 3500 w. Elektrotech Zeitschr—July 23, 1903.

Constant Potential to Constant Current.—Conversion from Constant Alternating Potential to Constant Alternating Current. R. B. Owens. Reviews the methods principally in use, and emphasizes the advantages of a combination of impedance coils and condenser for constant potential—constant current transformation. 1200 w. Can Elec News—July, 1901.

Electro-Chemical.—The Conversion of Direct into Alternating Current from the Electro-Chemical Standpoint. Showing how current variations in the electric arc can be explained in the same way as resistance variations in electrolytic conductors. 1000 w. Elec Rev, Lond—July 19, 1901.

Energy Transformations.—See **ROTARY CONVERTER.**

Frequency.—Frequency Converters. A. S. McAllister. Describes a recently developed method for changing the lower frequency to a value suitable for lighting purposes by the use of "frequency converters," which constitute a special adaptation of induction motors as secondary circuit generators. 1500 w. Elec Wld & Engr—May 11, 1901.

Grisson.—The Grisson Continuous-Alternating Current Transformers. A. Frederick Collins. Illustrated description of an apparatus which changes a direct continuous current into a pure alternating-current. It is recommended especially for wireless telegraphy sets. 1200 w. Sci Am—June 28, 1902.

Guarini.—Induction Experiments. Emile Guarini. An account of experiments made to show that it is possible to obtain in an induced circuit a current producing the same effect as a continuous current. 2900 w. Elec Engr, Lond—March 29, 1901.

Leblanc.—Improved Leblanc Converter (Neuer Umformer von Leblanc). C. Feldmann. A description of the new converter made by the Helios Company, of Cologne; with a mathematical analysis of its action. 4000 w. Elektrotech Zeitschr—Sept. 26, 1901.

ELECTRIC CURRENT RECTIFIER.

See also **DYNAMOTOR; ELECTRIC-CURRENT CONVERTER; MOTOR GENERATOR; ROTARY CONVERTER.**

Rectifiers. Charles F. Burgess. Read at Milwaukee meeting of the Northwestern Elec. Assn. Briefly considers mechanical, vapor and electrolytic rectifiers and their efficiency. 2500 w. Elec Rev, N. Y.—Feb. 27, 1904.

Aluminum Cell.—The Alteration in Current Forms by the Gratz Aluminum Cell (Ueber die Aenderungen der Stromform eines Normalen Wechselstromes durch Gratz'sche Aluminiumzellen). Dr. G. Mayrhofer. Showing especially the modifications produced in a normal alternating current. Two articles. 5000 w. Elektrotech Zeitschr Nov. 1, 8, 1900.

The Electro-Chemical Conversion of Alternating to Continuous Currents (Beiträge zu dem Problem der Elektrochemischen Umformung von Wechselstrom in Gleichstrom durch Aluminium Elektrolytzellen). Dr. E. König. Recording experiments upon the method of Graetz, using aluminum anodes, platinum cathodes, and an electrolyte of alum solution. 2000 w. Elektrotech Zeitschr—May 29, 1902.

A New Electrolytic Rectifier (Ein Neuer Gleichrichter). Robert Grisson. An illustrated description of an electrolytic cell, for converting alternating into direct currents, with an electrode of aluminum above a lead electrode, and a cooling coil of lead pipe in upper part of cell. 1600 w. Elektrotech Zeitschr—June 4, 1903.

The Influence of the Electrolyte upon the Action of the Aluminum Rectifying Cell (Der Einfluss des Elektrolyten auf die Wirksamkeit der Aluminum Drosselzelle). Dr. Franz Peters and Dr. A. E. Lange. Describing experiments with the electrolytic cell for rectifying alternating currents; extending the researches of Mott. 2500 w. Elektrotech Zeitschr—Aug. 10, 1905.

See also **ELECTRODE—Aluminum Anode.**

Arc Lamp.—See **Mercury Arc; SPEED INDICATOR—Electric.**

Arc Lamp Operation.—Some Notes on the Series Running of Arc Lamps by Rectified Currents. W. Rogers. Explains the mechanical method of obtaining a rectified current, describing the apparatus. Ill. 1700 w. Elec Engr, Lond—March 20, 1903.

Cooper Hewitt.—See **Mercury Arc.**

Electrolytic.—The Theory of the Electrolytic Rectifier. Dr. K. Norden. Advances a complete theory of the modern electrolytic rectifier, developed according to experimental researches. 2700 w. Elec Wld & Engr—Oct. 26, 1901.

The Electrolytic Rectifier. Prof. C. F. Burgess. Abstract of a paper presented before the Science Club of Wisconsin Univ., giving an account of investigations carried out in the Laboratory of Applied Electrochemistry, and the results obtained with a fused electrolyte. 2500 w. Wisconsin Engr—Dec., 1902.

The Electrolytic Rectifier and Interrupter. W. B. Churcher. Read before the Northwestern Elec. Assn. Describes the construction and mode of operation of these two inventions. 1500 w. Elec, N. Y.—Feb. 17, 1904.

Electrolytic Rectifiers—An Experimental Research. Albert Nodon. An account of a series of researches conducted by the writer at the Sorbonne and the Collège de France. 3500 w. Int Elec Cong of St. Louis—Sept., 1904.

An Electrolytic Rectifier for Telephone Stations (Electrolytischer Gleichrichter für Fernsprechanlagen). R. Stoeberg. Illustrating an arrangement of electrolytic rectifier for converting three-phase into continuous current, for telephone service. 800 w. Elektrotech Zeitschr—Feb. 23, 1905.

See also **Nodon; Storage Battery Charging.**

Mercury Arc.—Cooper Hewitt Static Converter. An illustrated description, with curves, of an apparatus consisting of a globular vessel containing vapor, at a certain degree of attenuation, and several electrodes, which converts an alternating, or a polyphase current into a pulsating direct current. 1200 w. Elec Wld & Eng—Jan. 17, 1903.

Pulsating Direct Currents in Alternating Current Electric Arcs (Pulsierende Gleichströme im Wechselstromlichtbogen). Berthold Monasch. Address before the Elektrotech. Verein of the Darmstadt Technical School, in which, apropos of the Cooper-Hewitt converter, a review is given of former methods of deriving pulsating direct currents from alternating current arcs. 2500 w. Elektrotech Zeitschr—April 30, 1903.

Constant Current Mercury Arc Rectifier. Charles Proteus Steinmetz. An explanation and description of the rectifier system, its operation, characteristics, tests, etc. 4000 w. Am Inst of Elec Engrs—June 19, 1905.

The Mercury Vapor Converter. P. H. Thomas. Explains the operation of the apparatus, and gives some of its applications. Ills. 1700 w. Elec Jour—July, 1905.

Mercury Arc Rectifiers. P. D. Wagoner. Abstract of a paper read before the Nat. Elec. Lgt. Assn. Describes a rectifier consisting of a mercury-vapor arc, enclosed in an exhausted vessel, and its operation. 900 w. Engr, U. S. A.—July 1, 1905.

Mercury Arc Rectifiers. P. D. Wagoner. Abstract of paper before the Ohio Electric Light Assoc., giving an illustrated description of the commercial outfit of the General Electric Co., for charging vehicle storage batteries. 2000 w. Elec Rev, N Y—Sept. 2, 1905.

Apparatus for Charging Storage Batteries. Illustrates and describes a mercury-vapor current rectifier, especially suited to automobile battery charging. 2000 w. Automobile—Dec. 14, 1905.

Motor-Generator Compared.—See MOTOR GENERATOR—Electrolytic Rectifier.

Nodon Electrolytic.—New Form of Electrolytic Apparatus for Rectifying Alternating Currents. C. L. Durand. An illustrated description of apparatus invented by M. Nodon, of Paris. 2000 w. Elec Rev, N Y—March 14, 1903.

Permutator.—Single-Phase Permutator with Revolving Brushes. P. Letheule. Illustrates and describes an apparatus designed by Rouge and Fayet for the purpose of charging automobile storage batteries from a single-phase distributing system. 5000 w. Elec Wld & Engr—March 15, 1902.

Storage Battery Charging.—Electrolytic Rectifiers for Charging Storage Batteries with Alternating Current. Charles F. Burgess. Read at Milwaukee meeting of the N. W. Elec. Ass'n. An explanation of the properties and peculiarities of the electrolytic rectifier. 2500 w. Sci Am Sup—April 30, 1904.

Telephone Exchange.—See Electrolytic.

ELECTRIC CUT-OUT.

See ELECTRIC PROTECTIVE APPARATUS—Cut-Out.

ELECTRIC DISCHARGE.

See also DIELECTRIC; ELECTRIC CABLE; ELECTRO-PHYSICS; LIGHTNING; VACUUM TUBE.

Air.—See Transmission Lines; ELECTRIC CONDUCTIVITY—Air.

Air Resistance.—The Law of Atmospheric Resistance to Electric Discharges (Ueber das Elektrische Durchschlagsgesets für Atmosphärische Luft). Hugo Grob. A study of experiments made at the Oerlikon Works, in Switzerland, with pressures up to 105,000 volts. 1800 w. Elektrotesch Zeitschr—Nov. 10, 1904.

Air Tests.—The Law of Electrical Discharges Through Air. Gives results of some interesting tests on the length of discharge path in air at high voltages as described by H. Grob in a recent article in the "Elektrotechnische Zeitschrift." 1400 w. Elec Engr, Lond—Feb. 24, 1905.

Circuits.—Static Discharges in Electric Circuits. Percy H. Thomas. Considers the character of wave motion and the laws involved and treats by analogy the effects of waves in electric circuits. Serial. 1st part. 3500 w. Jour Fr Inst—Nov.,1903.

See also Transmission Lines.

Conductivity of Gases.—The Electrical Conductivity and Absorption of Energy in the Electrodeless Discharge. Bergen Davis. An illustrated account of experiments made to measure the conductivity produced in gases by the discharge at various pressures. 1300 w. Am Jour of Sci—March, 1903.

Electrification of Gap.—Influence of Electrification on the Electric Spark. Ernst Lecher. From the "Annalen der Physik." An account of experimental investigations which make it appear certain that the electrification of a spark-gap has a decided influence upon the luminous phenomena. 3000 w. Elect'n, Lond—Nov. 7, 1902.

Fog.—See FOG—Electric Discharge.

Herts.—Eccentricities of the Static Discharge. Walton Harrison. Illustrates and describes an experiment of Herts, and modifications by other investigators. 700 w. Sci Am—Aug. 8, 1903.

Ionic Theory.—The Ionic Theory of the Arc and Spark. Prof. Henry Crew. Considers the two modes of ionization involved, and how nearly the electron theory explains the action. 8200 w. Jour W Soc of Engrs—Feb., 1905.

The Influence of the Ionized Medium and the Resistance upon Sparks Over Wide Gaps (Beeinflussung Grosser Funkenstrecken durch Ionisierende Körper und der Uebergangswiderstand). Dr. W. Voege. An examination of the law governing electrical discharges, with especial reference to the influence of the intervening medium. 3000 w. Elektrotech Zeitschr—April 20, 1905.

See also ELECTRO-PHYSICS.

Magnetised Electrodes.—The Action of Magnetised Electrodes Upon Electrical Discharge Phenomena in Rarefied Gases. C. E. S. Phillips. Deals with the conditions necessary for the production of a luminous ring in rarefied gases and under the influence of electrostatic and magnetic forces. 1200 w. Elect'n, Lond—April 26, 1901.

Mechanical Phenomena.—The Mechanical Phenomena of the Disruptive Discharge (Sur les Phénomenes Mécaniques de la Décharge Disruptive.) J. Semenov. Examining the conditions of the transport of material from one pole to another. 1200 w. Comptes Rendus—July 21, 1902.

Nitric Acid.—See ELECTRO-CHEMISTRY.

Nitrogen Fixation.—See NITROGEN.

Puncture.—See DIELECTRIC.

Rarefied Gases.—Investigations of the Electric Discharge in Rarefied Gases. W. Wien. Translated from "Annalen der Physik." An account of experimental investigations. Ill. Serial. 1st part. 3800 w. Elect'n, Lond—July 18, 1902.

Resistance Influence.—The Influence of a Non-Inductive Resistance on the Oscillatory Discharge of a Condenser. T. Misuno. Mathematical demonstration. 600 w. Elect'n, Lond—May 24, 1901.

Rotary Disc.—Rotary Disc. Alfred G. Dell. A report of experimental investigations of electrical discharges in a spark gap beneath a rotating mica disc. 1800 w. Elec Wld & Engr—Feb. 15, 1902.

Rotations.—Rotations from Electric Sparks. Alfred G. Dell. Describes interesting experiments. 3300 w. Elec Wld & Engr—March 30, 1901.

Spark Phenomena.—The Projection of Matter About an Electric Spark (Sur la Projection de la Matière autour de l'Etincelle Electrique). Jules Semenov. An account of experiments with electric discharges through flames, showing that the transport of matter from one electrode to another is only a secondary prenomenon. 600 w. Comptes Rendus—April 14, 1903.

Spark Potentials.—Conditions which Influence Spark Potential Values. E. A. Ekern. Gives facts proving that the spark potential for a given gap and pressure is a variable quantity, depending on the shape of the electrodes and the proximity of solid dielectrics to the electrodes. Ills. 1600 w. Sib Jour of Engng—June, 1904.

Spectrum.—The Induced Alternating Current Discharge Studied with Reference to Its Spectrum and Especially the Ultra-Violet Spectrum. A. W. Wright and E. S. Downs. A study of this discharge when produced on a large scale, with the aim of locating observed lines and discovering their origin. 3000 w. Am Jour of Sci—July 1, 1901.

Variations of the Spectrum of Electric Sparks (Variations du Spectre des Etincelles). E. Eginitis. An account of experiments, which show that with electrodes remaining the same, the spectrum of the electric discharge between them varies with the self-induction of the circuit. 600 w. Comptes Rendus—April 14, 1902.

Some Experiences With Powerful Electric Discharges. John Trowbridge. Report of observations made upon a spectrum of an exceedingly powerful discharge through the ordinary vacuum tube used in the study of the spectra of gases. Also editorial note. 700 w. Elec Rev, N Y—May 31, 1902.

Spectra of Gases at High Temperatures. John Trowbridge. Gives interesting facts obtained in researches to obtain a new series of hydrogen lines which might manifest themselves at high temperatures. A study of discharges of electricity in rarefied gases. 3000 w. Int Elec Cong of St. Louis—Sept., 1904.

Striking Distance.—The Law of Electric Striking Distance Through Atmospheric Air (Ueber das Elektrische Durchschlagsgesetz für Atmosphärische Luft). Dr. B. Walter. Discussing electric discharges through dielectrics, and giving tables showing the voltages required to overcome the resistance of various distances in air. 2000 w. Elektrotech Zeitschr—Oct. 6, 1904.

The Striking Distance in Gaseous Liquid and

Solid Substances (Die Schlagweiten in Gasförmigen, Flüssigen und Festen Körpern). Dr. W. Voege. Giving results of experiments showing the lengths of sparks at different voltages. 2500 w. Elektrotech Zeitschr—Dec. 8, 1904.

Electric Potential and Sparking Distance in Air. Briefly examines recent work on high potential differences, with particular reference to the sparking in air. 2000 w. Engng—March 17, 1905.

Surface of Large Curvature.—The Discharge-Current From a Surface of Large Curvature. John E. Almy. A study of the discharge from a platinum wire of very small size to a concentric, circular cylinder. Ill. 1200 w. Am Jour of Science—Sept., 1901.

Tesla.—Tesla's Artificial Lightning. Harris J. Ryan. Photograph of a shower of electrical discharges produced, with remarks. 700 w. Sibley Jour of Engng—Nov., 1901.

Transmission Line.—The Conductivity of the Atmosphere at High Voltages. Prof. Harris J. Ryan. Paper before the American Inst. of Elect. Engrs., giving an analysis of the factors that produce the energy losses through the atmosphere on high-voltage lines, with account of laboratory experiments and diagrams. 8800 w. Trans Am Inst of Elec Engrs—Feb. 26, 1904.

The Electrical Conductivity of the Atmosphere and the Losses Caused Thereby in Long Distance Transmission of Power. Prof. Harris J. Ryan. Abstract of a lecture delivered before the Cornell Chapter of the Sigma Xi. Considers the principles underlying the development of long distance transmission, and discusses the loss in energy due to the breaking down of the atmosphere. Ill. 1800 w. Sib Jour of Engng—April, 1903.

Ultra Violet Light.—Ultra-Violet Light and the Electric Discharge. Walter J. Turney. Describes experiments made. 1000 w. Sci Am Sup—Dec. 5, 1903.

See also **ELECTRO-PHYSICS.**

ELECTRIC DISTRIBUTION.

See also **ELECTRIC CABLE; ELECTRIC CONDUCTOR; ELECTRIC CONDUIT; ELECTRIC DRIVING; ELECTRIC LINE; ELECTRIC POWER; ELECTRIC STATION; ELECTRIC STATION MANAGEMENT; ELECTRIC SUB-STATION; ELECTRIC TRANSMISSION; ELECTRIC WIRING; TRANSFORMER.**

Distributing Systems from the Standpoint of Theory and Practice. Philip Torchio. A review of the systems of distribution, studying the problem by assuming a concrete case, describing the possible lay-outs, etc. Ills. 11000 w. Int Elec Cong of St. Louis—Sept., 1904.

Alternating Current.—Alternating Current Systems. H. S. Meyer. The present article discusses the advantages and disadvantages of high frequency and other points bearing on the selection of the best suitable frequency for a system. Serial. 1st part. 1800 w. Engng—March 29, 1901.

Balancing a 3-Wire Alternating Secondary System. L. Denis. This paper was written to open a discussion on the relative merits of the different alternating current secondary systems. 1700 w. Can Elec News—July, 1901.

Comparison of Methods of Secondary Distribution of Alternating Currents. George C. Holberton. Read before the Pacific Coast Gas Assn. Principally a comparison of the methods of secondary distribution at 100 volts, 2-wire, 200 volts, 3-wire, and 400 volts, 3-wire. 2700 w. Am Gas Lgt Jour—Aug. 12, 1901.

Notes on the Alternating Current System of Distribution. W. S. Barstow. Discusses the field of the alternating-current system and the requirements to enable it to enter the compact direct-current field. 1600 w. Trans Am Inst of Elec Engrs—Nov., 1901.

Alternating Current as a Factor in General Distribution for Light and Power. Charles F. Scott. Considers whether for general distribution, for lighting and power service it is desirable to utilize the current as alternating current or to convert it into direct current. 2000 w. Trans Am Inst Elec Engrs—Nov., 1901.

The Superiority of Alternating Current for the Supply of Current to Large Cities. Dr. Gotthold Stern. Abstract of a paper read before the St. Louis Int. Elec. Cong. Presents arguments favoring the alternating current. Also editorial. 6500 w. Elect'n, Lond—Oct. 28, 1904.

The Distribution of Pressure and Current Over Alternating-Current Circuits. A. E. Kennelly. Explains methods of computation. Serial. 1st part. 3500 w. Harvard Engng Jour—Nov., 1905.

See also Low Tension Feeding; Polyphase; Single-Phase; **ELECTRIC CURRENT, ALTERNATING; ELECTRIC SUPPLY**—Single Phase; **ELECTROSTATIC CAPACITY; MOTOR GENERATOR; ROTARY CONVERTER.**

Alternating Current, Austria.—See **ELECTIC STATION**—Austria.

Alternating Motors.—See **ELECTRIC MOTOR**—Alternating.

Alternating vs. Direct.—Relative Advantages of Direct-Current and Three-Phase Distribution for Small Installations. H. A. Earle. Read before the Manchester Section of the Inst. of Elec. Engs. Considers the choice of machinery and distribution in sub-stations and small installations; the systems are compared. 6000 w. Elec Engr, Lond—Nov. 30, 1900.

Relative Advantages of Direct-Current and Three-Phase Distribution. H. A. Earle. Read at the Manchester Sec. of the Inst. of Elec. Engs. A comparison of the two systems and a consideration of points which should guide in the choice. 4800 w. Elect'n, Lond—Dec. 28, 1900.

On the Relative Advantages of Alternating and Continuous Current for a General Supply of Electricity, Especially with Regard to Interference with Other Interests. A topical discussion at the joint meeting of the American and British societies at Paris, 1900. 12000 w. Trans Am Inst of Elec Engs—March, 1901.

The Production and Distribution of Alternating Current for Large City Systems. Richard McCulloch. Considers the production and transmission of alternating current, and the relative advantages of alternating and direct current transmission. Ill. 8800 w. St Ry Rev (Daily Ed)—Sept. 5,. 1903.

Direct Current versus Alternating Current Distribution. O. M. Rau. Read before the Northwestern Elec. Assn. Compares the efficiencies of the two systems, the cost of installation, etc., concluding in favor of the alternating current. 1800 w. Elec, N. Y—Feb. 1, 1905.

American Cities.—The Direct-Current Distributing Systems of American Cities. Alex Dow. Describes the electric distribution system which is commonly in use in the larger American cities, stating the reasons for the adoption and retention of the system, and in a sense justifying the methods of the larger electric light companies. 11000 w. Int Elec Cong of St. Louis—Sept., 1904.

Arnold-Bragstad-La Cour.—See **Polycyclic.**

Arrangement.—See **Network.**

Balancer.—See **Equalization; ELECTRIC DRIVING.**

Baltimore.—See **FIRE.**

Bex-Gryon-Villars. — See **HYDRO-ELECTRIC PLANT**—Sublin, Switzerland.

Blasting Circuits.—See **BLASTING.**

Booster.—See **BOOSTER.**

Boston.—See **ELECTRIC TRANSMISSION.**

Branched Circuits.—See **ELECTRIC CURRENT, ALTERNATING.**

British.—See **ELECTRIC POWER.**

British, Overhead Mains.—The Value of Overhead Mains for Electric Distribution in the United Kingdom. G. L. Addenbrooke. An investigation of the overhead distribution problem, its cost, advantages, etc. Also an appendix giving the Italian law for the transmission to a distance of electric currents. 12300 w. Inst of Elec Engrs—Feb. 9, 1905.

Buffalo, N. Y.—The Distribution and Conversion of Received Curents. Henry Gordon Stott. A brief description of the apperatus and lines generating, transforming and conveying the current from Niagara Falls to the Terminal House at the city limits of Buffalo, with the more important and novel features in the distribution and conversion. Ill. 6000 w. Trans Am Inst of Elec Engrs—April, 1901.

Distribution and Conversion of Received Currents. Discussion of paper by Henry Gordon Stott. 5400 w. Trans Am Inst of Elec Engrs—June & July, 1901.

The Buffalo High-Tension Cable Distribution System. Harold W. Buck. Illustrated description of this system and the methods employed. 1500 w. Trans Am Inst of Elec Engrs—Nov., 1901.

Niagara Power in Buffalo. The first of a series of articles dealing with the distribution of electrical energy by the Cataract Power & Conduit Company, the cost, equipment, etc. Serial. 1st part. 4400 w. Elec Wld & Engr—Dec. 3, 1904.

See also ELECTRIC SUB STATION.

Calculations.—Some Notes on Electric Light and Power Distribution. Daniel W. Mead. These notes are intended only to give an outline of the subject and point out the basis for calculations and estimates. Considers the electric generator. 1600 w. Munic Engng—Aug., 1901.

Changing Over.—Changing Over. States the advantages of direct current over alternating, and discusses the troubles incidental to changing stations and distribution systems. 1800 w. Elec Rev, Lond—June 21, 1901.

Chicago.—The Randolph Street Sub-station and the Development of the Chicago Edison System. A description of some recent features introduced showing important changes that are taking place in the character of this company's distribution. 3800 w. Elec Wld & Engr—Nov. 29, 1902.

See also ELECTRIC STATION; ELECTRIC SUB-STATION.

Circle Diagram.—See ELECTRIC CURRENT, ALTERNATING—Diagram.

Cities.—Distribution of Electrical Energy in Large Cities. Louis A. Ferguson. Describes the system employed in Chicago, and refers to similar systems in Europe. Recommends direct current for the lighting and power in the business and residence districts, and alternating current for the less closely built and suburban districts. 4000 Trans Am Inst of Elec Engrs—Nov., 1901.

Distribution of Electricity in Cities of Moderate Size. William Lispenard Robb. Favors the three-wire, 220 volt system of direct current, and discusses means of securing cheap production. 1800 w. Trans Am Inst of Elec Engrs—Nov., 1901.

Combinations.—Central Station Development. Discussion of papers dealing with different combinations in the system of distribution, by H. A. Lardner, Philip Torchio, and Peter Junkersfeld. 22000 w. Trans Am Inst of Elec Engrs—May, 1903.

Combined Energy.—Distribution of Combined Electrical Energy. Alton D. Adams. Outlines the methods of distributing electrical energy gathered from several sources of generation, describing those used at Manchester, N. H., and Hartford, Conn. 1500 w. Sci Am—Sept. 7, 1901.

Composite System.—See ELECTRIC TRANSMISSION.

Costs.—Distribution and Dollars. C. H. Williams. Read before the N.-W. Elec. Assn. An analysis of the factors that affect the cost of distribution, the losses to be guarded against, etc. 6800 w. Elec Rev, N. Y.—Feb. 11, 1905.
See also ELECTRIC STATION MANAGEMENT.

Current Densities.—See ELECTRIC CONDUCTOR—Economic Section.

Dielectric Losses.—See DIELECTRIC—Losses; ELECTRIC CABLE—Sheath Losses; ELECTROSTATIC CAPACITY.

Earthing.—See Grounding.

Economical Section.—See ELECTRIC CONDUCTOR—Section.

Economics.—Some Economic Aspects of Electric Power Distribution. Dr. Louis Bell. A discussion of the important influence of electric power distribution in redistributing industry and population. 3500 w. Engineering Magazine—April, 1905.
See also ELECTRIC TRANSMISSION.

Elevated Railway, Boston.—The Power Distributing System of the Boston Elevated Railway Company. C. H. Hile. Read at convention of the Am. Ry., Mech. & Elec. Assn. Describes this system of separate power plants, with their interconnected power distributing systems, giving facts, results and experiences as representative of such engineering practices. 4000 w. St Ry Jour—Sept. 30, 1905.

Equalization.—Equalizer Circuits (Ausgleichleitungen). Prof. J. Teichmüller. A paper before the Verband Deutscher Elektrotechniker, containing a theoretical discussion and a practical example of the equalization of the potential in distributing networks, with diagrams. 3 parts. 8500 w. Elektrotech Zeitschr—March 14, 21, 28, 1901.

The Equalization of Load Fluctuations in Power Transmission Plants (Ueber Ausgleich von Belastungsschwankungen in Kraftübertragungsanlagen). Gustav Meyersberg. An illustrated paper before the "Electrotechnischer Verein" on a method of compensating load fluctuations, particularly in electric hoisting plants for mines, by means of an auxiliary dynamo with a high-speed flywheel. Also discussion. 11000 w. Elektrotech Zeitschr—April 2, 1903.

See also Regulation.

Extensions.—Extensions to Outlying Areas. A. B. Mountain. Read before the Incor. Munic. Elec. Assn. Considers the extensions of electrical mains beyond the municipal boundary barely remunerative. General discussion. 3000 w. Elect'n, Lond—June 30, 1905.

Fault Location.—See ELECTRIC MEASUREMENT.

500-Volt-Three Wire.—See Three Wire.

Four-Wire Three-Phase.—See ELECTRIC STATION—Erith, Eng.

Franchises.—See ELECTRIC STATION MANAGEMENT.

Frankfort-on-Main.—Electrical Distribution in Frankfort. Illustrated detailed description of this single phase, alternating high-tension system. 1600 w. Engr, Lond—Aug. 16, 1901.

Geneva, Switzerland.—See ELECTRIC TRANSMISSION—Direct Current.

Glasgow. — Electricity Supply. W. A. Chamen. Read at meeting of the Glasgow Local Section of the Inst. of Elec Engs. Discusses the system and pressure of supply, having special bearing as applied to the city of Glasgow. 3800 w. Elect'n, Lond—Nov. 16, 1900.

Graphical Calculations.—Some Constructions for the Graphical Calculation of Conducting Networks (Einige Konstruktionen zur Graphischen Berechnung con Leitungsnetzen). Bruno Soschinski. An extension and completion of some graphical constructions due to C. Hochenegg, with diagrams. 1200 w. Elektrotech Zeitschr—April 24, 1902.

The Application of the Cord Polygon to the Computation of Current Distribution (Die Anwendung des Seilecks für die Berechnung der Stromvertheilung). Ph. Pforr. An application of the methods of graphical statics to electrical current distribution for tramways. 4000 w. Elektrotech Zeitschr—May 16, 1901.

Grenoble, France.—See HYDRO-ELECTRIC PLANT—Champ.

Grounded Neutral.—See Grounding.

Grounded Return.—See Grounding.

Grounding.—The Protective Value of Ground Connections (Der Schutzwerth der Erdung). F. Uppenborn. An examination of the conditions under which the grounding of poles for high-pressure Currents may prove of value as protection in case of accidents. 4500 w. Elektrotech Zeitschr—April 25, 1901.

Grounding of High Potential Systems. J. D. Nies. The aim of the paper is to determine what are the causes to which the existence of danger may be ascribed, with special reference to the occasional practice of grounding the point of zero e. m. f. in such systems. Also editorial. 3300 w. Elec Wld & Engr—April 12, 1902.

Notes re Earthing. H. Faraday Proctor. Read at the I. M. E. A. Convention. A consideration of intentional and accidental earths, and the problems arising from them. Also discussion. 4500 w. Elec Times—July 31, 1902.

Grounding of Alternate Current Systems. George N. Eastman. Presents a few problems with diagrams showing conditions which may arise and produce very disastrous results. 2500 w. Jour W Soc of Engrs—April, 1903.

The Grounded Neutral. R. S. Hale. Discusses four ways in which the wiring on a three-wire system with grounded neutral can be done more cheaply and as safely as at present. 1700 w. Elec Wld & Engr—Jan. 16, 1904.

Grounding of Constant Potential Systems. S. Bingham Hood. Illustrates the object of grounding a system and the requirements for safe operation, discussing conditions. 4200 w. Elec Wld & Engr—Feb. 20, 1904.

The Grounding of the Neutral Point with Three-Phase Currents (Die Erdung des Neutralen Punktes bei Drehstromanlagen). Paul Humann. Discussing especially the losses due to the dielectric of the cable. 2000 w. Elektrotech Zeitschr—May 5, 1904.

Grounded Transmission Mediums. J. Stanley Richmond. This first of a series of articles is mainly historical, referring principally to England. Succeeding articles will deal with earth potential measurements, track drops, stray transmission, tracks and bonding. Serial. 1st part. 1800 w. Elec Rev, N. Y.—Nov. 26, 1904.

"Earthing." W. W. Lackie. Abstract of a paper read at Glasgow, before the Inst. of Elec. Engrs. Criticises the regulations issued by the Inst. of Elec. Engrs. and emphasizes the necessity of insulating the sheathing throughout its length, earthing it at one point only, and introducing a proper sized resistance on the earth circuit. 3500 w. Elec Rev, Lond—Feb. 17, 1905.

See also Three-Wire; ELECTRIC MEASUREMENT.

Ground Shield.—See TRANSFORMER.

Hamburg.—The Electric Distribution System of the City of Hamburg (Le Reseau de Distribution Electrique de la Ville de Hambourg). With plan of the city and plan and sections of the main generating station. 1500 w. 1 plate. Génie Civil—Oct. 21, 1905.

High-Power Surges.—High-Power Surges in Electric Distribution Systems of Great Magnitude. Charles Proteus Steinmetz. Review and discussion of a high-power surge, which occurred in the high-potential distribution system of the Manhattan Railway, in New York, during the early days of its electric operation. 5000 w. Am Inst of Elec Engrs—June 19, 1905.

Discussion on "High Power Surges in Electric Distribution Systems of Great Magnitude," and "An Experimental Study of the Rise of Potential on Commercial Transmission Lines, Due to Static Disturbances such a Switching, Grounding, etc.," at Asheville, N. C. 7500 w. Am Inst of Elec Engrs—Sept., 1905.

See also ELECTRIC CABLE; ELECTRIC TRANSMISSION.

High Tension.—I. Overhead High-Tension Distributing Systems in Suburban Districts. George H. Lukes. II. Automatic Apparatus for Regulating Generator and Feeder Potentials. E. J. Bechtel. III. Safeguards and Regulations in Operation of Overhead Distributing Systems. W. C. L. Elgin. Three short papers discussed together. 10000 w. Trans Am Inst of Elec Engrs—Jan., 1904.

See also ELECTRIC CABLE; ELECTRIC LINE; ELECTRIC TRANSMISSION.

Hydraulic Analogies.—Some Notes on Electric Light and Power Distribution. Daniel W. Mead. Shows the analogies to hydraulic transmission and gives tabulated information of value, and wiring diagram. 1800 w. Munic Engng—Sept., 1901.
See also TELEPHONE LINE.

Indiana Railways.—See ELECTRIC STATION.

Interconnected Circuits.—Circuits for the Transmission and Distribution of Electrical Energy. A. S. M'Allister. Describes an ingenious arrangement of interconnected circuits, and the behavior of the currents. 2500 w. Am Elect'n—April, 1903.

Johannesburg.—See ELECTRIC EQUIPMENT—Gold Mining, Transvaal; ELECTRIC POWER—Transvaal; ELECTRIC STATION.

Junction Boxes.—The Value of Junction Boxes, with Cut-Out Switches, in Underground-Cable Networks (Ueber den Wert Ausschaltbarer Absweigmuffen in Unterirdischen Kabelnetzen). O. Ankersen. Description and discussion of protected and accessible switches which can cut out sections of cable. 1200 w. Elektrotech Zeitschr—Sept. 14, 1905.

Karlsruhe.—See ELECTRIC STATION.

Kirchhoff's Laws.—See ELECTRO-PHYSICS.

Lancashire, Eng.—See ELECTRIC STATION.

Leakage Indicators.—See Grounding.

Les Clées-Yverdon, Switzerland.—See HYDRO-ELECTRIC PLANT.

Losses.—Distribution Losses in Electric Supply Systems. A. D. Constable and E. Fawssett. Abstract of a paper read before the Inst. of Elec. Engrs. Gives figures referring to the Croyden electricity works, discusses the losses and whether it is possible to reduce the. The present article considers switchboard and cable losses. Serial. 1st part. 1000 w. Elect'n, Lond—March 13, 1903.

See also ELECTRIC CURRENT; ELECTRIC STATION MANAGEMENT.

Louisville Ry.—The Power Distribution System of the Louisville Railway Company. Illustrated description of an extensive polyphase power-distribution system recently installed. 1400 w. St Ry Jour—Feb. 11, 1905.

Low-Tension Feeding.—The Relative Advantages of Three-, Two-, and Single-Phase Systems for Feeding Low-Tension Networks. Michael B. Field. Abstract of a paper read at Glasgow Congress. Considers the generating and transforming machinery, and the different systems. 1400 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Mains.—Practical Notes on Electric Mains. Part first gives a general review, and discusses the management of men; other parts will consider cable laying and jointing, cable testing, substations, house connections, street-lighting, etc. Serial. 1st part. 2000 w. Elec Engr, Lond—Nov. 23, 1900.

Practical Notes on Continuous Current Distributing mains. John C. A. Ward. Abstract of a paper read before the Glasgow Soc. of the Inst. of Elec. Engrs. Presents some of the causes that effect the efficiency of distribution, and gives a comparison of the different systems. Ill. Serial. 1st part. 2500 w. Elect'n, Lond—Jan. 24, 1902.

The Standards for Electricity Supply Mains. Full text of the latest standard terms and conditions as agreed upon by the Cable Makers' Assn., England. 1500 w. Elect'n, Lond—Feb. 13, 1903.

Systems of Mains Laying. F. H. Davies. A detailed consideration of subways, conduit systems, pipe systems, cables laid direct in the earth, and solid systems. 3500 w. Elec Engr, Lond—June 19, 1903.

A Method of Laying Bare Underground Mains. Illustrated description of the "simplified" solid system. The insulating compound is composed of refined carbolite. 2200 w. Elect'n, Lond—Aug. 19, 1904.

See also ELECTRIC CABLE; ELECTRIC CONDUIT.

Mains Department.—The Mains Department of a Direct-Current Electricity Supply Station. J. F. Moore. Sketches the different characteristics of the several classes of cable, discusses localisation of faults, meters, etc. 3800 w. Elec Engr, Lond—April 11, 1902.

Mains, Fault.—See ELECTRIC MEASUREMENT—Fault Location.

Maintenance.—See ELECTRIC CABLE; ELECTRIC CONDUIT; ELECTRIC STATION MANAGEMENT.

Manchester, Eng.—Electricity Supply for Greater Manchester. Illustrated description of important extensions and three-phase transmission system. 3300 w. Elect'n, Lond—April 12, 1901.

Manchester Electricity Works. An illustrated description of the three-phase extensions put down as a temporary aid to the low-pressure system of distribution, and also of the present system of supply. 4000 w. Elec Engr, Lond—April 5, 1901.
See also ELECTRIC STATION.

Manchester, N. H.—Electrical Development at Manchester, N. H. Illustrated detailed description of the novel condition made possible by the consolidation of electrical supply interests, by which a single sub-station receives electrical energy from five generating plants and distributes it in four different towns. 4500 w. Elec Wld & Engr—May 25, 1901.

Manhattan Ry., N. Y.—See **ELECTRIC CONDUIT—Manhattan Ry.**

Marysville, Cal.—The Distribution of Bay Counties Power. The first of a series of illustrated articles showing how the power of this great corporation is to be utilized. The present article relates to Marysville and its industries. Serial. 1st part. 6000 w. Jour of Elec—Feb., 1903.

Mines.—The Distribution of Electricity in Mines. Deals with the types of cable that should be used in the various situations and the most satisfactory methods of installing them. Serial. 1st part. 1800 w. Elec Engr, Lond—Oct. 27, 1905.

See also **ELECTRIC EQUIPMENT.**

Mines and Smelters.—Relative Advantage of 2,300-Volt Alternating Current versus 550-Volt Direct Current, for Mine and Smelter Work. Hugh A. Brown. States the advantages of each. 1500 w. Eng & Min Jour—Sept. 26, 1903.

Multiple Wire.—See **Net Work.**

Navy Standard Voltage.—See **ELECTRIC EQUIPMENT.**

Network.—The Arrangement of the Distributing Network. Charles A. Gillin. Considers the subject under the heads of 1, Uniformity of pressure; 2, Maximum variation of pressure; 3, Continuance of supply of electric energy; 4. Facility in fault localization. Serial. 1st part. 3000 w. Elec Engr, Lond—Nov. 30, 1900.

The Balancing and Feeding of a Multiple-Wire Network. O. Dewey. Considers that the best arrangement for a large cross-connected network would be to have most of the feeders two-wire ones, and have a few multiple-wire feeders, so as to enable the network to be split up into sections for localizing faults. 3000 w. Elec Engr, Lond—Nov. 1, 1901.

A Simple Method for the Calculation of Closed Conducting Networks (Eine Einfache Methode zur Berechnung von Geschlossenen Leitungsnetzen). Dr. H. Gallusser. A graphical and mathematic method for calculating the current distribution in networks. Diagrams. 2000 w. Elektrotech Zeitschr—April 23, 1903.

The Rational Computation of Current Distributing Networks (Die Rationelle Berechnung von Stromverteilungsnetzen). Dr. E. Müllendorff. A mathematical investigation to determine the relation between the central station and the consumers for a minimum expenditure of copper. Two articles. 7000 w. Elektrotech Zeitschr—April 14, 21, 1904.

An Analytical and Graphical Method of Computing Closed Networks (Eine Analytische und Graphische Methode zur Berechnung von Geschlossenen Leitungsnetzen). P. M. Verhoeckx. Applying the method of determinants to the transformation of the original equations; with practical examples. Two articles. 6000 w. Zeitschr f Elektrotechnik—May 15, 22, 1904.

The Distribution of Voltage and Current in Closed Conducting Net-Works. Prof. Clarence Feldmann and Josef Herzog. A demonstration of some simple theorems which explain the manner of dealing with net-works of conductors from the standpoint of the electrical engineer, greatly restricting the application of mathematics. 3600 w. Int Elec Cong of St. Louis—Sept., 1904.

The Computations for Open Networks (Die Berechnung Offener Stromverzweigungen). Dr. E. Müllendorff. Deriving formulas for proportioning the members of a distribution network so that the volume of the conductors shall be a minimum. 2000 w. Zeitschr f Elektrotechnk—Oct. 16, 1904.

Computations for Equalisation in Closed Networks (Die Ausgleichsrechnungen in Geschlossenen Leitungsnetzen). B. Soschinsky. A mathematical investigation based upon an improvement of the approximate method of Gauss. Two articles. 8000 w. Elektrotech Zeitschr—Nov. 23, 30, 1905.

New York.—The transmission of Current at High Potential in New York City. Calvin W. Rice. Read at convention of Nat. Elec. Lgt. Assn. Also editorial. An interesting résume of high voltage power transmission as practiced in New York, giving practical information underground work in this field. 3500 w. Elec Wld & Engr—May 25, 1901.

The Transmission of Current at High Potential in New York City. Calvin W. Rice. Read before the Nat. Elec. Light Assn. Shows in outline the advances which have made possible the generation of current in one large station, its transmission to sub-stations, and local distribution from each such center, describing the system in New York. 2000 w. Elec Rev, N. Y.—May 25, 1901.

Nuneaton.—See **ELECTRIC STATION.**

Omaha.—See **ELECTRIC STATION.**

Overhead Mains.—See **British.**

Paris.—The Sections of Electrical Distribution in Paris (Les Secteurs de Distribution d'Electricité à Paris). C. Marquet. The first of a series describing the character and extent of electrical distribution under the various concessions in Paris. Serial. 1st part. 2500 w. Génie Civil—March 22, 1902.

Periodicity.—Some Notes on Changes of Periodicity. States the advantages of the reduction of the periodicity to the lowest possible value, with remarks on a change from 100 periods to 50 periods, but also applicable to changes of a lesser degree. 1500 w. Elec Rev, Lond—April 5, 1901.

Philadelphia.—Distribution System of the Philadelphia Rapid Transit Co. Illustrated description of the methods of distribution both in the underground feeder system, high-potential lines, telephone lines, etc. 2000 w. St Ry Rev—Sept. 15. 1905.

Department of Lines and Cables. Considers the direct current, and alternate surrent cables, underground conduits, overhead construction, telephone system, etc., of the Philadelphia system. Ills. 3000 w. St Ry Jour—Sept. 23, 1905.

See also **ELECTRIC STATION.**

Polycyclic.—The Arnold-Bragstad-la Cour Polycyclic Distribution System (Das Polycycklische Stromvertheilungssystem Arnold-Bragstad-la Cour). Prof. E. Arnold. A paper before the Elektrotechnische Gesellschaft of Frankfort-on-Main, giving an account of electrical distribution system in which currents of different voltages and frequencies are superposed on the same conducting network. Diagrams. Two parts. 5000 w. Elektrotech Zeitschr—June 25, July 3, 1902.

The Polycyclic Distribution of Electricity. Explains the term and states the claims made for the system. Especially considers the Arnold-Bragstad-la Cour System, and the validity of their claims. 2000 w. Elec Rev, Lond—Sept. 26, 1902.

The Arnold-Bragstadt-La Cour Polycyclic Power-Transmission. O. S. Bragstadt. An illustrated description of a composite system of transmission. 2500 w. Elec Wld & Eng—May 9, 1903.

Polyphase.—The Development of Three-Phase Working in the Twentieth Century. Val. A. Fynn. Considers briefly the items which make up a three-phase transmission and the distribution system, the improvements desirable, and those that may be expected, and cases where the application of this system would seem consistent with economy. 3500 w. Elec Rev, Lond—Feb. 1, 1901.

The Elements of Three-Phase Theory. Alexander Russell. Discusses fundamental theorems, giving mathematical proofs and graphical constructions. 3200 w. Elect'n, Lond—Aug. 16, 1901.

The Distribution of the Three-Phase System and the Operation of Single-Phase Circuits by It. W. L. R. Emmet. Favors the use of three-phase machines in general for alternating-current generation in central stations, even when the distribution is single-phase. 2500 w. Trans Am Inst of Elec Engrs—Nov., 1901.

Three-Phase Distribution for Power and Lighting. Sydney Woodfield. Presents the advantages of this system, and discusses other systems. Also briefly describes potential regulators. 2000 w. Elec Rev, Lond—Jan. 3, 1902.

Practical Polyphase Working. Dr. Louis Bell.

Deals with the installation and operation of polyphase stations, with special reference to the power transmission work for which such apparatus is used. 3000 w. Am Elect'n—June, 1902.

Distribution of Current in Three-Phase Systems. F. Hardie Jeannin. Gives analysis of method of connecting up ammeters. 1400 w. Elec Wld & Engr—Nov. 14, 1903.

On Pressure Variations in Polyphase Circuits. W. R. Kelsey. On the maintenance of balance with interconnected two-phase and with three-phase systems. 1600 w. Elec Engr, Lond—June 24, 1904.

Polyphase .Elastic.—Elastic Polyphase Circuits (Elastische Drehstromleitungen). Prof. J. Teichmüller. A mathematical investigation of the behavior of polyphase circuits when the different phases are variously loaded, with diagrams. Serial. 2 parts. 6000 w. Elektrotech Zeitschr Jan. 2, 9, 1902.

Polyphase, Four-Wire.—Some Experiences in the Regulation of a Three-Phase, Four-Wire, Mixed Distribution. C. W. Hutton. Paper before the Pacific Coast Electric Transmission Assoc., giving an account of troubles and remedies with a 200-volt electric distribution system in Sacramento, Cal. Voltage curves. 1000 w. Jour of Elec—Aug., 1904.

Polyphase vs. Direct.—See **Alternating vs Direct.**

Power Factor.—See **ELECTRIC CURRENT, ALTERNATING; ELECTRIC MOTOR—Regulating Line Currents.**

Providence, R. I.—See **ELECTRIC STATION.**

Railway.—Systems of Current Distribution. M. Van Vloten. Read at Paris Congress . Discusses the best method for the distribution of current for large systems of tramways, including suburban lines, susceptible of extension to long distances. 5700 w. Tram & Ry Wld—Oct. 11, 1900.

Comparisons of the Various Systems of Electrical Distribution for Street Railways. C. F. Bancroft. Read at Kansas City Convention of Am. St. Ry. Assn. Discusses the six systems at present in use, and the need of selecting the system best suited to the conditions. 3000 w. St Ry Jour—Nov. 3, 1900.

A System of Current Distribution for Tramways (Du Système de Distribution du Courant à Adopter pour les Grandes Réseaux de Tramways). P. Van Vloten. Paper and discussion at the International Tramway Congress at Paris. Two articles. 7000 w. Electricien—Nov. 24, Dec. 1, 1900.

The Supply of Current to Long Tramway Lines (Ueber Stromversorgung Längerer Bahnlinien). Dr. G. Rasch. A discussion of various feeder systems for tramway lines, including separate main stations, sub-stations, and alternating current supply. Two articles. 10000 w. Elektrotech Zeitschr—Dec. 20, 27, 1900.

Feeders for Electric Tramways (Stromzuführungs-Einrichtungen Elektrischer Strassenbahnen). H. Bissinger. A paper read before the Berlin Railway Association, discussing especially the arrangement of feeders for surface contact systems. 5000 w. Glaser's Annalen—May 1, 1901.

The Electrical Distribution System of the Metropolitan Street Railway Company, New York. Walter A. Pearson. Illustrates and describes the largest polyphase alternating-current distribution for railway purposes yet put in operation. It is notable for the large amount of energy distributed per square mile of territory served. 3500 w. St Ry Jour—Oct. 5, 1901.

Alternating and Direct-Current Transmission on City Lines. M. S. Hopkins. Read before the N. Y. State St. Ry. Assn. Explains the main features of polyphase alternating transmission with rotary converter sub-stations working in connection with existing direct-current feeder system. 3600 w. St Ry Jour—Oct. 12, 1901.

The Calculation of Feeders for Electric Railway distribution Systems (Beitrag zur Berechnung von Speiseleitungen Elektrischer Bahnanlagen). Prof. A. Sengel. A determination of the most economical cross-section of feeding conductors, with formulae and diagrams. 2000 w. Elektrotesch Zeitschr—April 17, 1902.

The Distribution of Current in Railway Systems (Stromvertheilung auf Eisenbahnnetzen). Ph. Pforr. Developing a graphical method by which the distribution can be shown both for direct and branching circuits. 3000 w. Elektrotech Zeitschr—July 24, 1902.

Transmission Lines for Electric Railways. Alton D. Adams. Discusses when direct feeding to trolley lines ceases to be good practice. 1000 w. St Ry Jour—Nov. 8, 1902.

Notes on Railway Feeder Problems. William A. DelMar. Treats only of direct-current feeders which supply current to the cars. 2500 w. Am Elect'n—July, 1903.

Feeder and Rail Drop. J. W. Welsh. Gives a method found convenient for the calculation of simple lay-outs where the number of circuits are few. Illustrates the method in a case where several feeders supply direct-current to an interurban electric road. 800 w. Elec Club Jour—March, 1905.

Feeders and Returns of Electric Tramway Systems. H. R. Yerbury. Read before the Leeds Soc. of the Inst. of Elec. Engrs. Discusses only systems supplied with power from one generating station at 500 to 550 volts. Ills. 4500 w. Tram & Ry Wld—May 4, 1905.

The Distribution of Electrical Energy for Large Railway Systems. (Ueber die Zuführung Elektrischer Energie für Grössere Bahnnetze). W. Reichel. Discussing especially the feeder arrangements of the high-speed, military railway, Marienfelde-Zossen. 6000 w. Elektrotech Zeitschr—June 9, 1903.

The Underground Distribution of Power for Urban Electric Traction. James Heywood. Read before the Philadelphia Branch of the Am. Inst. of Elec. Engrs. Discusses the conduits, high-tension cables, terminals, tests, installation, d. c. cables, return cables, localization of faults, etc. Ills. 3300 w. St. Ry Jour—Aug. 19, 1905.

Feeder Calculations for Direct Current Railways. William A. Del Mar. Considers four typical cases which show the most important distributions of copper and current. 2800 w. Elec Wld & Engr—Aug. 29, 1903.

See also **Elevated Railway, Boston; Louisville; Philadelphia; Single Phase; ELECTRIC POWER STATION; ELECTRIC PROTECTIVE APPARATUS; ELECTRIC RAILWAY; ELECTRIC STATION.**

Railway Series.—See **ELECTRIC RAILWAY—Problems.**

Railway Three Wire.—See **ELECTRIC RAILWAY—Three Wire Feeder.**

Regulation.—Voltage Regulation in Multiple-Wire Systems (Spannungsregulierung in Mehrleiteranlagen). Dr. Hiecke. An address, giving an illustrated description of the apparatus and methods used for measuring and regulating the voltage in the five-wire distribution system of the Allg. Oest. Elek. Gesellschaft of Vienna. 5000 w. Zeitschr f Elektrotechnik—April 19, 1903.

Automatic Voltage Regulators. H. C. Wirt. Abstract of a paper read before the Northwestern Elec. Soc. Remarks on the importance of constant pressure, with description of a regulator invented by A. A. Tyrrell. Ill. 2000 w. Elec Rev, N Y—Feb. 14, 1903.

Voltage Regulation in Alternating-Current Systems. H. S. Meyer. Abstract of a paper before th Liverpool Engng. Soc. Aims to give a general review of some of the most important points, without entering upon a detailed consideration of the theoretical side. Serial. 1st part. 3500 w. Elect'n, London—Feb. 19, 1904.

A New Method of Regulating the Pressures in a Distribution System (Ein Neues Verfahren zur Spannungsregelung in Stomverteilungsnetzen). Dr. E. Müllendorf. A discussion of the varying demands of different parts of a city for current, and the necessity of taking this into account in the distributing system. 3000 w. Elektrotech Zeitschr—Oct. 6, 1904.

See also **Equalization; Transmitted Power; ELECTRIC APPARATUS; ELECTRIC CURRENT, ALTERNATING; ELECTRIC INDUSTRY; ELECTRIC LIGHTING.**

Reversals.—See **ELECTRIC STATION.**

Safety Devices.—See **ELECTRIC PROTECTIVE APPARATUS.**

Saut Mortier, France. — See **HYDRO-ELECTRIC PLANT.**

Single Phase.—The Prospects of Single-Phase Supply. W. E. Warrilow. Discusses the prospect of single-phase supply for tramways and other purposes and reviews the past history, concluding that the method is not on the decline. 2000 w. Elec Engr, Lond—Aug. 23, 1901.

See also Alternating Current; ELECTRIC MOTOR; ELECTRIC RAILWAY; ELECTRIC TRANSMISSION.

South Wales.—See ELECTRIC POWER.

Stark System.—See TELEGRAPH—Simultaneous Telephony.

Storage Batteries.—See STORAGE BATTERY—Distribution System.

Sub-Station.—See ELECTRIC SUB STATION.

Switchboard Connections.—See ELECTRIC SWITCHBOARD.

Sydney University.—See ELECTRIC STATION.

Synchronous Motor Regulation. — See ELECTRIC MOTOR—Regulating Line Currents.

Three Phase.—See Polyphase.

Three-Wire. — A Three-Wire Five-Hundred-Volt Lighting System. Walter I. Barnes. Read before the Nat. Elec. Lgt. Assn. Describes the construction work, giving an outline of the development of the Narragansett Elec. Lgt. Co. 3200 w. Elec Rev, N Y—May 28, 1904.

A Three-Wire, 500-Volt Lighting System. Walter I. Barnes. Abstract of a paper read before the Boston convention of the Nat. Elec. Lgt. Assn. Describes the installation of the Narragansett Electric Lighting Company. 2000 w. Am Elect'n —July, 1904.

250-500 Three-Wire Distribution for Lighting and Power. Phillippo Torchio. Advocates the use of the three-wire, 500-volt system, discussing its advantages, and means of overcoming difficulties. 2500 w. Trans Am Inst of Elec Engrs—Nov., 1901.

The Three-Wire System. John H. Ryan, Jr. An explanation of why three wires are used and a statement of some of the troubles encountered, and methods of running. Ill. 3500 w. Engr, U. S. A.—Nov. 15, 1901.

Distribution with Uninsulated Neutral. E. Morgan. Discusses this question and its advantages, and suggests a system of distribution. 1000 w. Elec Rev, Lond—Aug. 29, 1902.

Re-Earthing the Middle Wire in Three-Wire Distributing Systems. G. Hooghwinkel. Presenting the advantages of using a bare neutral wire. 1500 w. Elec Rev, Lond—Aug. 29, 1902.

Notes on Certain Three-Wire Systems. Charles T. Mosman. Read before the Ohio Elec. Lgt. Assn. A discussion of the new conditions in electrical developments and points that should be considered. Thinks there is little justification for extensive use of the 500-volt three wire system in the United States. Considers desirable arrangements. 2000 w. Elec Rev, N Y—Oct. 31, 1903.

Earthing Arrangements and Leakage Indicating Devices. Considers every-day practice, particularly in connection with three-wire distribution systems. 1300 w. Elec Engr, Lond—July 8, 1904.

Three-Wire Distribution. F. Hardie Jeannin. Description of the three-wire system and its modifications, discussing its good and bad features, its applications, etc. Diagrams. 4000 w. Elec Wld and Engr—Oct. 22, 1904.

The Operation of a Three-Wire System with Battery (Ueber die Speisung eines Dreileiternetzes mit einer Batteriehälfte). F. Hohenemser. A brief description of a method of connecting a storage battery to a three-wire distribution system. 800 w. Elektrotech Zeitschr—Dec. 15, 1904.

Three-Wire Distribution for Factories. Ralph W. Birkett. Remarks on the advantages of a three-wire system, describing one installed by the author at a large engineering works. 4000 w. Elect'n, Lond—July 21, 1905.

Bare or Insulated Third Wires (Zur Frage des Blanken oder Isolierten Mittelleiters). Fr. Erens. A discussion showing the desirability of insulating the neutral wire in three-wire distribution systems. 3500 w. Elektrotech Zeitschr —Sept. 28, 1905.

Notes on Certain Three-Wire Systems. Charles T. Mosman. Read before the Ohio Elec. Soc. Considers points in direct-current lighting and power work. 2500 w. Engr, U S A—Oct. 2, 1905.

See also Polyphase, Three Wire; ELECTRIC RAILWAY; ELECTRIC WIRING.

Three-Wire vs. Two.—The Relative Advantages of Two and Three-Wire Distribution. John F. C. Snell. Read before the Incor. Munic. Elec. Assn. Compares a three-wire system with 400-volts across the outers, and a two-wire system 200-volts, discussing the relative economies. Discussion. 5800 w. Elec Engr, Lond—July 25, 1902.

Trains.—See CAR COUPLER—Electric Connection.

Transmitted Power.—Local Distribution of Transmitted Power. George C. Holberton. Read at Con. of Pacific C. Elec. Trans. Assn. Discusses how the best results may be obtained. 2700 w. Jour of Elec—July, 1903.

The Distribution of Electric Power from Transmission Systems. Dr. Louis Bell. Considers regulation the crucial point in the operation of power transmission plants for general distribution, discussing the details. 4500 w. Cassier's Mag—June, 1904.

See also Buffalo.

Two-Wire vs. Three.—See Three-Wire vs. Two.

Underground.—See also ELECTRIC CABLE; ELECTRIC CONDUIT.

Underground Mains.—See Mains; ELECTRIC CABLE; ELECTRIC CONDUIT.

Voltage.—Pressure of Supply. Arthur O. F. Webb. Comparisons between the rapidly disappearing 100-volt pressure and the more modern 200 to 230 volts pressure. 1700 w. Aust Min Stand—May 2, 1901.

Waterbury, Conn.—See ELECTRIC TRANSMISSION.

Yorkshire, Eng.—See ELECTRIC STATION.

ELECTRIC DRIVING.

See also ELECTRIC DISTRIBUTION; ELECTRIC EQUIPMENT; ELECTRIC MOTOR; ELECTRIC PLANT; ELECTRIC POWER; ELECTRIC TRANSMISSION; MACHINE SHOP; MACHINE TOOL—Electric; POWER TRANSMISSION; RAILWAY SHOP.

Applications of Electric Power in Engineering Works. Dr. Louis Bell. A broad discussion of the changes wrought by the distribution of electric energy in engineering works and its influence upon the arrangement and design of establishments. 4000 w. Engineering Magazine—Jan., 1900.

The Electric Distribution of Power in Workshops. Discussion by F. B. Crocker. Gano S. Dunn, W. H. Tapley, and others. Ill. 7800 w. Jour Fr Inst—Jan., 1901.

Electrically Operated Machine Tools. Frank C. Perkins. States the advantages and describes American and foreign practice, illustrating various applications. 2800 w. Mod Mach—Jan., 1901.

The Case for Electric Power Distribution. W. B. Esson. Read before the Civ. and Mech. Engs. Soc., England. Considers the circumstances upon which must depend the decision as to whether electricity can with advantage displace the older method of power distribution in machine shops, factories, etc. Also general discussion. 11000 w. Elec Engr, Lond—Jan. 11, 1901.

Requirements of Electricity in Manufacturing Work. William S. Aldrich. Considers briefly some essential features of electric power transmission in manufacturing work. 6300 w. Trans Am Soc of Mech Engrs, No. 898—May, 1901.

Electricity in Machine Shops. The first of a series of articles intending to present some of the applications of the electric motor. The present article shows the commercial variable speed motor driving an engine lathe of heavy type. Ill. Serial. 1st part. 1300 w. Ir Trd Rev—Aug. 8, 1901.

The Choice of an Electric Power Distribution System in Factories. P. R. Moses. Discusses the merits and demerits of the polyphase alternating system, and the question of best electrical pressure. 3000 w. Engineering Magazine —Sept., 1901.

The Electrical Operation of Modern Machine Tools and Machines. Robert T. Losier. Read before the N. Y. Elec. Soc. Shows what has been accomplished in overcoming the disadvantages of the entire belting system, and removing the objectionable features of the individual motor. Ill. 3000 w. Elec Rev, N. Y.—Dec. 21, 1901.

Electrically Driven Machine Tools. A. L. De Leeuw. Discussion of general principles, with illustrations showing application of motors. 4800 w. Mach, N. Y.—Jan., 1902.

Electrical Operation of Tools. Abstract of a lecture by Robert T. Losier before the New York Electrical Society. Discusses the economy, increased output, convenience, etc. 2400 w. Mach, N. Y.—Feb., 1902.

Influence of Electricity in Shops. Cloyd Marshall. An illustrated article reviewing the advantages and showing machines operated by electricity. 2000 w. Engr, U S A—April 1, 1902.

Electric Equipment in Modern Machine Shop Practice. F. B. Duncan. Discusses the equipment of shops and the obstacles at present to a complete installation of electric power, indicating methods to overcome some of these obstacles. Appended is a sheet giving motor power required by a number of the standard makes of tools in general use. Brief discussion follows. 5500 w. Pro Engrs' Soc of W Penn—May, 1902.

I. The Electric Motor in Mill Work. S. S. Wales. II. Some Characteristics of Direct Current Motors. Norman Wilson Storer. Two papers somewhat connected. The first discussing applications of the electric motor, the difficulties met, etc. The second in regard to the proper selection of motors for the work required, rating of motors, etc. 5000 w. Pro Engrs' Soc of W Penn—May, 1902.

Electric Driving for Mining and Workshops (Die Elektrizität im Berg und Hüttenwesen). Dr. H. Hoffmann. A review of the examples of electric driving shown at the Düsseldorf exposition. Serial. Part I. 2500 w. Zeitschr d Ver Deutschr Ing—May 31, 1902.

Advantages of Electric Transmission. F. J. A. Matthews. Discusses some points concerning the economy of electric power and steam power; the advantages of electric power, etc., showing that each case must be considered carefully to determine whether it will be economical. Serial. 1st part. 3400 w. Mech Engr—July 19, 1902.

Electricity as a Motive Power for Machine Shops. With special reference to the electrical equipment of the William R. Trigg Co., Richmond, Va., which is illustrated and described. 4800 w. Mach, N Y—Sept., 1902.

The Electrical Driving of Machinery; Its Economy and Advantages. Frank Broadbent. A discussion of this subject illustrated by examples. 2800 w. Elec Rev, Lond—Sept. 12, 1902.

Continuous Current Motors for Machine Tools. F. O. Blackwell. A description of the characteristics of the different classes of metal working tools, of the requirements of motors for operating them, of the conditions limiting the range of speed variation, and some of the methods of obtaining it with continuous current motors. 1800 w. Trans Am Inst of Elec Engrs—Dec., 1902.

The Operation of Machine Shops by Individual Electric Motors. R. T. Losier. Data concerning the load factor and operation of machine shops, and a description of the advantages derived from the use of individual electric motors. Ill. 4000 w. Trans Am Inst of Elec Engrs—Dec., 1902.

Electric Power Required by Various Tools and General Construction Methods Abroad. Notes some of the methods of construction, data of power used, and general equipment of foreign plants having modern equipments, and the methods of control of the alternating-current motors. 3500 w. Mod Mach—Dec., 1902.

Electric Shop Drive. W. R. Layman. Outlines the various methods of electric shop driving; introductory to a general discussion of their relative merits. 3200 w. Jour Assn of Engng Socs—Jan., 1903.

Electrical Distribution in the Machine Shop in 1903. Kern Dodge. A brief discussion of the application of electric motors to driving machine tools. 1200 w. Elec Wld & Engr—Jan. 3, 1903.

Electrical Distribution of Power in Industrial Establishments. Cecil P. Poole. The last twenty-five years really covers the history of the use of motors in factories, mills, etc. The methods are discussed. 2000 w. Eng Rec—Jan. 3, 1903.

The Requirements of Machine Tool Operation with Special Reference to the Motor Drive. Charles Day. Extracts from a paper read before the N. Y. Elec. Soc. Considers the method of driving, the requirements to be met, the factors to be considered, and the importance of management and organization to obtain the result desired. 4000 w. Ir Age—Jan. 8, 1903.

Electric Driving (Applications de l'Electricité à la Distribution de la Force Motrice dans les Ateliers et les Diverses Exploitations Industrielles). E. de Marchena. A general review of electric driving in factories and shops and discussion of different systems. 16000 w. Mem Soc Ing Civils de France—May, 1903.

Electric Driving in Machine Shops, Engineering and Shipbuilding Works. Reviews the papers by A. B. Chatwood and by A. D. Williamson, dealing with this subject. Serial. 1st part. 1700 w. Elec Rev, Lond—May 15, 1903.

Electric Driving for Factories (Elektrische Kraftübertragung für Betriebszwecke). Otto Kunze. A discussion of the benefits of electric driving, the different systems, and the increased safety and health of workmen. 2400 w. Oesterr Wochenschr f d Oeff Baudient—May 30, 1903.

Electric Driving in Machine Shops. A. B. Chatwood. Abstract of a paper before the Inst. of Elec. Engrs. On the advantages gained by the use of electricity, with suggestions. 2800 w. Mech Engr—June 6, 1903.

Variable-Speed Motors and Their Relation to New Shop Methods. Robert T. E. Losier. Considers the steps which have made for the progress in the application of electric motors to machine driving, and the effect of individually applied motors on efficiency and output of shops. 3000 w. Can Engr—July, 1903.

Motor-Driven Machine Tools. An illustrated article showing the latest practice in applying individual drives to shapers. 1500 w. Am Engr & R R Jour—July, 1903.

Electricity in Manufacturing Plants. Walter M. McFarland. Considers briefly the older methods of power transmission and their disadvantages, contrasting them with the advantages of electric driving. Ills. 5500 w. Trans Am Soc Nav Archts & Marine Engrs, No. 10—Nov., 1903.

Requirements of Machine Tool Operation with Special Reference to he Motor Drive. Charles Day. Extracts from a paper presented before the N. Y. Elec. Soc. Discusses shop conditions, fixed charges, etc., in shops doing a general class of work. Ill. 4000 w. Ry & Engng Rev—Nov. 21, 1903.

Modern Methods of Operating Machine Tools Electrically. General text of a lecture by Putnam A. Bates before the Engng. Soc of Columbia Univ. Considers the methods of electric distribution and the arrangements of the motors. 2500 w. Elec Wld & Engr—Feb. 13, 1904.

Electric Power in Workshops. J. T. Irwin. Read before the Rugby Engng. Soc. Discusses points that should be taken into consideration in planning the equipment. 2500 w. Prac Engr—March 4, 1904.

Motor-Driven Machine Tools. H. M. Phillips. Discusses points of importance in planning an electrical equipment for a shop. 5500 w. Ir Trd Rev—April 7, 1904.

Modern Methods of Operating Machine Tools Electrically. Abstract of a lecture by Putnam A. Bates, before the Engng. Soc. of Columbia Univ. Discusses the general problems to be considered in selecting a system, and describes a particular system which gives advantages due to its methods of variable-speed control. 2500 w. Sci Am Sup—April 16, 1904.

Electric Power in Manufacturing Plants. Dugald C. and William B. Jackson. An illustrated article discussing points to be considered in determining the most econmical and satisfactory means of distributing and applying the power. 5700 w. Cassier's Mag—June, 1904.

The Electric Equipment of Workshops and

Factory Buildings. Percival Robert Moses. A discussion of the advantages of electric driving, with suggestions as to the choice of apparatus for various kinds of work. 3000 w. Engineering Magazine—September, 1904.

Electric Motors in Machine Shop Service. Charles Day. The subject is considered from the standpoint of the shop engineer, whose one thought is economy. 6000 w. Int Elec Cong of St. Louis—Sept., 1904.

The Motor Equipment of Existing Machine Tools. George T. Hanchett. An illustrated article giving hints on selection of motors, conections, and cases of individual drive and geared connections. 2500 w. Am Elect'n—Feb., 1905.

Electric Power in Factories. A. W. Henshaw. Considers the reasons for the growing popularity of this system, giving information helpful in determining the system best adapted to any given condition. 6000 w. Elec Wld & Engr—March 18, 1905.

The Application of Electric Motors to Machine Tools. George T. Hanchett. Presents the advantages of driving tools directly by motors, considers variable speed control, and the methods. 3300 w. Elec Wld & Eng—March 18, 1905.

Some Special Applications of Electric Driving (Ueber Einige Elektrische Spezialantriebe). Alfred Kolben. Describing the electric driving of centrifugal sugar separators, of textile machinery, color presses, etc. 4000 w. Zeitschr f Elektrotechnik—April 2, 1905.

Some Problems in Electric Motor Driving. H. S. Knowlton. Suggestions for determining the proper motor outfit for any work, with remarks on the advantages to be gained. 1700 w. Cassier's Mag—June, 1905.

Recent Machine Tools with Electric Driving (Nuere Werkzeugmaschinen mit Elektrischem Antrieb). Paul Möller. Illustrations of lathes, shapers, and drill presses arranged for direct electric driving; designed by the Oerliken Works. 2500 w. Zeitschr d Ver Deutscher Ing—June 24, 1905.

Installing Electric Machinery. Norman G. Meade. Suggestions for light and power wiring in shops and foundries. Ills. 500 w. Power—July, 1905.

Advantages and Applications of the Electric Drive. F. B. Crocker and M. Arendt. Considers the one motor drive, group drive, and individual drive, and their proper application, and the advantages derived. Ills. 3000 w. Sch of Mines Qr—Nov., 1905.

A Discussion of the Various Systems of Electric Motor Driving. E. Kilburn Scott. Briefly considers belt driving, spur gearing, special cam gearing, worm gearing, chains, and friction gearing. Ills. 2400 w. Ir & Coal Trds Rev—Dec. 8, 1905.

Allis-Chalmers Co.—The Power Transmission and Speed Control System at the West Allis Works of the Allis-Chalmers Company. An illustrated article describing in detail the application of electric power throughout these large works. 2800 w. Engr, U S A—Jan. 1, 1904.

"Balancer."—The "Balancer" as Employed in Multiple-Voltage Direct-Current Systems. A. E. Kennelly. Describes the balancer and its general arrangement and applications for effecting speed control of motors in the shop. 1500 w. Harvard Engng Jour—Jan., 1905.

On Direct-Current Balancers. A. E. Kennelly and S. E. Whiting. Aims to express the fundamental conditions of operation of such balancers in a form adapted for use in electric driving. Diagrams. 1500 w. Elec Wld & Engr—Jan. 17, 1905.

See also **ELECTRIC APPARATUS.**

Blast-Furnace Plants.—See **BLAST FURNACE**—Electric Equipment.

Bottle-Making Plant.—See **ELECTRIC EQUIPMENT.**

British Works.—Electrical Power in British Works. W. Geipel. Read before the Gloucester Engng. Soc. Briefly reviews the older methods of operating, showing the losses, and considers how far electricity can assist in overcoming these losses. Serial. 1st part. 4200 w. Elec Rev, Lond—Feb. 22, 1901.

Cable Works, Silvertown.—See **ELECTRIC PLANT.**

Carriage Works.—Electric Power in Carriage Works. Ernest D. Phillips. An illustrated description of the electric power plant recently installed in those reconstructed works at Saltley, near Birmingham, Eng. 4000 w. Engng—Dec. 13, 1901.

Casting Pit.—See **CASTING**—Pit.

Cement Works.—See **CEMENT WORKS**—Edison; Grays.

Centrifugal Machines.—See **CENTRIFUGAL MACHINE.**

Centrifugal Pump and Fan.—See **PUMP**—Centrifugal, Electric.

Cheap Power.—The Possible Developments of Electrical Driving in Factories Due to the Supply of Electricity at Cheap Rates by Large Power Companies. J. S. Highfield. Abstract of paper before the Manchester Sec. of the Inst. of Elec. Engrs. A discussion of cost, advantages, and matters relating to electric driving. Serial. 1st part. 4000 w. Prac Engr—Feb. 27, 1903.

The Possible Developments of Electrical Driving in Factories Due to the Supply of Electricity at Cheap Rates by Large Power Companies. J. S. Highfield. A discussion of the important points of this subject. 2000 w. Elect'n, Lond—June 5, 1903.

Coal Cutting.—See **COAL MINING MACHINERY; ELECTRIC EQUIPMENT.**

Coal Handling.—See **COAL HANDLING**—Electric Driving.

Cost, Factory.—See **ELECTRIC POWER.**

Cotton Mill.—Electricity in Southern Cotton Mills. George E. Walsh. Concerning the application of electricity as a source of power. 2000 w. Elec Rev, N. Y.—Jan. 4, 1902.

Electricity in Cotton Mills. W. B. Smith Whaley. An account of the installation of an electric plant, tests, comparisons, etc. 2500 w. Trans Am Soc of Mech Engrs, No. 0942—May, 1902.

See also Textile Mills.

Cotton Mill, Columbia, S. C.—See **ELECTRIC PLANT.**

Cotton Mill, Italy.—The Electric Distribution of Power in the Amman Cotton Mils at Pordenone (Distribuzione Elettrica di Forza Motrice nel Cotonificio Amman E. C., in Pordenone). With numerous illustrations showing the manner in which the motors are applied. 2500 w. 1 plate. Industria—Oct. 14, 1900.

Cotton Mill, Mirecourt.—Electric Driving at the Mirecourt Cotton Mills (Commande Electrique des Usines de la Société Cotonniere de Mirecourt). J. A. Montpellier. General description of this important installation, in which 650 h. p. is distributed electrically with an efficiency of 71 per cent. 2000 w. Electricien—Jan. 17, 1903.

Cotton Mill, Montreal.—Electric Power Equipment for Dominion Cotton Mills Company. Illustrated description of the installation of electric power in mills at Montreal. 4000 w. Can Engr—Sept., 1901.

Cotton Mill, Pelzer, S. C.—Alternating-Current Motors in a Large Textile Mill. A. F. McKissick. Illustrated description of a water-power development, at Pelzer, S. C. 1700 w. Am Elect'n—Nov., 1900.

Crocker-Wheeler.—The Attachment of Motors to Machine Tools. Illustrates and describes the methods of the Crocker-Wheeler Company. 2800 w. Am Mach—Vol. 28, No. 17.

Dixon Crucible Co.—The New Power Plant of the Joseph Dixon Crucible Company. Illustrated description of a plant for electrically operating machinery in a number of buildings. 1300 w. Eng Rec—July 20, 1901.

Dubois, Pa.—Power Required to Drive Machine Tools. An account of tests made in the locomotive shops of the Buffalo, Rochester & Pittsburg Ry., at Du Bois, Pa., to ascertain the amount of power used in regular routine work, and also the power lost in shafting and belting. Describes shops. 3500 w. Ir Age—Feb. 12, 1903.

Electric Drive in Locomotive Repair Shops. A. S. Atkinson. Describes the electric drive in the large car shops of the Buffalo, Rochester & Pittsburg Ry Co., at DuBois, Pa., giving details of operation and results obtained. 2500 w. Ry & Loc Engng—Nov., 1905.

Economy.—The Advantages of the Electric Drive. D. N. Dunlop. States the advantages claimed, discussing the economy and increase of production. Ills. 4000 w. Ir & Coal Trds Rev—Dec. 16, 1904.

Feed Cone.—See **BLAST FURNACE.**

Fiberloid Works.—See **FIBERLOID WORKS.**

Flour Mill, Buffalo.—An Electrically Driven Flour Mill. O. C. McMeans. Read before the Indiana Engng. Soc. Describes the equipment of the flouring mill plant of the Uurban Milling Co., of Buffalo, which uses power from Niagara. 2000 w. Eng Rec—Feb. 11, 1905.

Foundry.—See **FOUNDRY.**

Glass Works.—Power Plant of the Edward Ford Plate Glass Co. T. L. Farnham. Illustrated description of a plant near Toledo, Ohio, which is probably the largest manufacturing plant entirely equipped with electrically driven machinery. 6000 w. Engr, U S A— April 1, 1901.

Induction Motors in a Plate Glass Factory. J. R. Cravath. Brief illustrated description of the plant of the Edward Ford Plate Glass Co., near Toledo, Ohio. 800 w. Am Elect'n—May, 1903.

See also **GLASS.**

Gold Dredge. — See **GOLD DREDGING — Electric Power.**

Goodrich Co., Akron.—See **STEAM TURBINE—Akron, O.**

Grinder.—See **GRINDER—Electric Driven.**

Group.—Group Driving of Machine Tools. J. C. Steen. Gives experience gained in equipping a new shop recently built. 1100 w. Am Engr & R R Jour—June, 1903.

The Application of Electric Driving to Workshops (Antrieb durch Elektrische Motoren im Fabrikbetrieb). W. Zuppinger. Discussing especially the matter of belting from the electric motor to shafting for group driving, when large speed reductions are necessary. 3000 w. Schweiz Bauzeitung—April 15, 1905.

See also **Group vs. Individual; Test.**

Group vs. Individual.—Comparative Tests of Independent and Group Driving (Einige Prüfungs Resultate des Electrischen Gruppen und Einsel-Antriebes). H. V. Reichel. Data and results of tests made at the Pruschkowo shops of the Vienna-Warsaw railway, showing the most favorable conditions of either system. 3000 w. Glasers Annalen—Oct. 15, 1902.

Motor Driving of Machine Tools. Dexter S. Kimball. Discusses the advantages and disadvantages of group driving compared to individual application of the motor, and the speed range to be given by the motor and the method of obtaining the same. 2800 w. Sib Jour of Engng—Dec., 1904.

Individual vs. Belt Drive in Electrically Operated Shops. Putnam A. Bates. An illustrated article discussing some mistakes made in installing electric apparatus, and the advantages of the individual motor drive. 1800 w. Am Elect'n —July, 1905.

Hydraulic Works.—See **Worthington.**

Ice Making Plant.—See **REFRIGERATION—Niagara Falls.**

Individual.—The Application of Individual Motor Drives to Old Machine Tools. R. V. Wright. A discussion of the points that bear on the problem as to whether it will pay to equip tools now in use with individual motors. Serial. 1st part. 2200 w. Am Engr & R R Jour—April, 1903.

The Individual Application of Electric Motors to Machinery, with Rules for Determining the Size of Motors. William Cooper. Calls attention to points of importance if these motors are to give satisfaction, illustrating by cases, and gives rules for determining sizes. 3500 w. Cassier's Mag—Feb., 1904.

Discussion on the Individual Operation of Machine Tools by Electric Motors. Discussion, with opening remarks by Charles Day. Ills. 9500 w. Jour Fr Inst—Nov., 1904.

See also **Group vs. Individual.**

Ingersoll-Sergeant Co.—The Application of Electricity to a Large Manufacturing Industry. Illustrated description of the new manufacturing plant of the Ingersoll-Sergeant Drill Company. 2000 w. Elec Wld & Engr—March 18, 1905.

A Modern Electrically-Driven Manufacturing Plant. Illustrated description of the Ingersoll-Sergeant Drill Company's new works at Phillipsburg, N. J. 1400 w. Am Elect'n—May, 1905.

Iron and Steel Works.—Electric Power Machinery in Iron and Steel Works. S. F. Walker. Giving many examples of the practical applications of electric driving in effecting economics in the production of the prime materials of construction. 3500 w. Engineering Magazine—Feb., 1901.

Electric Power in Iron Works (Emploi de l'Electricité dans le Forges). A. Abraham. With especial reference to the use of electric driving in forges and rolling mills, with examples from French and German practice. 3000 w. Génie Civil—Aug. 30, 1902.

The Use of Electricity in Iron and Steel Works. E. Kylberg. Read at the Düsseldorf meeting of the Iron & Steel Inst. Illustrates and describes some developments based on American practice and adapted to European requirements. Serial. 2 parts. 2500 w. Mech Eng—Sept. 20 and 27, 1902.

The Application of Electric Power in the Iron and Steel Industries. D. Selby-Bigge. Gives facts and figures of a practical nature collected from many sources. Serial. 1st part. 3500 w. Elect'n, Lond—Oct. 3, 1902.

Electric Power Applications in Modern Steel Making. John Hays Smith. Describing especially the numerous applications of electric driving in the Edgar Thomson mills of the Carnegie Company. 3500 w. Engineering Magazine—Dec., 1902.

Electrically Operated Charging Machines, Hoists, Hauling and Conveying Apparatus in Iron and Steel Works. Frank C. Perkins. Illustrated description of various forms of apparatus in which electric motive power is employed. 3300 w. Sci Am Sup—Dec. 20, 1902.

Alternating vs. Direct-Current, as Applied to the Iron and Steel Industry. C. H. Hines. Arguments as to the respective merits of the two systems, with the conclusion that the alternating current will be the equal of the direct in all cases, and its superior in most of them. 1200 w. Elec Wld & Engr—Feb. 21, 1903.

Electric Power in the Iron and Steel Industries. George E. Walsh. Some notes on the improvements made through the adoption of electricity as a motive power. 1800 w. Elec Rev, N. Y.—May 30, 1903.

Electric Power in Steel Works. Illustrates and describes a number of special applications of electric motors to steel works machinery. 1000 w. Engr, Lond—April 28, 1905.

Electric Driving for Iron Works (Die Elektrische Kraftübertragung auf Hüttenwerken). F. Janssen. A discussion of the advantages of electric power for iron works, with plans for a complete power plant. Serial. Part I. 5000 w. Stahl u Eisen—May 1, 1905.

See also **ELECTRIC EQUIPMENT—Coal Mine; Shop and Foundry; ELECTRIC PLANT—Donetz—Jurjewka; Frodingham; IRON WORKS; STEEL WORKS.**

Iron and Steel Works, Lackawanna.—Electrical Plant of the Lackawanna Steel Company. Illustrated description of an installation of especial interest in which both direct and alternating current are used. 6500 w. Elec Wld & Engr—Jan. 2, 1904.

Iron and Steel Works, Middlesbrough.—Electrical Power at Sir B. Samuelson and Company's Iron Works, Middlesbrough. Ernest D. Phillips. Illustrated detailed description of the plant and its applications. 4200 w. Ir Coal Trds Rev—Jan. 30, 1903.

Kimball Paper.—See **ELECTRIC MOTOR.**

Lathe.—Electrically Driven Lathes (Tours Actionnés Electriquement). Ch. Dantin. Showing the application of electric driving to large lathes for turning crank shafts of marine engines. 1500 w. Génie Civil—Oct. 19, 1901.

Electricaly Driven Turret Lathe. Illustrated description of an arrangement that enables a motor having a moderate speed variation to be attached direct to the lathe by gearing, and without the intervention of a cone pulley or similar speed-changing device. 1100 w. Engr, Lond —July 3, 1903.

See also **LATHE.**

Lathe, Old.—Applying a Motor Drive to an Old Lathe. Photograph and diagrams showing the method of adapting an old 60-in. engine lathe to a motor drive, and pointing out the utility of such an equipment and the management required to secure desirable results. 1500 w. R R Gaz—June 19, 1903.

Link Belt Co.—Electric Power Equipment of a Modern Machine Shop. Illustrates and describes the electrical equipment of the Link-Belt Engineering Co., near Philadelphia. Examples of both individual motor and group driving. 3000 w. Elec Wld & Engr—March 18, 1905.

Lister Works, Newark.—An Electrically Operated Manufacturing Plant. Illustrated description of the displacement of steam by electricity as motive power in the Lister Agricultural Chemical Works at Newark, N. J. 3000 w. Am Elect'n—Sept., 1902.

Live Rolls.—See **Iron and Steel Works; ROLLING MILL—Electric Driving.**

Locomotive Shops.—The Power Question in Locomotive Repair Shops. R. W. Stovel. Abstract of a paper read before the Ry. Club of Pittsburg. Discussion of systems of electric driving and their advantages with curves. 1200 w. Ry Age —April 4, 1902.

See also **Du Bois, Pa.; Railway Shop; LOCOMOTIVE SHOP.**

Machinery Design.—See **ELECTRIC MACHINERY—Heating Effects.**

Manchester, N. H.—Electric Water Power at Manchester, N. H. Mills. Illustrated article giving interesting facts in regard to this industrial plant operated with power from distant waterfalls. 1700 w. Elec Wld & Engr—Feb. 14, 1903.

Marine-Engine Works.—See **ELECTRIC EQUIPMENT—Shipbuilding; Union Iron Works.**

Mechanical Compared.—See **POWER TRANSMISSION—Electric vs. Mechanical.**

Mehl Leather Factory.—Power Plant in the Factory of John Mehl, Jersey City. An illustrated description of a carefully planned small plant. 1400 w. Engr, U. S. A.—July 1, 1901.

Mexican Central Shops.—See **RAILWAY SHOP.**

Milwaukee Harvester Co.—See **ELECTRIC PLANT.**

Morden Co.—Tests of Electric Driving Equipment in the Works of the Morden Frog & Crossing Co. Miles F. Moore. Gives tests made to determine the horse-power required to drive each machine or group of machines, and the alternating-current plant installed. 1200 w. Eng News—May 28, 1903.

Multiple Voltage Control.—Efficiency of Multiple Voltage Control in Electric Power Transmission. Lehman B. Holt. Calls attention to the seveeral ways in which losses occur in the use of power electrically transmitted. Brief discussion. 4500 w. Jour Assn of Engng Socs—Sept., 1901.

Multiple Control of Press Motors in San Francisco. Wyatt H. Allen. Illustrated description of the system of electric driving of the Mutual Label & Lithograph Co., where a variety of motors are used, with different requirements for speed variation. Illustrations and curves. 2400 w. Elec Wld & Engr—Aug. 27, 1904.

Multiple-Voltage Control of Motors. Norman Gardner Meade. Gives an outline of the multiple-voltage system and the methods of control employed, and its application to machine tool operation. Ills. 2400 w. Power—Nov., 1904.

See also **ELECTRIC MOTOR.**

Navy Yard.—See **ELECTRIC EQUIPMENT; ELECTRIC PLANT; MACHINE SHOP.**

Nordberg Co.—The Electrical Equipment of the Nordberg Manufacturing Company's Plant. Illustrated description of a plant electrically driven throughout and, with the exception of the tool room, all machines are fitted with individual motors. 2500 w. Am Mach—July 3, 1902.

Ongrée Works, Belgium.—Electric Power Installations at the Ongrée Works, Belgium. Illustrates and describes the leading features of an installation for electric power and light in large mechanical works. 3200 w. Ir & Coal Trds Rev —May 16, 1902.

Otis Elevator Co.—Power Plant of the Otis Elevator Co., Yonkers, N. Y. Arthur L. Rice. Illustrated detailed description. 2200 w. Engr, U S A—May 1, 1902.

Paper Mill.—See **PAPER MANUFACTURE; PAPER MILL.**

Planer.—See **PLANER—Electric Driving.**

Plate Glass Works.—See **Glass Works.**

Plymouth Cordage Co.—The New Mill and Power Plant of the Plymouth Cordage Company. Illustrated description of a plant for preparing and spinning binder twine at Plymouth, Mass., special attention being paid to the engine, plant and power transmission. Serial. 1st part. 1700 w. Eng Rec—May 11, 1901.

Polyphase.—Polyphase Equipment of Factories. W. Wyld. Read before the Birmingham Local Section of the Inst. of Elec. Engrs. Describes the polyphase alternating-current system and its advantages, and its application to factory driving. Ill. 6200 w. Elec Engr, Lond—May 10, 1901.

Portable Drills.—See **DRILL; TOOL—Portable.**

Portable Tools.—See **MACHINE TOOL.**

Power Consumption.—See **Test; ELECTRIC PLANT —Navy Yard; MACHINE TOOL.**

Printing.—The New Plant of the Curtis Publishing Co. Charles Henry Davis and John S. Griggs, Jr. Illustrated description of a large printing establishment with electric power transmission throughout. Serial. 1st part. 4400 w. Eng Rec—Feb. 23, 1901.

Spence's Electric Motors for Hoe Four-Roll Printing Machine. Illustrated description of the machine, its electric appliances and operation. 2400 w. Engng—Aug. 23, 1901.

Some Experiences with Electrically Driven Printing Machinery. An account of difficulties Arising in electrically driven printing works in London, and the cause and remedy. 1800 w. Elec Engr, Lond—June 26, 1903.

See also **ELECTRIC EQUIPMENT—Newspaper; Printing Office.**

Pruschkowo Railway Shops.—See **Group vs. Individual.**

Pump.—See **PUMP—Electric; PUMPING PLANT.**

Railway Shops.—The Question of Power for Railroad Repair Shops. Paper by R. W. Stovel, read before the Ry. Club of Pittsburg, with part of the discussion, and editorial giving further information on the subject of electrical driving of machine tools and the amount of energy required for machines of different types. 5500 w. Ry & Engng Rev—June 14, 1902.

Electricity in Railroad Shops. L. R. Pomeroy. A discussion of the power question and the advantages of the electric drive, the losses, etc., with suggestions. General discussion follows. 8500 w. Cent. Ry Club—Nov., 1902.

Electricity in Railroad Repair Shops. An illustrated description of buildings of monolithic concrete construction and the electrical equipment of the Central Railroad Shops at Elizabethport, New Jersey. 2800 w. Am Elect'n—Sept., 1903.

The Electric Drive as Applied to Machine Tools, with Special Reference to Railroad Shops. C. H. Hines. Outlines briefly what has been chosen as the equipment of a large railroad shop in the United States. 1600 w. Elec Wld & Engr—Sept. 19, 1903.

Electrically-Driven Shops. Report of Committees to Master Mechanics' Assn., giving general review of the systems and methods, with statistics and data derived. Serial. 2 parts. 10000 w. Ry & Engng Rev—Dec. 19 & 26, 1903.

The Electric Driving of Machinery in Shops of the Austrian State Railways at Linz (Der Elektrische Betrieb in den k. k. Staatsbahn-Werkstätten Linz). R. Dub and E. Suchy. With plan of the shops and details of the generating station, cranes and machinery. 3000 w. Elektrotech Zeitschr—Feb. 4, 1904.

Systems of Electrical Distribution in Railway Shops. J. Henry Klinck. An illustrated article discussing the system best adapted to railroad repair work. 4500 w. Ry Mas Mech—April, 1905.

Electric Drive in Railroad Shops. C. A. Seley. Reviews the development of electric transmission as applied to railroad shops, the methods adopted, the systems and applications of power. Ills. 3400 w. R R Gaz—Vol. XXXVIII., No. 19.

Electrical Equipment of a Railway Shop. Illustrates and describes the shops of the Great Northern Railway Co., at St. Paul, which were designed especially for motor driving. 5000 w. Elec Wld & Engr—May 27, 1905.

See also DuBois; Locomotive Shop; Roanoke; ELECTRIC PLANT—West Albany; POWER PLANT—Aguascalientes, Mex. Central; RAILWAY SHOP—Aguascalientes, Mex. Central; Elizabeth, N. J.; Power Equipment; St. Paul, Minn.

Roanoke Railway Shops.—Electric Driving for Shops. C. A. Seley. Read at the Saratoga Convention of the Mas. Mechs' Assn. A description of the regular motors for power purposes to be used at Roanoke shops of the Norfolk & Western Ry., the system of lighting, etc. 3200 w. R R Gaz—June 27, 1902.

See also Test.

Roller Tables. — See ROLLING MILL — Electric Driving.

Rolling Mill.—See Iron Works; ELECTRIC MOTOR—Cascade System; ROLLING MILL—Electric Driving.

Shaft and Axletree Works.—Electric Power at the Patent Shaft and Axletree Company's Works. Illustrated description of a three-phase electric power installation in England. 1800 w. Engng —Nov. 2, 1900.

Shaper.—See MACHINE TOOL—Power Consumption.

Shunt Motor.—See ELECTRIC MOTOR—Shunt.

Silk Weaving.—Silk Weaving at St. Etienne. Daniel Bellet. An account of the latest improvements by the addition of electric motors for driving the looms in the homes. Ill. 3000 w. Trac & Trans—June, 1903.

See also ELECTRIC PLANT.

Simmons Co., N. Y.—Motor Drives in the Plant of the John Simmons Company. Illustrates and describes a number of interesting combinations in a New York shop. The aim was to make the machines capable of using high speed steel tools. 2000 w. Ir Age—May 25, 1905.

Spice Factory, Charlestown.—Power Generating Equipment of a Spice Factory. Illustrated detailed description of a plant at Charlestown, Mass. 1800 w. Am Elect'n—May, 1902.

Stamp Mill.—See STAMP MILL.

Steel Works.—See Iron and Steel Works; STEEL WORKS—Antwerp.

Sugar Factory, Bohemia.—Electric Power Transmission in a Cube Sugar Factory. An illustrated description of the application of electric driving in a cube sugar factory in Bohemia. 1800 w. Elec Rev, Lond—Jan. 9, 1903.

Tannery.—Electric Power in Tanneries. George E. Walsh. An illustrated description of what has been accomplished in utilizing electricity for the operation of tanneries. 1700 w. Elec Rev, N Y—Feb. 20, 1904.

Test.—Power Test of Group Drive Motors. Records of an elaborate series of tests recently made at the Roanoke shops to determine the power required by the various group drive motors for machine driving. 1500 w. Am Engr & R R Jour—June, 1903.

See also Group vs. Individual.

Test, Case School.—Power for Large Machine Tools. Charles H. Benjamin. An illustrated report of a series of measurements made by the senior students of Case School of Applied Science on electrically-driven machines in two large modern shops. 1500 w. Cassier's Mag—Dec., 1903.

Textile Mills.—Lighting and Driving Textile Mills by Electricity. Marshal Osborne. Read before the Dublin Sec. of the Inst. of Elec. Engrs. A review of what has been done in this field, and the advantages gained. 3200 w. Elec Engr, Lond—Aug. 15, 1902.

Electrical Transmission of Power as an Aid to Greater Economy in Works and Factories. George Harland Bowden. Read before the Bradford Textile Assn. Discusses engineering detail in connection with the application of electric power to mills and factories. 3800 w. Elec Engr, Lond—Jan. 29, 1904.

Electric Driving of Textile Mills. W. B. Woodhouse. States briefly the advantages of electrical driving, with some facts on the cost of driving by motors, taking a supply from the mains of a power company or electricity works. 3800 w. Elect'n, Lond—Jan. 6, 1905.

The Electrical Operation of Textile Factories. H. W. Wilson. Abstract of a paper before the Manchester Sec. of the Inst. of Elec. Engrs. States the advantages claimed for electrical driving, discussing cost, reliability, etc. Serial. 1st part. 3000 w. Prac Engr—Jan. 27, 1905.

Electric Driving of Textile Mills. W. B. Woodhouse. Read before the Leeds Local Soc. of the Inst. of Elec. Engrs. States the advantages of electrical driving, its applications, etc. 3500 w. Elec. Engr, Lond—Sept. 8, 1905.

See also Cotton; Manchester, N. H.; Silk Weaving.

Tobacco Factory.—Induction Motors in a Tobacco Factory. F. E. Bausch. Illustrated description of the power plant of the M. C. Wetmore Tobacco Co., of St. Louis, Mo., with a capacity of 100,000 lbs. of tobacco daily. 1000 w. Am Elect'n —Feb., 1901.

Three Phase.—See ELECTRIC MOTOR.

Type Foundries.—Individual Motor-Drive in a Type Foundry. Illustrates and describes the application of individual motor drives for small machines at the factory of the American Type Founders' Company, at Communipaw, N. J. 2500 w. Elec Wld & Engr—March 18, 1905.

Valve Works.—Electric Motor Application. Ernst G. Howard. Extracts from a paper read before the Connecticut Valley Metal Trades Assn. An account of the equipment for the shops of the Chapman Valve Mfg. Co. 2000 w. Ir Trd Rev —May 11, 1905.

Variable-Speed Motors.—Some Variable Speed Motor Drives. Thomas J. Fay. A discussion of the electrical application of motors to machine tools, with illustrations, methods, and results. 2300 w. Elec Rev, N Y—Feb. 21, 1903.

Electric Drive. E. L. Walker. A discussion of variable speed motors and the methods of applying them to machine tools. Also general discussion. Ills. 5600 w. Pro Engrs' Club of Phila—Jan., 1905.

Vickers and Maxim.—Applications of Electricity at the Works of Vickers, Sons & Maxim. A. D. Williamson. Abstract of a paper read before the Inst. of Elec. Engrs. Describes a plant aggregating about 22,500 b. h. p. of generators and motors. Serial. 1st part. 3400 w. Mech Engr—May 30, 1903.

Wattenscheid.—See PUMPING STATION.

Westinghouse, Eng.—See ELECTRIC WORKS.

Wiring.—See ELECTRIC WIRING—Machine Tools.

Woodworking Machinery.—See WOODWORKING MACHINERY.

Woolwich Arsenal.—The Applications of Electricity in the Royal Gun Factory, Woolwich Arsenal. Col. H. C. L. Holden. Read before the Inst. of Elec. Engrs. Illustrates and describes applications of electricity and the methods, some of which are a departure from ordinary practice. Serial. 1st part. 3000 w. Elec Engrs, Lond—Nov. 24, 1905.

Worthington Pump Works.—Electric Motor Equipment of the Worthington Hydraulic Works. Illustrated description of a new plant in Harrison, N. J. 2400 w. Elec Wld & Engr—March 18, 1905.

Wüst System.—The Wüst System of Driving Machine Tools and Hoisting Machinery. Illustrates and describes the Wüst patent multi-speed polyphase motor and its working. 2000 w. Elec Rev, Lond—May 1, 1903.

ELECTRIC DYNAMOMETER.

See DYNAMOMETER—Electric; ELECTRIC INSTRUMENT—Electro-Dynamometer.

ELECTRIC ELEVATOR.

See CRANE, ELECTRIC; ELEVATOR, ELECTRIC; HOISTING—Electric.

ELECTRIC ENERGY.

See ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC EQUIPMENT; ELECTRIC POWER; ELECTRIC TRANSMISSION.

ELECTRIC ENGINEER.

See also EDUCATION; ELECTRIC ENGINEERING.

American Institute.—Proposed Developments of the Institute. Charles F. Scott. Presidential address delivered at New York, September 26, 1902. Considers the present standing and future possibilities of the Institute. 4800 w. Trans Am Inst of Elec Engrs—Aug. & Sept., 1902.

American Inst. Constitution.—Proposed Constitution of the American Institute of Electrical Engineers. Copy of proposed constitution to be brought up for consideration at the annual meeting, May 21, 1901. 5500 w. Trans Am Inst of Elec Engr—April, 1901.

Apprentice.—See **APPRENTICE.**

Brown.—See **BROWN.**

Buffalo Convention.—Report of the Commission of the Société Internationale des Electriciens to the Convention of the American Institute of Electrical Engineers (Rapport sur la Mission Envoyé par la Société Internationale des Electriciens au Congrés de l' American Institute of Electrical Engineers). 20,000 w. Bull Soc Int Des Elec—Aug., Sept., Oct., 1901.

Education.—See **EDUCATION—Electric Engineer.**

German Society.—The German Electrotechnical Society (Verband Deutscher Elektrotechniker). Report of the annual meeting, with regulations for standard installation details, together with the discussions. Two articles. 30,000 w. Elektrotech Zeitschr—Aug. 13, 20, 1903.

Military.—The Electrical Engineers R. E. in South Africa. R. E. Crompton. Lecture before the Inst. of Elec. Engs., England. An illustrated account of the war services of the English volunteers. 5600 w. Elect'n, Lond—Dec. 28, 1900.

Civilian Co-operation in the Development of Electrical Devices for Military Purposes. Caryl D. Haskins. An appeal for closer co-operation between civilian electrical engineers and the army and navy, indicating fields where they might be of service. 1200 w. Trans Am Inst of Elec Engrs—May 28, 1902.

Civilian Co-operation in the Development of Electrical Devices for Military Purposes. Caryl D. Haskins. An appeal for closer co-operation between civilian engineers and the officers of the U. S. Navy and Army in the development of electrical applications. 1200 w. Trans Am Inst of Elec Engrs—Oct., 1902.

Municipal Inspection.—See **INSPECTION—Municipal Electrician.**

Paris Exposition.—The Paris Exposition of 1900. Carl Hering. Inaugural address of the president at the meeting of Am. Inst. of Elec. Engs., New York. 10000 w. Trans Am Inst of Elec Engs—Oct., 1900.

Russian Congress.—The Second Congress of Russian Electrical Enginers at Moscow (Der II. Kongress Russicher Elektrotechniker in Moskau). C. v. Vetterlein. A general review of the congress, held in January, 1902, and of the papers read there. 2000 w. Elektrotech Zeitschr—Feb. 27, 1902.

Swinburne Address.—Some Difficulties in Getting On. J. Swinburne. Address delivered to the students of the Inst. of Elec. Engrs. 6000 w. Elect'n, Lond—Nov. 18, 1904.

See also **ELECTRIC ENGINEERING.**

Telephone.—See **EDUCATION.**

ELECTRIC ENGINEERING.

See also EDUCATION; ELECTRIC ENGINEER; ELECTRIC INDUSTRY; ELECTRICITY.

Some Notes on Electrical Engineering Practice in Europe and America. John Denham. Read before the Cape Town Sec. of the Inst. of Elec Engrs. On central station work and the transmission and utilization of electric power as observed by the writer on a recent trip through Europe and America. 6800 w. Elec Engr, Lond—Aug. 8, 1902.

The Mechanical Application of Electricity. W. B. Smith Whaley. Abstract of a lecture before Sibley College. Describing and illustrating the great progress made in the development of the application of electricity to the mechanic arts. 1800 w. Sib Jour of Engng—May, 1903.

Alternating Current.—See Polyphase; **ELECTRIC CURRENT, ALTERNATING; ELECTRIC GENERATOR, ALTERNATING.**

America.—A Traveler's Impressions of the United States (Reiseeindrücke aus den Vereinigten Staaten). Dr. F. Niethammer. A paper before the Elektrotechnischer Verein of Vienna, giving an illustrated general account of electrical engineering in America. Serial. 3 parts. 10000 w. Zeitschr f Elektrotech—July 5, 12 and 19, 1903.

American vs. British.—A Comparison of American and British Methods. Notes on American electrical engineering practice as seen from an English point of view. 2000 w. Elect'n, Lond—Sept. 20, 1901.

Argentine.—Electrical Enterprise in Argentine. Ernesto Danvers. Extracts from a paper read before the Inst. of Engs. of the River Plate, Buenos Aires, Argentina. The present article considers telegraphs, telephones and the electric light. Serial. 1st part. 5000 w. Elec Rev, N. Y.—Nov. 14, 1900.

Berlin.—See **ELECTRIC WORKS.**

British.—Electrical Engineering. Editorial review of the present standing in Great Britain, and of the work accomplished. 3800 w. Engr, Lond—Jan. 4, 1901.

British, 1904.—Electrical Engineering in 1904. Principally a review of the industry in England. 4800 w. Engr, Lond—Jan. 6, 1905.

Brown.—See **BROWN.**

Civil Engineering Relation.—The Relation of Electrical and Civil Engineering. Thomas Commerford Martin. Indicates some of the relationships that have developed during the last quarter of a century, the advances made, etc. 2800 w. Eng Rec—Jan. 3, 1903.

Columbia University, N. Y.—See **EDUCATION—Electrical Engineer.**

Convention, Monterey.—See **ELECTRIC TRANSMISSION.**

Development.—The Development of Electrical Science. From an address by Henry A. Gray, at a meeting of the Engineer's Club of Toronto. Traces the development of telegraphy, telephony, and electric lighting. 3000 w. Can Elec News—Feb., 1902.

See also **Progress.**

Earle's Address.—Mr. H. A. Earle's Inaugural Address to the Manchester Sec. of the Institution of Electrical Engineers. Abstract. Brief review of progress during the past 20 years, and subjects connected with electric lighting. 3500 w. Elect'n, Lond—Jan. 30, 1903.

Education.—See also **Perry Address; Thornton Address; EDUCATION.**

Efficiencies.—See **EFFICIENCIES.**

Esson Address.—The Influence of Electricity on Power Engineering. W. B. Esson. Presidential address to the Civ. & Mech. Engrs.' Soc. Historical review of the progress and development, with discussion of topics of special interest. Serial. 1st part. 5500 w. Elec Engr, Lond—Oct. 13, 1905.

Europe.—Important European Electrical and Engineering Developments at the Close of the Nineteenth Century. William J. Hammer. Illustrated detailed descriptions of the telephonograph, the Langen mono-rail, Nernst lamp, osmium lamp, gas engines, steam turbine, and other important inventions. 20600 w. Trans Am Inst of Elec Engs—Feb., 1901.

Electricity in Europe Twenty Years Ago and To-day. A statement of such facts as will show a comparison between the use of a score of years ago and to-day. 3800 w. Elec Rev, N Y—Feb. 15, 1902.

A Review of Electrical Engineering in Europe During 1902. A. Webster. A general review. 3500 w. Elec Rev, N Y—Jan. 10, 1903.

Notes on Recent Electrical and Scientific Developments. William J. Hammer. An illustrated article describing details of the Valtellina 20,000-volt three-phase railway in Italy; three-phase Cruto, and Ganz lamps, Osmium and

Nernst lamps. Serial. 1st part. 4400 w. Jour Fr Inst—May, 1903.

"Forrest" Lecture.—Unsolved Problems in Electrical Engineering. Col. Rookes Evelyn Bell Crompton. The "James Forrest' lecture, 1905. Treats a few of these problems, referring to some very near solution, and others that will greatly benefit mankind. 11000 w. Inst of Civ Engrs—April 10, 1905.

Unsolved Problems in Electrical Engineering. Col. R. E. B. Crompton. The "James Forrest" lecture, delivered at the Inst. of Civ. Engrs., April 10, 1905. Classifies the problems into two groups, those set by Nature, and those which have developed in applying electrical energy to man's service. Discusses some of the problems. Full paper. 8500 w. Engng—April 14, 1905 .

Unsolved Problems in Electrical Engineering. Col. R. E. B. Crompton. Abstract of the "James Forrest" lecture, delivered before the Inst. of Civ. Engrs., with editorial. Discusses a few of the most pressing problems. 5800 w. Elect'n, Lond—April 14, 1905.

General Electric Co.—See **EDUCATION.**

Germany.—Direct Current Engineering Practice in Germany. Charles Brandeis. An illustrated description of German engineering practice and methods. 1200 w. Elec Wld & Engr—July 6, 1901.

Visit of the Institution of Electrical Engineers to Germany. E. Kilburn Scott. An interesting account of the visit of this British society, the works inspected, etc. Ill. 3800 w. St Ry Jour—Sept. 7, 1901.

Traction, Light and Power Practice in Germany. Abstracts of the discussions of the London section of the Inst. of Elec. Engrs. on the works visited and things seen on their recent visit to Germany. The present article is devoted to the subjects in title. 2700 w. Elec, N Y—Jan. 29, 1902.

Heavy.—See **Swinburne Address.**

India.—Electrical Conditions in India. Arthur C. Hobble. States present conditions, explaining why electrical engineering projects have not kept pace with other engineering enterprises, and gives a brief account of the "Cauvery Power Scheme." which furnishes power for the Kolar gold fields. 1200 w. Elec Rev, N Y—July 25, 1903.

Japan.—Japanese Electrical Work. R. G. Mayse. An account of points observed during a recent visit. Ill. 1500 w. W Elect'n—April 27, 1901.

Laboratory.—See **LABORATORY—Central Technical College.**

Liége Exposition.—Electrotechnics at the Liége Exposition (Die Elektrotechnik auf der Weltausstellung in Lüttich). Dr. M. Corsepius. A general description of the exhibits, with details of lighting devices and transformers. 3500 w. Elektrotech Zeitschr—Oct. 12, 1905.

Light Current.—What Inducements to Enter "Light Current Engineering" Are Held Out to Technical Students. Joseph B. Baker. Explains what is meant by "light current engineering," and discusses the fields of telephony, telegraphy and wireles telegraphy. 1600 w. Elec Rev, N Y—Feb. 13, 1904.

Langdon Address.—Mr. W. E. Langdon's Presidential Address to the Institution of Electrical Engineers. A review of electrical achievements from the standpoint of a railway engineer, and a discussion of the future prospects. Serial. 1st part. 5000 w. Elect'n, Lond—Nov. 22, 1901.

McGill University.—See **EDUCATION.**

Materials.—See **ELECTRIC APPARATUS—Standardization.**

Munro Address.—Mr. J. M. Munro's Inaugural Address to the Glasgow Section of the Institution of Electrical Engineers. (Abridged.) Historical review of early work and of electricity in civic service. 6000 w. Elect'n, Lond—Nov. 24, 1905.

Paris Exposition.—Electrotechnics at the Paris Exposition, 1900 (Die Elektrotechnik auf der Pariser Weltausstellung, 1900). Dr. F. Vogel. A general descriptive address delivered before the German Society of Mechanical Engineers. 2500 w. Glasers Annalen—Nov. 15, 1900.

Pearce's Address.—S. L. Pearce's Inaugural Address to the Manchester Section of the Institution of Electrical Engineers. (Abridged.) A general survey of the year's work, noting advances made and the problems yet unsolved. 8000 w. Elect'n—Nov. 24, 1905.

Perry Address.—Electrical Engineering as a Trade and as a Science. John Perry. Inaugural address delivered at meeting of the Inst. of Elec. Engs., England. 9800 w. Nature—Nov. 8, 1900.

Physics.—See **ELECTRO-PHYSICS.**

Polyphase.—Polyphase Work in 1903. A. C. Eborale. Reviews the present position of heavy electrical engineering, indicating some of the lines upon which the work is progressing, and the future outlook. Serial. 1st part. 2200 w. Elec Rev, Lond—Feb. 6, 1903.

Precision.—The Necessity for Precision of Statement in Technical Work. H. M. Hobart. Especially considers the subject in its bearing on electrical work, illustrating by important questions which have been only superficially discussed. Serial. 1st part. 1600 w. Elec Rev, Lond—Aug. 7, 1903.

Problems.—The Problems That Are Facing the Electrical Engineer of To-Day and the Qalities of Mind and Character Which Are Needed to Meet Them. J. G. White. A discussion of this subject. 4500 w. Trans Am Inst of Elec Engrs—Oct., 1903.

See also **"Forrest" Lecture.**

Progress.—Electrical Progress, 1877-1902. Thomas Commerford Martin. Brief review of a period which, with the exceptions of telegraphy and telephony, covers most of the practical applications of electricity, and showing its relation to mechanical engineering. 2000 w. Am Mach—Nov. 6, 1902.

Twenty Years of Electrical Development. Charles T. Child. A review of progress from 1882 to 1902. 5200 w. Elec Rev, N Y—Feb. 15, 1902.

See also **Development.**

Railway.—See **ELECTRIC RAILWAY—Engineering.**

Regulations.—See **ELECTRIC INDUSTRY.**

St. Louis Exposition.—Electrical and Mechanical Engineering in the Exposition Plant. J. R. Cravath. A summary of the work of the electrical and mechanical department of the Division of Works, which builds and operates the exposition. Ills. 1600 w. Elec Wld & Engr—May 7, 1904.

South Africa.—Electric Engineering in South Africa. John Roberts. Principally an account of the municipal undertaking in Durban, Natal. 4500 w. Elect'n, Lond—July 29, 1904.

Swinburne Address.—Some Limits in Heavy Electrical Engineering. James Swinburne. Presidential address to the Inst. of Elec. Engrs., London. Confined to a discussion of heavy electrical engineering. Serial. 1st part. 4000 w. Elect'n, Lond—Dec. 5, 1902.

See also **ELECTRIC ENGINEER.**

Thornton Address.—Dr. W. M. Thornton's Inaugural Address to the Newcastle Section of the Institution of Electrical Engineers. Abstract. Discusses the science and art of engineering, the education of an engineer, &c. 2500 w. Elect'n, Lond—Nov. 24, 1905.

Wordingham Address.—Inaugural Address by C. H. Wordingham before the Manchester Section of the Institution of Electrical Engineers. Describes technical questions of interest to the practical engineer in relation to electrical engineering. Serial. 1st part. 4000 w. Elec Engr, Lond—Nov. 22, 1901.

ELECTRIC EQUIPMENT.

See also **ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC LIGHTING; ELECTRC PLANT; ELECTRIC POWER; ELECTRIC TRANSMISSION; HOISTING; MECHANICAL PLANT; POWER PLANT.**

The Application of Motors to Machine Tools. Charles Day. Supplementary to paper read before the N. Y. Elec. Soc. Discusses some details bearing upon the equipping machines with individual motors. 1400 w. Am Mach—March 26, 1903.

Battleship.—See **Navy.**

Blast Furnace.—See **BLAST FURNACE.**

Bottle-Making Plant.—Power Equipment in a Bottle-Making Plant. R. M. Hopkins. Describes the plant and processes used by the Illinois Glass Co., of Alton, Ill., and explains the electrical system employed, the apparatus installed, and the general arrangement of the power plant and transmission system. 2500 w. Eng Rec—Dec. 12, 1903.

Bridge Contractor's.—Electric Installation for Contractor's Plant on Brooklyn Anchorage of Manhattan Bridge. Describes the electric plant for the use of power instead of hand labor whenever possible. Electric apparatus is used for pile-driving, hoisting, traction, concrete mixing, pumping and lighting. Ills. 1500 w. Eng Rec—Aug. 26, 1905.

Canal.—See CANAL—Cornwall; Lachine; Soulanges, Canada; CANAL HAULAGE; HYDRO-ELECTRIC PLANT—Milleroches, Ont.

Cement Works.—See CEMENT WORKS—Alsen, N. Y.; California; Electric Equipment.

Coal Mine.—Electrically-Driven Machinery in the the "Adolph von Hausemann" Mine (Elektrisch Betriebene Maschinen auf der Zeche "Adolf von Hausemann"). R. Goetze. A very full description of this electric light and power plant in the Westphalia coal mining district. 3000 w. Glückauf—Dec. 8, 1900.

Economy of the Appliances of Electricity in Collieries and Iron and Steel Works. Ernest D. Phillips. On the improvements in the apparatus used, some of the peculiarities of the modern machines and the advantages gained by their use. Ill. 2500 w. Ir & Coal Trds Rev—Dec. 21, 1900.

Some Recent Developments of Electrical Power in Mines. Information concerning the most up-to-date German practice in electrical applications to coal mining. Ill. 4400 w. Ir & Coal Trds Rev—Dec. 21, 1900.

Electricity in Mines and Collieries. J. E. Hodgkin. Considers the extent to which electrical transmission may be adopted with profit in Great Britain. 4000 w. Ir & Coal Trds Rev—Dec. 21, 1900.

Electrical Apparatus in Coal Mining. John Price Jackson. A description of the most important machinery for electric locomotion, cutters and drills. 8000 w. Jour Fr Inst—Jan., 1901.

The Utilization of Electrical Machinery in Coal Mining. W. C. Mountain. On the necessity of introducing electrical machinery, and its application. Ill. 3000 w. Elec Rev, Lond—Feb. 8, 1901.

The Electrical Transmission of Power in Coal Mines. H. Ravenshaw. Read before the Inst. of Elec. Engrs., England. A discussion of the special features, and a record of difficulties and mishaps. 9000 w. Ir & Coal Trds Rev—March 29, 1901.

Some Notes on the Electrical Transmission of Power in Coal Mines. H. Ravenshaw. Read before the Brit. Inst. of Elec. Engrs. Discusses the special features met with in electric power plants in coal mines and gives a record of difficulties and mishaps which have come directly under the notice of the author. 8000 w. Elec Rev, Lond—April 12, 1901.

Practical Application of Polyphase Alternate-Circuit Machinery in Coal Mines. Illustrates and describes work carried out successfully at the Park Colliery, Garswood, and Sandwell Park Colliery, near Birmingham. 1600 w. Col Guard—April 19, 1901.

A Polyphase Electric Power Plant, and a Direct-current Power Plant. Illustrates and describes two recently installed plants at English collieries, comprising the two. 4000 w. Col Guard—April 11, 1902.

The Progress of Electricity in Mining During 1901. Reports steady progress without startling developments, noting the special features. 2200 w. Col Guard—Jan. 31, 1902.

Three-Phase Electric Driving, Applied to Coal-Cutting. Roslyn Holliday. Gives reasons for adopting it, and some of the experiences met with before success was assured. 1500 w. Ir & Coal Trds Rev—July 18, 1902.

Electric Pumping and Coal-Cutting Plant at the South Durham Colliery, near Bishop Auckland. Describes this plant recently visited by the N. of Eng. Inst. of Min. & Mech. Engrs., reporting addresses on the occasion. 2800 w. Col Guard—July 25, 1902.

Systems of Electric Power for Soft Coal Mines. John Price Jackson and William P. Cochran. Considers questions of importance in the relation of the system to be used for power operation, including haulage. Gives a description of the plant at Ehrenfeld, Pa. 2500 w. Eng & Min Jour—Aug. 16, 1902.

Electrical Mining Notes. Sydney F. Walker. An account of instance in English coal mining operations where electrical apparatus saved money. 1500 w. Elec Rev, N. Y.—Jan. 3, 1903.

Application of Electricity to Mining. Daniel Burns. Read before the Glasgow Tech. Col. Sci. Soc. Deals with some of the more important applications of electricity for mining purposes, such as lighting; driving machinery; coal-cutting; drilling; separating minerals; shot-firing; signalling, etc. Serial. 1st part. 1700 w Col Guard—Feb. 20, 1903.

Electricity in Mines. Reports to the Departmental Committee on Electricity in Mines, including an account of valuable experiments to test the liability of continuous-current motors on coal-cutters to ignite gas, undertaken and reported by W. E. Garforth. Ill. 3300 w. Col Guard—May 1, 1903.

Continuous and Alternating Currents Applied to Mining. Ellis H. Cropper. Lecture delivered before the Nat. Assn. of Colliery Mgrs. Deals with electricity applied to mining, considering the two systems of electrical transmission and distribution of power. 4400 w. Ir & Coal Trds Rev—July 17, 1903.

Electric Installation at the Noel-Sart-Culpart Collieries, Belgium. Illustrates and describes a plant of sufficient capacity to drive a hoisting engine, an underground pump, feed incandescent lamps for lighting the mine, drive an electric fan and the coal briquette factory. 2200 w. Ir & Coal Trds Rev—April 8, 1904.

The Electric Power and Transmission Plant at the Courl Mines (Die Elektrischen Kraftübertragungs-Anlagen der Zeche Courl). H. Schulte. An account of a complete electric power installation in the Dortmund district; about 700 h. p. being used for hoisting, pumping, ventilation, and other work. 3000 w. 2 plates. Glückauf—April 9, 1904.

Electricity in Colliery Work. F. J. A. Matthews. Considers in detail the application of electricity to colliery work, the methods of transmission of power, etc. Ills. Serial. 1st part. 8700 w. Mech Engr—June 18, 1904.

The Applications of Electricity at the Pinxton Collieries. Describes the extensive application of electricity in these English collieries. Ills. 4200 w. Elect'n, Lond—Sept. 9, 1904.

Power Plants at Collieries. Discusses the principal economies that may be applied to modern collieries in Great Britain and the saving that would result. 1800 w. Mech Engr—Oct. 29, 1904.

Electricity in Coal Mining. George E. Walsh. Considers the applications thus far made of electricity in the mining of coal. 1800 w. Eng & Min Jour—Feb. 2, 1905.

Application of Electric Power in Collieries. G. M. Brown. Abstract of a paper read before the Rugby Engng. Soc. Considers the use of electricity in the form of direct current, and also alternating current, the applications, etc. 4000 w. Ir & Coal Trds Rev—Feb. 3, 1905.

Dangers Attending the Employment of Electricity in Mines. Abstract from "Glückauf." An illustrated article discussing the conditions which add to the dangers of the employment of electricity, the safety devices and precautions to be used, etc. 2300 w. Ir & Coal Trds Rev—Feb. 10, 1905.

Application of Electric Power in Collieries. G. M. Brown. Abstract of a paper read before the Rugby Engng. Soc. Discusses the advance in the application of electricity to mining due to the introduction of the polyphase alternating current induction motor. 2700 w. Elect'n, Lond—March 17, 1905.

Electricity in Coal Mining. W. B. Clarke. On the applications made of the electric motor and its especial adaptability for such work. Ills. 1800 w. Min Mag—April, 1905.

Electricity in the Anthracite Coal Mines. Robert Thurston Kent. Illustrates and describes applications of electricity in the coal mines. Serial.

1st part. 5300 w. Elec Rev, N Y—April 8, 1905.

Electrical Mining Notes. Sydney F. Walker. Discussion of machinery, locomotives, ignition of coal dust and of gas, earth and leakage and other topics. 2000 w. Elec Rev, N Y—Sept. 2, 1905.

Improvements in Electric Operation of Coal Mines. George E. Walsh. An account of the operation of the mines in the vicinity of Scranton and Wilkesbarre, where electricity is generated at a central station and distributed for mine operation. 2200 w. Min Wld—Nov. 25, 1905.

Electricity as Applied to Mining. W. C. Mountain. The first of three lectures on this subject, to be given at the University College, Nottingham. A record of progress made in the application of electricity to coal mines, and suggestions for future application. Ills. 7500 w. Ir & Coal Trds Rev—Dec. 1, 1905.

See also Mine; COAL MINE—Ehrenfeld, Pa.; COAL-MINING MACHINERY; ELECTRIC INDUSTRY—Regulations, Mine.

Coal Mine, Ackton Hall.—The Electrical Installation at Ackton Hall Colliery. Illustrated description of a large light and power plant near Pontefract, in England. 1800 w. Col Guard—Jan. 25, 1901.

Coal Mine, Anthracite.—Application of Electricity in the Anthracite Coal-Field of Pennsylvania, with special reference to the Wyoming Field. Discussion at the Albany meeting of the paper of H. H. Stoek and G. W. Harris. 600 w. Trans Am Inst of Min Engrs—Feb., 1903.

Coal Mine, Belgium.—New Electric Equipment for Two Belgian Coal Mines (Zwei Neue Bergwerksanlagen mit Elektrischem Antrieb in Belgien). Adolf Spier. Description of electric plants and machinery at coal mines near Mons and Liége, with diagrams of the hoisting operations. 7000 w. Glückauf—Sept. 2, 1905.

Electrical Installation at the Hasard Colliery, Belgium. M. R. A. Henry. Abstract of a paper before the Min. Cong. at Liége. Illustrated description. 900 w. Col Guard—Dec. 29, 1905.

Coal Mine, British.—Electrical Mining Notes. Sidney F. Walker. The present article considers the uses of electricity in British collieries. Serial. 1st part. 2000 w. Elec Rev, N. Y.—March 14, 1903.

English and German Designs for Electrical Mining Equipment. Frank C. Perkins. Gives illustrations of the power house at the Sneyd mine in Staffordshire, England, and considers details of German and English designs, the generating and lighting stations, distribution, electric haulage and winding machines, underground pumping plants, etc. Serial. 1st part. 1600 w. Min Rept—Oct. 20, 1904.

High-Tension Electrical Plant at Messrs. Bolckow, Vaughan and Co.'s Collieries. Illustrates and describes this plant showing the advantages and economies of the use of electricity in mines. 1200 w. Proc Engr—May 12, 1905.

Coal Mine, Carmaux, France.—The Electric Plant at the Carmaux Mines (Installations Electriques des Mines de Carmaux). A. Bainville The gas from coke furnaces is used to supply steam for 1,400 h. p. generating sets. Plans for the generators, switch boards and distribution are given. 2000 w. Electricien—Jan. 26, 1901.

Coal Mine, Dahlbush.—Tests of the Electric Light and Power Plant of the Dahlbusch Mine (Untersuchung der Elektrischen Kraft und Lichtcentrale auf Zeche Dahlbush). A general description of the plant, and details of the tests of the turbo-alternator, and distribution. Two articles. 6000 w. Glückauf—Feb. 25, March 4, 1905.

The Electric Power and Lighting Station of the Dahlbusch Mine (Die Elektrische Kraft-und Lichtanlage der Zeche Dahlbusch). Messrs. Le Beil & Bollmann. Fully illustrated description of the plant, including steam engines, steam turbines, pumps, ventilators, buildings, etc. 4000 w. 4 plates. Glückauf—June 3, 1905.

Coal Mine, Danger.—The Dangers of Electricity in Mining (Die Gefahren der Elektrizität im Bergwerksbetriebe). A review of the applications of electricity in mining, with especial reference to the possible ignition of fire damp. Serial, Part I. 1800 w. Glückauf—Jan. 30, 1904.

Coal Mine, Durham.—See COAL MINING MACHINERY—Durham.

Coal Mine, Europe.—Electric Power in European Collieries. C. S. Vesey Brown. Gives illustrations showing typical engine rooms of the colliery plants, and motor drives, describing the working at various mines, and giving an account of the development. 2500 w. Cassier's Mag—June, 1904.

Coal Mine, Germany.—Electrically Driven Mining Apparatus in Germany. C. L. Durand. Illustrated description of electric plants for hoisting, haulage, etc., at coal mines near Dortmund und Zwickau, Germany. 2000 w. Elec Rev, N Y—Aug. 20, 1904.

Electricity in German Collieries. E. O. Forster Brown. From a paper read before the Mining Institute of Scotland, giving a statement of the methods used in German collieries and the extent to which electricity has been adopted. 900 w. Eng & Min Jour—June 8, 1905.

See also Coal Mine, British; MINE VENTILATION—Eschweiler, Germany.

Coal Mine, Lambton.—Lambton Collieries Power Distribution Scheme. Gives a summary of the requirements and general conditions as shown in the specifications. Serial. 1st part. 2500 w. Elec Rev, Lond—May 12, 1905.

Coal Mine, Lanarkshire.—Electricity in the Lanarkshire Coalfield. Abstract of a presidential address delivered by Robert Robertson before the Glasgow Local Sec. of the Inst. of Elec. Engrs. 3000 w. Col Guard—Dec. 16, 1904.

Coast Defense.—See COAST DEFENSE.

Coke Oven.—See BLAST FURNACE; COKE MANUFACTURE—Orlau-Lazy; Wigan, Eng.

Comstock Lode.—See Gold Mining.

Cotton Mill.—See ELECTRIC DRIVING; ELECTRIC PLANT.

Cripple Creek.—See Gold Mining.

Department Store, Chicago, Ill.—A Notable Example of Central Station Supply of Electric Power and Light. Describes the installation in Marshall Field & Co.'s stores, in Chicago. 2200 w. Eng Rec—Sept. 26, 1903.

Department Store, N. Y.—The Electrical Equipment of the New Macy Store Building. Charles E. Knox. Illustrated description of a recently installed plant, which furnishes electricity for lighting, and for driving motors for parcel conveyors, pneumatic blowers, carpet and sewing machines, ventilating fans, glass-cutting machines, etc. 3000 w. Am Electn—Feb., 1903.

Dock.—See CRANE, ELECTRIC; DOCK; HARBOR.

Docks, Middlesbrough.—Electric Equipment of Railway Docks, Middlesbrough, England. Illustrates and describes a fine plant at Middlesbrough, England, for the North-eastern Railway Co's docks. 2200 w. Elec Wld & Engr—Feb. 1, 1902.

Electric Cranes and Capstans at Middlesbrough Docks. Illustrated description of an example of the complete equipment of docks with electric cargo appliances. Also editorial. Serial. 1st part. 3000 w. Elect'n, Lond—Feb. 7, 1902.

Electric Capstans and Cranes at North Eastern Co's Railway Docks. Frank C. Perkins. Illustrates and describes some of the details of the installation at these English docks. 2400 w. Mod Mach—Feb., 1903.

Middlesbrough Dock Electric and Hydraulic Power Plant. Vincent L. Raven. Gives the particulars of the installation and of the tests made at this dock on the North Eastern Railway, comparing hydraulic with electric. Ills. 5000 w. Inst of Mech Engrs—June, 1904.

Dry Dock.—See DRY DOCK—Electric, Brooklyn.

Elba Iron Works.—See BLAST FURNACE GAS.

Emden Harbor.—See ELECTRIC PLANT.

Engine Works.—See Shipyard; Union Iron Works.

Fire Hazards.—The Installation of Electric Equipment from a Fire Insurance Point of View. C. W. Rohrer. The proper installation, the testing of materials, and the hazards of defective wiring are discussed, and the importance of inspection. 1800 w. Cal Jour of Tech—Sept., 1905.

Food Plant, Niagara.—Electrically Operated Food Plant at Niagara Falls. Frank C. Perkins. An illustrated description of the Natural Food plant. Both alternating and continuous currents are utilized, and also a storage battery. 1800 w. Elec Rev, N Y—Nov. 22, 1902.

Foundry.—Power and Light for the Machine Shop and Foundry. Forrest R. Jones. Discusses the requirements to be fulfilled by an electric system for power transmission and lighting, and the system selected for a large plant. 6900 w. Trans Am Soc of Mech Engs, No. 882—Dec., 1900.

Electricity in a Malleable Iron Foundry. H. P. Kernochan. Describes the electric equipment of the foundry of the Troy Malleable Iron Co., Watervliet, N. Y., for power and lighting. 1100 w. Elec Rev, N Y—July 8, 1905.

See also **ELECTRIC DRIVING—Iron and Steel Works; FOUNDRY.**

Gas Works.—See **COAL HANDLING; COKE HANDLING.**

Glucose Factory, Edgewater, N. J.—An Induction-Motor Factory Installation. Illustrated description of the new electrical generating and distribution system of the New York Glucose Co., at Edgewater, N. J. 2500 w. Elec Wld & Engr—March 18, 1905.

Gold Dredging.—See **GOLD DREDGING.**

Gold Mining.—Electricity in Gold Mining. Prof. Wilbar Colvin. Illustrated description of the plant of the Crown Mountain Gold Mining Co. of Dolonega, Ga., in which electricity is the motive power throughout. 1400 w. Sci Am—Oct. 5, 1901.

The Economy of Electric Power in Quartz Mining. C. C. Poole. Read before the Pacific Coast Elec. Trans. Assn. Presents in a practical way the economical results obtained by the use of electric power in comparison with steam power, using wood, coal and oil as fuel. The paper is based on practice of the mines on the Mother Lode in Amador and Calaveras counties, California. Ill. 4800 w. Jour of Elec—July, 1902.

Electrical Equipment of the C. & C. Shaft of the Consolidated California & Virginia Mining Company. Leon M. Hall. Illustrated detailed description of this installation, which is considered one of the most complete mining installations in the world, and its operation has been entirely satisfactory. 1600 w. Eng News—Aug. 21, 1902.

Electric Power for General Purposes in Mining and Milling. John B. Tregloan. Read before the California Miners' Assn. Deals with results obtained in Amador Co., Cal., using electricity at $6.50 per h. p. per month. 2800 w. Min & Sci Pr—Nov. 29, 1902.

Gold Mining, California.—High-Tension Systems for Mining Purposes. George E. Walsh. An account of the application of electric power at Folsom Creek, Cal., and neighboring mining regions. 1400 w. Eng & Min Jour—Feb. 23, 1905.

Electricity Applied to Mining in California. Describes and illustrates mines in Mariposa County, giving a description of the electric equipment of the Mariposa Commercial & Mining Co. as a typical example of an independent plant. 1800 w. Min & Sci Pr—April 8, 1905.

Gold Mining, Comstock.—Electric Power on the Comstock Lode. Wynn Meredith and Wyatt H. Allen. Illustrated description of a new transmission plant for use of the mines, with editorial notes. 4600 w. Elec Wld & Engr—Nov. 24, 1900.

Recent Application of Electrical Power on the Comstock Lode. Leon M. Hall. Read at the convention of the Pacific Coast Elec. Trans. Assn. Illustrates and describes the most important features of the new installation. 4700 w. Jour of Elec—Aug., 1902.

Electric Power on the Comstock. Gives an outline of the history of this noted mine, and a description of the plant supplying electric power for mining and for railway transportation of the raw material. 2500 w. Engng—Oct. 24, 1902.

Gold Mining, Cripple Creek.—Notes on Electrical Development and Experience in the Cripple Creek District, Colorado. J. R. Cravath. An account of the uses to which electricity is applied, the companies supplying the power, etc. 4300 w. Elec Wld & Engr—Jan. 19, 1901.

Gold Mining, Nevada.—Electrical Equipment of the C. & C. Shaft of the Consolidated California & Virginia Mining Co., Virginia City, Nev. Leon M. Hall. Illustrated description. 1800 w. Mines & Min—Nov., 1902.

Gold Mining, Transvaal.—Electricity in Rand Mines. Sidney F. Walker. A report of the use made of electricity in South Africa. 1200 w. Aust Min Stand—March 31, 1904.

Electricity in the South African Gold Mines. Sidney F. Walker. Describes a gold mine and the applications of electricity being made to its workings. 2500 w. Elec Rev, N Y—Jan. 16, 1904.

The Witwatersrand Deep Electrical Plant. Illustrates and describes the electrical plant of the Witwatersrand Deep Gold Mining Co., Ltd., which is of the most modern type. 1500 w. Elec Engr, Lond—Aug. 25, 1905.

See also **ELECTRIC STATION.**

Gun.—See **GUN—Electrical Equipment.**

Grain Elevator.—Electrical Equipment of a Grain Elevator. C. W. Whitney. An illustrated description of the power plant of the Southern Pacific Terminal Co., at Galveston, Texas. 1500 w. Am Elect'n—Oct., 1903.

See also **GRAIN ELEVATOR.**

Harbor.—See **Heysham; Karlsruhe; Manaos; HARBOR.**

Hat Factory, Philadelphia.—Electrical Equipment of a Large Hat Factory. Illustrated detailed description of the power plant of the John B. Stetson Company, at Philadelphia. 1800 w. Am Elect'n—Nov., 1902.

Heysham Harbor.—Electrical Plant at Heysham Harbor. Illustrated description of the plant at this large, new harbor built by the Midland Railway Co. In addition to arc and incandescent lighting current is supplied for the electric cranes, capstans, lifts, etc. Serial. 1st part. 2000 w. Elect'n, Lond—June 24, 1904.

Gas-Driven Electrical Plant at Heysham Harbor, England. Description, with illustrations, of Mond gas producer and gas-driven electric plant for lighting and supplying power for cranes, lifts, etc. 700 w. Elect Wld & Engr—Aug. 13, 1904.

See also **HARBOR.**

Hippodrome, New York.—The Application of Electricity in the New York Hippodrome. An illustrated article describing some of the novel features of the stage and the applications made of electricity for handling scenery, regulating lights, etc., in this large amusement building. 2500 w. Elec Rev, N Y—April 29, 1905.

Hospital, London.—Electricity in the London Hospital. An illustrated description of the electric light and power installation, comprising about 6,000 lights and 100 motors. 5000 w. Elec Rev, Lond—Nov. 10, 1905.

Hospital, N. Y.—The Electric Enquipment of a Large Hospital. Charles E. Knox. Illustrated detailed description of the lighting and power plant of the Lying-in Hospital, New York. 3500 w. Am Elect'n—Jan., 1902.

Hotel Astor, N. Y.—The Electrical Equipment of the Hotel Astor, New York. W. E. Crane. An illustrated detailed description of the engineering equipment of this fine hotel, especially the electrical plant. 2500 w. Elec Wld & Engr—Feb. 11, 1905.

Iron and Steel Works.—See **ELECTRIC DRIVING; ELECTRIC PLANT; IRON WORKS; STEEL WORKS.**

Karawanken Tunnel.—The Electric Plant at the Karawanka Tunnel (Die Elektrischen Anlagen am Karawanken Tunnel). Johann Perl. A full account of the use of electric power in the boring of the tunnel through the Karawanka Alps in Carinthia. The bore is 7,969 metres long. 5000 w. Zeitsch d Oesterr Ing u Arch Ver—May 6, 1904.

The Electrical Equipment of the Karawanken Tunnel. Illustrated description of an interesting power transmission plant and equipment in Austria-Hungary for transmitting power to be used in tunnel construction. 1300 w. Elec Wld & Engr—Nov. 12, 1904.

Electric Equipment at the Karawanken Tunnel. Illustrated description of the electric plant for furnishing power for tunnel construction in Austria, with explanation of some of the uses to which the power is applied. 2800 w. Engr, Lond—June 2, 1905.

Latest Electrical Equipment of the Karawanken Tunnel. F. C. Perkins. Describes briefly the electrical power transmission plants and equipments utilized for the construction of this tunnel in Austria-Hungary. 1500 w. Min & Sci Pr—Oct. 21, 1905.

Karlsruhe Harbor.—The Light and Power Plant of the Port of Karlsruhe on the Rhine (Die Licht und Kraftanlagen des Rheinhafens zu Karlsruhe). F. Winawer & C. Bender. A detailed account of the transformer station and electric distribution; also electric cranes, hoists, and conveyors; together with lighting plant. The current is obtained from the municipal plant. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 29, 1902.

Kimberley Mines.—The Power Plant of the De Beers Consolidated Mines, Ltd. Alpheus F. Williams. An illustrated description of steam turbines and electrical apparatus at the diamond fields of Kimberley, South Africa, and some of the uses for which the current is utilized. 3600 w. Eng Rec—Jan. 7, 1905.

See also **DIAMOND.**

Laboratories.—Electrical Equipment of the New Physical Laboratories, Owens College. W. P. Steinthal. An illustrated description of the electrical arrangements for lighting, power, and experimental work. 2500 w. Elec Rev, Lond—April 12, 1901.

Locomotive Shop.—See **ELECTRIC DRIVING; LOCOMOTIVE SHOP**—Slades Green, Eng.

London Coliseum.—See **ELECTRIC LIGHTING.**

Machine Shop.—See Foundry; **ELECTRIC DRIVING.**

Manaos Harbor, Brazil.—The Electrical Equipment of Manaos Harbor, Amazon River. Charles J. Seibert. A short illustrated description of a system for handling cargo, which has proved very successful. 1200 w. Elec Wld & Engr—Aug. 19, 1905.

Mine.—Electricity in Mining. Henry Louis. Abstracts from a series of papers in the "Mining Journal" of London, treating of advanced English and European practice. 2500 w. Mod Mach—Nov., 1900.

Electricity in Mining. Lawrence Birks. The first of a series of articles on the advantages of electrical installations. The present article deals principally with its use as an illuminant. Ill. Serial. 1st part. 1600 w. Aust Min Stand—Jan. 10, 1901.

Electrically Operated Mines in Europe. Frank C. Perkins. Illustrates and describes the Ferdinandsgrube electrical pumping plant, and the electric mine ventilators at Karwin. 600 w. Eng & Min Jour—March 30, 1901.

Electricity in Mountain Mines. F. W. Brady. Particulars and details of a few plants illustrating the general conditions and difficulties encountered in making different kinds of installations. 4800 w. Trans Am Inst of Elec Engs—April, 1901.

Electricity in Mountain Mines. Discussion of a paper by F. W. Brady. 2300 w. Trans Am Inst of Elec Engrs—June and July, 1901.

The Application of Electric Power to Mining (Anwendungen der Elektrizität im Bergbau). R. Goetze. A general examination of the adaptation of electric power to mining, including pumping and hoisting. 5000 w. Glückauf—Oct. 19, 1901.

German Electric Plants. Illustrates and describes an example of the slow-speed three-phase electric motor now extensively used for driving pumps in mines in Germany, and the acessory plant on the surface in connection with the system. 2500 w. Engr, Lond—Nov. 22, 1901.

Electric Power in Mining (Elektricität im Grubenbetriebe). A general review of the advantages of electric driving in mining, with examples of successful practice. 1200 w. Glasers Annalen—Dec. 1, 1901.

Electricity in Mining. George H. Gibson. On electrical machinery used in mining, with report of a number of recent installations. Ill. 2700 w. Eng & Min Jour—March 1, 1902.

The Electro-Mechanical Plant at the Tunnel of the Raibl Mine (Der Elektro-Maschinelle Betrieb des Neuen Hilfstollens für den Aerarischen Erzbergbau in Raibl). A. Edler von Posch. Describing the electric drills and other machinery used in running the auxiliary tunnel of the Raibl mines in Carinthia, Austria. Four articles. 7500 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 8, 15, 22, 29, 1902.

Sparkless Electrical Plant for Use in Mines and Ironworks. Abstract of a paper by J. H. Whittaker read at meeting of the South Staffordshire and East Worcestershire Inst. of Min. Engrs. on motors and other features of the electric equipment of mines. 2700 w. Col Guard—April 18, 1902.

The Use of Electricity in Modern Mining Installations. Frank C. Perkins. Information regarding modern electric installations, both of direct and alternating current. Ill. Serial. 1st part. 1400 w. Min Rept—Nov. 27, 1902.

Electricity in Modern Mining Drainage Installations. Frank C. Perkins. An illustrated article concerning the reliability and economy of electrically operated pumps, and the use of electricity for mine haulage, hoisting, etc. 1500 w. Sci Am—March 28, 1903.

Electrical Day at the Institution of Mining Engineers, London. Sidney F. Walker. A review of the electrical papers presented, and the discussions. 2000 w. Elec Rev, N. Y.—Aug. 1, 1903.

Electricity in Mines. T. Campbell Futers. Discusses the details of the application of electricity to mine work, the causes of dissatisfaction and the remedies. Ill. Serial. 1st part. 1600 w. Elec Rev, Lond—Aug. 21, 1903.

Some Electric Mining Appliances. Illustrations with brief descriptions of hauling engines, pumps, etc., designed and constructed by the Union Elektricitäts Gesellschaft. 1500 w. Engr, Lond—Nov. 13, 1903.

Application of Electricity to Mines. A. C. Anderson. Read before the Birmingham Loc. Sec. of the Inst. of Elec. Engrs. Remarks on the increased use of electricity in mines and its advantages, the choice of a system, voltage, generating plant, distribution, etc. Serial. 1st part. 3300 w. Elec Engr, Lond—March 3, 1905.

Application of Electricity to Mines. A. C. Anderson. Abstract of a paper read before the British Inst. of Elec. Engrs. Considers the choice of a system, the voltage, distribution, motors, etc., and the applications to pumping, winding and haulage, coal-cutters, drilling, etc. 4800 w. Elec Rev, N Y—Aug. 19, 1905.

Uses of Electricity in Mines. Henry Willock Ravenshaw. Describes the various applications of electricity in general use in mines, giving facts from actual practice. Ills. Serial. 1st part. 4000 w. Jour Soc of Arts—Sept. 1, 1905.

Up-to-Date Electrical Power Distribution. R. Loraine Gamlen. Read before the Inst. of Min. Engrs. Discusses the things necessary for success if a power company is to supply the power for mines. 4000 w. Ir & Coal Trds Rev—Sept. 15, 1905.

See also Coal Mine; Gold Mining; Kimberley; **COAL MINING MACHINERY; ELECTRIC EXHIBITION**—Düsseldorf; **ELECTRIC INDUSTRY**—Regulations, Mine; **ELECTRIC SHOCK**—Exhall Coal Mine; **ELECTRIC TRANSMISSION**—Sumatra; **ELECTRIC WIRING; HOISTING**—Electric; **MINE HAULAGE**—Electric; **MINING MACHINERY; PUMP.**

Mine, Compressed Air Compared.—A Discussion of Systems of Power Supply for Mine Operation. F. V. Henshaw. Comparing the relative advantages of electricity and compressed air for mining work. 3000 w. Engineering Magazine—March, 1905.

See also **COAL MINING MACHINERY**—Electric vs. Compressed Air.

Mine, Copper.—Mexican Electric Power Distribution to the Santa-Rosalia Copper Mines near the Gulf of California. Frank C. Perkins. Illustrations with description of the plant. 2000 w. Min Rept—April 10, 1902.

Mine, Cost.—Electric Drilling, Dredging and Pumping. George E. Walsh. Information in regard to the cost of operation, and applications at various mines. 2000 w. Eng & Min Jour—Dec. 15, 1904.

Mine, Europe.—Electric Power Appliances in the Mines of Europe. Emile Guarini. M. Guarini's second paper deals with the direct applications of electric power to ore getting, hauling, and hoisting. 3500 w. Engineering Magazine—Sept., 1903.

Electric Power Appliances in the Mines of Europe. Emile Guarini. An extensively illustrated review of current practice on the Continent. The first part deals with surface plant, generating stations, lighting, and signaling. Serial. First part. 3500 w. The Engineering Magazine—Aug., 1903.

Mine, Frongoch.—The Frongoch Zinc and Lead Mine, Wales. A short illustrated description of the electric plant and the appliances connected with the working of this mine. 1200 w. Eng & Min Jour—May 18, 1901.

Three-Phase Power Plant in a Welsh Lead Mine. Illustrated description of the plant in the Frongoch mine, in Cardiganshire. 700 w. Elec Rev, Lond—Sept. 12, 1902.

Electric Transmission Plant at a Lead Mine. Illustrates and describes the complete three-phase electrical equipment installed in a mine in Wales. Serial. 1st part. 500 w. Prac Engr —Nov. 7, 1902.

Mine, German.—Some Applications of Electricity in German Mines. Illustrated description of a number of installations of pumping and winding plants. 2500 w. Elect'n, Lond—Jan. 27, 1905.

See also **MINE DRAINAGE—Electric, German.**

Mine, Helios Co.—The Electrical Mining Installations of the Hélios Electrical Company. Emile Guarini. Gives an account of the work of this company, and illustrated descriptions of installations made. 4000 w. Elec Rev, N. Y.—March 12, 1904.

Mine, Hollertszug.—Electric Power Plant at the Hollertszug Iron Ore Mine, Herdorf on the Sieg, Germany. States the conditions to be met, and gives illustrated description of the plant installed. 2300 w. Ir & Coal Trds Rev—Feb. 22, 1901.

Mine, Hungary.—Electric Plant in the Grand Duke Frederick Iron Mine at Zakarfalu, Hungary (Die Elektrischen Anlagen des Erzehrsoglich Friederichschen Eisensteinbergbaues in Zakarfalu). H. Drolz. A description of the utilization of the water power of the Gölnitz for the light and power plant of the mines at Zakarfalu, including the transport of iron ore to the railway, 5 kilometres distant. Serial. Part I. 2 plates. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen —Aug. 16, 1902.

Mine, Kalgoorlie.—See **ELECTRIC PLANT.**

Mine, Legal Questions.—Electricity in Mines. Deals with legal questions that arise when the supply of electricity it taken from a supply company. 1800 w. Col Guard—June 5, 1903.

Mines, Mexico.—The Electrification of Mexican Mines. George E. Walsh. Information concerning important electric plants recently established for mining purposes, usually combining transportation, lighting and mine operation. 1500 w. Eng & Min Jour—July 6, 1905.

Mine, Quebec.—An Installation of Electric Power for a Quebec Mine. Describes the substitution of electricity, generated by water power, for steam power at the Eustis mine at Capelton, P. Q. The mine produces sulphur, copper and the precious metals. Ills. 2000 w. Can Min Rev—Dec. 31, 1904.

Mine Rules.—See **ELECTRIC INDUSTRY—Regulation, Mine.**

Model Basin.—See **MODEL BASIN.**

Navy.—Tests of the Electric Plants of the Battleships "Kearsarge" and "Kentucky." J. J. Woodward. Description of tests made to determine if all appliances used were properly constructed and installed, and to collect facts regarding their performance. 20000 w. 68 plates. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

Electric Plants on Modern Warships (Die Elektrischen Anlagen Neuerer Kriegsschiffe). H. Grauert. A very full account of electrical installations on recent German warships, with diagrams of switchboards, etc. Two articles. 10000 w. Electrotech Zeitschr—Nov. 22, 29, 1900.

Electricity in the Navy. Walter M. McFarland. Remarks mainly with respect to power plants and motor installations on shore, with brief reference to electrical apparatus on war vessels. 3400 w. Trans Am Inst of Elec Engrs —Oct., 1902.

Electricity in the Navy. Lieut. Harry George. Sketches the development and applications in the naval service for both lighting and power, and compares the United States vessels with foreign navies. Ill. 13500 w. Trans Am Inst of Elec Engrs—Oct, 1902.

Electric Light Plant for Dutch Torpedo Boats. Illustrations and brief description of plant for working the search lights, and for general lighting purposes. 350 w. Engng—July 31, 1903.

The Electric Installation on Board U. S. Battleships Connecticut and Louisiana. R. M. Klein. Illustrated detailed description of the electric applications aboard these ships and the plants for handling the entire load. 7000 w. Elec Wld & Engr—Aug. 15, 1903.

Electricity in the British Naval and Merchant Marine. Sydney F. Walker. Reports the progress, and describes some of the arrangements. 1600 w. Marine Engng—June, 1904.

Special Machinery on Board a Naval Ship. Perry K. Thurston. Describes some of the conveniences and labor-saving devices used on the modern naval vessel. 2800 w. Marine Rev—Nov. 3, 1904.

Application of Electric Power to Auxiliary Machinery in the Navy. L. C. Brooks. Describes the latest practice in the various applications made. Ills. 5000 w. Am Elect'n—Aug., 1905.

Application of Electricity on Warships (L'Electricité à Bord des Navires de Guerre). G. Maugas. A review of the applications of electricity on shipboard, including lighting, auxiliary motors, communication, etc., as well as the propulsion of submarines. 5000 w. Bull de la Soc Int des Electriciens—Dec., 1905.

Electricity in Service on British Battleships. Edward Nelson. An illustrated description of the electrical apparatus found on one of the British cruisers which recently visited New York. 2000 w. Elec, N Y—Dec. 6, 1905.

See also Ship; **ELECTRIC GENERATING SET.**

Navy Standard Voltage.—The Reasons for the Change of the Navy Standard Voltage from 80 to 125. Lieut. W. V. N. Powelson. Reviews briefly the history of the voltages used by the navy, and discusses the considerations that led to the recent adoption of 125 volts as the standard for all new installations on board U. S. ships. 5000 w. Trans Am Inst of Elec Engrs—May 20, 1902.

Navy Yard.—Electric Transmission of Power for Navy Yards. William S. Aldrich. An argument to show that to secure the highest efficiency electric-power transmission is best adapted to the work required. Serial. 1st part. 3500 w. Jour Am Soc of Nav Engrs—May, 1902.

See also **POWER PLANT.**

Navy Yard, Brooklyn.—Electricity at the New York Navy Yard. F. N. Kollock, Jr. An illustrated description of the new polyphase power plant. 8800 w. Jour Am Soc of Nav Engrs—Nov., 1901.

A Large Polyphase Workshop Distribution Plant. Illustrated description of the plant for the New York Navy Yard. 2000 w. Elec Wld & Engr—Aug. 17, 1901.

Electric Power Distribution in a United States Navy Yard. An illustrated description of the equipment of the Brooklyn Navy Yard and the results obtained. 1800 w. Elec Wld & Engr—Nov. 2, 1901.

The Steam Engineering Power Station at the Brooklyn Navy Yard. Illustrated description of the electric generating station built to furnish power to the extensive engineering shops at the Brooklyn Navy Yard. 2800 w. Eng Rec—June 1, 1901.

Central Electric Lighting and Power Station in the Brooklyn Navy Yard. Illustrated description of this plant. 1300 w. Power—Dec., 1900.

See also **MACHINE SHOP.**

Navy Yard, Washington.—Electricity at the Washington Navy Yard. J. E. Price. An illustrated article giving information of the electric outfitting of the various shops. 1100 w. Elec Rev, N. Y.—July 16, 1904.

Newspaper.—The Electrical Plant of a Philadelphia Newspaper. J. H. Vail. Illustrated detailed description of the plant of the "North American," the oldest newspaper in America. 3000 w. Elec Wld & Engr—July 27, 1901.

Electrical Equipment of a Southern Newspaper Plant. Louis Elliott. Illustrates and describes the isolated plant of the "Dallas-Galveston News." 1700 w. Am Elect'n—Jan., 1902.

New York Times Building.—The Electrical Equipment of the New York "Times" Building. Explains reasons for taking the supply of current from the N. Y. Edison Co. and describes the service, applications, etc. Ills. 1700 w. Elec Rev, N Y—Jan. 28, 1905.

Oil Field, Russia.—See ELECTRIC STATION—Caspian Oil Wells.

Oil Mine.—See Shale Oil Mine.

Packing House.—See ELECTRIC PLANT.

Paper Mill.—See PAPER MANUFACTURE; PAPER MILL.

Pierrefitte Mine and Mill.—See HYDRO-ELECTRIC PLANT.

Pinxton, Eng.—See Coal Mine.

Printing Office.—Power Plant of the Government Printing Office at Washington. An illustrated detailed description of the enlarged plant which is to serve the new office and the old adjacent plant. The present article describes the boiler plant. Serial. 1st part. 2300 w. Eng Rec—May 16, 1903.

The Government Printing Office—The Electrical Equipment of the Largest Printing Office in the World. Illustrated detailed description. 5000 w. Elec Wld & Engr—Jan. 2, 1904.

See also Newspaper; N. Y. Times; ELECTRIC DRIVING.

Quarry.—See CRANE ELECTRIC—St. Triphon Quarries; QUARRYING.

Quartz Mining.—See Gold Mining.

Shale Oil Mine.—Electric Power in a Lothian Oil Mine. Illustrated article describing applications of electric power in Scotland where oil is produced from shale. 2200 w. Elec Rev, N. Y.—Jan. 16, 1904.

Shale-Oil Works.—Electric Power in a Shale Oil Works. Brief description of an installation of exceptional interest about to be put down at the works of the Oakland Oil Company, in Scotland. 1200 w. Elec Rev, Lond—March 7, 1902.

Ship.—Electric Lighting for German Ships. Gives extract of an article in the "Elektrotechnische Zeitschrift" treating of electrical installations on new ships of the Germany navy. Also remark on the use of accumulators for supplying electric light on ocean steamers. 600 w. U S Cons Repts, No. 978—Feb. 28, 1901.

The Probable Future Developments in the Use of Electricity on Board Ships. F. O. Blackwell. Points out the improvements in sight in marine electric plants, the field for their profitable extension, and some of the recent developments in electrical engineering that may be advantageously employed on shipboard. 6600 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 13—Nov., 1902.

Ship Lighting. Frank Broadbent. Explains the unfortunate circumstances that affect the wiring of ships, and discusses the generating plants, governors, steam and exhaust service, dynamos, switchboards and fuseboards, in the present article. Serial. 1st part. 2400 w. Elec Rev, Lond—Feb. 6, 1903.

Use of Electricity on German Vessels. Illustrations, with brief description of the uses to which electricity is applied on the "Kronprinz Wilhelm." 600 w. U S Cons Repts, No. 1587—March 6, 1903.

Standards for Electric Installation on Ships (Normalien für die Verwendung von Elektricität auf Schiffen). Standards for electric light and power plants on ships proposed by the Verband Deutscher Elektrotechniker. 500 w. Elektrotech Zeitschr—May 21, 1903.

Uses of Electricity on Board Ship. J. W. Kellogg. Reviews this development since 1880, when the first plant was put into operation, describing modern plants. The present series of articles considers only the uses for lighting and power. Ill. Serial. 1st part. 3700 w. Marine Engng—July, 1903.

Special Machinery and Appliances on Board Ship. George McQuilkin, Jr. Shows the important bearing electrical installations have had on the development of special machinery. 2400 w. Marine Rev—Nov. 3, 1904.

Electricity on Shipboard (Einiges über Schiffselektrotechnik). C. Schulthes. An examination of the electrical requirements on shipboard, with description of generators, wiring systems, etc., adapted for marine service. Serial. Part I. 3500 w. Glaser's Annalen—July 1, 1905.

See also Navy; ELECTRIC LIGHTING; ELECTRIC MACHINERY—Repairs.

Ship "Baltic."—The New White Star Steamer Baltic's Electrical Equipment. George E. Walsh. Describes some of the electrical devices of this vessel, which has the most extensive electrical equipment yet installed. 1800 w. Elec Rev, N Y—April 16, 1904.

Ship "Deutschland."—Electric Light and Power Installation on Steamer "Deutschland." Illustrated detailed description of this very fine plant. 1700 w. Elec Wld & Engr—June 1, 1901.

Ship Repairs.—Electrical Repairs at Sea. Describes some of the methods of testing and makeshifts resorted to where conditions are often very different from those on land, and supplies not always available. 2400 w. Elec Rev, Lond—April 28, 1905.

Shipyard.—The Electrical Equipment of Messrs. Palmer's Shipbuilding Works. Illustrates and describes the recent electrical equipment of the shipbuilding and engine departments of these extensive works at Jarrow-on-Tyne. 5000 w. Engng—Nov. 1, 1901.

Electric Appliances in Shipbuilding Yards. Sydney F. Walker. A fully illustrated paper showing the advantages of electric power in shipyards for power distribution and for the operation of heavy tools. 3000 w. Engineering Magazine—Feb., 1902.

Electric Transmission at the Palmer Shipyard at Jarrow-on-Tyne (Transmission de Force par l'Electricité dans les Ateliers de la Palmer Shipbuilding and Iron Co. à Jarrow-sur-Tyne, Angleterre). Chas. Dantin. An illustrated description of the electric plant and electric driving in the shops and yard. 3000 w. Génie Civil—Feb. 1, 1902.

Electric Appliances in Shipbuilding Yards. Sydney F. Walker. Mr. Walker's second paper is devoted to the construction and uses of portable electric tools in all departments of shipbuilding. 3500 w. Engineering Magazine—March, 1902.

The Electrical Eequipment of a Modern Shipyard. Illustrated detailed description of the fine plant of the Fore River Ship and Engine Co., at Quincy, Mass. 3000 w. Elec Rev, N Y—April 26, 1902.

The Electrical Equipment of a Modern Shipyard. An illustrated description of the electrical generating and driving equipment of the plant of the New York Shipbuilding Co., at Camden, N. J. 2200 w. Elec Rev, N Y—Jan. 17, 1903.

The Distribution of Electricity in Shipyards and Engine Works. J. A. Anderson. Read before the Newcastle Sec. of the Inst. of Elec. Engrs. A description of the different means of applying electricity and some results obtained. 3000 w. Elec Engr, Lond—Feb. 12, 1904.

Electric Power in British Shipyards. C. S. Vesey Brown. Begins a review of electric power installations, with special reference to the northeast coast, illustrating applications made and the machines. The first of two articles. 3300 w. Cassier's Mag—March, 1904.

Description of the Electrical Equipment of an Engine Works and Shipyard, with Notes Thereon. H. O. Wraith. Read before the Leeds Local Sec. of the Inst. of Elec. Engrs. Discusses the question of converting large works of this type to electric driving. Serial. 1st part. 4500 w. Elec Engr, Lond—Oct. 14, 1904.

Application of Electricity to Industrial Purposes. J. F. C. Snell. Abstract of a paper read before the N.-E. Coast Inst. of Engrs. & Shipbuilders. Gives results and particulars in regard to the application of electricity to shipyards. 3000 w. Elect'n, Lond—March 3, 1905.

See also Navy Yard; Union Iron Works; SHIPBUILDING; SHIPYARD.

Shipyard, Vulcan.—The Light and Power Plant of the Vulcan Works at Stettin (Die Versorgung der Werkstätten der Stettiner Maschinenbau—A. G. Vulcan mit Kraft und Licht). A. Böttcher. A general description of the power plant of the great Vulcan shipyards, and of the electrical equipment. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—Jan. 24, 1903.

Electric Installation of the Vulcan Shipyard. A. Richardson. Gives an illustrated detailed description of the re-equipment of this important shipbuilding establishment in Germany. Serial. 1st part. 6500 w. Trac & Trans—May, 1903.

Soulanges Canal.—See CANAL.

Steamship.—See Ship.

Steel Works.—See ELECTRIC DRIVING; STEEL WORKS—Antwerp.

Stock Exchange.—The New Headquarters of the Stock Exchange, New York City. An illustrated description of the power plant, annunciator service, and telephone system. 3800 w. Elec Rev, N Y—May 9, 1903.

Theatre.—Electric Installations in Theatres. C. Arldt. An illustrated description of the installation in the Prince Regent Theatre, of Munich, as an example of recent practice. 1600 w. Trac & Trans—April, 1903.

The Electric Installation in the Prince Regent Theatre at Munich (Die Elektrischen Anlagen im Prinzregenten-Theater zu München). C. Ardlt. A well illustrated description of a very complete stage and theatre electrical installation. 1600 w. Elektrotech Zeitschr—April 2, 1903.

Torpedo Boat.—See Navy.

Type Foundry.—The Electrical Equipment of a Modern Type Foundry. Illustrated description of the plant of the American Type Founders' Company, Jersey City, N. J. 3500 w. Elec Rev, N Y—June 25, 1904.

The Electrical Equipment of a Modern Type Foundry. Illustrated description of the plant of the American Type Founders' Company, at Communipaw, N. J. 3300 w. Am Elect'n—Nov., 1904.

Union Iron Works.—Electricity in the Union Iron Works. W. W. Hanscom. An illustrated description of this plant for power and lighting large ship and engine-building works in San Francisco. 4000 w. Jour of Elec—June, 1901.

Vulcan Shipyard.—See Shipyard, Vulcan.

Warehouse.—See WAREHOUSE.

Warship.—See Navy; Ship.

Woolen Mill.—See ELECTRIC DRIVING—Textile Mills; ELECTRIC PLANT—Maynard, Mass.

ELECTRIC EXHIBITION.

See also ELECTRIC ENGINEER; ELECTRICITY; ELECTRIC LIGHTING; EXPOSITION; PAN AMERICAN EXPOSITION; ST. LOUIS EXPOSITION.

Charleston, S. C.—Electricity at the Charleston Exposition. Charles T. Malcolmson. Describes the arrangements being made for power and lighting. Ill. 1400 w. Elec Wld & Engr—Dec. 14, 1901.

See also EXPOSITION.

Düsseldorf.—Electricity and Power Gas in Mining and Metallurgy (Der Bergbau auf der Düsseldorfer Ausstellung 1902. Elektrizität und Kraftgas im Bergbau und Hüttenwesen). R. Goetze. Illustrated descriptions of electrical apparatus of various kinds and of large gas engines. 11 plates. 7500 w. Glückauf—June 28, 1902.

German Society.—Report upon the Exhibition of the Electrotechnical Society (Bericht über die Ausstellung des Electrotechnischen Vereins). F. Breisig. A fully illustrated description of the principal exhibits of the electrical exposition held on the twenty-fifth anniversary of the society. 25000 w. Elektrotech Zeitschr—April 20, 1905.

Glasgow.—The Glasgow International Exhibition. Sydney F. Walker. An illustrated account of the electrical features. 5200 w. Elec Rev, N Y—Oct. 12, 1901.

See also GLASGOW EXHIBITION.

London, Olympia.—Electrical Exhibition at Olympia. Begins a description of such exhibits as are of interest to the mining engineer. Serial. 1st part. 3000 w. Col Guard—Oct. 6, 1905.

See also ELECTRIC MACHINERY—Olympia.

Pan-American.—Electricity at the Pan-American Exposition, Buffalo, N. Y. An illustrated review of the plans executed and under way at Buffalo. 7000 w. Elec Wld & Engr—May 4, 1901.

Electricity at the Pan-American Exposition (L'Electricité à l'Exposition de Buffalo). Georges Dary. A general review. 2800 w. Electricien—Nov. 9, 1901.

Electricity at the Recent Buffalo Exposition. Comments on the illuminations and electrical exhibits, giving highest praises. 3300 w. Engng—Jan. 24, 1902.

See also PAN-AMERICAN EXPOSITION.

St. Louis.—See ST. LOUIS EXPOSITION.

ELECTRIC FAN.

See also FAN; MINE VENTILATION; VENTILATION.

The History and Development of the Electric Fan Motor. F. V. Henshaw. Reviews the history of this American invention, giving illustrations of various designs. 3800 w. Elec Rev, N Y—Feb. 9, 1901.

Electric Fans for 1901. Describes and illustrates various styles of direct and alternating-current fan motors. 7000 w. Elec Rev, N Y—Feb. 9, 1901.

Development of Motor Fans. Alton D. Adams. Discusses briefly the early fan motors; the design of fan motors, and those in present use. 4000 w. Elec Wld & Engr—March 2, 1901.

Fan Motor Hints. Harry Hertzberg. Remarks on their design and use with some of the difficulties in their operation and methods of meeting them. 2500 w. Engr, U S A—June 16, 1902.

Construction.—The Construction of a Direct-Current Fan Motor. Illustrates and describes a compact form of fan motor easily constructed by one familiar with the use of machine tools. 1400 w. Am Elect'n—April, 1901.

Export Trade.—Electric Fans in the Export Trade. Arthur Stanley Riggs. A discussion of the present standing and future outlook. 2200 w. Elec Rev, N Y—Feb. 9, 1901.

ELECTRIC FITTINGS.

See also ELECTRIC APPARATUS; ELECTRIC WIRING.

Fittings. Harold Watson. Abstract of a paper read before the Glasgow Loc. Sec. of the Inst. of Elec. Engrs. An illustrated article considering some of the factors in the evolution of the design of electric fittings, and some of the conditions designers have to fulfil. 3300 w. Elect'n, Lond—May 12, 1905.

ELECTRIC FOUNTAIN.

See also ELECTRIC EXHIBITION; ELECTRIC LIGHTING—Decorative.

A Brief History of Luminous Fountain Development. Luther Stieringer. An elaborately illustrated article giving the history as far as known of illuminated fountains. 4800 w. Elec Wld & Engr—Sept. 14, 1901.

Paris Exposition.—The Chateau d'Eau and the Illuminated Fountains (Le Chateau d'Eau et les Fontaines Lumineuses). E. Cayla. Giving details of the construction of the ornate façade of the Electricity Building and the brilliantly illuminated fountains contained in it, and placed before it. 2500 w. Génie Civil—Nov. 3, 1900.

The Luminous Decorations of the Palace of Electricity and the Chateau d'Eau (Les Décorations Lumineuses du Palais de l'Electricité et du Chateau d'Eau). With especial reference to the electric projectors and illuminated fountains at the Paris Exposition. 1200 w. Revue Technique—Nov. 25, 1900.

ELECTRIC FURNACE.

See also CALCIUM CARBIDE; CARBON BISULPHIDE; ELECTRO-METALLURGY; IRON METALLURGY; STEEL METALLURGY.

The Use of the Electric Arc as a Means of Fusion (Die Verwendung des Elektrischen Lichtbogens für Schmelzzwecke). Dr. Bermbach. A discussion of the thermal reactions in the use of the electric furnace for fusing alumina, carbide, glass, etc. 3500 w. Elektrotech Zeitschr—Aug. 1, 1901.

Electric Furnaces. Bertram Blount. Abstract of a paper read before the Manchester Sec. of the Inst. of Elec. Engrs. An illustrated article describing the types and reviewing the history and development. 5500 w. Mech Engr, Lond—March 15, 1902.

Electric Furnaces—Separation of Metals. Clinton Paul Townsend. Illustrated brief descriptions of various furnaces and methods. 700 w. Elec Wld & Engr—June 7, 1902.

The Electric Furnace in Industrial Chemistry. Charles B. Jacobs. Considers the types of electric furnace, the new products and their value in industrial chemistry, the advantages, etc. 4200 w.

Trans Am Inst of Elec Engrs—June & July, 1902.

The Electric Heat Furnace. A. Henrick Jackson. The first of a series of illustrated non-electrolytic uses. Serial. 1st part. 2000 w. Aust Min Stand—Nov. 27, 1902.

The Electric Furnace. J. Wright. A review of the development, giving illustrated descriptions of types and showing its importance to the chemist and metallurgist. 6500 w. Cassier's Mag—June, 1903.

Some First Principles of Electrical Resistance Furnaces. F. A. J. FitzGerald. A study of the principles of these furnaces, their construction and manipulation. Serial. 1st part. 3500 w. Elec Chem Ind—Sept., 1904.

The Electric Furnace: Its Origin, Transformations and Applications. Adolphe Minet. Defines and explains the apparatus, reviewing its history, and giving a bibliography of efforts which have been made to develop industries centering round the electric furnace. Discussion. 9500 w. Elec-Chem & Met—Dec., 1904.

The Present Status of Electric Furnace Working. Charles F. Burgess. States some of its advantages, illustrating and describing various forms, furnace construction, &c., and discussing its efficiency. General discussion. 10500 w. Jour W Soc of Engrs—April, 1905.

Accessory Equipment of Electric-Furnace Plants. M. M. Green. Discusses the ray materials and various stages of manufacture. 2000 w. Eng & Min Jour—Aug. 26, 1905.

Electric Furnaces. J. H. Stansbie. Abstract of a paper read before the Birmingham (Eng.) Electric Club. Brief illustrated description of some simple forms of electric furnaces which can be readily fitted up for experimental purposes. 1400 w. Elec Engr, Lond—Nov. 10, 1905.

Acheson.—See Ruthenburg; **CARBORUNDUM.**

Becker Glass.—See **GLASS MANUFACTURE—Electric Furnace.**

Blast-Furnace Gas.—See **BLAST FURNACE GAS—Electric Furnace.**

Borchers.—The Borchers Furnace. F. A. J. Fitz Gerald. Describes a furnace used by Despretz in 1849, as the progenitor of the Borchers type, giving data of the latter and the working. Ills. 3500 w. Elec-Chem & Met Ind—June, 1905.

Calcium-Strontium.—See **ELECTRO-METALLURGY.**

Carbon Bisulphide.—See **CARBON BISULPHIDE.**

Carbon Fusion.—See **CARBON—Fusion.**

Carbon Tube.—Electrically-Heated Carbon Tube Furnaces. R. S. Hutton and W. H. Patterson. Read before the Faraday Soc. An illustrated account of the authors' work with three furnaces and the results. Serial. 1st part. 2500 w. Sci Am Sup—Aug. 19, 1905.

Electrically-Heated Carbon-Tube Furnaces. Abstract of a paper by R. S. Hutton and W. H. Patterson before the Faraday Soc. Deals with electric furnaces constructed with a carbon tube through which an electric current is passed. Ills. 1400 w. Elec-Chem & Met Ind—Dec., 1905.

Colby.—See Gin.

Copper.—See **COPPER METALLURGY—Electric Smelting.**

Crucible.—Resistance Furnace for Crucibles. Francis A. J. FitzGerald. Describes the general methods of construction of a crucible furnace, and compares it with a commercially worked furnace giving experiments. Ills. 4200 w. Elec-Chem & Met Ind—Feb., 1905.

Diamond Production.—See Gem; **DIAMOND—Electric Furnace.**

Drying.—See **DRYING—Electric Oven.**

Experimental. — High-Temperature Electro-Chemistry. Notes on Experimental and Technical Electric Furnaces. R. S. Hutton and J. E. Petavel. Full paper read before the Manchester Sec. of the Inst. of Elec. Engrs. Illustrated descriptions of experimental and technical electric furnaces and their commercial applications, especially some of the newer industries. 11200 w. Engng —Dec. 19, 1902.

Ferro-Alloys.—See **ELECTRO-METALLURGY—Iron and Steel.**

Galbraith.—See **ELECTRO-METALLURGY — Iron and Steel.**

Gems.—Five Thousand Degrees of Heat. Describes the action of the electric furnace and some of the uses to which it has been applied, especially the making of gems. Illustrates and describes the making of diamonds. 2000 w. Sci Am—July 29, 1905.

See also **DIAMOND—Electric Furnace.**

Gin.—Industrial Resistance Furnaces. F. A. J. FitzGerald. Considers the Gin, Colby, and Kjellin furnaces. Ills. 1500 w. Elec-Chem & Met Ind—Aug., 1905.

The Gin Electric Furnaces (Fours Electriques Gustave Gin). G. Dary. Illustrated description of the electric furnaces for refining steel, and for producing vanadium and its alloys, as exhibited at Liége. 2500 w. L'Electricien—Nov. 11, 1905.

An Electrical Steel-Furnace. Gustave Gin. Abstract of a paper read at meeting of the Am. Elec-Chem. Soc. Gives plan and sections of furnace, with description. 1000 w. Eng & Min Jour—Nov. 11, 1905.

See also **ALUMINUM; ELECTRO—METALLURGY—Iron and Steel.**

Gin & Leleux.—See **CALCIUM CARBIDE—Milan Works.**

Glass.—See **GLASS MANUFACTURE—Electric Furnace.**

Gysinge, Sweden.—See **ELECTRO—METALLURGY —Iron and Steel.**

Heraeus.—Electric Furnace for Laboratory Work (Fours à Chauffage Electrique pour Laboratoires). Léon Guillet. Illustrating and describing the Heraeus furnace in practical use for high-temperature laboratory investigations. 1500 w. Génie Civil—Aug. 30, 1902.

History.—The Origin, Development and Applications of the Electric Furnace (Der Elektrische Ofen. Sein Ursprung, Seine Entwickelung und Seine Anwendungsformen). Adolphe Minet. A profusely illustrated, historical and descriptive review. Serial. Part I. 5000 w. Elektrochem Zeitschr—June, 1903.

Howe.—An Electric-Resistance Magnesia Crucible-Furnace for Laboratory-Use. Prof. Henry M. Howe. Illustrates and describes a furnace designed for the metallurgical laboratory of the School of Mines of Columbia University, N. Y. 1000 w. Trans Am Inst of Min Engrs—Nov., 1901.

Hutton-Patterson.—See Carbon Tube.

Kjellin.—See Gin; **ELECTRO-METALLURGY—Iron and Steel.**

Laboratory.—Some Electric Furnaces for Laboratory Use. Charles L. Norton. Details of construction and operation of several small electric furnaces used in the Rogers Laboratory of Physics, for instruction and research work. Ill. 1400 w. Elec Wld & Engr—Dec. 22, 1900.

High Temperature Electro-Chemistry. R. S. Hutton and J. E. Petavel. Abstract of a paper before the Manchester Local Section of the Institution of Electrical Engineers, illustrating and describing experimental and technical electrical furnaces, particularly those in the electro-chemical laboratory of Owens College. Manchester, Eng. Serial. Part I. 1500 w. Elect'n, Lond—Dec. 12, 1902.

A New Electric Furnace and Various Other Electric Heating Appliances for Laboratory Use. H. N. Morse and J. C. W. Frazer. Review of an article in the "Am. Chem. Jour. Description with illustrations and reports of experimental investigations. 2500 w. Min Rept—Aug. 25, 1904.

See also **Experimental; Heraeus; Moissan.**

Lining.—See **REFRACTORY MATERIAL.**

Moissan.—A Modification of the Moissan Furnace (Ueber einen Modifizierten Moissanschen Schmelzofen). L. Liebman. A detailed illustrated description of an improved electric furnace especially adapted for laboratory use. 1800 w. Zeitschr f Elektrochemie—Feb. 27, 1902.

See also **DIAMOND; FLUORINE.**

Muffle.—Experiments with an Electro-Thermic Muffle Furnace. F. A. J. Fitz-Gerald. Illustrated detailed description of the construction of an electric muffle furnace, and an account of experiments made in it. 3800 w. Elec-Chem & Met Ind—April, 1905.

Neuburg-Minet. — See **ELECTRO-METALLURGY — Iron and Steel.**

1903.—Electric Furnace Industries in 1903. F. A. J. Fitz Gerald. A review of the past year of the industries using electric furnaces, giving examples that indicate probable future developments. 2000 w. Elec-Chem Ind—Jan., 1904.

Parker.—A New Electric Furnace. Concerning a furnace recently patented in England by Mr. A. Parker which appears to have solved many of the difficulties under which carbide has been made. 1400 w. Elec Rev, Lond—July 26, 1901.

Potter Tube.—Recent Electrochemical Developments. Clinton Paul Townsend. An illustrated description of electric furnace structures, of the "tube" type, invented by H. N. Potter. 800 w. Elec Wld & Engr—Dec. 20, 1902.

Preheating Charge.—The Preheating of the Charge for the Electric Furnace (Verfahren zur Vorwärmung der Beschickung Elektrischer Oefen). A. Muriel and A. Neuburger. Showing the economy which may be effected by preheating the charge, and illustrating a form of furnace for the purpose. 1200 w. Elektrochemische Zeitschr—Oct., 1902.

Quartz Fusion.—On the Fusion of Quartz in the Electric Furnace. R. S. Hutton. A report of experimental study and interesting observations made. 1300 w. Electro Chem & Met—May, 1902.

Resistance.—Materials for Resistors. Francis A. J. Fitz Gerald. Explains reasons for using this term instead of resistance, and gives an experimental study of resistances used in electric furnaces, with conclusions. 5500 w. Elec-Chem Ind—Dec., 1904.

Miscellaneous Accessories of Resistance Furnaces. F. A. J. Fitz Gerald. Discusses principally means for regulating the voltage and methods of electrode connections. 4000 w. Elec-Chem & Met Ind—Jan., 1905.

Electrical Resistance Furnaces. Extract from an article by Otto Vogel, appearing in a German paper. Discusses the resistance furnace. 1300 w. Elec Rev, Lond—March 14, 1902.

See also **CRUCIBLE.**

Ruthenburg.—The Ruthenburg and Acheson Furnaces. F. A. J. FitzGerald. Describes the working and explains the theory of these furnaces. 2000 w. Elec-Chem & Met Ind—Nov., 1905.

Stassano.—See **ELECTRO-METALLURGY—Iron and Steel.**

Tube Type.—See **Carbon Tube; Potter Tube.**

ELECTRIC FUSE.

See **BLASTING; ELECTRIC PROTECTIVE APPARATUS; ELECTRIC SWITCH.**

ELECTRIC GENERATING SET.

See also **ELECTRIC APPARATUS; ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC GENERATOR TEST; ELECTRIC MACHINERY; ELECTRIC PLANT; ELECTRIC STATION.**

Direct-Connected Steam Engines and Generators. Frank C. Perkins. Compares American and foreign practice, and also gives illustrated descriptions of apparatus. Serial. 1st part. 3500 w. Ir Age—Jan. 3, 1901.

Some Details of Direct-Connected Generator Sets. William H. Bryan. The usual division of responsibilities between engine and generator builders in the construction of direct-connected sets, is outlined. 2500 w. Trans Am Soc of Mech Engrs, No. 0951—May, 1902.

Allis-Chalmers, St. Louis.—The 5,000-Horse-Power Engine at the World's Fair. C. J. Larson. Illustrated description of this Allis-Chalmers-Bullock steam-electric unit and features involved in the installation. 3000 w. Eng Rec—Sept. 10, 1904.

Alsacienne.—Generating Set of 200 Kilowatts of the Société Alsacienne (Groupe Electrogène de 200 Kilowatts de la Société Alsacienne de Constructions Mécaniques). Detailed description of tandem compound engine and continuous current generator, both made by the same company and exhibited at Paris. 1200 w. 1 plate. Génie Civil—April 27, 1901.

Augsburg-Nuremberg. — Generating Set of 1,400 Horse-Power (Groupe Electrogène de 1,400 Chevaux). A. Boudon. Illustrated description of the vertical steam engine by the Augsburg Machine Works, and direct-connected Lahmeyer alternator, exhibited at Paris. 2000 w. Génie Civil—Dec. 8, 1900.

A 2200-Horse-Power Generating Set at the Paris Exposition (Exposition de 1900): Groupe Electrogène de 2200 Chevaux). Georges Henry. A well illustrated description of a vertical triple-expansion steam engine, constructed by the United Augsburg-Nuremberg Machine Works, directly coupled to a 900-kilowatt continuous-current dynamo, and to an 850-kilowatt triphase generator, built by Schuckert. 1 plate. 4000 w. Génie Civil—March 16, 1901.

Belford, Eng.—Steam Alternator at Bedford. Illustrations with brief description. 1400 w. Engr, Lond—May 6, 1904.

Berlin Power House.—The 3,000 Kilowatt Dynamos of the Berlin Electric Station (Die 3,000 Kw. Dynamos der Berliner Elektricitäts-Werke). Giving details of these fine new examples of alternators built by the Allgemeine-Elektricitäts-Gesellschaft, and of the triple-expansion engines by which they are driven. 2000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Jan. 5, 1901.

Horizontal Engines and Dynamos of 3000 Horse Power (Horizontale Dampfdynamomaschinen vonje 3000 P. S.). Illustrated description of the Sulzer engines and A. E. G. dynamos in the Moabit station in Berlin. 2000 w. 1 plate. Schweizerische Bauzeitung—Dec. 7, 1901.

Machinery for the Extension of the Berlin Electricity Works (Maschinenanlagen zur Erweiterung der Berliner Elektrizitätswerke). Illustrating two new generating sets of 6,500 H. P. each, the triple-expansion engines by Sulzer and by the Görlitz works, with A. E. G. alternators. 1800 w. 3 plates. Zeitschr d Ver Deutscher Ing—Dec. 9, 1905.

Bollinckx.—Generating Set of 800 Kilowatts (Groupe Electrogène de 800 Kilowatts). A. Boudon. Illustrated description of the combined set of compound Corliss engines by Bollinckx, and alternator of the Société Electricité et Hydraulique exhibited at Paris. 2000 w. 1 plate. Génie Civil—Dec. 22, 1900.

Brooklyn Power House.—The 4,000-Horse Power Engines at the Third Avenue, Brooklyn, Power House. An illustrated detailed description of these engines. The present installation comprises eight 4,000 H. P. engines direct-connected to both direct- and alternating-current generators. They are arranged in four pairs. 2300 w. Power—July, 1903.

See also **ELECTRIC STATION.**

Brünn-Ganz.—Generating Set of 1,200 Kilowatts (Groupe Electrogène de 1,200 Kilowatt). Detailed description of horizontal compound engine of 1,000 H. P. by the Brünn Machine Works and 1,200 k. w. three-phase generator by Ganz & Co., exhibited at Paris. 2500 w. 1 plate—Génie Civil—Jan. 26, 1901.

1,000-H. P. Compound Engine at the Paris Exposition. An illustrated description of an engine built by the Erste Brünnner Machinen-Fabriks-Gesellschaft, of Brünn, Austria. 500 w. Eng News—Feb. 14, 1901.

Budapest.—See **STEAM ENGINE—Triple Expansion.**

Cail—Thomson-Houston.—The Cail and Thomson-Houston Generating Set (Groupe Electrogène Cail et Thomson-Houston). Ch. Dantin. The Cail vertical compound engine of the Allis-Corliss design operated a Thomson-Houston alternator of 1000 kilowatts. 1800 w. 1 plate. Génie Civil—Nov. 10, 1900.

Carels-Kolben.—The Kolben-Carels Generating Set (Groupe Electrogène Kolben-Carels). F. Loppé. Illustrated description of the 1100 H. P. Carels engine and 825 kilowatt three-phase Kolben generator, exhibited together at Paris. 3000 w. L'Electricien—Nov. 17, 1900.

An 825-Kilowatt Generating Set at the Paris Exposition (Exposition de 1900): Groupe Electrogène de 825 Kilowatts). Ch. Dantin. A well illustrated description of a Carels horizontal, tandem, compound engine, directly coupled to a Kolben triphase generator. 1 plate. 2200 w. Génie Civil—March 30, 1901.

Car Lighting.—See **CAR LIGHTING.**

Crépelle and Garand.—Generating Set of 830 Kilowatts (Groupe Electrogène de 830 Kilowatts). The group, exhibited at Paris, consisted of a 1200 H. P. compound Corliss engine by Crépelle & Garand, of Lille, and two dynamos of 415 kw. each, built by the Etablissements Decauville ainé, one on each side of the fly wheel. 1000 w. Génie Civil—June 8, 1901.

Delaunay-Belleville-Breguet. — Generating Set of 1,250 Horse-Power (Groupe Electrogène de 1,250 Chevaux). A. Morisot. Describing the Delaunay-Belleville engine and Breguet alternator, exhibited at Paris. 2500 w. Revue Technique—Dec. 25, 1900.

Delaunay-Belleville.-Labour. — Electric Generating Set by the Delaunay-Belleville and Eclairage Electrique Companies (Groupe Electrogène des Sociétés Delaunay-Belleville et l'Eclairage Electrique). Ch. Dantin. Illustrating the 1500 H. P. quadruple-expansion engine, and Labour alternator exhibited at St. Louis. 1500 w. 1 plate. Génie Civil—Oct. 24, 1904.

Double.—See **Lahmeyer; ELECTRIC GENERATOR.**

Dujardin-Schneider.—The Dujardin-Schneider Generating Set (Groupe Electrogène Dujardin-Schneider). M. Ademar. Illustrated description of the 1,700 H. P. Dujardin engine, and 1,120 kilowatt Schneider alternator exhibited at Paris. 2500 w. 1 plate. Génie Civil—Nov. 24, 1900.

Düsseldorf Exposition.—Some Engines and Generators at the Düsseldorf Exposition. Illustrates and describes interesting exhibits. 2000 w. Am Elect'n—Oct., 1902.

Enclosed.—Enclosed Steam-Engine and Dynamo. Illustrated description of a compact arrangement of enclosed, self-lubricating, compound steam-engine, coupled direct to a continuous-current dynamo for lighting or power purposes. 1000 w. Engng—March 11, 1904.

Farcot.—Two Phase 750 Kilowatt Generating Set by Farcot (Groupe Electrogène à Courants Diphases de 750 Kilowatts de la Maison J. Farcot). An illustrated description of the exhibit of the house of J. Farcot at the Paris Exposition; both engine and generator being built by the one firm. 2500 w. Revue Technique—July 25, 1901.

Fleming.—Construction and Efficiency of a Fleming Four-Valve Engine Directly Connected to 400 k. w. Generator. Benjamin T. Allen. Describes the general construction of, and the results obtained from a new type of four-valve stationary engine. 2000 w. Trans Am Soc of Mech Engrs, No. 011—Dec., 1903.

Humboldt-Lahmeyer.—500-Horse-Power Tandem Engine and Alternator. An illustrated description of a Humboldt engine and Lahmeyer electric generator at the Düsseldorf Exhibition. 600 w. Engng—May 16, 1902.

Lahmeyer.—Double Generating Sets (Ueber Doppelmaschinen, insbesondere solche in Schwungradanordnung). F. Collischon. An illustrated description of some Lahmeyer generating sets, in which two dynamos, furnishing different kinds of current, and acting as flywheels, are direct coupled to a steam engine. 1400 w. Elektrotech Zeitschr—March 26, 1903.

Navy.—See also **ELECTRIC EQUIPMENT.**

Navy, British.—150-Horse-Power Compound Electric Light Engines for the Royal Navy. Illustrated description of the engines of two electric generating sets to be installed on the Téméraire, a training vessel for lads to become engine-room artificers. This vessel will be the central generating station, supplying power to two floating factories and for lighting. 1300 w. Engng—April 15, 1904.

Parallel.—See **ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING.**

Portable.—See **AUTOMOBILE—Military; ELECTRIC PLANT.**

Porta Volta, Milan.—The 5,000-Horse-Power Three-Phase Turbo-Alternator at the Porta Volta Electric Supply Station of Milan. Illustrated description. 1000 w. Sci Am Sup—Oct. 1, 1904.

Preussen Mine.—See **STEAM TURBINE TEST.**

Rateau-Sautter-Harlé.—Three-Phase Generating Set (Groupe Electrogène Triphasé). J. A. Montpellier. Illustrated description of a 600 horse-power Rateau steam turbine connected to 400 kw. alternator by Sautter, Harlé & Co., exhibited at Liége. 2000 w. L'Electricien—Oct. 28, 1905.

Reavell, Ipswich.—Combined Engine and Dynamo. Illustrated description of a high-speed engine and 220 kilowatt six-pole dynamo. The engine is of 400 H.-P., and is of the three-crank type. 1100 w. Engr, Lond—Nov. 9, 1900.

Regulation.—Automatic Regulators, and the Compounding of Generating Sets (Les Régulateurs Automatiques et le Compoundage Electromécanique des Groupes Electrogènes). J. L. Routin. Discussing the combination of mechanical and electrical regulation in compounding. 10000 w. Bull Soc Int d'Electriciens—Aug., Sept., Oct., 1902.

The Routin Electro-Mechanical Regulator (Das Elektromechanische Regulier-system von Routin). F. Brock. By means of an auxiliary dynamo the excitation of the generator is varied with the load, and the weighting of the engine governor is altered. 1500 w. Elektrotech Zeitschr—Dec. 22, 1904.

The Electro-Mechanical Control of Electric Generating Sets (Compoundage Electro-Mécanique des Groupes Electrogènes). M. De Kermond. A description of the Routin method of regulation by controlling the excitation of the dynamo and the speed of the engine. 3000 w. L'Electricien—Dec. 24, 1904.

See also **ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; STEAM ENGINE.**

Ringhoffer-Siemens.—The Ringhoffer-Siemens & Halske Generating Set (Groupe Electrogène Ringhoffer-Siemens & Halske). G. Henry. Description of 1,000 kilowatt generating set, with Ringhoffer vertical engines and Siemens & Halske continuous-current dynamo, exhibited at Paris. 2000 w. 1 plate. Génie Civil—Dec. 1, 1900.

Robey.—350-Kilowatt Steam Generator at the Glasgow Exhibition. Two-page plate with description of compound steam engine and continuous-current generator. 1100 w. Engng—June 28, 1901.

Routin Regulator.—See **Regulation.**

St. Louis Exposition.—See **Turbo; Delaunay-Belleville.**

Slow Speed.—A Modern Slow-Speed Steam Alternator. An illustrated account of a standard steam-generator of a London firm, which has recently been set to work, with a statement of the performance. 1400 w. Ir & Coal Trds Rev—Dec. 5, 1902.

Small.—The Economy of Small Generating Sets (Les Petits Groupes Electrogènes considérés au Point de Vue de la Production Economique de l'Energie Electrique). R. Friederich. An examination of the cost of electricity as generated by small steam, gas, and oil engines. 3000 w. Revue Technique—March 25, 1905.

Speed Regulation.—See **Regulation; ELECTRIC GENERATOR, ALTERNATING—Parallel; STEAM ENGINE.**

Standardization.—Standardization of Direct-Connected Generating Units. A review of three papers read before the Engine Builders' Assn. of the United States, on the best methods of designing high-speed engines and generators for direct-connected units, so that the combination, as a whole, will be of the greatest efficiency. 1000 w. Eng Rec—Dec. 8, 1900.

Some of the Requisites of Modern Lighting Generator Sets. H. G. Reist. Read at meeting of the Engine Builders' Assn. of the U. S. A. Statement of the present situation of the steam engine in its relation to electrical generation. 2500 w. Elec Wld & Engr—Dec. 15, 1900.

Final Report of Committee on Standardisation of Engines and Dynamos. 2600 w. Trans Am Soc of Mech Engrs, No. 887—Dec., 1901.

Standardisation of Direct-Connected Engines and Dynamos. An illustrated report to the Am. Soc. of Mech. Engrs. 2000 w. Eng Rec—Dec. 7, 1901.

Engine and Generator Builder's Engine Type Units for Power Purposes. H. C. Ebert. Abstract of paper read at N. Y. meeting of the Eng. Builds.' Assn. of the U. S. Deals especially with engine type electric generating sets. 2200 w. Ir Age—Feb. 14, 1901.

See also **ELECTRIC APPARATUS; STEAM ENGINE.**

Stork.—Generating Set of 330 Kilowatts (Groupe Electrogène de 330 Kilowtts). G. Henry. An illustrated description of the compound engine by Stork Bros., and continuous-current generator by the Elektrotechnische Industrie exhibited at Paris. 1500 w. 1 plate. Génie Civil—Dec. 29, 1900.

Testing.—Testing of Combined Steam-Engine and Dynamo Sets. Extracts from a paper presented to the Inst. of Civ. Engrs. by Edwin Hartree

Rayner. An outline by the tests usually applied to such sets and the methods used in the testing shops of engine makers. Also editorial. 4000 w. Eng Rec—Sept. 6, 1902.

Efficiency Tests of a 400-Kw. Westinghouse-Parsons Turbo-Generator. Gives method of conducting the tests and the details concerning the calibration of instruments, methods of measurement, etc. 1400 w. Eng Rec—June 10, 1905.

See also ELECTRIC GENERATOR TEST; ELECTRIC TESTING; STEAM ENGINE TEST.

Turbo.—Turbo-Dynamo Generating Sets (Turbodynamos). F. Niethammer. Discussing especially the construction of dynamos for high rotative speeds, adapted for direct-connection with steam turbines. Serial. Part I. 1800 w. Zeitschr f Elektrotechnik—Feb. 7, 1904.

On Turbo-Dynamos. F. Niethammer. Outlines the electrical and mechanical difficulties which arise in the design of dynamo-electric generators directly connected to steam turbines of 500 to 4000 r. p. m. Ills. Serial. 1st part. 2000 w. Elec Wld Engr—March 19, 1904.

Steam Turbine Generators. B. A. Behrend. Discusses the mechanical requirements and principles of their design. Ills. 2000 w. Elec Rev, N Y—Sept. 10, 1, 1904.

Turbo-Generators Exhibited at the World's Fair. Illustrates and describes the exhibits of the Westinghouse, General Electric, and De Laval companies. 3000 w. Elec Rev, N Y—Sept. 10, 1904.

An Interesting French Steam-Driven Turbine Plant. An illustrated detailed description of the power station of Neuchatel. 2800 w. Am Elect'n—Oct., 1904.

2,700 Horse-Power Turbo-Alternator. Illustrated description of a powerful combined set made in Switzerland. 2000 w. Engr, Lond—April 21, 1905.

Turbo Dynamos and Their Associated Machinery (Turbodynamos und Verwandte Maschinen). F. Niethammer. Illustrating and describing a variety of turbo-dynamo sets, for both steam and hydraulic turbines, with details from German and American practice. Two articles. 7000 w. Zeitschr d Ver Deutschr Ing—May 13, 20, 1905.

Turbo-Dynamos (Turbodynamos). F. Niethammer. Address before the "Oesterr Vereinigung der Elektrisitätswerke," giving an illustrated review of the present constructions of dynamos for direct connection to steam turbines. 3000 w. Zeitschr f Elektrotech—Aug. 20, 1905.

A Broader Field for the Steam Turbine. Discusses the uses of the direct-connected continuous current turbine units. 1000 w. Eng News—Nov. 30, 1905.

See also CAR LIGHTING; ELECTRIC PLANT; ELECTRIC STATION; STEAM TURBINE.

Van den Kerchove.—Generating Set of the International Electrical Company, of Liége, and the Van Den Kerchove Company, of Ghent (Groupe Electrogène de la Compagnie International d'Electricité de Liége, et de la Societé Anonyme Van Den Kerchove de Gand). A 1,000 kilowatt three-phase generator and horizontal compound engine exhibited at Paris. 1000 w. Electricien—Dec. 1, 1900.

Generating Set of 1000 Kilowatts (Groupe Electrogène de 1000 Kilowatts). A. Boudon. A description of the Van den Kerchove engine and alternator by the Compagnie Internationale d'Electricité de Liége, exhibited at Paris. 1000 w. 1 plate. Génie Civil—Jan. 12, 1901.

ELECTRIC GENERATOR.

See also ARMATURE; COMMUTATION; ELECTRIC APPARATUS; ELECTRIC GENERATING SET; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC GENERATOR DESIGN; ELECTRIC GENERATOR TEST; ELECTRIC MACHINERY; ELECTRIC PLANT; ELECTRIC STATION; HYDRO-ELECTRIC PLANT; STEAM ENGINE.

Continuous-Current Dynamos. Henry A. Mayor. Abstract of a paper read before the Glasgow Congress, aiming at a standard system of dynamo design and manufacture, with a review of the paper by Claude W. Hill. 4800 w. Elec Rev, Lond—Sept. 20, 1901.

Acyclic.—Acyclic (Homopolar) Dynamos. J. E. Noeggerath. Describes in outline the design, and some results obtained with a 800-kw. 500-volt turbine-driven acyclic generator, discussing the uncertainty as to the magnetic and electrical conditions prevailing in this type, and the difficulties encountered in collecting large currents from a generator running at a high rate of speed. Ills. 1800 w. Pro Am Inst of Elec Engrs—Jan., 1905.

Acyclic (Homopolar) Dynamos. Discussions at New York and Boston of paper by J. E. Noeggerath. 4,000 w. Am Inst of Elec Engrs—March, 1905.

Acyclic Dynamos (Les Dynamos Acycliques). A general review of the homopolar type of dynamos, generating continuous currents without commutators and especially adapted for high rotative speeds. 2500 w. Génie Civil—July 29, 1905.

The Acyclic Dynamo of J. E. Noeggerath (Die Azyklische Maschine von J. E. Noeggerath). Clarence Feldmann. Illustrated description of the homopolar dynamo, a form of unipolar machine, invented by Noeggerath and developed by the General Electric Co. 1800 w. Elektrotech Zeitschr—Sept. 7, 1905.

See also Unipolar; Zone.

A. E. G.—See ELECTRIC GENERATING SET—Berlin Power House; STEAM TURBINE TEST—Preussen Mine.

Air Gap.—See ELECTRIC GENERATOR DESIGN.

Alsacienne.—See ELECTRIC GENERATING SET.

Alternator Combined.—See Double-Current.

Arc-Light.—Some Brush Arc-Light Dynamo Troubles and Their Remedies. F. B. O'Hanlon. Points from the experience of the writer. 1200 w. Am Elect'n—Dec., 1901.

Auxiliary Poles.—Auxiliary Poles for Continuous-Current Dynamos (Hilfspole für Gleichstrommaschinen). Franklin Punga. Showing that auxiliary poles and commutating fields are useful only in machines operating at high rotative speeds. 1800 w. Zeitschr f Elektrotechnik—Jan. 24, 1904.

The Lines of Force in Dynamos with Auxiliary Poles (Ueber Kraftlinienfelder in Gleichstrommaschinen mit Wendepolen). S. Defris. An examination of the distribution of magnetism in continuous-current dynamos provided with auxiliary poles to prevent sparking. 2000 w. Zeitschr f Elektrotechnik—May 28, 1905.

Commutating Magnets for Continuous Current Dynamos (Ueber Kommutierungsmagnete für Gleichstrommaschinen). Robert Pohl. Describing the use of auxiliary poles to prevent the sparking of the commutator. 3000 w. Elektrotech Zeitschr—June 1, 1905.

Continuous-Current Dynamos with Auxiliary Poles (Gleichstrommaschinen mit Hülfspolen). Max Breslauer. Experiments to determine the proper dimensions of commutation poles. 6000 w. Elektrotech Zeitschr—July 13, 1905.

Bay Counties Power Co.—Generators and Transformers for the Bay Counties Power Co., California. E. Heitmann and Wm. Currie. Illustrated description of the generating units and the step-up transformers, discussing the principal features to be considered in making the selection. 2500 w. Eng News—Nov. 21, 1901.

Bipolar at Paris.—Report on Bipolar Machines Exhibited at the Paris Exhibition. R. Lloyd-Pearson. Describes the exhibits, and expresses the opinion that in a few years this class of machine will be extinct. 4800 w. Elec Rev, Lond—Jan. 11, 1901.

Bolton, Eng.—Large Generators for Bolton Corporation. Illustrated account of the tests of two 1100 kilowatt machines at the works of the English Electric Manufacturing Company. 2200 w. Tram & Ry Wld—Feb. 13, 1902.

See also ELECTRIC STATION.

Breguet.—See ELECTRIC GENERATING SET—Delauney-Belleville.

British.—The Position of Dynamo Makers in England at the Close of 1900. Reviews the situation and considers the outlook "none too rosy" for the British manufacturers. 1500 w. Elec Rev, Lond—Dec. 28, 1900.

Capacity Limits.—Capacity Limits of Direct Current Dynamos and Motors. Alton D. Adams. States the limits that fix the safe capacity, discovering the distinctive features in their application. 2500 w. Engr, U S A—Jan. 1, 1902. Special number.

Car Lighting.—A New Dynamo. From "Elektrotechnische Zeitschrift." Illustrates and describes a dynamo designed by Prof. E. Rosenberg for the lighting of railway carriages. 2400 w. Elec Engr, Lond—April 28, 1905.

See also Leitner-Lucas; Variable Speed; CAR LIGHTING—Dynamo.

Characteristic.—Characteristics of Dynamos. E. B. Raymond. Explains the plotting of curves of series dynamos, shunt dynamos, &c. Diagrams. 1500 w. Engr, U S A—Oct. 16, 1905.

See also ELECTRIC GENERATOR, ALTERNATING.

Collectors.—See COMMUTATION.

Commutating Magnets.—See Auxiliary Poles.

Commutative Limits.—Modern Commutating Dynamo Machinery, with Special Reference to the Commutative Limits. H. M. Hobart. Read before the Glasgow Congress. Gives views regarding the continuous current dynamo-electric machine, describing types. Ill. Serial. 1st part. 8500 w. Elec Engr, Lond—Sept. 27, 1901.

Commutator.—See COMMUTATION.

Commutatorless.—New Commutatorless Dynamo or Motor. James Asher. Aims to show how to construct a dynamo which has neither brushes, commutator nor slip rings, and which will give a perfectly steady current of high tension. 1000 w. W Elect'n—Jan. 5, 1901.

Compounding.—See ELECTRIC GENERATING SET—Regulation.

Cost-Keeping.—See COST-KEEPING—Dynamo Manufacture.

Decauville.—See STEAM ENGINE—Crépelle and Garand.

Déri.—The Déri Compensated Direct-Current Dynamo (Ueber Kompensirte Gleichstrommaschinen, System Déri). Frederick Eichberg. A description of the Déri system of winding by which a constant potential is secured in direct-current generators. 6000 w. Elektrotech Zeitschr—Sept. 11, 1902.

Design.—See ELECTRIC GENERATOR DESIGN.

Double-Current.—Double-Current Generators and Their Application. E. T. Ruthven-Murray. Calls attention to some of their uses and advantages. Also discussion. 5500 w. Elect Engr, Lond—July 4, 1902.

Double-Current Generators and Rotary Converters. Sydney Woodfield. States the advantages of the double-current generator, explaining where they will prove especially useful. 2800 w. Elec Rev, Lond—Oct. 3, 1902.

The Copper Losses and Economy of Double-Current Generators (Kupferverluste und Ausnutzungsfähigkeit der Dopplestromgeneratoren). Felix Horschitz. An illustrated discussion of the action of the combined direct and alternating currents in the armature, and a comparison with direct current alone. 3000 w. Elektrotech Zeitschr—Jan. 14, 1904.

See also ARMATURE; ELECTRIC GENERATING SET.

Edison.—See ELECTRIC STATION.

Efficiency.—The Maximum Efficiency of Continuous Current Generators (Der Maximale Wirkungsgrad von Gleichstrommaschinen). Dr. L. Finzi. A demonstration that the maximum efficiency is attained when the losses due to the unloaded machine and the losses due to the load are equal. 800 w. Elektrotech Zeitschr—Aug. 8, 1901.

A Method of Determining the Efficiency of Dynamos. J. R. Ashworth. On the use of retardation curves for efficiency determinations. 2000 w. Elec Rev, Lond—Nov. 28, 1902.

Efficiency of Compound-Wound, Direct-Current Generators. V. D. Moody. Describes the tests essential for accurate calculation of the efficiency, taking an actual case for demonstration. 2000 w. Elec Wld & Engr—Dec. 24, 1904.

See also ELECTRIC GENERATOR TEST.

Elastic Line.—See ELECTRIC GENERATOR, ALTERNATING.

Elektrotechnische-Industrie.—See ELECTRIC GENERATING SET—Stork.

Erection.—The Erection of Large Generators. Louis Elliott. General notes on the setting and assembling of heavy units. Serial. 1st part. 2200 w. Steam Engng—Feb. 10, 1903.

The Erection of a Direct Current Dynamo. L. H. Pike. Directions for the inexperienced, with illustrations. 3000 w. Power—June, 1905.

See also ELECTRIC GENERATOR, ALTERNATING.

Experimental.—See ELECTRIC MOTOR.

Failure to Generate.—See Troubles.

Farcot.—See ELECTRIC GENERATING SET.

Field Coil.—See ELECTRIC GENERATOR DESIGN; ELECTRIC MACHINERY.

Flywheel.—Should Dynamos Be Used as Fly Wheels? (Sollen Dynamos als Schwungräder Dienen? A. Rothert. A review of the conditions under which the revolving portion of a generator may properly be used as a fly-wheel for the engine. 3000 w. Zeitschr d Ver Deutscher Ing—Oct. 26, 1901.

See also FLYWHEEL.

Former Winding.—See ARMATURE WINDING.

Frame Deflection.—The Deflection of Dynamo Frames (Die Durchbiegung von Dynamogehäusen). F. Niethammer. A brief examination of the effects of flexure of the shaft and frame of a dynamo upon the electrical conditions. 600 w. Zeitschr f Elektrotechnik—June 19, 1904.

Deflection of Stator of Direct-Current and Three-Phase Generators. F. Niethammer. Mathematical discussion of the mechanical deflection of dynamo yokes and frames, with diagram. 500 w. Elec Wld & Engr—Aug. 27, 1904.

Frames.—See IRON—Dynamo Frames.

Friction Losses.—The Determination of the Frictional Losses of Direct Current Machines (Ueber die Bestimmung der Reibungsverluste von Gleichstrommaschinen). C. Kinzbrunner. An illustrated description of a modification of the Dettmar method for determining friction losses in direct-current motors and dynamos by varying the excitation. Diagrams. 1600 w. Elektrotech Zeitschr—June 11, 1903.

See also ELECTRIC GENERATOR TEST; ELECTRIC TESTING.

Ganz.—See ELECTRIC GENERATING SET—Brünn.

Gas-Engine Driven.—See Girard Regulation; GAS ENGINE—Electric Station; GAS POWER PLANT.

Germany.—The Construction of Dynamos in Germany (La Construction des Dynamos en Allemagne). C. F. Guilbert. Illustrated description of the products of the principal German builders. Serial. Part I. 2000 w. Revue Technique—Nov. 25, 1903.

Girard Regulation.—The Girard System of Regulating Dynamos Driven by Gas Engines (Dispositif de M. Girard pour la Regularisation du Courant Electrique Fourni par un Moteur à Gaz). M. Lauriol. An automatic rheostat varies the separately excited field of the dynamo. General discussion of the problem with diagrams. 3000 w. Bull Soc Internationale des Electriciens—June, 1902.

Heating.—The Influence of Surface and Speed upon the Heating of Dynamos (Ueber den Einfluss der Beschaffenheit der Oberfläche von Elektrischen Maschinen und der Tourenzahl auf die Erwärmung). Dr. Wilhelm Schüppel. Experiments with surfaces of various colors upon the radiation of heat from dynamos; also the relation of speed to heating. 3000 w. Elektrotech Zeitschr—Feb. 8, 1903.

Heating Experiments.—See INSULATION.

Heyland.—See ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MOTOR.

High-Speed.—High-Speed Direct-Current Dynamos for Railway Service (Schnellaufende Gleichstrom-Generatoren für Bahnbetrieb). H. Kikli-Kehlstadt. Illustrating a very substantial continuous-current machine designed by Rieter for direct-connection to hydraulic turbines making 500 revolutions per minute. 2000 w. Schweiz Bauzeitung—July 16, 1904.

Homopolar.—See Acyclic.

Humming.—The Humming of Dynamos (Ueber das Pfeifen von Maschinen). J. Fischer-Hinnen. A discussion of the causes of the humming noise emitted by dynamos, and its alleviation. 1500 w. Zeitschr f Elektrotechnik—June 5, 1904.

Hunting.—See Parallel; ELECTRIC GENERATING SET; ELECTRIC GENERATOR, ALTERNATING.

Induction.—See **ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MOTOR.**

Insulation.—See **INSULATION.**

Iron for Frames.—See **IRON—Dynamo Frames.**

Iron Loss.—Iron Loss. An explanation of the great difference between the iron loss in dynamos and in transformers. 2200 w. Elect'n, Lond—Oct. 16, 1903.

Jaspar.—See **STEAM ENGINE—Mechlin Locomotive Works.**

"Jumbo."—See **ELECTRIC STATION—Holborn Viaduct, Lond.**

Kinetic Factor.—The Kinetic Variation of Pressure in Electric Generators. Alexander Russell. Points out that it is inconsistent to specify the drop in the terminal pressure of electric generators from no-load to full-load without stating the rate at which the voltage shall decrease with the speed. Gives a method of finding the kinetic factor. 2000 w. Elect'n, Lond—Aug. 4, 1905.

Kolben.—See **STEAM ENGINE—Carels.**

Lahmeyer.—The Lahmeyer Dynamos at the Exposition (Les Génératrices Electriques Lahmeyer à l'Exposition). G. Leugny. Describing polyphase and continuous current dynamos exhibited at Paris by Lahmeyer, of Frankfort, Germany. 1800 w. Revue Technique—Dec. 10, 1900.

See also **STEAM ENGINE—Augsburg-Nuremberg.**

Large.—Large Generators (Grosse Generatoren). A. Rothert. A study of dynamo design, comparing the writer's practice with that of Parshall and of Siemens & Halske. 5000 w. Elektrotech Zeitschr—Feb. 28, 1901.

Large Continuous-Current Generators (Grosse Generatoren für Gleichstrom). H. M. Hobart. A comparison of the practice in Europe and America, together with criticisms of the design of Rothert. 2500 w. Elektrotech Zeitschr—Aug. 15, 1901.

Laurence, Scott & Co.—See **ELECTRIC GENERATING SET—Reavell, Ipswich.**

Leitner-Lucas.—See **CAR LIGHTING—Electric, Leitner-Lucas.**

Liége.—See **ELECTRIC GENERATING SET—Van den Kerchove.**

Losses.—The Measurement of Lost Work in Dynamos (Messung der Arbeitsverluste in Dynamomaschinen). W. Peukert. With tables and diagrams showing the losses due to friction, eddy currents, and hysteresis. 2000 w. Elektrotech Zeitschr—May 9, 1901.

Finding Dynamo Efficiency by the Electrical Method. F. C. Caldwell. Describes methods of determining the various classes of losses. 2800 w. Engr, U S A—April 1, 1904.

The Division of Losses in Continuous-Current Dynamos (Beitrag zur Trennung der Effecktverluste in Gleichstrommaschinen). E. Cramer. Deriving equations and curves for the separation of the hysteresis and eddy-current losses. 1200 w. Elektrotech Zeitschr—Aug. 8, 1904.

The Distribution of Losses in Continuous-Current Dynamos (Zur Trennung der Verluste in Gleichstrommaschinen). W. Linke. With diagrams for practical use in dynamo testing. 1500 w. Elektrotech Zeitschr—June 29, 1905.

See also **Iron Losses; ELECTRIC GENERATOR TEST; MOTOR.**

Magnetic Attraction.—On the Mechanical Forces in Dynamos Caused by Magnetic Attraction. B. A. Behrend. Deduces a new formula applicable to dynamos, showing its agreement with observation. 1800 w. Trans Am Inst of Elec Engs—Nov., 1900.

The Mechanical Forces in Dynamos Caused by Magnetic Attraction. Discussion of Mr. B. A. Behrend's paper. 3000 w. Trans Am Inst of Elec Engrs—April, 1901.

Magnetic Attraction in Dynamos Due to the Armature and Field being Non-concentric. Edgar Knowlton. Gives a fairly accurate method of calculating the magnetic attraction for a specified displacement. Mathematical. 1200 w. Elec Wld & Engr—June 8, 1901.

The Determination of the Magnetic Pull in Cases of Eccentricity (Berechnung des Einsetigen Magnetischen Zuges bei Exzentrizität). J. K. Sumec. Deriving formulas for the computation of the one-sided pull for a given eccentricity of rotor in a dynamo. 1000 w. Zeit f Elektrotechnik—Dec. 18, 1904.

The Lateral Magnetic Pull of Dynamos and Motors (Der Einseitige Magnetische Zug von Dynamos und Motoren). F. Niethammer. Deriving formulas for computing the lateral magnetic effort due to eccentricity in construction. 1000 w. Zeitschr f Elektrotechnik—July 9, 1905.

Maintenance.—The Care of Dynamos and Motors. F. J. A. Matthews. Discusses the care needed, points requiring special attention, etc. 3000 w. Mech Engr—Nov. 22, 1902.

Care and Management of Electric Generators. Edwin W. Creed. Suggestion from practical experience, useful to men having the care of this kind of machinery. Ill. 2500 w. Power—Aug., 1903.

Management of Dynamos. Directions for properly caring for dynamos, especially the magnet winding, terminals and commutator. 3000 w. Mech Engr—Sept. 3, 1904.

Straightening Out a Dynamo. L. H. Pike. An account of a peculiar case in which the author was called to straighten out a factory dynamo. 1000 w. Power—Dec., 1904.

Mavor and Coulson.—See **ELECTRIC GENERATING SET—Robey.**

1903.—Dynamo Construction in 1903 (Der Elektromaschinenbau im Jahre 1903). Josef Löwy. A review of improvements in continuous and alternating machines during the past year. Serial. Part I. 1800 w. Zeitschr f Elektrotechnik—Feb. 21, 1904.

Parallel.—Starting and Stopping Direct-Current Dynamos Operated in Parallel. Alton D. Adams. Considers methods in use. 1600 w. Am Elect'n—Jan., 1901.

Parallel Running for Central Stations. L. R. Lee. Considers three methods of parallel running and the conditions under which each may prove satisfactory. 2200 w. Elec Rev, Lond—Jan. 4, 1901.

Relation of Characteristic Curves of Direct-Current Dynamos to Parallel Operation. Alton D. Adams. Shows curves for series, shunt, evenly compounded and over-compounded dynamos, discussing the results, indicated. 900 w. Am Elect'n—Feb., 1901.

Running Continuous-Current Electric Generators in Parallel. Explains methods of connection, and discusses in detail the distribution of the current. Ill. 2500 w. Col Guard—Feb. 8, 1901.

Direct-Current Dynamos in Parallel. Alton D. Adams. Suggestions of importance for their operation. Ill. 1200 w. Am Elect'n—May, 1901.

Running Direct-Current Generators in Parallel. John H. Ryan, Jr. An illustrated article discussing economical running at all loads. Serial. 1st part. 3000 w. Engr, U S A—April 1, 1902.

The Operation of Two or More Dynamos Together. B. T. McCormick. Discusses the cases of dynamos in parallel, the three-wire system, and dynamos in series explaining the reasons. Mathematical. 900 w. Elec Rev, N Y—April 5, 1902.

Some Hints on the Care and Paralleling of Direct-Current Dynamos. Ralph Scott. Suggestions, describing methods of testing, &c. 1800. Am Elect'n—April, 1903.

Parallel Operation of Dynamos Having Different Characteristics. Lamar Lyndon. Considers a case of paralleling several generators having different characteristics, explaining facts necessary to a clear understanding. Diagrams. 2000 w. Am Elect'n—March, 1905.

See also **ELECTRIC GENERATING SET; ELECTRIC GENERATOR, ALTERNATING; SPEED GENERATOR, ALTERNATING.**

Parallel and Series.—The Series and Parallel Operation of Generators. F. C. Caldwell. An illustrated discussion of cases. Serial. 1st part. 1200 w. Engr, U S A—Dec. 15, 1903.

Paris Exposition.—See under maker's sub-headings; and **ELECTRIC GENERATING SET; ELECTRIC GENERATOR ALTERNATING.**

Polarity Reversal.—Freaks Due to Reversal of Line Polarity. Two instances are given in illustration. 1500 w. Am Elect'n—Oct., 1901.

Pole Changing.—Notes on Pole Changing Machines (Bemerkungen über Wendepolmaschinen). A. Rotth. Comparative results obtained with two and four-pole dynamos with change magnets between the field magnets. 1500 w. Zeitschr f Elektrotechnik—Aug. 6, 1905.

Polyphase.—See **ELECTRIC GENERATING SET; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC STATION.**

Railway.—Development of the Modern Railway Generator. Historical review, giving illustrations of many types. 4200 w. St Ry Rev—Jan. 15, 1901.

See also **ELECTRIC STATION.**

Regulation.—Armature Interference and Brush Position. H. M. Hobart. Showing the influence of armature windings, and brush position upon regulation, and giving a table of useful observations to be taken on a commutating dynamo to determine the most favorable fixed brush position for a given machine. Serial. 1st part. 1800 w. Elec Rev, Lond—Feb. 28, 1902.

Field Regulation with Separate Excitation. Carl Kinzbrunner, in the "Elektrotechnische Zeitschrift." Gives methods of regulating within wide limits. 700 w. Elec Engr, Lond—April 17, 1903.

Dynamo-Regulation Testing. F. C. Caldwell. Describes how to make a regulation test. Ill. 2000 w. Engr, U S A—July 1, 1903.

See also **Girard Regulation; ELECTRIC DISTRIBUTION—High Tension; ELECTRIC GENERATING SET; ELECTRIC GENERATOR, ALTERNATING.**

Rieter.—See **High-Speed.**

Rosenberg.—A Novel Tppe of Dynamos. Illustrated description of a novel type of direct-current dynamo, which is especially suitable for the lighting of railway trains, designed by Dr. E. Rosenberg. 2000 w. Elec Rev, Lond—June 9, 1905.

Rothert.—See **Large.**

Schuckert.—The Schuckert Dynamos at the Paris Exposition (Les Dynamos Schuckert au Palais de l'Electricité). G. Leugny. With illustrations of continuous and polyphase generators and details of switchboards and distribution. 2500 w. Revue Technique—Feb. 10, 1901.

See also **ELECTRIC GENERATING SET—Augsburg—Nuremberg.**

Sheffield Tramways.—1000 K. W. Railway Generator, built by the Union Electric Co., Berlin (1000 K. W. Bahngenerator der Union Elektricitäts-Gesellschaft in Berlin). F. Niethammer. An illustrated description of a compound wound, 500 volt, direct current dynamo for the Sheffield (England) tramways. 400 w. Elektrotech Zeitschr—Jan. 16, 1902.

Short-Circuited Field.—The Effect of Short Circuited Field Coils Upon the Operation of an Electric Generator. William Baxter, Jr. Explains the effect upon two-pole and multipolar machines and the reasons. Ill. 2500 w. Marine Engng—Sept., 1901.

Siemens-Halske.—See **ELECTRIC GENERATING SET—Ringhoffer.**

Société Electricité et Hydraulique.—See **Paris Exposition; ELECTRIC GENERATING SET—Bollinckx.**

Sparking.—See **COMMUTATOR.**

Speed Influence.—The Influence of Rotative Speed upon the Design of Continuous-Current Dynamos (Der Einfluss der Tourenzahl auf den Entwurf von Gleichstrommaschinen). H. M. Hobart. Considering especially the design of very high speed generators, such as are adapted to be driven by steam turbines. 5000 w. Elektrotech Zeitschr—Oct. 1, 1903.

Standardization.—See **ELECTRIC APPARATUS; ELECTRIC GENERATING SET.**

Stationary Field.—The Electromagnetic Field in Dynamos (Das Elektromagnetische Feld in Maschinen). Fritz Emde. A mathematical study of the stationary magnetic field existing between the rotating and stationary members of a dynamo. Two articles. 6000 w. Zeitschr f Elektrotechnik—June 25, 1905.

Steam Turbine.—See **COMMUTATOR—Sparking; ELECTRIC GENERATING SET—Turbo.**

Switchboard Connections.—Switchboard Connections of Compound-Wound Generators. H. M. Gassman. Discusses the scheme of connections. Ill. 500 w. Am Elect'n—Feb., 1905.

Telephone.—See **TELEPHONE—Generator Efficiency.**

Telephone Work.—See **TELEPHONE EXCHANGE—Dynamo.**

Test.—See **ELECTRIC GENERATOR TEST; ELECTRIC TESTING.**

Thomson-Houston.—See **ELECTRIC GENERATING SET—Cail.**

Trouble Location.—See **ELECTRIC PLANT—Inspection.**

Troubles.—Faults in Dynamos. Lamar Lyndon. Discusses the chief irregularities to which dynamos are subject and their causes and remedies. Serial. 1st part. 2500 w. Marine Engng—July, 1901.

Dynamo Ills and Remedies. From the "National Engineer." A discussion of the cause and remedy of troubles. Ill. 4000 w. Can Elec News—Sept., 1901.

Failure of Direct Current Dynamos to Generate. E. C. Parham. Considers some of the causes of disorder leading to a failure of the dynamo to its duty. 1500 w. Am Elect'n—May, 1903.

See also **COMMUTATION—Sparking.**

Unipolar.—Unipolar Induction (Ueber Unipolare Induktion). H. Cahen. A review of the experiments of Hoppe, showing that the phenomena fall under similar laws, which have not yet been fully demonstrated. 5000 w. Elektrotech Zeitschr—Oct. 16, 1902.

The Unipolar Dynamo (Die Unipolarmaschine). J. Seidener. Describing a double-disc single-pole dynamo adapted for high rotative speeds, and hence for direct connection to steam turbines. 2500 w. Zeitschr f Elektrotechnik—Oct. 23, 1904.

The Unipolar Dynamo. Abstract translation of a paper by J. Seidener, in the "Zeitschrift für Elektrotechnik." An illustrated discussion of these machines, and especially with reference to their combination with steam turbines. 1300 w. Elec Rev, Lond—Nov. 18, 1904.

Development of the Unipolar Dynamo. James Asher. Brief review of the development in unipolar dynamos since 1831, describing briefly the types. 1100 w. Elec Wld & Engr—Feb. 4, 1905.
See also **Acyclic; Zone.**

Variable Speed.—Variable-Speed Dynamo. An illustrated account of the characteristics of this train-lighting dynamo, designed by Dr. E. Rosenberg, and its performance in actual service. Also editorial. 2500 w. Elec Wld & Engr—July 15, 1905.

Westinghouse.—See **STEAM ENGINE—Corliss Markham.**

Windings.—Compensating and Compound Windings for Continuous-Current Dynamos (Kompensierende und Compoundierende Wendepolwickelungen für Gleichstrommaschinen). J. Seidener. Discussing the methods of reducing sparking by compensating winding. 1800 w. Zeitschr f Elektrotechnik—June 12, 1904.

See also **ELECTIC GENERATOR DESIGN.**

Wiring.—Wiring Small Dynamos. An article in two parts, written for the guidance of the laymen. 3300 w. Aust Min Stand—Oct. 8 & 15, 1903.

Zone.—"Zone" Dynamos and Motors. Henry F. Joel. Illustrated description of dynamos and motors having a single field coil directly over the neutral zone of the armature. Serial. 2 parts. 1600 w. Elec Rev, Lond—Aug. 5 and 12, 1904.

See also **Acyclic; Unipolar.**

ELECTRIC GENERATOR, ALTERNATING.

See also **ARMATURE; ARMATURE WINDING; ELECTRIC APPARATUS; ELECTRIC GENERATING SET; ELECTRIC GENERATOR; ELECTRIC MACHINERY; ELECTRIC PLANT; ELECTRIC STATION; HYDRO-ELECTRIC PLANT.**

Alternating Current Machinery for High and Low Frequencies. B. A. Behrend. Illustrated detailed description of generating units in modern use. Serial. 1st part. 1200 w. Elec Rev, N Y—Feb. 15, 1902.

Anglemeter.—See **SPEED VARIATION.**

Armature Reactions.—The Armature Reaction of Alternators. C. F. Guilbert. A discussion of the diagrammatic methods that have been proposed, especially those which approach nearest to exactitude; treating the subject from the standpoint of a designing engineer. Serial. 1st part. 1000 w. Elec Wld & Engr—Oct. 25, 1902.

Armature Reaction in Alternators. James B. Henderson and John S. Nicholson. Account of a research to compare the theoretical and experimental armature reaction of a 30-kilowatt, three-phase alternator at the University of Glasgow. Diagrams. 2500 w. Elect'n, Lond—Aug. 5, 1904.

A Note on the Calculation of the Armature Reaction of Alternators. Waldo V. Lyon. A discussion showing the assumptions that must be made to calculate the armature reaction as it is ordinarily done. Considers first a single-phase alternator, and then a three-phase machine. 3000 w. Tech Qr—Dec., 1905.

See also **ARMATURE—Reaction.**

Armature Windings.—See **ARMATURE WINDING.**

Artificial Loading.—The Artificial Loading of Alternators (Künstliche Belastung von Wechselstrommaschinen). R. Goldschmidt. A discussion of the heating of alternators under various conditions of loading. 2000 w. Elektrotech Zeitschr—Aug. 22, 1901.

Artificial Loading of Alternating-Current Machinery. Rudolf Goldschmidt. Translated from the "Elektrotechnische Zeitschrift." Discusses the heating of alternators, and methods of loading. Ill. 1800 w. Elec Engr, Lond—Dec. 13, 1901.

Asynchronous.—Asynchronous Generators. A. S. McAllister. A discussion of the operation. 2200 w. Am Elect'n—Nov., 1903.

Compounded Asynchronous Machinery. G. Hooghwinkel. Briefly explains the difference between synchronous and asynchronous machines, and states the advantages of a compounded and self-exciting asynchronous alternator, describing the struction. Serial. 1st part. 1700 w. Elec Rev, Lond—July 17, 1903.

Boucherot.—See **Compounding.**

Bullock, St. Louis.—See **ELECTRIC GENERATING SET—Allis Chalmers.**

Characteristics.—The Determination of Alternator Characteristics. L. A. Herdt. A discussion considering, both theoretically and experimentally, the E. M. F. induction and current relations under different conditions as to load and power factor in the armatures of several types of alternating current generators, and indirect methods for obtaining the regulation of a particular machine developed and applied to those of other types. Ill. 5000 w. Trans Am Inst of Elec Engrs—June 18, 1902.

See also **Curve Analysis.**

Characteristic, Short Circuit.—The Computation of the Short-Circuit Characteristics of Alternating Generators (Die Vorausberechnung der Kurzschlusscharakteristik von Wechselstrom Generatoren). Dr. Theodor Torda. Deriving formulas and tables for the calculation of the constant from the dimensions and winding. 2500 w. Elektrotech Zeitschr—May 18, 1905.

Compensated.—Compensated Alternate Current Generators. Miles Walker. Abstract of a paper read at Manchester, Eng., before the Inst. of Elec. Engrs. Describes some methods of compensating, especially the method of the author which preserves the field excitation constant and utilizes the armature field to raise the voltage. Ills. 3000 w. Elec Rev, Lond—Dec. 30, 1904.
See also **Heyland.**

Compounding.—Compounding of Alternators by Compensating exciter. Ernst J. Berg. Explains the theory of automatic compensation, and gives an illustrated description of the method employed in the machine represented. Also editorial notes. 1900 w. Elec Wld & Engr—April 27, 1901.

The Compounding of Alternators (Appunti sul Compoundaggio degli Alternatori). Marco Tullio Gentile. A graphical and analytical examination, using the vector analysis of the variation limits with compounded alternators. 1800 w. Elettricita—Nov. 24, 1900.

The Compounding of Alternators (Compoundirung von Wechselstromgeneratoren). A. Heyland. Discussing the arrangement of synchronous and nonsynchronous generators, with diagrams showing the armature reactions. 3000 w. Elektrotech Zeitschr—Dec. 12, 1901.

Some Applications of Compound Alternators (Quelques Applications d'Alternateurs Compounds). M. Boucherot. A general review of the theory of compounding and a particular account of his system, in which there are compounded transformers which are connected to the alternator, to line and to the exciter which has an alternating field. A well illustrated account of practical applications and tests of this system are also given. 9000 w. Bull Soc International des Electriciens—June, 1902.

The Boucherot System of Compounding Alternators (Note sur les Alternateurs Compound, Systême Moucherot). E. J. Brunswick. An illustrated description of this system, in which a compounded transformer supplies current to an exciter, which, in turn, excites the alternator. 3500 w. Génie Civil—July 5, 1902.

The Compounding of Self-Excited Alternating Current Generators for Variation in Load and Power Factor. A. S. Garfield. A description of the characteristics of a polyphase alternating current revolving field generator provided with a single closed-circuit field-winding and commutator. Ill. 1800 w. Am Inst of Elec Engrs—May 19, 1903.

The Compounding of Alternators (Compoundierung von Wechselstrom-Generatoren). A. Heyland. Giving an application of the vector analysis to the problem of compounding with especial reference to the writer's improved system of synchronous compounding. 2500 w. Elektrotech Zeitschr—Nov. 5, 1903.

Recent Developments in Compounded Alternators with Alternating Current Self-Excitation. Alexander Heyland. An illustrated explanation of the present construction of the machines. 4000 w. Inst of Elec Cong of St Louis—Sept., 1904.

See also **Self-Exciting.**

Construction.—The Design and Construction of Polyphase Dynamos (Der Aufbau und die Planmässige Herstellung der Drehstrom-Dynamomaschine). O. Lasche. Especially discussing the constructive features of large generators, illustrated by examples of recent large equipments. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—July 13, 1901.

The Construction and Systematic Manufacture of Alternators. O. Lasche. The first of a series of articles which will discuss the conditions underlying the construction and systematic manufacture of alternators of various types. Ill. Serial. 1st part. 1900 w. Engng—Aug. 9, 1901.

A New Frame Construction for Alternators (Ueber eine Neue Gehäusekonstruktion von Wechselsrommaschinen). H. Böhmländer. Illustrating a built-up ring of structural wrought iron, in place of the usual cast frame. 1200 w. Electrotech Zeitschr—July 24, 1902.

Alternating Current Generators and Synchronous Motors. George T. Hanchett. Explains the construction of these machines. Ill. 2000 w. Cent Sta—July, 1903.

Core-Loss.—A Method of Calculating the Core-Loss in Large Alternators. T. S. Allen. Explains a method of calculation which has been adopted by the Electrical Department of the Allis-Chalmers Co., and which gives very satisfactory results. 1400 w. Elec Wld & Engr—July 1, 1905.

Coupling.—See **Parallel.**

Curve Analysis.—The Analysis of Alternator Curves. Charles F. Smith. Explains the method of curve analysis, illustrating by example. Serials. 1st part. 1700 w. Mech Engr—May 13, 1905.

Curves.—Causes for the Deformation of the Pressure Curves in Alternators (Die Ursachn der Deformationen von Spannungskurven in Wechselstrommaschinen). P. Wangemann. A study of the deviation of the pressure curves from the theoretical sine form, showing the influence of the arrangement of poles, and of the construction of the machine. Two articles. 7500 w. Elektrotech Zeitschr—Sept. 8, 15, 1904.

See also **Sine Current; ELECTRIC CURRENT, ALTERNATING—Wave Form.**

Dampers.—Alternators With Dampers. J. Fischer-Hinnen. Deals with the theory of copper loops linked with the field circuits of alternating current machines, on the basis of the theory of induction motors. Ill. 4400 w. Elec Wld & Engr Dec. 28, 1901.

The Effect of Dampers on Harmonics (Sur les Etouffeurs d'Harmoniques). Maurice Leblanc. Discussing a method of inserting damping coils in alternators so as to suppress the harmonic irregularities in the alternations. 6000 w. Bull Soc Int d Eletriciens—Jan., 1905.

Damper vs. Heavy Fly-Wheel.—See **Parallel.**

Design.—See **ELECTRIC GENERATOR; ELECTRIC GENERATOR DESIGN—Alternator; Polyphase; Siemens; Synchronous Reactance.**

Diagram.—A General Diagram for Alternators. Gives an explanation of F. Niethammer's method of pre-determining the characteristics of alternating-current machinery by graphical means, which has been found to give accurate results in practice. 1400 w. Elect'n, Lond—April 15, 1904.

Operating Diagrams of an Alternator (Sur les Diagrammes de Fonctionnement d'un Alternateur). C. F. Guilbert. Discussing methods of constructing the characteristic curves of alternating-current dynamos. Serial. Part. I. 2500 w. Revue Technique—April 25, 1904.

Diagram Heyland.—Applications of the Circle Diagram to Alternators (Anwendung der Kreisdiagramme auf Wechselstromgeneratoren). J. Pulnj. Showing the general applicability of the diagram, originally designed by Heyland for the induction motor, to alternating-current dynamos. Two articles. 6000 w. Zeitschr f Elektrotechnik—Jan. 31, Feb. 7, 1904.

See also **Heyland; ELECTRIC MOTOR.**

Dick Kerr.—The Dick Kerr Alternator for Steam Turbine Drive. Illustrated description of a new alternator for steam-turbine speeds. 900 w. Elect'n, Lond—Nov. 24, 1905.

Double-Current.—See **ELECTRIC GENERATOR.**

Double Field.—Double-Field Dynamos for Single and Polyphase Currents (Doppelfeld Generatoren für Ein und Mehrphasenstrom). E. Ziehl. With diagrams of the windings, and a general discussion of the advantages of the improvement. 5000 w. Elektrotech Zeitschr—July 6, 1905.

Elastic Line.—The Elastic Line of Polyphase Machines with Large Diameters (Die Elastische Linie von Drehstrommaschinen mit Grossen Durchmessern). Hans Linsenmann. An elaborate mathematical discussion of the mechanical strains caused by the magnetic forces acting in the machine. Diagrams. Serial. 2 parts. 6000 w. Elektrotech Zeitschr—Jan. 30, Feb. 6, 1902.

Electromotive Force.—The Computation of the Effective Electromotive Force of Polyphase Machines (Ueber die Berechnung der Effektiven Elektromotorischen Kraft von Drehstrommaschinen). Arthur Müller. A mathematical investigation, deriving formulas, and computing a table of factors for a three-phase alternator. 2000 w. Zeitschr f Elektrotechnik—Jan. 15, 1905.

E. M. F. on Open Circuits.—The E. M. F. of Alternators on Open Circuit. C. C. Hawkins. Discusses the manner of determining the E. M. F. Serial. 1st part. 900 w. Elec Rev, Lond—Oct. 26, 1900.

Erection.—The Erection of Alternating-Current Machines. R. Scott. Describes the three types of machines and discusses the erection and preliminary operation of alternators. 4800 w. Power—April, 1905.

See also **New York Subway; ELECTRIC GENERATOR.**

European.—European Types of High-Tension Alternators. C. F. Guilbert. An account of a careful study made of the alternators exhibited at the Paris Exposition. 2500 w. Elec Wld & Engr—Jan. 19, 1901.

Excitation.—Alternator Excitation. H. H. Norris and F. D. Newbury. Discusses the various methods used in the United States and Europe. Ill. 4000 w. Sib Jour of Engng—March, 1901.

Excitation of Asynchronous Generators by Means of Static Condensance. A. S. McAllister. A description, with diagram, of a method of using a condenser as a source of exciting current for an asynchronous generator. 1600 w. Elec Wld & Engr—Jan. 17, 1903.

The Excitation of Alternators. F. H. Davies. A discussion of methods of excitation. 3000 w. Elec Engr, Lond—Jan. 27, 1904.

Exciter Compensating.—See **Compounding.**

Grounded Neutral.—The Advisability and Methods of Grounding the Neutral on High Potential Alternating-Current Generators. George N. Eastman. Read before the Nat. Elec. Lgt. Assn. Presents conditions resulting in a production of dangerous potentials relative to earth, showing these conditions will only arise in a system which is insulated from the earth. 2800 w. Elec Rev, N. Y.—June 11, 1904.

See also **ELECTRIC DISTRIBUTION.**

Heyland.—Some Notes on the Design of Large Alternators. A. Heyland. Notes having special reference to tests made on the alternators of 1,000 E. H. P., exhibited by The Electricité et Hydraulique, Limited, of Charleroi, at the Paris Exhibition. Ill. Serial. 1st part. 1700 w. Elec Rev, Lond—Dec. 7, 1900.

Asynchronous Generators for Single and Polyphase Currents, Asychrone Generatoren für Ein- und Mehrphasenstrom). Alexander Heyland. A paper before the Verband Deutscher Elektrotechniker giving an illustrated description of non-synchronous alternators designed on the principle of an induction motor. Curves and diagrams. 4000 w. Elektrotech Zeitschr—June 26, 1902.

On Induction Machines and a New Type of Polyphase Generator. A. C. Eborall. An account of a new type of polyphase generator designed by Alexander Heyland, with remarks on its development. Serial. 1st part. 2700 w. Elect'n, Lond—July 3, 1903.

Improved Compound Polyphase Generator (Neuer Compound-Drehstrom-Generator). E. Kolben. Describing a modification of the Heyland machine with especial reference to the commutator construction. 2500 w. Elektrotech Zeitschr—Oct. 8, 1903.

On the Compensation and Compounding of Alternating-Current Generators. H. S. Meyer. Remarks on the generators of the Heyland type. 1500 w. Elect'n, Lond—Oct. 16, 1903.

A New Compounded Three-Phase Generator. Translation of an article by E. Kolben in "Electrotechnische Zeitschrift." Describes a modification of the Heyland machine. Ill. Serial. 1st part. 1000 w. Elec Engr, Lond—Nov. 27, 1903.

A New Alternator With Direct Excitation by Alternating Currents (Eine Neue Wechselstrommaschine mit Direkter Erregung durch Wechselstrom). Alexander Heyland. Illustrated paper before the Elektrotechnischer Verein, with extended discussion. Current from the machine passes through a commutator direct to the field coils. 8000 w. Elektrotech Zeitschr—Dec. 17, 1903.

See also **ELECTRIC MOTOR.**

History.—The Alternating Current Generator. David B. Rushmore. Historical sketch of the origin, development and present status of this important class of electric generators. Ills. 4500 w. Jour Fr Inst—Oct., 1905.

See also **ELECTRIC INDUSTRY.**

Hopkins.—How to Build a Small Alternating-Current Dynamo Without Castings. Nevil Monroe Hopkins. Illustrates and describes a machine which produces a single-phase alternating current of 110-volts pressure, and is built without patterns or castings. 5000 w. Sci Am Sup—Nov. 11, 1905.

Humming.—See **ELECTRIC GENERATOR.**

Hunting.—The "Hunting" of Parallel-Coupled Dynamos (Das Pendeln Parallel Geschalteter Maschinen). A. Foppl. A mathematical discussion of the oscillation of electrical energy between dynamos operated in parallel. 5000 w. Elektrotech Zeitschr—Jan. 23, 1902.

The "Hunting" of Alternating-Current Machines. Bertram Hopkinson. Communication to the Royal Society. An investigation of causes and a study of the general effect upon stability of running. Serial. 2 parts. 6000 w. Elect'n, Lond—Aug. 7 and 14, 1903.

The Oscillation of Parallel-Connected Alternators (Das Pendeln Parallel Geschalteter Wechselstrommaschinen). A Sommerfeld. A mathematical analysis of the prenomena of surging in parallel running of alternators. Two articles. 10000 w. Elektrotech Zeitschr—April 7, 14, 1904.

See also **Parallel.**

Hutin and Leblanc.—The Hutin & Leblanc Compound Alternator (L'Alternateur Compound Système Hutin & Leblanc). A full detailed description of the large alternator exhibited at the Paris exposition. 2500 w. Revue Technique—Oct. 25, 1901.

Impedance.—The Relation of Synchronous Impedance to the Impedance at Standstill. F. Townsend, H. P. Freund, W. I. Reich. An account, with diagrams, of experiments on the impedance of several alternating-current generators. 1000 w. Elec Wld & Engr—Jan. 3, 1903.

Induction.—Alternate Current Machinery—Induction Alternators. William Stanley, assisted by G. Faccioli. Discusses some of the elementary phenomena found while studying the performance of alternators excited by alternating currents. 4800 w. Am Inst of Elec Engrs—June 22, 1905.

Induction Experiments.—Experiments on Periodic Variations Occurring in the Exciting Current of an Inductor Alternator. W. Duddell and E. W. Marchant. A report of experimental investigations of the nature and magnitude of this induced alternating current in the field of an inductor alternator, in which the variation was known to be considerable. Serial. 1st part. 1800 w. Elect'n, Lond—Nov. 29, 1901.

Induction Motor.—See **ELECTRIC MOTOR—Induction, Generator.**

Inductor.—The Inductor Alternator. Edward Heitmann. Claims that this type of alternator, when properly designed and constructed, will meet the most severe conditions encountered in the operation of generators of all sizes and types. Ill. Serial. 1st part. 1100 w. Elec Wld & Engr—Oct. 5, 1901.

Iron Loss.—See **ELECTRIC GENERATOR.**

Kinetic Factor.—See **ELECTRIC GENERATOR.**

Lahmeyer.—See **ELECTRIC GENERATING SET.**

Lines of Force.—See **MAGNETIC FIELD.**

Magnetic Saturation.—The Best Degree of Saturation for Polyphase Generators (Günstigster Sättigungsgrad Mehrphasiger Generatoren). Emil Korrodi. The best flux density for the field magnets of polyphase generators is shown graphically. 400 w. Elektrotech Zeitschr—Jan. 16, 1902.

New York Metropolitan.—The Three Phase Alternators of the Metropolitan Street Railway Company of New York City. Harris J. Ryan. A study of the design and performance of those alternators, which are typical of the latest American practice. Ill. 3800 w. Sib Jour of Engng—Feb., 1901.

See also **ELECTRIC STATION.**

New York Subway.—The Erection of 5,000-K. W. Engine-Driven Alternators. R. L. Wilson. Illustrates and describes the installation of the generators which furnish power for the operation of the trains in the New York Subway. 3800 w. Eng News—March 23, 1905.

Parallel.—Notes on the Theory of Synchronous Motors and of Alternators in Parallel. Alexander Russell. A sketch of the elements of the mathematical theory of the synchronous motor and of alternators in parallel, illustrating the results by means of curves. Serial. 1st part. 2000 w. Elec Rev, Lond—May 31, 1901.

The Parallel Operation of Alternators from the Engine-Builder's Point of View. W. Trinks. A discussion of all the elements entering into the successful parallel operation of direct coupled alternators, with brief general discussion. 8800 w. Pro Engs' Soc of W Penn—May, 1901.

Parallel Running of Alternators. A few points on the subject of engine design for this purpose are discussed. 800 w. Elec Rev, Lond—July 26, 1901.

Parallel Operation of Alternators. A. S. McAllister. Discusses the operation on the output side of the machines. 1500 w. Am Elect'n—Sept., 1901.

Parallel Running of Alternators. Ernest J. Berg. Considers the principles governing the parallel operation of alternators driven by steam engines or turbines. 1200 w. Trans Am Inst of Elec Engrs—Oct., 1901.

The Parallel Running of Alternators (Parallelbetrieb in Wechselstromsystemen). H. S. Meyer. A mathematical examination of the principles of parallel running, with an exposition of its advantages. 8500 w. Elektrotech Zeitschr—Oct. 31, 1901.

The Design of Engines for Operating Alternators in Parallel. R. H. Rice. Read at the meeting of the Am. Inst. of Elec. Engrs. Discusses the determining of the proper fly-wheel effect, and the type of governor. 1000 w. St Ry Jour—Nov. 2, 1901.

Parallel Operation of Engine-Driven Alternators. W. L. R. Emmet. Read at meeting of the Am. Inst. of Elec Engrs. Presents a method of overcoming the difficulties of such operation which has been in successful use for three years in many important installations. 2500 w. St Ry Jour—Nov. 2, 1901.

Parallel Operation of Engine-Driven Alternators. W. L. R. Emmet. Explains a method of overcoming the difficulties of surging which has been in successful use for three years. 2500 w. Trans Am Inst of Elec Engrs—March, 1902.

The Regulation of Prime Movers and Parallel Operation of Alternators. Charles P. Steinmetz. Considers features regarding the effect of speed regulation of prime movers, and difficulties with parallel operation of alternators driven from separate prime movers. 1200 w. Trans Am Inst of Elec Engrs—March, 1902.

Discussion on Speed Regulation of Prime Movers. Discussion at New York, Oct. 25, 1901, of papers on this subject read before the society. 10600 w. Trans Am Inst of Elec Engrs—March, 1902.

Parallel Operation of Alternators. Paul M. Lincoln. Discusses this subject and describes a new synchronism indicator invented by the writer, and the principles upon which it rests. Ill. 5300 w. Jour Fr Inst—April, 1902.

The Phase Displacement of Alternators and Parallel Running. H. C. Leake. Deals with the effect of periodic fluctuation of the turning moment of the prime mover. Serial. 1st part. 1500 w. Elec Rev, Lond—April 4, 1902.

The Parallel Driving of Alternators (Ueber den Parallelbetrieb von Wechselstrommaschinen). E. Rosenberg. With especial reference to the use of gas engines as prime movers, and the necessary methods of speed regulation. 3 articles. 10000 w. Elektrotech Zeitschr—May 15, 22, 29, 1902.

Engine Requirements for the Parallel Operation of Alternators. E. M. Tingley. Read before the Engine Builders' Assn. of the U. S. Gives the specification of the Westinghouse Elec. & Mfg. Co., discussing it in detail. 2000 w. Elec Rev, N Y—May 31, 1902.

The Requirements for the Paralleling of Alternators as Viewed by the Engine Builders. H. E. Longwell. A discussion of this subject and the need of the electrical and mechanical engineers co-operating in solving the difficulties. 6600 w. Engr, U S A—June 2, 1902.

Some Notes on Synchronizing. Joseph Martin Roman. Discusses methods of indication, desirable conditions, the synchronizing circuit, etc. Ill. 2200 w. Elec Wld & Engr—June 14, 1902.

The Paralleling of Alternators. Abstract of a paper by Henry E. Longwell presented at the Pittsburg meeting of the Engine Builders' Assn., in which certain theories on the method of governing engines driving alternating generators are advanced. 1800 w. Eng Rec—June 14, 1902.

Parallel Operation of Direct-Connected Alternators. P. C. Oscanyan. Describes investigations made by the writer of the pendulum action which sometimes causes the generators to go out of step. 1200 w. Elec Wld & Engr—Sept. 13, 1902.

Engine Governing and Parallel Running of Alternators. Abstract of report of a special committee of the International Soc. of Elec. Engrs. on the best method of running alternators in parallel. 1500 w. Eng Rec—Sept. 20, 1902.

A few Hints on the Installation and Operation of Alternators in Parallel. Fred P. Woodbury. Helpful suggestions for the setting and operation of these machines. Ill. 3000 w. Am Elect'n—Oct., 1902.

The Influence of the Governor Upon the Parallel Working of Alternators (Influence des Regulateurs sur le Fonctionnement en Parallelle des Alternateurs). M. de Marchena. A discussion of the speed regulation of engines for driving alternators in parallel, with regard to the angular variations in velocity. 15,000 w. Bull Soc Int des Electriciens—Nov., 1902.

Armature Reactions and Pendulum Effects in Alternators (Ankerreaktion und Pendelerscheinungen bei Drehstromgeneratoren). Rudolf Goldschmidt. A graphical and analytical discussion of the reactions in alternator armatures. 1800 w. Elektrotech Zeitschr—Nov. 6, 1902.

The Coupling of Alternators (Note sur le Couplage des Alternateurs). L. Martin. With diagrams showing the method of arranging alternators in step for operation in parallel. 2000 w. Revue Technique—Nov. 10, 1902.

The Paralel Driving of Alternators. (Ueber den Parallelbetrieb von Wechelstrommaschinen). H. Görges. A review of the previous paper of Rosenberg, discussing the synchronising action of two alternators coupled in parallel. 2500 w. Elektrotech Zeitschr—Dec. 4, 1902.

The Pendulum Action of Alternators in Parallel (Das Pendeln Parallel Geschalteter Wechselstrommaschinen). Dr. G. Benischke. A discussion of the analogy of the phenomena of alternators in parallel to the oscillations of pendutions. 4000 w. Elektrotech Zeitschr—July 16, 1903.

The Parallel Operation of Alternating-Current Machines (Ueber den Parallelbetrieb der Wechselstrommaschinen). H. Görges. A paper before the Verband Deutscher Elektrotechniker, giving a general discussion of the operation of the alternating current generators in parallel. Illustrations. 4000 w. Elektrotech Zeitschr—July 16, 1903.

The Parallel Working of Alternators. B. Hopkinson. Read at Southport meeting of the British Assn. An attempt to harmonize the mathematical treatment with the practical rules regarded as good practice. 5000 w. Elec Engr, Lond—Sept. 25, 1903.

The Uarallel Working of Alternators. B. Hopkinson. Read before the British Assn. An attempt to co-ordinate the mathematical treatment of the subject with the practical rules which are now regarded as good practice, and to point out the reason for certain observed phenomena. 5000 w. Elect'n, Lond—Sept. 18, 1903.

The Action of Dampers in the Parallel Running of Alternators (Die Wirkung des Dämpfers bei Parallel Arbeitenden Wechselstrommaschinen). E. Rosenberg. A discussion of the connection between damping and the reaction relation of the machines, showing that heavy flywheels obviate the necessity for damping. 7500 w. Elektrotech Zeitschr—Oct. 15, 1903.

Notes on the Theory of Parallel Running of Synchronous Machinery. H. C. Leake. A critical review of a paper entitled "The Parallel Working of Alternators," by Mr. B. Hopkinson. 3000 w. Elec Rev, Lond—Nov. 13, 1903.

Synchronizers and Parallel Operation of Dynamos. Arthur B. Weeks. On the use of Voltmeters as synchronizers, and various cases in paralleling. Also brief illustrated description of the Loncoln synchronizer. 3400 w. Engr, U. S. A.—Dec. 15, 1903.

Alternators in Parallel. H. Bohle. Read before the Leeds Loc. Sec. of the Inst. of Elec. Engrs. A treatise on this subject, discussing the most important problems. Diagrams. Serial. 1st part. 2400 w. Elect'n, Lond—March 4, 1904.

Expressions for the Power Delivered by Two Alternators in Parallel (Expression des Puissances Fourmés par Deux Alternateurs en Paralleie). C. F. Guilbert. Developing graphical methods for determining the relative and joint performances of the two machines. Two articles. 4000 w. Rev Technique—Feb. 10, 25, 1905.

Parallel Running of Alternators Driven by Large Gas Engines. E. Kilburn Scott. Considers there is no difficulty whatever in running three-phase generators in parallel when driven by large gas engines, and calls attention to some points to be remembered. 1000 w. Elec Rev, Lond—March 10, 1905.

Operation of Alternators in Parallel. A. L. Mudge. Read before the Can Elec Assn. Considers some of the advantages secured by parallel operation, the requirements, and points in practical operation. 7500 w. Can Elec News—Aug., 1905.

"Flywheel Effect" and "Stored Energy" in Rotating Parts of Electrical Machinery, and the Parallel Running of Alternators. Compares English and Continental practice, and conversion of one system to the other is explained, giving example. 2000 w. Elec Engr, Lond—Aug. 18, 1905.

See also Hunting; ELECTRIC GENERATING SET—Regulation; ELECTRIC GENERATOR—Parallel; FLYWHEEL—Alternators; SPEED VARIATION; STEAM ENGINE—Parallel.

Parallel, Motor Driven.—See ELECTRIC MOTOR—Parallel Driving.

Paris Exposition.—French and German Polyphase Generating Units at the Paris Exposition. C. L. Durand. Details of construction and operation of the large machines of the Fives-Lille Co. and the Augsburg-Nuremberg Co. 1600 w. Elec Rev, N. Y.—Nov. 14, 1900.

Three-Phase Generators at the Paris Exposition (Dreiphasen-Generatoren der "Electricité et Hydraulique" auf der Pariser Welhausstellung, 1900). A. Heyland. Describing several large alternators and examining their action by plotted curves. 3000 w. Elektrotech Zeitschr—Dec. 6, 1900.

Polyphase Design.—See Construction; ELECTRIC GENERATOR DESIGN; ELECTRIC MOTOR.

Railway, Phase Choice.—Single versus Polyphase Generators in Alternating Current Railway Work. W. A. Blanck. A consideration as to the selection of the generators delivering the energy to the system. 1300 w. Elect'n, Lond—May 27, 1904.

Regulation.—Compensation of Alternators for Circuits of Varying Power Factors. Sydney Woodfield. Gives a description of the automatic regulating apparatus of the General Electric Company, etc. 1100 w. Elec Rev, Lond—Aug. 30, 1901.

Regulation of Alternators Under Variable Reactive Loads. George W. Redfield. Discusses the problem of alternator regulation. 3000 w. Technograph, No. 15, 1900-1901.

The Regulation of Alternating Current Generators. A. S. McAllister. Considers the causes of change in generator e. m. f., and the advantages of two-phase and three-phase generators. Ill. 2300 w. Am Elect'n—Aug., 1901.

Computation of Regulation of Alternating Current Generators. Virginius D. Moody. An explanation, illustrated by an example. 1600 w. Elec Wld & Engr—Oct. 18, 1902.

The Experimental Basis for the Theory of the Regulation of Alternators. B. A. Behrend. Aims to supply data to enable the Committee on Standardization to draw up rules for the determination of voltage regulation. 4700 w. Am Inst of Elec Engrs—May 19, 1903.

Theoretical Basis for the Experimental Pre-Determination of the Regulation of Alternators. Dr. Theo. Torda-Heymann. Describes a method which the writer considers will more nearly coincide with actual facts, applying it to examples given by B. A. Behrend in an earlier article. 1600 w. Elect'n, Lond—April 22, 1904.

A Contribution to the Theory of the Regulation of Alternators. H. M. Hobart and F. Punga. Discussion, with formulae and diagrams. 7500 w. Trans Am Inst of Elec Engrs—April 22, 1904.

Discussion on "Contribution to Theory of the Regulation of Alternators" and "The Mechanical Construction of Revolving-Field Alternators." The first paper was by H. M. Hobart and F. Punga; the second by David B. Rushmore. 5200 w. Trans Am Inst of Elec Engrs—June, 1904.

On the Theory of the Regulation of Alternators. C. F. Guilbert. Aims to show that a method suggested by the author two years ago leads in general, and especially in the case of an inductive load, to a much greater approximation than that demonstrated by Messrs. Hobart and Punga, presented before Am. Inst. of Elec. Engrs. 3800 w. Elec Wld & Engr—Dec. 17, 1904.

The Regulation of Alternators. D. B. Rushmore. A summary of work done and methods used for determining regulation, and the results of tests on differing types of machines. Ills. 3500 w. Int Elec Cong of St. Louis—Sept., 1904.

Calculation of Alternator Regulation. C. E. Canfield. Describes methods for calculating the value of the armature reaction and inductive reactance and for treating the quantities when so found. Also editorial. 4000 w. Elec Wld & Engr—Sept. 3, 1904.

See also ELECTRIC GENERATING SET; ELECTRIC GENERATOR.

Revolving Field.—The Mechanical Construction of Revolving-Field Alternators. David B. Rushmore. Paper before the Am. Inst. of Elect. Engrs., with illustrations and diagrams. 7700 w. Trans Am Inst of Elec Engrs—April 22, 1904.

A New Generator. William Ashabel Johnson. Illustrated description of an alternating current generator of the revolving field type. 1800 w. Can Elec News—April, 1905.

Some Noteworthy Revolving Field Construction (Eine Bemerkenswerte Magnetradkonstruktion). F. Tischendörfer. With photographs of portions of large alternators, showing the manner in which the rotor is built in conection with the flywheel. 1500 w. Zeitschr d Ver Deutscher Ing—Nov. 8, 1902.

See also **Regulation.**

Saturation.—The Normal Saturation of Alternator Fields. R. Beattie. Defines normal saturation as that degree of sanitation which makes the regulation efficiency a maximum. 600 w. Elect'n, Lond—July 11, 1902.

Schneider.—See ELECTRIC-GENERATING SET—**Dujardin.**

Self-Exciting.—Self-Exciting and Compounded Alternators. Gives illustrated particulars of recent machines of this class. 1500 w. Elect'n, Lond—July 15, 1904.

Self-Exciting, Compounding.—See **Compounding.**

Short Circuited.—A Phenomenon in the Short Circuiting of Alternators (Ueber ein Phänomen bei Kurzschluss von Drehstrommaschinen). E. Rosenberg. A graphical examination of the pressure in short-circuited alternators, using solid geometry; with tables and diagrams. Two articles. 6000 w. Elektrotech Zeitschr—April 25, May 2, 1901.

The Theory of Short Circuited Electric Alternators (Zur Theorie des Kurzgeschlossenen Wechselstrom-Generators). F. Horschitz. An analytical and graphical investigation of armature reaction in short-circuited alternators. 2000 w. Elektrotech Zeitschr—July 4, 1901.

Armature Reactions in Short Circuiting Polyphase Generators (Ankerreactie en Kortsluiting van Draaistromgeneratoren). A. C. van Rossem. An analytical and graphical treatment of the effects of short circuiting, discussing the methods of Behn-ESschenburg, Rothert, and Potier. 2000 w. De Ingenieur—Jan. 3, 1903.

See also **Armature Reaction.**

Siemens-Schuckert.—See STEAM TURBINE—**Zoelly.**

Sine Current.—The Production of Pure Sine Currents (Ueber die Erzeugung Reiner Sinusströme). Reinhold Rüdenberg. Discussing methods of winding by which an exact sine curve may be produced when such is desired. 2500 w. Elektrotech Zeitschr—March 31, 1904.

See also **Curve;** ELECTRIC CURRENT, ALTERNATING—**Wave.**

Single-Polyphase.—An Experiment with Single-Phase Alternators on Polyphase Circuits. C. A. Mailloux. Report of an experiment at Phoenix, Arizona, April 7, 1902, demonstrating the possibility of using single-phase alternators to produce two-phase, three-phase, and direct currents. 3200 w. Trans Am Inst of Elec Engrs—June 20, 1902.

Single vs. Polyphase.—Single versus Multiphase Generators in Alternating Current Railway Work. W. A. Blanck. Considers the relative merits of the two systems, discussing typical cases using one, two, and three-phase generators. 1600 w. St Ry Jour—April 9, 1904.

See also **Railway.**

Speed Regulation. — See **Parallel; Regulation;** SPEED VARIATION.

Stator Deflection.—See ELECTRIC GENERATOR—**Frame Deflection.**

Steam Turbine Driven.—See ELECTRIC GENERATING SET.

Stray Field.—See MAGNETIC FIELD—**Stray.**

Switchboard Connections.—See ELECTRIC GENERATOR.

Synchronizer.—See **Parallel.**

Synchronizing Devices.—See ELECTRIC INSTRUMENT.

Test.—See ELECTRIC GENERATOR TEST.

Theory.—The Theory of Alternating Dynamo-Electric Mechanism. W. Elwell Goldsborough. Explains the manner in which alternating electromotive forces are generated in commercial machines, and considers harmonic functions in the present article. Serial. 1st part. 2000 w. Elec Rev, N. Y.—Oct. 31, 1900.

Transmission.—Alternators for Electrical Transmission. Alton D. Adams. Considerations as to the number of dynamos in the generating station of a transmission system, describing the three types of alternators used, the voltages, etc. 3700 w. Elec Rev, N Y—Feb. 21, 1903.

See also ELECTRIC GENERATOR DESIGN; ELECTRIC TRANSMISSION.

Velocity Influence.—The Influence of Circumferential Velocity Upon the Dimensions and Weight of Alternators (Ueber den Einfluss der Umfangsgeschwindigkeit auf die Dimensionen und das Materialgewicht von Drehstromgeneratoren). A. Siewert. With computations of weights and dimensions in comparative cases. 3000 w. Elektrotech Zeitschr—June 6, 1901.

Voltage Drop.—The Pressure Drop in Alternating Generators (Ueber den Spannungsabfall in Wechselstromgeneratoren). Dr. H. Behn-Eschenburg. Discussing the mathematical method of computing the drop in voltage for a proposed machine. 4000 w. Elektrotech Zeitschr—May 19, 1904.

The Voltage Drop of Alternators. Dr. H. Behn-Eschenburg. Abstract translation from the "Elektrotechnische Zeitschrift." Suggests a simple correction of a method in general use for the predetermination of alternator voltage drop. 1800 w. Elec Engr, Lond—June 24, 1904.

Wave Form.—See **Curve; Sine Curve;** ELECTRIC CURRENT, ALTERNATING.

ELECTRIC GENERATOR DESIGN.

See also **ARMATURE; ARMATURE WINDING; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MACHINERY; ELECTROMAGNET; MAGNETIC FIELD; MAGNETIC INDUCTION.**

Principles of Dynamo Construction. Presents principles essential to the design and construction of dynamos and motors, discussing each in detail. Ill. Serial. 1st part. 3000 w. Elec, N. Y.—Nov. 13, 1901.

Inductive Reaction and Fall of Potential in Dynamo-Electric Machines (Reaction d' Induit et Chute de Tension dans les Machines Dynamo-Electriques). R. V. Picau. An attempt at a general method of predetermining the principal quantities in dynamo design, with formulae and diagrams. 5000 w. Bull Soc Internationale des Electriciens—June, 1902.

The Making of a Dynamo. Henry A. Mavor. Abstract of a paper read at Belfast meeting of the Brit. Assn. Illustrates and describes the construction. 1600 w. Elec Rev, Lond—Oct. 3, 1902.

Design of Continuous Current Dynamos. Henry A. Mavor. Read before the Glasgow Sec. of Inst. of Elec. Engrs. Considers the application of results of calculations and experiments to practical design. 4000 w. Mech Engr—Nov. 15, 1902.

The Computations for Continuous-Current Dynamos (Zur Berechnung der Gleichstrommaschine). Emil Korrodi. Discussing a method of determining graphically the proportions of the various parts and arranging them in tabulated form for a series of sizes. 1800 w. Elektrotech Zeitschr—Nov. 27, 1902.

The Use of Specific Forms in Designing Dynamo Machinery, and the Design of a Rotary Converter. H. M. Hobart. Describes a series of forms prepared for use in designing continuous-current commutating machinery. Serial. 1st part. 800 w. Elec Rev, Lond—Dec. 5, 1902.

A Criticism of Present-Day Continuous-Current Designing. Fred W. Davies. A discussion of various points in the design of continuous-current dynamos and motors. 2500 w. Elec Rev, Lond—Dec. 19, 1902.

Eonomy in Continuous-Current Dynamo Design. L. P. Purton. An analytical investigation of the problem of reducing the cost of dynamos without sacrificing efficiency. 1800 w. Elect'n, Lond—June 5, 1903.

Notes on the Design of Direct-Current Machines (Beitrag für den Entwurf von Gleichstrommaschinen). E. Dick. Developing equations for the computations of the proportions of parts, speed, weight and other elements of continuous-current dynamos and motors. 2000 w. Zeitschr f Elektrotechnik—Aug. 16, 1903.

A Basis for the Comparison of Dynamo Designs. H. M. Hobart. Explains the suggested method. 1200 w. Elect'n, Lond—Sept. 11, 1903.

Some Practical Points in the Design of Direct-Current Dynamo-Electric Machines. Cecil P. Poole. Describes a plan of designing. 3700 w. Jour Fr Inst—Nov., 1903.

The Design of Dynamos. Gives mathematical methods of obtaining dimensions. 900 w. Elec Rev, Lond—Sept. 16, 1904.

Notes on the Design of Continuous-Current Dynamos (Beitrag zum Entwurf von Gleichstrommaschinen). Arthur Müller. A mathematical examination of the controlling elements affecting the proportions of dynamos for continuous currents. 3500 w. Zeitschr f Elektrotechnik—Oct. 1, 1905.

Air Gap.—Air-Gap Induction. F. W. Carter. A contribution to the subject of the distribution of magnetic flux over the surface of a tooth-cored armature, giving the solution of an ideal problem devised to resemble very nearly that of the magnetic flux between a smooth pole face and a toothed armature. Also editorial. 4200 w. Elec Wld & Engr—Nov. 30, 1901.

An Experimental Determination of Air-Gap Reluctance. Charles H. Smoot. Aims to give a practical method of solving problems concerning magnetic reluctance and distribution. Ills. Discussion. 4000 w. Jour W Soc of Engrs—Aug., 1905.

The Magnetic Resistance of Air-Gaps. Translated from the "Electrotechnische Zeitschrift." Results of experiments carried out by Dr. G. Benischke. 500 w. Elec Rev, Lond—Dec. 16, 1904.

Alternator.—The Design and Construction of Alternators (La Construction et l'Etablissement des Alternateurs). A translation of the paper of M. Lasche recently presented before the "Verein Deutscher Ingenieure." Serial. Part I. 1500 w. Revue Technique—Oct. 10, 1901.

The Calculation of the Fall of Potential in Alternating Current Generators (Berechnung des Spannungsabfalles von Wechselstromgeneratoren). J. Fischer-Hinnen. A discussion of the mathematical design of alternators and polyphase generators, particularly Prof. Potier's method, with tables and diagrams. 3000 w. Elektrotech Zeitschr—Dec. 26, 1901.

Some Notes on Alternator Design. John Denham. Read before the Cape Town Loc. Sec. of the Inst. of Elec. Engrs. Discusses types of alternators and sets forth the superiority of polyphase plant. Also editorial. 3000 w. Elect'n, Lond—Sept. 26, 1902.

The Calculation of the Electromotive Force of Alternators (Le Calcul de la Force Electromotrice dans les Alternateurs). C. F. Guilbert. A mathematical discussion of the influence of the form of construction upon the electromotive force of alternating generators. 2000 w. Revue Technique—Jan. 25, 1903.

Commercial Alternator Design. W. L. Waters. An illustrated discussion of various designs and of the chief factors in deciding the design of the machine. 4300 w. Trans Am Inst of Elec Engrs—July, 1903.

The Design of Alternators. H. F. Parshall and H. M. Hobart. Sets forth a method of designing founded upon experimental data. Diagrams. 5800 w. Trac & Trans—March, 1904.

Pressure Drop in Alternators. William Cramp. Discussion of the theory of alternator design, with diagrams. 3500 w. Elec Engr—Aug. 12, 1904.

Design of Alternators. A. Press. Gives formulas and explanation. 600 w. Elec Rev, Lond—Dec. 23, 1904.

See also Polyphase; Siemens; Synchronous Reactance; ARMATURE; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC METER.

Alternator Compounding.—See ELECTRIC GENERATOR, ALTERNATING—Compounding.

Alternator, Stresses.—Stress on Frames of Alternating Current Generators. P. J. Frenell. Deals with the question of mechanical design for the purpose of reducing unnecessary weight and cost in the construction of large machines. 1600 w. Elec Wld & Engr—Jan. 24, 1903.

See also ELECTRIC GENERATOR—Frame Deflection.

Amateurs.—Design and Construction of Small Dynamos and Motors. Cecil P. Poole. The first of a series of articles aiming to enable amateurs to build any size of direct-current dynamos or motor, from 3 inches to 16 inches armature diameter without the necessity of mastering the science of dynamo design. Serial. 1st part. 1000 w. Am Elect'n—Oct., 1904.

American vs. British.—Note on American Practice in Dynamo Design. Calls attention to points in design, and makes some comparison with British work in this field. 4000 w. Elec Engr, Lond—May 23, 1902.

Armature Core Losses.—See ARMATURE.

Armature Reaction.—See Synchronous Reactance; ARMATURE—Reaction; ELECTRIC GENERATOR ALTERNATING.

Burleigh.—Design of Small Dynamos. J. W. Burleigh. Illustrates the course adopted by the writer, giving briefly the principal formulae used in determining the results. 1000 w. Elec Rev, Lond—April 8, 1904.

Commutator.—See COMMUTATION.

Comparison.—A Basis for the Comparison of Dynamo Designs. W. B. Esson. Critical remarks on an article by H. M. Hobart. 1100 w. Elect'n, Lond—Oct. 23, 1903.

Comparative Designs for a 10-Kw. Dynamo. J. W. Burleigh. A short illustrated description of several types given for comparison. 800 w. Elec Rev, Lond—Dec. 9, 1904.

Compounding.—Series Windings on Compound Dynamos and Their Adjustment. Alton D. Adams. Suggestions of value. 1100 w. Am Elec'n—Dec., 1900.

See also ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MACHINERY.

Eccentricity.—See ELECTRIC GENERATOR—Magnetic Attraction.

Eddy Currents.—See EDDY CURRENTS.

Electroplating.—Design for a 400-Ampere Electroplating dynamo. Cecil P. Poole. Illustrated description of the principal features of the machine. 1300 w. Am Elect'n—July, 1901.

Design for a 150-Ampere Electro-Plating Dynamo. Cecil P. Poole. Reproductions of working drawings with descriptive notes. 1800 w. Am Elect'n—June, 1903.

See also ELECTRO-PLATING.

Field Coils.—Field Coil Formulas. Thorburn Reid. Gives approximate equations deduced by the writer and used constantly in calculating the weight of copper, depth of coil, number of turns, size of wire, etc., in field coils. 1800 w. Elec Wld & Engr—May 16, 1903.

Five-Kilowatt.—The Design of a 5-K. W. Dynamo. An illustrated detailed description of a design to be constructed with the ordinary tools and appliances found in any engineering workshop. 5000 w. Elec Engr, Lond—Nov. 15, 1901.

Frith.—Labor Saving Formulae. Julius Frith. Gives examples illustrating the use of formulae in the design of direct current dynamos, especially with regard to high speeds. 1800 w. Elec Engr, Lond—Aug. 4, 1905.

History.—The Evolution of Dynamo Design. David B. Rushmore. An illustrated article reviewing the early history of dynamo design, and discussing direct-current generators and alternators. 4500 w. Elec Wld & Engr—March 5,—1904.

Kennedy.—The Design of Continuous-Current Dynamos. Rankin Kennedy. Discusses an appropriate formula for a machine that will run efficiently and sparkless. 600 w. Elec Rev, Lond—May 30, 1902.

Magnet System.—Some Notes on the Design of Magnet Systems for Continuous-Current Machines. Introductory notes to a discussion of the mechanical design of the magnet system are given in the present article. Ill. Serial. 1st part. 1600 w. Elec Engr, Lond—Sept. 11, 1903.

Mason.—Construction of a 2-H. P. Motor or 25-Light Incandescent Dynamo. F. C. Mason. Drawings with explanatory notes. 2500 w. Am Elect'n —April, 1904.

Materials.—On the Specific Utilisation of Materials in Dynamo Design. Prof. Sylvanus P. Thompson. Read before the British Assn. Considers this subject solely in relation to the armature. 1400 w. Elect'n, Lond—Sept. 13, 1902.

Poles.—The Influence of Pole Arrangement Upon the Performance of Dynamos (Beurtheilung der Eigenschaften von Dynamomaschinen auf Grund der Nuthenanordnung). Dr. M. Corsepius. A long analytical examination of the effects of pole arrangements with practical examples. Three articles, 10,000 w. Elektrotech Zeitschr—Nov. 18. Dec. 6, 12, 1901.

Special-Shaped Magnet Poles and the Way They Affect Commutation. Fred W. Davies. Describes the principal ways in which the shape of the cores and the pole-pieces of continuous-current machines have been modified in order to make sparkless commutation easier, and thus permit of a more economical design. Ill. 1800 w. Elec Rev., Lond—Nov. 14, 1902.

See also EDDY CURRENTS; ELECTRIC GENERATOR—Auxiliary Poles.

Polyphase.—The Drop of Potential in Rotary Current Generators (Spannungsabfall von Drehstromgeneratoren). F. Niethammer. A mathematical discussion, with diagrams. 800 w. Elektrotech Zeitschr—March 21, 1901.

The Computation of Polyphase Generators (Zur Berechnung Mehrphasiger Generatoren). K. Pichelmayer. With a table of co-efficients and diagram of characteristic curves for use in designing. 1800 w. Elektrotech Zeitschr—Oct. 31, 1901.

The Predetermination of the Fall of Pressure in Polyphase Generators (Vorausbestimmung des Spannungsabfalles von Drehstrom Generatoren). F. Kesselring. Describing the construction of polar diagrams from which the problem can be solved graphically. 1500 w. Elektrotech Zeitschr—Oct. 2, 1902.

Rotating Ring.—Rotating Ring with Attached Lugs. Forrest R. Jones. Considers the design of rings of electric generators with regard to tension in ring and lug bolts. 1800 w. Mach, N Y—Jan., 1903.

75-Light.—Design for a 75-Light Dynamo. Cecil P. Poole. Illustrates the principal features of a dynamo designed to maintain 75 16-c. p. incandescent lamps at 110-120 volts. 1300 w. Am Elect'n —Jan., 1901.

Shunt.—The Relation Between Voltage and Speed in a Shunt Dynamo. H. B. Poynder and H. E. Wimperis. The chief object of the paper is to point out two valuable deductions to be drawn from the magnetization curve by single graphical treatment. 2000 w. Engng—May 3, 1901.

Siemens Alternator.—The Interpolar Induction and Distrubition of Copper in the Armature of a Siemens 12-Pole Alternator. Ernest Wilson and William Marden. Decribes experiments made at King's College, London, stating the objects in view and the results. Ill. Serial. 1st part. 1100 w. Elect'n, Lond—Aug. 16, 1901.

Synchronous Reactance.—Synchronous Reactance. F. G. Baum. Presents a method showing the probable error due to using the synchronons reactance in computing the effect of regulation. 800 w. Elec Wld & Engr—April 26, 1902.

Transmission Work.—The Design of Generators for Electric Power Transmission Work. David B. Rushmore. An explanation of the characteristics and relations of this machine. 5500 w. Eng News—Oct. 27, 1904.

See also ELECTRIC GENERATOR, ALTERNATING; ELECTRIC TRANSMISSION.

ELECTRIC GENERATOR TEST.

See also ELECTRIC APPARATUS—Standardization; ELECTRIC GENERATING SET—Testing; ELECTRIC MACHINERY; ELECTRIC TESTING.

Air Calorimetry.—See CALORIMETRY—Electric Generator Test.

Artificial Load.—See RHEOSTAT—Water.

Behrend.—An Improved Method of Testing Large Alternators Under Full Load Conditions. B. A. Behrend. Also editorial. The magnetic balance is preserved by using different exciting currents for the motor section and for the generator section of the revolving field. 2000 w. Elec Wld & Engr—Oct. 31, 1903.

The Testing of Alternating Current Generators. B. A. Behrend. Describes an improved method devised by the author for testing alternating-current generators and synchronous motors, under full-load conditions, without actually having to place the machines under full load. Ills. 1300 w. Int Elec Cong of St. Louis—Sept., 1904.

Testing Alternators Under Full Load Conditions. W. L. Waters. Criticisms of method recently discussed by Mr. Behrend, showing the results are unreliable in regard to regulation, and are apt to exaggerate the iron losses to the prejudice of efficiency. Also a letter from Mr. Behrend. 1600 w. Elec Wld & Engr—Nov. 28, 1903.

The Testing of Alternators. Stanley P. Smith. Gives the results of a test made by the Behrend method, and the results of tests with unequal fields balanced, also results of a test with equal fields balanced, and gives conclusions as to the best methods. 1700 w. Elect'n, Lond—July 14, 1905.

Burnand.—Testing Large Alternators. W. E. Burnand. Suggests a modification of a method by W. M. Mordey, published 11 years ago. The test is applied under almost the conditions of service. 1800 w. Elect'n, Lond—Jan. 15, 1904.

Testing Large Alternators. W. E. Burnand. Describes method which is believed to overcome objections made to other methods. The armature circuit is divided into quarters so as to abolish the unbalanced mechanical stresses forcing alternating current of the same frequency as that of the generator through the armature coils. Also editorial. 3700 w. Elec Wld & Engr—Jan. 2, 1904.

Crompton, Chelmsford.—The Arc Works, Chelmsford. An account of a visit to the arc lamp and electric instrument works of Crompton & Co. to witness a Hopkinson test of two large dynamos, having an output of 800 kw. Ill. 2000 w. Elec Engr, Lond—Aug. 1, 1902.

Heating Time Constants.—Dynamo Heating Time Constants. Explains method of Calculation. 600 w. Elec Wld & Engr—Oct. 28, 1905.

Hobart-Punga.—A New Method of Testing Alternating-Current Generators. H. M. Hobart and F. Punga. Describes a method requiring no alterations to the windings and no greater expenditure of energy than is necessary for covering the internal losses. 1200 w. Elec Wld & Engr —April 22, 1905.

A New Method of Testing Alternators (Eine Neue Methode zur Prüfung von Wechselstromgeneratoren). H. M. Hobart and F. Punga. The losses are separated into friction losses, heating, and iron losses. 2000 w. Elektrotech Zeitschr May 11, 1905.

Hopkinson.—See Crompton.

Karlsruhe.—The Experimental Investigation of Direct-Current Dynamos (Beitrag zur Experimentellen Untersuchung von Gleichstrommaschinen). E. Arnold. Paper before the Verband Deutscher Elektrotechniker, giving an account, with diagrams and tables, of experiments and tests with direct-current dynamos at the Karlsruhe Technical High School. 7000 w. Elektrotech Zeitschr—June 18, 1903.

Loading.—Loading Machines for Testing Purposes—Supplying Only the Losses. E. A. Regestein. Applies this method of getting full-load conditions on two direct-current machines, and two similar rotary converters. 3000 w. Elec Rev, N Y—July 9, 1904.

N. Y. Interborough.—Some Advantages of Liberal Design. B. G. Lamme. Comments upon the "Test of a 5,000 Kw. Alternator." 800 w. Elec Club Jour—May, 1905.

Test of a 5,000 Kw. Alternator. L. L. Gaillard. An illustrated general description of the series of tests made on each of the alternators installed in the 74th St. station of the Interborough Rapid Transit Co., of New York City. 1800 w. Elec Club Jour—May, 1905.

Power House.—Testing Direct Current Generators in the Power House. Cloyd Marshall. Points on the erection and testing, when it is necessary that it should fall upon the station engineer. 2000 w. Engr, U S A—May 1, 1901.

Preston.—Dynamo Testing at the English Electric Manufacturing Company's Works, Preston. Comments on the striking features of the works of the English Electric Manufacturing Co., and the tests of two 1100-kilowatt continuous-current machines. Ill. 2800 w. Engng—Jan. 24, 1902.

Rheostat.—See **RHEOSTAT—Water.**

Schüttorf Machine Works.—Test of a Direct-Current Dynamo by the Schüttorf Machine Works. (Prüfung einer Gleichstrom-Dynamomaschine der Schüttorfer Maschinenfabrik). W. Winkelmann. With detailed illustrations of the machine and data and results of test. 1500 w. Elektrotech Zeitschr—May 19, 1904.

10,000 Cycle.—Data and Tests on a 10,000 Cycle-per-second Alternator. B. G. Lamme. Presents data of the machine and the tests obtained. Ills. 2200 w. Trans Am Inst of Elec Engrs—May 17, 1904.

ELECTRIC HAULAGE.

See also **ELECTRIC RAILWAY.**

Canal.—See **CANAL HAULAGE.**

Mine.—See **ELECTRIC EQUIPMENT; ELECTRIC LOCOMOTIVE; MINE HAULAGE.**

ELECTRIC HEATING.

See also **CAR HEATING; ELECTRIC EQUIPMENT; ELECTRIC FURNACE; HEATING.**

Electric Heating and Cooking (Ueber das Elektrische Heizen und Kochen). W. Krejza. With illustrations of a variety of electric stoves and heaters. Two articles. 4000 w. Zeitschr f Elektrotechnik—June 5, 12, 1904.

Electric Heating and the Field It Offers Central Stations. James I. Ayer. Reviews the conditions that have affected the development of electric heating, and discusses how to popularise and successfully introduce this method. 5500 w. Cent Sta—Aug., 1904.

Electric Heating and Cooking. George E. Walsh. States the advantages claimed for electricity in this field, and describes a number of applications for cooking, laundry work, in hospitals, etc. 3000 w. Archt's & Build's Mag—Aug., 1905.

The Development of Electric Heating. A. E. Jepson. Abstract of a paper read before the Manchester students' section of the Inst. of Elec. Engrs. Briefly refers to the early applications, the recent development, the various systems in use at the present time, etc. Ills. 5400 w. Mech Engr—Oct. 7, 1905.

Carnegie Residence.—Electric Heating and Lighting in the Carnegie Residence, New York. An illustrated article describing the electric wiring system and the various applications of electricity, particularly the electric heating apparatus. Plans. 2500 w. Eng Rec—Dec. 20, 1902.

Kryptol.—Kryptol, a New Substance for Electric Heating. Information concerning an indirect electrical heating system recently invented in Germany. Ills. 1200 w. U S Cons Repts—Oct., 1904.

Laboratory Appliances.—See **ELECTRIC FURNACE.**

ELECTRIC HOISTING.

See **CRANE, ELECTRIC; ELEVATOR, ELECTRIC; HOISTING—Electric.**

ELECTRIC INDUSTRY.

See also **ELECTRIC APPARATUS; ELECTRIC ENGINEERING; ELECTRIC EXHIBITION; ELECTRICITY; ELECTRIC POWER; ELECTRIC STATION; ELECTRIC WORKS.**

Electricity in the Service of Man. A. N. Brady. Briefly reviews the many applications of electricity, and the large investments represented. 2400 w. N Am Rev—Nov., 1901.

American and British.—Six Years of British and American Electrical Export Statistics. W. Pollard Digby. Gives the exports to certain trade zones, considering the tendencies exhibited. 2000 w. Elec Rev, Lond—Nov. 25, 1904.

American Census.—Statistics of Electrical Progress. Reviewing the U. S. Census Report prepared by Thomas Commerford Martin on the manufacture of electrical apparatus and supplies. 1800 w. Elec Rev, N Y—Sept. 6, 1902.

U. S. Census Report on Electrical Manufactures. A review of the report compiled by Mr. T. C. Martin, giving tabulated information and discussing the report in general. 5000 w. Elec Wld & Engr—Sept. 20, 1902.

American Competition.—The American Peril and the Electrical Industry (Die Amerikanische Gefahr und die Elektrotechnische Industrie). Emil Honigmann. A discussion of the danger of American competition in Europe, particularly in the electrical industries, apropos of an article by H. L. Geissel in the "Electrical World and Engineer." Statistical tables. 5000 w. Zeitschr f Elektrotechnik—March 22, 1903.

American Exports.—American Electrical Exports. Arthur Stanley Riggs. Discusses some of the conditions in China, Japan and the Turkish Empire favorable to export. Serial. 1st part. 2700 w. Elec Rev, N Y—March 9, 1901.

Baltimore.—See **FIRE.**

Berlin.—The Users of Electricity at Berlin. Reports the rapid development of electricity as applied to the various purposes of power and illumination, especially the phenomenal development of electrical tramways. 1000 w. U S Cons Repts, No. 1206—Dec. 5, 1901.

Brazil.—Electricity in Brazil. W. Whyte Gailey. Information concerning this country and the character of the electrical work. 2200 w. Elec Rev, Lond—June 23, 1905.

British.—Electric Traction and Transmission in the New Century. Philip Dawson. Gives a retrospect of the progress in England during the last 10 years, discusses the present position of the electrical industries, and the future outlook. 3500 w. Elec Rev, Lond—Jan. 4, 1901.

Some Statistics Relating to Electrical Engineering. William Pollard Digby. Gives figures showing the import and export trade of the United Kingdom in electrical goods, and compares with the internal trade. Serial. 1st part. 1400 w. Elect'n, Lond—Nov. 6, 1903.

Some Hindrances to the Development of the Electrical Manufacturing Industry in this country. E. W. Cowan. Chairman's address to Manchester Local Section of the Inst. of Electrical Engineers. Abstract. 3300 w. Elect'n, Lond—Nov. 20, 1903.

See also **ELECTRIC GENERATOR.**

British and American Legislation.—Electrical Law in England and America. A comparison. W. Valentine Ball. 4800 w. Trac & Trans—Jan., 1904.

Electricity and the Law in England and America. W. Valentine Ball. A comparison of the two countries as regards liabilities of supply companies. 3400 w. Elec Wld & Engr—April 2, 1904.

British Colonial Legislation.—Electrical Law in the Colonies and India. Synopsis of electrical legislation in the more important British colonies. Serial. 1st part. 3000 w. Elec Rev, Lond—Sept. 30, 1904.

British Legislation.—Penalties Under the Electric Lighting Acts. A review of points concerning the rights of consumers and "undertakers" in Great Britain. 2200 w. Engng—Feb. 1, 1901.

The Electrical Power Bills of 1900; Before and After. William L. Madgen. Read before the Inst. of Elec. Engs. (Eng.). Considers the conditions which led to the bills of the past session, describes some of the main features of the bills, and urges the Inst. to determine what its attitude should be in regard to the application of electrical energy in England. Serial. 1st part. 4800 w. Elect'n, Lond—March 1, 1901.

Electrical Progress and Legislation: The Need of Revision. R. Percy Sellon. An address before the London Chamber of Commerce. Sketches the condition of the electrical industries in England and the causes that have placed the country in serious arrear of the position she should have attained. Serial. 1st part. 3200 w. Elec Rev, Lond—Dec. 27, 1901.

Electric Legislation and Finance. H. W. Hancock. Read before the Newcastle Section of the Inst. of Elec. Engrs. Discussion of these subjects as related to the practical application of electricity in England. 5000 w. Elec Engr, Lond—Feb. 28, 1902.

Electricity and Legislation. The first of a series of articles proposing to show what has been the effect of legislation on the development of commercial electricity in England. Serial. 1st part. 2500 w. Engr, Lond—May 30, 1902.

Electrical Legislation. W. Valentine Ball. A discussion of the effect of British legislation upon the electrical industry, and the effort being made to bring about a reform. 3800 w. Trac & Trans—Oct., 1904.

London Electricity Bills. Considers bills before the English Parliament which are of extreme importance to the electrical industry. Serial. 1st part. 4800 w. Engr, Lond—March 24, 1905.

See also **Regulations; STRAY CURRENTS—Telegraph Interference.**

British, 1903.—The Electrical Industry in Great Britain During 1903. General review. Ill. 4800 w. W Elect'n—Jan. 2, 1904.

British, 1904.—Review of the Year in Great Britain and the Continent of Europe. C. L. Durand. A general review of the progress in electric traction and other electrical industries. 3200 w. Elec Rev, N Y—Jan. 14, 1905.

British Obstruction.—Official Obstruction of Electric Progress. J. A. Fleming. Reviews briefly the great electrical inventions, noting the nationality of the inventors, and discusses the reasons why electrical inventions have moved so slowly in Great Britain, and the reforms needed. 6200 w. Nineteenth Cent—Feb., 1901.

British Regulations.—See **Regulations, British.**

Burma.—See **India.**

Denver.—The Electrical Properties of the Denver Gas and Electric Company. C. W. Humphrey. Illustrated review of the electrical developments, and methods used. 4200 w. Elec Rev, N Y—June 3, 1905.

Development.—A Study of Electrical Developments. Valentine Ryan. The present article is a review of the general conditions of the electrical industry, calling attention to some things yet to be accomplished. Serial. 1st part. 2200 w. Elec Rev, Lond—Nov. 21, 1902.

England.—See **British.**

Europe, 1903.—Electrical Progress on the Continent in 1903. Alfred Gradenwitz. A general review of the advance, especially in electric traction. Ill. 3800 w. W Elect'n—Jan. 2, 1904.

French Regulations.—See **Regulations, French.**

General Electric Co.—General Electric Report. Report for the year ending Jan. 31, 1902, containing much information of interest. 4000 w. Elec Wld & Engr—May 3, 1902.

German Regulations.—See **ELECTRIC APPARATUS—Standardization; ELECTRIC STATION MANAGEMENT—Government Supervision.**

Germany.—German Electrical Industries. Editorial review of the wonderful rise and collapse of these industries in Germany, the cause and the outlook. 3300 w. Engng—Oct. 23, 1903.

A Study of the Electrical Industry in Germany (Etude sur l'Industrie Electrique Allemande). L. Sekutowicz. A full review of the development of the industry of electrical machinery and the operation of plants, with a discussion of recent busines reorganizations. 10,000 w. Mem Soc Ing Civ de France—Dec., 1903.

See also **ELECTRIC ENGINEER.**

Hawaii.—Electricity in the Sandwich Islands. F. E. Grain. An account of recent progress, and present conditions. 2200 w. Elec Wld & Engr—May 4, 1901.

History.—One Hundred Years of Electrical Industry and Finance. T. C. Martin. A review of the remarkable progress of an industry now representing an investment of nearly four billions. 2500 w. Elec Wld & Engr—Jan. 5, 1901.

Personal Recollections of the Rise of the Electrical Industry. Prof. Elihu Thomson. An extremely interesting record of the early work in lighting and power, and of the steps by which the present enormous growth was reached. It forms a brief autobiographical account of Professor Thomson's own part in the electrical industry. 4500 w. The Engineering Magazine, July, 1905.

India.—The Use of Electricity in India. George Cecil. An illustrated article telling of the development of electricity in the country. 1600 w. Elec Engr, Lond—April 5, 1901.

Electricity in India and Burma. E. C. Deepholt. A brief account of the gradual progress of electricity at the present day and the future outlook. 2000 w. Elec Engr, Lond—Jan. 13, 1905.

Japan.—The Manufacture of Electrical Machinery in Japan. William Dinwiddie. Illustrates and describes the Shibaura Engineering Works and some of their products. Also editorial on the quality and cost. 2800 w. Elec Rev, N Y—April 22, 1905.

The Electrical Outlook in Japan. A review of the present condition of electrical matters bearing upon trade. 3300 w. Elec. Rev, Lond—Sept. 8, 1905.

Legislation.—See **British and American Legislation; British Colonial Legislation; British Legislation; Swiss Legislation; ELECTRIC STATION MANAGEMENT.**

Liège Exposition.—See **ELECTRIC ENGINEERING; EXPOSITION.**

Liverpool.—The Rapid Progress of Electricity in Liverpool. Abstracted from a report submitted by A. B. Holmes. Gives much information relating to supply and cost. 2000 w. Elec Engr, Lond—Feb. 28, 1902.

Massachusetts.—Statistics of the Massachusetts Electrical Supply System in 1902. Alton D. Adams. 2500 w. Elec Wld & Engr—May 23, 1902.

Massachusetts Electrical System in 1901. Alton D. Adams. A review of the finances of the electric lighting companies. 2300 w. Elec Wld & Engr—June 7, 1902.

See also **ELECTRIC LIGHTING.**

1904.—Electricity in 1904. A review of the progress made in electrical science and arts during the past year. 2700 w. Elec Rev, N Y—Jan. 14, 1905.

Regulations.—See **ELECTRIC APPARATUS — Standardization; ELECTRIC ENGINEER—German Society; ELECTRIC WIRING.**

Regulations, American.—The National Electrical Code. B. H. Glover. Read before the electrical engineering department of Armour Inst. Discusses the rules and requirements, and considers the stages through which they have passed. 2500 w. W Elect'n—Dec. 15, 1900.

Regulations, British.—The Board of Trade and Electric Lighting. Review of the expert evidence in an application for an alteration in one of the Board of Trade (England) regulations, providing that "no change should be made in the pressure of the supply to any premises . . . . except with the consent of the consumer." 1600 w. Nature—April 18, 1901.

Government Regulations Affecting Electric Power Distribution. A copy of the memorandum of the regulations committee sent to the electrical adviser of the British Board of Trade, with editorial comment. 2500 w. Engng—Aug. 30, 1901.

The Home Office Draft Regulations for the Use of Electricity in Factories and Workshops. Frank Broadbent. A critical review of the Home Office regulations and those of the Board of Trade, which are compared. 4000 w. Elec Rev, Lond—Dec. 9, 1904.

Regulations, French.—Regulations for the Installation of Electric Conductors (Instruction Technique pour l'Etablissement des Conducteurs d'Energie Electrique). The proposed French official regulations for all kinds of aerial and underground electric wires. 2000 w. Revue Technique—Dec. 25, 1901.

Regulations, Germany.—See **ELECTRIC APPARATUS—Standardization; ELECTRIC STATION MANAGEMENT—Government Supervision.**

Regulations, Mine.—Report of the Electricity in Mines Committee. Gives the report of the Committee presented to the Home Secretary, under date January 19, 1904, with copy of rules for the installation and use of electricity in mines. Also editorial. 18700 w. Col Guard—Feb. 5, 1904.

Rules of the Electricity in Mines Committee—An Analysis and a Criticism. E. Kilburn Scott. Serial. 1st part. 2000 w. Ir & Coal Trds Rev—Feb. 12, 1904.

Rules for the Installation and Use of Electricity in Mines. Gives rules drawn up by the Departmental Committee. 8000 w. Elect'n, Lond—Feb. 19, 1904.

Special Rules for the Installation and Use of Electricity in Mines. Gives rules prepared by The Home Secretary. 4400 w. Elect'n, Lond—Feb. 24, 1905.

Earth in Collieries, with Reference to the "Special Rules for the Installation and Use of Electricity." Sydney F. Walker. Read before the Inst. of Min. Engrs. An explanation of the term and of the conditions usually found in mines as affecting electrical installations, and their designers. 3500 w. Ir & Coal Trds Rev—Sept. 15, 1905.

See also **ELECTRIC EQUIPMENT—Coal Mine; Mine.**

Santa Cruz, Cal.—Electricity in the "City of the Holy Cross." An illustrated article describing the electrical situation, the service being divided among six different companies. 4400 w. Jour of Elec—May, 1905.

Sault Ste. Marie.—The Giant Growth of the "Soo." Cy Warman. An illustrated account of the great industrial plans created by the power canals of Sault Sainte Marie. 2700 w. Rev of Revs—Dec., 1902.

Sault Ste. Marie and Its Industries. Brief account of the developments on the Canadian and United States sides of the St. Mary's river. Ill. 4700 w. Can Eng—Jan., 1903.

The Industries of the Consolidated Lake Superior Company. E. G. M. Cape. An account of what this company has done, showing how its different industries are bound together. Chiefly considers the electrochemical idustries on the Canadian side of the St. Mary's river. 11 plates. 9500 w. Can Soc of Civ Engrs, Adv Proof—March, 1903.

See also **CANAL; HYDRO-ELECTRIC PLANT.**

Siberia.—Electricity in Siberia. Illustrated article describing electrical installations seen by an American traveler. 1600 w. Elec Rev, N Y—Dec. 12, 1903.

Spain.—Electrical Progress in Spain. Henry L. Geissel. A report of the slow but steady progress being made in the electrical development. 1600 w. Elec Wld & Engr—May 2, 1903.

Electrotechnics in Spain (Die Elektrotechnik in Spanien). D. Blumenthal. A general account of the development of electrical industries in Spain, and the present opening there for a market in electrical appliances. 3000 w. Elektrotech Zeitschr—Nov. 5, 1903.

Stray Currents.—See **STRAY CURRENTS.**

Swiss Legislation.—Swiss Laws Regulating Electric Installations (Schweizerisches Bundesgesetz, betreffend die Elektrischen Schwach- und Starkstromanlagen). The full test of the recent enactments of June, 1902, regulating both moderate and heavy currents. 4000 w. Elektrotech Zeitschr—Jan. 1, 1903.

Systems.—Electrical Systems. John H. Ryan, Jr. An illustrated description of apparatus and working of the various systems. 5400 w. Engr, U S A—Jan. 15, 1902.

United States.—See **American.**

Westinghouse Address.—The Tendency of Enterprise. Editorial discussion of an address of Mr. George Westinghouse, to the shareholders of the British Westinghouse Company. 2500 w. Engng—Dec. 19, 1902.

ELECTRIC INSTRUMENT.

See also **ELECTRIC APPARATUS; ELECTRIC MEASUREMENT; ELECTRIC METER; ELECTRIC TESTING; ELECTRO-PHYSICS.**

Electrical Measurements and Measuring Instruments (Ueber Elektrische Messungen und Messinstrumente). Prof. August Raps. Lecture before the Oesterr Ing. und Arch. Verein on the elements of electrical measurement. Serial. 2 parts. 5000 w. Supplement to Zeitschr d Oesterr Ing u Arch Vereines—July 4, 11, 1902.

A New Form of Measuring Apparatus and its Application (Ein Neues Messgeräth und seine Verwendung). G. Dietze. Describing a combination of a spool wound with insulated wire and of a telephone; showing how this simple appliance may be used to detect faults and to make other measurements of current with much convenience. 3500 w. Elektrotech Zeitschr—Sept. 18, 1902.

Some Novelties in Electrical Apparatus. M. B. Field. Read at Belfast meeting of the Brit. Assn. States the objects these instruments are intended to serve. Deals with a compensated voltmeter, hot-wire wattmeter, fault indicator, and synchronising gear. 1200 w. Elect'n, Lond—Oct. 3, 1902.

Electrical Measuring Instruments. Caryl D. Haskins. Considers instruments used in daily practice for purposes of frequent observation and indication of conditions. Ill. 5400 w. Jour Fr Inst—Feb., 1903.

Alternating Current.—The Use of Iron in Alternate-Current Instruments. Dr. W. E. Sumpner. Abridged address before the Inst. of Elec. Engrs., Birmingham. Considers the reasons for the unsatisfactory results obtained with instruments for alternate-current measurements and the reasons and future prospects. Serial. 1st part. 4000 w. Elect'n, Lond—Nov. 25, 1904.

A New Instrument for the Measurement of Alternating Currents. E. F. Northrup. Illustrated description of instrument and methods of measuring alternating current instruments, and large alternating currents regardless of their wave form or frequency. 4000 w. Am Inst of Elec Engrs.—June, 1905.

The Measurement of Small Alternating Currents. Frederick Bedell. Description of a simple device for measuring small alternating currents. Also editorial. 1200 w. Elec Wld & Engr—June 10, 1905.

Alternating-Current Calibration.—An Instrument for Measurement and Calibration of Alternating Apparatus (Ein Wechselspannungswähler für Mess- und Aichzwecke). C. Heinke. Describing a form of variable transformer, adapted for purposes of alternating current measurement. 1800 w. Elektrotech Zeitschr—Oct. 2, 1902.

A. I. E. E. Conversazione.—A Frequency Indicator, Power Factor Indicator, Wave Form Indicator, and the Thomson Load Meter. Brief illustrated descriptions of apparatus exhibited at the recent "conversazione" of the Am. Inst. of Elec. Engrs. 1000 w. Elec Rev, N Y—April 27, 1901.

Balance.—A Sensitive Electrical Balance (Sur une Balance Très Sensible Pouvant Servir de Galvanometre, d'Electrodynamometre et d'Electromètre Absolu). V. Crenneu. Describing a modification of M. Lippmann's astatic galvanometer. 1000 w. Comptes Rendus—May 28, 1901.

See also Shielded Balance; Voltameter.

Cable-Testing.—Portable Cable-Testing Apparatus (Transportable Apparatensusammenstellung für Kabeluntersuchungen). Prof. M. T. Edelmann. Describing and illustrating a convenient combination for testing insulation, capacity and resistance. 1200 w. Elektrotech Zeitschr—Jan. 24, 1901.

See also **ELECTRIC CABLE; ELECTRIC MEASUREMENT; ELECTRIC TESTING.**

Calibration.—See **Alternating Current Calibration; Frequency; LABORATORY—Reichsanstalt.**

Capillary Electrometer.—See **Electrometer.**

Chronograph.—See **CHRONOGRAPH—Electric.**

Comparing Voltmeters.—See **ELECTRIC METER—Voltmeter Comparison.**

Compass Indicator.—See **COMPASS INDICATOR.**

Compensator.—An Improved Compensator for the Determination of Electromotive Force (Ein Neuer Kompensator zur Bestimmung Elektromotorischer Kräfte). N. T. M. Wilsmore. Describing an improved form of the Poggendorff-du Bois Reymond apparatus. 1000 w. Elektrotech Zeitschr—Nov. 29, 1900.

A New Form of the Thiermann Compensator (Eine Neue Form des Thiermannschen Kompensators). P. Heyck. Describing an improved form of the Thiermann device for measuring currents by compensation. 2500 w. Elektrotech Zeitschr—Oct. 17, 1901.

Improvements in Compensation Apparatus (Ueber Neuerungen an Kompensations-Apparaten). Dr. Rudolf Franke. Describing varieties of apparatus for measuring a wide range of pressures. 2000 w. Elektrotech Zeitschr—Nov. 26, 1903.

The Thiermann Resistance Wire and Compensator (Messdraht und Kompensator nach Prof. Wilhelm Thiermann, Hannover). Dr. Wilhelm Schüppel. Describing an improved apparatus for comparing resistances, claimed to give accurate results to six significant figures. 3000 w. Elektrotech Zeitschr—Sept. 29, 1904.

Conductometer.—The Conductometer. Illustrates and describes a direct reading conductivity meter devised by Rollo Appleyard. 1500 w. Elec Rev, Lond—Oct. 9, 1903.

The Measurement of Electrical Conductivity. J. Rymer-Jones. The present article considers the use of the conductometer, and the ordinary meter-bridge, and the objections to them, as introductory to another system to be described later. Serial. 1st part. 1500 w. Elec Rev, Lond—April 29, 1904.

The Conductometer. Rollo Appleyard. A defence of this instrument invented by the writer, in reply to a recent paper by John Rymer-Jones. Serial. 1st part. 1800 w. Elec Rev, Lond—May 13, 1904.

Curve Tracing.—See **ELECTRIC CURRENT, ALTERNATING**—Wave Indicator; **ELECTRIC GENERATOR, ALTERNATING.**

Dynamometer.—See **Electro-Dynamometer; DYNAMOMETER.**

Electro-Dynamometer.—The Construction of an Electro-Dynamometer. S. M. Kintner. Illustrated description of instruments built by the students of the Western Univ. of Penn. 1300 w. Am Elect'n—May, 1901.

The Electro-Dynamometer (Ueber Elektrodynamometer). Dr. Th. Bruger. Describing a convenient instrument for the direct indication of the energy developed by an alternating current. 3000 w. Elektrotech Zeitschr—Sept. 15, 1904.

Electrometer.—The Use of the Electrometer for the Direct Measurement of the Energy, Current Strength and Phase Angle of Alternating Currents (Anwendung des Elektrometers bei Wechselstrom zur Direkten Messung des Effektes, des Stromes und des Phasenwinkels). Karl Hohage. A description of method with diagram of connections. 400 w. Electrotech Zeitschr—April 24, 1902.

The Capillary Electrometer. G. J. Burch. On the insulation resistance of the capillary electrometer and the minimum quantity of electricity required to produce a visible excursion. Read before the Royal Soc. 2000 w. Elect'n, Lond—May 30, 1902.

A New Capillary Electrometer. George J. Burch, F. R. S. Abstract of a paper before the Royal Society, with illustrated description of an electrical measuring instrument for laboratory use, and of the method of putting in the capillary tubes. 1000 w. Elect'n, Lond—Dec. 19, 1902.

An Unusual Form of Capillary Electrometer. Emilo Guarini. Illustrated description of an apparatus devised by S. W. T. Smith, of London. 600 w. Sci Am Sup—Nov. 14, 1903.

Electrometer Ebert-Hoffmann.—Investigations Upon the Ebert-Hoffmann High Voltage Electrometer (Untersuchungen am Ebert-Hoffmanschen Hochspannungselektrometer). Ch. Bäumler. Giving the method and results of a calibration of the instrument, and data for plotting curves. 1800 w. Elektrotech Zeitschr—Dec. 6, 1900.

Electroscope.—A Method of Determining Very Small Electrical Charges (Sur une Méthode Prope à Déceler de Très Petites Charges Electriques). R. Blondlot. A communication to the French Academy describing a very sensitive form of electroscope. 1200 w. Comptes Rendus—Nov. 4, 1901.

Elster and Geitel's Improved Form of Exner's Electroscope. A. Frederick Collins. Illustrated description of apparatus adapted for open air researches, in determining the radio-activity of air and indicating the electrification. 1400 w. Elec Wld & Engr—March 7, 1903.

Electroscope, Radioactivity.—The Construction of Simple Electroscopes for Experiments on Radioactivity. O. W. Richardson. An illustrated description of simple electroscopes. 2200 w. Nature—Jan. 19, 1905.

Electrostatic Transformer.—See **TRANSFORMER—Electrostatic.**

Errors.—The Errors of Instruments. George T. Hanchett. Comments on errors in the types of measuring instruments used in electrical work and their causes. 2700 w. Cent Sta—March, 1904.

See also **Faults; Switchboard Errors.**

Everett-Edgcumbe Works.—Messrs. Everett, Edgcumbe & Co.'s London Works and Some of Their Specialties. Brief, illustrated description of the works and of some of the electrical instruments made by them. 3500 w. Elec Engr, Lond—Dec. 16, 1904.

Faults.—Faults of Electrical Measuring Instruments and Their Correction. H. Williams. Discusses the general class of trouble common to most types, and their remedy. 2500 w. Am Elect'n—Nov., 1902.

See also **Errors; Switchboard, Errors.**

Frequency.—A Method of Determining the Frequency of Wave Currents (Ueber eine Methode zur Bestimmung der Frequenz Wellenförmiger Ströme). R. K. Hartmann. Discussing the use of the resonator and frequency meter, with reproductions of wave photographs. 4500 w. Elektrotech Zeitschr—Jan. 3, 1901.

The Precision and Operation of the Hartmann & Braun Resonance Instruments (Ueber Genauigkeit und Wirkungsweise der Hartmann & Braunschen Resonanzinstrumente). Dr. R. Hartmann-Kempf. Illustrating and describing instruments for measuring frequency and phase relations. 3000 w. Elektrotech Zeitschr—Jan. 21, 1904.

The Calibration of Frequency Meters, with Especial Reference to the Slaby Multiplication Scales (Die Aichung von Wellenmessern, insbesondere beim Slabyschen Multiplikationstabe). P. Drude. Describing both the direct and the indirect process of calibration, according to the Slaby method, with tables of instrumental corrections. 3500 w. Elektrotech Zeitschr—April 13, 1905.

See also **Hartman & Braun; Synchronism.**

Galvanometers.—Electrical Measuring Instruments. S. S. Edmonds. The present article illustrates and describes three types of galvanometer. Serial. 1st part. 2200 w. Engr, U S A—April 15, 1904.

See also **ELECTRIC METER.**

Galvanometer, Ballistic.—The Apparent Resistance of a Ballistic Galvanometer of the Moving Coil Type, and a Method of Allowing for the Damping Current. David Robertson. An account of experiments, describing methods and results obtained. Serial. 1st part. 2000 w. Elect'n, Lond—April 5, 1901.

Consideration of Some Points in the Design and Working of Ballistic Galvanometers. P. H. Powell. Read at the Southport meeting of the British Assn. Gives an illustrated outline of the design of one of these instruments. 1200 w. Elec Rev, Lond—Sept. 25, 1903.

Galvanometer d'Arsonval.—Investigations on the d'Arsonval Galvanometer (Untersuchungen über d'Arsonval-Galvanometer). G. Kümmell. A comparison of galvanometers of various makers, showing methods of calibration. 1800 w. Zeitschr f Elektrochemie—July 4, 1901.

Construction of a D'Arsonval Mirror Galvanometer. F. W. Cerny. Illustrated description of a self-adjusting instrument built by the writer. 700 w. Am Elect'n—Feb., 1903.

Galvanometer Differential.—Notes on the Use of the Differential Galvanometer. C. W. S. Crawley. Read before the Inst. of Elec. Engrs., England. Explains how this instrument may be effectively used for modern work. Ill. 2000 w. Elect'n, Lond—May 17, 1901.

Application of the Differential Galvanometer to Exact Measurements of Resistance. W. Jaeger. Translated from "Zeitschrift fuer Instrumentenkunde." An explanation of the Kohlrausch method. 2500 w. Elec Rev, N Y—June 17, 1905.

The Measurement of Low Resistances. Lancelot W. Wild. Describes a little-known method of measuring low resistances that combine the sensibility of the differential galvanometer method with the highest degree of accuracy, it is claimed. 1000 w. Elect'n, Lond—July 14, 1905.

Galvanometer Electrolytic.—An Electrolytic Galvanometer (Elektrolytisches Galvanometer). Richard Heilbrun. The circulation of the current in a tube containing the electrolyte acts upon the suspended magnet of a mirror galvanometer. 1800 w. Zeitschr f Elektrochemie—Feb. 5, 1903.

Galvanometer, Hartmann and Braun.—The Hartmann and Braun Galvanometers (Les Galvanometers Hartmann et Braun). J. A. Montpellier. With illustrations of fine reflecting galvanometers exhibited at Paris. 1800 w. Electricien—Jan. 19, 1901.

Galvanometer, High Sensibility.—On Galvanometers of High Sensibility. C. E. Mendenhall and C. W. Waidner. An illustrated account of an instrument possessing advantages as regards convenience and ease of manipulation, giving results of some experiments with minute magnets. 3400 w. Am Jour of Sci—Oct., 1901.

Galvanometer Lippmann.—A Perfectly Astatic Galvanometer (Sur un Galvanometre Parfaitement Astatique). M. Lippmann. The needle is so suspended as to be displaced parallel to itself by the action of the current. 1000 w. Comptes Rendus—May 13, 1901.
See also **Balance.**

Galvanometer, Milammeter.—Marine Galvanometer and Adjustable Universal Shunt Used as a Direct-Reading Milammeter or Voltmeter. J. Rymer-Jones. Gives particulars showing how a galvanometer may be employed as a very sensitive milammeter, and also for a sensitive voltmeter. 1800 w. Elec Rev, Lond—Aug. 11, 1905.

Galvanometer, Mirror.—An Inexpensive Mirror Galvanometer. A. P. Carman. Describes the details of construction, the cost, and the performance. Ill. 700 w. Technograph, No. 15—1900-1901.

A Home-Made Sensitive Mirror Galvanometer. John D. Adams. Gives illustrations and directions for the construction of a galvanometer of the mirror or reflecting type. 1500 w. Am Elect'n—March, 1904.

Galvanometer Recording.—See **Recording Voltmeter.**

Galvanometer Shunt.—Shunt for Galvanometers (Nebenschlusskasten für Galvanometer). W. Volkmann. Description of a special form of shunt for varying the sensitiveness of a galvanometer. 1000 w. Elektrotech Zeitschr—Aug. 15, 1901.

German.—Types of German Testing Instruments. Dr. Alfred Gradenwitz. A brief illustrated review of types exhibited at the recent Jubilee of the German Electrical Society. 2000 w. Elec Mag—May 23, 1905.

Graduation.—The Graduations of Electrical Measuring Apparatus (Sulla Graduazione degli Apparecchi Elettrici di Misura). V. Arcioni. Discussing graphical methods for laying out the scales of instrumental graduations so as to insure approximate uniformity. 1200 w. L'Elettricita—Nov. 30, 1902.

Ground Detector.—A True Ground Detector. T. W. Varley. Illustrated detailed description of the apparatus with methods of using. 2000 w. Elec Wld & Engr—July 13, 1901.
Ground Detctors and Their Connections. James T. Coe. Describes various types, with diagrams. 2500 w. Am Elect'n—Dec., 1905.

See also **ELECTRIC CABLE; ELECTRIC DISTRIBUTION; ELECTRRIC MACHINERY; ELECTRIC MEASUREMENT.**

Handling.—The Handling of Electrical Instruments in Relation to Their Accuracy. H. B. Taylor. Discusses the location of instruments where they will not be affected by other pieces of apparatus or by the conducting current. Considers the stray magnetic field, correction for energy losses, zero errors, and the precautions necessary in handling. 3500 w. Elec Jour—Aug., 1905.

Holtz Machine.—The Priority of Invention of the Double Plate Influence Machine (Zur Priorität der Erfindung der Influenzmaschine mit Doppelter Drehrung). Dr. W. Holtz. An account of the development of the static electrical machine, with especial reference to the form employing two plates revolving in opposite directions. 2000 w. Elektrotech Zeitschr—Aug. 18, 1904.

See also **ELECTRO-PHYSICS; ELECTRO-THERAPEUTICS.**

Indicator.—The Construction of a Current and Potential Indicator. Sketches, with explanations, illustrating the essential features of a simple indicator which may be wound either to serve as a voltmeter or potential indicator, or as an ammeter or current indicator. 1200 w. Am Elect'n—Oct., 1901.

Induction Standards.—Standards of Mutual Induction. G. F. C. Searle, and J. R. Airey. Explains the method of calculating the coefficient of mutual induction to any desired degree of accuracy, when the secondary coil lies inside the primary coil. 3500 w. Elect'n, Lond—Dec. 8, 1905.
See also **Power Factor; Recording; Synchronism.**

Influence Machine.—A Large Influence Machine. H. S. Allen. An illustrated description of a large influence electrical machine, of the Wimshurst type, recently presented to the Royal Infirmary, Glasgow. 1500 w. Elec Rev, Lond—Aug. 15, 1902.

Interrupter.—See **INTERRUPTER.**

Kelvin.—Kelvin's Electric Measuring Instruments. Prof. Magnus Maclean. Read before the Elec. Section of the International Engng. Cong. at Glasgow. (Abstract.) Brief illustrated descriptions of various classes of instruments patented by Lord Kelvin. 2500 w. Elec Rev, Lond—Sept. 6, 1901.

Kelvin Bridge.—Three Forms of Thomson Bridge for Small Resistances (Drei Formen der Thomson'schen Messbrücke für Kleine Widerstände). Dr. M. T. Edelmann. With illustrations showing the wiring of three forms of bridge for low resistances and views of the completed instruments. 1000 w. Elektrotech Zeitschr—Feb. 14, 1901.

The Accurate Measurement of Small Resistances with the Kelvin Double Bridge. W. Jaeger, S. Lindeck, and H. Diesselhorst. From the "Physikalisch-Technische Reichsanstalt." Describes the measurement of resistances comprising principally standards from 0.1 ohm to 0.0001 ohm. Serial. 1st part. 900 w. Elec Rec, N Y—Jan. 2, 1904.

Lausanne Station.—The "Pierre de Plan" Station of the Electric Plant at Lausanne (Apparatenanlage in der Centrale und Umformerstation "Pierre de Plan" des Elektricitätswerkes der Stadt Lausanne). K. P. Tauber. Describing especially the measuring instruments and their mounting and connections. 3500 w. Elektrotech Zeitschr—Oct. 3, 1901.

Lightning Recorder.—A Simple, Effective and Inexpensive Lightning Recorder. Henry F. Alciatore. Illustrated description of a lightning recorder designed to obtain automatic records of the hundreds of electric discharges, visible and invisible, that usually precede and accompany thunder storms. 1800 w. Sci Am Sup—March 18, 1905.

Magnetic.—See **MAGNETIC TESTING.**

Magnetograph.—See **MAGNETOGRAPH.**

Manufacture.—Notes on Practical Electrical Instrument-making. John C. Bagot. An illustrated article touching on points needing to be understood by instrument makers, that comprehending the effect to be produced, he can manufacture the cause. Serial. 1st part. 1700 w. Elec Engr, Lond—Nov. 22, 1901.

Milli-Voltmeter.—See **Galvanometer, Milammeter; ELECTRIC MEASUREMENT; ELECTRIC METER.**

Ondograph.—See **ONDOGRAPH.**

Oscillator.—A New Oscillator for Stationary Electrical Waves. Dr. Bernouilli. Brief illustrated description of the Blondlot-Coolidge oscillator, with remarks on the researches of Hertz and Lecher. 1000 w. Elect'n, Lond—March 8, 1901.
See also **ELECTRO-PHYSICS.**

Phase Relation.—See **Hartmann & Braun.**

Poggendorff Mirror.—An Extension of the Poggendorff Mirror-Reading Method (Eine Erweiterung der Poggendorffschen Spiegelablesungsmethode). E. Preuss. Describing a method of multiplying the movement of the spot of light, for galvanometers and similar reflecting instruments. 2000 w. Elektrotech Zeitschr—April 27, 1905.

Polyphase.—Polyphase Measuring Appliances (Ueber Drehfeldmessgeräthe). F. Schrottke. Illustrated description of the apparatus made by Siemens & Halske of Berlin. 10,000 w. Elektrotech Zeitschr—Aug. 15, 1901.

Potentiometer.—The Carpentier Potentiometer (Potentiometre J. Carpentier). M. Aliamet. Describing an improved form of the Thomson-Varley bridge for accurate electrical measurements. 1800 w. L'Electricien—Jan. 5, 1901.

Liquid Potentiometer; Determining Electrolytic Resistances with Direct Current Instruments. Carl Hering. Describes a liquid potentiometer and the methods of using it. 2500 w. Trans Am Inst of Elec Engrs—June and July, 1902.

Checking Electrical Instruments. Dr. Clayton H. Sharp. Abstract of a paper read at the Mt. Washington convention of the Edison Illuminating Companies. Describes methods of measurement with the potentiometer, used with a standard cell. 1800 w. Elec Wld & Engr—Sept. 20, 1902.

The Crompton Potentiometer for Electrical Measurements with Direct Current Supply. Illustrates and describes this instrument which is in use in many electric lighting and power stations in England. 1500 w. Sci Am Sup—May 16, 1903.

Potentiometer. W. Clark Fisher. An illustrated description of a new instrument, showing its essential difference and improvement on the older form. Ill. 3500 w. Elect'n, Lond—Jan. 15, 1904.

A Multiple-Dial Potentiometer. Albert Campbell. Describes a low-resistance instrument, aiming at ease of mechanical construction, accuracy, convenience of reading, and compactness. 400 w. Elec Rev, Lond—Dec. 30, 1904.

The Potentiometer. W. M. Nelson. Read before the Queensland Elec. Assn. Briefly describes the instrument and discusses its possibilities for general testing and measurement of electromotive force. 3500 w. Aust Min Stand—Feb. 9, 1905.

Power Factor.—Power Factor Indicators. William Hand Browne, Jr. Describes various types of meters and indicators, considering the best method of attaining the end sought. 5300 w. Trans Am Inst of Elec Engrs—June and July, 1901.

A Phase Meter (Ein Phasenmesser). A. Grau. Describing an arrangement of an alternating-current wattmeter so that it will indicate the power factor and enable the difference of phase to be found. 1000 w. Elektrotech Zeitschr—March 31, 1904.

The Power Factor Indicator. Harry W. Richardson. Describes the theory of action of the power factor indicator, explaining its action by the aid of mathematics. 1600 w. Elec Wld & Engr—Dec. 29, 1904.

See also **ELECTRIC METER—Wattmeter.**

Precision.—Notes on Modern Precision Measuring Instruments (Bemerkungen betreffend die Benutsung der Neueren Elektrischen Präcisions-Messinstrumente). W. Marek. A discussion of the calibration and use of direct-reading electrical measuring instruments. 4000 w. Elektrotech Zeitschr—May 22, 1902.

Quantometer.—See MAGNETIC TESTING.

Rail Bond Conductivity.—See RAIL BOND—Conductivity.

Recording.—Voltage and Current Recorder. Frank W. Springer. Illustrated description of a device for recording the instantaneous values of current, or pressure, or both. 2100 w. Engs' Year Bk, Univ of Minn—1901.

A Recording Indicator for Maximum Currents and Shortcircuits (Ein Registrirender Maximalstrom und Kurzschlussanzeiger). H. Marken. A solenoid opposed by a spring is connected with a recording mechanism and revolving disc. 1800 w. Elektrotech Zeitschr—Dec. 11, 1902.

Curve Drawing or Graphic Recording Instruments. H. W. Young. Explains the value of these instruments, describing the more important ones. 4000 w. Am Elect'n—June, 1904.

Recording Voltmeter.—A Recording Galvanometer and a Revolving Contact and their Employment in Tracing Alternating-Current Curves (Sur un Galvanomètre Enregistreur et un Contact Tournant, et sur leur Emploi au Tracé des Courbes de Courants Alternatifs). J. Carpentier. A description of two pieces of apparatus, which may be used independently or together. 700 w. Comptes Rendus—April 20, 1903.

A Universal Recording Voltmeter and a Revolving Contact (Voltmètre Enregistreur Universel et Contact Tournant). J. Carpentier. Descriptions of a recording galvanometer of the Deprez-d'Arsonval type, and of a contact apparatus for getting alternating-current curves. 1000 w. Bull Soc Internat d'Electriciens—June, 1903.

Resistance.—See **Kelvin Bridge; ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE; RHEOSTAT.**

Resistance Box.—Resistance Boxes for Use in Precise Alternating Current Measurements. George A. Campbell. Shows that a practically reactanceless coil may be produced by double-winding the coil as usual and then shunting the coil with a definite small condenser. 1700 w. Elec Wld & Engr—Oct. 29, 1904.

See also **ELECTRIC RESISTANCE; RHEOSTAT.**

Resonance.—See Frequency.

Revolving Coil.—The Computation of Revolving-Coil Measuring Appliances (Die Berechnung von Drehspul Messgeräten). F. Janus. Deriving formulas for the computation of the magnets, coils, and other portions of various measuring instruments. 3500 w. Elektrotech Zeitschr—June 15, 1905.
See also **Electro-Dynamometer.**

Revolving Contact.—See Recording Voltmeter.

Rheostat.—See RHEOSTAT.

Shielded Balance.—The Shielded Balance. G. A. Campbell. Aims to show how the source of error in a Wheatstone bridge balance when alternating current is employed may be entirely eliminated by magnetic, leakage and capacity shielding. 2500 w. Elec Wld & Engr—April 2, 1904.

Shunt.—See Galvanometer Shunt.

Slip Meter.—Measurement of the Slip in Asynchronous Motors (Messung der Schlüpfung Asynchroner Motoren). G. Seibt. The slip is determined from the vibrations of the needle of an amperemeter of which the terminals are connected to the contact rings of the armature. 1200 w. Elektrotech Zeitschr—Feb. 28, 1901.

The Measurement of the Slip of Asynchronous Motors by the Stroboscopic Method (Messung der Schlüpfung Asynchroner Motoren nach der Stroboskopischen Methode). A. Schweitzer. Showing the manner in which Braun's tube may be used instead of the arc lamp, as described by Benischke. 1000 w. Electrotech Zeitschr—Nov. 14, 1901.

A Mechanical Slip Counter for Non-Synchronous Motors (Ein Mechanischer Schlüpfungszähler für Asynchronmotoren). E. Ziehl. A combination of a differential speed indicator and a small standard synchronous motor. 1800 w. Elektrotech Zeitschr—Dec. 12, 1901.

A New Slip Meter (Ein Neuer Schlüpfungsmesser). Angelo Bianchi. Illustrated description of methods and apparatus for measuring the slip of induction motors. 800 w. Elektrotech Zeitschr—Dec. 24, 1903.

A New Strobscopic Slip Meter (Ein Neuer Stroboskopischer Schlüpfungsmesser). Dr. G. Wagner. A description of the operation of apparatus using the principle of persistence of vision upon intermittent flashes of light for determining the slip of non-synchronons alternating and polyphase motors. 6000 w. Glasers Annalen—July 15, 1904.

The Slip of an Induction Motor. B. F. Bailey. Describes the method of measuring the slip which is used in the electrical engineering laboratory of the University of Michigan, which requires only the simplest apparatus and does not involve any change in the connections of the motor. Also editorial. 1700 w. Elec Wld & Engr—April 22, 1905.

Measuring the Slip of Induction Motors. F. Lawton Stone. Describes a mechanical method of measuring the slip which seems well adapted to workshop conditions. Ills. 1200 w. Elec Wld &Engr—June 10, 1905.

Note on a Simple Device for Finding the Slip of an Induction Motor. Charles A. Perkins. Describes a simple and inexpensive device used in the laboratory of the University of Tennessee. 600 w. Am Inst of Elec Engrs—June 22, 1905.

Measurement of the Slip of Induction Motors. C. V. Drysdale. Discussion of various methods, with illustrated description of some modifications of the stroboscopic method. 2400 w. Elect'n, Lond—Aug. 25, 1905.

Spark Recorder.—Electric Spark Recorder. F. W. Springer. Illustrated description of an apparatus which has been in use six years and proven successful. 2000 w. Elec Wld & Engr—July 1, 1905.

Standardization.—See **ELECTRIC APPARATUS; ELECTRIC MEASUREMENT; LABORATORY—Reichsanstalt.**

Storage-Battery Testing.—See **STORAGE BATTERY—Testing Instruments.**

Switchboard.—Notes on the Use of Instruments on Switchboards. F. P. Cox. To introduce a discussion on the more important features of instrument engineering, confining the remarks to the conditions which are found on switchboards in central stations. 1200 w. Am Inst of Elec Engrs—April, 1905.

Accuracy Checks of Switchboard Instruments. Clayton H. Sharp. Considers the derangements liable to occur in switchboard instruments and the necessity for periodic checking, and the methods. 2800 w. Elec Rev, N Y—Feb. 11, 1905.

See also **ELECTRIC SWITCHBOARD.**

Switchboard, Errors.—Direct Reading Measuring Instruments for Switchboard Use. Kenelm Edgecombe and Franklin Punga. Abstract of a paper read before the Inst. of Elec. Engrs. Describes the chief types of switchboard measuring instruments and the electrical errors. Serial. 1st part. 5000 w. Elect'n, Lond—March 25, 1904.

Synchronism.—Synchronism and Frequency Indication. Paul M. Lincoln. Describes these two devices, which were conceived and developed almost simultaneously, giving related information of interest. Ill. 4400 w. Trans Am Inst of Elec Engrs—June and July, 1901.

A New Synchronism Indicator for Alternators. Fred P. Woodbury. Illustrates and describes an instrument, invented by Paul M. Lincoln. 500 w. Sci Am—Dec. 7, 1901.

Construction of a Three-Phase Synchroniser. Paul C. Percy. Illustrates and describes in detail how a useful synchronism indicator may be produced. 1300 w. Am Elect'n—May, 1904.

The Construction of a Two-Phase Synchronizer. Paul C. Percy. Drawings and description of a two-phase synchronism indicator of the "revolving light" type. 1500 w. Am Elect'n—June, 1904.

The Automatic Synchronizer. Norman G. Meade. Illustrates and describes the instrument and its operation, and also other synchronising devices. 1700 w. Elec Club Jour—May, 1905.

Automatic Synchronising of Generators and Rotaries. Paul MacGahan. Abstract of a paper read before the Nat. Elec. Lgt. Assn. Describes a device recently perfected by the Westinghouse Electric & Mfg. Co., describing the actions of the various parts. Ills. 1500 w. Engr, U S A —July 1, 1905.

Synchronizing Devices. F. H. Davies. Describes the earliest method used, and some recent devices, commenting on their efficiency. 1800 w. Elec Engr, Lond—Oct. 2, 1903.

Testing.—Instrument Equipment of a Testing Department. F. Conrad. Read before the Ohio Elec. Lgt. Assn. Considers portable testing instruments, auxiliary devices, and standard instruments. 3300 w. Cent Sta—March, 1905.

A 12,000-Volt-Direct Current Testing Set. William Ambler. Illustration, with description of the apparatus recently installed in the dynamo laboratory at Sibley College. 1400 w. Sib Jour of Engng—June, 1902.

See also **ELECTRIC GENERATOR TEST; ELECTRIC MEASUREMENT; ELECTRIC TESTING.**

Thermostat.—An Electric Thermostat (Sur un Thermostat à Chauffage et Régulation Electriques). C. Marie and R. Marquis. An illustrated description of a bath for physical experiments which is heated by an electric current and whose temperature is regulated very closely by an electric thermostat. 200 w. Comptes Rendus—March 9, 1903.

Thiermann Compensator.—See Compensator.

Thomson Bridge.—See Kelvin Bridge.

Transformers.—See **TRANSFORMER—Measuring Instrument.**

Voltameter.—The Lead Voltameter. Anson G. Betts and Dr. Edward F. Kern. Gives a short account of the silver voltameter, and the results obtained by comparing the lead voltameter. 2500 w. Int Elec Cong of St. Louis—Sept., 1904.

The Silver Voltmeter. Dr. K. E. Guthe. Gives rules adopted in the United States where the silver voltameter has been legalized, and discusses sources of trouble that may arise, etc. 3500 w. Int Elec Cong of St. Louis—Sept., 1904.

A New Solution for the Copper Volameter. William K. Shepard. Gives a solution used by the writer, and the good results obtained. 2100 w. Am Jour of Sci—July, 1901.

Measurement of Current by Copper Voltameter. J. L. Dickson. Describes method. 400 w. Elec Wld & Engr—Jan. 16, 1904.

The Voltametric Balance (Die Voltametrische Wage). W. Phanhauser. The cathode is suspended from one arm of a balance, and the disturbance of equilibrium indicates the deposit of metal. 1000 w. Zeitschr f Elektrochemie—Oct. 10, 1901.

Mercury Voltameters (Ueber Quecksilbervoltameter). H. Danneel. Describing various forms of mercury voltameter, showing how they may be employed as electric meters. 2000 w. Zeitschr f Elektrochemie—March 10, 1905.

An Iodine Titration Voltameter. D. Albert Kreider. Gives experimental investigations with a titration voltameter, showing the accuracy may be depended upon to about one part in ten thousand. 3000 w. Am Jour of Sci—July, 1905.

Wave Length Standard.—See **ELECTRIC WAVE—Length Standard.**

Wave Meter.—See **SPACE TELEGRAPHY.**

Wheatstone Bridge.—Reversible Wheatstone Precision Bridge (Umkehrbare Wheatstone'sche Präcisions-Messbrücken). Dr. M. Th. Edelmann. Showing a simple arrangement of resistances and galvanometers, enabling measurements to be rapidly and accurately made. 1000 w. Elektrotech Zeitschr—Nov. 22, 1900.

See also Kelvin Bridge; **ELECTRIC MEASUREMENT; RHEOSTAT—Rotating Contact.**

ELECTRIC INSULATION.

See **DIELECTRIC; ELECTRIC MEASUREMENT; INSULATION.**

ELECTRIC INVENTION.

The Latest Triumphs of Electrical Invention. Joseph S. Ames. Discusses the recent work of Marconi, Tesla and Pupin. 3700 w. Am Rev of Revs—June, 1901.

The Relation of Electric Inventions to Human Activity. Dr. Louis Bell. A review of the fundamental electrical inventions, including the telegraph, telephone, dynamo, motor, incandescent lamp, etc., showing their nature as labor-saving appliances. 3000 w. Engineering Magazine—March, 1904.

ELECTRICITY.

See also **ELECTRIC ENGINEERING; ELECTRIC EXHIBITION; ELECTRIC INDUSTRY; ELECTRO-PHYSICS.**

Agriculture.—See **AGRICULTURAL MACHINERY; AGRICULTURE; ELECTRO-PHYSICS — Plants; HYDRO-ELECTRIC PLANT.**

Air Navigation.—See **AERONAUTICS—Electricity.**

Applications.—Some Recent Applications of Electricity on a Small Scale. Howard S. Knowlton. Describes its use in the photographic dark room, in exploring lights, electric bells on cars, and numerous other fields. 1800 w. Elec, N Y—July 6, 1904.

Atmospheric.—See **ELECTRIC CURRENT—Earth; ELECTRO-PHYSICS—Electron.**

Benjamin Franklin.—Benjamin Franklin's Contributions to Electrical Science. Edwin F. Northrup. Begins a review, in some detail, of his contributions to electrical knowledge. The present article deals with his experiments on the action of points on the electric charge. Serial. 1st part. 2700 w. Elec Rev, N Y—March 30, 1901.

Domestic Service.—Electricity as a Home Comfort. J. D. Mackenzie. Considers some of the applications and discusses the design and the method of executing the work. Serial. 1st part. 3000 w. Elec Engr, Lond—Dec. 15, 1905.

Future.—Electricity in the Coming Century. Elihu Thomson. Reviews the problems awaiting solution, and the probable fields where research will be rewarded. 2000 w. Elec Wld & Engr—Jan. 5, 1901.

Government Service.—Electricity in the United States Government Service. J. E. Price. An illustrated article giving an interesting account of the uses, especially the distribution of correct time for public clock service, the registering of earthquake shocks, and the business of the magnetic observatory. 1300 w. Elec Rev, N Y—Oct. 31, 1903.

History.—Electricity in the Nineteenth and Twentieth Centuries. A. E. Kennelly. Reviews the progress made in the century just closed, and discusses where improvements are looked for in the coming century. 4400 w. Am Elect'n—Jan., 1901.

A Century of Electrical Progress. E. E. Fournier d'Albe. An illustrated review. 3700 w. W Elect'n—Jan. 5, 1901.

The First Century of Electricity. Charles T. Child. An interesting review of the progress and achievements of the last hundred years. 9500 w. Elec Rev, N Y—Jan. 12, 1901.

1901.—Electrical Progress in 1901. A review of the advances made during the year showing that it was a year of unusual progress. 2500 w. Elec Rev, N Y—Jan. 11, 1901.

1902.—The Progress of Electrical Science During the Year 1902. A. E. Kennelly. A general review. 2200 w. Elec Wld & Engr—Jan. 3, 1903.

Paris Exposition.—Electricity at the Paris and St. Louis Expositions. Frans Weis. A comparison, showing the progress made in electricity during the four years since the Paris exposition. Ills. 3800 w. Elec Wld & Engr—May 7, 1904.

St. Louis Exposition.—See Paris Exposition; ELECTRIC EXHIBITION; ST. LOUIS EXPOSITION.

War.—See COAST DEFENSE.

ELECTRICITY DIRECT.

See also COAL—Misuse; ELECTRIC CELL—Carbon.

Electricity and Power Direct from Heat. James Asher. Reviews some of the methods, the thermo-electric batteries, pyromagnetic generators, &c. 1500 w. Sci Am—March 29, 1902.

Berthier Actino-Electric.—The Berthier Actino-Electric Transformer. Emile Guarini. An illustrated article sketching the main features of two forms of apparatus for producing electricity from light. 1500 w. Sci Am—June 18, 1904.

Carbon Cell.—Electrical Energy Direct from Carbon. A. E. Kennelly. A discussion of this subject, indicating where improvement may be looked for in utilising the energy of coal. 3000 w. Elec Wld & Engr—Jan. 5, 1901.

See also ELECTRIC CELL.

Coal Battery.—The Coal Battery. Hugo Jone. An illustrated description of an invention of the writer, which he claims will give more electrical energy than is obtainable by means of the dynamo, in combination with a steam or gas engine. 4500 w. W Elect'n—Nov. 21, 1903.

Reid Process.—A New Device for Producing Electrical Currents. Brief illustrated description of apparatus devised by James H. Reid for producing energy direct from fuel, with editorial notes. 1200 w. Elec Rev, N Y—Dec. 12, 1903.

The Dynelectron.—S. D. V. Burr. An illustrated description of the dynelectron cell, invented by James H. Reid, and its action, for producing electricity direct from heat. 1800 w. Ir Age—Dec. 8, 1904.

Fuel and Heat Batteries. C. J. Reed. A description of the Reid battery. 2000 w. Elec-Chem Ind—Jan., 1904.

Tommasi.—The Transformation of Thermo-Chemical Energy into Voltaic Energy or Electromotive Force. Dr. D. Tommasi. An account of investigations made by the writer with discussion of of the results. 1200 w. Elec Rec, Lond—Jan. 22, 1904.

ELECTRIC LAMP.

See ARC LIGHT; ELECTRIC ENGINEERING—Europe; ELECTRIC LIGHTING; INCANDESCENT LAMP; MERCURY VAPOR LAMP; NERNST LAMP; OSMIUM LAMP.

ELECTRIC LAUNCH.

See BOAT, ELECTRIC.

ELECTRIC LEGISLATION.

See ELECTRIC INDUSTRY.

ELECTRIC LIGHTING.

See also ARC LIGHT; ELECTRIC EQUIPMENT; ELECTRIC PLANT; ELECTRIC SIGN; ELECTRIC STATION; ILLUMINATION; INCANDESCENT LAMP; INCANDESCENT LIGHTING; NERNST LAMP; PHOTOMETRY; SEARCHLIGHT; STREET LIGHTING.

The Scope of Lighting Technology (Die Ziele der Leuchttechnik). Otto Lummer. Addresses delivered before the Elektrotechnischen Verein in Berlin, reviewing in an exhaustive manner the subject of artificial illumination, with especial reference to electric lighting. An extensive bibliography is appended. Two articles; 20000 w. Elektrotech Zeitschr—Aug. 28, Sept 4, 1902.

Recent Lighting Progress. Henry Noel Potter. A review of the Bremer arc lamp, Cooper Hewitt vapor lamp, osmium lamp, Nernst lamp and general electric lighting progress. 2200 w. Elec Rev, N Y—Jan. 10, 1903.

Expansion and Changes in Electric Light and Power Systems. Alton D. Adams. Gives statistics and data of interest showing the great increase of capacity. 3000 w. Elec Wld & Engr—March 5, 1904.

Recent Progress in Electric Ligthing (Récent Progrès de l'Eclairage Electrique). M. Roberjot. A review of recent improvements, including arc, mercury vapor, magnetite, incandescent, Nernst and osmium lamps. 6000 w. Bull Soc d'Encour—Aug., 1904.

Aldershot Camp.—Electric Lighting of Aldershot Camp. Gives plan, illustrations and description of this undertaking, which includes not only the generating station and distributing network, but also the barrack and building lighting, and some street lighting. 2500 w. Elec Rev, Lond—May 29, 1903.

Alexander III. Bridge.—Lighting the Alexander III. Bridge, Paris. An illustrated description. 900 w. Elec Wld & Engr—Dec. 1, 1900.

America.—The Electric Lighting Industry of the United States. A tabular statement of the present status of this industry, giving facts and figures hitherto unpublished. Also editorial. 2000 w. Elec Rev, N. Y.—Nov. 9, 1901.

American vs. English Lamps.—Comments on Remarks Made by Col. R. E. B. Crompton before the International Electrical Congress at St. Louis. John W. Howell. Remarks made in discussion of papers read by Mr. Torchio and Mr. Dow are given. Reports tests made of English lamps, and also of American lamps, and discusses conditions in England. 1200 w. Am Inst of Elec Engrs—June 19, 1905.

Antartic Ship.—Lighting Antartic Ships. Brief Illustrated description of the special lighting features of the British steamer "Discovery," which has just started for the South Polar regions. The driving agency is a great windmill on the upper deck. 200 w. Elec Wld & Engr—Aug. 17, 1901.

Balancer.—See ELECTRIC APPARATUS.

Baltimore.—See REFRIGERATION.

Bergen Co., N. J.—The Bergen County, N. J., Lighting System. W. J. Jones. Illustrated description of a system furnishing current for street lighting, commercial lighting and power to thirty-eight municipalities, which comprise about fifty different towns and boroughs, covering about 160 sq. miles. 1400 w. Elec Wld & Engr—May 24, 1902.

Berlin.—See STREET LIGHTING.

Bexley, Eng.—See ELECTRIC RAILWAY.

Blue Print.—See BLUE PRINT.

Boston Edison.—See ELECTRIC STATION.

Boston Store.—See ELECTRIC PLANT.

British Legislation.—See ELECTRIC INDUSTRY.

Canal.—See CANAL HAULAGE—Electric.

Carnegie Residence.—See ELECTRIC HEATING.

Central Station.—Central-Station Lighting. J. A. Seager. Thinks the stations should not only be well lighted, but should display the newest and most effective arrangements as an object lesson. Also discusses the proper source and distribution of station lighting, and other related matters. 2000 w. Elec Engr, Lond—Jan. 17, 1902.

Chicago.—Chicago's Lighting Plant; Its Progress Under Municipal Ownership. Edward B. Ellicott. From a paper read before the League of Am. Munic. Favors municipal ownership, and claims the city is saved $160,400 annually. 1400 w. Munic Engng—Jan., 1901.

Municipal Electric Lighting in Chicago. Edward B. Ellicott. Report by the city electrician, of 13 years' operation of municipal electric stations. 1600 w. Eng Rec—Feb. 23, 1901.

Thirteen Years' Experience with Municipal Street Lighting at Chicago, Ill. Edward B. Ellicott. An official report of results obtained and benefits derived from the service, with a comparison with the cost under private contract. 1700 w. Eng News—May 2, 1901.

The Lighting System of the Chicago Edison Company. An illustrated study of the plant and methods of one of the largest electric lighting supply companies in the world. 4400 w. Elec Rev, N. Y.—Jan. 11, 1902.

Municipal Electric Lighting in Chicago. I. Report of Haskins and Sells, the result of an investigation into the finances of the plant. II. Economic and Social Factors in Chicago Municipal Lighting. John R. Commons. The general conclusions favor the municipal plant. 7000 w. Munic Af—March, 1902.

See also **ELECTRIC DISTRIBUTION; ELECTRIC STATION; ELECTRIC SUBSTATION.**

Churches and Libraries.—The Lighting of Churches and Libraries. E. Leavenworth Elliott. Discusses the illumination of churches of both gothic and amphitheater type and of libraries, giving suggestions. Ills. 2500 w. Cent Sta—Dec., 1905.

Cincinnati.—The Cincinnati Gas and Electric Company. Illustrated detailed description of the generating station and its equipment, the territory supplied, lamps, etc. 5200 w. Elec Wld & Engr—May 17, 1902.

The System of the Cincinnati Gas and Electric Company. L. G. Lilley. Illustrated description of a fine modern electric lighting system. 3000 w. Elec Rev, N Y—May 17, 1902.

Circus Tank.—Method of Lighting the Great Water Tank at the Nouveau Cirque, Paris. Illustrated description. 1000 w. Sci Am—Dec. 28, 1901.

Coast.—Electric Lights Along the Coast. George E. Walsh. An account of the recent application of electricity to a large number of lighthouses, lightships and signal lights. 1400 w. Elec Wld & Engr—Dec. 29, 1900.

See also **LIGHTHOUSE.**

Companies and Municipalities.—See **ELECTRIC STATION MANAGEMENT—Legal Relations.**

Cornwall Canal.—Power Transmission Plant for Lighting the Cornwall Canal, Canada. An illustrated article describing an installation of American apparatus. 2000 w. Elec Wld & Engr—March 1, 1902.

See also **CANAL.**

Coronation, London. — The Coronation Illumination. An illustrated account of the preparations made to illuminate London in honor of the King's coronation. Also some remarks on the attitude of the companies and the precautions taken. 3200 w. Elect'n, Lond—July 4, 1902.

Croydon, Eng.—See **Street.**

Decorative.—From Christmas Tree to Pan-American. Luther Stieringer. An illustrated article giving the history of electrically-illuminated towers. 3600 w. Elec Wld & Engr—Aug. 24, 1901.

Electrical Installation and Decorative Work in Connection with Exposition Buildings. Luther Stieringer. Read before the Am Inst of Archts. Describes particularly the electric installation at the Pan-American Exposition. 1700 w. Eng Rec—Oct. 12, 1901.

The Art of Design for Electric Illumination; Domestic and Public. Fred T. Cash. Comments on the great improvement made in fixtures for interior lighting, and criticises the designs for public lighting. 2000 w. Elec Rev, Lond—April 11, 1902.

Artistic Electrical Illumination. Edwin O. Sachs. Read before the Soc. for the Encouragement of the Fine Arts. Reviews briefly illumination appliances used in the past, discussing gas illumination and electric lighting boards. 4800 w. Elec Rev, Lond—April 11, 1902.

Display Lighting. Signs and Decorations. Russell Spaulding. Suggestions helpful in producing good effects in this work. 1600 w. Cent Sta—Dec., 1902.

The Electrical Decorations of San Francisco. Illustrates and describes the more prominent illuminations, giving details of difficulties encountered and the means of overcoming them. Serial. 1st part. 1500 w. Jour of Elec—Nov., 1904.

See also **Coronation; Delhi; Exposition; Pan-American; Paris Exposition; St. Louis Exposition; ELECTRIC EXHIBITION; ELECTRIC FOUNTAIN; ELECTRIC SIGN.**

Delhi Durbar.—Electric Lighting at the Delhi Durbar. Brief illustrated description of the arrangements for electric lighting of this temporary city, showing the magnitude of the undertaking. 1200 w. Elect'n, Lond—March 6, 1903.

Department Store.—Electricity in a Newark, N. J., Department Store. Illustrates and describes the arrangements for lighting which are said to be the best in the country. 2000 w. Elec Wld & Engr—Dec. 14, 1901.

Distribution.—See also **ILLUMINATION; PHOTOMETRY.**

Earle Address.—See **ELECTRIC ENGINEERING.**

Efficiency.—Electric Lighting. Dugald C. Jackson. Calls attention to the great waste in producing the electric light, and the need of correction. 1000 w. Elec Wld & Engr—Jan. 5, 1901.

"Elblight."—A New System of Electric Lighting. Illustrates and describes a new system by which incandescent lamps provided with spike contacts can be inserted in any part of surfaces under which positive and negative conductors are interlaced while being insulated from one another. 1300 w. Engr, Lond—Oct. 26, 1900.

Europe.—Some Notes on the Commercial Features of European Lighting Practice. Abstract of a paper by Arthur Williams, read at the convention of the Assn. of Edison Ill. Co.'s. 2700 w. Elec Rev, N Y—Nov. 7, 1903.

Exposition.—Ground Lighting at the Pan-American and Prior Expositions. Luther Stieringer. Illustrated review of the writer's work, discussing the difficulties and defects. 2500 w. Elec Wld & Engr—July 20, 1901.

See also **Decorative; Pan-American; Paris Exposition; St. Louis Exposition; ELECTRIC EXHIBITION; ELECTRIC FOUNTAIN.**

"Express" Lamp.—See **NERNST LAMP.**

Factory Plant.—See **ELECTRIC PLANT—Factory Lighting.**

500-Volt, 3-Wire.—See **ELECTRIC DISTRIBUTION—Three-Wire.**

Foundry.—See **FOUNDRY—Electric Equipment.**

Fountain.—See **Decorative; ELECTRIC FOUNTAIN.**

Future Economies.—The Possibilities of Future Economies in Electrical Illumination. W. A. Chamen. Read before the Incor. Munic. Elec. Assn. Discusses incandescent lamps, the Hewitt mercury vapor lamp, arc lamps, and the possible improvements. Short discussion. 4500 w. Elect'n, Lond—July 24, 1903.

Gas Compared.—See **Massachusetts; LIGHTING; STREET LIGHTING.**

Hartford.—The Hartford, Conn., Electric Light Company's System. An illustrated detailed description of a modern and complete generating and distributing system, possessing features of interest. 2800 w. Elec Rev, N. Y.—May 18, 1901.

Hippodrome, N. Y.—See **ELECTRIC EQUIPMENT.**

History.—The Electric Light. Richard H. Pierce. Brief review of the development. Ill. 2200 w. W Elect'n—Jan. 5, 1901.

A Review of the History of Electric Lighting. Edwin R. Weeks. 3800 w. Elec Rev, N. Y.—Jan. 12, 1901.

Electric Lighting Twenty Years Ago and Since. Prof. Elihu Thomson and Mr. Edwin R. Weeks. Two reviews of interest. 2000 w. Elec Rev, N Y—Feb. 15, 1902.

Staite and Petrie's Electric Light—1846—1853. J. J. Fahie. An illustrated article giving an account of the labor of two early workers in this field and what they accomplished. Also editorial. Serial. 1st part. 4800 w. Elec Engr, Lond—Aug. 29, 1902.

A Quarter of a Century of Electric Lighting. Dr. Louis Bell. Some of the reasons for the rapid development of this enterprise and the factors which have produced it. 3000 w. Elec Wld & Engr—March 5, 1904.

See also **ELECTRIC INDUSTRY; ELECTRICITY.**

Hoho Method.—The Principles of a New Method of Electric Lighting. Paul Hoho. Describes a method of obtaining light and very high temperatures by immersing a smal sphere of silicon dioxide and silicates in an electrolyte of bicarbonate of soda and potassium and passing an electric current. 2500 w. Elec Wld & Engr—March 28, 1903.

Hotel Astor, N. Y.—The Illumination of the Hotel Astor, New York City. E. Leavenworth Elliott.

An illustrated article describing some of the changes made, which has made this one of the most successfully lighted of modern buildings of this class. 2500 w. Cent Sta—Nov., 1905.

See also ELECTRIC EQUIPMENT.

Illumination.—See ILLUMINATION.

Indianapolis.—See HEATING.

Infirmary, Liverpool.—The Electric Lighting of the Liverpol Royal Infirmary. E. S. Bradburne. Illustrated description of an interesting installation where many precautions were necessary. 1000 w. Elec Engr., Lond—Jan. 18, 1901.

Interior.—A Study of Certain Shades and Globes for Electric Lights, as Used in Interior Illumination. William Lincoln Smith. Illustrated account of tests made upon leading types of shades and globes, with results and description of methods of testing. 6600 w. Tech Quar—Sept., 1900.

Electric-Lighting Arrangements in Flats, Offices and Residences. F. J. Warden Stevens. Suggestions for the economical lighting of residential flats, offices and like buildings. 2300 w. Archt, Lond—Jan. 2, 1903.

Intermittent Currents.—Suggestions for the Use of Intermittent Currents for Electric Lighting. S. H. Holden. Points out means whereby currents which are constant as to direction but periodic as to intensity may be satisfactorily generated, and some uses to which they may be put. 1700 w. Elec Rev, Lond—Jan. 23, 1903.

Launches.—Electric Lighting Outfit for Launches. D. A. Richardson. An illustrated article discussing the requirements. 1500 w. Marine Engng—June, 1904.

Lighthouse.—See Coast; LIGHTHOUSE.

London Coliseum.—The London Coliseum. An illustrated article describing the electric equipment of a large place of amusement, especially the stage lighting and power. 4000 w. Elect'n, Lond—Jan. 27, 1905.

Malden, Mass.—A Successful Suburban System. Alton D. Adams. Describes the territory served by the Malden Electric Company, near Boston, the plant, etc., the number of incandescent street lamps supplied being larger than any other plant in the state. 2000 w. Elec Wld & Engr—May 17, 1902.

Manila.—See ELECTRIC RAILWAY.

Massachusetts.—Electrical Supply Stations in Massachusetts. Alton D. Adams. An account of the electric lighting development in this State. 2800 w. Elec Rev, N Y—July 27, 1901.

Electric Street Lighting and Population. Alton D. Adams. An examination of the relation existing between the extent of population and the use of electric street lamps in the State of Massachusetts, the kinds of lamps used, etc. 2000 w. Elec Rev, N. Y.—Nov. 9, 1901.

Changes in Arc Lighting. Alton D. Adams. A statistical review of arc-lighting in Massachusetts, showing the changes that have taken place. Also editorial. 3300 w. Elec Wld & Engr—Nov. 30, 1901.

Prices of Electric Street Lighting in Massachusetts. Alton D. Adams. Considers the prices paid for the service of electric street lamps by all the important cites and towns of Massachusetts, with the object of determining whether variation exists, its exent, some of the modifying factors, and the exceptions. 3000 w. Munic Engng—Dec., 1901.

Costs and Prices of Gas and Electric Lighting by Municipal Plants. Alton D. Adams. Considers 18 cities and towns in Massachusetts. Also editorial. 3800 w. Munic Engng—Oct., 1903.

See also ELECTRIC INDUSTRY; ELECTRIC STATION.

Mercury-Vapor.—See MERCURY VAPOR LAMP.

Meter.—See Street by Meter.

Military.—See AUTOMOBILE.

Municipal.—See Chicago; St. Louis; ELECTRIC STATION MANAGEMENT; MUNICIPAL OWNERSHIP.

Municipal Ownership Opposed.—Municipal Electric Lighting Opposed. James Blake Cahoon. Read at Nat. Con. on Munic. Ownership and Pub. Franchises. A discussion of the trials made in the United States, and the conclusions reached. 4000 w. Elec Rev, N. Y.—March 14, 1903.

Narragansett, R. I.—See ELECTRIC DISTRIBUTION—Three-Wire.

Navy Standard Voltage.—See ELECTRIC EQUIPMENT.

New England.—Rise of Electric Lighting in New England. Alton D. Adams. A concise review of the early history. 1500 w. Elec Wld & Engr—May 28, 1904.

See also Massachusetts.

New Forms.—Some Undeveloped Possibilities in the Electric Lighting Field. J. Wright. On new forms of arc and incandescent lamps considered in relation to their possible future development. 2800 w. Page's Mag—July, 1903.

Electricity and Light. Charles Proteus Steinmetz. Discusses the advance being made in electric lighting, explaining the action of the incandescent lamp, the gases and vapors that are made luminous, the mercury arc, and the magnetite arc lamp. 2800 w. Cassier's Mag—June, 1904.

The Problems of Improving Electric Lamps. Henry Noel Potter. Reviews the six prominent systems of electric lighting, studying the problems of each with a view to their improvement. 3500 w. Elec Rev, N Y—May 21, 1904.

Some Recently Improved Forms of the Electric Lamp. F. C. Caldwell. Abstract of a paper before the Ohio Soc. of Mech., Elec., and Steam Engrs. Reviews briefly the essential characteristics necessary for a first-class source of light, and considers recent improvements in efficiency. 2000 w. Engr, U S A—June 1, 1905.

New York Contract.—See ELECTRIC STATION MANAGEMENT—Lighting Contract.

New York Isles of Safety.—Electric Lights for Proposed Isles of Safety in New York City. Illustrates the first and third prize designs of the Municipal Art Society of New York, with critical comment. 400 w. Eng News—Aug. 7, 1902.

Night Lamp.—See INCANDESCENT LAMP.

Office Buildings.—The Lighting of Office Buildings. E. Leavenworth Elliott. Suggestions for adapting the illumination to the special needs. 1800 w. Cent Sta—July, 1905.

See also MECHANICAL PLANT.

Olympia Exhibition.—Recent Progress in Electric Lighting as Indicated by the Olympia Exhibition. Francis H. Davies. Remarks on improvements during recent years, and description of exhibits of various types of lamps. Serial. 1st part. 2000 w. Elec Engr, Lond—Sept. 29, 1905.

See also ELECTRIC EXHIBITION.

Pan-American Exposition.—Artistic Effects of the Pan-American Exposition. Ernest Knaufft. An illustrated account of the fine effects produced by electric lighting. 3300 w. Am Rev of Revs—June, 1901.

See also Exposition; ELECTRIC EXHIBITION; ELECTRIC TOWER.

Paris.—The Electric Lighting Situation in Paris. Begins a review of the report of a technical commission appointed to investigate the problem. Map. Serial. 1st part. 1000 w. Elec Wld & Engr—May 13, 1905.

Paris Exposition.—Report on Electric Lighting Exhibits at the Paris Exposition. An advance copy of the official report of Carl Hering in his capacity as U. S. Juror for Class 25. 4500 w. Elec Wld & Engr—Dec. 29, 1900.

See also Exposition; ELECTRIC FOUNTAIN; LIGHTING.

Philadelphia.—See ELECTRIC STATION.

Philadelphia Subway.—See UNDERGROUND RAILWAY.

Philippines.—Electric Lighting and Railway Construction in the Philippines. Illustrated description of the reconstruction and extension of the lighting and power system, the electrification of the horse car lines and of a short steam line. 2500 w. Elec Wld & Engr—May 6, 1905.

Plymouth, Mass.—See ELECTRIC STATION.

Projection Apparatus.—See PROJECTION APPARATUS.

Providence.—See ELECTRIC DISTRIBUTION—500-Volt, Three-Wire.

Radiation.—See ILLUMINATION.

Rare Earths.—Notes on the Use of Rare Earths in Electric Illuminants. Murray Charles Beebe. Discusses the work in this field, the difficulties, and experiments. Serial. 1st part. 2700 w. Am Gas Lgt Jour—June 12, 1905.

See also **INCANDESCENT LAMP; NERNST LAMP.**

Rates.—See **ELECTRIC-STATION MANAGEMENT.**

Rathmines, Dublin.—Some Notes on the Electric Lighting of Rathmines. G. H. Pilditch. Read before the Dublin Sec. of the Inst, of Elec. Engrs. A description of the important details of the lighting system of a suburb of Dublin. 5500 w. Elec Engr, Lond—Feb. 27, 1903.

Reflector.—See **PHOTOMETRY.**

Regulations.—See **ELECTRIC INDUSTRY.**

Residences.—The Lighting of Residences. E. Leavenworth Elliott. Discusses the lighting of the kitchen, dining-room, library, parlor, bedrooms, etc. 3000 w. Cent Sta—June, 1905.

St. Louis—Street Lighting of Cities. Henry H. Humphrey. Briefly discusses the subject generally, and gives an illustrated description of the principal engineering features of the new electric lighting system in St. Louis. 4300 w. Jour Assn of Engng Socs—Jan., 1901.

A Single-Phase Lighting-System in St. Louis. L. A. De Blois. An explanation of this system of the Missouri Edison Electric Co., and the conditions it is required to meet. 4500 w. Harvard Engng Jour—Jan., 1904.

Municipal Electric Lighting. J. W. Wood. Read before the League of Am. Municipalities at Toledo, O. An account of what has been accomplished in this field in St. Louis, Mo. 3800 w. Munic Jour & Engr—Sept., 1905.

St. Louis Municipal Lighting. Joseph W. Wood. An account of conditions and cost by private companies and by municipal plant, showing a great saving by the latter. 2500 w. Munic Eng—Sept., 1905.

See also **ELECTRIC STATION MANAGEMENT.**

St. Louis Exposition.—Electrical Illumination of the Louisiana Purchase Exposition. Cloyd Marshall. Describes features of exterior and interior lighting. Ills. 1200 w. Elec Wld & Engr—May 21, 1904.

School.—Lighting an Assembly Room. W. H. Wakeman. Illustrated description of a plan adopted for controlling lights in the assembly room of a large school building. Serial. 1st part. 700 w. Elec, N Y—May 17, 1905.

Searchlight.—See **SEARCHLIGHT.**

Shades and Globes.—See Interior.

Ship.—See **ELECTRIC EQUIPMENT.**

Signs.—See Decorative; **ELECTRIC SIGN.**

Stoke Newington, London.—Stoke Newington Lighting. A report by R. E. Crompton on the lighting of Stoke Newington by electricity, with editorial. 3000 w. Elec Engr, Lond—Oct. 18, 1901.

Street.—Street Lighting by Electric Lamps. F. H. Minshall. Discusses the systems, especially those in use at Croydon, England. 4800 w. Elec Wld & Engr—Dec. 1, 1900.

Street Electric Lighting. Bailie W. Maclay. Read before the Incor. Munic. Elec. Assn. Also discussion on the superiority of electric lighting for this purpose. 3300 w. Lightning—July 4, 1901.

Electric Street Lighting. Alex. Dow. Read before the Am. Soc. of Munic Imp. Considers methods, costs, and municipal ownership of street lighting plants. 3500 w. Munic Engng—Nov., 1902.

Street Lighting. A. S. Hatch. Read before the Int. Assn. of Munic. Elect'ns. Remarks on the various methods of electric lighting for streets. 3000 w. Munic Engng—Oct., 1904.

See also Chicago; Cincinnati; Massachusetts; New York; St. Louis; **ARC LIGHT; LIGHTING; PHOTOMETRY; STREET LIGHTING.**

Street by Meter.—Street Lighting by Meter. T. D. Allin. A suggestion for the consideration of those buying electrical energy for street lighting. 1000 w. Jour of Elec—May, 1902.

Street Railway Systems.—Electric Lighting by Street Railway Systems. Alton D. Adams. Discusses the movement looking to the supply of electric light from street railway stations, showing its desirability from the standpoint of the general public. 1700 w. St Ry Rev—May 20, 1902.

Sydney, N. S. W.—Electric Lighting in Sydney. Brief illustrated description of the Empire Company's station. 1500 w. Aust Min Stand—Aug. 14, 1902.

Sydney University.—See **ELECTRIC STATION.**

Tangermünde, Germany.—Public Electric Lighting From a Private Station (Application à l'Eclairage Public de l'Electricité Produite par un Usine pour ses Besoins Personnels). A description of the lighting of the town of Tangermünde, on the Elbe, by current from the plant of the Meyer sugar refinery. 1800 w. Revue Technique—July 25, 1901.

Tantalum Lamp.—See **INCANDESCENT LAMP—Tantalum.**

Tea Co., Brooklyn.—See **ELECTRIC PLANT.**

Textile Mills.—The Electric Lighting of Weaving Sheds and Spinning Mills. Discusses the subject in regard to England, giving facts in the inspector's report. Serial. 1st part. 1400 w. Prac Engr—May 27, 1904.

See also **ELECTRIC DRIVING.**

Thames Embankment.—The Electric Lighting of the Thames Embankment. Illustrated description of the arrangements so far as carried out, with outline of the previous history. 1700 w. Elect'n, Lond—March 1, 1901.

Theatre.—Electricity in Stage Lighting (Die Elektrizität im Bühnenwesen). Heinrich Rupprecht. Describing lamps, projectors and general systems of wiring in the use of electric lighting for theatres. Two articles. 4000 w. Elektrotech u Polytech Rundschau—Nov. 1, 15, 1904.

See also **ELECTRIC EQUIPMENT.**

Theatre, Buffalo.—Electric Equipment of a Buffalo Theatre. Describing the arangement of footlights and border lights dimmers, and switchboard for an equipment of more than 5,000 lamps; using a two-wire system. 1000 w. Elec Wld & Engr—Nov. 4, 1905.

Theatre, London.—The Electric Lighting of Drury Lane Theatre Royal. An illustrated review of the electric lighting arrangements, describing in detail recent improvements. 3300 w. Elect'n, Lond—Feb. 12, 1904.

Three-Wire.—See **ELECTRIC DISTRIBUTION.**

20th Century.—Electrical Illumination at the Beginnig of the Twentieth Century. Brief of a lecture by Dr. Louis Bell given before the N. Y. Elec. Soc. 5600 w. Elec Wld & Engr—Feb. 9, 1901.

Williamsburg Bridge, N. Y.—The Illumination of the Williamsburg Bridge, New York City. Illustrates and describes the manner in which the lighting work has been carried out. 1500 w. Elec Wld & Engr—Dec. 24, 1904.

Wiring Buildings.—See **ELECTRIC WIRING—Buildings.**

ELECTRIC LIGHT STATION.

See **ELECTRIC STATION.**

ELECTRIC LINE.

See also **ELECTRIC CABLE; ELECTRIC CONDUCTOR; ELECTRIC PROTECTIVE APPATUS; ELECTRIC RAILWAY—Overhead Construction; ELECTRIC TRANSMISSION; ELECTRIC WIRING; HYDRO-ELECTRIC PLANT; INSULATOR; POLE; TELEPHONE LINE; TROLLEY WIRE.**

Practical Line Construction. Loren W. Burch. Read at Milwaukeet meeting of Northwestern Electrical Assn. Discusses the requirements of good construction. 2000 w. Elec Rev, N. Y.—Jan. 26, 1901.

Notes on the Construction and Protection of Aerial Transmission and Distribution Systems. K. B. Thornton. Discusses the essential features of good construction. Ill. 4000 w. Can Elec News—July, 1901.

Notes on the Construction and Protection of Aerial Transmission and Distribution Systems. K. B. Thornton. Read before the Canadian Elec. Assn. Discusses the selection and setting of poles, insulators, wires, etc. 2000 w. Elec Rev, N. Y.—July 6, 1901.

Construction of Transmission Lines. A portion of a paper by George H. Lukes read at the recent convention of the Edison Illuminating Companies. Treats of line construction, switching, regulation and rates. 3000 w. Elec Wld & Engr—Sept. 20, 1902.

Pole Lines for Power Transmission. Alton D. Adams. A description of the poles and wires of some of the principal long-distance, high-tension electric transmission lines in the United States. Serial, 2 parts. 4000 w. Elec Rev, N Y—Jan. 10 and 17, 1903.

Overhead Pole Line Construction and Operation for Central Stations. A. H. Manwaring and J. T. Hutchings. Read at meeting of the Assn. of Edison, Ill. Co.'s. Treats of important points to considered in successful pole line construction for a plant supplying current for series arc lighting and alternating current for light and power. 4000 w. Elec Wld & Engr—Sept. 26, 1903.

Overhead High-Tension Distributing Systems in Suburban Districts. George H. Lukes. Calls attention to certain points in pole line construction which experience has shown to be often neglected. 1600 w. Trans Am Inst of Elec Engrs—Dec. 18, 1903.

Overhead High-Tension Distributing Systems in Suburban Districts. George H. Lukes. Calls attention to certain points in pole line construction which experience has shown to be often neglected. 1600 w. Trans Am Inst of Elec Engrs—Dec. 18, 1903.

Selection of Transmission Circuits. Alton D. Adams. Discusses points to be considered in the determination of the number of circuits that shall make up the line, and the relations of these circuits to each other. 4800 w. St Ry Rev—March 20, 1904.

Some Experiences With High-Tension Transmission Lines. H. C. Reagan. Illustrates and describes experiences which have come under the observation of the writer. 1600 w. St Ry Rev —May 20, 1904.

The Construction and Insulation of High-Tension Transmission Lines. M. H. Gerry, Jr. Discusses the problems connected with this work. The methods are drawn entirely from American practice. Ill. 4500 w. Int Elec Cong of St. Louis—Sept., 1904.

American Practice in High-Tension Line Construction and Operation. Dr. F. A. C. Perrine. A review of what is considered the best practice. 5500 w. Int Elec Cong of St. Louis—Sept., 1904.

High-Tension Lines. H. Parker Gibbs. On the importance of good line construction, and other points essential for successful working. Ills. 2800 w. Elec Rev, N Y—Oct. 22, 1904.

Notes on Aerial Power Lines. Considers the problems underlying the elementary principles of the construction of line wires and their supports. Serial. 1st part. 1500 w. Elec Engr, Lond—Aug. 11, 1905.

Line Construction. B. L. Chase. Abstract of paper before the Ohio Electric Light Assoc., discussing poles, cross arms, insulators, pins, etc., for high-voltage lines. 1200 w. Elec Rev, N Y —Sept. 9, 1905.

Discussion on "Line Construction for High-Pressure Electric Railroads," and "High-Pressure Line Construction for Alternating-Current Railways." Discussion on papers of Mr. Varney and Mr. Damon. Ils. 5600 w. Am Inst of Elec Engrs—May, 1905.

Allg. Elek. Gesellschaft.—Overhead Wiring Distribution System for Pressures below 1,000 Volts (Installationsmaterial für Oberirdische Starkstrom-Vertheilungsnetze mit Spannungen unter 1,000 Volt). H. Bönninghofen. An illustrated description of the practice of the Allgemeine Elektricitäts-Gesellschaft, of Berlin. 2000 w. Elektrotech Zeitschr—Aug. 8, 1901.

Aluminum Conductors. — See **ELECTRIC CONDUCTOR—Aluminum.**

Artistic. — See **ELECTRIC RAILWAY — Overhead Construction.**

Astafieff System.—New System of Wire Fixing and Protecting Apparatus for Overhead Electric Light and Power Wires and Cables. Illustrates and describes the system of M. N. K. Astafieff and the devices he adopts for holding the wires, coupling them together, and giving the necessary fuse protection. 1700 w. Elec Wld & Engr—Aug. 6, 1904.

Atmospheric Losses.—See **DIELECTRIC; ELECTRIC DISCHARGE—Transmission Lines; ELECTRIC TRANSMISSION.**

California.—Some Details of High-Tension Pole Line Construction. C. O. Pole. An illustrated description of the pole line construction adopted by the Standard Electric Co., of California, confined principally to the mechanical construction. 4000 w. Jour of Elec—Aug., 1901.

The Bay Counties Transmission Line. C. E. Dutcher. Illustrated detailed description of a double pole line of best material and workmanship. 2300 w. Jour of Elec—Aug., 1901.

Medium-Span Line Construction. C. A. Copeland. Paper before the Pacific Coast Electric Transmission Association, giving an illustrated description of electric transmission lines in Southern California, with 225-ft. spans and wooden poles, and 800-ft. spans and steel poles. 2200 w. Eng News—Aug. 18, 1904.

See also Carquinez Straits; **ELECTRIC TRANSMISSION.**

Capacity.—See **ELECTRIC CABLE; ELECTROSTATIC CAPACITY.**

Carquinez Straits, Cal.—The Great Carquinez Transmission Span. An illustrated description of this engineering achievement at Carquinez, in California, and its construction. 4000 w. Jour of Elec—May, 1901.

Spanning Carquinez Straits with a High-Potential Transmission Line. R. H. Sterling. An illustrated description of an aerial crossing at the point named and the method of construction. 1400 w. Elec Wld & Engr—June 8, 1901.

A 4,427-foot Span in an Electric Transmission Line. Illustrates and describes an interesting feature of the line of the Bay Counties Power Company, of San Francisco, whereby high tension electrical energy is carried across navigable tide-water, 200 feet above high-water level. 2700 w. Eng Rec—June 22, 1901.

Some Further Details of the Carquinez Span. Illustrates and describes details relating to the mechanical features of the towers. 1200 w. Jour of Elec—Oct., 1901.

See also **ELECTRIC TRANSMISSION—California.**

Conductor.—See **ELECTRIC CONDUCTOR—Transmission Line.**

Cross Prevention.—The Prevention of Crosses Between Signalling and High-Voltage Circuits. Howard S. Knowlton. Considers some of the dangers due to the increasing number of circuits carrying high-potential currents, and the methods of preventing them. 2500 w. Elec Wld & Engr—April 23, 1904.

Dangers.—Report on High Voltage Transmission Lines. Report to the Utica convention of the committee appointed to investigate the dangers incident to high voltage power transmission lines. 1800 w. St Ry Jour—Sept. 24, 1904.

Design.—Calculation of Transmission Lines. Alton D. Adams. Gives principles and formulae applying to the design of transmission lines for either continuous or alternating currents, explaining the calculations. 4500 w. Elec Rev, N Y—Feb. 13, 1904.

Drop.—See **ELECTRIC TRANSMISSION.**

Earth Returns.—Earth Returns for High-Potential Currents. From the "Elektrotechnische Zeitschrift." A report of experimental investigations. 1500 w. Elec Engr, Lond—May 13, 1904.

Economy.—Economy in Electric Mains. Discusses the devices and systems aiming at a reduction of cost, with the view of showing their reliability or unreliability. 1500 w. Elec Engr, Lond—April 1, 1904.

European Practice.—European Practice in the Construction and Operation of High-Pressure Transmission Lines and Insulators. Guido Semenza. Illustrated descriptions of iron poles, insulators, etc. 4500 w. Trans Am Inst of Elec Engrs—Feb. 26, 1904.

Frequencies.—See **ELECTRIC TRANSMISSION.**

Goldfield & Tonopah, Nevada.—See **ELECTRIC TRANSMISSION.**

Guanajuato, Mexico. — See **HYDRO-ELECTRIC PLANT.**

Homestead Steel Works.—See **Long Span.**

Hydrodynamic Analogies.—See **TELEPHONE LINE —Long-Distance Analogies.**

Insulation.—See **DIELECTRIC; ELECTRIC DISCHARGE; ELECTRIC TRANSMISSION; INSULATION; INSULATOR.**

Leakage.—See **Losses; ELECTRIC DISCHARGE; ELECTRIC MEASUREMENT—Fault; Insulation.**

Legal Questions.—Rights of Abutting Owners as

Against Telephone and Telegraph Companies. G. C. Hamilton. From the "Central Law Journal." Discusses some of the questions that have been raised and the opinions rendered. 2500 w. Elec Rev, N. Y.—May 4, 1901.

See also **ELECTRIC INDUSTRY—Legislation.**

Lightning Arrester.—See **LIGHTNING ARRESTER.**

Long Span.—A Long-Span Transmission Line. B. Wiley. Describes a power line from the Carrie furnaces to the Homestead Steel Works, the particular feature being a span of 1000 feet between supports. . Ils. 1300 w. Elec Wld & Engr—April 16, 1904.

Long Spans for Transmission Lines. F. O. Blackwell. Considers the principal causes of interruption in long-distance transmission, and the remedies to be gained by substituting steel tower construction with long spans for a wooden pole line. 2800 w. Trans Am Inst of Elec Engrs—June 21, 1904.

Conductors for Long Spans. Francis O. Blackwell. Gives results of investigations made to determine the characteristics of conductors so as to secure some definite basis upon which to figure long spans. 2800 w. Int Elec Cong of St. Louis—Sept., 1904.

Discussion on "Long Spans for Transmission Lines." Discussion at Chicago of the paper by F. O. Blackwell. 9500 w. Trans Am Inst of Elec Engrs—Oct., 1904.

New 30,000-Volt, Steel Pole, Long Span, Transmission Line. Describes the line from Los Angeles to Inglewood, a distance of fourteen miles. Ills. 1500 w. Jour of Elec—Jan., 1905.

See also Carquines Straits; Sag of Wires; Steel Tower; **ELECTRIC CONDUCTOR.**

Losses.—Line Effects Due to a Moving Load. Carl P. Nachod. An analytical study of the distribution of current potential and energy lost in circuits supplying power from two points to a locomotive traversing the distance between them. Also editorial. 900 w. Elec Wld & Engr—April 29, 1905.

See also Leakage; **DIELECTRIC; ELECTRIC DISCHARGE; ELECTRIC TRANSMISSION.**

Losses, Pole.—Earth Connections for Masts and Poles for High-Tension Transmission (Ueber Erdverbindung für Mastenbeschläge und Hölserne Leitungsmasten bei Elektrischen Hochspannungsleitungen). Norberg Schulz. Data from experience in Norway showing the losses of current through the masts and connections. 1500 w. Elektrotech Zeitschr—May 25, 1905.

Medium Span.—Medium-Span Line Construction. Clem. A. Copeland. Read before the Pacific Coast Elec. Trans. Assn. Discusses line construction, giving experience with various cables, and stating the importance of studying carefully the conditions. Ills. 3500 w. Jour of Elec—July, 1904.

Morgan Falls, Georgia.—See **HYDRO-ELECTRIC PLANT.**

Overhead vs. Underground.—High Tension Cables and Overhead Transmission. Charles C. Gerrard. A brief comparison of overhead and underground transmission with special reference to English conditions. 1500 w. Elec Rev, Lond—Aug. 14, 1903.

Parallel Operation.—Conditions for Continuous Service Over Lines Operated in Parallel. M. H. Gerry, Jr. Advocates the use of multiple lines and proper appliances. 800 w. Trans Am Inst of Elec Engrs—June 21, 1904.

Mechanical Specifications of a Proposed Standard Insulator Pin. Ralph D. Mershon. Introduction to a discussion of a proposed standard pin covering wooden pins and, so far as it may, metal ones. 1200 w. Trans Am Inst of Elec Engrs—March 27, 1903.

Burning of Wooden Pins on High Tension Transmission Lines. C. C. Chesney. Discusses the preparation of the pins, pin troubles and their causes. Ill. 1000 w. Trans Am Inst of Elec Engrs—March 27, 1903.

Polarity Reversal.—See **ELECTRIC GENERATOR.**

Pole.—See Losses; Steel Tower; **POLE.**

Pole Preservation.—See **TIMBER PRESERVATION—Electric Poles.**

Polyphase.—See **ELECTRIC CONDUCTOR—Copper Calculation.**

Portland and Great Falls, Me.—See **HYDRO-ELECTRIC PLANT—Great Falls, Me.**

Potential Rise.—See **ELECTRIC TRANSMISSION—Static Effects.**

Properties and Computations.—Computations of the Influence of Capacity, Induction and Resistance upon Aerial or Subterranean Conductors (Berechnung der Einflüsse von Kapazität, Induktion, und Resistanz auf Ober-oder Unterirdischen Leitungen). E. W. Ehnert. Containing an extensive series of examples relating to various problems with single-phase and polyphase currents. Three articles, 6000 w. Zeitsch f Elektrotechnik—Sept 4, 11, 18, 1904.

Protection.—See **ELECTRIC PROTECTIVE APPARATUS—Transmission Systems; ELECTRIC RAILWAY—Overhead Construction; TELEPHONE LINE.**

Protective Appliances.—See **ELECTRIC PROTECTIVE APPARATUS—Transmission Systems; ELECTRIC TRANSMISSION; LIGHTNING PROTECTION.**

Regulation.—See **ELECTRIC TRANSMISSION.**

Safety Devices.—See **ELECTRIC PROTECTIVE APPARATUS — Transmission Systems; LIGHTNING PROTECTION.**

Sag of Wires.—The Arrangement of Overhead Conductors (l'Establissement des Canalisations Aériennes). M. Loppé. A discussion upon the stresses and deflections for long spans. 7000 w. Bull Soc Int des Elec—Aug., Sept., Oct., 1901.

The Proper Amount of Sag for Bare Wires of Soft Copper (Welcher Durchhang Soll Blanken Freileitungen aus Weichkupfer Gegeben Werden). K. Krohne. A discussion of the tension and sag in freely-suspended overhead wires, with diagrams, curves and tables. 1000 w. Elektrotech Zeitschr—July 3, 1902.

The Computation of Sag of Wires (Berechnung des Drahtdurchhanges). K. Otto. Deducing formulas for the sag of overhead wires for various conditions of tension, temperature, and wind. 2000 w. Elektrotech Zeitschr—Jan. 15, 1903.

A Determination of the Sag and the Tension in Wires (Zur Bestimmung des Durchhanges und der Spannung in Drähten). H. von Glinski. An approximate analytical and a more exact graphical method for determining the sag and tension in line wires, with diagrams. 1200 w. Elektrotech Zeitschr—April 2, 1903.

Computation of Sag and Stress in Freely Suspended Wires (Berechnung des Durchhanges und der Spannung in Frei Gespannten Drähten). A. Sengel. Developing equations for the determination of the catenary for overhead wires. 2500 w. Elektrotech Zeitschr—Sept. 24, 1903.

The Calculations of Sag and Stresses in a Freely Stretched Wire (Beitrag zur Berechnung des Durchhangs und der Spannung von Frei Gespannten Drähten). A. Löwit. Giving formulas and diagrams for the stresses in an overhead wire for various spans and sags. 800 w. Zeit f Elektrotechnik—Dec. 18, 1904.

A Dynamometer for the Measurement of Stresses in Overhead Wires (Ein Dynamometer zur Messung der Drahtspannung in Freileitungen). George Nicolaus. The stress is measured by determining the force required to produce a certain lateral deflection. 1000 w. Elektrotech Zeitschr—Feb. 2, 1905.

Temperature Effects in Spans. C. P. Nachod. Showing the relation between the sag and tension in a span where there is a temperature variation. 700 w. Elec Wld & Engr—Dec. 7, 1905.

St. Maurice-Lausanne. — See **HYDRO-ELECTRIC PLANT—St. Maurice.**

Steel Pole.—See Long Span; **POLE.**

Steel Towers.—The Use of Steel Towers and Wooden Poles. Alton D. Adams. Notes the growing use of steel towers to support long distance transmission lines, giving examples of both kinds of line construction, and their approximate cost, and the advantages claimed for steel towers. Ills. 3300 w. Elec Rev, N Y—Aug. 19, 1905.

See also Long Span; **ELECTRIC TRANSMISSION — Niagara-Toronto; HYDRO-ELECTRIC PLANT—Guanajuato.**

Surging.—See **ELECTRIC TRANSMISSION; OSCILLOGRAPH.**

Temperature Effect.—See **Sag of Wire.**

Tension.—See Sag of Wires.

Trolley.—See ELECTRIC RAILWAY—Overhead Construction.

Trouble.—The Location of Trouble. George T. Hanchett. The article is confined to a discussion of the location of trouble in lines. 2300 w. Cent Sta—Feb., 1904.

See also Losses; ELECTRIC MEASUREMENT.

Underground vs. Overhead.—See Overhead vs. Underground.

Wire Materials.—Electric Transmission Lines. Alton D. Adams. A discussion and comparison of line wire materials. 3500 w. Cassier's Mag—March, 1903.

Wire Sag.—See Sag of Wires.

Wire Spacing.—The Spacing of the Wires on High-Pressure Power Lines. W. B. Esson. Discusses this subject briefly and proposes that a uniform standard spacing be adopted of 1 ft. for every 10,000 volts pressure with a minimum spacing of 2 ft. 900 w. Elec Rev, Lond—Sept. 1, 1905.

Wire Stresses.—See Sag of Wires.

ELECTRIC LOCOMOTIVE.

See also CANAL HAULAGE; ELECTRIC EQUIPMENT—Coal Mine; Mine; ELECTRIC RAILWAY; MINE HAULAGE; MOUNTAIN RAILWAY.

Electric Locomotives. H. K. Myers. Principles which determine the size and power of locomotives necessary for various loads and grades. 2300 w. Mines & Min—Dec., 1900.

Allg. Elek. Ges.—Standard Gauge Electric Locomotive (Elektrische Vollbahn Locomotive). Illustrated account of the powerful electric locomotives for standard gauge service built by the Allgemeine Elektricitäts Gesellschaft, of Berlin. 3000 w. Mitt d Ver f d Förd d Local u Strassenbahnwesens—Oct., 1900.

Electric Locomotives (Elektrische Lokomotiven). Illustrated descriptions of a variety of electric locomotives built by the Allgemeine Elektricitäts Gesellschaft. 1200 w. Ill Zeitschr f Klein und Strassenbahnen—March 16, 1902.

Baltimore & Ohio.—Control System, Motors and Shoes of the Baltimore & Ohio Locomotives. Particulars and illustrations of these electric locomotives. 1100 w. St Ry Jour—June 25, 1904.

B. & O. Belt Line.—See THIRD RAIL—Pick-Up Device.

Baltimore Tunnel.—Electric Locomotives for the Baltimore Tunnel. Illustrated description of a distinct advance in electric locomotive design. 900 w. Ry Age—Aug. 21, 1903.

Brooklyn Rapid Transit.—A New Shifting Locomotive for the Brooklyn Rapid Transit Company. Illustrates and describes an interesting electric locomotive especially designed for the shifting of cars. 1500 w. St Ry Jour—Feb. 25, 1905.

Canal Haulage.—See CANAL HAULAGE—Electric.

Coal Mine.—See Mine; ELECTRIC EQUIPMENT; MINE HAULAGE.

Control.—Speed Control of Electric Mine Locomotives. R. B. Williamson. An illustrated explanation of the construction of controllers and the reasons therefor. 3000 w. Mines & Min—May, 1902.

Control of Electric Locomotives. William Cooper. Considers methods of controlling the pull on the coupling. 2000 w. Elec Rev ,N Y—April 8, 1905.

See also CONTROLLER.

Freight.—Electric Locomotive for Freight and Industrial Service. Remarks on the class of work for which these locomotives are adapted. with illustrated descriptions of recent installations. 1400 w. St Ry Jour—Sept. 13, 1902.

How Can We Haul by Electric Locomotives Freight Trains Weighing Twice as Much as Those Now Hauled by Steam Locomotives? H. Ward Leonard. Gives statistics showing the average train loads and cost of hauling, and predicts that economics will be effected by the use of electric locomotives. 600 w. Elec Wld & Engr—Feb. 27, 1904.

French Ry.—Electric Locomotives on French Railways. From "La Nature." Illustrates and describes the types adopted by the Orleans line, and the line of the West, and discusses their advantages under certain conditions. 1700 w. Sci Am Sup—Aug. 15, 1903.

See also Paris-Orleans; ELECTRIC RAILWAY.

French Western Railway.—The Electric Locomotives on the Western Railway of France. Views and particulars of machines possessing very novel features, in use on the Versailles division. 1100 w. St Ry Jour—Feb. 28, 1903.

Ganz System.—See Valtellina Ry.

Gasoline Combined.—See GASOLINE LOCOMOTIVE ..—Electric Combined.

Gathering.—See Mine.

Hallberg. — See ELECTRIC RY —.Alternating Current.

High Speed.—See Reichel; Zossen.

Italian Central Ry.—See Storage Battery.

Jungfrau.—Electric Locomotive No. 4 for the Jungfrau Railway (Die Elektrische Ausrüstung der Jungfraubahn Lokomotive No. 4). Giving photographs of the motors and machinery; also diagrams of the wiring and charts of the performance. 3000 w.. Schweizerische Bauzeitung—Feb. 2, 1901.

The New Jungfrau Locomotives. C. L. Durand. Illustrated description of the three-phase electric locomotives now used on this road, which are working successfully. 2000 w. Elec Rev, N Y—Dec. 31, 1904.

The New Jüngfrau Locomotive. Emile Guarini. Illustrates an old and a new Jungfrau locomotive, describing the latter in detail. 1400 w. Sci Am Sup—June 10, 1905.

See also MOUNTAIN RAILWAY.

London Metropolitan. — Metropolitan Railway Electric Locomotives. Brief illustrated description of the 150-ton electrical locomotives being supplied. 600 w. Engr, Lond—Sept. 22, 1905.

London Tube.—Electrical Locomotives. Brief illustrated description of the locomotives on the City and South London Railway. 1400 w. Elec Rev, Lond—May 3, 1901.

See also Storage Battery.

See also ELECTRIC RAILWAY.

London Underground.—See London Metropolitan; London Tube; Storage Battery.

Mine.—Electric Locomotives for Mine Haulage. An illustrated detailed description of an electrical locomotive for haulage purposes, with comparison of cost with mule haulage as shown by American practice. 2000 w. Ir & Coal Trds Rev—Dec. 21, 1900.

Electric Mine Locomotives. W. B. Clarke. Things to be observed in the choosing, operating and caring for mine locomotives to ensure the greatest economy. Ill. 3600 w. Mines & Min—April, 1901.

The Progress of Locomotive Haulage in Mines (Die Fortschritte der Lokomotivförderung). Hr. Baum. A comprehensive illustrated review of locomotives for mine haulage, principally electric and benzine. Serial. 3 parts. 7 plates. 17000 w. Glückauf—Jan. 25, Feb. 8, 15, 1902.

Electric Traction on Roads and Mineral Railways. W. R. Cooper. Discusses whether the cost will make it advantageous to use electric locomotives as a means of transporting from mines to railroads. 1800 w. Ir & Coal Trds Rev—June 6, 1902.

Electric Mining Locomotives and Auxiliary Machinery. Frank C. Perkins. States the special advantages of their use for haulage and gives information of types used in various mines. Serial. 1st part. 1000 w. Min Rept—July 16, 1903.

Electric Mine Locomotives for Narrow Gauge (Elektrische Grubenlokomotiven für Schmalspur). Ernst Egger. Illustrated description of 3 ton electric locomotive for 488 millimetre gauge for the coal mines at Fünfkirchen, Hungary. 2000 w. Elektrotech Zeitschr—Oct. 1, 1903.

Electric Mine Locomotives. William L. Affelder. Read before the W. Penn. Cent. Min. Inst. An illustrated article considering traction, third-rail, and sprocket locomotives, their development, and the conditions to which they are adapted. 3000 w. Mines & Min—March, 1904.

Electric Gathering Locomotive. An adaptation of the ordinary trolley locomotive so that it may enter rooms in which wires have not been installed, is illustrated and described. 1500 w. Mines & Min—Sept., 1904.

See also Speed Control; COMPRESSED AIR LOCOMOTIVE; ELECTRIC EQUIPMENT; MINE HAULAGE—Electric.

Newcastle, Eng.—Electric Goods Locomotive. Illustrated description of a locomotive for service on the electrified branch of the North-Eastern Railway Company's system at Newcastle. 800 w. Engng—Oct. 14, 1904.

N. Y. Central.—Electric Locomotives for the New York Central & Hudson River R. R. Illustrations and descriptions of these machines which differ radically in their electrical features from any hitherto constructed. 1500 w. Eng News—June 2, 1904.

Electric Railway Locomotives for the New York Central. Illustration and principal dimensions of these locomotives, with description and general remarks. 1400 w. Sci Am—Nov. 12, 1904.

Construction and Characteristics of Electric Locomotives for the New York Central & Hudson River R. R. Illustrated detailed description, calling attention to the new features. 3000 w. Eng News—Nov. 17, 1904.

The First Electric Locomotive for the New York Central. Illustrated description of the powerful high-speed electric locomotive officially tried at Schenectady on Nov. 12. 2500 w. Ir Age—Nov. 17, 1904.

See also LOCOMOTIVE TEST—Electric vs. Steam.

North-Eastern, Eng.—North-Eastern Railway Electric Locomotive. Illustrated detailed description. 1500 w. Tram & Ry Wld—Nov. 10, 1904.

Oerlikon.—Oerlikon Electric Locomotives. C. O. Mailloux. Illustrated description of two types of single-phase a. c. electric locomotives, with information concerning them. 2400 w. St Ry Jour —April 8, 1905.

Electric Locomotive with Overhead Trolley (Locomotive Electrique et Prise de Courant pour Ligne Aérienne). Illustrating a locomotive with improved sliding-contact trolley, built by the Oerlikon Works. 1000 w. Génie Civil—March 12, 1904.

Orleans Ry, Paris.—See Paris-Orleans.

Palermo-Monreale.—See MOUNTAIN RAILWAY.

Paris Exposition.—Electric Locomotives and Motor Cars at the Exposition of 1900 (Les Locomotives et les Automotrices Electriques à l'Exposition de 1900). R. Godfernaux. Describing and illustrating some recent applications of electric traction to main-line service. 5000 w. Rev Gen des Chem de Fer—Nov., 1901.

Paris-Orleans.—The Electric Locomotives of the Orleans Railway (Locomotives Electriques de la Compagnie des Chemins de Fer d'Orleans). An illustrated description of the locomotives for hauling the trains on the new extension of the Orleans railway in Paris. 1800 w. Revue Technique—July 10, 1901.

The Electric Locomotives of the Orleans Railway (Die Elektrischen Lokomotiven der Orléans-Bahn). H. Pforr. Full detailed description of the heavy electric locomotives, hauling trains from the Austerlitz to the Quai d'Orsay stations in Paris. 2500 w. 2 plates. Glasers Annalen—Nov. 15, 1901.

The New Locomotives and Motor Cars for the Paris-Orleans Railway Co. M. Vingoe. Description, with illustration of track. 900 w. Elect'n, Lond—Aug. 12, 1904.

See also ELECTRIC RAILWAY.

Polyphase.—See Siemens-Halske; Valtellina Railway.

Rack and Adhesion.—Combined Rack and Adhesion Locomotive (Locomotive à Crémaillère et à Adhérence). F. Barbier. Description of narrow gauge electric locomotive used on the road between Lyons and the plateau of Saint-Just. There are two sets of motors for the rack and adhesion respectively. 1800 w. Génie Civil—Aug. 31, 1901.

Electric Locomotives for Both Rack and Adhesion Traction (Elektrische Lokomotiven für Zahnrad und Adhäsionsbetrieb). M. Gase. A well illustrated description of electric locomotives to be used in and about a large sugar refinery, which are to operate on a rack railway, as well as by ordinary adhesion. 4000 w. Zeitschr d Ver Deutscher Ing—April 26, 1902.

See also MOUNTAIN RAILWAY.

Reichel.—A 10,000-Volt High-Speed Electric Locomotive. An illustrated detailed description of the improved design worked out by Herr Reichel. 4000 w. Feilden's Mag—Feb., 1903.

St. Georges de Commiers.—See ELECTRIC RAILWAY.

Self-Transforming.—See ELECTRIC RAILWAY—Single Phase.

Siemens-Halske.—Three-Phase 10,000-Volt Railway at Gross-Lichterfelde. Frank C. Perkins. Illustration, with description of a Siemens & Halske three-phase current locomotive, and brief account of the experimental line on which it is used. 3000 w. Sci Am—March 22, 1902.

A 10,000-Volt Locomotive. Illustrated detailed description of a locomotive built by Siemens and Halske for the high-speed, high-pressure electric railway experiments near Berlin. 2000 w. Elect'n, Lond—Oct. 17, 1902.

See also Zossen.

Single Phase.—The Ward Leonard Single-Phase Locomotive. G. T. Hanchett. An illustrated description of this system, with a statement of the advantages and disadvantages over the ordinary heavy system of multiple unit direct-current traction. 2500 w. Elec Wld & Engr—March 5, 1904.

The Single-Phase Electric Locomotive for Heavy Passenger and Freight Service. C. Renshaw. On the development of the single-phase alternating current-motor and its practical application for the electrical operation of trunk line service. Interesting discussion. Ills. 7000 w. Pro Ry Club of Pittsburg—Dec. 22, 1905.

Westinghouse Single-Phase Electric Locomotive. Illustration and description of an electric locomotive weighing 135 tons for heavy electric traction. 800 w. R R Gaz—Vol. XXXVIII., No. 22.

See also ELECTRIC RAILWAY.

Sliding Contact Trolley.—See Oerlikon; ELECTRIC RAILWAY—Huber Current Collector; TROLLEY.

Steam Compared.—See ELECTRIC RAILWAY.

Storage Battery.—Accumulator-Driven Locomotives for Workshops (Ueber Fabrik Locomotiven mit Accumulatorenbetrieb). Max Büttner. Illustrating and describing a number of electric locomotives used in manufacturing establishments in Germany, and showing the advantages of accumulators for such service. 2500 w. Stahl und Eisen —Nov. 1, 1900.

Electric Locomotives for Shops. Illustrates and describes a storage battery electric locomotive, well adapted to the work for which it was designed. 900 w. R R Gaz—Dec. 20, 1901.

Switching Locomotive with Electric Accumulators (Elektrische Rangier-Lokomotiven mit Akkumulatoren). An illustrated description of a 40-H. P. electric locomotive carrying a storage battery of 120 cells. 1000 w. Ill. Zeitschr f Klein u Strassenbahnen—Feb. 16, 1902.

Electric Locomotives. Waldon Fawcett. Information concerning these engines of the storage battery type, stating their economic advantages. Ill. 1200 w. Loc Engng—Aug., 1902.

Accumulator Locomotives on Two Lines of the Italian Central Railway in Emilia, Italy. Enrico Bignami. An illustrated account of tests with accumulator traction on the Bologna-San Felice line and the Bologna-Modena. 3000 w. Elec Rev, N Y—Feb. 28, 1903.

A Twenty-Ton Storage Battery Switching Engine. Describes a locomotive for shifting cars while loading or unloading, and for transferring material from one shop to another. 1200 w. Eng Rec—May 16, 1903.

Storage Battery Industrial Locomotives. F. L. Sessions. An illustrated article considering the equipment of a storage battery locomotive. 3700 w. Trans Am Inst of Elec Engrs—July, 1903.

Storage Battery Locomotives for Shop Transportation. J. A. McIntyre. Illustrated descriptions of exhibits at the Louisiana Purchase Exposition. 700 w. Sci Am Sup—July 16, 1904.

A Storage-Battery Locomotive. Illustrated description of a novel type of electric locomotive designed for service on the new deep level tube for London that is in course of construction. 700 w. Sci Am—Nov. 25, 1905.

See also **AUTOMOBILE, ELECTRIC; ELECTRIC RAILWAY—Paris-Arpajon; ELECTRIC RAILWAY ACCUMULATOR; MINE HAULAGE; STORAGE BATTERY.**

Suburban Service.—Rapid Transit and the Electric Locomotive. Howard S. Knowlton. Discusses the application of electric locomotives for suburban service, and the future outlook, the advantages and disadvantages, and the effect on the engineers running high-speed trains. 2500 w. Am Elect'n—Dec., 1904.

10,000 Volt.—See Reichel; Siemens-Halske.

Valtellina.—New Locomotives on the Valtellina Railway. Gives illustrations and interesting particulars of these locomotives, taken from an article by Béla Valatin, in "Elektrische Bahnen u Betriebe." Serial. 1st part. 2000 w. Elec Engr, Lond—Feb. 3, 1905.

The New Electric Locomotives of the Valtellina Railway (Les Nouvelles Locomotives electriques de la Valteline). Frederic Koromsay. With full details of the mechanical and electrical construction of the new three-phase locomotives of 62 tons weight. 5000 w. 4 plates. Rev Gen d Chem de Fer—March, 1905.

The New Electric Locomotives of the Valtellina Railway (Die Neuen Elektrischen Lokomotiven der Valtellina-Bahn). Eugen Cserhati. Full detailed description of the improved three-phase electric locomotives built by Ganz for the Valtellina line in Northern Italy. Serial. Part I. 2500 w. 1 plate. Zeitschr d Ver Deutschr Ing—March 4, 1905.

The New Electric Locomotives for the Valtellina Railway (Neue Elektrische Lokomotiven Type R. A. 1903, für die Valtellinabahn). E. Cserhati. A fully illustrated description of the new three-phase locomotives for the Lecco-Colico-Sondrio line in Northern Italy. Two articles. 5000 w. Zeitschr f Elektrotechnik—April 9, 16, 1905.

The New Electric Locomotives for the Valtellina Railway (Les Nouvelles Locomotives Electriques des Chemins de Fer de la Valteline). Illustrated description of the 62-ton, three-phase locomotives recently put into service on the Valtellina railway in Northern Italy. 2500 w. 1 plate. Génie Civil—April 22, 1905.

An Electric Locomotive with Coupling-Rod Drive. Illustrated description of new electric locomotives for the Valtellina line in which the motors are mounted on independent shafts carrying a crank at each end, and actuate the driving wheels by means of coupling rods. 1500 w. Eng News—May 1, 1905.

New Electric Locomotives on Italian Railways. Frank C. Perkins. Illustrated detailed description of high power alternating current electric locomotives recently placed in operation on the Valtellina three-phase electric railway. 3000 w. Ry & Engng Rev—May 20, 1905.

The New Electric Locomotive for the Valtellina Road. Illustrated detailed description of this new locomotive. The design of the motor and the method of control are of special interest. Also editorial. 4000 w. Elec Rev, N Y—June 24, 1905.

New Electric Locomotives for the Valtellina Railway. Bela Valatin. An illustrated account of the latest methods employed on this important three-phase line, and the new equipment. 6500 w. St Ry Jour—Aug. 5, 1905.

Electric Locomotive (Ganz System) for the Valtellina Line, Italy. Illustrated detailed description of the new locomotives and information of tests. 2500 w. Ry Age—Dec. 29, 1905.

See also **ELECTRIC RAILWAY—Valtellina.**

Ward Leonard.—See Single-Phase; ELECTRIC RAILWAY.

Weight Distribution.—Weight Distribution on Electric Locomotives as Affected by Motor Suspension and Draw-Bar Pull. S. T. Dodd. The discussion is limited particularly to locomotives drawing trailing loads. Ills. 3500 w. Am Inst of Elec Engrs—June, 1905.

Westinghouse Single-Phase.—See Single-Phase.

Wrecking.—Electric Breakdown Locomotive. Gives an illustration of an electric locomotive designed for breakdown and wrecking purposes on the Waterloo and City Railway, London, with description, and notes on the working of this railway. 800 w. Engr, Lond—Jan. 17, 1902.

Yard and Shop.—Electric Locomotives for Yard and Shop Work. Classifies industrial electric locomotives, and considers some of their important uses. Ill. 1000 w. Sci Am—March 7, 1903.

Zossen.—High-Speed Locomotive (Schnellbahn-Lokomotive). W. Reichel. Describing the Siemens & Halske locomotive operating at 10,000 volts pressure on the Berlin-Zossen high speed military railway. 6000 w. Elektrotech Zeitschr—Aug. 7, 1902.

The Express Train of the Future. Describes certain features of the new locomotives which are to be tested on the Berlin-Zossen line next year. 900 w. U S Cons Repts, No. 1415—Aug. 11, 1902.

A High-Speed Locomotive. Enrico Bignami. Illustrated description of the high-speed locomotive equipped for motors built for 10,000 volts, used in the tests at high-speed on the Marienfelde-Zossen military line. 3300 w. Elec Rev, N Y—Nov. 8, 1902.

The Siemens & Halske High-Speed Electric Locomotive (Schnellbahn-Lokomotive von Siemens & Halske A. G.). A detailed description of the electric locomotive built by Siemens & Halske for the high-speed trials on the Marienfelde-Zossen line. 2500 w. 1 plate. Zeitschr d Ver Deutschr Ing—Nov. 15, 1902.

Electric Traction. Illustrated brief description of the 10,000-volt alternating-current locomotive for the Berlin-Zossen experiments. 1000 w. Sci Am—Dec. 13, 1902.

See also **Siemens-Halske; ELECTRIC RAILWAY.**

ELECTRIC LOG.

See **LOG; SPEED INDICATOR.**

ELECTRIC MACHINERY.

See also **ELECTRIC APPARATUS; ELECTRIC EQUIPMENT; ELECTRIC GENERATING SET; ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MOTOR; ELECTRIC POWER STATION; ELECTRIC STATION; HYDRO-ELECTRIC PLANT; ROTARY CONVERTER.**

Apparatus for Power Distribution from Central Stations. Charles F. Scott. Considers the various types of electrical machinery, particularly generators, rotary converters and motors, showing some recent types of construction, and the characteristics of their performance. Ill. 8500 w. Jour Fr Inst—April, 1901.

Electric Light and Power Engineering. This first paper is a description of the construction and action of dynamos. Serial. 1st part. 3700 w. Mech Engr—Oct. 10, 1903.

Accidents.—Accidents from Electrical Machinery. Abstract from a report of the British Electrical Inspector of Factories, G. Scott Ram, on electric shock and mechanical accidents. 2400 w. Mech Engr—Aug. 13, 1904.

Agricultural.—See AGRICULTURAL MACHINERY—Electric.

Alternating Current.—The Management of Alternating Current Machinery. George T. Hanchett. Suggestions for successful operation. Ill. 2000 w. Cent Sta—Aug., 1903.

Booster.—See BOOSTER.

Breakdowns.—Breakdowns of Electrical Machinery. Michael Longridge. Abstract from the annual report giving particulars of the nature of breakdowns. Gives list of selected cases. 5700 w. Mech Engr—Sept. 19, 1903.

See also **MOTOR—Longridge Report.**

Characteristic Diagrams.—See ELECTRIC GENERATOR, ALTERNATING—Diagrams.

Compound.—See also ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING.

Compounding.—A Method of Compounding Alternating Current Generators and Motors. Direct Current Generators, Synchronous Motor Generators and Synchronous Converters. Frank George Baum. Gives methods which, if intelligently applied, will give a system with very satisfactory regulation. 2800 w. Trans Am Inst of Elec Engrs—June 18, 1902.

Design.—Points on Determining Good Designs in Dynamos and Motors. W. L. Woodmansee. How to discriminate between good and bad designs. 1200 w. Engr, U S A—Nov. 1, 1900.

Designs for High-Speed and Slow-Speed Electrical Machines (Ueber den Entwurf Sehr Rasch- und Sehr Langsamlaufender Maschinen). F. Niethammer. A discussion of the principles of proportion and winding for dynamos and motors for various extreme speeds. 10000 w. Elektrotech Zeitschr—May 15, 1902.

Electrical Design. Reviews papers by Mr. Esson and Mr. E. K. Scott, dealing with the design of electrical machinery. 1000 w. Elec Rev, Lond—Jan. 23, 1903.

The Modern Construction of Electric Machinery (Moderne Konstruktionen in Elektro-Maschinenbau). A. Tischbein. With especial reference to correct proportions, including the use of ball bearings. Serial. Part I. 8000 w. Glasers Annalen—Sept. 15, 1903.

Formulas for the Design of Electrical Machinery (Formen zum Entwerfen Elektrischer Maschinen). A. Sengel. Deriving a number of convenient working formulas for use in designing dynamos, motors and transformers. 3000 w. Elektrotech Zeitschr—Oct. 29, 1903.

The Design of Direct-Current Machinery. Val. A. Fynn. Confined particularly to the smaller machines, discussing points in design, etc. Ill. Serial. 1st part. 1800 w. Elec Rev, Lond—Nov. 20, 1903.

Notes on the Design of Electrical Machinery. Louis Hunt. The first part of the paper deals with continuous-current machines, and the second part with alternating-current motors and generators. Serial. 1st part. 2200 w. Mech Engr—April 23, 1904.

Limitations in Direct-Current Machine Design. Sebastian Senstius. Presents a system of design based directly upon general experimental data and the commercial guarantees of the machine. Deals also with the limitations imposed by the quality of brushes obtainable. 4000 w. Am Inst of Elec Engrs—June, 1905.

See also **ELECTRIC GENERATOR DESIGN; ELECTRIC MOTOR.**

Düsseldorf Exposition.—Heavy Electrical Machinery at the Düsseldorf Exposition (Die Starkstromtechnik auf der Ausstellung in Düsseldorf 1902). A. Seyfferth. A general description of the powerful generators and electrical machinery at Düsseldorf. Serial. Part I. 4000 w. Elektrotech Zeitschr—Aug. 14, 1902.

Earthing.—See **Grounding.**

Erection.—Installing Electric Machinery. Norman G. Meade. Gives a few practical hints for erecting such apparatus, with illustrations. Power—May, 1905.

Field Coil Winding.—Winding Field Coils from Flat Copper Strips. Illustrates and describes a machine which winds copper ribbons edgewise into coils for the fields of electrical machines. 3000 w. Ir Age—Jan. 2, 1902.

Frames.—See **IRON—Dynamo Frames.**

Frictional Losses.—The Separation of the Frictional Losses in Electric Machines (Die Trennung der Reibungsverluste bei Elektrischen Maschinen). Dr. Leo Finzi. A description of methods for determining the air friction and the bearings friction of dynamos and motors. Diagrams. 800 w. Elektrotech Zeitschr—July 9, 1903.

Glasgow Exposition.—Electric Machinery at the Glasgow Exhibiton. Illustrates and describes interesting exhibits. Serial. 1st part. 1400 w. Engr, Lond—July 12, 1901.

See also **ELECTRIC EXHIBITION; GLASGOW EXHIBITION.**

Grounding.—Notes on the Earthing of Dynamo-Electric Machinery. Arthur Bloemendal. Brief consideration of the question not only for low-pressure, but also for high-pressure installations. 1200 w. Elec Rev, Lond—March 27, 1903.

See also **ELECTRIC DISTRIBUTION.**

Heating.—The Computation of Resistances, Motors and Other Details of Electric Driving (Die Berechnung von Widerständen, Motoren und Dergleichen für Aussetzende Betriebe). E. Oelschläger. Giving graphical and analytical methods of computing the various parts of a power system for given conditions and particularly the heating effects with intermittent operation. 5000 w. Elektrotech Zeitschr—Dec. 20, 1900.

Heating of Electrical Machinery Under Two Regularly Alternating Conditions of Load. Edwin Rust Douglas. The aim of the article is to show that, from a knowledge of certain constants of a machine, its performance under any unusual conditions of load may be predicted with accuracy, and to explain the determination of those constants. 2500 w. Elec Wld & Engr—May 11, 1901.

See also **ELECTRIC APPARATUS—Standardization; ELECTRIC INDUSTRY—Regulations; ELECTRIC TESTING—Standards.**

History.—The Development of Electric Machines (Die Entwickelung der Elektrischen Maschinen). F. Tischendörfer. Paper before the Elektrotechnische Verein, giving a general historical review of the evolution of dynamos and electric motors and their design. Illus. 8000 w. Elektrotech Zeitschr—Aug. 24, 1905.

Humming.—The Humming of Electrical Machines. J. Fischer Hinnen, in the "Zeitschrift für Elektrotechnik." Describes how absolutely silent running may be secured. 1400 w. Elec Engr, Lond—Sept. 9, 1904.

Insulation.—See **INSULATION.**

Iron Loss.—Notes on Iron Loss. F. Lydall. An account of experiments undertaken to ascertain how far the Steinmetz law held good with high densities. Serial. 1st part. 1600 w. Elec Rev, Lond—June 23, 1905.

See also **ELECTRIC GENERATOR TEST; ELECTRIC TESTING; TRANSFORMER.**

Labor Saving.—See **ELECTRIC STATION—Labor Saving Machinery.**

Losses, Separation.—The Separation of Iron and Friction Losses in Direct Current Machinery. F. Handley Page. Principally describes a modification of the Kapp method showing results obtained. 900 w. Elec Rev, Lond—Dec. 1, 1905.

Mining Plants.—Dynamos and Motors, Showing the Various Windings and Wire Connections. William H. Kritzer. Illustrated article describing the most important systems suitable for mining plants. Serial. 1st part. 1400 w. Min & Sci Pr—Nov. 7, 1903.

Olympia Exhibition.—Direct-Current Machinery at Olympia. P. K. Friedlander. Remarks on the machines shown at the electrical exhibition. Ills. 1800 w. Elec Engr, Lond—Sept. 29, 1905.

See also **ELECTRIC EXHIBITION; ELECTRIC LIGHTING.**

Operation.—Electrical Pointers. W. H. Wakeman. Points concerning the operation of generators and motors, wtih diagrams. 2000 w. Power—Dec., 1904.

Polyphase.—Polyphase Sub-Station Machinery. A. C. Eborall. Read before the Inst. of Elec. Engs., London. Discusses the equipment and operation of polyphase substations, with features of working and a comparison of different types of machinery, etc. 2 parts. 16500 w. Engng—March 22 and 29, 1901.

Polyphase Electric Working. A. C. Eborall. Howard Lecture. Deals with the machinery employed in polyphase working, discussing the leading features. The present lecture considers the design and construction of three-phase generators. Ill. Serial. 1st part. 3600 w. Jour Soc of Arts—Sept. 13, 1901.

Some Notes on Polyphase Machinery. A. C. Eborall. Read before the Manchester Sec. of the Inst. of Elec. Engrs. Considers the construction and operation of standard types, discussing the latest development. Ill. Serial. 1st part. 3000 w. Elec Rev, Lond—April 18, 1902.

Some Notes on Polyphase Machinery. A. C. Eborall. Read before the Manchester Sec. of the Inst. of Elec. Engrs. Discusses the construction and operation of standard types, giving full constructional details of modern plant of standard design. Ill. Serial. 1st part. 8500 w. Engng—June 6, 1902.

Rating.—See **ELECTRIC APPARATUS—Standardization.**

Repairs.—Emergency Repairs of Electrical Machinery on Board Ship. William Baxter, Jr. Considers expedients that may be resorted to temporarily until port is reached. Serial. 1st part. 2100 w. Marine Engng—Jan., 1901.

St. Louis Fair.—See **ELECTRIC EXHIBITION; ELECTRIC STATION.**

Standardization.—See ELECTRIC APPARATUS; ELECTRIC ENGINEER—German Society; ELECTRIC GENERATING SET; ELECTRIC INDUSTRY—Regulations; ELECTRIC RAILWAY; ELECTRIC TESTING; STEAM ENGINE TEST.

Synchronous Commutating.—Synchronous Commutating Machines. A. S. M'Allister. Discusses rotary converters and double-current generators, making comparison with the capacities of alternating-current generators of different number of phases. 2200 w. Am Elect'n—Oct., 1902.

Temperature Curve.—See ELECTRIC APPARATUS—Standardization.

Testing.—See ELECTRIC CURRENT, ALTERNATING; ELECTRIC GENERATOR TEST; ELECTRIC TESTING.

Troubles.—Dynamo and Motor Troubles and Their Remedies. W. L. Woodmansee. A statement of cases from the experience of the writer. 1500 w. Engr, U S A—May 15, 1901.

Diseases of Electrical Machinery. F. B. Crocker and S. S. Wheeler. A statement of troubles with their symptoms and remedies, prepared to facilitate their detection and elimination. Ills. 4800 w. Am Elect'n—March, 1905.

See also ELECTRIC GENERATOR; ELECTRIC MOTOR; ELECTRIC TESTING.

ELECTRIC MANUFACTURING.

See also ELECTRIC ENGINEERING; ELECTRIC INDUSTRY; ELECTRIC WORKS.

Machine Tools and Outfits.—See MACHINE TOOL—Electrical Manufacturing.

ELECTRIC MEASUREMENT.

See also ELECTRIC INSTRUMENT; ELECTRIC METER; ELECTRIC RESISTANCE; ELECTRIC TESTING; ELECTRO-PHYSICS.

Alternating Currents.—The Influence of the Form of the Current Curve on Measuring Instruments (Der Einfluss der Kurvenform auf Messinstrumente). Dr. Gustav Benischke. A brief account, with diagrams, showing that electromagnetic instruments are affected by the curve form, while induction instruments are affected by the speed. 200 w. Elektrotech Zeitschr—April 4, 1901.

On Test-Room Methods of Alternate-Current Measurement. Albert Campbell. Abstract of a paper read before the Inst. of Elec. Engrs., England. Describes a number of methods of measurement, some of which are capable of fairly general application, while others are only of use in special cases. Serial. 1st part. 2000 w. Elect'n, Lond—June 7, 1901.

A Method of Measuring Powerful Alternating Currents (Sur une Methode de Mesure des Courants Alternatifs Intenses). MM. Janet & Illiovici. A description of the work done at the Central Electrical Laboratory, using a modification of the Kelvin balance. 7000 w. Bull Soc Int Elec—Feb., 1903.

See also ELECTRIC CURRENT, ALTERNATING; ELECTRIC DISTRIBUTION; ELECTRIC INSTRUMENT.

Alternating Power.—The Measurement of Power in Alternating Current Circuits. W. G. Rhodes. An explanation of methods of deducing formulae for the measurement of power in alternating current circuits without having recourse to the calculus. 600 w. Elec Rev, Lond—Sept. 5, 1902.

Power Measurement on Alternating-Current Circuits. R. B. Williamson. Considers points affecting the determination of power and methods of making power measurements. Serial. 1st part. 2000 w. Elec Rev, N Y—Aug. 15, 1903.

Armature.—See Milli-Voltmeter; ARMATURE—Inductance; Resistance.

Battery Resistance.—On the Measurement of the Internal Resistance of a Battery. J. H. Oates. Gives two methods which reduce the error caused by the running down of the cell to a minimum, and require no apparatus beyond that found in most laboratories. 1200 w. Elect'n, Lond—April 17, 1903.

Measurement of Internal Resistance of a Battery by Ohm's Method. J. L. Dickson. Describes an interesting method. 450 w. Elec Wld & Engr—March 19, 1904.

See also STORAGE BATTERY—Resistance Measurement.

British Standards.—See Standards.

Bureau of Standards, U. S.—Electrical Measurements at the National Bureau of Standards. Morton Githens Lloyd. A detailed account of the work of this bureau. Ills. 9700 w. Pro Engrs' Soc of W Penn—Oct., 1903.

Cable Capacity.—The Measurement of Cable Capacity. An extract from a chapter in Vol. II, of "A Handbook for the Electrical Laboratory and Testing Room," by Dr. J. A. Fleming. 2000 w. Elect'n, Lond—Sept. 11, 1903.

See also ELECTRIC CABLE—Capacity.

Cable, London.—See DIELECTRIC—Losses.

Cable Testing.—The Capabilities of the Milammeter and the Galvanometer in General and Submarine Cable Testing. C. W. Schaefer. Describes the adaptability of the direct-reading milammeter to measurements of batteries, resistances, etc., and to the practical solution of many problems. Serial. 1st part. 2200 w. Elect'n, Lond—Aug. 15, 1902.

Capacity.—See Cable Capacity; ELECTRIC CABLE; ELECTROSTATIC CAPACITY.

Compensating Voltmeters.—See ELECTRIC METER—Compensating Drop.

Condenser.—See ELECTRIC CONDENSER—Measurements.

Condenser Discharge.—Graphical Method of Determining the Discharge of a Condenser Through a Variable Self-Induction. E. W. Marchant. Abtract of a paper read before the British Assn. The method is an extension of one described by Dr. Sumpner for determining the rise of current with a variable self-induction, to which a P. D. is suddenly applied. 700 w. Elec Rev, Lond—Oct. 17, 1902.

Conductivity.—The Commercial Measurement of Electrical Conductivity. Lawrence Addicks. A review of methods and apparatus and a brief discussion of their respective merits. 3300 w. Elec Rev, N Y—April 12, 1902.

See also CONDUCTIVITY—Conductometer.

Conductometer.—See ELECTRIC INSTRUMENT.

Curve Form.—See Two-Wattmeter.

Differential Telephone.—The Use of Differentially Wound Telephone Receiver in Electrical Measurements. Prof. H. Ho. Calls attention to the uses which can be made of the differential telephone for the purposes of measurement. 700 w. Elec Wld & Engr—May 23, 1903.

Direct Currents with Transformer.—The Transformer for Measuring Large Direct Currents. Harris J. Ryan. Presents a method for large direct current calibrations that employs the transformer for comparing the values of large and small currents in terms of the ratio of transformation and the reading of the instrument used for measuring the small current. 2800 w. Trans Am Inst of Elec Engrs—April, 1901.

The Transformer for Measuring Large Direct Currents. Discussion of paper by Harris J. Ryan. 3200 w. Trans Am Inst of Elec Engrs—June and July, 1901.

Earths.—See Grounds.

Electrode-Potential.—The Measurement of the Potential of the Electrodes in Stationary Liquids. Henry J. S. Sands. Read before the Faraday Society. Describes a method which will allow the electrode potential in stationary liquids of the most varying kind to be measured, when much larger currents are employed than those which can be made use of according to Cottrell's method, and indicates conclusions drawn. Ills. Serial. 1st part. 3700 w. Elect'n, Lond—Oct. 28, 1904.

Electromotive Force.—See ELECTRIC INSTRUMENT—Compensator.

Electrons.—See ELECTRON.

Electrostatic Capacity.—See ELECTROSTATIC CAPACITY.

Efficiency.—Approximate Methods for the Determination of Efficiency (Leistungsmessung mittels Angenäherter Methoden). G. Stern. A discussion of the errors of certain approximate methods, including the three-wire meter, and various induction meters. 4500 w. Elektrotech Zeitschr—July 18, 1901.

Electrometer.—See ELECTRIC INSTRUMENT.

Errors.—See ELECTRIC INSTRUMENT—Switchboard, Errors.

Fault.—A Simple Method of Locating a Short Circuit Between Electrical Conductors. Arthur B. Roe. Illustrates and describes a method based upon the law of induction. 1000 w. Am Elect'n—May, 1901.

A New Method of Localizing a Fault in a Single Cable. Walter Betts. Describes a method of testing approaching the loop test in accuracy and simplicity. 1000 w. Elec Rev, Lond—Aug. 16, 1901.

The Measurement of Defects in Insulation in Multiple Conductors (Die Messung von Isolationsfehlern bei Mehrleiteranlagen). E. Müllendorff. Deriving equations by use of which the leakage may be determined according to its distribution from successive measurements. 1200 w. Elektrotech Zeitschr—Dec. 11, 1902.

Tests on Broken Cables—Some Inconsistencies in Localization Formulae. E. Raymond-Barker. Calls attention to various inconsistencies in textbook formulae, and summarises the several formulae which have appeared. Serial. 1st part. 1100 w. Elec Rev, Lond—Aug. 14, 1903.

Two Simple Methods for Locating Faults in Cables. Edwin E. Northrup. Describes two methods of locating faults occurring on telephone lines. 1600 w. Elec Rev, N Y—Aug. 29, 1903.

Localization of Faults on Low-Tension Networks. W. E. Groves. Read at Birmingham before the Inst. of Elec. Engrs. Remarks referring particularly to a three-wire low-tension network, with the neutral earthed at the generating station or sub-station through a resistance of 2 ohms. Serial. 1st part. 2800 w. Elec Rev, Lond—April 8, 1904.

Special Methods for Locating Faults on Electric Cables. Henry W. Fisher. Illustrates and describes methods more or less connected with the Murray & Varley "Loop Tests," and emphasizes the importance of determining accurately the resistance of subsidiary resistances in the circuit of a faulty cable under localization test. 1600 w. Elec Wld & Engr—Dec. 17, 1904.

The Localisation of Faults on Cables. Explains a method of localising faults in light and power cables by use of a dynamo and motor; measuring the drop in pressure across the fault. 1200 w. Elec Rev, Lond—March 8, 1905.

Notes on Main's Work and Fault-Finding. G. C. Knight. Gives suggestions for the laying of mains, testing and fault-finding and earth finding and the calculations involved. Serial. 2 parts. 5000 w. Elec Rev, Lond—Aug. 25 and Sept. 1, 1905.

Notes on the Localization of Cable Faults. Henry Joseph. The writer aims to investigate the conditions under which tests already published are likely to be useful, and to ascertain what steps should be taken to find the position of a fault, the nature of which is such that no test known to the writer can be applied with any degree of certainty. The conditions appertaining to a three-wire continuous current system with the neutral earthed at the station are particularly considered. 2500 w. Elec Rev, Lond—Sept. 15, 1905.

The Measurement of an Insulation Fault Between a Cable and the Earth (Mesure d'un Défaut d'Isolement entre un Cable et la Terre). J. Vinson. Brief description of method of locating a fault in a distribution system while under charge. 800 w. Revue Technique—Nov. 25, 1905. See also **ARMATURE; TELEPHONE EXCHANGE —Testing Equipment.**

Fault, Arc Circuits.—Fault Finding on Long Series Arc Circuits. F. B. O'Hanlon. The article applies more particularly to underground circuits and discusses methods of testing. 1000 w. Am Elect'n—Jan., 1901.

Fault, Railway System.—Fault Localising on Tramway Systems. A. Johnston. An illustrated description of a method of localising faults on overhead wires, conduits and feeders of electric railway systems. 1200 w. Elec Rev, Lond—Jan. 9, 1903.

Fault Submarine.—Localization of High Resistance Breaks. J. Ryner-Jones. An explanation of a test devised by the writer. Serial. 1st part. 3200 w. Elec Rev, Lond—June 7, 1901.

A Graphic Method for Calculating the Distance of a Break in a Submarine Cable. E. Jona. An explanation of method with a table of values to save calculation. 1200 w. Electric, Lond—June 21, 1901.

A Graphic Proof of the Betts Test. E. Raymond-Barker. Shows the adaptability of Mr. Betts' test for locating faults in submarine cables, to graphic illustration, giving diagram and explanatory notes. 800 w. Elec Rev, Lond—Sept. 13, 1901.

Modified Blavier Test. Walter J. Murphy. Describes a method affording a means of localising a fault with minimum assistance at the further end. 1400 w. Elect'n, Lond—Oct. 11, 1901.

The Localization of Faults in Submarine Cables (Eingrenzung von Fehlern in Seekabeln). A description of methods, with diagrams. 2400 w. Elektrotech Zeitschr—Jan. 2, 1902.

A Modified Mance Test. J. H. Strong. Explanatory of the method of eliminating the error due to earth current in localizing faults in submarine cables. 200 w. Elect'n, Lond—March 28, 1902.

Reducing the Measured D. R. of a Laid Submarine Cable to 75 degrees F. and Atmospheric Pressure. J. Rymer-Jones. A discussion, with formulae, showing that to get the true insulation resistance, a sub-marine cable must be considered in sections in which the conditions are uniform. 2000 w. Elec Rev, Lond—Jan. 2, 1903.

See also **SUBMARINE CABLE; SUBMARINE TELEGRAPH.**

Fault, Underground.—Methods of Locating Faults in Underground Electric Cables. H. W. Fisher. Describes the methods used in daily practice, and also original methods which the writer has found of service. 11200 w. Pro Engs.' Soc of W. Penna.—Dec., 1900.

Locating the Faults in Underground Distribution Systems. Henry G. Stott. Shows that with the large cables used in cities the application of the loop method is impracticable, and discusses three other methods, favoring the compass method. Ill. 1300 w. Trans Am Inst of Elec Engrs—Nov., 1901.

The final Localization of "Earths" on Low-Tension Networks. A. P. McDougall. Concerning the means of locating a fault when the solid system of laying mains is used, describing the loop test. 1000 w. Elec Rev, Lond—March 14, 1902.

Form Factor.—The Measuremnt of the Form Factor of an Alternating Voltage. Translation of an article by P. Rose and A. Kuhns in "Elektrotechnische Zeitschrift." The form factor is the ratio of the effective value to the average value of the voltage. Gives methods of measurement. 1400 w. Elec Engr, Lond—Jan. 8, 1904.

Frequency.—Measurement of the Frequency of Very Rapidly Alternating Currents. J. Wertheim Salomonson. An account of experimental investigations. 2000 w. Elect'n, Lond—Nov. 13, 1903.

Galvanometer.—See **ELECTRIC INSTRUMENT—Galvanometer.**

Giorgi Unit.—See **ELECTRIC UNIT—Giorgi System.**

Grounds.—The Localization of "Earths" on Feeders and Networks. Horace Boot. Describes the method which the writer has found the best, giving some results. 1000 w. Elec Rev, Lond—July 22, 1904.

Tests for Earthing (Erdungsprüfer). Dr. M. Corsepius. Describing apparatus and methods of testing the completeness of earthing connections for machinery, lighting arresters, and other electrical appliances. 1800 w. Elektrotech Zeitschr—Oct. 19, 1905.

See also Fault; **ELECTRIC DISTRIBUTION; ELECTRIC INSTRUMENT; ELECTRIC RAILWAY.**

Heavy Current.—Accurate Measurements of Heavy Currents. P. Letheule. On the results obtained in experiments performed under the direction of Prof. Janet. 900 w. Elec Wld & Engr—April 11, 1903.

A Method for Measuring Heavy Currents (Strommesser für Hohe Stromstärken). Dr. Eugen Nesper. The current is measured by the manner in which it affects iron filings in proximity to a permanent magnet. 1200 w. Elektrotech Zeitschr—Nov. 30, 1905.

High Frequency.—The Measurement of High-Frequency Currents and Electric Waves. Abstract of a Cantor lecture by Prof. J. A. Fleming on recent progress in quantitative measurements. Ills. 3500 w. Engng—Dec. 1, 1905.

The Measurement of High Frequency Currents and Electric Waves. Prof. J. A. Fleming. Cantor lectures. Explains the methods of measurement used in the writer's investigations, illustrating instruments. Serial. 1st part. 5000 w. Jour Soc of Arts—Dec. 29, 1905.

High Pressures.—Methods of Measurement of High Electrical Pressures. S. M. Kintner. A summary of the various methods of high-pressure measurement at present employed, pointing out their advantages and faults, and describing a new type of Westinghouse static voltmeter. 5700 w. Am Inst of Elec Engrs—June, 1905.

Discussion on "Methods of Measurement of High Electrical Pressures," at Asheville, N. C. 3800 w. Am Inst of Elec Engrs—Sept., 1905.

See also ELECTRIC METER—Voltmeter Static.

High Temperatures.—See PYROMETRY.

High Voltage.—See High Pressure.

Hysteresis.—See HYSTERESIS.

Inductance.—On a New Method of Measuring Small Self-Inductions. W. Mansergh Varley. Describes a method devised for measuring the self-inductions of some small solenoids in the course of an investigation on the magnetisation of iron in rapidly-oscillating current fields. 1300 w. Elect'n, Lond—June 20, 1902.

Self-Induction Standards and Measurements (Ueber Selbstinduktionsnormale und die Messung von Selbstinduktionen). Dr. E. Orlich. A paper before the Elektrotechnischer Verein, giving an illustrated description of the methods used at the Reichsanstalt, Charlottenburg, for measuring inductances. 4500 w. Elektrotech Zeitschr—June 25, 1903.

A Method of Determining the Coefficient of Self-Induction (Methode zur Vergleichung von Selbstinduktionskoefficienten und Kondensatoren). Dr. G. Brion. Describing the method using the Wheatstone bridge, with a telephone instead of a galvanometer. 1200 w. Elektrotech Zeitschr—Aug. 6, 1903.

Measurements of Self-Inductance. J. B. Whitehead and H. D. Hill. Reports investigations made of the methods for the measurement and comparison of self-inductance capacity and mutual inductance published by Prof. Rowland, to determine their value. 8800 w. Am Jour of Sci—Feb., 1905.

A New Method for Determining Coefficients of Self-Induction (Neues Verfahren zur Bestimmung von Selbstinduktionskoeffizienten). W. Peukert. The attraction betwen two coils is measured by a beam balance, in connection with a variable capacity and resistance. 1800 w. Elektrotech Zeitschr—Oct. 5, 1905.

See also Condenser Discharge; ELECTRIC INSTRUMENT.

Instruments.—See ELECTRIC INSTRUMENT.

Insulation.—Testing the Insulation Resistance of a Conductor (Eine Einfache Methode zur Prüfung des Isolationwiderstandes von Leitungsmaterialien). Dr. J. Rabinowicz. The insulated conductor is immersed in water, the latter being in a circuit into which a condenser and galvanometer may be successively thrown. 1000 w. Elektrotech Zeitschr—Jan. 31, 1901.

The Determination of the Insulation Resistance of Telegraph Cables (Ueber die Bestimmung des Isolationswiderstandes von Telegraphkabeln). K. Strecker. Deriving curves from which the resistance can be deduced from a limited number of observations. 2000 w. Elektrotech Zeitschr—Nov. 14, 1901.

The Measurement of Insulation in Operating Continuous-Current Installations (Isolationsmessung an in Betrieb befindlichen Gleichstromanlagen). Dr. Th. Bruger. Describing the method of employing a separate auxiliary current passing through a resistance to the earth, and measuring the extent to which the latter current is neutralized by the leakage from the main current. 1500 w. Elektrotech Zeitschr—Oct. 9, 1902.

The Measurement of Distributed Leakage on Transmission Lines. Frank F. Fowle. Describes methods of measuring insulation resistance. Mathematical. 2000 w. Elec Wld & Engr—Feb. 6, 1904.

Measurement of the Insulation Resistance of an Electric Wiring System. Edwin F. Northrup. Describes a voltmeter method and also a galvanometer method applicable for determining the insulation resistance of each side of any wiring system while the power is on. 900 w. Elec Wld & Engr—May 21, 1904.

The Determination of the Insulation Resistances of Single Conductors of Multiple-Wire Systems (Bestimmung des Isolationswiderstandes der Einzelleiter von Gleichstrom-Mehrleiteranlagen während des Betriebes). Dr. J. Sahulka. Discussing the measurement of insulation and faults during operation. 3000 w. Elektrotech Zeitschr—May 26, 1904.

The Measurement of Insulation by Means of the Electrostatic Voltmeter (Isolationsmessung mittels des Elektrostatischen Voltmeters). Dr. J. Sahulka. Describing the application of the Siemens electrostatic method to the measurement of the insulation resistance of long cables. 2500 w. Elektrotech Zeitschr—June 30, 1904.
See also Fault.

See also Fault; Ground; ELECTRIC TESTING; INSULATION.

Magnetic.—See MAGNETIC TESTING.

Magnetic Force.—See MAGNETIC FORCE—Measurement.

Magnetic Link.—The Magnetic Link in Plant Testing. George S. Macomber. Briefly describes a method of measuring large direct currents by means of a special type of transformer, and the auxiliary apparatus necessary. 2000 w. Sib Jour of Engng—March, 1903.

Milli-Voltmeter.—Armature Testing with a Milli-Voltmeter. Cale Gough. On the use of the milli-voltmeter for finding defects, the method of testing, etc. 1800 w. St Ry Jour—Oct. 3, 1903.

Motor Losses.—See ELECTRIC MOTOR—Polyphase Losses.

Motor Slip.—See ELECTRIC INSTRUMENT—Slip Meter.

Null Wattmeters.—Null Wattmeter Methods of Measuring Power. Albert Campbell. Brief description of two novel methods of measuring power. 700 w. Elec Rev, Lond—Jan. 27, 1905.

Phase Angle.—A Means of Measurement of the Angle of Lag and the Power Factor with a Voltmeter. George T. Hanchett. Gives an interesting method of measuring the power factor of an alternating-current circuit, requiring no other instrument than the voltmeter. 800 w. Elec Wld & Engr—Nov. 2, 1901.

Measurement of the Angle of Lag of Three-Phase Circuits with One Wattmeter. A. S. McAllister. Outlines the method. 700 w. Elec Wld & Engr—Nov. 23, 1901.

An Exact Method for Measuring Very Large Phase Differences (Eine Methode zur Exakten Messung Sehr Grosser Phasenverschiebungen). Dr. Max Breslauer. From the "Zeitschrift für Elektrotechnik." An illustrated description of a modification of the "three-voltmeter" method, in which only a differential galvanometer is used, with very exact results. 2500 w. Elektrotech Zeitschr—March 13, 1902.

Phase Shifting.—A New Method of Determining the Shifting of Phase in Alternators with Revolving Pole Rings (Eine Neue Methode zur Bestimmung der Phasenverschiebung an Wechselstrommaschinen mit Rotirendem Polrad). Ottomar Queisser. The poles appear to stand still, when viewed by the light of an arc lamp fed with the alternating current, in a position depending upon the phase angle. 900 w. Elektrotech Zeitschr—Feb. 6, 1902.

A New Method of Determining the Angle of Phase Displacement in Alternators with Rotating Pole Rings. O. Queisser. Translated from the "Elektrotechnische Zeitschrift." Explanation of method. 1100 w. Elec Engr, Lond—Feb. 14, 1902.

Polyphase.—The Measurement of Three-Phase Currents by a Single Wattmeter (Mesure à l'Aide d'un Seul Wattmètre de la Puissance dan les Circuits Equilibrés, parcourus par des Courants Triphases). O. Robert. The method involves the connection of the two wires of the instrument successively with the three circuit wires. 1200 w. Revue Technique—Dec. 10, 1902.

Three-Phase Measurements. A. S. McAllister. Analyzes a case of current unbalance in a three-phase system, showing how inaccurate may be the results of formulae which apply to wattmeter measurements when dealing with balanced circuit. 1200 w. Elec Wld & Engr—Dec. 13, 1902.

The Measurement and Separation of Losses in Nonsynchronous Polyphase Motors (Messung und Trennung der Verluste bei Asynchronen Drehstrommotoren). W. Peukert. Discussing experiments for measuring separately the hysteresis and friction losses in polyphase motors. 2000 w. Elektrotech Zeitschr—Aug. 20, 1903.

The Measurement of Three-Phase Currents (Sur la Mesure de la Puissance des Courants Triphasés). Maurice Soubrier. Describing the method of connecting totalizing wattmeters for three-phase currents. 2000 w. Revue Technique —April 25, 1904.

See also **Three-Phase Three-Wire; Two Wattmeter.**

Polyphase Power.—See **Power.**

Potential.—The Determination of Differences of Potential with the Telephone as a Zero Instrument (Die Messung von Potentialdifferenzen mittels Telephon als Messinstrument). Frans Fischer. A description of the application of the telephone to the compensation method of measuring differences of electric potential. 2000 w. Zeitschr f Elektrochemie—Jan. 1, 1903.

See also **High Pressure.**

Power.—The Measurement of Energy in Polyphase Motors (Ueber Energiemessung an Drehstrommotoren). Dr. G. Stern. A discussion of the methods employed in the testing rooms of the Union Electric Company at Berlin. 3500 w. Elektrotech Zeitschr—July 4, 1901.

Power Measurement in the Case of Polyphase Circuits. J. A. Fleming. From a forthcoming book. Describes the methods of estimating in various cases giving a graphical method of solution accurate enough for practical purposes. 1700 w. Elect'n, Lond—July 5, 1901.

A Note on Three-Phase Power Measurement. F. A. Fish. Describes a method used by the writer based on the principle of increasing the angle between the current in the pressure coil and that in the series coil of the wattmeter. 1200 w. Elec Wld & Engr—June 27, 1903.

Measurement of Power in Alternating Current Circuits. Nathaniel R. Craighill. A description of the wattmeter method. 1500 w. Am Elect'n —Sept., 1903.

The Measurement of Power in Alternating-Current Circuits. F. W. Ballard. Abstract of a lecture before the United Assn. of Sta. Engrs. of Cleveland. Description of methods employed. 3300 w. Engr, U S A—Oct. 1, 1903.

Three-Phase Power Measurements. F. Hardie Jeannin. Describes a graphical method for computing the power in any three-phase system with no other data than the three ammeter and voltmeter readings. Also editorial notes. 4500 w. Elec Wld & Engr—Oct. 10, 1903.

See also **ELECTRIC TESTING.**

Power Factor.—Three-Phase Measurements. Leslie L. Perry. Description, with diagrams, of a method for measuring the power factor of any three-phase circuit, no matter how unbalanced are the currents and voltages. 600 w. Elec Wld & Engr—Jan. 10, 1903.

Direct Measurement of Wattless Power. Budd Frankenfield. Explains a method devised by the writer for reading wattless power directly in a balanced three-phase circuit. Also editorial. 2500 w. Elec Wld & Engr—Aug. 16, 1902.

Rail Bond.—See **RAIL BOND; STRAY CURRENTS.**

Reichsanstalt.—See **Inductance; ELECTRIC METER —Testing, Reichsanstalt.**

Resistance.—See also **ARMATURE; ELECTRIC INSTRUMENT—Kelvin Bridge; ELECTRIC METER Ohm; ELECTRIC TESTING.**

Rheostat.—See **RHEOSTAT.**

Self-Induction.—See **Inductance.**

Short Circuit.—See **Fault.**

Standard.—Dominion Electrical Standards. O. Higman. Describes the apparatus and units procured as standards of electrical measure. 4500 w. Can Elec News—July, 1901.

Experiments for Improving the Construction of Practical Standards for Electrical Measurements. Report of a committee of the British Association, presented at Southport. 4000 w. Elect'n, Lond—Oct. 2, 1903.

Experiments for Improving the Construction of Practical Standards for Electrical Measurements. Abstract of the report of a committee of the British Assn. 2500 w. Elect'n, Lond—Sept. 9, 1904.

Practical Standards for Electrical Measurements. Report of the committee of the British Association, recently presented in South Africa, on experiments for improving the construction of practical standards for electrical measurements. 4000 w. Elec Engr, Lond—Aug. 25, 1905.

Standardization. — See **ELECTRIC APPARATUS; LABORATORY—Standards; Reichsanstalt.**

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ELECTRIC METER.

See also **ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC STATION MANAGEMENT; ELECTRIC TESTING.**

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Efficiency of Lamps.—An Efficiency Meter for Electric Incandescent Lamps. Edward P. Hyde and H. B. Brooks. Describes the theory and operation of an instrument designed and constructed to meet the need of an efficiency meter in the photometric work of the Bureau of Standards. Also Editorial. 5200 w. Elec Wld & Engr—Dec. 2, 1905.

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Watt-Hour.—A Watt-Hour Meter. Frank Holden. Read before the Inst. of Elec. Engrs. Describes the Frazer meter, showing its defects, and using it for comparison in describing the meter which is the subject of this paper. Ill. Serial. 1st part. 2600 w. Elect'n, Lond—May 24, 1901.

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A Study of Integrating Electric Meters. Caryl Davis Haskins. A record of such starting points as have up to the present time been shown to be worthy of development into an integrating meter. 5000 w. Int Elec Cong of St. Louis—Sept., 1904.

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Wright Maximum.—See **ELECTRIC STATION MANAGEMENT—Maximum-Demand Charging.**

ELECTRIC MINING.

See **COAL MINING MACHINERY; ELECTRIC EQUIPMENT; ELECTRIC LOCOMOTIVE; HOISTING; MINE HAULAGE; MINE SIGNAL; MINING MACHINERY; PUMP ELECTRIC; ROCK DRILL.**

ELECTRIC MINING MACHINERY.

See **COAL MINING MACHINERY; ELECTRIC EQUIPMENT; MINE HAULAGE; MINING MACHINERY; ROCK DRILL.**

ELECTRIC MOTOR.

See also **ELECTRIC APPARATUS; ELECTRIC CAR; ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC MACHINERY; ELECTRIC POWER; ELECTRIC RAILWAY; ELECTRIC TESTING; ELECTRIC TRANSMISSION.**

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See also **ELECTRIC RAILWAY—Alternating.**

See also **Asynchronous; Induction; Polyphase; Single-Phase; Synchronous; Winter-Eichberg; ELECTRIC DRIVING—Cotton Mill, Pelzer, S. C.; ELECTRIC RAILWAY.**

Alternating Commutator.—Alternating Current Commutator Motors. A. S. M'Allister. Reviews the properties common to all commutator type, alternating-current machines, and discusses the performance of repulsion motors. 3300 w. Sib Jour of Engng—Oct., 1904.

Alternating-Current Commutator Motors (Wechselstrom-Kommutatormotoren). F. Niethammer. A general discussion of recent single-phase motors. 2000 w. Zeitschr f Elektrotechnik—Dec. 4, 1904.

See also **Heyland; Polyphase Commutator; Repulsion; Single-Phase.**

Alternating Experiment.—An Unsuccessful Experiment. Fred W. Davis. An account of an unsuccessful alternate-current motor experiment, stating the ideas upon which the experiment was based. 1400 w. Elec Engr, Lond—April 3, 1903.

Alternating Series.—The Series Alternating Motor Problem. George T. Hanchett. An explanation, with diagrams, of the difficulties of operating single-phase alternating current railway motors, and the way these difficulties have been met. 2500 w. St Ry Jour—Dec. 20, 1902.

The Alternating-Current Series Motor (Der Wechselstrom-Serienmotor). M. Osnos. Theoretical discussion, with diagrams. 4000 w. Zeitschr f Elektrotechnik—Dec. 27, 1903.

The Alternating-Current Series Motor. F. D. Newbury. An explanation of its operation. 1800 w. Elec Club Jour—Feb., 1904.

The Alternating-Current Series Motor. F. D. Newbury. A detailed explanation of its operation. 2000 w. Elec Rev, N Y—Feb. 6, 1904.

The Alternating-Current Series Motor. F. D. Newbury. An illustrated article explaining the advantages of the neutralizing field winding. 900 w. Elec Club Jour—March, 1905.

The Alternating-Current Series Motor. F. Creedy. An account of some investigations carried out at the Central Technical College between March and July, 1904, which are intended to show the effect, on the performance of the motor, of varying the elements of the design. 12800 w. Inst of Elec Engrs—April 13, 1905.
See also **Series Diagrams.**

American.—American Practice in Electric Motor Construction. A very fully illustrated description of many makes of electric motors, both direct and alternating current, and their parts. 1000 w. Am Elect'n—Jan., 1903.

American, British View.—See **Single Phase.**

Applications.—Electric Motor Applications. J. Henry Klinck. Read before the Ohio Elec. Lgt. Assn. Illustrates numerous applications, discussing the conditions and methods applicable to each. 2000 w. Elec Jour—Sept., 1905.

Electric Motors and Their Applications. W. Edgar Reed. Gives a classification according to their speed-torque characteristics, and a statement regarding their other important operating characteristics, which are useful in making applications. Discussion. Ills. 6400 w. Pro Engrs' Soc of W Penn—Oct., 1905.

See also **ELECTRIC DRIVING.**

Armature Reaction.—See **ELECTRIC GENERATOR, ALTERNATING.**

Asynchronous.—The Asynchronous Motor Run as a Synchronous One (Der Asynchronmotor als Synchronmotor). Ernst Danielson. An illustrated description of a method for running a non-synchronous motor synchronously by sending continuous current through the secondary winding. 700 w. Electrotech Zeitschr—Dec. 26, 1901.

The Rational Design of Asynchronous Motors (Sur l'Etablissement Rationnel des Moteurs Asynchrones). C. F. Guilbert. Working out the mathematical computations for the proportions giving the maximum efficiency. 1500 w. Revue Technique—Oct. 25, 1904.

See also **Galatti; Induction; Oerlikon; Polyphase; Single-Phase; ELECTRIC INSTRUMENT—Slip Measurement; ELECTRIC GENERATOR, ALTERNATING.**

Automobile.—See **AUTOMOBILE, ELECTRIC—Motor; Speed-Time Curves.**

Balancer.—See **ELECTRIC DRIVING.**

Battery, Design.—Design of a Battery Motor. Clarence W. Coleman. Illustrates and describes a motor designed by the writer for operating railroad semaphore signals, though capable of application to other uses. 2000 w. Am Elect'n—Dec., 1905.

Bogie.—See **ELECTRIC CAR.**

Brake.—See **BRAKE—Electric Motor; Magnetic.**

"Bull" Pump.—The "Bull" Pump Electric Motor. Illustrated description of an English motor for driving a pump. 500 w. Engng—Sept. 13, 1901.

Capacity Limits.—See **ELECTRIC GENERATOR.**

Care.—See **ELECTRIC GENERATOR.**

Cascade System.—A Graphical Discussion of the Cascade Operation of Polyphase Motors (Graphische Behandlung der Kaskadenschaltung von Drehstommotoren). Dr. Max Breslauer. An application of Heyland's graphical method to the analysis of the operation of motors in cascade. 5000 w. Elektrotech Zeitschr—Jan. 1, 1903.

Cascade Operation of Motors for Rolling Mills (Kaskadenschaltungen bei Motoren für Walzwerke) E. Danielson. An account of the performance of induction motors operating rolling mill machinery at Näs, Delelfven, Sweden. A hydrostatic station of 2700 h. p. is included. 2000 w. Elektrotech Zeitschr—Jan. 21, 1904.

The Cascade Connection of Motors in Rolling Mills. E. Danielson, in the "Elektrotechnische Zeitschrift." Gives a description of one of the three-speed motors. Ills. 1200 w. Elec Engr, Lond—April 1, 1904.

Classification.—See **Application.**

Cleaning.—See **Ventilating.**

Commutatorless.—See **ELECTRIC GENERATOR.**

Compensated.—On Compensation of Asychronous Motors. H. S. Meyer. Discusses the pros and cons of the question of compensating and compounding alternating-current machines. 2400 w. Elect'n, Lond—Sept. 4, 1903.

The Theory of the Compensated Series Motor (Theorie des Kompensierten Serienmotors). M. Osnos. An application of the vector analysis to the solution of problems relating to the compensated motor; graphical and analytical examples are given. 3000 w. Elektrotech Zeitschr—Nov. 12, 1903.

Condenser.—See **ELECTRIC CONDENSER.**

Control.—The Control of Electrical Motors in Factories. N. C. Woodfin. Discusses switches and methods of control arguing that bad systems have hindered the adoption of electric motors. 1800 w. Elec Rev, Lond—Sept. 19, 1902.

A Variable Reluctance Method of Motor Speed Control. G. Frederick Packard. Describes the special construction patented by Frederick A. Johnson for providing speed control over a very wide range in motors. Discusses also the regulators patented by Thomas A. Edison and by Philip Diehl. Ill. 3500 w. Trans Am Inst of Elec Engrs—Nov., 1902.

Variable Speed Motor Control. Charles F. Scott. Introductory address at a meeting where most of the papers were on this subject. 1300 w. Trans Am Inst of Elec Engrs—Dec., 1902.

A Series-Parallel System of Speed Control. George W. Fowler. A description of the parts of a system including a double commutator motor, switchboard controller, automatic switches and emergency switches. Ill. 1500 w. Trans Am Inst of Elec Engrs—Dec., 1902.

Discussion of Papers on Speed Control of Electric Motors. 5800 w. Trans Am Inst of Elec Engrs—Dec., 1902.

Communications and Discussions. Additions to the discussion of previous papers on variable speed control. 7000 w. Trans Am Inst of Elec Engrs —Jan., 1903.

Shunt-Field and Variable Voltage Control for Electric Motors. William Cooper. Extracts from a paper read before the Cincinnati Section of the Am. Inst. of Elec. Engrs. Gives a useful diagram and explains a system of determining the minimum size motor. 3400 w. Am Mach—April 30, 1903.

Notes on the Speed Regulations of Continuous-Current Motors. Wallace Rogers. Considers the effect of weakening the field as a means of speed regulation, and its disadvantages. Also considers other methods both as regards stationary and traction work. 2200 w. Elec Engr, Lond—Aug. 14, 1903.

The Regulation of Polyphase Motors (Regulierung von Drehstrommotoren). Walter Burkard. A discussion of the various methods of regulating the speed of polyphase motors, with especial reference to a special form of motor composed of multiple elements capable of having the connections changed. 2500 w. Elektrotech Zeitschr —Aug. 27, 1903.

Speed Variation of Continuous-Current-Motors by Shunt-Control. H. M. Hobart. Reviews recent articles relating to methods of speed control, criticising statements made and explaining principles that need attention. 2500 w. Elec Rev, Lond—Dec. 4, 1903.

New Regulating Arrangements for Direct-Current Electric Motors (Neue Regelungseinrichtungen für Gleichstrom-Elektromotoren). Joseph Löwy. Paper before the Vienna Elektrotechnischer Verein, describing several motor-regulating systems and particularly one due to Josef Seidener, of Vienna. Diagrams. 3000 w. Zeitschr f Elektrotechnik—Dec. 20, 1903.

Speed Regulation of Direct-Current Motors. H. H. Cutler. Considers the three systems in practical use, their advantages and disadvantages. Ill. 4000 w. Engr, U S A—Jan. 1, 1904.

Variable Speed Alternating-Current Motors. Walter I. Slichter. Considers the various types of motors and the methods of controlling them. 2000 w. Engr, U S A—Jan. 1, 1904.

Variable Speed Control. Budd Frankenfield. Begins a discussion of methods of controlling the speed of electric motors. Serial. 1st part. 1500 w. Engr, U S A—March 1, 1904.

The Speed Regulation of Three-Phase Motors by Pole Changing. J. K. Sumec. Abridged translation from the "Zeitschrift für Elektrotechnik." Discusses the regulating of induction motors by varying the magnetic field. Diagrams. 1200 w. Elec Engr, Lond—Oct. 7, 1904.

Multiple Voltage Control of Motors. Norman Gardner Meade. An illustrated description of the Bullock system, stating its advantages, and remarks on the installation of the plant. 1500 w. Power—Dec., 1904.

American Types of Control Apparatus for Direct Current Motors. Laurence B. Mather. Illustrations, with brief descriptions of the various types and their operation. 8700 w. Am Elect'n —June, 1905.

Motor-Controlling Apparatus. Francis W. Appleton. Brief description of a simple arrangement, which is a condensation of solenoid switches, with suggestions. 800 w. Am Elect'n—June, 1905.

See also **CONTROLLER; ELECTRIC DRIVING; ELECTRIC SWITCH; RHEOSTAT.**

Crane.—Calculations for the Shaft, Gear and Bearings of Crane Motors. George J. Leire. Gives an example and illustrates the use of the table and diagrams given in the method of calculation. 900 w. Mach, N Y—July, 1905.

Design, Amateurs. — See **ELECTRIC GENERATOR DESIGN—Amateurs.**

See also **CRANE, ELECTRIC.**

Design, Commutator.—See **COMMUTATION—Design.**

Design, D. C.—See **ELECTRIC GENERATOR DESIGN.**

Design, Mason.—See **ELECTRIC GENERATOR DESIGN—Mason.**

Diagram.—See **Heyland Diagrams; Induction, Diagrams; Polyphase Diagrams; Repulsion; Series Diagrams; ELECTRIC RAILWAY—Speed Time Curves.**

Diagram, Heyland.—See **Heyland Diagram.**

Direct Current.—The Up-Keep of the Direct Current Motor and Its Accessories. Alfred H. Mayes. Considers the causes of trouble to which a motor is liable, and the precautions to be taken. 2000 w. Elec Rev, Lond—Sept. 12, 1902.

Double Commutation.—See **Johnson-Lundell.**

Early Forms.—Early Forms of Electric Motors. Illustrated descriptions of the motors designed by Page, Davenport and Hjorth, about the middle of the nineteenth century. 800 w. Sci Am Sup—March 22, 1902.

Efficiency.—The Efficiency Curve of a Shunt Motor and Its Relation to Operating Characteristics and the Cost of Operation. Summary of a paper by Prof. Budd Frankenfield, at the Sheboygan convention of the Northwestern Elec. Assn. An outline of the method of testing for efficiency. 3300 w. Elec. Wld & Engr—July 6, 1901.

The Calculation of Motor Efficiency in Railway Service (Die Berechnung der Motorleistung im Bahnbetriebe). Maximilian Müller. With graphical diagrams showing relations of load, speed, stops, etc., in determining the efficiency of railway motors. 3000 w. Zeitschr f Elektrotechnik —July 24, 1904.

Eichberg-Winter.—See **Winter-Eichberg.**

Electrostatic.—A Rotary Field Electrostatic Induction Motor. Prof. Hidetaro Ho. The nonmathematical portion of a paper from the "Journal of the Inst. of Elec. Engrs.," of Tokyo, Japan. Illustrated description. 1600 w. Elec Wld & Engr—June 15, 1901.

Experimental.—An Experimental Motor and Dynamo. W. E. Parker. Illustrated description of a simple and inexpensive outfit for illustrating the principles of the electric motor and dynamo in the teaching of physics. 700 w. Sci Am—July 12, 1902.

Explanation.—Why a Motor "Motes." An explanation of why a motor rotates, and why it rotates constantly in one direction under the same conditions. Ill. 4000 w. Power—Aug., 1901.

Factories.—See Control.

Fan.—See ELECTRIC FAN—Motor.

Field Coil.—See FIELD COIL.

Field Winding. — The Differentially Compounded Motor. W. R. Kelsey. A discussion of the design of differential-compound field windings for electric motors where close speed regulation is necessary; with curves. 1000 w. Elec Engr, Lond—Dec. 12, 1902.

Finzi.—See Single-Phase.

Friction Losses.—See ELECTRIC GENERATOR.

Galatti Asynchronous.—Determination of the Efficiency of a Galatti Asynchronous Motor (Determinazione di Rendiment di un Motore Asincrono Galatti). G. Sartori. Applying the Heyland circle diagram. 1200 w. L'Elettricita—Jan. 8, 1904.

Gas Engine Compared.—Small Gas Engines vs. Electric Motors. Claims a saving by introducing the electric motors. 1000 w. Elec Rev, Lond—Feb. 26, 1904.

Small Gas Engines vs. Electric Motors. H. E. M. Kensit. Gives tabulated particulars of the cost of operating a number of small gas engines used in various trades, showing a large saving in favor of electric motors for intermittent loads. 800 w. Elec Rev, Lond—April 15, 1904.

Heating.—A Study of the Heating of Railway Motors. A. H. Armstrong. A study of some of the variables met with and their influence upon the motive power and station output for the higher as well as the lower speed schedules. 6000 w. Trans Am Inst of Elec Engrs—June 20, 1902.

The Conditions Governing the Rise of Temperature of Electric Railway Motors in Service. Cary T. Hutchinson. A report of investigations made developing a method for determining the performance of any motor in service. 5700 w. Trans Am Inst of Elec Engrs—Oct., 1903.

The Heating of Railway Motors. S. T. Dodd and M. C .Canfield. States what has already been done in the way of ventilated motors, and the probable tendency of the development of street-railway motors. 2500 w. St Ry Jour—Nov. 21, 1903.

The Efficiency of Railway Motors (Die Motorleistung im Bahnbetrieb). M. Müller. A review of the theory of Zehme upon the influence of heating on the efficiency of motors. 1500 w. Elektrotech Zeitschr—March 10, 1904.

See also Ventilation.

Heating and Sparking Limits.—See Variable Speed.

Helios.—See ELECTRIC CAR.

Hemingway.—See Speed Range.

Heyland.—Tests of a Compensated Asynchronous Motor (Die Ersten Versuchsresultate am Kompensirten Asynchronmotor). Alexander Heyland. An illustrated description of tests of an asynchronous alternating current motor, with compensation windings. 1500 w. Elektrotech Zeitschr—Jan. 9, 1902.

Asynchronous Induction Motor Without Phase Variation Between Current and Pressure (Asynchroner Induktionsmotor bzw. Generator ohne Phasenverschiebung zwischen Strom und Spannung). A. Heyland. The rotary field is produced from the secondary armature, and a closed commutator is used. 2000 w. Elektrotech Zeitschr—Aug. 8, 1901.

An Asynchronous Induction Motor or Generator with a Power-Factor of Unity. Alexander Heyland. From the "Electrotechnische Zeitschrift." Describes a method of eliminating the phase difference between current and pressure, and thus at the same time doing away with the wattless magnetising and light load currents, and the consequences of the air-gap between the stator and the rotor. 2000 w. Elect'n, Lond—Aug. 16, 1901.

A New Method of Compensating for Phase shifting in Non-Synchronous Alternators (Ein Neues Verfahren zum Kompensiren der Phasenverschiebung in Asynchronen Wechselstrommaschinen). M. Osnos. A review of the theories of Görges and Heyland, discussing them from the point of maximum economy. 2500 w. Elektrotech Zeitschr—Oct. 16, 1902.

An Asynchronous Motor with Power Factor Equal to Unity. A. S. McAllister. A statement of the advantages of the induction motor, with a description of the Heyland motor. 2500 w. Sib Jour of Engng—Nov., 1902.

Recent Forms of Non-Synchronous Motors with Compensation and Compounding (Asynchron-Maschinen mit Kompensierung und Compoundierung in ihrer Heutigen Ausführung). Alexander Heyland. Describing the improved windings adopted for the latest types of Heyland motor. Three articles. 10,000 w. Elektrotech Zeitschr—Jan. 22, 29, Feb. 5, 1903.

The Heyland Induction Motor. Boy de la Tour. Reprint of a chapter specially written for the American edition of the author's work. Explains the nature of this invention and gives a method of calculation for a machine designed to meet certain requirements. 1500 w. Elec Wld & Engr—March 14, 1903.

The Heyland Induction Motor (Asynchronmaschinen mit Kurzgeschlossenem Kommutator, ohne in sich Geschlossene Lamellenverbindungen). Alexander Heyland. An illustrated description of a new form of the Heyland induction motor, having a power factor of unity, in which the commutator segments are not permanently shortcircuited. 1000 w. Electrotech Zeitschr—March 19, 1903.

The Heyland Single-Phase Motor (Der Einphasenmotor, System Heyland, in seiner Heutigen Ausführung und Verwendung). André Schmidt. An illustrated description of this single-phase alternating-current motor which can start under load, and its present applications. 2500 w. Elektrotech Zeitschr—May 7, 1903.

A Study of the Heyland Machine as a Motor and Generator. Comfort A. Adams. A report of experimental work, with a review of the history and general theory. Ill. 13000 w. Am Inst of Elec Engrs—May 19, 1903.

An Interesting Phenomenon in Compensated Motors (Ueber eine Interessante Erscheinung an Kompensierten Motoren). Alexander Heyland. A discussion and explanation of the observed phenomenon that the rotor losses are less in "compensated" motors (with commutators on the rotor) than with ordinary induction motors. Diagrams. 1000 w. Elektrotech Zeitschr—May 28, 1903.

The Heyland Induction Motor. A. S. McAllister. A study of this invention explaining how the provision of an exciting current in the rotor winding takes the place of the usual primary exciting current. Ill. 3000 w. Am Elect'n—July, 1903.

The Heyland Induction Motor. A. S. Langsdorf. An illustrated description of the motor and its theory of operation, its advantages and disadvantages. 2500 w. Jour Assn of Engng Socs—Sept., 1903.

See also ELECTRIC GENERATOR, ALTERNATING—Compounding.

Heyland Diagrams.—The Circle Diagram of the Induction Motor (Das Kreisdiagramm des Mehrphasenmotors). A. Heyland. A communication regarding the question of priority of use of the diagram, with some examples of its application. 1800 w. Elektrotech Zeitschr—Jan. 21, 1904.

Diagrams and Measurements for Polyphase Motors (Diagramm und Ausmessung von Drehstrommotoren). Hugo Grob. An extended study of the application of the Heyland circle diagram. Two articles. 15,000 w. Elektrotech Zeitschr—June 2, 9, 1904.

See also Galatti; Induction.

Heyland, Starting.—The Starting of the Heyland Single-Phase Induction Motor. A. Boyd. Describes experiments carried out with the object of showing the distribution of the flux in the air-gap before and after the rotor circuits are closed, and to explain how the latter distribution is brought so that a torque is produced in a definite direction. 3500 w. Elect'n, Lond—Sept. 23, 1904.

Heyland Tests.—Tests of a Compensated Asynchronous Motor. Alexander Heyland. From "Elektrotechnische Zeitschrift." An account of interesting tests. Those with the compensated motor consisted in determining the position of the brushes giving a minimum phase displacement, and then determining the number of turns of exciting winding just sufficient to prevent all phase displacement. The tests as a generator were the more interesting. Ill. 1700 w. Elect'n, Lond—Jan. 24, 1902.

Hire.—See **ELECTRIC STATION MANAGEMENT—Motor Hire.**

History.—See **ELECTRIC MACHINERY.**

Hopkinson Test.—See **ELECTRIC TESTING—Hopkinson.**

Induction.—The Induction Motor. B. A. Behrend. The first of a series of essays. A careful treatment of the subject, with much new experimental information. Serial. 1st part. 1800 w. Elec Wld & Engr—Nov. 3, 1900.

The Computation of the Stray Co-efficient in Induction Motors (Ueber die Berechnung des Streuungsfaktors Asynchroner Motoren). J. Jonas. Deriving formulas for the coefficients of the stator and the rotor in terms of the e. m. f. of the respective fields. 3500 w. Elektrotech Zeitschr—May 30, 1901.

The Polyphase Induction Motor for General Power Service. Ralph D. Mershon. Presents the merits of the induction motor for general power service and corrects misconceptions which exist concerning it. 2500 w. Elec Wld & Engr—June 8, 1901.

The Induction Motor. Harris C. Trow. An explanation of the induction motor and its action. 3400 w. Engr, U S A—Sept. 1, 1901.

The Induction Motor and the Rotary Converter and Their Relation to the Transmission System. Charles F. Scott. An examination of their behavior in service, indicating the characteristics which have made them so successful. 3500 w. Trans Am Inst of Elec Engrs—Dec., 1901.

The Induction Motor. Alfred E. Wiener. Explains the principle of the rotary magnetic field, and the design of the induction motor. Ill. 4800 w. Elec Age—Jan., 1902.

Some Pointers on Induction Motors. Dr. Louis Bell. Discusses the objections often raised, and the wrong ideas prevalent, and gives information concerning their usefulness. 1500 w. Elec Wld & Engr—Jan. 18, 1902.

A Novel Combination of Polyphase Motors for Traction Purposes. Ernst Danielson. Describes an arrangement which makes it possible to obtain economically four different speeds by means of only two motors. Ill. 4000 w. Trans Am Inst of Elec Engrs—April, 1902.

Some Notes on Induction Motors. H. S. Meyer. Calls attention to points of importance in regard to asynchronous or induction motors. 2700 w. Elect'n, Lond—June 13, 1902.

The Influence of Closed Slots in Induction Motors (Ueber den Einfluss Geschlossener Nuthen im Inducirenden Theile von Drehstrommotoren). W. Mollier. With diagrams showing the modifications produced when the slots in the inductor are closed with iron. 2000 w. Electrotech Zeitschr—July 31, 1902.

Polyphase Induction Motors Operating on Single Phase Circuits. A. S. M'Allister. Describes methods of operating, illustrating the mode of connecting the windings. 600 w. Am Elect'n—Aug., 1902.

A New Method of Starting Induction Motors (Ein Neues Verfahren zum Anlassen von Induktionsmotoren). Alfred Schwartz. An examination of the operation of the induction motor and the condition of starting under load. A centrifugally operated clutch throws the load on only when full speed is attained. 4000 w. Elektrotech Zeitschr—Sept. 4, 1902.

The Speed Regulation of Induction Motors (Die Tourenregulirung von Induktionsmotoren). M. Osnos. An examination of the efficiency at various speeds for different styles of induction motors. 6000 w. Elektrotech Zeitschr—Dec. 11, 1902.

The Induction Motor. George T. Hanchett. Describes the electrical and mechanical characteristics, explaining the general principle of the machine. Ill. 3000 w. Cent Sta—May, 1903.

The Induction Motor and Its Engineering Capabilities. George L. Hoxie. A thesis presented for the degree of Doctor of Philosophy. Gives a detailed study of a particular motor and of the behavior of the magnetic circuit in the present number. Ill. Serial. 1st part. 6800 w. Jour Fr Inst—Sept., 1903.

Management of Induction Motors. George T. Hanchett. Describes the behavior of the induction motor, and shows why it is often objectionable. 2500 w. Cent Sta—Oct., 1903.

The Application of Induction Motors. Arthur B. Weeks. Illustrates and describes methods of applications. 1200 w. Engr, U S A—March 15, 1904.

The Induction Motor. Explains the principle of the induction motor, its operations, with diagrams and illustrated descriptions of some forms. Serial. 1st part. 9500 w. Harvard Engng Jour—April, 1904.

A Method of Designing Induction Motors. H. M. Hobart. An investigation limited to three-phase squirrel-cage induction motors. 1600 w. Int Elec Cong of St. Louis—Sept., 1904.

The Induction Motor with High Resistance Secondary. C. J. Spencer. Defines certain cases where the installation of such a type of motor is desirable. 1100 w. Elec Wld & Engr—Nov. 26, 1904.

Notes on the Theory and Testing of the Polyphase Induction Motor. W. Rogers. Describes the polyphase induction motor and considers some methods of starting and regulating the speed, in the present number. Serial. 1st part. 3500 w. Elec Engr, Lond—May 12, 1905.

The Starting of Induction Motors. Frank Lewis. Illustrates and describes the selective winding designed by the writer, which does not require a complicated switchgear and which fulfils the conditions for efficient selection. 2000 w. Elec Rev, Lond—June 30, 1905.

Notes on the Polyphase Induction Motor. H. A. Burson. Read before the Can. Elec. Assn. Considers the characteristics, the various types, and the classes of work to which each is suited. 1500 w. Can Elec News—July, 1905.

Some Points About the Induction Motor. J. W. Welsh. Considers the effect of variation in the supply circuit. 1500 w. Elec Jour—Sept., 1905.

Notes on Alternate-Current Induction Motors. T. Harding Churton. Compares the performance and characteristics of motors provided with short-circuit and with wound rotors respectively; the performances of such motors on single-phase and polyphase circuits; and indicates the effect of frequency of alternations on the working of such motors. 4300 w. Elec Engr, Lond—Oct. 27, 1905.

See also **Asynchronous; Electrostatic; Heyland; Polyphase; Single Phase; Repulsion; ARMATURE WINDING; ELECTRIC DRIVING—Tobacco Factory.**

Induction, Analysis.—The Determination of Straying and the Measurement of the Constants for Idle Running for Induction Motors (Streuungsmessung an Drehstrommotoren und Bestimmung der Leerlaufskonstanten). Robert Moser. A general mathematical treatment, making use of the vector analysis. 5000 w. Elektrotech Zeitschr—Jan. 5, 1905.

Induction, Car.—See **ELECTRIC CAR—Induction Motor.**

Induction, Care.—The Care of Induction Motors in a Large Factory. Arthur B. Weeks. Hints for the inspection and care of these motors. 1200 w. Am Elect'n—Feb., 1903.

Induction Characteristics.—The Computation of the Characteristic curves of Induction Motors (Berechnung der Charakteristischen Kurven des Induktionsmotors). A. Lindström. A discussion of the methods of Steinmetz and of Heyland and the development of an additional one. 1500 w. Elektrotech Zeitschr—June 12, 1902.

Induction Motor Characteristics by the Vector Diagram. H. C. Specht. Gives a practical example of the use of the vector diagram in working up the characteristics of an induction motor. 1000 w. Elec Jour—Dec., 1905.

Induction, Design.—Design for a 1-2-H. P. Self-Starting Single-Phase Induction Motor. Drawings and description of all the essential features. 1800 w. Am Elect'n—March, 1903.

Design for a One Horse-Power Self-Starting Single-Phase Induction Motor. Drawings and description of the essential features of a motor capable of giving one brake horse-power on a single-phase circuit of 100 volts and 125 to 133 cycles. 1800 w. Am Elect'n—Aug., 1903.

The Choice of Air Gap Diameter for Induction Motors. H. M. Hobart. On induction-motor design, showing the very great percentage which the inductance of the end connections may form of the total inductance, and proposing a method by which the best proportions may be determined. 1000 w. Elec Wld & Engr—Jan. 23, 1904.

The Design of Induction Motors with Examples from Recent European Practice. H. M. Hobart. Shows the dependence of the factor in Behrend's formula on the ratio of the length of the core to the pole pitch. 2500 w. Elec Wld & Engr—April 30, 1904.

Induction Motor Design as Determined by Commercial Requirements. J. B. Wiard. Outlining the fundamental principles which govern the design, indicating the different forms which are on the market commercially. 5000 w. Jour Worcester Poly Inst—May, 1904.

The Computation of the Lines of Magnetic Force in Induction Motors (Die Berechnung der Streuung und des Magnetisierungsstromes von Drehstrommotoren). Dr. G. Benischke. Deriving general formulas applicable to any case without the use of empirical coefficients obtained from special experiments. 4000 w. Elektrotech Zeitschr—Sept. 22, 1904.

The Design of Induction Motors. A. Press. A mathematical investigation. 1000 w. Elec Rev, Lond—Oct. 14, 1904.

The Design of Induction Motors. Comfort A. Adams. Gives method of calculating the magnetic leakage, a new method for the calculation of the power factor and other matters of interest. 5400 w. Am Inst of Elec Engrs—June, 1905.

The Design of Induction Motors. H. M. Hobart. The first of a series of articles giving a consistent plan of design. Serial. 1st part. 600 w. Elec Mag—July 29, 1905.

Air-Gap Flux in Induction Motors. A. S. Langsdorf. Report of an investibation made to study the effect upon the flux distribution of varying numbers of teeth in the stator. 1400 w. Am Inst of Elec Engrs—Sept., 1905.

Induction, Diagrams.—Polar Diagrams of Induction Motors (Kreisdiagramm des Drehstrommotors). J. K. Sumec. An application of the polar diagram to the determination of iron losses, capacity, slip, and efficiency of induction motors. 2000 w. Zeitschr f Elektrotechnik—Jan. 4, 1903.

Determination of Induction Motor Charactertistic Curves. A. S. M'Allister. Mathematical discussion of induction motors, with formulas, diagrams and tables. 2500 w. Am Elect'n—Jan., 1903.

Some Induction Motor Diagrams (Ueber einige Diagramme zum Asynchronen Wechselstrommotor). Hans Görges. A graphical and mathematical discussion of non-synchronous alternating current motors, with diagrams. 3000 w. Elektrotech Zeitschr—April 9, 1903.

The Polar Diagram of the Compensated Motor (Das Kreisdiagramm des Kompensierten Motors). A. Heyland. An examination of the effect of compensation upon the induction motor, using the vector diagram, showing the degree of compensation and position of brushes giving maximum efficiency. 2500 w. Elektrotech Zeitschr—July 23, 1903.

A Graphical Development of the Ossanna Diagram (Graphische Ermittelung des Ossannaschen Diagrmmes). Ad. Thomälen. A comparison of the Ossanna and the Heyland diagrams for induction-motor computations. 4000 w. Elektrotech Zeitschr—Nov. 26, 1903.

The Circle Diagram Applied to Oversynchronism (Das Kreisdiagramm für Uebersynchronismus). Paul Müller. Showing the inapplicability of the circle diagram to induction motors when they are operated above synchronism. 2000 w. Elektrotech Zeitschr—March 3, 1904.

Simple Computation Methods for Induction Motors (Einfache Berechnung von Drehstommotoren). H. M. Hobart. Illustrating a modified form of the Heyland circle diagram. 1800 w. Zeitschr f Elektrotechnik—March 13, 1904.

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A Practical Vector-Diagram for Induction Motors. H. C. Specht. An explanation of a vector diagram method for analyzing the behavior of induction motors which is applicable to single-phase as well as polyphase induction motors of all sizes. 4000 w. Elec Wld & Engr—Feb. 25, 1905.

The Construction of the Current Diagram of a Polyphase Induction Motor (Konstruktion des Stromdiagrammes eines Mehrphasen Asynchronmotors). T. Rosskopf. Brief description, with geometrical proof. 600 w. Zeitschr f Elektrotechnik—June 11, 1905.

The Practical Application of the Heyland Diagram for Induction Motors. W. C. Way. Gives description of the use of the "circle diagram" in design of induction motors, with figures and tables. 1500 w. Elec Wld & Engr—Dec. 23, 1905.

See also **Heyland; Induction, Characteristic.**

Induction, Elevator.—See **ELEVATOR, ELECTRIC.**

Induction, Generator.—Notes on the Induction Motor as Generator. T. P. E. Butt. Gives results of a test made by the writer, explaining the action of asynchronous generators. 3000 w. Jour S African Assn Engrs—May, 1905.

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Induction, Glass Works.—See **ELECTRIC DRIVING—Glass Works.**

Induction, Leakage.—The Induction Motor Leakage Coefficient. A. Press. Mathematical development of formula, with diagram, and comparison with other formulae. 800 w. Elec Wld & Engr—Sept. 9, 1905.

Induction Losses.—The Distribution of Losses in Non-Synchronous Induction Motors (Verlusttrennung bei Asynchronen Drehstrommotoren). W. Angermann. An analysis of the copper, iron, and friction losses in induction motors, with diagrams showing their distribution. 5000 w. Elektrotech Zeitschr—March 30, 1905.

The Measurement and Distribution of Iron Loss in Induction Motors (Messung und Trennung der Eisenverluste in den Asynchronen Drehstrommotoren). O. S. Bragstad. With diagrams to aid in the determination of hysteresis and eddy-current losses. 1800 w. Zeitschr f Elektrotechnik—June 18, 1905.

Core Losses in Induction Motors. R. E. Hellmund. Gives a method for determining the core losses for motors with phase-wound secondaries. 400 w. Elec Wld & Engr—Dec. 23, 1905.

Induction, Magnetic Dispersion.—On the Magnetic Dispersion in Induction Motors, and Its Influence on the Design of These Machines. Dr. Hans Behn-Eschenburg. A description of theoretical and experimental researches communicated to the Institution of Electrical Engineers through Prof. S. P. Thompson. Serial. 1st part. 2800 w. Elect'n, Lond—Jan. 22, 1904.

Induction, Oerlikon.—Oerliken Induction Motor with Four Speed Variations. Hans Behr. Description, with illustrations and diagrams, of a drum-wound induction motor, with its switches and connections. 2000 w. Elec Wld & Engr—Jan. 17, 1903.

Induction, Pensabene.—On Asynchronous Motors. N. Pensabene. An explanation of a method more convenient than the Heyland diagram. Mathematical. 1100 w. Elec Engr, Lond—Feb. 12, 1904.

Induction, Railway.—The Induction Motor for Electric Railways. The present article gives an abstract of a recent paper by Albert H. Armstrong, entitled "Notes on Modern Electric Railway Practice." Serial. 1st part. 3000 w. Elec Wld & Engr—Sept. 14, 1901.

Induction, Regulation.—Pole Changing in Induction Motors (Polumschaltung von Drehstrommotoren). J. K. Sumec. An examination of the method of regulating the rotative speed of induction motors by varying the magnetic field. 2500 w. Zeitschr f Elektrotechnik—June 26, 1904.

Induction, Reluctance.—The Reluctance of the Air-Gap in the Induction Motor. N. Pensabene. A study of the case of open slots in the stator and totally enclosed slots in the rotor. 900 w. Elec Engr, Lond—June 17, 1904.

The Reluctance of the Air-Gap in the Induction Motor. N. Pensabene. Considers the case of semi-enclosed slots in stator and closed slots in rotor, and also the case where both stator and rotor have semi-enclosed slots. 700 w. Elec Engr, Lond—Aug. 26, 1904.

Induction, Rotor.—The Choice of Rotor Diameter for Induction Motors (Die Wahl des Rotordurchmessers bei Induktionsmotoren). H. M. Hobart. A discussion of the formula of Behrend with application to a practical example. 1800 w. Elektrotech Zeitschr—Nov. 12, 1903.

The Choice of the Rotor Diameter of Induction Motors. Translation of an article by H. M. Hobart in "Elektrotechnische Zeitschrift." Emphasizes the importance of that part of the total inductance, which is due to the end connections, and develops a practical method by which the best dimensions may be decided. 1200 w. Elec Engr, Lond—Dec. 11, 1903.

Induction, Self-Starting.—Auto-Starter for a 1,400-Horse-Power Induction Motor. Brief illustrated description of an apparatus manufactured by the Westinghouse Co. 900 w. Sci Am Sup—July 15, 1905.

Induction, Single-Phase.—The Single-Phase Induction Motor. A. S. M'Allister. An outline of its characteristic features, showing the similarities and differences between the performance of a single-phase and a polyphase machine and investigating the methods by which the single-phase motor may be operated under various conditions. 2800 w. Am Elect'n—June, 1902.

Induction, Slip.—See **ELECTRIC INSTRUMENT—Slip.**

Induction, Slow Speed.—A New Design for Slow Speed Induction Motors. Prof. Clarence P. Feldmann. Brief illustrated description of a German design of a double motor for draining pumps in mines. 700 w. Elec Wld & Engr—Feb. 18, 1905.

Induction, Stray Coefficient.—The Computation of the Stray Coefficient of Induction Motors (Berechnung des Streuungskoeffizienten bei Drehstrommotoren). Karl Pichelmayer. Deriving formulas for practical use, with tabulated results for its application to a number of machines. 2500 w. Zeitschr f Elektrotechnik—Feb. 12, 1905.

Induction, Testing.—A Test for Induction Motor Windings. G. H. Garcelon. Describes a test based upon the fact that any error in the winding will destroy the symmetry of the magnetic field produced by the winding when single-phase alternating-current is passed through it. Ills. 2200 w. Elec Club Jour—April, 1904.

See also **Heyland Tests; ELECTRIC TESTING.**

Induction-Transformer.—The Graphic Treatment of the Phenomena of Static Transformers and Induction Motors. A. S. M'Allister. An outline description presenting the facts upon which the coustruction of the circular diagram depends and giving a comprehensive example of its application to an induction motor treated as a transformer. 3000 w. Sib Jour of Engng—Nov., 1904.

Induction vs. Direct Current.—The Relative Performance and Efficiency of Direct Current and Induction Motors. W. Elwell Goldsborough. Abstract of a lecture delivered before the Cleveland Electric Club. A comparison of the characteristics and discussion of the performance. 4000 w. Engr, U S A—May 15, 1901.

Interpole.—See **Morris-Hawkins.**

Iron and Steel Works.—The Electric Motor. A. E. MacCoun. From Boston "Journal of Commerce." Gives facts showing how the use of electricity is being developed about steel works and blast furnaces. 1500 w. Sci Am Sup—March 7, 1903.

See also **ELECTRIC DRIVING.**

Ivel, Agricultural.—The Ivel Agricultural Motor. Herbert C. Fyfe. Brief illustrated description of a motor constructed to draw reapers, plows, mowers, wagous, etc. Designed chiefly for the use of farmers. 800 w. Sci Am—May 30, 1903.

Johnson-Lundell.—Railway Motors with Compound Winding (Bahnmotoren mit Kompoundwickelung). H. M. Hobart. An illustrated account of tests made on Johnson-Lundell electric railway motors with compound winding and two commutators. 1 plate. 1500 w. Zeitschr f Elektrotech—June 28, 1903.

Kimball Paper.—The Development and Use of the Small Electric Motor. Fred M. Kimball. The first of a series of articles treating of the applications of electric motors of moderate size in all branches of engineering work. The present article discusses progress in design, introduction, and running economy, and is profusely illustrated. 4000 w. Engineering Magazine—April, 1903.

The Development and Use of the Small Electric Motor. II. The Electric Motor in the Machine Shop. Fred. M. Kimball. This second paper in Mr. Kimball's series deals with the function of electric driving in increasing shop output, lays down the general principles of motor applications to machine tools, and gives valuable figures of the power required for standard tools and operations. Largely illustrated. 4100 w. Engineering Magazine—May, 1903.

The Development and Use of the Small Electric Motor. III. The Choice of Motors for Machine Shop and Factory. Fred. M. Kimball. This third paper in the current series describes the types of motors and discusses their choice, installation, and daily operation from the standpoint of the power user. It gives some valuable data of power required for various machines and of running costs. Illustrated. 5000 w. The Engineering Magazine—June, 1903.

The Development and Use of the Small Electric Motor. IV. Applications to General Manufacturing Purposes. Fred. M. Kimball. Concluding a comprehensive series by an illustrated review of a variety of industrial, domestic, and commercial uses to which electric driving is especially adapted. Ill. 4500 w. The Engineering Magazine—July, 1903.

The Widening Use of Small Electric Motors. F. H. Kimball. An illustrated article referring specially to American practice. Serial. 1st part. 1500 w. Cassier's Mag—Feb., 1905.

Lamme.—See **Single-Phase.**

Lanhoffe.—See **Speed Range.**

Latour.—See **Repulsion; Single Phase; COMMUTATION—Alternating Current Motor.**

Launch.—Design for a 3 H. P. Launch Motor. Cecil P. Poole. Sketches showing the important features of a multipolar motor designed for driving the screw propeller of a pleasure boat, with description. 1500 w. Am Elect'n—Nov., 1901.

Leakage Coefficient.—See **Induction.**

Liverpool Elevated Railway. — See **ELEVATED RAILWAY.**

Loading A. C.—Load Equalization for Asynchronous Motors (Belastungsausgleich von Asynchronmotoren für Stossweise Betriebe). Hans Linsenmann. An examination of the influence of irregular loading, developing curves for computation of turning moments, and regulating masses. 2500 w. Elektrotech Zeitschr—Nov. 19, 1903.

Losses.—The Retardation Method of Measuring

Losses in Electric Motors and Generators. Frederick W. Seringhaus, Jr., and Gerard B. Werner. Gives in detail the results of an investigation of this method, made at Columbia Univ. 2000 w. Sch of Mines Qr—Jan., 1905.

Machine Shop.—See ELECTRIC DRIVING.

Magnetic Brake.—See BRAKE—Magnetic.

Magnetic Leakage.—See Induction, Design.

Maintenance.—Use and Care of Motors. Lloyd Marshall. Some points bearing on the service and control of motors and the care needed. 1800 w. Engr, U S A—July 1, 1901.

Mine Drainage.—See Induction, Slow Speed.

Morris-Hawkins.—The Morris-Hawkins Inter-pole Motor. Illustrated description of motors which, it is claimed, run sparklessly on all loads with brushes fixed in the neutral position. 800 w. Engng—Sept. 29, 1905.

Multiple-Voltage Control.—See Control; Single Phase; ELECTRIC DRIVING.

N. Y. Subway.—The Type of Controllers and Motors to be Used in the New York Subway. Illustrated description of the controller equipments and of the General Electric motors. 2500 w. St Ry Jour—March 14, 1903.

Test of Subway Motors. An account of these tests, which were the most exacting ever made in electric railway practice, and of the methods employed. 2500 w. St Ry Jour—March 21, 1903.

Westinghouse Motors for the Rapid Transit Subway, New York. Illustrated description of motors designed especially for this purpose, to fit the conditions and requirements. 1500 w. St Ry Jour—March 21, 1903.

Oerlikon.—Non-Synchronous Polyphase Motor of 600 H. P. and 75 Revolutions (Asynchroner Drehstrommotor von 600 P. S. mit 75 Umdrehungen). A description of a large polyphase motor recently constructed by the Oerlikon works. 1200 w. Schweizerische Bauzeitung—Dec. 29, 1900.

Electric Motors with Variable Speed (Moteurs Electriques à Vitesse Variable). A description of the induction and continuous current motors made by the Oerlikon Company of Switzerland. 1800 w. Génie Civil—Oct. 18, 1902.

Polyphase Motors with Four Speeds (Vierstufiger Drehstrommotor). Dr. Hans Behn-Eschenburg. A description of the improved polyphase motors of the Oerlikon works, having speeds of 500, 750, 1,000 and 1,500 revolutions; also continuous current motors with speeds from 350 to 1,600 revolutions. 2000 w. Schweitz Bauzeitung—Oct. 18, 1902.

Oerlikon Polyphase Motor with Four Speeds (Drehstrommotor der Maschinenfabrik Oerlikon mit Vier Geschwindigkeitsstufen). Dr. H. Behn-Eschenburg. A description of an improved polyphase for speeds of 500, 750, 1,000 and 1,500 revolutions per minute; also of a continuous-current motor for 350 to 1,600 revolutions. 3500 w. Elektrotech Zeitschr—Dec. 4, 1902.

A New Railway Motor (Nouveau Moteur Electrique pour Chemins de Fer). Illustrated description of a 750-volt, direct-current motor made by the Oerlikon Co. for the Freiburg-Morat Ry., Switzerland. 500 w. Bull Tech d la Suisse Romande—April 25, 1903.

Olympia Exhibition.—Alternate-Current Machinery at Olympia. P. R. Friedlander. Principally illustrating and describing single-phase and three-phase motors of recent design at the Olympia exhibition, at London. 2000 w. Elec Engr, Lond—Oct. 6, 1905.

See also ELECTRIC EXHIBITION; ELECTRIC MACHINERY.

Parallel Driving.—The Requirements Upon Motors for the Parallel-Driving of Alternators (Anforderungen an Antriebmotoren beim Parallelbetrieb von Wechselstromdynamos). E. Rosenberg. Discussing especially matters of speed-regulation. Two articles. 8000 w. Zeitschr d Ver Deutscher Ing—May 28, June 4, 1904.

See also ELECTRIC GENERATOR, ALTERNATING.

Polyphase.—A New Design for Motors (Eine Neue Motorschaltung). Hugo Grob. Describing a special method of connecting the stator and the rotor of polyphase motors in series. 2500 f. Elektrotech Zeitschr—March 7, 1901.

The Distribution of Lines of Force in Rotary Current Motors (Zur Kraftlinienvertheilung in Drehstrommotoren). J. B. Krantz. A mathematical discussion, with diagram and table. 700 w. Elektrotech Zeitschr—March 28, 1901.

Short-Circuiting and Starting of Polyphase Current Motors (Ueber den Kurzschluss und Anlauf von Drehstrommotoren). R. Goldschmidt. Deducing formulas for computing the short-circuiting for different periodicities, and magnetic conditions. 4500 w. Electrotech Zeitschr—April 18, 1901.

Measurement and Computation of the Losses of Unloaded Induction Motors (Messung und Berechnung der Leerlaufverluste von Drehstrommotoren). Dr. G. Benischke. Describing the application of the stroboscopic disk for the determination of slip at various loads. 2500 w. Elektrotech Zeitschr—Aug. 29, 1901.

Characteristic Performance of the Induction Motor. A. S. McAllister. Discusses the ordinary polyphase induction motor, its characteristic behavior as built at present, starting devices, etc. 2200 w. Am Elect'n—April, 1902.

Three-Phase Motors with Wide Range of Speed Variation. Dr. H. Behn-Eschenburg. Illustrates and describes the new drum windings introduced by the Oerlikon Co., stating the advantages gained. 2800 w. Elect'n, Lond—Nov. 21, 1902.

On the Application of Three-Phase Motors to the Electrical Driving of Workshops and Factories. A. C. Eborall. Gives an introductory general discussion, and considers questions relating to the construction and performance of three-phase motors. Illustrations and discussion. 11000 w. Jour Soc of Arts—April 3, 1903.

Polyphase Motor Installations. The first of a series of papers aiming to give in a brief and simple manner such information as will enable the engineer in charge, who has no special knowledge of electrical matters, to understand the plant put under his care. Serial. 1st part. 4000 w. Prac Engr—April 24, 1903.

The Power Factor of Three-Phase Motors with Current Curves of Any Shape (Ueber den Leistungsfaktor von Drehstrommotoren bei Beliebiger Kurvenform). Alberto Dina. A mathematical discussion of the relation of the power factor to the shapes of the potential and current curves. 1200 w. Zeitschr f Elektrotechnik—May 3, 1903.

The Theory and Operation of Polyphase Motors with Commutators and Shunt Excitation (Beitrag zur Theorie und Wirkungsweise der Mehrphasigen Kommutatormotoren mit Nebenschlusserregung). O. S. Bragstad. An illustrated theoretical and descriptive discussion of these electric motors. Serial. Part 1. 1800 w. Elektrotech Zeitschr—May 14, 1903.

Electric Motors: Their Theory and Construction. H. M. Hobart. The first article of a second series, investigating the conditions leading to the most satisfactory design of polyphase motors. Ill. Serial. 1st part. 6800 w. Trac & Trans—Sept., 1903.

Some Polyphase Motors (Ausgeführte Drehstrommotoren). Jens Bache-Wiig. Describing motors of 250, 25 and 0.25 horse power, of simple construction and high efficiency. 2500 w. Zeitschr f Elektrotechnik—Nov. 6, 1904.

The Speed Regulation of Three-Phase Motors. Abstract translation of an article by W. Burkard in "Elektrotechnische Zeitschrift." An illustrated explanation of the principal methods. 900 w. Elec Engr, Lond—Nov. 13, 1903.
See also Cascade; Induction; Oerlikon; Tesla Patent; ELECTRIC CONDENSER.

Polyphase, Air Gap.—An Experimental Study of the Influence of Various Air Gaps in Polyphase Motors (Eine Experimentalstudie über den Einfluss Verschiedener Grössen des Luftzwischenraumes bei Drehstromotoren). Dr. Max Breslauer. With diagrams showing the influence of changes in the width of the air gap upon the action of motors. 2000 w. Zeitschr f Elektrotechnik—Jan. 18, 1903.

Polyphase, Commutator.—Polyphase Motors with Commutators (Ueber Drehfeldmotoren mit Kommutatorankern). H. Alexander and Dr. L. Fleischmann. A theoretical discussion of polyphase motors provided with commutators in order to prevent phase shifting, and a consideration of special types of this class. Serial. 2 parts. 4500 w. Zeitschr f Elektrotechnik—May 10 and 17, 1903.

See also **Alternating Commutator; Heyland; Repulsion.**

Polyphase Design.—The Computation of the Short-Circuit Current in Polyphase Motors (Die Berechnung des Kurzschlusstromes von Drehstrommotoren). A. Siewert. A mathematical investigation, showing the relation between the short circuit current and the magnetization. 5000 w. Elektrotech Zeitschr—Aug. 1, 1901.

The Designing of Polyphase-Current Machines. David Bergman. A discussion, with curves, of various points in the design of polyphase motors and generators. 1200 w. Elec Rev, Lond—Dec. 26, 1902.

The Design of Polyphase Motors (Zur Berechnung von Drehstrommotoren). J. K. Sumec. Comprehensive discussion of the calculations with formulae and diagrams. 4000 w. Zeitschr f Elektrotech—Aug. 27, 1905.

Polyphase Diagrams.—The Numerical Computation of Three-phase Motor Diagrams (Ein Beitrag zur Rechnerischen Behandlungen des Dreiphaser-Motordiagrammes). O. Weisshaar. An analytical treatment of the data from motor diagrams, with applications to numerical examples. 4000 w. Elektrotech Zeitschr—Nov. 14, 1901.

See also **Heyland Diagrams; Induction Diagrams.**

Polyphase, Losses.—The Measurement of Iron Losses in Asynchronous Polyphase Motors (Messung und Berechnung der Eisenverluste in den Asynchronen Drehstrommotoren). J. Bache-Wiig and O. S. Bragstad. Describing the construction of curves for the determination of hysteresis and eddy-current losses. 2000 w. Zeitschr f Elektrotechnik—Dec. 3, 1905.

Polyphase, Oerlikon.—See **Oerlikon.**

Polyphase Tests.—Tests of Polyphase Motor (Untersuchung eines Drehstrommotors). E. Ziehl. Data and results of tests of a polyphase motor built by the Berlin Maschinenbau A. G., with curves showing efficiency and capacity under various conditions. 3500 w. Elektrotech Zeitschr—March 20, 1902.

See also **Heyland Tests; Induction Testing; ELECTRIC MEASUREMENT—Power; ELECTRIC TESTING.**

Polyphase, Wüst.—Report on the Wüst Polyphase Motor (Bericht über Untersuchungen an einem Drehstrom-Motor mit Abstufbarer Tourenzahl; Patent Wüst). Drs. Weber and Denzler. Description of a polyphase motor with speeds ranging from 700 to 1,500 revolutions per minute. 2500 w. Schweizerische Bauzeitung—Aug. 31, 1901.

Power Factor.—See also **Polyphase; ELECTRIC MEASUREMENT.**

Power Factor Regulation. — Discussion on "Synchronous Motors for the Regulation of Power-Factor and Line Voltage." Discussion at Chicago of paper by B. G. Lamme. 6500 w. Trans Am Inst of Elec Engrs—Oct., 1904.

Railway.—The Capacity and Rating of Railway Motors. Norman Wilson Storer. Gives a method for determining the capacity of railway motors and their fitness for any given service. 3500 w. St Ry Jour—Jan. 5, 1901.

The Efficiency of Street Railway Motors (Zur Frage der Leistungsbezeichnung von Strassenbahnmotoren). M. Müller. An examination of the conditions of action of motors in tramway service, with a view to proper powering. 3000 w. Elektrotech Zeitschr—Jan. 24, 1901.

The Construction of an Electric Tramway Motor. S. H. Short. Illustrates and describes the various processes through which the steel, iron and copper must go to make a complete modern motor. Serial. 1st part. 1100 w. Elec Rev, Lond—March 29, 1901.

The Service Capacity of Railway Motors. A. H. Armstrong. Considers method of predetermining the fitness of a railway motor for a given service. 4000 w. St Ry Jour—April 6, 1901.

The Railway Motor of the Company "La Francaise Electrique" (Les Moteurs de Tramways de la Société "La Française Electrique"). Illustrating and describing an improved form of enclosed motor for tramway service. 1500 w. Revue Technique—Sept. 25, 1901.

The Service Capacity of Railway Motors. N. W. Storer. A reply to an article by A. H. Armstrong in the April number of this journal, criticising a former article by the writer, published in the Jan. number. Also editorial. 4500 w. St Ry Jour—Nov. 2, 1901.

The Determination of the Capacity of Railway Motors (Die Berechnung der Motorleistung im Bahnbetrieb). M. Müller. Showing the limitations as to sparking and overheating of motors at maximum load, with methods of computing these limits. 4000 w. Elektrotech Zeitschr—Nov. 7, 1901.

The Performance of Electric Railway Motors. George T. Hanchett. Gives an analysis of performance curves and considers their application to the problem of practical selection, believing it to be the only proper way of choosing a railway motor for a given service. 5000 w. St. Ry Jour—Dec. 7, 1901.

Geared Electric Motors for City and Suburban Railways (Zahnradmotoren für Stadt- und Vorortbahnen). Hr. Siebert. An illustrated discussion of motors for railway work. 1000 w. Elektrotech Zeitschr—March 6, 1902.

Selection of Street Railway Motor Equipment. Fred A. Jones. Read at meeting of the Southwestern Gas, Elec. & St. Ry. Assn. Gives a statement of efficiency showing great need of economy, and discusses what should be considered in the selection of the motor equipment. 1800 w w. St Ry Jour—May 17, 1902.

Selection of Tramway Motors: Tractive Effort and Power Required. Harold C. King. Gives a diagram showing the power required for various weights of cars running at various speeds on certain gradients, and points to assist in proper selection. 1200 w. Tram & Ry Wld—June 12, 1902.

Notes on the Testing of Tramway Motors, and an Investigation into Their Characteristic Properties. Michael B. Field. Read before the Glasgow Local Sec. of the Inst. of Elec. Engrs. Shows how such motors may be tested quickly and all their characteristic properties ascertained. Serial. 1st part. 3400 w. Elec Engr, Lond—Aug. 15, 1902.

Some Notes on the Operation of Railway Motors in Service. Clarence Renshaw. On the means of determining whether the loads carried by the motor are within its capacity. Results of actual tests, explaining method of equating the service loads. Also discussion. 7000 w. Trans Am Inst of Elec Engrs—June, 1903.

Electric Railway Motors (Der Elektromotor als Eisenbahnmotor). F. Niethammer. A classification and review of the different systems of electric traction and a discussion comparing the direct-current motor very favorably with the polyphase motor. Serial. 2 parts. 6000 w. Zeitschr f Elektrotech—June 14 and 21, 1903.

Is a Universal Type of Railway Motor Advisable? A. H. Armstrong. Discusses the various types of motors and their advantages and concludes that while uniformity is desirable, the best interests of a system are conserved by adapting the motive power to the requirements. 2800 w. St Ry Jour—April 15, 1905.

A 75-Horse Power Continuous Current Railway Motor for High Voltages (Ein 75 P. S. Gleichstrom Bahnmotor für Hochspannung). H. Rikli-Keblstadt. Details of windings for a continuous-current motor to be operated at 1,500 volts; with curves and tables of its performance. 2000 w. Schweiz Bauzeitung—Nov. 25, 1905.

Exhibition of the General Electric Company's Compensated Railway Motor Equipment. Gives illustrations showing features of this new equipment recently exhibited on the Ballston extension of the Schenectady Railway. The object is to adapt electric traction to longer lines through the use of the alternating current. 1200 w. Am Mach—Vol. 27, No. 39.

See also **Heating; Induction, Railway; Johnson-Lundell; N. Y. Subway; Oerlikon; Self-Induction; Single-Phase; ELECTRIC CAR—Motor; ELECTRIC RAILWAY; ELEVATED RAILWAY—Liverpool.**

Railway, A. C.—Discussion at St. Louis, Sept. 14, 1904, on "Different Methods and Systems of Using Alternating Current in Electric Railway Motors." 10,600 w. Trans Am Inst of Elec Engrs—Nov., 1904.

See also **Single-Phase.**

Railway, Connections.—See **ELECTRIC CAR—Motor Connections.**

Railway Interurban.—See **ELECTRIC CAR—Interurban.**

Railway Operation.—See ELECTRIC RAILWAY—**Motor Operation.**

Railway Regulation.—See **CONTROLLER.**

Railway Shunt Wound.—Shunt-Wound Motors on Railway Circuits. E. C. Parham. An explanation of why the belt on the motor either squeals or flies off when there is a ground-out on the line. 800 w. Am Elect'n—Dec., 1900.

Shunt-Wound Tramway Motors. A. Johnston. Some points on the working of shunt-wound motors, especially in tramway service. 2200 w. Elect Engr, Lond—Dec. 1, 1905.

Railway Tests.—Comparative Tests of Street Railway Motors. C. H. Bigelow. Read at Boston meeting of the New England St. Ry. Club. A report of comparative tests between four-motor and two-motor cars. 1600 w. Elec, N Y—April 10, 1901.

Rating, Diagrams.—Motor-Rating Diagram. C. P. Nachod. Outlines a convenient method of expressing the characteristics of a complete line of motors of one type, but of various speeds and outputs. 500 w. Elec Wld & Engr—Sept. 16, 1905.

Regulating Line Currents.—Synchronous Motors for Regulation of Power-Factor and Line Pressure. B. G. Lamme. Shows how a synchronous motor can be used to establish leading or lagging currents in its supply system, and as a regulator. 4500 w. Trans Am Inst of Elec Engrs—June 21, 1904.

Regulation.—Speed Regulation of Shunt Motors by the Multiple Voltage System. G. L. Hoxie. Considers the methods employed to provide for the speed adjustment, describing especially the multiple voltage system. 1500 w. Sib Jour of Engng —Dec., 1900.

The Speed Control of Electric Motors. G. F. Packard. Describes the method which consists in varying the speed by varying the volume and pole face distribution of the magnetic flux. 1100 w. Ir Age—March 7, 1901.

See also **Shunt on Railway; CONTROLLER.**

Repulsion.—A Repulsion Motor (Repulsionsmotor). Marius Latour. An illustrated discussion of an electric motor having an alternating field, wound like an armature and a rotor with commutator. 1200 w. Elektrotech Zeitschr—June 11, 1903.

The Repulsion Motor. Notes from an article by M. Marius Latour, recently published in the "Elektrotechnische Zeitschrift." Gives a diagrammatic sketch of repulsion motor with distributed stator windings, explaining the theory. 1300 w. Elect'n, Lond—July 10, 1903.

On Single-Phase Repulsion Motors. William Cramp. Read at Southport meeting of the British Assn. A study of the design of the repulsion motor. Ill. Serial. 1st part. 4000 w. Elec Engr, Lond—Sept. 25, 1903.

The Circle Diagram of the Repulsion Motor (Das Kreisdiagramm des Repulsions-motors). M. Osnos. A discussion of the application of the vector analysis to the solution of problems of speed and torque in repulsion motors; graphical and analytical treatments are given. 4000 w. Elektrotech Zeitschr—Oct. 29, 1903.

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The Second Form of Repulsion Motor and the Compensated Series Motor (Die Zweite Form des Repulsionsmotors und des Kompensierten Reihenmotors). M. Latour. With diagrams showing the various modification in the commutation. 1200 w. Elektrotech Zeitschr—Nov. 10, 1904.

A New Repulsion Motor and its Preliminary Computations (Ein Neuer Repulsions-Motor und Seine Vorausberechnung). Karl Schnetzler. A discussion of the problems connected, the windings, the position of the brushes, and the dimensions for required power and regulation. Two articles. 6000 w. Elektrotech Zeitschr—Jan. 19, 26, 1905.

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See also **Alternating Commutator; Heyland; Single-Phase.**

Self-Induction.—Effect of Self-Induction on Railway Motor Commutation. E. H. Anderson. Deals with fundamental features of railway motor commutation, illustrating by oscillograph records. 2700 w. Trans Am Inst of Elec Engrs—May 17, 1904.

Series, Diagrams.—Diagrams for the Compensated Series Motor (Diagramme für den Kompensierten Serienmotor). M. Osnos. Developing graphical diagrams for determining the voltage relations at various speeds. 4500 w. Elektrotech Zeitschr —March 17, 1904.

The Alternating-Current Series Motor Considered as a Choking Coil (Der Wechselstrom-Serienmotor als Allgemeine Drosselspule). H. Weichsel. Study of the circle diagram, showing the identity of the diagrams of the alternating series motor and the ordinary choking coil. 2500 w. Elektrotech Zeitschr—Oct. 20, 1904.

Series Parallel.—See **Speed Control.**

Shunt.—Action of a Shunt-Wound Motor when Driven by a Series-Wound Dynamo. A. S. M'Allister. A study of the operation. Ill. 1100 w. Am Elect'n—Feb., 1903.

Shunt Motors for Electric Cranes. Claude W. Hill. Points out the advantages the shunt motor offers for driving the hoisting gears of cranes, more especially when the gears are remote from the controller. 700 w. Elec Rev, Lond—July 14, 1905.

Shunt on Railway.—See **Railway Shunt Wound.**

Siemens & Halske.—Losses in a Large Non-Synchronous Motor (Ueber Verluste an einem Grossen Asynchronmotor). F. Bodensteiner. Data and results of a test of a Siemens & Halske motor of 170 H. P.; showing an efficiency of 92.4 per cent. at full load. 1200 w. Elektrotech Zeitschr—Aug. 21, 1902.

Single-Phase.—Self-Starting Single-Phase Motor Without Brushes. J. Fischer-Hinnen. Illustrated description of a motor where the current distribution in the armature required for starting is effected by means of induction, doing away entirely with the brushes. 800 w. Elec Wld & Engr—June 22, 1901.

A New Single-Phase Motor (Nouveau Matériel à Courant Alternatif Simple). Marius Latour and M. Gratzmuller. The theory of a new single-phase alternating current motor for railway work, and illustrated description of one and results of tests. 3000 w. Bull Soc Internat d Electriciens—June, 1903.

Single-Phase Motors on Multi-Phase Plants. H. A. Bullard. Read at Con. of Pacific Coast Elec. Trans. Assn. Explaining its value in polyphase plants, and describing the Wagner single-phase motor and its operation. 1800 w. Jour of Elec —July, 1903.

A New Single-Phase Motor (Ein Neuer Einphasenmotor). L. Schüler. An illustrated description of a single-phase alternating-current motor working on the rotary-field and the repulsion principle, with a commutator. 2500 w. Elektrotech Zeitschr—July 16, 1903.

The Theory of Non-Synchronous Single Phase Motors (Zur Theorie des Asynchronen Einphasenmotors). Fritz Emde. A mathematical discussion of the theory of Görges, transforming the relations to render them applicable to the case of two rotating fields. 2000 w. Elektrotech Zeitschr—Aug. 27, 1903.

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"Elektrotechnische Zeitschrift." An illustrated description of an alternating current motor working on the repulsion principle. Ill. 3000 w. Elec Engr, Lond—Sept. 4, 1903.

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Single-Phase Motors without Difference of Phase (Einphasenmotoren ohne Phasenverschiebung). Marius Latour. Describing the simple form of single-phase repulsion motor designed by the writer, with a mathematical discussion showing the torque at different speeds. 2000 w. Elektrotech Zeitschr—Oct. 22, 1903.

Single-Phase Motors for Traction. Dr. Giorgio Finzi. A discussion of this system, giving results of experiments, and comparing with other systems. Serial. 1st part. 3000 w. Elec Rev, Lond—Nov. 6, 1903

A Single-Phase Motor. Illustrated description of the motor employed in the new system of single-phase traction introduced by the Union Elektricitäts Gesellschaft. 3000 w. Elect'n, Lond—Nov. 27, 1903.

Self-Starting Single-Phase Motor without Commutator (Mit-Last Angehender Kollektorloser Einphasen-Wechselstrommotor). Dr. Max Corsepius. Describing a simple form of single-phase motor. 2500 w. Elektrotech Zeitschr—Dec. 10, 1903.

European Single-Phase Railway Motor. Guido Semenza. An illustrated account of experiments with the motor designed by Giorgio Finzi. 3000 w. St Ry Jour—Dec. 12, 1903.

The Finzi Single-Phase, Alternating-Current Traction Motor. Enrico Bignami. Illustrated detailed description. 2000 w. Elec Rev, N Y—Dec. 12, 1903.

Traction with Single-Phase Alternating-Current Speed Regulation and Recovery of Energy (Traktion mit Einphaseustrom. Regelung der Geschwindigkeit und Wiedergewinnung von Arbeit). Marius Latour. Discussion of motor types and connections. Diagrams. 800 w. Elektrotech Zeitschr—Dec. 17, 1903.

Some Possibilities of the Alternating Current Single Phase Railway Motor. A. H. Armstrong. Abstract of a paper read before the Elec. Sec. of the Canadian Soc. of Civ. Engrs. A general discussion of the operation of steam lines by the alternating current railway motor. 3300 w. Can Elec News—Jan., 1904.

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The Regulation of Single Phase Commutator Motors (Einphasenkollektormotoren und ihre Regelung). Friedrich Eichberg. A mathematical discussion, with numerous diagrams referring especially to the motor designed by the author and Herr Winter. 5000 w. Elektrotech Zeitschr—Jan. 28, 1904.

The Alternating-Current Railway Motor. Charles P. Steinmetz. Theory of the single-phase repulsion motor, whose field constitutes a primary winding, and whose armature or secondary winding is closed upon itself through a commutator. Diagrams. 4700 w. Trans Am Inst of Elec Engrs—Jan. 29, 1904.

Speed-Torque Characteristics of the Single-Phase Repulsion Motor. Walter I. Slichter. Results of tests of alternating-current motors with armature winding short-circuited on itself through commutator and brushes, which are well suited for railway service. Curve sheets. 1600 w. Trans Am Inst of Elec Engrs—Jan. 29, 1904.

The Single-Phase Series Motor in Its Relation to Existing Railway Systems. Charles F. Scott. On the advantages of the single-phase system, and the adaptability of the apparatus to the old system. 1700 w. Elec Club Jour—Feb., 1904.

Discussion on A. I. E. E. Papers on the Single-Phase Railway Motor. Discussion in full by Messrs. Lamme, Steinmetz and Armstrong, and the non-mathematical part of the remarks of Prof. A. S. McAllister. 8000 w. Elec Wld & Engr—Feb. 13, 1904.

British Lamme Single-Phase Railway Motor Patent. Reprint of the full specification of the British patent granted to B. G. Lamme, with drawings. 5000 w. Elec Wld & Engr—Feb. 13, 1904.

The Theory of the Atkinson Repulsion Motor (Theorie der Atkinsonschen Repulsionsmotoren). M. Osnos. An exhaustive analytical and graphical analysis. Two articles. 6000 w. Zeitschr f Elektrotechnik—Feb. 14, 21, 1904.

Single-Phase Commutator Motors and Their Regulation. Translation of a paper by Friedrich Eichberg, printed in the "Elektrotechnische Zeitschrift." The present number discusses phenomena appertaining to commutator machines. Serial. 1st part. 2500 w. Elec Engr, Lond—Feb. 26, 1904.

Single-Phase Commutator Motors (Die Einphasigen Kommutatormotoren). J. K. Sumec. An elaborate mathematical study, employing both analytical and graphical methods. Serial. Part I. Zeitschr f Elektrotechnik—March 20, 1904.

Single-Phase Motors as a Means of Increasing Station Earnings. W. A. Layman. Presented at meeting of the Ohio, Colorado, and Southwestern Electric Light Assn. Shows ways in which the single-phase, alternating-current motor lends itself to power distribution and economical service. Describes the Wagner single-phase motor. Ills. 3000 w. Jour of Elec—April, 1904.

The Westinghouse Single-Phase Motor. Illustrated description of this alternating-current series motor. It is claimed that by a simple change in the controller the motor can be operated by direct current. 1100 w. R R Gaz—April 8, 1904.

The Single-Phase Induction Motor. William S. Franklin. A mathematical discussion of the design. 2700 w. Trans Am Inst of Elect Engrs—May 17, 1904.

The Repulsion Motor. F. W. Carter. Discusses the principles and properties of a single-phase alternating-current motor whose speed characteristic droops considerably with increase of train resistance. Serial. 1st part. 1000 w. Elec Rev, Lond—May 27, 1904.

Single-Phase Motors. George T. Hanchett. A non-mathematical description of the rotative principle of the single-phase induction motor. 1500 w. Cent Sta—June, 1904.

Single-Phase Commutator Motors (Ueber Einphasenkommutatormotoren). Karl Pichelmayer. A review of the various forms of single-phase motors, comparing them with the continuous-current motor. 7000 w. Elektrotech Zeitschr—June 2, 1904.

On Single-Phase Commutating Motors. K. Pichelmayer. Abstract translation from the "Elektrotechnische Zeitschrift." A review of various types of motors, comparing them with the continuous-current motor. 4300 w. Elec Engr, Lond—July 29, 1904.

Single-Phase Power Motors. R. B. Elder. Paper before the Pacific Coast Electric Transmission Assoc., discussing the single-phase alternating current motor principally from the commercial standpoint. 3000 w. Jour of Elec—Aug., 1904.

The Operation of the Single-Phase Motor on the Niederschöneweide-Spindlersfeld Line (Der Betrieb mit Epinphasigem Wechselstrom auf der Strecke Niederschöneweide-Spindlersfeld). H. von Glinski. Detailed description of the motor, made by the Union Elektrizitäts-Gesellschaft, and diagrams showing the results of tests. 3000 w. Glasers Annalen—August 1, 1904.

Single-Phase Series Motor. Ralph McNeill. Describes a construction free from interruption of current in any single armature circuit. 800 w. Elec Wld & Engr—Ang. 6, 1904.

Improved Commutator-Motors for Single-Phase Alternating Currents (Neue Kollektormotoren für Einphasigen Wechselstrom). Clarence Feldmann. An examination of the action of the commutator as used on single-phase alternating motors. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 20, Sept. 10, 1904.

Compensated Single-Phase Motor of the General Electric Company. Illustrated description with report of the recent test on the Ballston Division of the Schenectady Railway Company. 2500 w. St Ry Jour—Aug. 27, 1904.

Single-Phase Motors. Max Deri. A review of the essential functions and relations of modern single-phase motors in order to facilitate a comparison of the working conditions and commutating requirements of the different systems. 6000 w. Int Elec Cong of St. Louis—Sept., 1904.

Single-Phase Commutator Motors. Seijiro Sugiyama. A theoretical treatment of series and repulsion motors. Mathematical. Serial. 1st part. 700 w. Elec Wld & Engr—Oct. 20, 1904.

Railway Motors for Single-Phase Alternating Current. Dr. Hans Behn-Eschenburg. Illustrates and describes two of the later single-phase commutator types of motor made by the Oerlikon Company, criticising their characteristics as deduced from experimental results. 2600 w. Engng—Nov. 4, 1904.

Paper on Single-Phase Railway Motors at the New York Electrical Society. Lecture by Prof. A. S. McAllister in abstract, with remarks by Frank J. Sprague. 3700 w. St Ry Jour—Nov. 12, 1904.

Description of Some Plants Inspected During a Recent Visit to the States. H. L. Risley. Describes apparatus that appeared to differ from British practice, especially single-phase traction motors. 3600 w. Elec Engr, Lond—Jan. 20, 1905.

Single-Phase Motors on Polyphase Systems. H. W. Doubrava. Discusses recent action in regard to the use of single-phase motors, the reasons for and against their use, the saving in cost, &c. 3200 w. Elec Rev, N Y—Feb. 18, 1905.

The Computations for Single-Phase Commutator Motors (Zur Berechnung Einphasiger Kommutatormotoren). J. K. Sumec. A mathematical examination of the theory of the various forms of single-phase motors, with applications to practical details of design. 6000 w. Zeitschr f Elektrotechnik—April 23, 1905.

Latest Developments in Single-Phase Motors for Commercial Power Purposes. W. A. Layman. Read before the Pacific Coast Engng Cong. Considers in some detail the developments being made in variable speed motors. 2200 w. Jour of Elec—Sept., 1905.

The Westinghouse Single-Phase Railway Motor (Der Einphasige Bahnmotor der Westinghouse-Gesellschaft). Clarence Feldman. Illustrated description, with curves. 500 w. Zeitschr d Ver Deutscher Ing—Sept. 16, 1905.

Single-Phase Alternating-Current Motors. G. Percy Cole. Abstract of a paper read before the Ohio Elec. Lgt. Assn. Reviews the development of these motors, and describes the Schuler type and the compensated series types for variable speed service. Ills. 2500 w. Engr, U S A—Oct. 2, 1905.

A Study of a Single-Phase Series Motor. George I. Rhodes. Illustrated report of test made. 2000 w. Tech Qr—Dec., 1905.

Single Phase Motors for Tramways (Einphasen-Wechselstrom-Betrieb auf Strassenbahnen). E. C. Zehme. A detailed description of the system under test in Paris by the French Thomson-Houston Company. 2000 w. Elektrotech Zeitschr—Dec. 7, 1905.

The Arrangement of Windings in Single-Phase Motors (Die Zerlegung der Amperewindungen des Einphasenmotors). Adolf Thomälen. A general study of the theory of the single-phase motor, with analytical and graphical investigation of the windings of rotor and stator. Two articles. 12000 w. Elektrotech Zeitschr—Dec. 7, 14, 1905.

See also Heyland; Repulsion; COMMUTATION—Alternating Current Motor; ELECTRIC RAILWAY; ELECTRIC STATION MANAGEMENT—Single-Phase Motor; INDUCTION REGULATOR.

Single-Phase Induction.—See Heyland; Induction Single-Phase.

Single-Phase, Non-Synchronous.—The Theory of the Single-Phase Non-Synchronous Motor (Zur Theorie des Asynchronen Einphasenmotors). Paul Müller. A mathematical and graphical study for different arrangements of the magnetic field. 4500 w. Electrotech Zeitschr—Sept. 29, 1904.

Single-Phase, Station.—Single-Phase Power Motors for Electric-Lighting Stations. W. A. Layman. Gives the writer's views as to the proper form of alternating-current equipment for large and small plants, comparing the cost of single and polyphase motors, and discussing related matter. 3500 w. Cent Sta—July, 1904.

Single-Phase vs. Direct Current.—The Electric Motor as a Railway Motor (Der Elektromotor als Eisenbahnmotor). J. Szass. A comparison of the relative advantages of continuous and single-phase motors for railway service. 1800 w. Zeitschr f Elektrotech—Nov. 22, 1903.

Slip Measurement.—See ELECTRIC INSTRUMENT.

Small.—See Kimball Paper; ELECTRIC TESTING.

Speed Control.—See Control; Variable Speed; VARIABLE SPEED—Electric vs. Mechanical.

Speed Range.—See Variable Speed.

Speed Rating.—The Rated Speed of Electric Motors as Affecting the Type to be Employed. H. M. Hobart. Read before the Inst. of Elec. Engrs. A study of continuous-current and induction motors, giving tabulated data of eleven designs, and conclusions. Ills. 3500 w. Elect'n, Lond—March 11, 1904.

The Rated Speed of Electric Motors as Affecting the Type to be Employed. Abstract of the discussion of paper by H. M. Hobart. 2700 w. Elect'n, Lond—March 18, 1904.

Speed-Time Curves.—See AUTOMOBILE, ELECTRIC; ELECTRIC RAILWAY.

Speed Variation.—See Variable Speed.

Spence.—See ELECTRIC DRIVING—Printing.

Starting.—See Control; CONTROLLER; ELECTRIC SWITCH; HOISTING—Electric Mine; RHEOSTAT.

Static.—How to Make an Oscilalting Static Electric Motor. Howard B. Dailey. Working drawings and suggestions for the construction of an experimental static motor. 1200 w. Sci Am Sup—April 29, 1905.

Switching.—See ELECTRIC SWITCH—Shunt Motors.

Synchronizing Device.—A Device for Synchronizing Motors. William Duane. Illustrated description of a device for synchronizing two electric motors under stated conditions. 1300 w. Elec Rev, N Y—March 15, 1902.

Synchronous.—Synchronous Motor Stability and Overload Capacity Curves. F. G. Baum. Considers some important factors influencing the stability and overload capacity of motors, giving method of determining curves. 1800 w. Elec Wld & Engr—March 29, 1902.

Synchronous Motor Calculations. F. G. Baum. Gives a method for solving synchronous motor problems which is as simple as the solving of problems concerning a generator. 3200 w. Elec Wld & Engr—May 17, 1902.

Notes on the Theory of the Synchronous Motor, with Special Reference to the Phenomenon of Surging. Charles Proteus Steinmetz. A mathematical study of synchronous motors and converters, in which two independent variables exist; load and field excitation. Diagrams and curves. 3000 w. Am Inst of Elec Engrs—June 18, 1902.

An Analysis of the No-Load Current of Synchronous Motors (Analyse des Leerlaufstromes von Synchronmotoren). E. Rosenberg. With diagrams showing the variations in phase curves under different conditions. 3000 w. Elektrotech Zeitschr—Feb. 12, 1903.

Influence of the Line on the Parallel Operation of Synchronous Motors. Abstracts of the papers by Signor Rebora and Signor Guido Jemenza, in the "Transactions" of the Italian Assn. of Elec. Engrs. Also Editorial. 4000 w. Elec Wld & Engr—June 18, 1904.

See also Power Factor Regulation; ELECTRIC GENERATOR, ALTERNATING — Construction; Parallel.

Synchronous Asynchronous.—See Asynchronous.

Synchronous, Construction.—See ELECTRIC GENERATOR, ALTERNATING—Construction.

Synchronous, Diagram.—A Working Diagram of the Alternating Current Synchronous Motor. A. E. Kennelly. Gives a graphical method of representing the relations between the e. m. f.'s, currents and power in a single-phase synchronous-motor circuit, applicable to three-phase motor systems. Also editorial. 2000 w. Elec Wld & Engr—Jan. 28, 1905.

Synchronous, Testing.—See **ELECTRIC GENERATOR, ALTERNATING—Testing.**

Tesla Patent.—An Important Polyphase Motor Decision. Judge Brown's decision in the suit of the Westinghouse Electric and Manufacturing Co. vs. the Royal Weaving Co. for infringement of the Tesla patents for polyphase motors. 2500 w. Elec Rev, N Y—May 24, 1902.

Testing.—See also **Heyland Tests; N. Y. Subway; ELECTRIC GENERATOR TEST; ELECTRIC TESTING.**

Testing, Eddy Current Brake.—See **ELECTRIC APPARATUS—Eddy Current Brake.**

Testing Hopkinson.—See **ELECTRIC TESTING—Hopkinson.**

Testing Windings.—See **Induction Testing.**

Thompson-Ryan.—The Thompson-Ryan Motor and Its Application to Machine Tools. An illustrated description of an electric motor giving wide speed range by means of field control. 3300 w. Ir Age—Jan. 5, 1905.

Three-Phase.—See **Polyphase.**

Three Wire, D. C.—See **Variable Speed.**

Torque.—A Convenient and Economical Electrical Method for Determining Mechanical Torque. A. S. McAllister. Explains a method which is very accurate and applicable to all types of motors. 1400 w. Elec Wld & Engr—May 7, 1904.

Electromagnetic Torque. A. S. McAllister. Describes somewhat unusual conditions for obtaining torque in direct current apparatus, having a bearing upon commutator types of alternating-current machinery. Diagrams. 700 w. Elec Wld & Engr—Dec. 3, 1904.

Traction.—See **Single-Phase; ELECTRIC RAILWAY.**

Variable Speed.—Continuous Current Motors with Variable Speed (Ueber Gleichstrommotoren mit Veränderlicher Umdrehungszahl). A. Hundt. The variation in speed is effected by varying the air gap between the poles and the armature. 1200 w. Elektrotech Zeitschr—March 20, 1902.

Three-Wire System for Variable Speed Motor Work. N. W. Storer. A description of the operation of variable speed d. c. motors on the three-wire system. Ill. 2500 w. Trans Am Inst of Elect Engrs—Dec., 1902.

A Direct-Current Electric Motor Whose Speed Can Be Widely Varied (Gleichstrom-Elektromotoren mit in Weiten Grenzen Veränderlichen Tourenzahlen). F. Müller. An illustrated description of a motor with auxiliary winding on the armature creating a counter e. m. f. This winding is in sections which can be cut in and out. 1000 w. Elektrotech Rundschau—April 1, 1903.

Alternating Current Motors for Variable Speed. W. I. Slichter. Shows that where an alternating current system is desirable variable speed can be obtained with good results. 2000 w. Trans Am Soc of Mech Engrs—June, 1903.

A Possible Source for Securing Wide Speed Range in Direct-Current Motors. Albert F. Hemingway. Describes methods that have been tried, especially the design of E. Lanhoffe, and the type conceived by the author. 2400 w. Elec Wld & Engr—Oct. 3, 1903.

Variable Speed Motors. J. W. Burleigh. Shows the writer's method of design of motors capable of withstanding large variations of speed. 900 w. Elec Rev, Lond—March 25, 1904.

Variable Speed Motors. William Baxter, Jr. Illustrated description of types made by the General Electric Co. Serial. 1st part. 2500 w. Mach, N Y —April, 1904.

Design of Continuous-Current Motors for Variable Speed. Franklin Punga. An explanation of the lines on which variable-speed motors should be built. 2300 w. Elec Rev, Lond—April 22, 1904.

Variation of Motor Speed with Variable Line Voltage. J. L. Dickson. Outlines, in as simple a manner as possible, two different methods of investigating this question. 600 w. Elec Wld & Engr—June 18, 1904.

Synopsis of Fundamentals Pertaining to Speed Variations in Direct-Current Motors and Details of a Motor Having a Wide Speed Range. Albert F. Hemingway. Relates briefly to the character and limitations, with illustrated description of a type of motor with wide range of speed variation. 2500 w. Am Elect'n—Aug., 1904.

Standardizing Variable Speed Motors. W. H. Powell. Read before the Nat. Machine Tool Bldrs' Assn. Shows how the output for a given size motor frame and armature core varies for the different systems of speed control, and also when operated at different amounts of speed variation. 900 w. Ir Trd Rev—Dec. 1, 1904.

Variable Speed Motors. C. L. Sumpter. An illustrated article caling attention to characteristics of the direct current motors and their applicaion. 1400 w. Elec Rev, Lond—Jan. 27, 1905.

Notes on Heating and Sparking Limits in Variable Speed Motors. A. H. Bate. Read before the Birmingham Loc. Sec. Notes the three ways of varying the speed of a shunt motor, the factors that determine the sparking limits, and discusses the way these methods offset the heating and sparking limits. 2500 w. Inst of Elec Engs—March 15, 1905.

See also **Control; Single Phase; ELECTRIC DRIVING.**

Ventilating. — Ventilating Railway Motors. Illustrates and describes a plan for ventilating and cleaning railway motors while in operation in regular commercial service. Natural draft is used. Reports tests. 1000 w. St Ry Jour—July 25, 1903.

Ventilation.—See also **Heating.**

Vibrations.—Methods of Overcoming the Vibrations Caused by Motors. Sherard Cowper-Coles. Illustrations with brief notes on a method of placing or suspending the motors on springs which has been found satisfactory. 300 w. Elec Chem & Met—Nov., 1903.

Wagner.—See **Single Phase.**

Westinghouse, Ry.—See also **New York Subway.**

Winter-Eichberg.—The Winter-Eichberg System for Regulating the Speed of Polyphase Motors (Regulierbare Drehstrommotoren. System Winter-Eichberg). G. Winter. An illustrated description of a polyphase motor in which the rotor has an auxiliary winding and a commutator, with brushes connected to a transformer which can be varied. 1500 w. Zeitscher f Elektrotechnik—April 12, 1903.

The Winter Eichberg Single-Phase Railway System. Illustrates and describes some of the features of this motor as given in the English patent, with remarks on the system. 1100 w. Elec Wld & Eng—Dec. 19, 1903.

The Theory of the Winter-Eichberg Motor (Zur Theorie des Winter-Eichberg-Motors). Paul Müller. A comparison of the Winter-Eichberg motor with the single-phase induction motor, deriving diagrams and formulas for the former. 6500 w. Elektrotech Zeitschr—Oct. 27, 1904.

The Theory of the Winter-Eichberg Motor (Zur Theorie des Winter-Eichberg Motors). Dr. L. Fleischmann. Giving both graphical and analytical treatment, and deriving equations for the computation of the turning moment. 2500 w. Elektrotech Zeitschr—Aug. 17, 1905.

A Traction Motor for Continuous and Alternating Current. Describes a car equipped with the Winter-Eichberg motors, which can be driven either by continuous or alternating-current. From the "Elektrotechnische Zeitschrift." Ills. 1000 w. Elec Engr, Lond—Aug. 4, 1905.

Single-Phase Railway Motors. Dr. Friedrich Eichberg. Describes the system of the Allgemeine Elektricitäts-Gesellschaft, and states some of its advantages. 2400 w. Elec Engr, Lond—Dec. 22, 1905.

See also **Single Phase; ELECTRIC RAILWAY—Single-Phase; Spindlersfeld.**

Wiring.—Direct Current Motor Wiring. P. C. Percy. General specifications for wires leading to direct-current motors, and full wiring tables; with diagrams. 900 w. Am Elect'n—Jan., 1903.

Worm Gear.—See **GEAR—Worm.**

Wüst Polyphase.—See **Polyphase Wüst.**

Zone, Unipolar.—See **ELECTRIC GENERATOR—Zone.**

ELECTRIC NOMENCLATURE.

See ELECTRIC APPARATUS—Standardization; ELECTRIC TERMINOLOGY; ELECTRIC UNIT.

ELECTRIC OSCILLATION.

See ELECTRIC WAVE; ELECTRO-PHYSICS; OSCILLOGRAPH; SPACE TELEGRAPHY.

ELECTRIC OSCILLATOR.

Skin Effect.—See ELECTRO-PHYSICS—Oscillator.

ELECTRIC PATENT.

See ELECTRIC INVENTION; TELEPHONE PATENT.

ELECTRIC PENDULUM.

Foucault.—See PENDULUM—Electric Foucault.

ELECTRIC PLANT.

See also ELECTRIC DRIVING; ELECTRIC EQUIPMENT; ELECTRIC GENERATING SET; ELECTRIC STATION; HYDRO-ELECTRIC PLANT; MECHANICAL PLANT; POWER COST; POWER PLANT; STEAM PLANT.

The Economy of Isolated Plants. K. L. Aitken. Read before the Can. Elec. Assn. Deals with the smaller class of isolated plants which supplies light and power only to the building which contains the equipment. 3800 w. Can Elec News—July, 1905.

Isolated Plant Engineering. James F. Hobart. Calls attention to points needing attention in such plants, giving suggestions for the best care of the plant. 2200 w. Am Elect'n—Oct., 1905.

Aldershot, Eng.—See SEWAGE DISPOSAL.

American Cigar Co., Richmond.—Power Plant of the Whitlock Branch of the American Cigar Company, Richmond, Va. Illustrated description of a plant for supplying alternating-current to motors, chiefly interesting from the standpoint of its design. 1700 w. Eng Rec—June 11, 1904.

Arbroath.—Electric Power Transmission at Arbroath. An illustrated account of the plant installed at the Lowson Mills, which operates six factories situated in different parts of the same town in Scotland. 3000 w. Engng—Feb. 13, 1903.

Ardross Castle, Ross-Shire.—Electricity at Ardross Castle. Illustrated description of a private installation of unusual interest. 3000 w. Elec Rev, Lond—Nov. 23, 1900.

Asylum, Lancashire.—Electric Light and Power Installation at the Lancashire County Asylum, Rainhill. Particulars and illustrations of an interesting and carefully designed installation. 1400 w. Elec Engr, Lond—Jan. 17, 1902.

Asylum, Prestwich, Eng.—The Electric Light and Power Installation at the Lancashire County Asylum, Prestwich, England. Illustrated detailed description. 4000 w. Elec Engr, Lond—Aug. 30, 1901.

Asylum, Tooting Bec.—Electric Lighting and Power Plant at the Tooting Bec Asylum. Illustrates and describes a plant having novel features. 1500 w. Elec Engr, Lond—Dec. 18, 1903.

Bank, Pittsburg.—Electrical Equipment of the Farmers' Bank Building, Pittsburg. L. L. Emerson. Describes an alternating-current system of electric service; an extensive power plant has been installed and the entire building wired for illumination by the Nernst lamp. Ill. 1600 w. Eng Rec—May 9, 1903.

Battleship.—See ELECTRIC EQUIPMENT—Navy.

Birmingham University.—Birmingham University Power Station. C. Alfred Smith. Illustrates and describes the equipment of this station which has been in successful operation for more than a year. 2200 w. Elec Rev, Lond—Aug. 25, 1905.

Blast Furnace.—See BLAST FURNACE—Electric Equipment.

Boléo Mines, Mex. — The Electric Plant of the Boléo Mines (Installations Electriques des Mines du Boleo). E. Hoffman. A general description of the power house and distribution of the electric system at Santa Rosalia, Mexico. 2000 w. Génie Civil—Sept. 27, 1902.

Boston Store.—The First Electric Light Plant in Boston. Alton D. Adams. An account of a plant started Nov. 9, 1878. 1000 w. Elec Wld & Engr—Dec. 22, 1900.

Brewery, St. Louis—Power Plant of the Anheuser-Busch Brewing Association at St. Louis. Illustrates and describes a plant with a capacity of 1,400 kilowatts, to furnish power for direct-current motors which drive the various machines, and for lighting. 1500 w. Engr, U S A—Feb. 1, 1905.

British Navy.—See ELECTRIC EQUIPMENT—Navy; ELECTRIC GENERATING SET—Navy.

Brooklyn Museum.—Power and Lighting Equipment of a Brooklyn Museum. E. T. Walsh. Illustrates and describes the plant of the Brooklyn Inst. of Arts and Sciences. 2500 w. Am Elect'n—March, 1905.

Buckeye.—See FOUNDRY.

Cable Works, Silvertown.—The Power Plant of the Silvertown India-Rubber Works. An illustrated description of the latest extensions to the plant of the India-Rubber, Gutta-Percha and Telegraph Works Co., at Silvertown, Eng. The installation is as large as is often provided for a town of 50,000 inhabitants, and is interesting because of the diversity of uses to which the electric motors are put. 1400 w. Elec Rev, Lond—Nov. 15, 1901.

Chemnitz, Saxony.—The Electric Light and Power Plant of the Saxon Machine Works (Die Elektrische Kraft und Lichtanlage der Sächsischen Maschinen Fabrik). W. Philippi. A general description of a large isolated plant in a manufacturing establishment at Chemnitz, Saxony. 6000 w. Elektrotech Zeitschr—Jan. 3, 1901.

Chicago University.—The Power, Lighting and Heating Plant of the University of Chicago. Illustrated description of an installation of tubular boilers of 1,350 H. P. with an elaborate auxiliary equipment and a unique sytem of tunnels for the heating and electric lines. 5100 w. Eng Rec—March 15, 1902.

Cleveland Drill Co.—Power Plant of the Cleveland Twist Drill Co. Illustrated detailed description of an interesting modern isolated plant. 2800 w. Engr, U S A—Oct. 1, 1902.

Coal Mine.—Electric Plant at the Simson Mine of the Rossitz Mining Company, at Zbeschau, near Brünn, Austria (Elektrische Kraftanlage am Simsonschacht der Rossitzer Bergbau-Gesellschaft in Zbeschau bei Brünn). Jaroslav Jicinsky. An illustrated description of a three-phase electric power plant for a coal mine and coal washing and coke oven plant. 1 plate. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 25, 1903.

Polyphase Electric Plant at the Staveley Coal and Iron Company's Collieries. An illustrated detailed description of this plant recently installed in English mines. 3200 w. Ir & Coal Trds Rev—Sept. 25, 1903.

A Central Electric Power Plant of the Coal-Mining Department of the Delaware, Lackawanna & Western Railroad Co. at Scranton. H. M. Warren. Illustrated detailed description. 3300 w. Mines & Min—Dec., 1903.

The Plant of the Richard Mine at Brüx (Die Neue Anlage Richard-Schacht in Brüx). Paul Sonntag. A very complete description of the electric power plant installed in an important coal mine in Northwestern Bohemia. Three articles. 7500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 21, 28, Dec. 5, 1903.

See also ELECTRIC EQUIPMENT.

Cornell University.—A High-Potential Direct-Current Plant for Experimental Work. G. S. Moler. Illustrates and describes a plant in use at Sibley College, which has proved very satisfactory. 1500 w. Elec Wld & Engr—July 19, 1902.

Cost.—Cost Determination in Isolated Electric Plants. P. R. Moses. Discussing the methods of recording and classifying cost data so as to enable intelligent conclusions to be deducted. 3000 w. Engineering Magazine—March, 1901.

The Economy of Isolated Electric Plants. Isaac D. Parsons. A methodical study of the actual working costs of existing plants, showing the conditions under which isolated plants are advantageous. 4500 w. Engineering Magazine—Jan., 1902.

The Economy of Isolated Electric Plants. Isaac D. Parsons. Mr. Parsons' second paper reviews, in a very accurate manner, the usually inaccessible field of power plants installed in residential buildings, with valuable results. 4500 w. Engineering Magazine—Feb., 1902.

Some Notes on the Running of a Private Lighting and Power Plant. P. T. Blisset. Read before the Dublin Loc. Sec. of the Inst. of Elec. Engrs. Descriptive notes of a large private three-wire light and power plant, showing how electrical driving has gradually superseded steam driving and gas lighting. Serial. 1st part. 2500 w. Elec Eng, Lond—Feb. 24, 1905.

The Systematized Operation of Isolated Plants. Percival Robert Moses. With forms and records for the organization and systematic operation of a moderate-sized electric station. 2500 w. Engineering Magazine—Dec., 1903.

See also ELECTRIC POWER; POWER COST.

Cotton Mill.—See also ELECTRIC DRIVING.

Cotton Mill, Charlotte, N. C.—Power Plant of a Large Cotton Mill. W. H. Smead. Illustrates and describes an interesting electrical power plant at Charlotte, N. C., for operating cotton mills. 1800 w. Engr. U S A—Dec. 15, 1905.

Cotton Mill, Columbia, S. C.—The Generation and Distribution of Power in the Olympia Mills. Illustrated description of a 5,000 H. P. plant and electric distribution system in a cotton mill at Columbia, S. C. The electric plant was cheaper in first cost, and is expected to be cheaper in operation and maintenance, than a shafting system. 3000 w. Eng Rec—April 6, 1901.

Power Plant of the Olympia Cotton Mill. Illustrated detailed description of steam and electric plant of cotton mill at Columbia, S. C. 3200 w. Engr, U S A—Oct. 15, 1901.

Cotton Mill, Magog.—Power Plant of Dominion Cotton Mills Co., Magog. Illustrated detailed description of a plant in Quebec, and its equipment. 2700 w. Can Engr—Feb., 1902.

Curtis Publishing Co.—Electrical Plant of the Curtis Publishing Company, Philadelphia, Pa. John S. Griggs, Jr. Illustrated detailed description of a plant for furnishing light, heat and power to two buildings. 3500 w. Elec Rev, N Y—April 6, 1901.

Darmstadt Polytechnic.—The Electric Plant of the Technical High School at Darmstadt (Die Elektrischen Einrichtungen im Neuen Kraftwerk der Technischen Hochschule Darmstadt). Prof. A. Sengel. An illustrated description of the isolated plant furnishing current for light, power and educational purposes at the Darmstadt Polytechnic. 3000 w. Zeitschr d Ver Deutscher Ing—July 16, 1904.

Denver.—The Daniels & Fisher Power Plant in Denver. Howard S. Knowlton. Illustrates and describes the isolated plant of a large department house. 3000 w. Eng Rec—Sept. 3, 1904.

Dividing Power.—Dividing the Power in Isolated Plants. H. F. Schmidt. Describes a method by which a heavy and light load can be taken care of at the smallest first cost, and yet be operated at very good efficiency. Ill. 500 w. Am Elect'n—Jan., 1902.

Donetz—Jurjewka.—Electric Power and Lighting Plant at the Donetz-Jurjewka Metallurgical Works (Die Elektrische Kraftübertragungs und Beleuchtungsanlage auf den Hüttenwerken der Donetz-Jurjewka Metallurgischen Gesellschaft). Ludwig Gohs. Showing the extensive use of electric power in this large Russian works. 4500 w. Electrotech Zeitschr—Dec. 13, 1900.

Economy.—See Cost; ELECTRIC POWER—Cost.

Elba Iron Works.—See BLAST FURNACE; BLAST-FURNACE GAS.

Emden, Harbor.—The Electric Plant of the Harbor of Emden (Die Elektrische Anlage des Emder Hafens). H. Langner. With plan of the harbor, and illustrated description of the generating station and lighting and power installation. Two articles. 7000 w. Electrotech Zeitschr—Oct. 2, 9, 1902.

Energy Diagrams.—See ELECTRIC STATION.

Factory Lighting.—The Economy of Isolated Light Equipments in Small Factories. F. O. Runyon. A short article showing the cost of installing and maintaining such plants. 1200 w. Elec Rev, N Y—May 16, 1903.

Frodingham Iron and Steel Works.—The Frodingham Iron and Steel Company's New Electrical Plant. An illustrated description of an interesting power and lighting plant. 2000 w. Ir & Coal Trds Rev—March 3, 1905.

Frongoch Mine.—See ELECTRIC EQUIPMENT; Mine, Frongoch.

Gas Engine.—See ELECTRIC EQUIPMENT—Heysham Harbor; GAS ENGINE—Electric Generation; GAS POWER PLANT.

Gas Engine vs. Steam.—Steam Engine vs. Internal Combustion Engine for Electric Power Generating Plants. Frank C. Perkins. An illustrated article giving information in regard to recently erected plants where gas engines have been installed and the systems used, the Diesel oil engines, and others. 5800 w. Mod Mach—Jan., 1903.

Gasoline.—Generating Set for a House Plant (Groupe Electrogène pour Installations Domestiques). J. A. Montpellier. An illustrated description of de Dion-Bouton gasoline engine driving a small dynamo. The supply of gasoline dynamo. The supply of gasoline is regulated electro-magnetically by the dynamo current. 1200 w. Electricien—Nov. 9, 1901.

Gas Works.—See GAS WORKS—Electric Appliance.

Gelsenkirchen, Germany.—See COAL MINE.

General Electric.—See BUILDING CONSTRUCTION

Glasgow Exhibition.—See POWER PLANT.

Goldsmiths' Institute, London.—The Electric Plant at the Goldsmiths' Institute. Illustrates and describes an electric lighting plant which also provides current for educational and experimental purposes in the laboratory. 1000 w. Engr, Lond—Dec. 6, 1901.

Group Switch.—See ELECTRIC SWITCH—Group, Station.

Halle Mine.—See GAS ENGINE—Electric Plant.

Hardware Factory.—See New Britain, Conn.

Hospital.—See also FUEL GAS.

Ilseder Iron Works.—See BLAST FURNACE GAS—Ilseder, Westphalia.

Inspection.—Inspection of Plants. George A. Burnham. The present paper considers dynamos and connections. The object is to point out the troubles which are liable to occur, and a simple and efficient method of locating and remedying them. Ills. Serial. 1st part. 1600 w. Engr, U S A—April 1, 1904.

Iron and Steel Works.—See Donetz-Jurjewka; Frodingham; ELECTRIC DRIVING; IRON WORKS; STEEL WORKS.

Isolated vs. Central.—The Isolated Plant versus the Central Station—Discussion at the Chicago Electrical Association. Report of a very interesting discussion on the comparative advantages of the two systems. 3200 w. Elec Wld & Engr—May 10, 1902.

Kalgoorlie, Australia.—The Kalgoorlie Electric Power and Lighting System. Illustrated description of the first large power distribution scheme in Australia, which furnishes over 15,000 H. P. for these gold mines. 1800 w. Elec Rev, Lond—Sept. 12, 1902.

Kalgoorlie Electric Power. C. E. Crocker. A description of this plant the principal purpose of which is to supply electric current to the mines. 1700 w. Aust Min Stand—July 17, 1902.

Karawanken Tunnel.—See ELECTRIC EQUIPMENT; HYDRO-ELECTRIC PLANT.

Karlsruhe Harbor.—See ELECTRIC EQUIPMENT.

Laar, Germany.—See GAS—POWER PLANT.

Lackawanna Steel Works.—See ELECTRIC DRIVING—Iron and Steel Works.

McCormick Twine Mills.—Power Plant of the McCormick Twine Mills. Illustrated detailed description of the electric plant of the new works of the McCormick Harvesting Machine Co. at Chicago. 2500 w. W Elect'n—Feb. 16, 1901.

Maynard, Mass.—The New Power Plant for the Assabet Mills, Maynard, Mass. Illustrated description of an electric plant for driving a 5 and 6-story woolen mill, 690x106 ft. in plan. 3000 w. Eng Rec—Oct. 4, 1902.

Milwaukee Harvester Co.—Electrical Installation of the Milwaukee Harvester Company. Illustrated detailed description of a fine plant. 2500 w. W Elect'n—Nov. 24, 1900.

Mint, Philadelphia.—The Electric Light and Power Plant of the New United States Mint, Philadelphia. Clayton W. Pike. An illustrated detailed description of the electrical equipment. 3800 w. Elec Wld & Engr—Feb. 1, 1902.

Modern.—Modern Electric Lighting Plant. R. D. Summerfield. A short description of electric lighting machinery as used at the present day, including boilers, engines, generators, and all auxiliary plant connected with them. Serial. 1st part. Elec Engr, Lond—Jan. 18, 1901.

Morecambe Bay.—See GAS ENGINE—Electric Plant.

Municipal Ownership Opposed.—See ELECTRIC LIGHTING.

Nassau, Bahama.—An Isolated Plant at Nassau, Bahama Islands. An illustrated description of the power house and equipment which provides two hotels with light, power, steam and ice. 2800 w. Elec Wld & Engr—June 1, 1901.

Navy Yard, Brooklyn. — See ELECTRIC EQUIPMENT.

New Britain, Conn.—Electrical and Steam Equipment of a Hardware Factory. W. G. Viall. An illustrated description of a lighting and power plant in New Britain, Conn. 1200 w. Am Elect'n—July, 1903.

Newspaper.—See ELECTRIC EQUIPMENT.

N. Y. Stock Exchange.—See ELECTRIC EQUIPMENT.

Cleveland Office Building.—Power Plant of the Western Reserve Building. Illustrates the plant for furnishing power to a large addition to the building, occupied by large mining, shipping, steel and iron companies. The plant consists of two water-tube boilers, of the cross-drum type, and three 30 kilo-watt direct connected generators. 1700 w. Engr, U S A—March 1, 1901.

Ohio University.—Power Plant and Heating System of the Ohio State University, Columbus. W. C. McCracken. Illustrated description of the system for heating, lighting and power distribution for a number of buildings. 2000 w. Engr, U S A—March 15, 1902.

Oil Engine.—See Gas vs. Steam.

Packing House.—Power Plant of the Cudahy Packing Co. Illustrates and describes a Kansas City plant, the power being furnished by two simple Buckeye engines, direct-connected to Crocker-Wheeler generators. 2500 w. Engr, U S A—March 1, 1901.

Alternating Current Power Equipment in a Packing House. Illustrated descriptions of the centralized power plants of Swift & Company at Chicago, Ill., and St. Joseph, Mo. 1800 w. Am Elect'n—April, 1901.

Paint Works, Cleveland.—A Turbo-Electric Plant in a Paint Works. Illustrated description of a Cleveland plant for a large paint and varnish manufactory. 2500 w. Engr, U S A—Sept. 1, 1904.

Pan-American Exposition.—See POWER PLANT.

Peruna Drug Co.—A Central Isolated Plant. Illustrated detailed description of the plant of the Peruna Drug Mfg. Co. of Columbus, O. Interesting because of the high-class of the installation, diversity of service, and special devices and their applications. 3500 w. Elec Wld & Engr—April 26, 1902.

Piano Factory.—The Electrical Plant at the Broadwood Grand Piano-Forte Factory at Old Ford. Illustrated detailed description. 2800 w. Elec Engr, Lond—Feb. 5, 1904.

Pimlico Wheel Works.—Electric Power, Light and Electric Welding Installation at the New Pimlico Wheel Works. Illustrated description. 3000 w. Elec Rev, Lond—Sept. 12, 1902.

Portable.—Power Plant for Use in Track Repairing (Application de la Force Mécanique aux Travaux de Renouvellement des Vorés). M. Regnoul. Illustrating a portable electric generating plant for use with electric tools for repair work on any part of a railway line. 4500 w. Rev Gen des Chem de Fer—May, 1904.

Electric Plant for Fixing Rails and Packing Permanent Way. Illustrates and describes a portable plant used on some of the French railways for permanentway construction and repair. 900 w. Engng—Aug. 11, 1905.

See also AUTOMOBILE—Military; FIRE ENGINE—Electric Light Plant.

Printing Office.—See ELECTRIC DRIVING; ELECTRIC EQUIPMENT.

Pumping.—See PUMP—Electric.

Railway Shop.—See ELECTRIC DRIVING; POWER PLANT; RAILWAY SHOP.

Regulations.—See ELECTRIC INDUSTRY.

Residence.—An Interesting Residence Lighting Plant. Illustrated description of a plant for lighting a country residence, comprising seven scattered buildings. 1800 w. Eng Rec—Nov. 17, 1900.

Electric Generator for Lighting Residence. Brief illustrated description of an installation for the lighting of a villa, and a number of domestic purposes; also furnishing the power for an automobile. 800 w. Sci Am Sup—April 18, 1903.

See also Gasoline.

Residence, Fisher's Island, N. Y.—An Interesting Residential Electric Light and Power Plant. Illustrated description of a fine private plant at Fisher's Island, N. Y. 2500 w. Am Elect'n—Aug., 1902.

Residence, Newport.—An Interesting Residence Plant. Illustrates and describes the principal features of the equipment recently installed in a house at Newport, R. I. 500 w. Am Elect'n—Jan., 1902.

St. Louis Exposition.—The Westinghouse Power Plant at the St. Louis Exhibition. Illustrations of the fine electric-generating sets for supplying current needed in the Exhibition, with interesting particulars. 1700 w. Engng—July 15, 1904.

St. Louis Publishing House.—The Power Plant of the Lewis Publishing Company, St. Louis, and the Largest Searchlight in the World. Illustrates and describes a plant having many interesting features seldom encountered. 1500 w. Elec Wld & Engr—Nov. 12, 1904.

Saltley, England.—See GAS ENGINE—Electric Plant.

Silk Mill, Altoona, Pa.—Power Plant of a Large Silk Mill. Illustrated description of the plant in Schwarzenbach, Huber & Co.'s mill at Altoona, Pa. 3200 w. Engr, U S A—Nov. 15, 1901.

Spezia Arsenal.—The Electric Plant of the Royal Arsenal at Spezia, Italy (L'Impianto Elettrico del R. Arsenale di Spezia). Attilio Incontri. An illustrated description of an alternating and direct-current plant for light and power at this naval station. 12 plates. 6000 w. Rivista Marittima—Feb., 1903.

Steam Turbine.—See ELECTRIC STATION; STEAM TURBINE.

Storage Battery.—The Application of the Storage Battery to Isolated Plants. S. E. Rucker. Discusses systems carrying loads in club houses and buildings of a like nature, also those plants which operate during the day and have need of only a small portion of the capacity after 7 P. M., and methods of computing battery equipments. Ill. 4000 w. Am Elect'n—Jan., 1902.

See also STORAGE BATTERY.

Tangermünde, Germany.—See ELECTRIC LIGHTING.

Tea Co., Brooklyn.—Electrical Equipment of an Industrial Plant. An illustrated description of the power and lighting plant of the Grand Union Tea Co., at Brooklyn, N. Y. 2500 w. Am Elect'n—Oct., 1903.

Tea Co., New Cross, Eng.—The Light and Power Plant of the Mazawattee Tea Company. Illustrates and describes an interesting installation in these new works at New Cross, Eng. 2700 w. Elec Engr, Lond—Jan. 31, 1902.

Telephone Exchange.—See TELEPHONE EXCHANGE—Power Equipment.

Telephone Relay Switchboard.—See TELEPHONE SWITCHBOAD—Relay Plants.

Theatre.—See ELECTRIC EQUIPMENT.

University of California.—The Power Plant of the University of California. A. S. Wheeler. Illustrated description of the new plant, designed for a full load of 200 kilowatts. Oil is used for fuel. 2000 w. Cal Jour of Tech—May, 1905.

Urfahr, Austria.—See WATERWORKS—Urfahr.

Vulcan Shipyard.—See ELECTRIC EQUIPMENT—Shipyard, Vulcan.

Warehouse.—See WAREHOUSE—Electric Equipment; Plant.

Warship.—See ELECTRIC EQUIPMENT—Navy.

Weehawken Terminal.—See POWER PLANT.

West Albany-N. Y. Central.—New Power House—West Albany Shops. Illustrated description of this new power house and its equipment. It is a part of the plan for modernizing the method of driving. N. Y. C. & H. R. R. R. 1500 w. Am Engr & R R Jour—Nov., 1904.

Westinghouse, St. Louis.—See St. Louis Exposition.

Whitehall Building, N. Y.—Lighting Plant of a Large Office Building. Illustrated description of the generating equipment of the Whitehall Building, New York. 1400 w. Am Elect'n—Aug., 1904.

ELECTRIC POLE.

See ELECTRIC LINE; POLE.

ELECTRIC POWER.

See also ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC EQUIPMENT; ELECTRIC LIGHTING; ELECTRIC PLANT; ELECTRIC STATION; ELECTRIC TRANSMISSION; POWER COST.

The Development of Electrical Energy Supplies. Mark Ruddle. Reod before the Dublin Local Sec. of the Inst. of Elec. Engrs. A discussion of matters pertaining to the economical generation and distribution of electrical energy. 3500 w. Elec Engr, Lond—March 20, 1903.

The Motive Power of the Future. Horace D. B. How. Abstract of a paper read before the South Wales Inst. of Engrs. An illustrated article considering the possibilities of electrical power at present and the future outlook. 3000 w. Ir & Coal Trds Rev—May 1, 1903.

Providing the World with Power. Arthur Goodrich. On the great increase in the use of electricity, the factories where electrical devices are made, etc. 4500 w. World's Work—Feb., 1904.

Bergen Co., N. J.—See ELECTRIC LIGHTING.

Birmingham, Eng.—Electricity and Sewage Disposal. Illustrated description of the high tension power distribution scheme of the Birmingham Tame and Rea District Drainage Board to pump sewage to a higher level. It is also used to drive motors at various places, lighting, etc. 2300 w. Elec Engr, Lond—Nov. 17, 1905.

British.—The Supply of Electrical Power Over Large Areas. F. J. Warden Stevens. Considers the question from a point of view of the public, the local authorities and the companies. 2000 w. Archt, Lond—Jan. 3, 1901.

The Electrical Power Distribution Systems of Great Britain. An outline map showing the areas and situations occupied by the respective schemes with some particulars relating to them. 1500 w. Elec Rev, Lond—Sept. 12, 1902.

Distribution of Energy for Tramway, Lighting and Power Purposes. A résumé of the latest information available on the distribution of power over a moderate sized area. 12200 w. Elec Engr, Lond—Oct. 17, 1902.

Electric-Power Distribution in Great Britain. Describes the work of various companies showing the use of electricity to be developing rapidly. 2500 w. U S Cons Repts, No. 1569—Feb. 12, 1903.

Some Economic Aspects of Electrical Power Distribution. Edmund L. Hill. Abstract of a paper read before the South Wales Inst. of Engrs. The advantages of the power distribution companies in Great Britain are discussed, and the value of the diversity factor to a power company. 2000 w. Ir & Coal Trds Rev—April 15, 1904.

The Supply of Electricity in Industrial Areas from a Municipal Point of View. William Hodgson. Read before the Incor. Munic. Elec. Assn. Discusses various phases of the problem. Brief general discussion. 2500 w. Elect'n, Lond—June 30, 1905.

Distribution of Electrical Energy. John Francis Cleverton Snell. Historical review of progress, and a discussion of the prospects of a wider commercial use of electrical energy. Discussion. Ills. 38000 w. (No. 3522). Inst of Civ Engrs.

See also Birmingham; London; Midland; South Wales.

British Legislation.—See ELECTRIC INDUSTRY.

British Northeast.—Electric Power Supply on the Northeast Coast. C. S. Vesey Brown. Read before the Newcastle Section of the Inst. of Elec. Engrs. A brief retrospect of the history of electric power supply in England, with views on the equipment of power stations, and the possibilities which will probably follow their instalment. 4500 w. Elec. Engr, Lond—March 21, 1901.

Calcium Carbide.—The Determination of Electrical Energy (Zur Wertbestimmung Elektrischer Kraft). O. Schmidt. An estimate of the energy stored in calcium carbide. Also a discussion of the generation of gas by electricity in localities poor in coal. 1200 w. Zeitschr f Elektrochemie—Aug. 1, 1901.

See also CALCIUM CARBIDE.

Caspian Oil Wells.—See ELECTRIC STATION.

Cost.—Some Notes on the Cost of Generating Electrical Energy. E. J. Fox. Points connected with cheap production are discussed with the view of showing that very economical results can be obtained. Serial. 1st part. 3000 w. Engr, Lond—Feb. 26, 1904.

The Cost of Electricity in Private Plants. Editorial review of paper by R. E. Fox, read before the Cleveland Inst. of Engrs. 1700 w. Engng—March 11, 1904.

See also ELECTRIC PLANT; ELECTRIC STATION MANAGEMENT; POWER COST.

Cost, Factory.—Purchased Electric Power in Factories. E. W. Lloyd. Abstract of a paper read before the Assn. of Edison Ill. Cos. Considers the installation of motors, and the cost of power from central stations for large factories, as compared with isolated plant costs. 3200 w. Elec Wld & Engr—Sept. 26, 1903.

Curves.—Theoretical Determination of Power Curves. Gives communications from V. R. Heftler, John C. Parker, Bassett Jones, Jr., and Frank R. Stowe, having for their subject the article by W. J. Berry, which appeared in the issue of Jan. 30. 1000 w. Elec Wld & Engr—April 16, 1904.

Drainage.—See DRAINAGE—Electric Power.

England.—See Birmingham; British; London; Midland.

Esson Address.—See ELECTRIC ENGINEERING.

Foundry.—See FOUNDRY—Electric Equipment.

Industrial Prosperity.—Electric Power as a Factor in Industrial Prosperity. D. N. Dunlop. The present article considers the circumstances which retard the progress of electrical power and the advantages. Serial. 1st part. 3200 w. Ir & Coal Trds Rev—Aug. 16, 1901.

Irish Bogs.—See PEAT.

Joplin Zinc Mines.—See HYDRO-ELECTRIC PLANT—Spring River.

Lackawanna Coal Mines.—See Nanticoke, Pa.

Loft Buildings.—Loft-Buildings—Electric Power Desirable. E. R. Knowles. States the condition in large cities which have led to the growth of the modern loft building, its requirements, etc. 1500 w. Elec Rev, N Y—April 2, 1904.

London.—The Supply of Electric Power to London. A. Britton. A summary of the steps taken to unify the supply of current and electric power. 2500 w. Elec Wld & Engr—July 8, 1905.

A New Electric Power Scheme for London. Outlines the scheme of the Additional Electric Power Supply (London) Bill, discussing its main points. 3300 w. Engng—Nov. 24, 1905.

London's Power Supply. T. H. Minshall. Information concerning the present supply of electrical energy, and the proposed schemes, the relative cost of production, &c. 1400 w. Elec Wld & Engr—Dec. 9, 1905.

Massachusetts.—The Rise of Electric Power Distribution. Alton D. Adams. An examination of motive power statistics showing the growth. Also editorial. 4000 w. Elec Wld & Engr—Nov. 2, 1901.

See also **ELECTRIC INDUSTRY; ELECTRIC STATION MANAGEMENT—Coal Consumption; LIGHTING—Electric vs. Gas.**

Mexico.—See **ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT.**

Midland, Eng.—The "Midland" Electric Power Distribution. Begins an illustrated detailed description of the plant of this company, also describing the location, and giving information of general interest. Serial. 1st part. 4200 w. Elect'n, Lond—Oct. 3, 1902.

See also **British; ELECTRIC STATION.**

Modern Practice.—See **POWER.**

Niagara. — See **ELECTRIC RAILWAY; HYDRO-ELECTRIC PLANT.**

Refrigeration.—See **REFRIGERATION — Electric Power.**

San Mateo Co., Cal.—Electricity in San Mateo County, California. C. H. Pennoyer. An illustrated detailed description of the Consolidated Light and Power Co.'s plant, and the various applications of electricity over a wide area. 2500 w. Jour of Elec—April, 1901.

South Wales.—Electric Power Supply Scheme for South Wales. An account of the engineering features of a scheme for supplying electric energy over an area of about 1,034 square miles. 1600 w. Ir & Coal Trds Rev—May 2, 1902.

Electrical Enterprise in Wales. Describes the plant of the South Wales Electrical Distribution Company, summarized from an article in the South Wales "Daily News." 1500 w. U S Cons Repts, No. 1344—May 17, 1902.

Electric Power Distribution in South Wales. Map and illustrated description of a system supplying power to a large number of collieries and other works in the South Wales industrial district. Serial. 1st part. 4000 w. Elect'n, Lond—Dec. 2, 1904.

District Electric Power Distribution. An illustrated description of the system of the South Wales Electric Power Distribution Company, especially describing the Treforest power house and its equipment. Also the sub-stations. 2800 w. Elec Wld & Engr—Jan. 28, 1905.

Toronto.—Niagara Power at Toronto. Facts as to the railway and lighting situation, which are to receive power from Niagara, 75 miles distant. 2500 w. Elec Wld & Engr—June 24, 1905.

Transvaal.—Electric Power Distribution for the Rand. Robert Hammond. Read before the British Assn., at Johannesburg. A discussion of the problem of supplying electrical energy for the mines, the cost, etc. Also short discussion. 6800 w. Elect'n, Lond—Sept. 29, 1905.

United States.—The Position of the United States in the Production of Electric Power. Sidney Graves Koon. Tables and diagrams with facts showing the enormous preponderance of the United States in every department of this field. 1300 w. Sib Jour of Engng—March, 1902.

Westinghouse Works, Eng.—See **ELECTRIC WORKS.**

ELECTRIC POWER STATION.

See **ELECTRIC PLANT; ELECTRIC RAILWAY; ELECTRIC STATION.**

ELECTRIC PROSPECTING.

See **PROSPECTING—Electric.**

ELECTRIC PROTECTIVE APPARATUS.

See also **ELECTRIC APPARATUS; ELECTRIC DISTRIBUTION; ELECTRIC LINE; ELECTRIC SHOCK; ELECTRIC STATION MANAGEMENT; ELECTRIC SWITCH; LIGHTNING ARRESTER; LIGHTNING PROTECTION.**

The Protection of Electrical Installations Against Excess Pressure Rises. Remarks on the disturbing influences and their causes, and the resistances used. 1200 w. Elec Engr, Lond—June 9, 1905.

Accidents.—Electric Accidents and the Means of Preventing Them. L. W. de Grave. Abstract of a paper read before the Chesterfield & Midland Co.'s Inst. of Engrs. Discusses the causes and considers accidents usually due to gross carelessness. Also measures for protection and prevention. 2200 w. Col Guard—May 31, 1901.

Electric Accidents and the Means of Preventing Them. L. W. de Grave. Abstract of a paper read before the Chesterfield and Midland Co.'s Inst. of Engrs. Considers accidents due to shock and to fire. 2000 w. Quarry—May 1, 1902.
See also **ELECTRIC SHOCK.**

Automatic Grounding.—An Isolator Interrupter (Isolateur Interrupteur). A description of the Giraud device for supporting trolley or other overhead wires in such a manner that the current is cut off or grounded in case the wire is broken. 800 w. Génie Civil—Nov. 21, 1903.

Cable.—See **ELECTRIC CABLE—Protection.**

Circuit Breaker.—Notes on the Care of the Power House. Arthur B. Weeks. An illustrated article on repairs to station circuit-breakers. 1600 w. St Ry Rev—March 15, 1902.

High-Voltage Protectors (Spannungssicherungen). Dr. Gustav Benischke. A paper before the Electrotechnische Verein giving an illustrated description of apparatus for protection against high voltages below those due to lightning. 4500 w. Electrotech Zeitschr—June 19, 1902.

High Tension Circuit-Safeguards. Joseph Martin Roman. An illustrated review of various controlling and safety appliances. 5000 w. Elec Wld & Engr—Aug. 16, 1902.

Reverse Current Circuit Breakers and the Protection of Transmission Lines. Leonard Wilson. Considers this system of protection, discussing its more important characteristics, and the essential feature of the Andrews system. 2200 w. Trans Am Inst of Elec Engrs—June, 1903.

A Safety Appliance for High Tension Electric Conductors (Sur un Dispositif de Securité pour Canalisations Electriques à Haute Tension). L. Neu. Describing a safety switch arranged to cut off the current in case of defective insulation or accidental contact. 1000 w. Comptes Rendus—Oct. 31, 1904.

See also **Fuse; Cut Out; ELECTRIC RAILWAY—Load Factor and Circuit Breaker.**

Circuit Breaker, Car.—Checking the Adjustment of Car Circuit Breakers. E. C. Parham. Suggests a method whereby the adjustment of a car circuit breaker can be tested in from one to three minutes. 1500 w. St Ry Jour—Dec. 31, 1904.

Circuit Breaker, Magnetic.—Some Recent Tests of Magnetic Circuit Breakers. Hugh A. Brown. Investigations which formed a part of a graduation thesis at Columbia University, the object being to determine how accurately circuit breakers act, and their working. 1500 w. Elec Wld & Engr—Feb. 9, 1901.

Circuit Breaker, Reverse Current.—Circuit-Breakers. W. M. Scott. A discussion of reverse current circuit-breakers and their operation, applications, &c. Ills. 5500 w. Jour Fr Inst—Sept., 1904.

Circuit Breaker, Trolley Wire.—Control of Overhead Trolley Wire by Circuit Breakers in Feeder Boxes. Presenting the advantage of having the circuit breakers in the boxes. 500 w. Elec Engr, Lond—Nov. 22, 1901.

Coat of Mail.—See **ELECTRIC SHOCK.**

Coherer.—The Construction of Electric Protective Device for Weak Currents (Beitrag zur Konstruktion Elektrischer Sicherungen für Schwachstromanlagen). Hans Carl Steidle. A coherer is employed to operate a cut-out in case of any sudden change in current. 3500 w. Elektrotech Zeitschr—Nov. 3, 1904.

Cut-Out.—A New Automatic Cut-Out. H. Müller. Illustrated description of a new design. 1000 w. Elect'n, Lond—Feb. 8, 1901.
See also **Circuit Breaker; Fuse; Relay.**

Fuse.—Safety Fuses in Branched Circuits (Ueber Sicherungen in Verzweigten Leitungsanlagen). Prof. A. Sengel. A discussion of the proper placing of fuses in branch circuits which have more than one connection with main circuits. Diagrams. 1600 w. Elektrotech Zeitschr—May 1, 1902.

Standard Electric Safety Fuses (Ueber eine Absolute Unverwechselbarkeit an Elektrischen Schmelzsicherungen). E. Dreefs. A paper before the Verband Deutscher Elektrotechniker giving illustrated descriptions of fuses for a definite current and e. m. f., and which cannot be mistaken for fuses of a higher or lower capacity. 1000 w. Elektrotech Zeitschr—June 26, 1902.

The Permanency of Safety Fuses (Ueber Unwerwechselbarkeit bei Schmelzsicherungen). R. Hundhausen. A review of various forms of fuse construction, with data concerning their permanency. 5000 w. Elektrotech Zeitschr—Dec. 4, 1902.

Safe and Accurate Electric Safety Fuses. Joseph Sachs. Considers their evolution principle, operation, and application, describing devices and reporting tests. Ill. 5900 w. Jour Fr Inst—Jan., 1903.

Supplement to the Report of the Commission on Standard Fuse Plugs with Edison Screw Threads (Erläuterungen zu den Vorschlägen der Kommission für Installationsmaterial). W. Klement. An explanation of the proposed standard fuse plugs to fit Edison lamp sockets. 3000 w. Elektrotech Zeitschr—June 16, 1904.

Fuse, Low Tension.—Low-Tension Thermal Cut-Outs. Alfred Schwartz and W. H. N. James. A brief résumé of a paper read before the Manchester Sec. of the Inst. of Elec. Engrs. States the requirements of an efficient protective device and shows the influences that may affect a fuse wire. Discussion. 3000 w. Elec Engr, Lond—March 24, 1905.

Low-Tension Fuses. Prof. Alfred Schwartz and W. H. N. James. Abstract of a paper on "Low Tension Thermal Cut-Outs," read before the Manchester Loc. Sec. of the Inst. of Elec. Engrs. A report of experimental investigations. 5000 w. Elect'n, Lond—April 21, 1905.

Fuse, Melting.—Observations with the Oscillograph upon the Time Required for the Melting of Fuses (Ueber den Zeitlichen Verlauf des Schmelzstromes von Sicherungen Beobachtet mit dem Oscilligraphen). E. Oelschläger. Giving diagrams showing the time required for melting safety fuses with various currents. 2500 w. Elektrotech Zeitschr—Sept. 1, 1904.

Fuse, Oil.—A New Safety Fuse for High Pressure Currents (Eine Neue Schmelzsicherung für Hochspannungsstromkreise). F. Collischonn. The wire fuse is enclosed in a glass tube filled with oil. 3000 w. Elektrotech Zeitschr—June 9, 1904.

Fuse Standardization.—Standardisation of Enclosed Fuses. H. O. Lacount. Discusses the necessity of standardizing enclosed fuses, the work of standardizing, the results of this work and the tests of enclosed fuse designed to comply with the specifications. 6000 w. Am Inst of Elec Engrs—Sept., 1905.

Notes on the Standardization of Fuses. Alfred Schwartz. Considers the particulars in connection with which standardization would be advantageous. 2400 w. Elec Rev, Lond—Dec. 1, 1905.

Notes on Continental Systems of Fuse Standardization. Alfred Schwartz. Gives the principal points in connection with fuses contained in the official regulations, with remarks. 2000 w. Elec Rev, Lond—Dec. 15, 1905.

Fuse, Uncertainty.—The Uncertainty of Fuses. Considers some of the causes of uncertainty, with remarks on the recent researches of Oelschlager. 1500 w. Elec Rev, Lond—Dec. 30, 1904.

Fuse vs. Circuit Breaker.—Fuses and Circuit Breakers in Transmission Lines. Alton D. Adams. Explains the primary object, and the qualities of each, discussing the variation in practice. 1800 w. St Ry Rev—Nov. 20, 1903.

Fuses versus Circuit Breakers for Protection of Railway Apparatus. Edward Taylor. Describes the construction of each device stating the advantages, and concludes that only by the use of both devices, conjointly, is it possible to properly protect a railway motor. 5600 w. St Ry Jour—March 25, 1905.

Fuse, Zinc and Aluminum.—Zinc and Aluminum Fuses. Alfred Schwartz and W. H. N. James. An experimental examination of zinc and aluminum as materials for fusible cut-outs. Serial. 1st part. 1200 w. Elec Rev, Lond—Nov. 17, 1905.

Guard Wires.—Protection Devices for High-Tension Overhead Wires (Schutzvorrichtung für Starkstromleitungen mit Oberirdischer Stromzuführung). Fr. Krizik. Especially describing arrangements of guard wires for the protection of telegraph and telephone wires from contact with overhead trolley wires. 1200 w. Zeit f Elektrotechnik—Dec. 18, 1904.

See also **ELECTRIC RAILWAY—Overhead Construction.**

House Connections.—Switches and Fuses for House Use (Hausanschlusssicherungen mit Feuersicheren Patronen). W. Klement. Illustrating a variety of fittings as made by the Siemens-Schuckert Works for house wiring. 6000 w. Elektrotech Zeitschr—July 14, 1904.

Junction Boxes.—See **ELECTRIC DISTRIBUTION.**

Lightning.—See **LIGHTNING PROTECTION.**

Load Factor.—See also **ELECTRIC RAILWAY—Load Factor and Circuit Breaker.**

Railway.—See **ELECTRIC RAILWAY—Load Factor and Circuit Breakers.**

Relay.—An Alternating-Current Relay for Low Frequencies. Frank F. Fowle. Describes an invention of the writer, designed to operate on circuits of 16 2-3 cycles with a very small consumption of energy. 1200 w. Elec Wld & Engr—Nov. 19, 1904.

Discriminating Relays and Cut-Outs. M. B. Field. Deals with wattmeter relays, and briefly considers compound differential devices. Ills. 2000 w. Elec Rev, Lond—Jan. 13, 1905.

Discriminating Relays and Cut-Outs: A Reply to Mr. M. B. Field. Leonard Andrews. A critical discussion of devices for isolating a faulty generator. 1800 w. Elec Rev, Lond—Feb. 3, 1905.

Time-Limit Relays. George F. Chellis. Discusses the operation of various types. 3200 w. Am Inst of Elec Engrs—May, 1905.

Discussion on "Time Limit Relays," and "Duplication of Electrical Apparatus to Secure Reliability of Service," at New York, May 16, 1905. 6000 w. Am Inst of Elec Engrs—Sept., 1905.

Relays for Direct and Alternating Current Circuits. An illustrated description of a series of direct and alternating current relays manufactured by the British Westinghouse Company. 1700 w. Elec Engr, Lond—May 5, 1905.

Time-Limit Relays. W. T. Fernandez. Discussion, with illustration and curve, of clock and bellows types of relays for automatically breaking electric circuits. 1500 w. Am Elect'n—Sept., 1905.

The Overhead and Reverse Current Relay. An illustrated description of an automatic device in which an increase in current starts a motor which operates a circuit breaker. Serial. 1st part. 3000 w. Elec Rev, Lond—Dec. 29, 1905.

See also **ELECTRIC STATION MANAGEMENT—Protection.**

Reversing Switch.—See **ELECTRIC SWITCH.**

Stations.—Safety Devices in Central Stations and Sub-Stations. Philip Torchio. Considers generally the characteristic features tending to increase the factor of safety and the reliability of operation. 2800 w. Trans Am Inst of Elec Engrs—April 24, 1903.

Switch.—See **Fuse; ELECTRIC SWITCH.**

Telephone.—The Protection of Telephone or Telegraph Lines When in Hazardous Proximity to High Tension Lines. Robert E. Chetwood, Jr. Illustrates and describes the most modern practice of the Bell Telephone system, explaining methods of cross-arm construction designed to reduce the possibility of accident. 1800 w. Elec Wld & Eng—May 21, 1904.

Notes on the Construction of Electric Safety Devices for Weak-Current Installations (Beitrag zur Konstruktion Elektrischer Sicherungen für Schwachstromanlagen). Hans Carl Steidle. A description, with diagrams, of lightning protectors, fuses and other protective devices for telephone and telegraph plants. 2500 w. Elektrotech Zeitschr—July 2, 1903.

The Evolution of Telephonic Protective Apparatus. Charles H. Coar. Discusses the various devices to protect telephone lines not only from lightning, but against other destructive currents. States the qualifications demanded by some of the larger companies. 2500 w. Elec Wld & Engr—July 30, 1904.

Commercial Aspects of Telephone Line Protection. Kempster B. Miller. Considers where and under what conditions protection should be given, and under what conditions it is better to take some risk and give only partial protection or none at all. 2500 w. Elec Rev, N Y—Dec. 10, 1904.

See also TELEPHONE; TELEPHONE EXCHANGE.

Three-Wire Balanced Systems.—Protection of Electrical Machines. J. B. Clarke. Examines the reasons for non-protection in the case of a three-wire balanced system, showing the function of the balancer in maintaining a potential in the neutral wire. Ill. 800 w. Elec Rev, Lond—July 11, 1902.

Transmission Systems.—The Relief of Conductors Charged With Statical Electricity (Die Ladung von Freileitungen mit Statischer Elektricität und deren Ableitung). H. Müller. A discussion of the principles involved in the construction of devices for protecting highly charged line wires. 2000 w. Elektrotech Zeitschr—July 25, 1901.

Protection of Long Distance Transmission Lines. F. A. C. Perrine. Read before the Nat. Elec. Lgt. Assn. Calls attention to means for giving the best possible protection, while admitting the imperfections. 1600 w. Elec, N Y—June 4, 1902.

Safety Devices for High-Tension Alternating-Current Lines (Sicherungen für Wechselstrom-Hochspannungsleitungen). Franz Probst. An illustrated description of safety devices to protect electric lines and apparatus against excessive currents and excessive pressures, including fuses, lightning arresters, etc. Serial. 2 parts. 5000 w. Zeitschr f Elektrotechnik—March 29 and April 5, 1903.

Protective Devices for High-Tension Electrical Systems. W. B. Woodhouse. Read before the British Assn. Discusses several points in connection with the operation of a high-tension polyphase transmission system. Ill. 2700 w. Elec Engr, Lond—Sept. 18, 1903.

Protective Devices for High-Tension Electrical Systems. W. B. Woodhouse. Read before the British Assn. An illustrated article discussing points in connection with the operation of a high-tension polyphase transmission system. 2800 w. Elect'n, Lond—Sept. 25, 1903.

Safeguards and Regulations in Operation of Overhead Distributing System. W. C. L. Eglin. Discusses the conditions that must be considered in the construction of the line, the safety devices and their action, inspection, etc. 2800 w. Trans Am Inst of Elec Engrs—Dec. 18, 1903.

The Protection of High-Pressure Transmission Lines from Static Discharges. H. C. Wirt. Comments on devices now in use. 1200 w. Trans Am Inst of Elec Engrs—June 21, 1904.

See also ELECTRIC LINE; ELECTRIC TRANSMISSION; LIGHTNING PROTECTION.

Trolley Wire.—See Circuit Breaker, Trolley Wire; Transmission Systems; ELECTRIC RAILWAY—Overhead Construction; TROLLEY WIRE.

ELECTRIC PUMP.

See PUMP—Electric.

ELECTRIC RAILWAY.

See also ELECTRIC CAR; ELECTRIC DISTRIBUTION; ELECTRIC LOCOMOTIVE; ELECTRIC POWER; ELECTRIC PROTECTIVE APPARATUS—Relay; ELECTRIC RAILWAY, ACCUMULATOR; ELECTRIC RAILWAY, CONDUIT; ELECTRIC RAILWAY, CONTACT; ELEVATED RAILWAY; MOUNTAIN RAILWAY; SINGLE RAIL; STREET RAILWAY; SUSPENDED RAILWAY.

The Trolley Age. Albert L. Johnson, in "The Independent." Considers the electric system of transportation will make it possible to greatly reduce rates and give rapid service. 1500 w. Sci Am Sup—April 27, 1901.

Electric Railways. Major P. Cardew. First of a series of Cantor Lectures. Gives a brief historical summary of practical electric railways in Europe; discusses the advantages of electric traction, and details of operation. Serial. 1st part. 9000 w. Jour Soc of Arts—July 12, 1901.

Present Tendencies in Electric Traction. Dr. Louis Bell. A brief review of the history of electric traction, with a discussion of the present tendencies. 3500 w. Elec Rev, N Y—Jan. 11, 1902.

The Electric Problem of Railways. James Swinburne. Read before the Manchester Sec. of the Inst. of Elec Engrs. Considers the different systems in use and of possible application. Serial. 2 parts. 6500 w. Mech Engr, Lond—March 1 and 8, 1902.

Urban and Suburban Electric Traction (Traction Electrique Uurbaine et Suburbaine). M. Monmerque. A paper before the French Association for the Advancement of Science, opening a general discussion on the subject of electric traction. 12000 w. Rev Gén de Chemins de Fer—July, 1902.

Electric Tramways. C. Hopkinson, B. Hopkinson and E. Talbot. Read before the Brit. Inst. of Civ. Engrs. Abstract. Considers briefly the generation of power, transmission of power to the cars, rolling stock, and earth returns. 1700 w. Mech Engr—Nov. 22, 1902.

Magnetism Applied to Traction. William P. Baer. Describes the application to the electric car, explaining the principles upon which it is based. Ills. Also discussion. 4800 w. Pro Iowa Ry Club—Oct. 20, 1903.

Past, Present and Future of Electric Traction. Frank J. Sprague. Reviews features in the development. 8000 w. Elec Wld & Engr—March 5, 1904.

The Electric Railway Situation. Dr. Louis Bell. A review of the progress during the past year. 1500 w. Elec Rev, N Y—Jan. 14, 1905.

Acceleration.—Acceleration of Electric Cars. George H. Morse. The bearing of this subject on the economy of the system is discussed, the conditions to be met and the best practice. 1700 w. St Ry Jour—Feb. 2, 1901.

See also Speed—Time Curves; ELEVATED RAILWAY—Liverpool; TRACTION.

Acceleration Test.—Comparative Acceleration Tests with Steam Locomotive and Electric Motor Cars. B. J. Arnold and W. B. Potter. A report of tests for determining the comparison on short-haul suburban passenger service, in connection with the preparation of a report on the use of electricity for their terminal in New York City. Ill. 2000 w. Trans Am Inst of Elec Engrs—June 19, 1902.

Method of Ascertaining by Means of a Dynamometer Car the Power Required to Operate the Trains of the New York Central & Hudson River Railroad Between Mott Haven Junction and Grand Central Station, and the Relative Cost of Operation by Steam and Electricity. Bion J. Arnold. Report of the investigation made. Ills. & records. 6500 w. Trans Am Inst of Elec Engrs—June 19, 1902.

Accidents.—See Danger; ELECTRIC RAILWAY ACCIDENT; RAILWAY ACCIDENT.

Albany.—United Traction System of Albany. An illustrated description of the line, its equipment and management. 4800 w. St Ry Jour—Aug. 29, 1903.

Albany-Buffalo.—Electric Lines in Northern New York State. An illustrated article dealing with the territory between Albany and Buffalo. 3500 w. R R Gaz—Aug. 21, 1903.

Albany & Hudson.—See Hudson Valley.

Alexandria, Egypt.—A New Electric Railway in Alexandria, Egypt. An illustrated account of the electrification of the Alexandria & Ramleh Railway, and instalaltion of electric traction upon the lines of the Alexandria Tramway Co. A high-voltage alternating-current transmission system with rotary converter sub-stations. 1700 w. St Ry Jour—May 7, 1904.

All Station Express Train.—See RAILWAY OPERATION.

Alps.—See MOUNTAIN RAILWAY.

Alstaetten-Berneck.—A Combined Railway and Lighting System in Switzerland. Enrico Bignami. Illustrated description of the Alstaetten-Berneck electric railway and the electric lighting of Alstaetten, in the northeast portion of Switzerland. 1600 w. Elec Rev, N Y—Sept. 14, 1901.

Alternating Current.—Four-Motor Equipments and the Possibilities of Alternating Currents for Street Railway Service. Albert H. Armstrong. Extract from an address before the New England Street Ry. Club, on the suburban phase of street railway work. 2800 w. St Ry Jour—March 8, 1902.

Electric Traction with Alternating Currents. A. C. Eborall. Read before the Manchester Soc. of the Inst. of Elec. Engrs. Deals with some features incidental to the employment of three-phase currents for railway purposes, considering briefly the subject of single-phase railway motors. Serial. 1st part. 4700 w. Elect'n, Lond—Dec. 18, 1903.

Electric Traction with Alternating-Current. Editorial review of paper by A. C. Eborall. 2500 w. Engng—Jan. 1, 1904.

Alternating Motors for Railway Service. Dr. Louis Bell. Discusses recent designs in new equipment and the advantages of the alternating-current motor. 2000 w. St Ry Jour—Dec. 19, 1903.

The Alternating Railway Motor Situation. Dr. Louis Bell. Briefly considers the various systems for operating electric roads, discussing the motors already brought into notice. 2000 w. St Ry Jour—Feb. 27, 1904.

Adaptation of Alternating Currents to Railways. P. M. Lincoln. A statement and discussion of the transportation problem, reviewing the development of electric railroading, the use of direct-current motors, the rotary converter, &c., and discussing the single-phase alternating current motor and its advantages. General discussion. 9000 w. Pro Engrs' Soc of W Penn—April, 1904.

Heavy Electric Traction by Alternating Currents. P. M. Lincoln. Discusses the advantages and the reason of the slow adoption of electricity for heavy traffic in the United States. 2400 w. Can Engr—July, 1904.

A Comparison of Alternating Current Railway Systems. J. H. Hallberg. States some of the requirements of electric locomotives for heavy traction, and the four different systems and types of locomotives that have been considered; and describes the Hallberg single-phase to polyphase system, and the Hallberg locomotive. 3800 w. Elec Wld & Engr—Jan. 14, 1905.

High-Pressure Line Construction for Alternating-Current Railways. Theodore Varney. Illustrates and describes some preliminary work which has been carried out on a practical scale with overhead conductors. 2200 w. Am Inst of Elec Engrs—March, 1905.

Progress in Electric Traction (Fortschritte auf dem Gebiete der Elektrischen Zugförderung). Friedrich Eichberg. Describing especially recent three-phase and single-phase interurban lines in Germany and Austria. 2500 w. Zeitschr d Ver Deutschr Ing—Sept. 23, 1905.

See also **Arnold; Deri; Polyphase; Return Current; Single-Phase; Steam Compared.**

Alternating vs. Direct Current.—Interurban Electric Traction Systems—Alternating Current vs. Direct Current. P. M. Lincoln. Read before the Canadian Engrs.' Soc. Discusses the principal advantages of the alternating-current-electric traction over the direct current, comparing the two systems 6000 w. St Ry Jour—Dec. 12, 1903.

Alternating vs. Direct Current Traction. F. Niethammer. A comparison of the various electric systems with regard to first cost, operating expenses, reliability and safety in service. Ills. 14500 w. Int Elec Cong of St. Louis—Sept., 1904.

American.—See **International Ry Congress.**

Amsterdam-Haarlem.—The Amsterdam - Haarlem Electric Railway. A full illustrated description of this recently completed line. 7000 w. Elec Engr, Lond—Jan. 6, 1905.

The Amsterdam-Haarlem Tramways System. An illustrated detailed description of the construction of this road, and an account of the conditions of franchise, contracts, &c. 5000 w. St Ry Jour—Jan. 7, 1905.

Apparatus.—See **ELECTRIC APPARATUS—Railway; ELECTRIC MOTOR—Railway; ELECTRIC POWER STATION.**

Appleyard, Ohio.—The Appleyard Syndicate's Interurban System. Map and illustrated description of an extensive electric railway system in Ohio, the lines in operation and proposed, their equipment, etc., with account of present business. Serial. 1st part. 5400 w. St Ry Jour—May 16, 1903.

Appliances.—See **ELECTRIC APPARATUS—Railway.**

Arnold Electro-Pneumatic.—New Electro-Pneumatic System of Electric Railway Construction. Bion J. Arnold. A brief description of the writer's system with a statement of the results he believes will be accomplished by its adoption. 1500 w. Trans Am Inst of Elec Engrs—May, 1902.

A Single-Phase Electric Railway with Pneumatic Acceleration (Einphasenbahn mit Pneumatischer Beschleunigung). W. A. Blanck. An illustrated brief description of the B. J. Arnold system of single-phase electric and compressed-air traction. 1000 w. Elektrotech Zeitschr—July 16, 1903.

The Arnold-Electro-Pneumatic Railway System, Its Application and Experiments Therewith in Connection with the Lansing, St. John & St. Louis Railway. Illustrated detailed description of the single-phase electric traction system developed by Bion J. Arnold. 4000 w. Elec Rev, N Y—Jan. 2, 1904.

Arnold Single-Phase Electro-pneumatic Railway System. Illustrated detailed description of the work of Bion J. Arnold in this field. 5700 w. W Elect'n—Jan. 2, 1904.

The Arnold Electro-Pneumatic Railway System. Bion J. Arnold. Illustrated detailed description, stating the principles underlying the system. 4000 w. Sib Jour of Engng—April, 1904.

See also **ELECTRIC MOTOR.**

Artistic Poles.—See **Overhead Construction.**

Atlanta, Ga.—The System of the Atlanta Rapid Transit Company. Illustrated detailed description. 2500 w. St Ry Jour—Aug. 3, 1901.

Auburn & Syracuse.—Auburn & Syracuse Electric Railway. An illustrated detailed description of this road and its equipment. Of interest because of the direct competition with steam lines. 2000 w. St Ry Jour—Oct. 3, 1903.

Auckland, N. Z.—The Auckland Electric Tramways. An illustrated detailed description of electric lines recently constructed in this flourishing town in New Zealand. 3500 w. Tram & Ry Wld—March 12, 1903.

Electric Tramways in Auckland, New Zealand. Illustrated detailed description of an extensive system. 1300 w. St Ry Jour—Sept. 26, 1903.

Augusta & Aiken.—The Augusta & Aiken Railway. An illustrated description of a 25-mile trolley road in Georgia and South Carolina, and its electrical equipment. 3000 w. St Ry Jour—Jan. 3, 1903.

Aurora, Elgin & Chicago.—The Aurora, Elgin & Chicago Railway. An illustrated detailed description of an important suburban electric railway, covering the most populous suburban districts of Chicago. Also describes the equipment, rolling stock, etc. 8000 w. St Ry Rev—Aug. 20, 1902.

The Aurora, Elgin & Chicago Interurban Railway. An illustrated description of a recently opened road extending west from Chicago, which is a good example of recent construction. 2200 w. R R Gaz—Sept. 26, 1902.

The Aurora, Elgin & Chicago Railway. This noted interurban road is especially notable for its speed. This article discusses the elements which make this speed possible. Ill. 6600 w. St Ry Jour—Oct. 4, 1902.

An American High-Speed Electric Railway. A brief, illustrated description of the third-rail system betwen Aurora, Elgin and Chicago. 800 w. Tram & Ry Wld—Dec. 8, 1904.

Some Operative Features of the Aurora, Elgin & Chicago Railway Co. An illustrated article reviewing briefly the installation, and the changes and additions made. 4500 w. St Ry Rev—May 15, 1905.

See also **TRACK—Electric Railway.**

Aurora, Joliet.—The Joliet, Plainfield & Aurora Railroad. Illustrated description of this recently completed electric interurban line in Illinois. 4000 w. St Ry Jour—Dec. 24, 1904.

Automobile Compared.—Tramways vs. Motor 'Buses. Henry M. Sayers. Discusses the commercial aspects, comparing costs and carrying capacities. 2000 w. Elect'n, Lond—Feb. 17, 1905.

Motor 'Buses vs. Electric Tramways. J. Clifton Robinson. Discusses this question as affecting England. Thinks the omnibus will find its usefulness as a "feeder" to other lines, but in no danger of supplanting the tramway. 2500 w. St Ry Rev—March 15, 1905.

Electric Tramways v. Motor Omnibuses. Gives reports of Mr. Stephen Sellon and Mr. W. Worby Beaumont, with other information which led to the decision to establish electric traction in Oxford. Also editorial. 6500 w. Elec Engr, Lond —Sept. 8, 1905.

See also AUTOMOBILE—Railway Feeders.

Ayr, Scotland.—The Electric Tramways of Ayr. Illustrates and describes an installation of special interest from the traffic point of view, because the resident population is so small—28,700. 2900 w. Tram & Ry Wld—Oct. 17, 1901.

Baltimore, Md.—The Street Railway System of Baltimore. An illustrated account of important changes and additions which have greatly improved the system. 5000 w. St Ry Rev—Aug. 15, 1901.

Increased Power Facilities for the United Railways & Electric Co., of Baltimore, Md. Illustrates and describes extensive improvements being made which will considerably increase the generating and distributing capacity. 3300 w. St Ry Rev—June 20, 1902.

The First Commercial Electric Street Railway in America. An illustrated account of the line in Baltimore, opened August 10, 1885, and interesting matters related. 2200 w. Elec Wld & Engr —March 5, 1904.

Baltimore & Ohio.—The Baltimore & Ohio Third Rail System. Illustrated description of the recent third-rail construction, taken from an account in the recently published "Book of the Royal Blue." 1600 w. Ry Age—July 25, 1902.

The Third Rail on the Baltimore and Ohio. W. D. Young. States some of the difficult problems involved in the installation, with illustrated description of the general form of construction. 4800 w. St Ry Jour—March 14, 1903.

See also THIRD RAIL—Pick-Up-Device.

Barcelona, Spain.—Electric Tramways in Barcelona and Vicinity. Gives particulars regarding progress on roads under construction, and changes made from horse and steam on electric traction, etc. 700 w. U S Cons Repts, No. 909—Dec. 13, 1900.

Barrow-in-Furness, Eng.—The Tramways in Barrow-in-Furness. Illustrated description of track cars, and other features of an English electric railway. 1600 w. Tram & Ry Wld—Aug. 11, 1904.

Belfast.—Belfast City Tramways. Illustrate detailed description of an extensive electric system of the latest designs. 11700 w. Tram & Ry Wld—Oct. 12, 1905.

The Belfast City Tramways. Information of interest concerning these recently completed lines, with plans and sections of the generating station. 6800 w. Elect'n, Lond—Dec. 1, 1905.

Berkshire, Mass.—See ELECTRIC STATION—Pittsfield.

Berlin.—The Electric Driving of the Great Berlin Street Railway (Der Elektrische Betrieb auf der Grossen Berliner Strassenbahn). A general description of the electrical operation of the surface tramways of Berlin. 4000 w. Elektrotech Zeitschr—Jan. 29, 1903.

See also ELEVATED RAILWAY.

Berlin-Lichterfelde.—Electric Traction on the Suburban Railway from Berlin to Gross-Lichterfelde-Ost (Die Elektrische Zugförderung der Vorortbahn Berlin-Gross-Lichterfelde-Ost). Kurt Meyer. Well illustrated description of the electrical equipment of a third-rail, direct-current road, about 6 miles long. Serial. Part 1. 4000 w. Zeitschr d Ver Deutscher Ing—June 6, 1903.

Electric Traction on Main Railways and the Electric Equipment of the Berlin-Gross Lichterfelde Ost Suburban Railway (Die Bisherigen Ergebnisse des Elektrischen Betriebes auf Hauptbahnen und die Einrichtung der Gegenwärtig in Ausführung Begriffenen Elektrischen Zugförderungsanlage für die Vorortstrecke Berlin-Gr. Lichterfelde Ost). Hr. Bork. Paper before the Verein für Eisenbahnkunde, giving a discussion of electric traction on main lines, and a well illustrated description of the electric equipment and rolling stock of a third-rail direct-current railway out of Berlin. 1 plate. 9000 w. Glasers Ann—May 15, 1903.

Berlin-Zossen.—See Zossen.

Bex-Gryon-Villars.—See MOUNTAIN RAILWAY.

Bexley.—The Bexley Electric Tramways and Electric Lighting. Illustrated description of a recently inaugurated system in England. 2000 w. Elec Engr, Lond—Oct. 2, 1903.

Birkenhead, Eng.—Birkenhead Corporation Electric Tramways. Briefly reviews the history of tramways, illustrating and describing their recent electrical equipment. 2500 w. Tram & Ry Wld —Sept. 12, 1901.

Birmingham, Ala.—Birmingham Railway, Light & Power Co. Thomas de Granville. An illustrated article describing the system, which is a consolidation of fifteen companies, the track, overhead construction, buildings, rolling stock, &c. 8400 w. St Ry Rev—April 20, 1904.

Birmingham, Eng.—Electric Traction in Birmingham. Illustrated detailed description of the first overhead trolley system in this city, which is an example of the best construction. 1700 w. Tram & Ry Wld—June 13, 1901.

Blankenese-Ohlsdorf. — The Proposed Blankenese-Ohlsdorf Electric Railway (Ueber den Geplanten Elektrischen Betrieb der Hamburger Stadtbahn Blankenese-Ohlsdorf). Gustav Schimpff. With map and profiles of the extension of the Hamburg electric railway system to neighboring towns using single-phase traction. 3500 w. Elektrotech Zeitschr—June 22, 1905.

Bloomington-Joliet.—See Single-Phase, Illinois.

Bloomington & Normal.—The System of the Bloomington & Normal Railway, Electric & Heating Company. C. H. Robinson. An illustrated account of a company furnishing transportation facilities and also carrying on a general lighting and heating business. 1800 w. St Ry Jour—May 27, 1905.

Bolton, Eng.—The Tramway System of Bolton. Map and full illustrated account of this English tramway, which has features of construction of interest. 7000 w. Tram & Ry Wld—Jan. 15, 1903.

Borinage, Belgium.—The Street Railway System of the Borinage. Dr. Alfred Gradenwitz. Illustrated description of this single-phase system in the Belgian Colliery district, and its equipment. 2000 w. Elec Rev, N Y—Sept. 23, 1905.

Boston.—The Boston Rapid Transit Situation. Dr. Louis Bell. A critical study, discussing also the character of railway construction of the future and the mistakes of the past. 3300 w. Elec Rev, N Y—May 3, 1902.

The Street Traffic in the City of Boston. Charles Prelini. An illustrated article describing the conditions and the difficulties, and the construction of the subway. Serial. 1st part. 7700 w. Trac & Trans—April, 1903.

Boston & Worcester.—The Boston & Worcester Street Railway. An illustrated description of one of the latest interurban roads of New England, representing the most advanced practice. 5700 w. St Ry Jour—Oct. 4, 1902.

Bournemouth, Eng.—See ELECTRIC CONDUIT RAILWAY.

Bow Trolley.—See TROLLEY—Bow.

Bremgarten-Dietikon.—The Bremgarten-Dietikon Interurban Electric Railway. Illustrates and describes a short interurban line in Switzerland which combines a passenger and freight business. 1200 w. St Ry Jour—Nov. 1, 1902.

Bridge.—See also Williamsburg Bridge; BRIDGE—Electric Railway.

Brighton, Eng.—The Brighton Corporation Tramways. Illustrated detailed description of construction. 2800 w. St Ry Jour—Jan. 4, 1902.

Brighton Corporation Electric Tramways. Illustrated detailed description of the tramway system of Brighton, England. 1800 w. Elec Rev, Lond—Jan. 24, 1902.

Brinckerhoff Address.—Electric Railways. H. M. Brinckerhoff. Abstract from a lecture before the night classes of the Lewis Institute as one of a series of semi-popular talks on engineering subjects. Ill. 4800 w. Jour W Soc of Engrs—April, 1903.

British.—Electric Tramways—Progress in the United Kingdom, 1891-1900. J. Clifton Robinson. A résumé of the history of tramways in Gt. Britain and Ireland during the last ten years. 5000 w. St Ry Rev—Jan. 15, 1901.

Tramways in Large Cities. C. H. Wordingham. Reviews the probable effects of the extensive network of tramways, destined to cover Gt. Britain, and some of the problems involved. 2700 w. Elec Rev, Lond—Jan. 18, 1901.

Recent Electric Tramway Practice in the British Isles. P. T. J. Estler. Abstract of a paper read before the University College Engng. Soc., London. The paper is confined to the overhead trolley system and discusses the permanent way, overhead equipment, generating station and rolling stock. Ill. 7500 w. Tram & Ry Wld—Feb. 13, 1902.

Electric Traction on English Railroads and Tramways. On the present position of electric traction matters in Great Britain. 1800 w. R R Gaz—Feb. 28, 1902.

Recent Electric Tramway Practice. P. T. J. Estler. Abstract of a paper read before the London Univ. Col. Engng. Soc. Deals only with the overhead trolley system, discussing the permanent way in the present article. Serial. 1st part. 3000 w. Mech Engr, Lond—March 15, 1902.

Electric Traction Progress. Philip Dawson. Read at Northampton, England, before the Tramways Committee. A review of the history of electric traction in England. 5800 w. Elec, Engr, Lond—May 16, 1902.

"Electrical Review" List of Electric Tramways and Railways in the United Kingdom. List and tabulated information. 5500 w. Elec Rev, Lond—June 26, 1903.

Running Powers. Stephen Sellon. Read before the Tram. & Lgt. Rys. Assn. Discusses railway working in England, and the advantages of running through cars without change, with summary of discussion, and letters from numerous tramway Engineers and managers. 11000 w. Elec Engr, Lond—Dec. 9, 1904.

Statistics of the Growth of Electric Traction. W. Pollard Digby. Gives statistics for the United Kingdom in regard to capital invested, mileage, &c. 1200 w. Elec Mag—April 25, 1905.

See also International Ry. Congress; Steam Compared; ELECTRIC INDUSTRY; STREET RAILWAY; STREET RAILWAY LEGISLATION.

Brockton & Plymouth, Mass.—The Brockton & Plymouth Street Railway. Illustrated detailed description of the line and its operation. 7200 w. St Ry Jour—April 5, 1902.

Bronx, N. Y.—The Trolley in the Bronx Region. Edward A. Maher. Explains the character of this district, giving illustrations. Its parks draw the pleasure-seekers, and it is rapidly becoming a residential section, through the influence of its trolley lines. 4000 w. St Ry Jour—Oct. 5, 1901.

Brooklyn.—System of the Brooklyn Rapid Transit Co. An illustrated article dealing with some of the operating conditions, traffic across Brooklyn Bridge, consolidations, excursion traffic, &c. 8000 w. St Ry Rev—Sept. 15, 1901.

Some Railway Problems of Brooklyn. J. L. Greatsinger. An illustrated article explaining some of the reasons why the service is at present inadequate and the plans being adopted to increase the efficiency. 2000 w. St Ry Jour—Oct. 5, 1901.

Rapid Transit Railway Construction in Brooklyn. The present article gives an illustrated description of work on Section 3, Division 5, which extends from Flatbush and Atlantic Avenues to Clinton and Joralemon Streets. Serial. 1st part. 3300 w. Eng Rec—Oct. 22, 1904.

See also TRANSPORTATION.

Brussels.—Brussels Electric Tramways. An illustrated description of the reorganised arrangements of the power supply for these lines. 1600 w. Elec Rev, Lond—Nov. 6, 1903.

See also ELECTRIC STATION.

Budapest.—The Conversion of the Budapest Tramways from Horse to Electric Traction (Ueber den Umbau der Budapester Pferdebahn auf Elektrischen Betrieb). L. Spängler. With plans of the city and illustrations of the power stations. Two articles. 6000 w. 2 plates. Zeitschr d Oesterr Ing u Arch Ver—Oct. 18, 25, 1901.

Electric Railways of Budapest. Franz Köster. Illustrated description of the electric underground and surface railways and power plant construction. 2000 w. St Ry Rev—Sept. 20, 1903.

Buenos Aires.—Notes on Street Railway Systems of Buenos Aires. Guillermo A. Puente. Statistics and illustrated description of power station and other features. 1600 w. St Ry Rev—Aug. 20, 1904.

See also ELECTRIC STATION.

Buffalo.—The Street Railways of Buffalo and Vicinity. Illustrated description of the lines of the International Traction Co., their operation and connecting lines. 14000 w. St Ry Rev—June 15, 1901.

See also Freight.

Buffalo-Pan American.—Handling Pan-American Exposition. Crowds on the Buffalo Railway. Illustrates and describes the arrangements made for the transportation and control of large crowds. 900 w. St Ry Jour—June 1, 1901.

Burgdorf-Thun, Switzerland.—The Burgdorf-Thun Electric Railway (Le Chemin de Fer Electrique de Berthoud à Thoune). M. Maguin. A general description of this important installation of polyphase traction in Switzerland, with details of the trials. 4000 w. Revue Gen des Chemins de Fer—Sept., 1901.

The Burgdorf-Thun Electric Railway (Le Chemin de Fer Electrique à Voie Normale de Berthoud à Thoune, Suisse). Henry Martin. A very well illustrated description of this Swiss polyphase railway and its rolling stock. 1 plate. 6000 w. Génie Civil—Jan. 11, 1902.

The Electric Road of Berthoud-Thoune, Switzerland. Describes a mountain line using the three-phase low-tension electric current, with illustrated descriptions of the rolling-stock. 2000 w. Sci Am—June 14, 1902.

See also Polyphase; HYDRO-ELECTRIC PLANT —Kander River.

Burnley, Eng.—Burnley Corporation Electric Tramways. Brief history of these tramways with an illustrated description of the conversion from steam to electricity. 3700 w. Tram & Ry Wld —April 17, 1902.

Burnley Tramways Depot. Henry Mosley. Particulars and illustrations of the Queen's Gate depot and general offices which have recently been erected, equipped and placed in operation. 2000 w. Tram & Ry Wld—Nov. 9, 1905.

Butte, Mont.—Some Features of the Butte, Mont., Electric Ry. J. R. Wharton. Illustrates and describes the line and equipment. 1500 w. St Ry Rev—Nov. 20, 1903.

Calcutta.—The Calcutta Tramways System. An illustrated detailed description of the electric traction system, with an account of the conditions under which it operates. 5500 w. St Ry Jour —June 3, 1905.

The Calcutta Tramways System. Illustrated description of electrification of the tramways system, and a statement of the climatic conditions which cause difficulty in operation. 4000 w. Elect'n, Lond—June 9, 1905.

Camden, N. J.—The System of the Camden & Suburban Railway Company. The first of a series of four articles describing in detail the methods of this company. The present article is devoted to a description of the physical condition of the system. Ill. Serial. 1st part. 7300 w. St Ry Jour—Dec. 5, 1903.

Canal Conversion, Eng.—The Conversion of English Canals into Electric Railways. F. F. Bennett. Outlines a scheme of amalgamation and electrification, aiming to prove that the change would give profits. 6000 w. Public Works—Jan., 1905.

Canal Haulage.—See CANAL HAULAGE.

Canton & Akron.—The Canton and Akron Railway. Outlines the history of this Ohio line which is a part of the system controlled by Tucker, Anthony & Company, giving illustrated description and account of the management and operation. 7800 w. St Ry Jour—May 28, 1904.

Canton-Salem, O.—The System of the Stark Electric Railroad Company. An illustrated description of a line in Ohio, built on private right of way. 5000 w. St Ry Jour—Jan. 7, 1905.

Cape Town.—Camps Bay, Cape Town, and Sea Point Tramways. Illustrates and describes the construction and equipment of this line. 3000 w. Tram & Ry Wld—March 13, 1902.

Car.—See **ELECTRIC CAR.**

Cardiff, Wales.—Electric Tramways in Cardiff. An outline from a local paper describing the undertaking. 900 w. U S Cons Repts, No. 973—Feb. 28, 1901.

Cardiff Electrical Tramways. An illustrated article giving the history of the undertaking, with description of the line and its equipment. 7000 w. Elec Engr, Lond—May 16, 1902.

The Electric Tramway System of Cardiff Corporation. An illustrated account of this system, giving detailed description of the plants, equipment, rolling stock, etc. 7500 w. Tram & Ry Wld—June 12, 1902.

Carlisle, Eng.—The City of Carlisle Electric Tramways. Illustrated detailed description of overhead construction system. 1600 w. Tram & Ry Wld—Oct. 11, 1900.

Ceylon.—The Electric Tramway in Colombo, Ceylon. H. S. Morrison. Illustrated description of a line that has been running satisfactorily about three years and is to be extended. 1600 w. St Ry Jour—Nov. 2, 1901.

Chamonix.—Electric Railway from Fayet to Chamonix and the Swiss Frontier (Chemin de Fer Electrique du Fayet à Chamonix et à la Frontière Suisse). M. Geoffray. A well illustrated description of this third-rail road near Mont Blanc and its hydro-electric plants. 8 plates. 16000 w. Ann d Ponts et Chaussées—3 Trimestre, 1901.

The Fayet-Chamonix Electric Railway (La Traction Electrique sur la Ligne du Fayet à Chamonix). M. Auvert. A well illustrated description of the line, rolling stock and power stations of this railway near Mont Blanc. 2 plates. 5000 w. Rev Gen d Chemins de Fer—April, 1902.

The Fayet-Chamonix Electric Railway. Brief illustrated description of an interesting line 11.8 miles long, with steep gradients and sharp curves. 2000 w. Engng—May 2, 1902.

The Electric Railway from Fayet to Chamonix, France (Chemin de Fer à Traction Electrique du Fayet à Chamonix). Henry Martin. A very well illustrated description of a direct-current electric railway, 20 kilometers long, near Mount Blanc, its rolling stock and hydro-electric plants. Serial.. 2 parts. 2 plates. 9000 w. Génie Civil—June 28, July 5, 1902.

Electric Road from Fayet to Chamonix. Illustrated detailed description of a road leading to this French village near Mont Blanc, which is a popular tourist resort. It possesses features of interest. Also describes rolling stock, and notes proposed extensions. 4000 w. St Ry Jour—Feb. 7, 1903.

The Chamonix Electric Railway. Archibald Wilson. An illustrated description of this short but interesting line near Mont Blanc. Water power and protected third-rail current supply. 2500 w. Cassier's Mag—Jan., 1904.

The Fayet-Chamonix Railway. Daniel Bellet. Outlines a plan for constructing a railway to the summit of Mont Blanc, and gives an illustrated detailed description of the Fayet-Chamonix electric railway, which connects the foot of Mont Blanc with the Paris-Lyons-Mediterranean System. 4500 w. Trac & Trans—May, 1904.

The Chamonix Railway (Le Chemin de Fer de Chamonix). F. Loppé. An illustrated description of the electric railway operated by the Paris, Lyons and Mediterranean Company from Fayet to the Swiss frontier. Serial. Part I. 2000 w. Revue Technique—Nov. 10, 1904.

The Fayet-Chamonix Electric Railway. Dr. Alfred Gradenwitz. Illustrated detailed description of this line and its construction. 2000 w. Elec Engr, Lond—Jan. 27, 1905.

A French Mountain Railway. Brief illustrated description of the electric mountain railway operating between Chamonix and Fayet, in the Mont Blanc region. 700 w. Ry Age—July 21, 1905.

See also **HYDRO-ELECTRIC PLANT; MOUNTAIN RAILWAY—Mont Blanc.**

Charleston Exposition.—See **TRANSPORTATION.**

Chicago.—Railways and Train Service in Chicago. Tabulated statement of the average number of trains arriving and departing every 24 hours at the present time, with explanatory remarks. 1300 w. Ry Age—Jan. 2, 1903.

Engineering and Operating Features of the Chicago Transportation Problem. An abstract of the report submitted by Bion J. Arnold giving facts regarding the conditions and matters of engineering interest. Serial. 1st part. 5500 w. St Ry Jour—Jan. 10, 1903.

Report on Chicago Street Railways. Report of B. J. Arnold on the engineering and operating features of the transportation problem, submitted to the Committee on Local Transportation. Maps and ill. 11800 w. St Ry Rev—Jan. 20, 1903.

The Street Railways of Chicago. Part of an address by Mayor Dunne before the League of Am. Munic., explaining his scheme for securing early municipalization. 2500 w. Munic Jour & Engr—Oct., 1905.

Chicago & Milwaukee.—Chicago & Milwaukee Electric Railroad. Illustrates and describes extensions and improvements, the installation of new power house and substation equipments, operating features, etc. 6500 w. St Ry Rev—Dec. 20, 1904.

Chicago, Harvard & Geneva.—See **Freight.**

Chicago-Joliet.—Chicago & Joliet Interurban Railway. A. S. Kibbe. Illustrated description of an interurban road recently opened to service, its construction and equipment. 7000 w. St Ry Rev—Jan. 15, 1902.

Christ Church, N. Z.—The Installation of Electric Tramways in Christ Church, New Zealand. James Drummond. Illustrated detailed description of a ocmplete electric railway system built under the auspices of the municipality. 2200 w. St Ry Jour—Aug., 1905.

Christ Church Electric Tramways. James Drummond. Illustrated description of first municipal installation of electric traction in New Zealand, opened June 5, 1905. 4000 w. Tram & Ry Wld—Sept. 14, 1905.

Cincinnati.—The Interurban Railway & Terminal Co. Illustrates and describes the lines and equipment of a company operating in and around Cincinnati, Ohio. 5500 w. St Ry Rev—Nov. 20, 1903.

Cincinnati Interurban Development. The first of a series of articles giving an illustrated detailed description of this extensive system and its equipment, with its history. Serial. 1st part. 3500 w. St Ry Jour—Nov. 21, 1903.

Cincinnati, Georgetown & Portsmouth.—Steam Railroad Converted to Electric System. Illustrates and describesthe changes made in the Cincinnati, Georgetown & Portsmouth Railroad. 5000 w. St Ry Jour—Feb. 21, 1903.

The Cincinnati, Georgetown & Portsmouth Railroad Changed from Steam to Electric Traction. E. M. Stevens. Illustrates and describes the electrical apparatus installed, the power plants and sub-stations. 2500 w. Elec Rev, N Y—April 4, 1903.

Cleveland, Ohio.—Improvements on the Cleveland Electric Railway. Illustrated description of the interesting features. 1300 w. St Ry Jour—June 1, 1901.

The Trolley Situation in Cleveland. A study of the conditions of local short-haul and long-haul electric traffic. 3300 w. R R Gaz—Feb. 6, 1903.

The First Electric Street Car in America—1884. E. M. Bentley. An account of the opening of a line a mile long in Cleveland, Ohio, the system installed, the difficulties, &c. Also notices of other early work in this field. 2500 w. Elec Wld & Engr—March 5, 1904.

New Operating Features in Cleveland. Illustrates and describes a test car, derrick car, stone crusher, concrete conveyor, new track construction, &c. 1500 w. St Ry Jour—Oct. 14, 1905.

Cleveland and Eastern.—Cleveland & Eastern Interurban Line. Illustrated description of this line, the sixth to be built with Cleveland as one of the termini. 1400 w. St Ry Rev—March 15, 1901.

See also **Freight.**

Cleveland Interurban.—Improvements on the Cleveland & Southwestern Interurban System. An illustrated article reviewing this system and describing recent construction and equipment. 3000 w. St Ry Jour—June 27, 1903.

The Cleveland, Painesville & Ashtabula Electric Railway. Illustrates and describes a line built entirely on private right of way. 4500 w. St Ry Jour—July 16, 1904.

Clinton & Davenport, O.—The Iowa & Illinois Railway Co. Illustrates and describes the line, power plant, rolling stock and operating methods of a recently completed interurban line between Clinton and Davenport, Iowa. 5500 w. St Ry Rev—Feb. 15, 1905.

Coeur d'Alene & Spokane.—The Coeur d'Alene & Spokane Railway. Describes the situation and conditions in this region, giving an illustrated description of the railway and its equipment and operation. It handles freight as well as passengers. 1800 w. St Ry Jour—Feb. 11, 1905.

Colorado Springs.—The Colorado Springs & Interurban Street Railway System. J. H. Rusby. An illustrated description of the electrical equipment and the power installation. 2000 w. Elec Rev, N Y—April 25, 1903.

Colorado Springs and Interurban Railway System. Illustrated detailed description of the road and equipment. 3500 w. St Ry Jour—Oct. 3, 1903.

Columbia, S. C.—Columbia Electric Street Railway Light & Power Co., of Columbia, S. C. An illustrated detailed description of the construction, distribution, equipment and other features. 4000 w. St Ry Rev—Feb. 20, 1903.

Columbus, O.—The Interurban Railway Loop at Columbus, O. Illustrates this loop and describes its construction. 1700 w. Munic Engng—Aug., 1901.

Third-Rail System of the Scioto Valley Traction Co., Columbus, Ohio. Illustrates and describes the interesting features of this high speed electric road. 7500 w. St Ry Rev—Sept. 20, 1904.

The Scioto Valley Traction Company. An illustrated description of the only line in Ohio operated by a third rail. 4000 w. St Ry Jour—Dec. 3, 1904.

Test of the Railway System of the Scioto Valley Traction Company. F. C. Caldwell. The principal object of the test was to obtain a statement of the distribution of the power consumption and losses throughout the system during a normal day's run. 4800 w. St Ry Rev—Nov. 15, 1905.

Columbus-Zanesville, Ohio.—Electric Interurban Between Columbus and Zanesville. Illustrated detailed description of a road under construction on a private right of way. Also of the portion of the road which has been in operation more than a year, and its equipment. 5800 w. St Ry Jour—Aug. 1, 1903.

The Columbus, Newark & Zanesville Electric Railway. Illustrated detailed description of this Ohio line and its equipment. 3500 w. St Ry Jour—April 15, 1905.

Combined Trolley and Conduit. — See **ELECTRIC RAILWAY CONDUIT—Trolley Combined.**

Concord & Manchester.—The Concord & Manchester Branch of the Boston & Maine Railroad. An illustrated description of an electric branch road built and operated by a steam railroad company. 2500 w. St Ry Jour—Dec. 6, 1902.

See also **STREET RAILWAY MANAGEMENT.**

Concrete Roadbed.—See **STREET RAILWAY; TRACK.**

Conduit.—See **ELECTRIC RAILWAY, CONDUIT.**

Conestoga.—See **Lancaster, Pa.**

Conneaut & Erie.—The Conneaut & Erie Interurban System. Illustrated detailed description of the line and equipment. 4000 w. St Ry Jour—Feb. 6, 1904.

Connecticut.—Railway Interests in the Connecticut Legislature. Clarence Deming. A review of the steam-trolley conflict of the last decade. 1500 w. R R Gaz—July 19, 1901.

Steam, Trolley and Third Rail in Connecticut. Clarence Deming. Discusses problems of electric transportation as affected by the peculiar conditions of this state, especially the developments of the past year. 2100 w. R R Gaz—June 6, 1902.

Construction.—The Growth of an Electric Railway. L. E. Gould. Explains in a general manner the progress of an electric railway up to the date of its operation. Serial. 1st part. 4000 w. St Ry Rev—May 20, 1904.

Standards of Construction on the Indianapolis Northern Lines of the Indiana Union Traction Company. Illustrates and describes work on the latest lines of the company, which is the second largest interurban system in the United States. 2500 w. St Ry Jour—Dec. 17, 1904.

See also **Economics.**

Controller.—See **Multiple—Unit; CONTROLLER; ELECTRIC CAR.**

Cost of Power.—See **ELECTRIC STATION MANAGEMENT.**

Croydon, Eng.—Croydon Corporation Electric Tramways. An illustrated description of the system, and account of the undertaking of this English borough. 1100 w. Elect'n, Lond—Oct. 4, 1901.

Current Consumption.—Economy in Consumption of Current. Peter Fisher. Read before the Munic. Tram. Assn., Liverpool, England. Discusses the subject generally and gives information received in reply to a set of questions circulated. 7800 w. Tram & Ry Wld—Oct. 13, 1904.

Current Distribution.—See **ELECTRIC DISTRIBUTION—Railway.**

Curve Resistance.—See **TRACTION—Street Railway Curves.**

Dallas-Forth Worth.—The System of the Northern Texas Traction Company. Map and illustrated description of the interurban line connecting Dallas and Fort Worth, and the local lines of the two places. 6000 w. St Ry Jour—July 18, 1903.

Danger.—Concerning Some Dangers from Electric Traction. A letter from George Westinghouse, with editorial showing that the use of electricity in the Park Ave. tunnel might have made the recent accident even more serious. 900 w. R R Gaz—Jan. 17, 1902.

The New York Central Accident—Electricity—Protection by Signals. S. S. Neff. A review of improvements necessary to insure safety on electric roads, with some reference to warnings in letters by Mr. George Westinghouse. 2800 w. R R Gaz—Jan. 24, 1902.

Comments on the Electrical Equipment of the New York Central Tunnel. Letters from Mr. George Westinghouse in regard to the dangers of electric traction, with replies from various writers, and editorial. 6000 w. St Ry Jour—Jan. 25, 1902.

The Supposed Dangers of Electric Traction. Editorial discussion of the recently published letter from Mr. George Westinghouse. 1100 w. Sci Am—Feb. 1, 1902.

Electricity for the New York Central Tunnel. Frank J. Sprague. A reply to the letters of Mr. George Westinghouse on the subject of the dangers of electric traction in tunnels. 1500 w. Elec Wld & Engr—Feb. 1, 1902.

See also **UNDERGROUND RAILWAY.**

Darlington, Eng.—Electric Traction at Darlington. Illustrated description of track, power-house and other features of an English electric road. 2000 w. Tram & Ry Wld—Aug. 11, 1904.

Darwen, Eng.—Darwen Electric Tramways and Refuse Destructor. Illustrated description of a tramway installation at Darwen, England, in which steam is raised by refuse destructors. 5000 w. Tram & Ry Wld—Feb. 7, 1901.

Davenport-Rock Island-Moline.—System and Parks of the Tri-City Railway Co. An illustrated description of an electric railway between Davenport, Iowa, and Rock Island and Moline, Illinois, and its pleasure parks. 2200 w. St Ry Rev—Dec. 20, 1902.

Dayton & Muncie.—The Dayton & Muncie Electric Railway. Particulars in regard to this recently completed line, with illustrated detailed description of its stations, equipment, rolling-stock, &c. 3000 w. St Ry Jour—Dec. 2, 1905.

Dayton-Greenville.—An Important Interurban Road in Southern Ohio. Illustrated description of an interurban road 39.5 miles long, connecting Dayton and Greenville, Ohio, its equipment, operation, etc. 4500 w. St Ry Jour—Sept. 6, 1902.

Dayton-Piqua.—The Dayton, Covington & Piqua Traction Company. Illustrated description of a successful electric railway in Ohio, carrying passengers and freight. 4500 w. St Ry Jour—Sept. 17, 1904.

Demerara.—See **Georgetown, British Guiana.**

Denver, Col.—Notes on the Denver City Tramway. Illustrates and describes the track and special work, the despatching system, cars, and matters of interest in the operation and management. 6000 w. St Ry Jour—Feb. 2, 1901.

Denver Tramway System. An illustrated detailed description of the new station of the Denver Tramway Power Co., and the high-tension transmission, and other features. 7500 w. St Ry Jour—Oct. 10, 1903.

See also **STREET RAILWAY MANAGEMENT.**

Denver Interurban.—Denver & Northwestern Interurban Road for Hauling Coal. Illustrates and describes the coal mines and plant, the track and overhead construction, equipment, passenger operation, etc. 3000 w. St Ry Jour—Aug. 1, 1903.

Derby, Eng.—Derby Electricity Works and Tramways. An illustrated description of extensions, and changes being made at Derby. Serial. 1st part. 2500 w. Elect'n, Lond—June 10, 1904.

The Derby Electric Tramways and Electricity Supply. Illustrated description of large electric power house and railway system in England. 1800 w. Elec Engr—Aug. 12, 1904.

Deri System.—The Deri System of Electric Traction (Trazione Elettrica Sistema Deri). G. Oliva. Two motors are used on each car; one alternating motor receiving current from overhead wire, and one continuous current motor fed from an accumulator carried on the car. 1800 w. Elettricita—Dec. 1, 1900.

Design.—See **ELECTRIC STATION.**

Des Moines, Iowa.—A Remarkable Iowa Interurban. Illustrated description of the Colfax branch of the system of the Interurban Ry. Co. of Des Moines, Iowa, which is of interest because of the remarkable amount of traffic in a sparsely populated territory. 2400 w. St Ry Jour—June 20, 1903.

Despatching.—Two Methods of Despatching on Interurban Electric Railways. Describes two methods quite different in principle, one used by the Union Traction Co. of Indiana, and the other by the Toledo, Fremont & Norwalk R. R. Ill. 2800 w. St Ry Rev—Aug. 15, 1901.

Car Despatching. An illustrated article giving an outline of the methods employed on the Washington, Alexandria, & Mt. Vernon Ry. Dispatching is done entirely by telegraph. 2800 w. St. Ry Rev—June 20, 1902.

Car Dispatching on Interurban Lines. Thomas E. Mitten. Read at convention of the N. Y. State St. Ry. Assn. An explanation of a system devised by the writer which, while similar to steam railway practice, is more flexible and simple. 3000 w. St Ry Jour—Sept. 20, 1902.

Interurban Train Dispatching. E. P. Wilcoxen. Read at Syracuse meeting of the N. Y. State St. Ry. Assn. Describes principally the telephone system of despatching. 1200 w. St Ry Jour—Oct. 17, 1903.

Train Despatching on the Rochester & Eastern Rapid Railway. An illustrated article giving interesting particulars regarding the telephone despatching system, and the apparatus employed. 2000 w. St Ry Jour—May 21, 1904.

See also **RAILWAY OPERATION.**

Detroit.—The Street Railways of Detroit. An illustrated article giving the history of their development, with a review of the agitation for low fares, and a table showing the relations of the different companies forming the Detroit United Railway. 4500 w. St Ry Rev—Sept. 20, 1902.

Review of the Detroit United Railway System from an Operating Standpoint. A. H. Stanley. Map and illustrations. 3500 w. St Ry Rev—Sept. 20, 1902.

Overhead Construction and Electric Power Distribution of the Detroit United Railway System. An illustrated article describing types of construction, materials, power distribution, and the work in general. 2200 w. St Ry Jour—Oct. 4, 1902.

Motive Power and Rolling Stock of the Detroit United Railway. Thomas Farmer. Illustrated detailed description of the power houses and battery stations, and various types of cars, etc. 3700 w. St Ry Jour—Oct. 4, 1902.

Flint Division of Detroit United Railway Company. S. T. Dodd. Illustrates and describes a plant of S. K. C. rotaries which works very successfully on this long distance line. 2800 w. Elec Wld & Engr—Oct. 4, 1902.

Detroit as an Interurban Electric Railway Center. Map and information, showing the great number of interurban lines centering in this city. 1500 w. St Ry Jour—Oct. 4, 1902.

The Detroit Group of Electric Railroads. An account of lines in sharp competition with steam railroads. 2500 w. R R Gaz—Nov. 27, 1903.

See also **ELECTRIC STATION; STREET RAILWAY MANAGEMENT.**

Detroit & Port Huron. — The Rapid Railway System. F. W. Brooks, W. O. Wood and A. C. Marshall. An illustrated article giving a full account of the Detroit & Port Huron Shore Line Railway, its equipment and operation. 3800 w. St Ry Rev—Sept. 20, 1902.

Motive Power and Rolling Stock on the Rapid Railway. Illustrates and describes these features of the Detroit & Port Huron Shore Line Railway. 1500 w. St Ry Jour—Oct. 4, 1902.

Detroit-Saginaw. — The Detroit, Flint & Saginaw Railway Co. Illustrated description of the territory served, roadway construction, new power house and equipment. Edward J. Hunt. 2500 w. St Ry Rev—Dec. 15, 1905.

Detroit-Ypsilanti.—The System of the Detroit, Ypsilanti, Ann Arbor & Jackson Railway. F. E. Merrill. Illustrates and describes this road which was the first to construct 40 miles of track. 3500 w. St Ry Rev—Sept. 20, 1902.

Power Distribution and Operating Points on the Detroit, Ypsilanti, Ann Arbor & Jackson Railway. An illustrated article considering points of interest in the working of this long interurban electric road. 2000 w. St Ry Jour—Oct. 4, 1902.

Distribution of Current.—See **ELECTRIC DISTRIBUTION—Railway.**

Doncaster, Eng.—Doncaster Electric Tramways. History of the undertaking, with illustrated description of the equipment, generating works, etc. 2500 w. Elec Engr, Lond—June 6, 1902.

Dublin.—The Dublin United Tramway System. A detailed account of the present condition and gradual development. Ill. Serial. 1st part. 1800 w. Elect'n, Lond—Aug. 9, 1901.

The Dublin United Tramways Company. An illustrated account of the tramways of this company, which may be considered as the pioneer electrical system in the United Kingdom. 4200 w. Tram & Ry Wld—July 10, 1902.

Du Bois, Pa.—Improvements in the Du Bois Electric and Traction System. Illustrates and describes the improvements since the consolidation of the two companies controlling the electric interests. 3000 w. St Ry Jour—May 9, 1903.

Dulait.—See **Magnetic Polyphase; Tangential Traction.**

Earths.—See **Grounds.**

East Ham, London.—East Ham Electric Tramways and Lighting Installation. Illustrated detailed description of the first municipal electric tramway system in the Metropolitan district of London. 2500 w. Tram & Ry Wld—July 11, 1901.

East St. Louis.—See **St. Louis.**

Economics.—Economic Considerations Determining the Magnitude and Details of a Proposed Road. From advance proofs of "Electric Railway Economics," by W. C. Gotshall. 3000 w. St Ry Jour—Oct. 10, 1903.

See also **Construction; Interurban Design.**

Electric and Steam Compared.—See **Steam Compared.**

Electromagnetic Field.—See **Magnetic Polyphase; Tangential Traction.**

Electro-Pneumatic.—A System of Electric Driving, Especially for Electric Tramways (Betriebs system für Elektrische Kraftanlagen, insbesondere für Bahnen). Dr. Johann Sahulka. A description of an electro-pneumatic system of power transmission, especially adapted for use with single-phase motors. 2500 w. Zeitschr f Elektrotechnik—Sept. 4, 1904.

See also **Arnold.**

Elevated, Subway and Surface Compared.—See **ELEVATED RAILWAY—Subway and Surface Compared.**

Elmira, N. Y.—The System of the Elmira Water, Light and Railroad Company. An illustrated description of the portion of this combination which is of particular interest to street railway men. 2000 w. St Ry Jour—July 5, 1902.

Employees.—See **MOTORMAN; ELECTRIC RAILWAY MANAGEMENT; STREET RAILWAY MANAGEMENT.**

Engineering.—The Electrical Engineer in Heavy Traction Work. William McClellan. A discussion of the special problems and methods developed in this line of work. Ills. 11400 w. Pro Engrs' Club of Phila—July, 1905.

Equipment.—See **ELECTRIC APPARATUS—Railway.**

Erie Canal.—See **New York State; Niagara Power.**

Erith.—See **London.**

Europe.—Electric Railway Practice on the Continent of Europe. Heinrich Veilguth. An illustrated article giving important information relating to the electric railway practice of Germany, France, Switzerland, and Holland. 2200 w. St Ry Jour—June 7, 1902.

Electric Railway Schemes in Europe. A statement of present conditions, and what is being done at various centers. 1700 w. Engr, Lond —Oct. 17, 1902.

Electric Railway Practice on the Continent of Europe. Heinrich Veilguth. An illustrated account of the most interesting developments in electric railway practice in Austria, Hungary and Italy. 3000 w. St Ry Jour—March 7, 1903.

Notes on European Tramways. Richard McCulloch. General observations of an engineer engaged in the examination, construction, and operation of tramways, traveling with the view of locating tramway lines. Ill. 8500 w. W Soc of Engrs—June, 1903.

European Commercial Possibilities.—The Possibilities for Capital in European Tramway Enterprises. A discussion of the features of urban and interurban passenger trasportation in Europe, methods of obtaining franchises, and commercial possibilities of electric tramways. 5000 w. St Ry Jour—Jan. 3, 1903.

Europe, 1903.—See **ELECTRIC INDUSTRY.**

Exhibition.—The Tramways and Light Railways Exhibition. An illustrated account of the exhibition and exhibits. Serial. 1st part. 4700 w. Elect'n, Lond—July 4, 1902.

International Tramways Exhibition. An illustrated review of the exhibits, with comments on the novel features. 7000 w. Mech Engr—July 12, 1902.

Express.—Handling Express Matter in Electric Cars in New York. Information concerning the methods adopted for carrying on the details of the express, freight and baggage service in special express cars of the Metropolitan St. Ry system of New York, including the Union Ry. lines in the Bronx. Ill. 1700 w. St Ry Rev—Feb. 15, 1902.

See also **Freight.**

Express, Detroit.—Electric Express and Package Delivery. George Parker. Read at the Detroit meeting of the St. Ry. Con. Describes the system, methods employed, and general management of the express business on the roads about Detroit. 3500 w. St Ry Jour—Oct. 11, 1902.

Freight Business on Detroit Interurban Roads. An illustrated account of methods of conducting an extensive business in competition with steam roads. 1500 w. St Ry Jour—Oct. 4, 1902.

Express Service in Detroit. An illustrated description of this service, which has developed rapidly and is growing in popularity. 2000 w. St Ry Rev—Jan. 15, 1902.

Falkirk, Scotland.—Falkirk Electric Tramways. Illustrated detailed description of overhead construction, following standard tramway practice for a moderately dense service. 2000 w. Tram & Ry Wld—Dec. 7, 1905.

The Falkirk Tramways. Ilustrated description of a new line in Scotland. 1200 w. Elec Rev., Lond—Dec. 22, 1905.

Farnham System.—See **Third Rail.**

Farnsworth, Eng.—See **ELECTRIC STATION.**

Fayet-Chamonix.—See **Chamonix; MOUNTAIN RAILWAY—Mont Blanc.**

Feeders.—See **Three-Wire; ELECTRIC DISTRIBUTION—Railway.**

Fonda, Johnstown & Gloversville.—The Electric Division of the Fonda, Johnstown & Gloversville Railroad. H. O. Rockwell. Illustrates and describes the line and its equipment. 10000 w. St Ry Rev—Aug. 20, 1903.

Fonda, Johnstown and Gloversville system. Illustrates and describes this system which combines both steam and electric operation. 7000 w. St Ry Jour—Aug. 27, 1903.

Ft. Wayne-Lima.—Ft. Wayne, Van Wert & Lima Traction Co. Illustrates and describes a recently completed electric railway, as an example of good construction work rapidly executed. 2000 w. St Ry Rev—Jan. 15, 1905.

France.—The Economy of Electric Traction in France (Résultats Economiques de la Substitution de la Traction Electrique à la Traction Animale). Charles Jean. An article with many tables showing statistics and financial results of the substitution of electric for animal traction in six French cities. 3000 w. Génie Civil—March 30, 1901.

The French Railways and Tramways in 1902. C. Colson. A review of the lines, their earnings, needed expenditure, and the general condition. 3000 w. Bul Int Ry Cong—Feb., 1904.

France Western.—See **Multiple-Unit; Paris-Versailles.**

Frankfort-Herkimer.—First Electrical Operation on the West Shore Railroad. Illustrates and describes the section between Frankfort and Herkimer, 3.17 miles long, used by steam trains of the West Shore R. R., and also by electric cars of the Utica & Mohawk Valley Ry. 1000 w. St Ry Jour—Dec. 16, 1905.

Freight.—The Conveyance of Freight on Electric Roads. A reprint of a part of an article by Alfred H. Gibbings, in "Traction and Transmission," dealing with the problem of serving the region about Manchester, England. 1500 w. R R Gaz—May 3, 1901.

The Conveyance of Goods on Electric Trolley Lines. Alfred H. Gibbings. Outlines a system for Great Britain, pointing its advantges. 3600 w. Tram & Ry Wld—Oct. 17, 1901.

Electric Roads as Freight Carriers. Editorial discussion of this subject, and the type of road which may find profit in hand to its adoption. 3400 w. R R Gaz—Jan. 4, 1902.

Electric Freight and Express Service for Eastern Ohio. An illustrated account of the methods which have proved successful on the Cleveland and Eastern Ry. 2500 w. St Ry Jour—May 31, 1902.

Freight Business on the Chicago, Harvard & Geneva Lake Railway. An illustrated article indicating the volume and kind of business in a farming community and related matters of interest. 2000 w. St Ry Jour—June 7, 1902.

Handling Freight and Express on Interurban Electric Railways. Albion E. Lang. Describes this work as carried out on the interurban roads of Northwestern Ohio. Ill. 3800 w. St Ry Jour—Oct. 4, 1902.

Moving Small Fruits by Electric Railway. Illustrates and describes the arrangements of the International Railway Co. of Buffalo for marketing perishable farm products. 700 w. St Ry Rev—Nov. 20, 1902.

Freight and Express. Alton D. Adams. Reasons why electric railways should take up freight and express business, with some statistics. 2500 w. St Ry Rev—Dec. 20, 1902.

Freight and Express on Electric Railways. H. S. Cooper. The first of a series of articles discussing the handling of freight and express by electric roads, the charges, classification, etc. Serial. 1st part. 3500 w. St Ry Jour—Feb. 7, 1903.

The Carriage of Goods on Electric Tramways. Alfred H. Gibbings. Abstract of a paper before the Manchester Section of the Inst. of Elec. Engrs. The present article considers the existing methods and cost of conveying goods, and begins a discussion of proposed methods. Serial. 1st part. 3000 w. Prac Engr—May 1, 1903.

Freight and Express on Electric Railways. J. B. McClary. Considers methods of handling freight and express on electric roads, the profits, and related matter of interest. 4800 w. St Ry Jour—Sept. 12, 1903.

Freight Development by Interurban Roads. E. F. Seixas. Read at Syracuse meeting of the N. Y. State St. Ry. Assn. An account of the development of this service in Canada. 2300 w. St Ry Jour—Oct. 17, 1903.

Freight Business on Electric Railways. F. D. Hawks, in "The Gateway." A valuable article, considering also the passenger side, and discussing what business should, and what should not, normally be sought by various classes of transportation lines. 1300 w. Ry Age—Nov. 20, 1903.

The Question of Freight. L. W. Serrell. Read before the Utica convention. Discusses the freight business on electric roads, the methods which would probably lead to a large increase in receipts, etc. 2000 w. St Ry Jour—Sept. 24, 1904.

Freight and Express Business on Street Railways. C. R. Van Etten. Read before the Utica convention. Discusses some of the things to be considered to determine whether a street railway can profitably engage in the transportation of freight and express. 1700 w. St Ry Jour—Sept. 24, 1904.

A Method of Handling Interurban Express Matter. George Dunford. Read before the Utica convention. Gives the forms and methods used in transacting business by the Utica & Mohawk Valley Electric Express. 800 w. St Ry Jour—Sept. 24, 1904.

Freight and Express Business of the Interurban Railway & Terminal Co. An illustrated article giving an account of the development of this business in Cincinnati and vicinity. 5000 w. St Ry Rev—Oct. 20, 1904.

The Electric Railroad Freight Service. H. H. Polk. Read before the Iowa St. & Inter. Ry. Assn. A general discussion of the service, its convenience to farmers, the profits to be realised, &c. 2500 w. St Ry Rev—May 15, 1905.

I. The Electric Freight Railway Service. H. H. Polk. II. Some Consideration of Operation Involved in Changing from Steam to Electric Power on Railroads. D. McNichol. Two papers discussed together. 7500 w. Pro Iowa Ry Club—June 12, 1905.

Freight Development by Interurban Roads. E. F. Seixas, in the "Railway and Shipping World." Gives an account of the success on the Niagara, St. Catharines & Toronto Railway, a steam line originally, but changed to electricity, and concludes that the freight business of interurban lines will pay if confined to the higher class of traffic, and attention is paid to dispatch and accommodation of the public. 2500 w. Ry & Engng Rev—Aug. 12, 1905.

Discussion on "Heavy Electric Freight Traction," at Asheville, N. C. 4000 w. Am Inst of Elec Engrs—Sept., 1905.

Freight and Express Traffic on Interurban Railways. M. E. Graston. Read before the Indiana Elec. Ry. Assn. Discusses points in regard to increasing the business and handling the freight. Abstract of discussion. 2800 w. St Ry Rev—Nov. 15, 1905.

Cost of Freight by Electric Haulage. George E. Walsh. Discusses the carrying of freight by interurban electric lines, giving reports from various lines. 2000 w. Elec, N Y—Dec. 6, 1905.

See also **Express; Toledo & Western; SUBWAY—Chicago.**

Freight, Cleveland.—Interurban Freight and Express. An illustrated article describing the methods of the Electric Traction Co. of Cleveland. 2500 w. St Ry Jour—Oct. 24, 1903.

Freight, Eng.—Carriage of Merchandise on Electric Tramways. Thomas Upton. Discusses this service in England, the inter-working with the railways, rates, etc. Serial. 1st part. 2200 w. Elec Rev, Lond—Aug. 14, 1903.

Carriage of Goods on Electric Tramways. Alfred H. Gibbings. Abstract of a paper read before the Manchester Soc. of the Inst. of Elec. Engrs. Shows the possibility of cheapening the cost of conveyance by utilizing electric tramways for short distance traffic. 4400 w. Elect'n, Lond—Aug. 21, 1903.

Freight Interchange.—Interchange of Freight Between Steam and Electric Roads. An important decision by the N. Y. Court of Appeals concerning the right of electric railways to compel steam railroads to make connections between roads and to interchange freight. Text of Judge Haight's opinion. 2500 w. St Ry Rev—July 20, 1902.

Fribourg, Morat & Anet.—Electric Railway Between Freiburg-Morat and Anet, Switzerland (Chemin de Fer Electrique de Fribourg-Morat-Anet, Suisse). H. Somach. An illustrated description of a third-rail road, supplied with 750-volt direct current from rotary sub-stations. Part of the line was formerly a steam road. 1 plate. 3000 w. Génie Civil—June 27, 1903.

The First Third-Rail in Switzerland. Henri Somach. An illustrated description of the recently constructed third-rail electric railway extending from Fribourg to Morat, near Neuchatel. 1100 w. St Ry Jour—July 25, 1903.

Fruit Transportation.—See Freight.

Future.—The Electric Railway of the Future—A Prophecy. Louis Bell. Reviews the general outlook for electric traction. 4000 w. St Ry Jour—Jan. 5, 1901.

Electric Traction in the Twentieth Century. S. H. Short. Notes some of the agreeable changes due to the introduction of electric traction, and calls attention to improvements expected. 1500 w. Elec Rev, Lond—Jan. 11, 1901.

The Future of the Electric Railway. B. A. Behrend and A. G. Wessling. A sketch containing many suggestions worthy of thought. 2500 w. Elec Wld & Engr—Jan. 12, 1901.

Ganz System.—The Ganz System of Electric Traction. Describes an experimental road constructed on this system, and manner of working. 4400 w. Engr, Lond—Feb. 1, 1901.

The Ganz System of Electric Traction. Further information of this system, concerning the use made of compressed air, the safety appliances, the equipment, a comparison of costs, etc. 4500 w. Engr, Lond—Feb. 15, 1901.

See also **Italy; Valtellina; UNDERGROUND RAILWAY—London.**

Georgetown, British Guiana.—Electric Railway for Georgetown, Demerara. N. Swan and Norman S. Rankin. An account of a modern electric railway in British Guiana, in a city of over 60,000 inhabitants. Ill. 3000 w. St Ry Rev—Dec. 15, 1900.

The New Electric Railway at Georgetown, British Guiana. Brief description of the city and the conditions to be met, with an account of the construction and equipment of the line. 2000 w. St Ry Jour—April 6, 1901.

German Main Lines.—The Electrification of Railways (Ist der Bisher Eingeschlagene Weg, für unsere Verkehrsmittel höhere Geschwindigkeiten zu Erreichen, der Richtige?). A. Hecker. A discussion of the probable development of electric traction on German railways. 2000 w. Elektrotech Rundschau—Jan. 1, 1904.

The Future Development of Electric Railways in Germany (Die Zukünftige Entwickelung der Elektrischen Bahnen in Deutschland). Dr. R. Haas. A review of electric traction in Germany, and its influence upon main-line projects. 5000 w. Elektrotech Zeitschr—June 29, 1905.

Germany.—Statistics of Electric Tramways in Germany (Statistik der Elektrischen Bahnen in Deutschland). The annual review giving tabulated details concerning roads in operation, under construction and projected. 12000 w. Elektrotech Zeitschr—Feb. 7, 1901.

Experiments with Electric Traction on Standard Railways in Germany (Versuche über Elektrischen Betrieb auf einigen Hauptbahnen in Deutschland). Ludwig Spängler. A well illustrated account of some of the electric railways in successful operation, and particularly of recent high-voltage and high-speed experiments on the Wannsee Ry., at Lichterfelde and on the Zossen Ry. Serial. 2 parts. 10,000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 17, 24, 1902.

Statistics of Electric Railways in Germany (Statistik der Elektrischen Bahnen in Deutschland). The usual annual tabulated review of the progress of electric railway construction and operation; the data are brought down to October, 1901. 10000 w. Elektrotech Zeitschr—March 27, 1902.

An Analysis of Street Railway Operations in Germany. Wilhelm Mattersdorff. Abstract of an article in the "Zeitschrift für Kleinbahnen." Data relating to traffic density, gross receipts, operating expenses, etc. Diagrams. 3800 w. St Ry Jour—April 5, 1902.

Electric Railways in Germany. Information relating to experiments for the reduction of vibration and noise; the use of storage battery cars for local steam lines; high-speed experiments, etc. 1500 w. Elec Rev, Lond—Nov. 7, 1902.

The Street Railways of Germany (Die Strassenbahnen Deutschlands). A. Liebmann. A critical analysis of the statistics of German street railways, with diagrams showing the relations of the various elements of operation to the number of passengers. 4000 w. Ill. Zeitschr f Klein u Strassenbahnen—Jan. 16, 1903.

Statistics of Electric Railways in Germany, Oct. 1, 1902 (Statistik der Elektrischen Bahnen in Deutschland nach dem Stande vom 1. Oktober, 1902). General statistics of all German electric railways, in operation or under construction, with editorial. Tables. 10000 w. Elektrotech Zeitschr—July 9, 1903.

Costs and Profits of Electric Railways in Germany. Interesting statistics on the financial results which have followed the change from horse to electrical traction in this country. 2000 w. U S Cons Repts—July, 1904.

Statistics of Electric Railways in Germany (Statistik der Elektrischen Bahnen in Deutschland). The usual yearly tabulated report, showing very fully the growth of electric railways in Germany, with editorial comments. 15000 w. Elektrotech Zeitschr—July 21, 1904.

Changes in German Electric Railway Practice During the Past Year. A review of changes in construction, equipment and methods, and related matters of interest. 3800 w. St Ry Jour—Nov. 5, 1904.

Electric Traction Systems of the Present (Die Elektrischen Bahnsysteme der Gegenwart). F. Niethammer. A general examination of the various systems in use and proposed for tramway and railway service. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—July 1, 1905.

The Status of Electric Railways in Germany at October 1, 1904 (Zusammenstellung der Elektrischen Bahnen in Deutschland nach dem Stande vom 1. Oktober, 1904). The yearly tabulated review of electric traction development in Germany, with editorial comment. 12,000 w. Elektrotech Zeitschr—July 13, 1905.

Germany and Switzerland.—Electric Traction on Railways. Br. Bohm-Raffay. From "Zeitschrift des Ingenieur- und Architekten Vereines." Describes briefly the experimental roads in Germany and Switzerland, for the running at high speeds, giving details of the system adopted by the Maschinenfabrik Oerlikon. 4600 w. Bul Internat Ry Cong—Aug., 1903.

Glasgow.—Glasgow Electric Tramways. An illustrated account of the opening of the Pinkston power station, with the history of the undertaking and detailed description of the system. Serial. 1st part. 3700 w. Elec Engr, Lond—April 26, 1901.

The Glasgow Corporation Electric Tramways. An illustrated account, giving a summary of the principal facts in regard to the station and equipment. 4500 w. Tram & Ry Wld—May 9, 1901.

Glasgow's Tramway System. A. C. Shaw. Reviews the history of Glasgow's tramways, and gives an illustrated detailed description of the recently installed electrical equipment. 9000 w. St Ry Jour—June 1, 1901.

The Glasgow Municipal Tramway System. Historical descriptive account of this very successful undertaking, with illustrations and maps. 4500 w. Tram & Ry Wld—July 9, 1903.

Glasgow Municipal Tramway Results. Editorial review of the report for the year ending with last May. 1800 w. Engng—Aug. 7, 1903.

The Glasgow Tramways. An examination of some points brought out in a discussion of the report of the Tramways Committee. 4700 w. Trac & Trans—Nov., 1903.

Glasgow and Its Tramways. Editorial discussion of the project of a private company to construct tramways in the vicinity, which is opposed by the Municipal Corporation. 2000 w. Engng—Nov. 27, 1903.

The Glasgow Tramways. A review of the operation, traffic, finances, etc., of 70 miles of double-track surface electric railway, serving about 1,000,000 population. 3000 w. Engr, Lond—Aug. 12, 1904.

See also ELECTRIC STATION.

Grading Work.—Electric Railways for Grading Work. An illustrated article describing the carrying away of the excavated material in trolley cars operated over temporary tracks, to fill the marsh lands. 2500 w. Eng Rec—Dec. 24, 1904.

See also GRADING.

Grand Rapids.—Novelties on the Grand Rapids Street Railway System. Illustrates and describes devices for the reduction of labor and the improvement of the economy of operation. 1800 w. St Ry Jour—Nov. 1, 1902.

Grand Rapids-Lake Michigan.—The Grand Rapids, Holland and Lake Michigan Rapid Ry. William D. Ray. From a paper read before the Chicago Elec. Assn. Illustrated detailed description of the line and its equipment. 9000 w. St Ry Rev—March 15, 1902.

Grand Rapids & Muskegon.—Grand Rapids, Grand Haven & Muskegon Railway. Illustrated detailed description of a recently opened interurban railway in Michigan, for passenger and freight business. 2400 w. St Ry Jour—July 5, 1902.

Great Northern & City.—See UNDERGROUND RAILWAY—London Northern.

Great Orme, Wales.—See CABLE RAILWAY; MOUNTAIN RAILWAY.

Green Bay, Wis.—Electric Railways at Green Bay, Wis. Illustrated description of the system of the Green Bay Traction Co., which was formed by the consolidation of several lines. 3000 w. St Ry Jour—Dec. 10, 1904.

Greenock, Scotland.—The Tramways of Greenock, Port Glasgow, and Gourock. An illustrated article describing the line and its equipment. 3000 w. Tram & Ry Wld—Nov. 14, 1901.

Grenoble & Chapareillan.—A Three-Wire Electric Railway System Operating Between Grenoble and Chapareillan (France). Enrico Bignami. An illustrated description of an electric railway and hydro-electric station. Continuous current is distributed over a three-wire system, with 1,200 volts between the outer wires, and the car motors are in series. 1800 w. Elec Rev, N Y—Jan. 10, 1903.

The Grenoble-Chapareillan Tramway. Brief illustrated description of a three-wire system, with 1200 volts between the outers, installed in France. 600 w. Elect'n, Lond—April 24, 1903.

Grimsby-Cleethorpes.—Grimsby and Cleethorpes Electric Tramways. Illustrated description of a line about six miles in length in which the overhead equipment is used. 1200 w. Tram & Ry Wld—May 8, 1902.

Grounds.—The Indication of Earths on Trolley Standards. Discusses faults on a trolley and the earth lamp system of indicating, and criticizing some devices on the market. 1500 w. Elec Rev, Lond—Nov. 28, 1902.

Gruyeres, Switzerland.—The Electric Railway of Gruyères. Emile Guarini. Illustrated description of a recent line in the canton of Freiburg, Switzerland. 2000 w. Engineering Magazine—Dec., 1905.

Halifax, England.—The Tramway System of Halifax, England. An illustrated article giving particulars of the system and its power equipment. 3500 w. St Ry Jour—Sept. 6, 1902.

Hamburg.—The Street Railway Company of Hamburg, Germany. Heinrich Veliguth. Gives the history of the company, with an illustrated detailed description of the construction and equipment of the tramways and information related. 9400 w. St Ry Jour—Jan. 4, 1902.

Hampshire, Eng.—Hampshire Electric Light Railways. Illustrated detailed description of an interesting system of electric railways recently completed in England, and the equipment. 1800 w. Tram & Ry Wld—Aug. 6, 1903.

Hampton Court.—See London.

Hanger Bolts.—See Overhead Construction.

Hanover, Germany.—See Overhead Construction, Hanover.

Hartford-Springfield.—The Hartford and Springfield Street Railway. Illustrates and describes a line that forms an important link in connecting New York and Boston by trolley. 1500 w. St Ry Jour—Feb. 1, 1902.

Harz, Germany.—The Electric Narrow-Gauge Road in the Clausthal District (Die Elektrische Schmalspurbahn der Königlichen Berginspection Clausthal). Dr. J. Werther. Describing a successful electric mining road in the Harz. 1200 w. Stahl und Eisen—Dec. 15, 1901.

Hastings, Eng.—Hastings Electric Tramways. Illustrated description of a system of interest because of the extremely steep grades and sharp curves. 3000 w. Elect'n, Lond—Oct. 13, 1905.

The Tramway System of Hastings. Full illustrated description of a sytem having features of interest. 5000 w. Tram & Ry Wld—Oct. 12, 1905.

Havana.—Urban Transportation in Havana. G. F. Greenwood. Illustrated description and particulars relating to the electric railway. 1400 w. St Ry Rev—Oct. 15, 1901.

Heavy Traction.—See Freight; High Speed; Long Island; N. Y. Central; N. Y., N. H. & Hartford; Steam Compared; Third Rail.

Helios Equipment.—See ELECTRIC CAR.

High-Speed.—Operating Notes on High-Speed Electric Railways. States the conditions at present existing on interurban electric roads, discussing recent improvements, and needed improvements. 2500 w. St Ry Rev—March 15, 1902.

High Speed Electric Traction. Arthur L. Cook. Reviews the various sytems that have been brought forth and the types of apparatus employed, and discusses the classes and apparatus best suited to each. 8300 . Jour Worcester Poly Inst—March, 1903.

Limited Service and Interline Business. A review of the conveniences and possibilities for fast long distance travel on electric railways. 4500 w. St Ry Jour—Feb. 4, 1905.

High Speed Electric Railway Problems. A. H. Armstrong. Considers some of the relations existing between first cost and probable cost of operation and schedule speed, discussing also the probable traffic receipts with different methods of operation. 5000 w. Trans Am Inst of Elec Engrs—July, 1903.

High Speed Electric Railways. B. F. Bradford. Read before the Elec. Assn. of N. S. W. Considers some of the problems bearing upon the earning capacity and design of a projected interurban railway, and methods for their solution. Serial. 1st part. 3700 w. Aust Min Stand—July 16, 1903.

See also Aurora, Elgin & Chicago; Interurban; Italy; Steam Compared; Third Rail; Zossen Experiments; FAST TRAIN; SINGLE RAIL.

Hillischer System.—See ELECTRIC RAILWAY, CONTACT.

History.—A Résumé of the Electric Street Railway. O. T. Crosby. Reviews the advantages and benefits to the public due to this enterprise. Ill. 3500 w. St Ry Jour—Jan. 5, 1901.

Development of Electric Traction. Frank B. Rae. Brief review from the first application of the magnetic motor to the propulsion of a car. 1600 w. W Elect'n—Jan. 5, 1901.

Historical Notes of Electric Traction. Historical review, with introductory note by Frank J. Sprague. Portraits. 6000 w. Elec Rev, N Y —Jan. 12, 1901.

The Development of Electric Tramways (Ueber die Entwicklung der Elektrischen Bahnen). Karl Hochenegg. With many diagrams showing the growth of electric traction in the various countries of Europe and the builders thereof. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 31, Nov. 7, 1902.

Electric Power for Railways. B. S. Lanphear. Read before the Iowa Engng. Soc. A brief review of early electric railroading, and its progress. 1700 w. Elec Rev, N Y—Feb. 20, 1904.

The History and Development of Electric Railways. Frank J. Sprague. An interesting historical review. 8500 w. Int Elec Cong of St Louis—Sept., 1904.

Street Railways During the Last Decade. A brief sketch of the steps by which this industry has grown since 1894. 6000 w. St Ry Jour—Oct. 8, 1904.

See also Baltimore; Cleveland; ELECTRIC INDUSTRY—British.

Hong Kong.—Electric Tramways in Hong Kong. Brief illustrated description of this pioneer system of electric traction in China, with information in regard to the city and surroundings. 2200 w. Elec Engr, Lond—Jan. 13, 1905.

Houghton Co., Mich.—Houghton County Street Railway. Illustrates and describes a road for passenger service between various towns in the copper region. 5500 w. St Ry Jour—May 3, 1902.

Huber Current Collector.—A New System of Current Collecting for Heavy Electric Traction Lines. Henri Somach. Illustrated description of a system devised by E. Huber of the Oerlikon Machine Works, of Switzerland, for taking high-voltage currents off overhead wires. 3000 w. St Ry Jour—April 23, 1904.

See also Oerlikon Experiments; ELECTRIC LOCOMOTIVE—Oerlikon; TROLLEY—Sliding Contact.

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Third Rail System of the Albany & Hudson Railroad Co. R. P. Leavitt. Brief illustrated description of this line which carries passengers and freight between Albany and Hudson. 2000 w. St Ry Rev—Aug. 20, 1903.

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McKinley Syndicate Properties of Central Illinois. Describes properties, including city and suburban lines, which will eventually reach from Danville to St. Louis. Serial. 1st part. 5500 w. St Ry Rev—Sept. 20, 1904.

Indiana.—Notable Features in the Operation of the Union Traction Company of Indiana. An illustrated article describing interesting features of an extensive interurban line. 3200 w. St Ry Jour—Dec. 7, 1901.

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Indianapolis Interurban.—Interurban Trolley Roads in Indian. A study of the effect of the extensive interurban system around Indianapolis upon the business of steam roads, and the prosperity of the city and its surroundings. Serial. 1st part. 3000 w. R R Gaz—Jan. 8, 1904.

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Interurban.—Some Observations on Interurban Electric Railways. Walter J. Sherman. Reviews briefly the pioneer work in this field, and discusses the present problem of furnishing rapid transit and give satisfactory earnings. 1800 w. Trans Assn of Civ Engrs of Cornell Univ—1901.

An Interurban Railway as an Investment. Guy Morrison Walker. Discusses the earnings of electric lines as compared with steam roads, the passenger traffic, and the carrying of freight and express. 3000 w. St Ry Rev—Sept. 15, 1901.

Overhead and Track Construction in Connection with Interurban Railways. Gilbert Hodges. Address before the New England St. Ry. Club. Urging a good, substantial, well laid track, and overhead construction, discussing points in detail. 4500 w. St Ry Jour—April 19, 1902.

High-Speed Interurban Electric Railways. George H. Gibson. A highly illustrated discussion of the recent phenomenal development of interurban electric railways, with numerous examples of important roads. 5000 w. Engineering Magazine—September, 1902.

Track and Overhead System for an Interurban Electric Railway. Concerning the economy and advisability of the best construction, with estimate of cost. 3500 w. St Ry Rev—Oct. 20, 1902.

A Decade of Interurban Electric Railways. Louis Bell. Reviews the electric interurban development, and discusses their future and the field they must occupy. 2000 w. St Ry Jour—Feb. 28, 1903.

Urban and Interurban Locomotion in America. Robert P. Porter. Reviews the report of Lieut.-Col. H. A. Yorke and discusses the projected extensions in Greater New York, in the present article. Serial. 1st part. 3000 w. Engng—March 13, 1903.

The Why and How of Interurban Railways. Guy Morrison Walker. Discusses the advantages of these railways, giving much information of the increase in wealth due to improved transportation, and giving suggestions for developing these roads. 6000 w. St Ry Rev—June 20, 1904.

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Interurban and City.—The Relation of Interurban Roads to City Roads. Ira A. McCormack. Read before the American St. Ry. Assn. Discusses traffic agreements, rails, cars, and various matters, giving the agreements of various cities in the United States. 6600 w. St Ry Jour—Oct. 12, 1901.

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Interurban Design.—Engineering Preliminaries for an Interurban Electric Railway. Ernest Gonzenbach. Gives plans and recommendations embodied in a report on a proposed railway, showing the way in which certain conditions were met, with reasons. Serial. 1st part. 3500 w. St Ry Jour—March 7, 1903.

The Future of Interurban Electric Railways. Ernest Gonzenbach. A discussion of the things necessary for the success of a road, the present conditions and the future prospects. 3000 w. R R Gaz—Vol. XXXVII. No. 12.

Interurban Operation.—The Operation of Electric Interurban Railways. W. O. Wood. Discusses the problems and needs of these roads. 2500 w. St Ry Jour—Oct. 4, 1902.

Practical Hints on Interurban Railway Operation. A. B. Herrick. Discusses some points in common practice that are not suited to interurban service. 2200 w. St Ry Jour—May 21, 1904.

Ipswich, Eng.—The Electric Tramways of Ipswich. Ilustrated description of a new tramway system, the peculiarities are the great size of the power station buildings compared with present requirements, and the use of double-track in narrow streets. 3500 w. Tram & Ry Wld—Dec. 10, 1903.

Isle-of-Man.—The Manx Electric Railway. Illustrated description of an interesting and picturesque road. 9500 w. St Ry Jour—March 5, 1904.

Isle of Thanet, Kent.—The Isle of Thanet Electric Light Railways. An illustrated sketch of lines recently opened. The staion provides light, power and traction service. History and description. 4200 w. Tram & Ry Wld—April 11, 1901.

The Isle of Thanet Tramways. An illustrated detailed description. 2400 w. Elect'n, Lond—April 19, 1901.

Isle of Thanet Electric Tramways and Lighting Company. B. Pontifex. An illustrated description of the power equipment, and lines. 2700 w. Elec Engr, Lond—Nov. 20, 1903.

Italy.—The Development of Electric Railways in Italy. Enrico Bignami. A well illustrated account of various systems of electric tramways in many cities, and of the projects for main line electric roads. 5400 w. Eng Mag—Nov., 1900.

High-Speed Electric Traction Between Milan and the Italian Lakes. Illustrates and describes the line, its operation, the steam generating plant, sub-stations, rolling stock, &c. 3800 w. St Ry Jour—Aug. 3, 1901.

Heavy Electric Traction in the North of Italy. Enrico Bignami. Illustrated account of the projects under way and experiments in progress. 1200 w. Elec Rev, N Y—Aug. 10, 1901.

Electrical Tramways and Railways in Italy. Magrini Effren. Reviews the great development of electrically worked lines. 2200 w. Tram & Ry Wld—Nov. 14, 1901.

Electrical Operation on the Italian Mediterranean Railway (Elektrischer Betrieb auf den Linien der "Italienischen Mittelmeer-Eisenbahn-Gesellschaft"). A comprehensive illustrated description of standard electric railways running north from Milan and their power station and sub-stations. 2000 w. Mitt d Ver f d Förderung d Local u Strassenbahnwesens—Jan., 1902.

Electric Traction on the Railway Lines from Milan to other Northern Towns of Italy (Traction Electrique sur les Lignes de Milan à Gallarate, Varese, Porto Ceresio, Arona et Laveno). Illustrated description of these electric railways of the Italian Mediterranean Company and of the power plants. 1 plate. 4000 ,w. Rev Gen d Chemins de Fer—Feb., 1902.

Electric Traction on Steam Railways in Italy. Prof. C. A. Carus-Wilson. Read before the Inst. of Elec. Engrs. An account written from an economic rather than from a technical standpoint, of what is being done toward providing, by means of electricity, a service of short trains, running frequently at high speeds, with some comparisons between the conditions of railway working in Italy and in England. Ill. Discussion. 3000 w. Elec. Engr, Lond—May 30, 1902. Supplement.

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The Status of the Electric Traction Problem in Italy (I Termini del Problema della Ferrovia Elettrica Italiana). P. Lanino. A discussion of the relation of electric traction to the railways of Italy, urging the standardisation of apparatus and methods. 3000 w. L'Elettricità—March 8, 1903.

Main Line Electric Traction in Italy (Elektrische Vollbahnen in Italien). Pietro Lanino. A general description of the satisfactory operation of the lines in northern Italy. 4500 w. Elektrotech Zeitschr—Feb. 11, 1904.

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See also Gans System; Leghorn; Milan; Naples; Steam Compared; Valtellina.

Jackson & Battle Creek.—The Jackson & Battle Creek Railway. W. G. Fargo. Illustrates and describes a road in Southern Michigan, built mostly on private right of way, using third-rail system. 3000 w. St Ry Jour—Jan. 2, 1904.

Johannesburg.—See ELECTRIC STATION.

Jungfrau.—See MOUNTAIN RAILWAY.

Kalamazoo.—See Michigan.

Kalgoorlie, Australia.—Electric Railway Construction in Kalgoorlie. Illustrated description of the system installed in this mining city of Western Australia. 600 w. St Ry Jour—Jan. 24, 1903.

The Electric Tramways of Kalgoorlie, Western Australia. S. W. Childs. Brief description of a line for a city of about 30,000 people. 1600 w. Elec Rev, N Y—Oct. 24, 1903.

Kingston, N. Y.—Kingston Consolidated Railroad Company. An illustrated description of a successful trolley road at Kingston and Rondout, N. Y., and its park at Kingston Point. 2500 w. St Ry Jour—Dec. 27, 1902.

Lackawanna and Wyoming Valley.—The Lackawanna and Wyoming Valley Railroad. A brief general description, with illustrations, of a 35-mile, double-track, third rail line built and equipped for carrying freight and passengers. 3800 w. Eng Rec—June 13, 1903.

The Lackawanna & Wyoming Valley Railroad. George B. Francis. Illustrated detailed description of a standard-gauge, double-track, rock-ballasted, third rail electric road on a private right of way, laid with 90-pound rail. Extends from Scranton to Wilkesbarre. 3500 w. Jour Assn of Engng Socs—March, 1904.

The Lackawana & Wyoming Valley Railroad. D. A. Willey. Illustrated description of an interesting electric road between Scranton and Wilkesbarre, which represents the most advanced type of third rail electric traction yet completed in the United States. 2000 w. Elec Rev, N Y—Aug. 27, 1904.

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La Mure.—See St. Georges de Commiers.

Lancashire.—The South Lancashire Electric Traction and Power Company, Limited. Map and information of one of the most extensive schemes for the application of electric traction in the United Kingdom. 3000 w. Tram & Ry Wld—March 13, 1902.

The Electrification of South West Lancashire. Describes the Farnworth and Kearsley Tramways. Ill. 5500 w. Tram & Ry Wld—Dec. 11, 1902.

Lancaster Electric Tramways. Illustrated description of the routes completed, the equipment, power, etc., of the Lancaster, England, tramways. 1600 w. Tram & Ry Wld—Feb. 12, 1903.

Lancashire & Yorkshire.—See Liverpool-Southport.

Lancaster, Pa.—The Conestoga Traction System. An illustrated detailed description of a comprehensive system serving Lancaster, Pa., and the surrounding country. 4500 w. St Ry Jour—Nov. 7, 1903.

Lansing, Mich.—The Lansing, St. John & St. Louis Electric Ry. An illustrated account of the opening of a new electric interrurban road for passenger and freight traffic, in Michigan. 1400 w. Ry Engng Rev—Feb. 15, 1902.

The New Interurban Line of the Lansing & Suburban Traction Company. I. L. Dixon. An illustrated article briefly outlining the history of this undertaking and describing the line as now operated. 4500 w. St Ry Jour—Feb. 25, 1905.

Lausanne-Moudon.—Swiss Electric Railroading. Franz Koster. Illustrated description of the Lausanne-Moudon railway system. 1600 w. Elec Rev, N Y—March 5, 1904.

Narrow-Gauge Road from Lausanne to Moudon. E. Guarini. Illustrated description of an interesting line in Switzerland. 1300 w. St Ry Rev—May 20, 1904.

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Leeds.—City of Leeds Electric Tramways. Illustrated detailed description of the present tramway system. 3200 w. Tram & Ry Wld—Oct. 17, 1901.

Leeds-West Riding, Eng.—Leeds, Wakefield and West Riding Tramways. Illustrates and describes an extensive system of electric tramways in England. 2000 w. Elec Engr, Lond—Nov. 11, 1904.

Leghorn, Italy.—The Electric Tramways of Leghorn, Italy. Enrico Bignami. An illustrated description of the city and suburban electric railway lines of an Italian seaport. 1000 w. Elec Rev, N Y—April 19, 1902.

Leicester, Eng.—Leicester Corporation Electric Tramways. Illustrated detailed description of a trolley system constructed on the latest designs. 10800 w. Tram & Ry Wld—May 12, 1904.

Leicester Corporation Electric Tramways. E. G. Mawbey. Detailed description of an English electric railway. The first part is devoted chiefly to the power station. Illustrations and map. Serial. Part I. 4000 w. Public Works—Aug. 15, 1904.

Leipzig.—Street Railways at Leipzig. A report of concessions, operation, equipment, and management of the electric street railways. 2200 w. U S Cons Repts, No. 1724—Aug. 15, 1903.

Light.—See LIGHT RAILWAY.

Lima, O.—Engineering Features of the Western Ohio Railway. D. W. Pell. An illustrated description of power house, line and cars of an interurban electric railway centering at Lima, Ohio. 2200 w. St Ry Rev—Dec. 20, 1902.

Limited Service.—See High Speed.

Lisbon.—See STREET RAILWAY.

Liverpool.—The Street Railway System of Liverpool, England. Illustrated description of the tramway scheme, the power plants also supplying energy for electric lighting. 6700 w. St Ry Jour—April 6, 1901.

High Acceleration on Electric Railways. Results on the Liverpool Overhead Line. Herbert C. Fyfe. On the satisfactory results from the accelerated service introduced. 1400 w. Sci Am Sup—Aug. 22, 1903.

The Tramway System of Liverpool. An illustrated detailed description of this very successful system, with historical notes and general information. 11500 w. Tram & Ry Wld—Sept. 8, 1904.

Liverpool-Birkenhead.—See Mersey, Liverpool.

Liverpool-Southport.—Electrification of the Liverpool-Southport Line. Interior and exterior views of the electric train, with brief account of the electrification of the line. 800 w. Engr, Lond—Jan. 1, 1904.

Electrification of the Southport Branch of the Lancashire and Yorkshire Railway. 3000 w. Tram & Ry Wld—Jan. 14, 1904.

The Electrification of the Liverpool and Southport Railway. An ilustrated detailed description of this new departure. 7000 w. Engng—March 18, 1904.

Electrification of the Liverpool-Southport Line—L. & Y. Railway. J. A. F. Aspinwall. A full illustrated account of the first main line steam railway in England to be partially equipped for handling passenger traffic by electric power. 8500 w. Mech Engr (Sup)—March 19, 1904.

The Electrical Equipment of the Liverpool & Southport Division of the Lancashire & Yorkshire Railway. Illustrates and describes the equipment of the first English steam railway with electrically-equipped multiple-unit trains. 9200 w. St Ry Jour—April 2, 1904.

Electric Traction on the Lancashire and Yorkshire Railway. An illustrated detailed description of the new service between Liverpool and Southport, and the changes made necessary in permanent way, rolling stock and equipment. 8600 w. Tram & Ry Wld—April 14, 1904.

The Liverpool and Southport Railway (Chemin de Fer de Liverpool à Southport). M. Debeul. General description of the third-rail equipment of the branch of the Lancashire and Yorkshire railway, between Liverpool and Southport. 2000 w. Génie Civil—May 28, 1904.

Lancashire and Yorkshire Railway—Bullfield Widening: Bolton. Illustrated description of the improvements recently effected, especially the application of electricity. 2200 w. Elec Engr, Lond—July 14, 1905.

Load Factor and Circuit Breakers.—Load Factors and Circuit Breakers. Arguments showing the close connection between the load factor and circuit breaker on electric railways, and the need of judgment in estimating the limit of economy. 1800 w. Elec Rev, Lond—Dec. 27, 1901.

London.—Electric Tramways in London. An account of London's first electric line, the large patronage, power, &c. 2500 w. Engng—July 12, 1901.

London United Tramways. Begins an account of this great undertaking of providing constant inter-communication between London and its western suburbs. Serial. 1st part. 2500 w. Elec Rev, Lond—July 19, 1901.

The London United Electric Tramways. Illustrated description of interesting features. 1600 w. Engr, Lond—July 19, 1901.

The Electric Trolley Lines of London. Illustrates and describes the model power house, showing the latest tramway work in England. 3800 w. Elec, N Y—Aug. 14, 1901.

Electric Tramways of the London United Tramways. The first of a series of articles giving an illustrated detailed description of the conversion and extension of the tramway system, and the introduction of electricity. Serial. 1st part. 1700 w. Elect'n, Lond—Oct. 18, 1901.

The Electrification of London. Concerning the bills before the British parliament, giving details of the schemes, and a summary of the route and points of interest of the different lines. Map. 2700 w. Nature—July 24, 1902.

The Electrification of Our Railways. A discussion of what has been done and ought to be done in London and suburbs especially, criticizing the attitude of the railway companies. 3700 w. Elec Rev, Lond—Aug. 22, 1902.

Suburban Traffic Conditions of London, England. Philip Dawson. An explanation of the conditions, and the system of railway lines existing and proposed which are expected to meet all requirements. Maps. 6000 w. St Ry Jour—Oct. 4, 1902.

The District Railway and Its Associated Lines. A view of the presnt situation with map of the lines and drawings of the cars being built for experimental trial. Also an important speech delivered by Mr. Perks to the shareholders. 8000 w. Tram & Ry Wld—Jan. 15, 1903.

The Hampton Court Line of the London United Tramways Company. Brief illustrated description of a branch line recently opened in England. 1200 w. Elect'n, Lond—April 24, 1903.

London United Electric Tramways. B. Pontifex. An illustrated detailed description of the power-house equipments, and the cars and overhead construction work, etc. 3300 w. Elec Engr, Lond—Aug. 21, 1903.

The Electrification of the District Railway. Begins an illustrated detailed description of this work. Serial. 1st part. 1500 w. Engr, Lond—Feb. 3, 1905.

See also East Ham; ELECTRIC POWER STATION; ELECTRIC RAILWAY CONDUIT; TRANSPORTATION; UNDERGROUND RAILWAY.

London-Brighton.—London, Brighton and South Coast Railway and Electric Traction. Gives an account of the circumstances which led to the decision to use overhead conductors fed with single-phase alternating-current at high pressure, with some particulars of the equipment. 3300 w. Elec Rev, Lond—Jan. 20, 1905.

London County Council.—The Tramways of the London County Council. A résumé of the facts relating to the London tramway situation. 2500 w. Tram & Ry Wld—Sept. 12, 1901.

The London County Council Electric Tramways. Gives a report on the relative cost of the conduit and overhead system of electric traction and on the difference in the cost of maintenance. Also an illustrated descripton of the electrical equipment as far as arranged for at present. Serial. 1st part. 7500 w. Elec Engr, Lond—May 15, 1903.

See also ELECTRIC RAILWAY, CONDUIT.

London, Erith.—The Erith Electric Tramways. Illustrated description of a line forming a part of ways of the Erith Urban District Council recently opened. 2500 w. Elec Engr, Lond—Aug. 25, 1905.

The Erith Electric Tramways. General description of tramway system of town on lower Thames, 13 miles from London. 2000 w. Elect'n, Lond—Sept. 1, 1905.

Erith Electric Tramways. Illustrated detailed description of this recently completed link in Greater London's system. 2500 w. Tram & Ry Wld—Sept. 14, 1905.

London-Ilford.—Ilford Corporation Tramways. Illustrated description of a line forming a part of the suburban tramway system of London. 4000 w. Tram & Ry Wld—Feb. 11, 1904.

London Metropolitan.—Electric Traction on the Metropolitan Railway. Illustrated detailed description of the work of equipping London surface and underground lines for electric traction. 12000 w. Tram & Ry Wld—July 14, 1904.

Metropolitan Electric Tramways. General description, with outline map, of electric surface railways in the northern part of London. 1600 w. Tram & Wld—Aug. 11, 1904.

The Metropolitan Railway. An account of the opening of this newly "electrified" London railway, with illustrated description of the plant. Serial. 1st part. 4000 w. Elect'n, Lond—Dec. 16, 1904.

The Electrification of the Metropolitan District Railway. The present article gives principally an illustrated description of the rolling-stock and of the signaling system. Serial. 1st part. 3000 w. Elec Rev, Lond—June 2, 1905.

Metropolitan District Railway. Illustrated description of some of the rolling stock equipment and traffic arrangements. 3500 w. Tram & Ry Wld—Aug. 10, 1905.

See also London-Uxbridge; UNDERGROUND RAILWAY.

London, Narrow Street.—The Question of Tramways for London. W. Craig Henderson. Considers the traffic conditions of Central London and thinks the narrowness of the strets makes rapid tramway communication in that part of the city impracticable. 5000 w. Trac & Trans—Sept., 1903.

London-Uxbridge.—A New Route from London to Uxbridge. An illustrated account of the latest extension of the Metropolitan Railway, opened July 4. 1400 w. Transport—July 8, 1904.

Long Distance.—See Steam Compared.

Long Island, N. Y.—Problems of Heavy Electric Traction. O. S. Lyford, Jr., and W. N. Smith. Considers some of the questions brought out in the engineering of the work in progress for the Long Island Railroad Co., describing particularly some of the simple things that were done to facilitate decision regarding motor equipment for cars. 7000 w. Trans Am Inst of Elec Engrs—Nov. 25, 1904.

Problems of Heavy Electric Traction. O. S. Lyford, Jr., and W. N. Smith. Abstract of a paper presented at meeting of the Am. Inst. of Elec. Engrs. An illustrated article describing changes to be made in the Long Island Railroad system, the electrification of the suburban service, etc. Also discussion. 7500 w. St Ry Jour—Dec. 3, 1904.

The Installation of Electric Traction on the Long Island R. R. An illustrated article giving a statement of the work thus far done. 4000 w. Eng News—Nov. 2, 1905.

Electrification of the Long Island Railroad. S. D. V. Burr. Map and illustrated description of the extensive system of electrification recently completed. 2500 w. Ir Age—Nov. 2, 1905.

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The Electrification of the Long Island Railroad. An illustrated description of this important electrification of a steam road, and the complicated service. 4000 w. Eng Rec—Nov. 4, 1905.

Los Angeles, Calif.—Recent Work of the Los Angeles Railway. Illustrates and describes features of interest. 2000 w. St Ry Jour—June 1, 1901.

The Los Angeles and the Pacific Electric Railway System, Los Angeles, Cal. An illustrated description of the urban and interurban systems which have recently been consolidated by the Huntington-Hellman syndicate, and at present aggregate over 300 miles of track. Serial. 1st part. 7500 w. St Ry Rev—May 20, 1903.

Los Angeles Traction and California Pacific Railway Companies. Samuel B. McLenegan. Brief illustrated description of this line. 2200 w. Jour of Elec, Power & Gas—Jan., 1904.

The Los Angeles and Pacific Railway Companies. Illustrated description of the construction, equipment and engineering features. 6000 w. Jour of Elec, Power & Gas—Jan., 1904.

The Pacific Electric Railway Company's System. Gives a map of the region around Los Angeles, Cal., showing the various lines, and an illustrated description of the distinctive points of the physical features and operation of this road. Serial. 1st part. 4800 w. St Ry Jour—Feb. 27, 1904.

Power Station, Rolling Stock and Dispatching System of the Pacific Electric Railway Company. Illustrated detailed description. 5500 w. St Ry Jour—March 12, 1904.

Organization and Operating Features of the Pacific Electric Railway Company's System. Discusses in detail interesting operating features in Los Angeles and interurban systems. Ills. 4500 w. St Ry Jour—March 26, 1904.

Notes on Los Angeles Railway Company's System. An illustrated description of the features of interest in the rolling stock, car houses, and methods of operating of this company. 3500 w. St Ry Jour—April 9, 1904.

The Los Angeles & Redondo Railway. An illustrated description of an electric interurban system that was formerly a steam road. 4000 w. St Ry Jour—April 30, 1904.

Lowestoft, Eng.—Lowestoft Municipal Electric Tramways. Illustrated detailed description. 3000 w. Tram & Ry Wld—Sept. 3, 1903.

Magnetic Polyphase.—Electric Traction Independent of Adhesion (Traction Electrique Indépendante de l'Adhérence). F. D. A brief, illustrated description of a polyphase system of traction on the principle of a "travelling magnetic field," in which the car carries what corresponds to the "rotor" and the sectional "stator" is disposed along the line. The car is then pulled along by the attraction of the moving magnetic field. 500 w. Génie Civil—April 6, 1901.

See also Tangential Traction.

Mail.—See MAIL TRANSPORTATION.

Maine.—Lewiston-Brunswick & Bath Street Railway. Illustrated description of interesting line in Maine, furnishing communication between villages and cities, and comprising 55 miles of track. 2400 w. St Ry Rev—Feb. 15, 1901.

Main Line.—See Steam Compared.

Maintenance.—Notes on the Wear and Maintenance of Tramways. C. F. Wike. Read before the Assn. of Munic. & Co. Engrs. Statistics and information concerning the wear of electric tramways from observations made of the tramways of Sheffield, Eng. Ill. 1800 w. Elec Engr, Lond—July 25, 1902.

Manaos, Brasil.—See ELECTRIC STATION.

Manchester, Eng.—Manchester Corporation Tramways. General notice of the undertaking and illustrated description of the section now open. 2900 w. Tram & Ry Wld—June 13, 1901.

The Tramway System of Manchester. An illustrated account of the tramway system as now completed. 10500 w. Tram & Ry Wld—March 10, 1904.

Mandalay.—Electric Tramway in Mandalay. Illustrated detailed description of the first electric railway in Burma, which has been in operation two or three months. 1500 w. Elec Engr, Lond—Sept. 30, 1904.

Electric Tramways in Mandalay. Illustrates and describes recently opened tramway route 7 miles in length, double-track throughout. 1500 w. Tram & Ry Wld—Oct. 13, 1904.

Manila.—The First Philippine Electric Railway. A brief illustrated article giving information of this recently opened line. 900 w. Sci Am Sup—April 29, 1905.

Opening of the Electric Railway System in Manila, P. I. Illustrated detailed description of the reconstruction and electrification of the street railways, and matters related. 3500 w. St Ry Jour—April 29, 1905.

Electric Railroad and Light System of Manila. An illustrated article giving information of the stations, and their equipment, power house, etc. 4500 w. Far East Rev—May, 1905.

American Trolleys in Manila. Short general description with illustration. 700 w. Elec Wld & Engr—Sept. 2, 1905.

Manx.—See Isle of Man.

Marseilles.—The Electric Tramways of Marseilles (Tramways Electriques de Marseilles). M. Deniset. A detailed description of the entire plant with map of the city and plans of the station and equipment. 8000 w. 4 plates. Ann des Ponts et Chaussées—1 Trimestre, 1902.

The Electric Tramways of Marseilles (Tramways Electriques de Marseille). Especially describing the central generating station and transforming apparatus. 3000 w. 1 plate. Génie Civil—Aug. 9, 1902.

Massachusetts.—The Exeter, Hampton & Amesbury Street Railway. C. B. Fairchild. Illustrated detailed description of interesting lines through a very attractive region. 3700 w. St Ry Rev—Nov. 15, 1900.

A Long Electric Railway in Massachusetts. Alton D. Adams. Describes the line to be constructed between Great Barrington and Cheshire. 900 w. Elec Wld & Engr—Aug. 31, 1901.

The Rise of Electric Railways in Massachusetts. Alton D. Adams. A review showing remarkable development and financial expansion. 3000 w. Elec Rev, N Y—Feb. 8, 1902.

Steam and Trolley in Massachusets. Clarence Deming. Discusses the trolleys of this State and their bearing upon the steam roads, the railway laws, and the problems to be solved. 4000 w. R R Gaz—Jan. 16, 1903.

The Experience of Massachusetts in Street Railways. Louis D. Brandeis. Read at Nat. Con. on Munic. Ownership & Pub. Franchises. An account of the development of street railway lines. 3500 w. St Ry Jour—March 7, 1903.

Expansion of Electric Railways in Massachusetts. Alton D. Adams. A review of the returns for 1901, showing the remarkable development. 1500 w. Sci Am—Sept. 19, 1903.

See also Boston; Milford; New Bedford—Onset; ELECTRIC INDUSTRY.

Massachusetts Electric Co.—The Massachusetts Electric Companies. Outlines the scheme for substituting a high-tension alternating-system. Also gives an illustrated description of the new Quincy Point steam-turbine power house. 5000 w. St Ry Rev—Dec. 20, 1903.

Mechanical Engineering.—Mechanical Engineering of an Electric Railway. H. P. Quick. A general review of the administrative and maintenance departments of an electric traction system, based upon the operation of the transport systems of Boston, Mass. 4000 w. Engineering Magazine—July, 1902.

Meilen-Wetzikon.—See Wetzikon-Meilen.

Mendel, Tyrol.—See Mountain Railway.

Mersey, Liverpool.—The Electrification of the Mersey Railway. Gives a review of the history of this tunnel railway connecting Liverpool with Birkenhead, and an account of the recently completed electrification of the entire line. 4000 w. St Ry Jour—April 4, 1903.

The Electrification of the Mersey Railway. An illustrated description of the electrical equipment, with a comprehensive account of this important undertaking. It is the first steam line in England on which electric motors have displaced steam locomotives. 5000 w. Tram & Ry Wld—April 9, 1903.

The Electrification of the Mersey Railway. A brief account of the history of the original undertaking, with illustrated description of the change from steam to electric power. 5500 w. Engng—April 24, 1903.

Electric Traction on the Mersey Railway (Traction Electrique dans le Tunnel de la Mersey). Ch. Dantin. A well illustrated description of the electric railway under the Mersey, between Liverpool and Birkenhead, and its equipment. 6000 w. Génie Civil—May 16, 1903.

The Electrification of the Mersey Railway. An illustrated description of the replacing of steam power by electricity on an English suburban railway. 4800 w. Feilden's Mag—June, 1903.

See also Liverpool.

Meudon, France. — See Multiple-Unit; Paris-Versailles.

Michigan.—The System of the Michigan Traction Company and the Power House of the Kalamazoo Valley Electric Traction Company. Brief illustrated description of electric railway from Kalamazoo to Battle Creek, and hydro-electric plant at Allegan. 1500 w. St Ry Jour—April 6, 1901.

The Development of Trolley Networks in Michigan. Edward J. Hart. An illustrated account of the lines radiating from Grand Rapids and connecting it with the important Lake Michigan ports. 2800 w. Elec Wld & Engr—Nov. 16, 1901.

Middleboro, Wareham & Buzzards Bay.—Middleboro, Wareham & Buzzards Bay Street Ry. An illustrated description of an interurban road in the Cape Cod region, which is of interest because of its original schemes and ways of doing things. 6300 w. St Ry Rev—Jan. 20, 1903.

Middleton-Oldham.—The Middleton Electric Tramways. An illustrated detailed description of an English electric tramway system connecting Middleton with Oldham. 2000 w. Tram & Ry Wld—April 17, 1902.

See also Oldham; ELECTRIC STATION.

Milan.—Milan Street Railways. Effren Magrini. An account of these railways in Italy, where the city owns the tracks but leases them to a private company. 3500 w. Munic Af—March, 1902.

Electric Traction with Single-Phase Motors. Brief account of trials of running an electric car with single-phase currents, made at Milan by Dr. G. Finzi. 1200 w. Elect'n, Lond—Aug. 14, 1903.

See also Italy.

Milan-Gallarate.—Third Rail Electric Traction in Italy. Illustrated description of interesting features of the line between Porto Ceresio and Milan, especially the steam plain. 1500 w. St Ry Jour—Dec. 6, 1902.

Electric Railway from Milan to Gallarate and the Italian Lakes (Conditions d'Etablissement et d'Exploitation du Réseau Electrique de Milan à Gallarate et aux Lacs Italiens). M. de Marchena. An illustrated description of the construction and operation of this electric railway, generating stations and rolling stock. Triphase current is generated and then converted to direct current in rotary substations. 10,000 w. Bull Soc Internat des Elect—April, 1903.

The Milan-Gallarate-Porte Ceresio Railway. An illustrated description of prominent features of a third-rail system, with high-tension transmission lines and rotary converter sub-stations. Serial, 1st part. 1700 w. Elect'n, Lond—May 8, 1903.

The Milan-Gallarate Electric Railway. P. Letheule. Brief illustrated description of this electric railway line and its operation. 1500 w. Elec Wld & Engr—Aug. 1, 1903.

Milan-Monza.—The Milan-Monza Interurban Tramway. Guido Semenza. Brief illustrated description of a road using the overhead system. 1200 w. St Ry Jour—Dec. 7, 1901.

Milford, Mass.—The System of the Milford, Holliston and Framingham Street Railway Company. An illustrated description of an interurban electric railway of interest. 2800 w. St Ry Jour—Dec. 7, 1901.

Milford Street Railway System. An illustrated description of a road interesting on account of the peculiar situation in reference to the territory covered and the steam roads in that section. 1500 w. St Ry Jour—July 25, 1903.

Minneapolis-St. Paul.—See Double Deck; ELECTRIC STATION.

Modern Practice.—Notes on Modern Electric Railway Practice. Albert H. Armstrong. A review of some of the more important problems in electric traction now in course of installation or under serious discussion. 4500 w. Trans Am Inst of Elec Engrs—Aug., Sept., 1901.

Discussion of Papers by Messrs. Armstrong and Berg on Modern Electric Tramway Practice. Discussion at Buffalo, Aug. 24, 1901. 1400 w. Trans Am Inst of Elec Engrs—March, 1902.

Recent Practice in Electric Railway Construction and Operation. Editorial discussion of cost and the construction suitable for the conditions to be met. 2700 w. Eng News—Aug. 29, 1901.

Recent Tramway Practice. James More, Jr. A review of present practice and its results, with remarks on different methods. Ill. 1500 w. Tram & Ry Wld—Sept. 12, 1901.

Recent Tramway Practice. Notes suggested by Mr. James More's paper, read before the Glasgow Congress. 2500 w. Elec Rev, Lond—Oct. 18, 1901.

Present Electric Railway Practice. Clarence Renshaw. Considers present practice in the generation of the electric power; in its transmission and distribution; and the operation of the cars. 3500 w. Pro Engrs' Soc of W. Penn—July, 1904.

Mödling-Hinterbrühl.—The Reconstruction of the Mödling-Hinterbrühl Electric Railway (Die Rekonstruktion der Elektrischen Bahn Mödling-Hinterbrühl). Describing the modernisation of the oldest electric railway in Austria, in connection with the introduction of gas engines as prime movers at the power station. Two articles. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 16, 23, 1904.

Mont Blanc.—See **MOUNTAIN RAILWAY.**

Montreux-Berner Oberland.—The Montreux-Berner Oberland Railway (Die Montreux-Berner-Oberland-Bahn). An account of the new electric road to run between Montreux to Lake Thun, through the Berner Oberland. 3000 w. Maps. Schweizerische Bauzeitung—Nov. 23, 1901.

The Montreux-Oberland-Bernois Railroad. Frank C. Perkins. Illustrated detailed description of an interesting electric line traversing one of the most beautiful parts of Switzerland. 1200 w. R R Gaz—Vol. XXXIX, No. 10.

Morgantown, W. V.—Notes on the Construction of an Electric Road and Power-House at Morgantown, West Virginia. Walter Loring Webb. An illustrated description of the construction of a road where the conditions were in some respects unusual, the question of grade having much influence on the route. Discussion. 4700 w. Pro Engrs' Club of Phila—Jan. 1904.

Motor Efficiency.—See **ELECTRIC MOTOR—Railway.**

Motor Equipment.—See **ELECTRIC CAR; ELECTRIC MOTOR—Railway.**

Motors and Speed.—See **Speed—Time Curves.**

Motor Temperature.—See **ELECTRIC MOTOR—Heating.**

Motor Ventilation.—See **ELECTRIC MOTOR—Ventilating and Cleaning.**

Mt. Beacon Inclined.—See **MOUNTAIN RAILWAY.**

Multiple Control.—See **Multiple Unit; ELEVATED RAILWAY—Berlin.**

Multiple Supply.—See **STORAGE—BATTERY RAILWAY.**

Multiple-Unit.—The Sprague Multiple-Unit Railway System. Edw. Chilton. Discusses the objections to the multiple-unit train system, and gives illustrated description of manner of controlling used in the Sprague system. 2200 w. Am Elect'n—Jan., 1901.

The Sprague Multiple-Unit System. Frank J. Sprague. The object of the article is to supplement a brief operative description of the system by details of the apparatus as constructed, with comments upon features peculiar to the operation. Ill. 7000 w. St Ry Jour—May 4, 1901.

Some Notes on the History and Development of the Multiple-Unit System of Train Operation. George H. Hill. 5400 w. St Ry Jour—May 4, 1901.

Multiple-Unit Traction (La Traction à Unités Motrices Multiples). A description of the system of the French Thomson-Houston Company as used on the Meudon railway, France. 1800 w. Revue Technique—June 25, 1901.

The Thomson-Houston System of Train Control. Illustrates and describes a train on the extension of the French Western Railway into Paris, which has been recently equipped with this multiple control system. 2200 w. Elect'n, Lond—Sept. 6, 1901.

The Multiple Unit System of Electric Traction (Traction Électrique à Unités Multiples). A general description of the Sprague system, as used on the Western Railway of France. 1500 w. Génie Civil—Oct. 26, 1901.

The Sprague Multiple-Unit System of Electric Traction (Le Système Sprague pour la Commande des Trains Électriques à Motrices Multiples). Jean de Tras. A comprehensive account of this electric traction system, with many diagrams and illustrations. 6500 w. Bull Soc Internationales des Électriciens—March, 1903.

The Multiple Unit System of Electric Traction (La Traction Elektrique et les Trains à Unités Multiples). Jean de Tras. Discussing the extending use of the multiple-unit system in the United States, and showing its applicability to local transport in France. 10,000 w. Mem Soc Ing Civ de France—Aug., 1903.

Electric Train-Control Systems (Elektrische Zugsteuerungen). F. Niethammer. Discussing the multiple-unit systems of Siemens & Halske, Sprague, Westinghouse, Schuckert, and others. Two articles. 6000 w. Zeitschr f Elektrotech—Dec. 6, 13, 1903.

The Siemens-Schückert Multiple Unit System of Electric Train Control. Emile Guarini. Illustrated article explaining a mixed system in which electricity serves only for the operation of compressed-air valves. 1400 w. Elec Rev, N Y—Dec. 19, 1903.

The Westinghouse Unit-Switch System of Multiple-Unit Train Control. Illustrates and describes the method of controlling the driving power as exemplified in this system. 2500 w. Elec Engr, Lond—July 29, 1904.

Sprague's Multiple Unit System of Electric Traction. Report of the Committee on Science and the Arts on the invention of Frank J. Sprague. 1200 w. Jour Fr Inst—Aug., 1904.

The Conditions of Electric Traction on Metropolitan Railways (Des Conditions de la Traction Electrique sur les Chemins de Fer Métropolitains). Maurice Soubrier. A discussion of the advantages of the multiple-unit system, with especial reference to the rapidity and acceleration. Serial. Part I. 3000 w. Revue Technique—Nov. 25, 1904.

The Electro-Pneumatic System of Train Control. P. C. McNulty, Jr. Illustrated description of this system, which has been developed by the Electric Company. 4000 w. Elec Club Jour—April, 1905.

Multiple-Unit Systems of Train Control. Hugh Hazelton. Read at convention of Am. Ry. Mech. & Elec. Assn. Describes the two types of multiple-control apparatus now in use, illustrating details, and showing the merits of the system for interurban and street railway lines. 3000 w. St Ry Jour—Sept. 30, 1905.

See also **Paris-Versailles; CONTROLLER; ELEVATED RAILWAY; UNDERGROUND RAILWAY.**

Muncie, Hartford & Ft. Wayne.—The Muncie, Hartford & Ft. Wayne Ry. An illustrated description of route, construction, stations, rolling stock, etc., of a line in Indiana. 4000 w. St Ry Rev—Dec. 20, 1903.

Murnau-Ober-Ammergau. — Murnau-Ober-Ammergau Single-Phase Railway. Illustrates and describes this line, which traverses a mountainous region, and has some interesting points of novelty. 1000 w. Elec Rev, Lond—March 17, 1905.

Murphy Third Rail.—See **UNDERGROUND RAILWAY—Baltimore.**

Naples.—Electric Traction in Naples, Italy, and Vicinity. Information concerning the transformation of the horse-car lines and the system installed. 2200 w. Elec Wld & Engr—Jan. 19, 1901.

The Street Railway System of Naples. Cesare Pio. Brief illustrated account of the electrical equipment of the street railway lines. 1400 w. St Ry Jour—April 6, 1901.

See also **MOUNTAIN RAILWAY—Vesuvius.**

Naples-Aversa-Calvano.—The Naples-Aversa-Calvano Interurban Electric Railway System. An illustrated description of this line, the region through which it passes and the power station. 1200 w. St Ry Jour—Aug. 3, 1901.

New Bedford-Onset.—The New Bedford & Onset Street Railway. Illustrated description of a recently opened interurban line, with information concerning it. 2500 w. St Ry Rev—Dec. 15, 1901.

Newcastle-on-Tyne.—The Electric Tramways of Newcastle-on-Tyne. Illustrated description with account of some of the difficulties attending the work of construction. 4500 w. Tram & Ry Wld—Jan. 9, 1902.

New Transportation System for Newcastle-on-Tyne. Illustrated description of an electrically operated system and its cars. 4800 w. St Ry Jour—May 3, 1902.

Electric Traction as Applied to the Newcastle Tramways. A. E. Le Rossignol. Read before the Munic. Elec. Assn. Investigates the influence of additional capital expenditure on the cost of current at the tramway power station in Newcastle. 4000 w. Elec Engr, Lond—July 24, 1903.

Descriptive Account of the Newcastle Corporation Tramways System. A. E. Le Rossignol. Read before the Incor. Assn. of Munic. & Co. Engrs. Ills. 2000 w. Elec Engr, Lond—July 22, 1904.

Electrification on the North Eastern Railway. Facts from the specifications concerning the change to electric power on one of the branches of this railway. Map. 2500 w. Engng—Aug. 15, 1902.

Electrical Traction on the North-Eastern Railway. An account of the proposed equipment for suburban traffic in the neighborhood of Newcastle-upon-Tyne. Ill. 2000 w. Elect'n, Lond—May 29, 1903.

Electric Traction on the North-Eastern Railway. An illustrated account of the extent of the scheme and of the manner in which it will be carried out. 2300 w. Engr, Lond—July 24, 1903.

Electric Traction on the North-Eastern Railway. Illustrates and describes the equipment of the Newcastle local lines. 7500 w. Tram & Ry Wld—Jan. 14, 1904.

See also **Tyneside**; **ELECTRIC STATION—Carville, Eng.**

New Haven, Conn.—Some Wrinkles on the Fair Haven & Westville Railroad. Illustrated description of the tower car, motor testing device and pit jack and rack. 900 w. St Ry Jour—April 6, 1901.

The New Haven's Electric Railway System. Reviews the history of the upbuilding of this system. Map. 1200 w. R R Gaz—Vol. XXXIX., No. 17.

New Jersey.—The Electric Railroads in New Jersey. E. Bjerregaard. Map and account of the electric railroads of the State, especially those connecting New York and Philadelphia. Ill. 6500 w. R R Gaz—Nov. 28, 1902.

Some Operating Features of the Electric Railway System Controlled by the Public Service Corporation of New Jersey. A. H. Stanley. Illustrates and describes the property of this company, its equipment and operation. It comprises 550 miles of overhead trolley system. 5000 w. St Ry Rev—Sept. 20, 1904.

New Jersey & Hudson River.—The New Jersey & Hudson River Railway & Ferry Co. An illustrated description of the Fort Lee ferry, and the line to Englewood and Hackensack, N. J. 1800 w. St Ry Rev—Dec. 15, 1900.

New Orleans.—The System of the New Orleans and Carrollton Railroad Company. Illustrated detailed description of one of the finest equipped and operated street railway properties in the United States. 3600 w. St Ry Jour—Nov. 2, 1901.

New Orleans & Carrollton Railroad, Light & Power Co. An illustrated article describing the topography and climatic conditions, track and roadbed, construction, rolling stock, shops, method of accounting, etc. 8000 w. St Ry Rev—July 20, 1902.

New York.—Report of the Merchants' Association on Improving the Surface Car Service of New York City. Abstracts such features of the report as are of general interest. 6000 w. Eng News—Sept. 17, 1903.

Power Production and Distribution on the Metropolitan Street Railway System. M. G. Starrett. Read before the Utica convention. A description of the system, which embraces all the street surface railway lines in the boroughs of Manhattan and the Bronx, New York. Also discussion. 8000 w. St Ry Jour—Sept. 24, 1904.

See also **ELECTRIC RAILWAY CONDUIT; ELECTRIC DISTRIBUTION—Railway, N. Y.; ELECTRIC STATION; ELEVATED RAILWAY; STREET RAILWAY; TRANSPORTATION; UNDEGROUND RAILWAY.**

New York-Boston.—From New York to Boston by Trolley. Gives four maps showing the electric railways in operation, proposed, and under construction, and the steam railroads. The trip can be made by electric railways with the exception of about 4 miles. Time, 20 hours and 5 minutes. Fare, $2.85. 800 w. St Ry Jour—June 20, 1903.

Short Vacations by Trolley. Albert Bigelow Paine. An illustrated article on the pleasures of trolley travel, describing principally the route between New York and Boston. 2500 w. World's Work—July, 1903.

N. Y. Bridge Connections.—The Brooklyn Bridge Railroads. Julius Meyer. Discusses the connection desirable between the Manhattan ends of the Brooklyn, Williamsburg and Navy Yard bridges, trolley terminals, etc. Ill. 1800 w. R R Gaz—April 18, 1902.

East River Bridges Connecting Line. Julius Meyer. Extracts from an address delivered before the Board of Rapid Transit Commissioners discussing the requirements of this line. 900 w. R R Gaz—June 6, 1902.

See also **BRIDGE TERMINAL.**

N. Y. Central R. R.—Electric Traction for the New York Central Railroad. Information concerning the contracts just awarded for the equipment of the lines near New York City with electricity. Also editorial. 2000 w. Elec Wld & Engr—Nov. 28, 1903.

Electric Power on the New York Central. Editorial discussion of some arguments that may have led to the adoption of direct-current apparatus. 2000 w. St Ry Jour—Jan. 9, 1904.

The New York Central Plans in the Center of New York. An account, based on an interview with H. E. Andrews, of plans for consolidating electric roads and electrifying portions of steam roads. 1800 w. St Ry Jour—Aug. 13, 1904.

The Parting of the Ways—From Steam to Electricity. Discusses the important changes from steam to electric traction in progress on the New York Central Railroad near New York. Illustrates the latest steam locomotive and the new electric locomotive for the express service on this road. 1600 w. Sci Am Sup—April 8, 1905.

New York Central Electrification. Illustrates and describes the improvements which are in progress at the Forty-second Street terminal in New York City, to accommodate electric trains, and also the transmission system and sub-stations. 4200 w. St Ry Jour—Nov. 18, 1905.

The Electrification of the New York Central's Terminal Lines. An illustrated article summarizing the important work of electrifying the terminal lines of this railway. 6500 w. Sci Am Sup—Dec. 9, 1905.

Improvements of the New York Central & Hudson River Within the Electric Zone. G. R. Wadsworth and J. C. Irwin. The present article gives an illustrated description of the electrical equipment. 5000 w. R R Gaz—Vol. XXXIX., No. 20.

Improvements of the New York Central and Hudson River Within the Electric Zone. G. R. Wadsworth. This article concludes a series, and describes and illustrates the new terminal building, which will be erected on the site of the Grand Central Station. 1300 w. R R Gaz—Vol. XXXIX., No. 21.

A New and Higher Standard of D. C. Operation. Frank J. Sprague. The New York Central-New Haven Situation. Charles A. Mudge. Two letters on heavy electric railway work, with editorial discussion of them. 3000 w. St Ry Jour—Dec. 23, 1905.

See also **Acceleration Tests; Danger; N. Y., N. H. & H.; Single Phase vs. Direct; THIRD RAIL.**

New York Metropolitan.—See **ELECTRIC RAIL-**

WAY, CONDUIT; STREET RAILWAY—New York.

N. Y., N. H. & H.—The New Haven's Electrification Plans in the Bronx. An account of improvements to be made on the New York, New Haven & Hartford between the Harlem River and New Rochelle. 1000 w. R R Gaz—Vol. XXXVII., No. 12.

See also Danger; N. Y. Central; RAILWAY CONSTRUCTION.

New York-Portchester.—The Proposed New York and Portchester Railway. Particulars of the plans and extracts from the testimony given to prove the convenience and necessity of the road. 10,500 w. St Ry Jour—Dec. 7, 1901.

The New York and Portchester Railway Hearing. Presents testimony relating to the engineering and financial features of this undertaking. 7000 w. St Ry Jour—Jan. 4, 1902.

New York-Stamford.—New York and Stamford Railway Co. Putnam A. Bates. Brief illustrated account of the railways consolidated to form this line. 2000 w. St Ry Rev—Feb. 15, 1905.

New York State.—The Possibilities of a State Electric Freight Railway as a Substitute for a Barge Canal from Buffalo to the Hudson River. J. H. Ehrehart. A letter considering this subject. 1400 w. Eng News—Jan. 17, 1901.

See also Niagara Power; STREET RAILWAY.

New York, Westchester & Boston.—The New York, Westchester & Boston Railway. Information concerning a four-track suburban electric line under construction on a right-of-way 100 ft. wide. Ills. 3000 w. Eng Rec—Dec. 2, 1905.

Niagara Gorge.—The Operation of the "Great Gorge Route." Godfrey Morgan. An illustrated article presenting the facts and problems of operation and maintenance of the Niagara Gorge electric railways. 2000 w. St Ry Rev—Nov. 15, 1901.

Niagara Power.—Niagara Electric Power for Steam Railways of Western New York. Mentions new fields for large amounts of electric power and reviews what has been done and is being done in the line of generating stations in the vicinity of Niagara Falls. Ills. 6000 w. Ry & Engng Rev—Oct. 14, 1905.

Niagara-St. Catharine's, Ont.—The Niagara, St. Catharine's & Toronto Railway. E. F. Seixas. An illustrated description of a road changed from steam to electricity. 1500 w. St Ry Jour—Sept. 7, 1901.

Niagara-Toronto.—See Freight.

Nice, France.—Mediterranean System of Electric Traction in the Neighborhood of Nice and Hydraulic Plant of Mesala. C. L. Durand. Brief illustrated description of one of the most extensive systems of electric traction in Europe. 2200 w. Elec Rev, N Y—Aug. 8, 1903.

Niederschöneweide-Spindlersfeld.—See Spindlersfeld.

1902.—Electric Traction in 1902. Dr. Louis Bell. A general review. 3000 w. Elec Rev, N Y—Jan. 10, 1903.

1903.—Electric Traction in 1903. Dr. Louis Bell. A review of the year's progress. 2000 w. Elec Rev, N Y—Jan. 9, 1904.

The Outlook in Electric Traction in 1903. Dr. Louis Bell. A general review of present conditions in electric tramways and railways. 1800 w. Elec Wld & Engr—Jan. 3, 1903.

Nogentais System.—See STORAGE BATTERY RAILWAY—Paris.

Norfolk, Va.—The System of the Norfolk & Atlantic Terminal Company. Illustrated detailed description of the plant with report of the service, and the conditions to be met, and the various interests of the company in Norfolk, Newport News, Old Point Comfort and the surrounding country. 4200 w. St Ry Jour—Sept. 7, 1901.

Northampton, Eng.—Northampton Corporation Electric Tramways. General illustrated description of power house, track and other features of an English electric railway. 2000 w. Elec Engr, Lond—Aug. 5, 1904.

Northampton Electric Tramways. Illustrated detailed description. 3500 w. Tram & Ry Wld—Oct. 13, 1904.

North Eastern, Eng.—See Newcastle; Tyneside; ELECTRIC STATION—Carville, Eng.

North Shore, California.—See San Francisco—San Rafael.

Norwich, Eng.—Norwich Electric Tramways. Illustrated detailed description. 3300 w. Tram & Ry Wld—Dec. 6, 1900.

Nottingham, Eng.—Nottingham Corporation Electric Lighting and Tramways. Illustrated detailed description of interesting features of the improved plant. 3300 w. Elec Rev, Lond—Jan. 11, 1901.

Nottingham City Tramways. Illustrated detailed description of the construction of the new overhead electric line. 3700 w. Tram & Ry Wld—Feb. 7, 1901.

The Conversion of the Nottingham Street Railways. An illustrated account of the conversion from animal to electric traction, the construction, equipment, power station, etc. 3000 w. St Ry Jour—May 4, 1901.

Nottingham Corporation Tramways. Illustrates and describes recent work in connection with these tramways, new sections, new sheds and repair shops. 3800 w. Tram & Ry Wld—Dec. 11, 1902.

Nürnberg-Fürth.—See Three-Wire.

Oakland, Cal.—The Street Railway and Ferry Systems of Oakland, Cal. Illustrated description. 900 w. St Ry Rev—May 20, 1904.

Oerlikon Experiments.—Electric Traction on Normal Railways (Die Elektrische Zugförderung auf Normalen Eisenbahnen). A paper by Hr. Huber before the Zürich Engineers' and Architects' Society, partly abstracted from the "Schweizerische Bauzeitung," giving an account of the experiments about to be made by the Oerlikon Co., using single-phase currents. 4000 w. Elektrotech Zeitschr—April 17, 1902.

Electric Traction and Standard Railways. E. Huber. Gives details regarding the experiments made by the Oerlikon Company, briefly describing the system and showing its advantages over existing systems. 3500 w. St Ry Jour—June 7, 1902.

See also Huber Current Collector.

Ohio.—Electric Railways in Ohio. A statement of the present conditions in the State, showing great progress, and also stating the causes which have retarded the building of electric railways. 2800 w. St Ry Jour—March 12, 1904.

Ohio Interurban.—Interurban Electric Railroad Development in Northern Ohio. An account of the connecting of detached systems forming interurban lines, and, ultimately, extended trunk lines between large centers, and the problems in consequence. 1500 w. R R Gaz—April 26, 1901.

The Interurban Electric Railways of Ohio. George S. Davis. An interesting account of the rapid development of electric railways in this State, giving much information concerning the different projects. Map. 13,000 w. St Ry Jour—Aug. 3, 1901.

Northern Ohio Interurban Lines. An illustrated description of the Columbus, Delaware & Marion Ry., which is a part of an electric system which will eventually reach Cleveland. 4500 w. St Ry Jour—March 21, 1903.

The Columbus, London, and Springfield, and the Dayton, Springfield and Urbana Railways. H. C. Reagan. An illustrated detailed description of a fine interurban system in Ohio. 7000 w. St Ry Rev—Sept. 20, 1903.

See also Columbus Loop; Toledo-Monroe.

Ohio Western.—The Western Ohio Railway. D. W. Pell. Illustrated detailed description of a high-speed line operating at present 47 miles of road, and having 67.5 miles more under construction. 2000 w. Ry Age—Dec. 5, 1902.

The Western Ohio Railway Co. Illustrates and describes the company's lines, power house, substations, etc., with a review of some operating details. 5000 w. St Ry Rev—March 20, 1904.

Old Colony, Mass.—See ELECTRIC STATION—Quincy Point.

Oldham, Eng.—Oldham Corporation Electrical Tramways. History and illustrated description of these recently opened lines. 2500 w. Elec Engr, Lond—May 30, 1902.

The Electric Tramways of Oldham. An illustrated detailed description of the line, stations, rolling stock, etc. 5500 w. Tram & Ry Wld—June 12, 1902.

See also Middleton.

Oley Valley, Pa.—The Oley Valley Railway. Illustrates and describes one of the most interesting interurban lines in Pennsylvania. 4000 w. St Ry Jour—Oct. 4, 1902.

Operating Cost.—See STREET RAILWAY MANAGEMENT.

Oregon Water Power & Ry Co.—The Territory, Construction, Power Transmission System and Rolling Stock of the Oregon Water Power & Railway Company. Begins an illustrated detailed description of an electric system having many interesting features, and carrying on a large passenger and also freight business. Serial. 1st part. 5800 w. St Ry Jour—Oct. 22, 1904.

Orleans.—The Orleans, France, Electric Tramway and its Gas Power Plant (Die Elektrische Tramway in Orleans und deren Kraftgas-Anlage). E. A. Ziffer. An illustrated description of this road and particularly of gas producing plant and gas engines, with a general discussion of the use of power gas. 1 plate. 5000 w. Mitt d Ver f d Förderung d Local u Strassenbahnwesens—Feb., 1902.

See also Paris-Orleans.

Overhead Construction.—Methods of Safety for the Overhead Electric Trolley System. Edward Manville. Read before the Incor. Assn. of Munic. & Co. Engrs. Considers the precautions to be taken to ensure solid construction and methods of ensuring safety should a breakdown occur. Ill. 3800 w. Tram & Ry Wld—July 11, 1901.

Methods of Safety for the Overhead Electric Trolley System. Edward Manville. Discusses the precautions to be taken to ensure solid construction, and methods of ensuring safety if a breakdown should occur. Ill. and discussion. 5400 w. Elec Engr, Lond—Aug. 30, 1901.

Dangers from Trolley Wires and Their Prevention. Andrew Jamieson. Abstract of paper read before the Elec. Sec. of the Glasgow Cong. Considers the necessity of the proper protection of trolley wires from contact with other overhead conductors; methods adopted and proposed; the Board of Trade and Post Office regulations, etc. Also editorial. Ill. 5200 w. Elec Rev, Lond—Sept. 6, 1901.

Track and Overhead System for an Interurban Electric Railway. Gilbert Hodges. A discussion of road bed and track work and the construction of an overhead electric system. 3800 w. Jour Assn of Engng Socs—Aug., 1902.

The Artistic Treatment of Electric Railway Line Construction. H. P. Quick. Illustrates many pole designs for the support of the wires. Compares American and foreign practice. 1200 w. St Ry Rev—Sept. 20, 1902.

Some Notes on Overhead Tramway Wires. Lionel E. Harvey. Discusses the construction, inspection and use of the line. 1100 w. Elec Rev, Lond—Nov. 28, 1902.

The Suspension of Trolley Wires (Die Aufhängung des Fahrdrahtes Elektrischer Bahnen). F. Hermann. A discussion of the stresses in overhead trolley wires, taking into account the weight of the wire and the effect of temperature changes. 3000 w. Ill Zeitschr f Klein u Strassenbahnen—Feb. 1, 1903.

Board of Trade Guard Wire Regulations for Electric Tramways. A copy of the new regulation to be required in all new undertakings in England. 1600 w. Elect'n, Lond—Feb. 20, 1903.

Safety Devices for Tramway Trolley Wires. Donald Smeaton Munro. Gives an illustrated description of various devices used for protection against accidents. Serial. 1st part. 1500 w. Elec Rev, Lond—March 13, 1903.

Standard Overhead Construction in City Streets. An illustrated outline of the practice in the largest cities of the United States, with general conclusions. 2700 w. St Ry Jour—Aug. 29, 1903.

Overhead Tramway Construction. Deals with the design, selection, arrangement and erection of overhead line material, discussing standard practices, and pointing out the leading features of the best design. 3300 w. Elec Rev, Lond—May 27, 1904.

Overhead Equipment: Notes on its Construction and Maintenance. J. M. McElroy. Read at the Liverpool Congress of the Munic. Tram. Assn. of Gt. Britain. Discusses the best and most suitable method of constructing and maintaining the equipment. 5500 w. Elec Engr, Lond—Sept. 30, 1904.

Tramway Overhead Equipment Materials. H. M. Sayers. Read from the Tram. & Light Rys. Assn. Gives a brief analysis of the mechanical and electrical conditions to be satisfied, with reference to the design and erection of the line, materials, etc. 7500 w. Elec Engr, Lond—Jan. 20, 1905.

Line Construction for High Pressure Electric Railroads. George A. Damon. Gives a brief record of what has been accomplished in line construction, and examines the requirements and difficulties of installation in order to obtain permanent insulation at reasonable cost. Ills. 2500 w. Am Inst of Elec Engrs—March, 1905.

Overhead Accidents and Their Prevention. Discusses the risks from defective design or construction, defective maintenance and from lack of foresight. Serial. 1st part. 2000 w. Elec Rev, Lond—May 5, 1905.

Diagram for Recording Overhead Data. Illustrated explanation of the method used by the Hartford Street Railway Company. 600 w. St Ry Jour—June 3, 1905.

The Prevention of Overhead Accidents. Robert N. Tweedy. Explains how the safety of the overhead equipment is guarded on one of the large Midland systems. 2200 w. Elec Rev, Lond—Aug. 11, 1905.

Overhead Construction. Robert N. Tweedy. Discussing some details in connection with poles, wiring, etc., and referring to paper by Mr. Sayers. Serial. 1st part. 2000 w. Elec Rev, Lond—Oct. 20, 1905.

The Preservation of Hanger Bolts on Electric Tramways. Robert N. Tweedy. Gives an account of failure of insulated hanger bolts, and the remedy. 1100 w. Elec Rev., Lond—Dec. 29, 1905.

See also Carlisle, Eng.; Feeder; Huber Current Collecter; Three Wire; ELECTRIC CONDUCTOR—Railway; ELECTRIC LINE; ELECTRIC PROTECTIVE APPARATUS; INSULATION—Trolley Wire; INSULATOR—Trolley; POLE; TROLLEY; TROLLEY WIRE.

Overhead Construction, Hanover.—The New Overhead Wiring of the Street Railways of Hanover (Die Neuerbaute Oberleitungsanlage der Strassenbahn Hannover). L. Liebenberg. A fully illustrated account of the wiring and feeders, including the arrangement for a number of intricate curves. 3000 w. Elektrotech Zeitschr—May 5, 1904.

Oxford.—See Automobile Compared.

Pacific Company.—See Los Angeles.

Paisley, Scotland.—The Paisley and District Tramway System. An illustrated account of this undertaking, with map. 3500 w. Tram & Ry Wld—July 13, 1905.

Palermo-Monreale.—See MOUNTAIN RAILWAY.

Paris.—See ELECTRIC RAILWAY, ACCUMULATOR; ELECTRIC RAILWAY, CONDUIT; ELECTRIC RAILWAY, CONTACT; STREET RAILWAY.

Paris-Arpajon.—The Paris-Arpajon Electric Railway (Chemin de Fer sur Route de Paris à Arpajon). G. Boeto. A well illustrated description of railway, power station and rolling stock. Both accumulator locomotives and motor cars are used. 1 plate. 5000 w. Génie Civil—April 26, 1903.

Paris Exposition.—See Moving Sidewalk.

Paris-Orleans.—Extension of the Third-Rail System of the Paris-Orleans Railway. An illustrated account of this work, with explanation of its aim. 3500 w. St Ry Jour—Aug. 6, 1904.

Local Electric Service of the Orleans Railway (Traction Electrique der Trains de Banlieue de la Compagnie d'Orleans). F. Paul-Dubois. A description of the generating station, locomotives, rolling stock and operation of the Orleans railway between Paris and Juvisy, a distance of about 12 miles. 5000 w. 4 plates. Rev Gen d Chem der Fer—Dec., 1904.

Paris-Orleans Electric Railway Extension. An illustrated article reviewing the history of electric traction on these lines, and describing recent extension and improvements. 4000 w. Elec Rev, Lond—Dec. 2, 1904.

The New Paris Electric Railroad. C. L. Durand. Illustrates and describes the equipment of the Paris-Orleans electric railroad. 3200 w. Elec Rev, N Y—Feb. 18, 1905.

See also **Paris-Versailles.**

Paris-Versailles.—Electric Traction on the Invalides-Versailles Line (La Traction Electrique sur la Ligne des Invalides à Versailles). F. Drouin. Describing especially the running of the feeders, also the substations and motor cars. 3000 w. 1 plate. Génie Civil—Oct. 26, 1901.

Construction Work on the Paris-Versailles Electric Railway (Note sur les Travaux de la Ligne d' Issy a Viroflay). M. Rabut. A well-illustrated account of construction work on this suburban branch of the Western Ry. of France, particularly the viaducts and the Meudon tunnel. 5 plates. 8000 w. Rev Gen d Chemins de Fer—July, 1902.

Electric Traction on the Line From the Invalides to Versailles (La Traction Electriques sur la Ligne des Invalides à Versailles). M. Mazen. A general description of the power house, transformers, and locomotives, with a plan of the line. 5000 w. Rev Gen d Chemins de Fer—Aug., 1902.

The Electric Railway from Paris to Versailles. C. L. Durand. Brief illustrated description of the technical equipment and engineering features. 2700 w. Elec Rev, N Y—May 23, 1903.

The Paris-Versailles Electric Railway. Daniel Bellet. An illustrated detailed description of the new route, Invalides-Versailles, its construction, equipment, etc. 5800 w. Trac & Trans—Dec., 1903.

Notes on Heavy Electric Traction Near Paris. An illustrated article describing some particulars of the Paris-Orleans line, and giving details of the electric service of the Paris-Versailles line. 1600 w. St Ry Jour—Nov. 15, 1902.

See also **Multiple-Unit; ELECTRIC STATION—Moulineaux.**

Pennsylvania.—See **Philadelphia; Pittsburg; West Penn.**

Performance.—See **Speed-Time Curves.**

Permanent Way.—Permanent Way for Electric Traction. H. Ross Hooper. Shows the importance of permanent way to the success of electric traction, discussing materials and construction. 3000 w. Ry & Tram Wld—Dec. 6, 1900.

See also **Right of Way; TRACK.**

Petaluma and Santa Rosa.—The Petaluma and Santa Rosa Railway, Cal. An illustrated description of a road built primarily for the handling of all kinds of express and freight, but also developed for passenger business. 1600 w. St Ry Jour—July 1, 1905.

Philadelphia.—The Philadelphia Rapid Transit System. W. W. Wheatley. Explains the organisation and growth of the system, reports expenses, earnings, etc., in the present issue. Ill. Serial. 1st part. 3300 w. St Ry Jour—March 28, 1903.

History, Organisation and Financial Characteristics of the Philadelphia Rapid Transit Company. Reviews the early lines, race question, introduction of mechanical traction, operating factors, etc. Ills. 6500 w. St Ry Jour—Sept. 23, 1905.

Way and Roadway Matters in Philadelphia. Describes types of track construction, special work, shops, appliances, etc. Ills. 3500 w. St Ry Jour—Sept 23, 1905.

The Electric Tramways of Philadelphia (Les Tramways Electriques de Philadelphie). P. Ayné. An illustrated description of the electric street and suburban railways of Philadelphia, from a French point of view. 3000 w. Génie Civil—Nov. 25, 1905.

See also **TRANSPORTATION.**

Philippines.—The Trolley in the Philippines. Discusses its outlook as a field for electric railway promoters. 2500 w. St Ry Rev—Dec. 15, 1900. See also **Manila; ELECTRIC LIGHTING.**

Pierrefitte-Cauterets.—The Electric Railway of Pierrefitte-Cauterets (Le Chemin de Fer de Pierrefitte-Cauterets). P. Médebielle. Illustrated description of electric railway in the Central Pyrenees, with hydro-electric power station. 3500 w. 2 plates. Rev Gen des Chemins de Fer—March, 1901.

See also **HYDRO-ELECTRIC PLANT.**

Pittsburg, Pa.—The Street Railway System of Pittsburg, Pa. An illustrated article giving information of the finances, lines, rolling stock, power plants, etc. 9000 w. St Ry Rev—April 20, 1903.

I. Notes on Rapid Transit with Special Reference to Pittsburg. Emil Swensson. II. The Effect of Multiple Control on the Traction Problem of Pittsburg. N. W. Storer. Two papers discussed together. 17,800 w. Pro Engrs' Soc of W. Penn—Nov., 1903.

Pittsburg Interurban.—Interurban Railway Development in Western Pennsylvania. William Gilbert Irwin. Outlines the scheme of development in the vicinity of Pittsburg. 7500 w. St Ry Jour—May 3, 1902.

Pittsfield, Mass.—New High Alternating Current Installation of the Berkshire Street Railway Co., at Pittsfield, Mass. Illustrated description of a route through Western Massachusetts, a region renowned for its beauty. The power house, substations, overhead construction and equipment are described. 2200 w. St Ry Rev—Feb. 15, 1902.

Pneumatic Combined.—See **Arnold.**

Polarity Reversal.—See **ELECTRIC GENERATOR.**

Poles.—See **Overhead Construction; ELECTRIC LINE; POLE.**

Polyphase.—Polyphase Electric Traction. C. A. Carus-Wilson. Discusses some features of the polyphase system, particularly those relating to punctuality and frequency of train service. Ill. Serial. 1st part. 2400 w. Elec Engr, Lond—Dec. 7, 1900.

Polyphase Electric Traction. C. A. Carus-Wilson. Calls attention to some features of the polyphase system, particularly relating to punctuality and frequency of train service, that make it of great advantage; and gives an illustrated detailed description of the Burgdorf-Thun Ry. in Switzerland. 6000 w. Tram & Ry Wld—Feb. 7, 1901.

Some Notes on European Practice in Electric Traction with Three-Phase Alternating Currents. Carl L. de Muralt. Brief description of typical roads using polyphase alternating currents, results of tests, etc. Ill. 7700 w. Trans Am Inst of Elec Engrs—April, 1902.

Some Notes on European Practice in Electric Traction with Three-Phase Alternating Currents. Carl L. de Muralt. Abstract of a paper before the Am. Inst. of Elec. Engrs. Gives facts showing the present standing of polyphase electric traction, with illustrated description of motors and car equipments. Also editorial comment. 7200 w. St Ry Jour—May 31, 1902.

Three-Phase Traction. F. N. Waterman. Deals particularly with specific features of three-phase traction, and with some of the results attained and to be expected in practice. 10,300 w. Am Inst of Elec Engrs—June, 1905.

Discussion on "Three-Phase Traction," at Asheville, N. C. 7500 w. Am Inst of Elec Engrs—Sept., 1905.

See also **Alternating; Burgdorf-Thun; Ganz; High Speed; Magnetic Polyphase; Tangential Traction; Stansstadt-Engelberg; Valtellina; Zossen; MOUNTAIN RAILWAY—Jungfrau; UNDERGROUND RAILWAY—London.**

Polyphase vs. Single-Phase.—Some Early Work in Polyphase and Single-Phase Electric Traction. Bion J. Arnold. An illustrated description of the conditions surrounding the development and application of the alternating current system, with details making clear its operation. 7500 w. Int Elec Cong of St. Louis—Sept., 1904.

Portchester.—See **New York & Portchester.**

Port Huron to Atlantic.—From the Lake Region to the Atlantic Sea Board by Trolley. R. H. Derrah. An illustrated account of a trip from Port Huron, Mich., eastward to the sea. Brief descriptions of many lines and the towns and cities through which they pass. Maps. Serial. 1st part. 10,300 w. St Ry Rev—Oct. 20, 1902.

Portland, Ore.—The Oregon Water Power and Railway Company. George I. Brown. An illustrated article reviewing the history and describing the property of this Portland company, which operates steel car, suburban, interurban, and heavy freight traffic. 4000 w. Jour of Elec, Power & Gas—Jan., 1904.

Notes on the Portland Railway Company's System. A brief illustrated description of the Portland Heights scenic line and its operation. 6000 w. St Ry Jour—Dec. 31, 1904.

Porto Ceresio & Milan.—See **Milan-Gallarate.**

Portsdown & Horndean.—See **Portsmouth & Horndean.**

Portsmouth & Horndean.—English Interurban Line. Illustrates and describes an interesting electric railway, recently completed, extending from the outskirts of Portsmouth to Horndean. 2200 w. St Ry Jour—June 27, 1903.

The Portsdown and Horndean Light Railway. John R. Hewett. Illustrated description of an English electric line, running from a large town into a rural district. 3600 w. Trac & Trans—Dec., 1903.

Portsmouth, Eng.—Portsmouth Municipal Electric Tramways. Illustrated description of an overhead system and equipment. 3200 w. Tram & Ry Wld—Oct. 17, 1901.

The Portsmouth Electric Tramways. Full illustrated description of these tramways, which form the largest municipal system in the South of England. 1700 w. St Ry Jour—Jan. 4, 1902.

Power Consumption.—The Watt-Hour Consumption of Electric Railways (Berechnung des Wattstundenverbrauches Elektrischer Bahnen). E. E. Volkers. The various elements of resistance are taken into account, and it is shown that an efficiency of 58 per cent. is practicable. 4500 w. Elektrotech Zeitschr—June 13, 1901.

Power Equipment.—Power Equipment for City Roads. An illustrated article, showing the general condition of power equipment of American cities. 3200 w. St Ry Jour—Aug. 27, 1903.

Power Production.—The Production of Electrical Power. The first of a series of articles aiming to give a popular explanation of methods employed in generating and utilizing electric current for tramway purposes. Serial. 1st part. Tram & Ry Wld—Jan. 14, 1904.

Power Station.—See **ELECTRIC STATION.**

Power Transmission.—See **ELECTRIC DISTRIBUTION—Railway; ELECTRIC TRANSMISSION—Railways.**

Preston, Eng.—The Electric Tramways of Preston. Illustrated description of the line, overhead equipment, rolling, stock, etc. 2300 w. Tram & Ry Wld—Dec. 8, 1904.

Problems.—Problems of Electric Railways. J. Swinburne and W. R. Cooper. Read before the Inst. of Elec. Engrs. Discusses the series distribution of power for railways, especially for short lines. Its use for main lines is also considered; also other systems. Serial. 1st part. 5200 w. Elect'n, Lond—April 4, 1902.

Problems of Electric Railways. J. Swinburne and W. R. Cooper. Abstract of a paper read before the Inst. of Elec. Engrs. Urges the claims of series distribution of power for railways, especially for short lines, such as the tube and suburban types. 8500 w. Tram & Ry Wld—April 17, 1902.

Providence.—The Street Railway System of Providence, Rhode Island, and Vicinity. George B. Francis. An illustrated article giving an account of this system. Also discussion. 3000 w. Jour Assn of Engng Socs—Aug., 1902.

Providence-Bristol.—The Electrical Equipment of the Providence, Warren & Bristol Railroad. Describes the equipment of this section of the New York, New Haven & Hartford Railroad, with the overhead trolley system. Ill. 2400 w. St Ry Jour—March 1, 1902.

Providence & Danielson.—The Providence & Danielson Ry. Illustrated account of this road, which forms the completing line in a system of electric lines from Worcester, Mass., to Providence, R. I. It is for passengers and freight, and has an interesting adaptation of storage batteries. 2400 w. St Ry Rev—March 20, 1903.

Public Safety.—See **AUTOMOBILE.**

Pueblo, Colo.—See **HYDRO-ELECTRIC PLANT.**

Queens County, N. Y.—Railway Development in Queens County. An illustrated description of the system of the N. Y. & Queens Co. Ry., which has recently passed under new ownership and of the territory it serves. 4000 w. St Ry Jour—Aug. 22, 1903.

Raworth, Eng.—See **Regenerative Control.**

Reading, Eng.—Reading Corporation Electric Tramway. Illustrated detailed description of this road and its equipment. 10,800 w. Tram & Ry Wld—Sept. 3, 1903.

Reading, Pa.—See **United Power & Transportation Co.**

Recent Practice.—See **Modern Practice.**

Regenerative Control.—A Regenerative System of Tramcar Control. Illustrates and describes two recent British patents by J. S. Raworth for improvements in motors and regulating devices for electrically propelled vehicles. 2800 w. Elect'n, Lond—April 29, 1904.

The Automatic Regenerative Control for Electric Tramways. An illustrated description of a new system of automatic regenerative control worked out by J. S. Raworth, and put in daily service at Davenport, England. 2200 w. Trac & Trans—April, 1904.

Raworth's Traction Patents. Account of successful demonstration of Raworth's system of automatic regenerative control for electric cars, the motors being compound wound, the series coils being used for emergency purposes and the shunt for normal. Diagrams and tables. 2000 w. Elec Rev, Lond—Aug. 12, 1904.

Raworth's Automatic Regenerative Control. An illustrated description of this system, the apparatus and report of trials made. 3200 w. Tram & Ry Wld—Sept. 8, 1904.

The Johnson-Lundell Regenerative Control for Tramcars. Illustrates and describes the latest Johnson-Lundell-Land regenerative, double series, paralleling, automatic braking control system for electric tramcars. 1800 w. Elec Engr, Lond—Aug. 4, 1905.

See also Valtellina.

Repairs.—Repairs to Equipment. M. M. Nash. Read before the Indiana Elec. Ry. Assn. Suggestions for securing the best results in the maintenance of the equipment. 3800 w. St Ry Rev—June 15, 1905.

See also **ELECTRIC CAR; ELECTRIC RAILWAY SHOP.**

Return Circuit.—The Best Method of Conducting the Return Current to the Power House. E. G. Connette. Read before the Am. St. Ry. Assn. Discusses rail-bonding, the trouble experienced, etc., and advocates the use of a jointless and independent metallic return, connected to each rail. 1800 w. St Ry Rev—Oct. 12, 1901.

Rail Feeder Construction in San Francisco. S. L. Foster. An illustrated account of the recent work of the Market Street Railway Company. 1700 w. St Ry Jour—Jan. 4, 1902.

The Drop in Voltage in Alternating Traction Systems (Spannungsabfall von Wechselströmen in Eisenbahnschienen). Dr. H. Behn-Eschenburg. A discussion of the difficulties in using the rails as return conductors. 4500 w. Elektrotech Zeitschr—April 21, 1904.

Resistance and Current Flow (Widerstand und Stromverlauf). Dr. Richard Heilbrun. Experimental determinations of the resistance offered by rails and rail bonds to the passage of the return current in tramways. 3000 w. Elektrotech Zeitschr—Dec. 22, 1904.

The Treatment of the Ground Return in Railroad Systems. Albert B. Herrick. Discusses how to improve this portion of the system with the least possible cost. The question of bonding and considerations bearing upon it. 2200 w. St Ry Rev—Sept. 15, 1905.

See also **BOOSTER—Negative; ELECTRIC DISTRIBUTION — Railway; ELECTRIC RESISTANCE — Alternating Current; RAIL BOND; RAIL JOINT; STRAY CURRENT.**

Rheydt-Gladbach, Germany.—See **ELECTRIC STATION.**

Richmond, Va.—The Street Railway System of Richmond, Va. Illustrates and describes improvements due to a consolidation of interests. 5000 w. St Ry Jour—Jan. 2, 1904.
See also **Sprague.**

Right of Way.—The Private Right of Way. Alton D. Adams. States the advantages of the private right of way, giving information relating to cost, and the growing appreciation, especially in Massachusetts. 2000 w. St Ry Rev—Nov. 20, 1902.

Road Material Transportation.—Electric Railways for the Transportation of Road Material. A statement, by F. P. Cobb, of the advantages of hauling road materials on street railways and permitting cars so loaded to run on the tracks of more than one company. 1000 w. Eng Rec—April 27, 1901.

Roads.—See **ROAD—Electric Railway.**

Rochester & Eastern.—Rochester & Eastern Rapid Railway. Illustrated description of a high-speed electric interurban railway in western New York, operating on its own private right of way. 2500 w. St Ry Rev—Jan. 20, 1904.

Construction Work on the Rochester, Syracuse and Eastern Railroad. Explains the plan of construction of a road designed ultimately to furnish a double-track, high-speed, interurban electric road between Syracuse and Rochester. Ills. 3800 w. St Ry Jour—Dec. 16, 1905.

See also **Despatching.**

Rochester-Canandaigua. — Electrical Interurban in Western New York. Illustrated detailed description of the recently completed line between Rochester and Canandaigua. 3800 w. St Ry Jour—Jan. 16, 1904.

Rockford and Interurban.—Rockford & Interurban Railway Co. An illustrated article dealing with the growth and development of this Illinois system, the railways included in the new consolidated company, the organization, operating features, etc. Serial. 1st part. 5500 w. St Ry Jour—June 20, 1903.

Rockford-Janesville.—Rockford, Beloit & Janesville Railroad—Power Plant, Operation and Equipment. Illustrates and describes an interurban road, in Illinois and Wisconsin, supplied by alternating-current transmission with rotary converter sub-stations. Gives records of the power house and substation performance. 2500 w. St Ry Jour—April 25, 1903.

Rodes, France.—The Electric Tramways of Rodes (Les Tramways Electriques de Rodez). H. Somach. General description of overhead trolley line in operation at Rodes in the south of France. 1800 w. 1 plate. Génie Civil—Dec. 27, 1902.

Rome-Castellana.—The Single-Phase Railway System in Italy. E. A. Kerbaker. Describes the Roma-Civita Castellana line now under construction. 2000 w. Elec Rev, Lond—June 2, 1905.

Rothesay, Scotland.—The Rothesay Electric Tramways. Illustrated description of the electrification of a tramway on the west coast of Scotland, the reconstruction and re-equipment work. 2800 w. Tram & Ry Wld—Oct. 9, 1902.

Safety Appliances. — See **Overhead Construction; ELECTRIC INDUSTRY — Regulations, German; ELECTRIC PROTECTIVE APPARATUS.**

Saginaw & Bay City.—Saginaw & Bay City Railway & Light Co. An illustrated article describing a consolidation of four properties in Michigan, to be operated under one management. 3500 w. St Ry Rev—June 15, 1905.

St. Gall-Trogen, Switzerland.—The St. Gall-Speicher-Trogen Electric Railway. S. Herzog. Illustrated detailed description of a recently constructed railway driven by direct current obtained through transformers and converters from the three-phase 10,000-volt supply coming from the Kubelwerk. 2000 w. St Ry Rev—Nov. 20, 1904.

The St. Gallen, Speicher, Trogen Electric Railway (Die Strassenbahn St. Gallen-Speicher-Trogen). S. Herzog. Describes a Swiss interurban road about six miles long, taking the current from the generating station at Kubel. 2500 w. Zeitschr d Ver Deutscher Ing—Sept. 17, 1904.

The Electric Railway from St. Gall to Speicher and Trogen, Switzerland (Chemin de Fer Electrique de Saint-Gall à Speicher et à Trogen, Suisse). H. Somach. Illustrated description of direct-current railway, about 6 miles long, rising 900 feet. 2000 w. Génie Civ—Aug. 26, 1905.

St. Georges de Commiers.—St. Georges de Commiers-la Mure Electric Railway. Describes this narrow gauge railway in the French Alps and its rolling stock. It is used mainly for goods traffic. 2800 w. Trac & Trans—July, 1904.

Tests on Electric Railway Traction (Essais de Fraction Electrique). P. Dumas. A report of tests with electric locomotives on the narrow gauge railroad of Saint-Georges-de-Commiers at La Mure, in the south of France. The electric current is derived from the works at Grenoble. 30,000 w. Ann des Ponts et Chaussées—4 Trimestre, 1905.

St. Helen's, Eng.—St. Helen's Electrical Tramways. Illustrated description of one of the first lines in England to adopt electricity. 2300 w. Tram & Ry Wld—May 9, 1901.

St. John's, Newfoundland.—The St. John's Street Railway. An illustrated description of interesting features of a road built where many topographical difficulties were encountered. 700 w. St Ry Jour—Jan. 5, 1901.

St. Louis, Mo.—Street Railway Progress in St. Louis. An illustrated article dealing with present progress, past improvements, consolidations, management, etc. 5600 w. St Ry Jour—July 6, 1901.

Some Features of the East St. Louis & Suburban Railway. Brief illustrated description of this system, road and equipment, shops, etc. 2800 w. St Ry Jour—May 14, 1904.

East St. Louis & Suburban Railway. Illustrating and describing the new power plant recently completed to replace several smaller plants of the consolidated companies. 2000 w. St Ry Rev—May 20, 1904.

The Electric Railways of St. Louis. An illustrated article giving a brief summary of the situation. Also an illustrated description of the new central sub-station of the St. Louis Transit Company, by Charles A. Hobein. 3300 w. St Ry Jour—Oct. 8, 1904.

St. Louis Exposition.—Electric Railways and the St. Louis Exposition. W. E. Goldsborough. An illustrated article giving information concerning the transportation and electrical buildings and electric railway exhibits. 2800 w. St Ry Rev—Oct. 20, 1902.

The Electric Urban and Interurban Railway at the St. Louis Exposition. W. E. Goldsborough. Information concerning plans for exhibits in this field, including the actual operation and test of railway equipments. 3300 w. St Ry Jour—Nov. 1, 1902.

The Intramural Railway for the St. Louis World's Fair. Two illustrated articles by Richard H. Phillips, and by Charles V. Weston. The first is descriptive; the second discusses the original design, with estimates on performance and cost. 3300 w. St Ry Rev—Aug. 20, 1903.

Some of the Electric Railway Features at the World's Fair, St. Louis. Winder Elwell Goldsborough. An illustrated article explaining the investigations to be carried out under the direction of the Electric Railway Test Commission. 1600 w. St Ry Jour—May 7, 1904.

See also **TRANSPORTATION.**

St. Moritz, Switzerland.—The Electric Tramway of St. Moritz, Switzerland. Brief illustrated description of an interesting installation. 700 w. Elec Rev, N Y—Dec. 14, 1901.

Salford, Eng.—Salford Corporation Electric Tramways. History of the tramway service with illustrated description of the recent re-equipment and reconstruction on the overhead wire system. 4000 w. Tram & Ry Wld—Dec. 12, 1901.

San Diego-Coronado, Cal.—Notes on the San Diego and Coronado Railway Systems. Illustrates and describes the equipment, the double-deck cars, and interesting features in general. 3500 w. St Ry Jour—June 4, 1904.

San Francisco.—Some Recent Electric Railway Construction for San Francisco. S. L. Foster. Illustrated account of features introduced in changing from cable, steam and horse power to electricity. 5800 w. St Ry Jour—March 2, 1901.

Notes on the Market Street Railway, San Francisco. An illustrated account of the organization, operation, equipment, and management. 3800 w. St Ry Jour—May 4, 1901.

The United Railroads of San Francisco. An illustrated account of these lines, their features of interest and equipment. 6000 w. Jour of Elec, Power & Gas—Jan., 1904.

San Francisco, Oakland & San Jose.—The San Francisco, Oakland & San Jose Railway—"The Key Route." Illustrated description of an electric railway having interesting features, and operating trains instead of single cars. Serial. 1st part. 3500 w. St Ry Jour—Feb. 13, 1904.

San Francisco-San Mateo.—San Mateo Extension of the United Railroads of San Francisco. An illustrated detailed description of a new line to give high-speed service, its equipment, etc. 3000 w. St Ry Jour—Oct. 31, 1903.

San Francisco-San Rafael.—The Third Rail System of the North Shore Railroad. George P. Low. Illustrated detailed description of an important electric railway line in California. 8500 w. Jour of Elec, Power & Gas—Jan., 1904.

Electrical Equipment of the North Shore Railroad from San Francisco to San Rafael. Illustrates and describes a system of electric third-rail traction in California having many interesting features. Serial. 1st part. 4000 w. St Ry Jour—Jan. 2, 1904.

San Jose-Los Gatos, Cal.—The San Jose and Los Gatos Interurban Railway Company. Illustrates and describes this system, which is distinctly a passenger road, though considerable freight is hauled. 2500 w. Jour of Elec—July, 1905.

Sao Paulo, Brazil.—The System of the Sao Paulo Tramway, Light & Power Company, Ltd. A statement of the conditions to be met with a general review of the situation, describing the electric plant and its construction. Ill. 5800 w. St Ry Jour—Sept. 7, 1901.

See also **HYDRO-ELECTRIC PLANT—Parnahyba.**

Sault Ste. Marie.—Transportation Facilities at the Soo. An illustrated description of the street railway lines both in Michigan and Ontario, at this point. 1600 w. St Ry Jour—July 4, 1903.

See also **ELECTRIC INDUSTRY; HYDRO-ELECTRIC PLANT.**

Scarborough, Eng.—Scarborough Electric Tramways. Illustrated detailed description of the lines to this seaside resort in England. The exceptional feature is the passage of the line right over the roof of the Aquarium. 1400 w. Tram & Ry Wld—May 12, 1904.

Schaffhausen, Switzerland.—The Street Railway System of Schaffhausen, Switzerland. Illustrates and describes one of the most prominent Swiss installations. 1800 w. St Ry Jour—Feb. 13, 1904.

See also **HYDRO-ELECTRIC PLANT.**

Schenectady, N. Y.—The City and Interurban System of the Schenectady Railway Company. An illustrated survey of this system which has features of more than ordinary interest. 3000 w. Elec Rev, N. Y.

Schenectady's City, Suburban and Interurban Railway Facilities. An illustrated description of rapid advancement in the electric railway industry. 5800 w. St Ry Jour—Aug. 29, 1903.

Schenectady-Albany. — Schenectady-Albany Trolley Line. Illustrates and describes the latest improvements in electric railway engineering as shown in this line over an old turnpike used as a toll-road over a hundred years ago. 1700 w. St Ry Jour—Sept. 28, 1901.

Schwanden-Elm.—The Sernf Valley Railway (Die Sernftalbahn). Illustrated description of the electric railway recently opened in the Sernf valley between Schwanden and Elm, above Glarus, Switzerland. Serial. Part I. 1500 w. Schweiz Bauzeitung—Nov. 11, 1905.

Scioto Valley.—See Columbus, O.; **ELECTRIC STATION—Reesee.**

Scranton-Pittston.—Electric Interurban for Freight and Passengers. An illustrated detailed account of the recently opened section between Scranton and Pittston, of the Lackawanna & Wyoming Valley Railway. 7500 w. St Ry Jour—June 13, 1903.

See **Lackawanna & Wyoming Valley.**

Sea Cliff-Glen Cove, L. I.—A Short Single-Phase Railway on Long Island. Illustrated description of a road that has been in service for the past two months to convey passengers from Sea Cliff and Glen Cove stations to neighboring steamboat landings on Long Island Sound. 2000 w. St Ry Jour—Dec. 16, 1905.

Seattle.—Notes on Seattle Street Railway Practice. Illustrates and describes the soldered bonds used, the block signals, snow drags, bracket construction, etc., and gives information concerning the operation. 2400 w. St Ry Jour—April 6, 1901.

The Stone & Webster Properties on Puget Sound. An illustrated article describing the lines of the Seattle Electric Co., their equipment, management, &c. 5700 w. St Ry Rev—Jan. 20, 1904.

Seattle-Tacoma.—The Seattle-Tacoma Interurban Railway. Howard S. Knowlton. Illustrated description of a high-speed electric railway on the third-rail system; the equipment, roadbed, track and right of way conform closely to steam railway practice. 6800 w. St Ry Jour—May 2, 1903.

Sectional Third Rail.—See **THIRD RAIL—Pick-Up-Device.**

Securities.—See **STREET RAILWAY MANAGEMENT.**

Sernf Valley.—See **Schwanden-Elm.**

Sheffield, Eng.—The Equipment of the Sheffield Electric Tramway System. A. L. C. Fell. Read before the Northern & Midland Co.'s Assn. Illustrates and describes points of interest in the equipment. 2700 w. Tram & Ry Wld—May 9, 1901.

See also **Maintenance.**

Sicily.—Electric Railway Possibilities in Sicily. Cesare Pio. An account of the schemes for electric traction developing in this island, where no tramways have ever been laid. 1300 w. St Ry Jour—Dec. 1, 1900.

Siemens & Halske.—See Berlin; **AUTOMOBILE, TROLLEY; ELEVATED RAILWAY—Berlin; TROLLEY AUTMOBILE.**

Singapore.—A British Enterprise in the Far East. An illustrated description of the electric tramways in Singapore. 2200 w. Tram & Ry Wld—Dec. 7, 1905.

Single-Phase.—Single-Phase Equipment for Washington, Baltimore & Annapolis Interurban Railway. Brief description of the equipment with single-phase alternating-current apparatus. 900 w. St Ry Jour—Sept. 13, 1902.

An Electric Traction System Employing Single-Phase Alternating Current. Gives the paper describing this new system, presented by B. G. Lamme, at the recent meeting of the Am. Inst. of Elec. Engrs., with editorial comment. 5300 w. Eng News—Oct. 2, 1902.

Single-Phase Electric Railway System. B. G. Lamme. Read at meeting of the Am. Inst. of Elect. Engrs. A description of the new high-speed electric line extending from the suburbs of Washington to Baltimore, with a branch to Annapolis. 8000 w. Elec Wld & Engr—Oct. 4, 1902.

Single-Phase Railways. Discussion of paper by B. G. Lamme entitled "Washington, Baltimore and Annapolis Single-Phase Railways." 10,000 w. Trans Am Inst of Elec Engrs—Nov., 1902.

A New Single-Phase System of Electric Traction. Brief illustrated description of the Westinghouse installation for the Baltimore, Washington & Annapolis Electric Ry. 2000 w. St Ry Rev—Aug. 20, 1903.

Application of Single-Phase Alternating-Current for Traction and Railway Service. B. G. Lamme. Discusses the commutator type of single-phase motors and their advantages. Also editorial. 6700 w. St Ry Jour—Dec. 26, 1903.

Single-Phase Electric Traction (Traction Electrique avec Moteurs Monophasés). E. Dieudonné. A review of recent experiments in Europe and America. 2000 w. Revue Technique—Jan. 10, 1904.

Single-Phase Car Equipment at East Pittsburg. Illustrates the truck and car in operation on the Interworks Railway of the Westinghouse Co. 800 w. St Ry Jour—Jan. 23, 1904.

Single-Phase Railways. W. A. Blanck. Considers the fundamental characteristics of various single-phase railway motors, details of line construction, and comparative cost of direct-current and alternating-current systems. Ills. 3500 w. Trans Am Inst of Elect. Engrs—Feb. 15, 1904.

Single-Phase Electric Railways (Ueber Einphasenbahnen). Dr. Friedrich Eichberg. An address before the Vienna Elektrotechnischen Verein, reviewing the recent successful applications of single-phase railway motors. Two articles. 5000 w. Zeitschr f Elektrotechnik—Feb. 28, March 6, 1904.

The Westinghouse Single-Phase Railway System. Clarence Renshaw. An illustrated detailed description of the various features of the system, and its advantages as compared with the present direct-current system. 4000 w. Elec Club Jour—April, 1904.

Compensated Motor Railway Equipment of the General Electric Company. Illustrated description of electric motors and other equipment of a new single-phase road, the Ballston division of the Schenectady railway. 1600 w. Elec Wld & Engr—Aug. 27, 1904.

Transmission and Distributing Problems Peculiar to the Single-Phase Railway. Paul M. Lincoln. Discusses maximum economy, voltage drop, insurance against accident, mechanical considerations and avoidance of undue multiplicity of stations. 2400 w. Int Elec Cong of St. Louis—Sept., 1904.

The Westinghouse Single-Phase A. C. Railway System for Interurban Service. Brief, illustrated description of the system of control and wiring as used at present. 2400 w. St Ry Jour—Nov. 5, 1904.

Single-Phase Line Construction. Theodore Varney. Illustrates and describes features developed with the view of making this high voltage system thoroughly safe and reliable with a minimum cost. 1100 w. Elec Club Jour—April, 1905.

A New Single-Phase Railway Equipment. A. Frederick Collins. Reviews some of the three-phase alternating current systems of Europe and gives an illustrated description of the single-phase alternating current equipment of the General Electric Company. 1700 w. Sci Am Sup—April 22, 1905.

Car Equipment of the Indianapolis & Cincinnati Traction Company. Illustrated description of the cars of this single-phase line. 1100 w. Ry Age—June 2, 1905.

The Single-Phase Railway System, Its Field and Its Development. Charles F. Scott. Reviews briefly the status of electric railway engineering just prior to the announcement of the single-phase railway motor, and the engineering evolution of the system since that time. 2200 w. Elec Jour—July, 1905.

The Development of the Single-Phase Railway System. Gives a table of lines using or proposing to use the Westinghouse system of single-phase railway traction, and describes the apparatus employed and the general manner of operating the Indianapolis and Cincinnati Railway. Ills. 2000 w. Engng—July 28, 1905.

The Single-Phase Railway in Practical Operation. Gives an account of the operating experience of three equipments of this kind which have been in regular service some months. Ills. 4000 w. Elec Wld & Engr—Sept. 23, 1905.

The Single-Phase Railway System. Charles F. Scott. Read before the Am. Ry. Mech. & Elec. Assn. Presents the important features of this system, and the results of the work accomplished in developing apparatus to meet the demands in electric traction. 4000 w. St Ry Jour—Sept. 30, 1905.

The Single-Phase Railway. M. P. Randolph. Read at the Portland exposition congress. Describes the particular features of the alternating-current series motor, also details of the car equipment, and other matters relating principally to interurban service. 4000 w. Jour of Elec—Oct., 1905.

Electric Traction by Single-Phase Alternating Currents (Traction Electrique par Courant Alternatif Monophase). M. Auvert. Describing a system in which the alternating current is converted into a continuous one by a rectifier carried on the locomotive. 7000 w. 1 plate. Rev Gen de Chem de Fer—Oct., 1905.

"The Single-Phase Railway" and "Electric Railway Equipment." Abstract of a paper by W. B. Potter, and abstract of a discussion of both Mr. Scott's and Mr. Potter's papers. 4500 w. Elec Rev, N Y—Oct. 28, 1905.

Tests of Interurban Single-Phase Equipments. Graham Bright. Describes methods of testing, reporting tests taken recently. 1500 w. Elec Jour—Nov., 1905.

Development of Heavy Electric Traction. Discusses the subject as applicable to suburban service, favoring single-phase traction not only for long-distance lines, but for heavy suburban traffic. 1500 w. Elec Rev, Lond—Nov. 17, 1905.

The First American Single-Phase Railway in Commercial Operation; The General Electric System on the Ballston Line of the Schenectady Ry. Co. Illustrated description of line, cars and apparatus. Also, editorial. 4500 w. Eng News—Aug. 25, 1904. Also R R Gaz—Vol. XXXVII., No. 11.

See also Alternating Current; Arnold Electro-Pneumatic; Blankenese-Ohlsdorf; Borinage; Indianapolis & Cincinnati; London-Brighton; Milan; Murnau-Ober Ammergau; Oerlikon Experiments; Polyphase vs. Single-Phase; Rome-Castellana; Sea Cliff-GlenCove, L. I.; Spindlersfeld-Niederschöneweide; Stubai Valley, Austria; Ward Leonard; ELECTRIC CAR; ELECTRIC LOCOMOTIVE; ELECTRIC MOTOR; TRANSFORMER—Auvert-Ferrand.

Single-Phase, Europe.—Single-Phase Electric Railway Work in Europe. A summary of the remarks of C. O. Mailloux on some investigations he had made in Europe on alternating-current railway work, contributed in the discussion of the paper by Prof. A. S. McAllister. Ills. 6600 w. St Ry Jour—Nov. 26, 1904.

Single-Phase, Illinois.—The Bloomington, Pontiac & Joliet Single-Phase Electric Railway. John R. Hewett. Illustrated detailed description of the first line of single-phase current opened for public service in the United States. 2800 w. St Ry Jour—May 6, 1905.

General Electric Single-Phase Railway. Illustrated description of details of the single-phase system between Pontiac and Odell in Illinois. 1000 w. Elec Wld & Engr—May 6, 1905.

Single-Phase vs. Direct.—Single-Phase Electric Traction. W. Perren Maycock. A comparison of the single-phase and direct-current methods, discussing the advantages of the former. 1800 w. Trac & Trans—March, 1904.

The Continuous-Current System and the Single-Phase System for Traction. H. M. Hobart. A defense of the continuous-current system is given in the present article. Serial. 1st part. 2200 w. Elec Rev, Lond—April 29, 1904.

Single-Phase v. Continuous Current for Traction Purposes. Editorial discussion of the merits of a well-designed single-phase system as compared with the continuous current. 2000 w. Engng—Nov. 24, 1905.

An Unprecedented Railway Situation. Frank J. Sprague. Analyses the conditions which will be brought about by an attempt to utilise a. c.—d. c. locomotives in the present d. c. zone of the New York Central & Hudson River R. R. Co., outlining the situation and discussing both electrical and operating features. 5000 w. St Ry Jour—Oct. 21, 1905.

The Single-Phase Alternating and the Direct-Current Systems. A letter from Mr. George Westinghouse setting forth the advantages of the single-phase alternating system, and giving also letters to President Newman of the N. Y. C. R. R. from Mr. Westinghouse, and to Mr. E. M. Herr, from B. G. Lamme. 5200 w. R R Gaz—Vol. XXXIX., No. 25.

The Electrical Equipment for the New York Central. Interesting letters on this subject from Mr. George Westinghouse and B. G. Lamme. 600 w. Elec Wld & Engr—Dec. 30, 1905.

See also ELECTRIC MOTOR.

Single Rail.—See SINGLE RAIL; SUSPENDED RAILWAY.

Sofia, Bulgaria.—Electric Tramways of Sofia. Illustrated description of tramways operated by means of a high tension water power station with low tension steam power station for reserve. 1400 w. St Ry Rev—Feb. 20, 1904.

South Africa.—See **Cape Town.**

South Covington & Cincinnati.—Improvements on a Kentucky System. An illustrated detailed description of recent improvements in the system of the South Covington & Cincinnati Street Ry. Co. 1700 w. St Ry Jour—Dec. 19, 1903.

Southend-on-Sea, Eng. — Southend-on-Sea Electric Tramways. Illustrated detailed description of a recently opened electric tramway. 1400 w. Tram & Ry Wld—Sept. 12, 1901.

Southport.—See **Liverpool-Southport.**

South Wales and Bristol.—The South Wales and Bristol Direct Railway. Information and description of the leading characteristics of this line. Ill. 2800 w. Transport—Jan. 2, 1903.

Speed.—Schedule Speeds on Electric Railways. W. Park. A study of the maximum schedule speed, and things affecting it. 1100 w. Tram & Ry Wld—March 12, 1903.

See also **STREET RAILWAY MANAGEMENT.**

Speed-Time Curves.—The Relation of Energy and Motor Capacity to Schedule Speed in the Moving of Trains by Electricity. Cary T. Hutchinson. A general solution of the question involved in the movement of a body from rest to rest, covering all cases that can arise in ordinary practice of train movement. 5700 w. Trans Am Inst of Elec Engrs—Feb., 1902.

The Selection of Electric Motors for Railway Service. W. B. Potter. Discussing the paper of Dr. Cary T. Hutchinson, pointing out some variations from the average met with in the practical consideration of motor selection. 2500 w. Trans Am Inst of Elec Engrs—Feb., 1902.

The Relation of Energy and Motor Capacity to Schedule Speed in the Moving of Trains by Electricity. Discussion of Dr. Cary T. Hutchinson's paper. Plates. 12300 w. Trans Am Inst of Elec Engrs—June & July, 1902.

Notes on the Plotting of Speed-Time Curves. C. O. Mailloux. The object of the paper is to facilitate the use of speed-time curves of electric railways as a "method of precision." 14800 w. Trans Am Inst of Elec Engrs—June 19, 1902.

Notes on the Plotting of Speed-Time Curves. C. O. Mailloux. Notes of theoretical and practical observations bearing upon the analysis of the speed-time curve, or the study of its characteristics, and upon its synthesis, or the principles involved in plotting it, with a view to facilitating its use as a "method of precision." 27600 w. Trans Am Inst of Elec Engrs—Aug. & Sept., 1902.

Papers by A. H. Armstrong, W. B. Potter, and B. J. Arnold, and by C. O. Mailloux and B. J. Arnold, at Great Barrington, Mass. Papers on electric railways. 4000 w. Trans Am Inst of Elec Engrs—Aug. & Sept., 1902.

A Graphical Method of Making Time-Speed Curves. Walter S. Valentine. Describes a method devised by the writer which greatly facilitates the construction of these curves. 1400 w. St Ry Jour—Sept. 6, 1902.

Graphical Determination of Speed, Current, and Motor-Load from the Motor Diagram (Graphische Ermittelung von Geschwindigkeit, Stromverbrauch und Motorbelastung Elektrischer Fahrzeuge aus dem Motordiagramm). R. Mauermann. A description of the use of power, current, and velocity curves in proportioning a projected electric tramway installation. 3000 w. Elektrotech Zeitschr—Jan. 8, 1903.

Determination of the Performance of Electric Tramways in America (Bestimmung der Leistung von Elektrischen Bahnmotoren in den Vereinigten Staaten von Amerika). Fr. Gutbrod. An examination of the graphical methods of plotting railway performances by curves. Two articles, 8000 w. Zeitschr d Ver Deutscher Ing—Dec. 19, 26, 1903.

Predetermination in Railway Work. F. W. Carter. Gives a method of determining performance of the ordinary continuous current railway motor, or motors having similar characteristics. 5500 w. Trans Am Inst of Elec Engrs—July, 1903.

Plotting of Speed-Time and Speed-Distance Curves from the Acceleration Speed-Curve. L. A. Freudenberger. An extension of the method of Mailloux for plotting curves for the construction of railway schedules from predetermined data. 1200 w. Elec Wld & Engr—Aug. 8, 1903.

The Numerical Computation of the Acceleration Curves for Electric Railways (Rechnerische Bestimmung der Anfahrlinien Elektrischer Vollbahnen). Dr. W. Kummer. A derivation of the mathematical formulas, and their application to concrete examples. 2500 w. Schweiz Bauzeitung—Dec. 17, 1904.

See also **Acceleration Tests; AUTOMOBILE, ELECTRIC; ELECTRIC MOTOR—Heating.**

Spindlersfeld-Niederschöneweide. — An Important Step in Electric Traction. Information concerning an experiment in progress on a suburban line near Berlin. The trial of a new motor, invented by an Austrian electrician, deriving its energy from a single-phase alternating current of 6,000 volts, delivered directly to the motor, apparently with entire success. Ill. 700 w. U S Cons Repts, No. 1769—Oct. 8, 1903.

The Single-Phase Railway System of the Union Elektrizitäts-Gesellschaft (Das Einphasen-Bahnsystem der Union Elektrizitäts-Gesellschaft). Dr. Friedrich Eichberg. Describing especially the experimental work on the Nieder-Schöneweide-Spindlersfeld experimental line. 2500 w. Zeitschr d Ver Deutschr Ing—Feb. 27, 1904.

Single-Phase Electric Traction (La Traction par Courant Alternatif Simple). An illustrated account of the Spindlersfeld-Niederschöneweide line, describing the Winter-Eichberg motor, with diagrams of tests. 1800 w. Génie Civil—Oct. 8, 1904.

See also **Single-Phase; ELECTRIC MOTOR—Winter Eichberg.**

Spokane, Wash.—Electric Railways in and About Spokane. An illustrated article giving information of interest relating to the lines receiving power from the Washington Water Power Co. 3000 w. St Ry Rev—Aug. 15, 1905.

Sprague.—Some Personal Notes on Electric Railways. Frank J. Sprague. Interesting notes relating to the Union City Railway of Richmond, 1887, and the South Side Elevated of Chicago, 1897. 2800 w. Elec Rev, N Y—Feb. 15, 1902.

See also **Multiple-Unit; N. Y. Central; Single-Phase vs. Direct.**

Springfield-Piqua.—The Springfield, Troy and Piqua Electric Railway. An illustrated detailed description of a fine interurban line in Ohio, and its equipment. 5500 w. St Ry Jour—July 23, 1904.

The Springfield, Troy & Piqua Railway Co. Illustrated description of the line, power house and sub-station equipments and rolling stock of a recently opened Ohio interurban electric railway. 3000 w. St Ry Rev—Aug. 20, 1904.

Standards.—Report of the Committee on Standards. Gives the report adopted by the American Street Railway Association, Detroit, Oct. 10, 1902. Ill. 2200 w. St Ry Jour—Nov. 15, 1902.

See also **ELECTRIC APPARATUS.**

Stansstadt-Engelberg.—The Stansstadt - Engelberg Three-Phase Electric Railway. Illustrates and describes features of interest on this line. 700 w. Tram & Ry Wld—June 12, 1902.

Staten Island, N. Y.—See **ELECTRIC STATION.**

Station Indicator.—See **STATION INDICATOR.**

Steam Combined.—Electric Cars on Steam Railroads. E. A. Evans. Read before the Canadian Elec. So. Showing that steam trains and electric cars can be operated on the same track with advantage. 1200 w. St Ry Jour—June 28, 1902.

Methods of Dealing with Mixed Systems of Traction. A. L. C. Fell. Read before the Liverpool Cong. of the Munic. Tram. Assn. of Gt. B. Considers temporary mixed traction during reconstruction; mixed traction under normal conditions; and mixed traction in connection with running powers. 2000 w. Elec Engr, Lond—Oct. 7, 1904.

Steam Compared.—Electric Traction on Railways (La Trazione Elettrica nelle Ferrovie). D. Civita. A general discussion as to the practicability of the introduction of electric traction on main line railways. Three articles, 6000 w. Elettricita—Nov. 17, 24, Dec. 8, 1900.

On the Supersession of the Steam by the Electric Locomotive. W. Langdon. Read before the Inst. of Elec. Engrs. Considers the question to be mainly a matter of economy. Serial. 1st part. 3000 w. Elec Engr, Lond—Nov. 30. 1900.

The Electrical Working of Main Line Railways. Ernest Kilburn Scott. A discussion of paper by W. Langdon, on "The Supersession of the Steam by the Electric Locomotive," read before the Inst. of Elec. Engs., England. 1600 w. Elec Rev, Lond—Dec. 7, 1900.

Electrical Locomotives and Multiple-Driven Axles. Edward H. Tyler. Concerning the circumstances that must determine which is the better system. 2200 w. Engng—Dec. 21, 1900.

Electric Traction for Heavy Railway Service. Edward P. Burch. The purpose of the paper is to show the present status of electric-railway engineering and to give reasons why the electric motive power will supplant the steam locomotive for heavy railway service. 5600 w. Engs' Year Bk, Univ of Minn—1901.

Electric Traction for Heavy Railway Service. Edward P. Burch. Read before the Northwest Ry. Club. Shows the present standing of electric-railway engineering, and gives reasons why electric motive power will supplant the steam locomotive for heavy service. 5000 w. St Ry Rev—Jan. 15, 1901.

Electricity v. Steam for Heavy Railway Service. L. D. Tandy. A comparison of lines in operation in the United States, showing the advantages over steam and the saving in operating expenses. Ill. 5000 w. Tram & Ry Wld—May 9, 1901.

Standard Gauge and High-Speed Electric Railways (Ueber Elektrische Voll- und Schnellbahnen). Max Schiemann. A discussion of the problem of the application of electric driving to main line railways, in view of what has already been accomplished in tramways. 4500 w. Elektrotech Zeitschr—July 25, 1901.

The Supersession of the Steam Locomotive. W. E. Warrilow. Discusses the scheme proposed by Mr. Langdon in his paper "The Supersession of the Steam by the Electric Locomotive," and does not favor the conversion of the steam railway to the electric, and says inventive energy should be directed toward aeronautics. 2800 w. Elec Engr, Lond—Aug. 16, 1901.

Electricity as a Motive Power on Railways. Prof. C. A. Carus-Wilson. Read before the Glasgow Congress. Deals with the economic considerations governing the substitution of electricity for steam as a motive power on railways. 2700 w. Engng—Sept. 6, 1901.

High-Speed Electric Railway Traction. C. A. Carus-Wilson. The present article gives an illustrated description of the cars and their equipment, and describes investigations thus far made. 1200 w. Elect'n, Lond—Nov. 1, 1901.

The Electric Motor in Competition with the Steam Locomotive. Editorial discussion of how far the electric motor has proved a success, and a review of several recent papers bearing on this subject. 2400 w. Eng News—Nov. 14, 1901.

The Electrification of Our Railways. Philip Dawson. Discusses this subject, especially the problem as related to suburban traffic. 2200. Elec Rev, Lond—Dec. 13, 1901.

Electric Railways (Les Chemins de Fer Electriques). Léon Gerard. A general review of electric traction of all kinds and comparisons between it and steam traction with classification tables of electric railways. Serial. 1st part. 5000 w. Mem Soc Ing Civils d France—March, 1902.

High Speed and Electric Operation on Standard Railways (Ueber Schnellbahnen und Elektrische Zugförderung auf Hauptbahnen). Hr. Wittfeld. A discussion before the Verein für Eisenbahnkunde, of the comparative merits of steam and electric traction. 7000 w. Glasers Ann—March 1, 1902.

Electric Traction on Main Lines. Editorial review of paper by E. Huber before the Zürich Assn. of Engrs. & Archts. 1800 w. Engng—April 11, 1902.

The Relative Efficiency of Electric and Steam Locomotives (Die Leistungsfähigkeit der durch den Elektrischen Strom und der durch Dampfkraft Betriebenen Lokomotiven). Hr. Beyer. A general discussion of electric vs. steam traction on standard railways. 1800 w. Glasers Annalen—July 1, 1902.

Competition Between Steam and Electric Railways in the United States. Daniel Royse. Comparing the advantages and disadvantages of the two classes of roads when they are competitors. 2200 w. Transport—July 4, 1902.

Electric Traction in Its Relation to Existing Railways. J. W. Jacomb-Hood. Read before the London & Southwestern Ry. Debating Soc. A discussion of the subject from the point of view of a practical railway operator. Considers the possible advantages of electricity over steam service, etc. Serial. 1st part. 3700 w. Transport—July 11, 1902.

Electric Problems of Main-Line Railway Traction. Charles T. Child. A thoughtful examination of the fundamental conditions of the problem, showing the limitations of modern electric motors for railway use. 2500 w. Engineering Magazine—August, 1902.

Electric Traction in Its Relation to Existing Railways. J. W. Jacomb-Hood. Extract from a paper read before the London and South-Western Ry. Debating Soc. Discusses mainly its application to suburban service, and the cost. 2000 w. Elect'n, Lond—Oct. 17, 1902.

Long-Distance Electric Railroading. Louis Duncan. Discusses the application of electricity to traction on tramways, suburban and interurban roads, and the field at present occupied by steam locomotives, reviewing the systems, and showing the methods now used are not applicable on steam roads, but thinks the problem will yet be solved. 3800 w. Tech Quar—Dec., 1902.

Electric Traction on Long Distance Railways. Alton D. Adams. Reviews what has been done in Europe and America to solve this problem. 2000 w. Sci Am—Dec. 13, 1902.

Electricity as a Motive Power on Trunk Lines. Cornelius Vanderbilt. Considers, in a general way, the reasons pro and con, drawing conclusions from an examination of the principles involved. 3000 w. N Am Rev—Dec., 1902.

Electricity as a Motive Power on Trunk Lines. C. L. de Muralt. A paper claiming to show that it would be a great advantage, both from an engineering and financial standpoint to have all trains propelled by electricity. A reply to the paper by Mr. Cornelius Vanderbilt. 3500 w. N Am Rev—May, 1903.

Electric Traction on Main Line Railways (Ueber Elektrische Zugförderung auf Normalen Eisenbahnen). Br. Böhm-Raffay. A discussion of the practicability of applying electric locomotives to main line service. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 19, 1902.

Electric Traction on Steam Railways. Alton D. Adams. Discusses the systems tried, their cost, advantages and disadvantages. 2200 w. Cassier's Mag—April, 1903.

I. High-Speed Electric Traction on Railways. J. W. Jacomb-Hood. II. The Position and Protection of the Third-Rail on Electric Railways. William E. Langdon. Two papers read at the Engng. Con. of the Inst. of Civ. Engrs. and discussed together. 4800 w. Elect'n, Lond—July 3, 1903.

The Electrification of British Railways. Reviews briefly what has been accomplished on the continent of Europe, and discusses the peculiar features of the problem in Great Britain. Maps. 5800 w. St Ry Jour—July 4, 1903.

Steam vs. Electric Traction for Main Line Railways (Vergleich swischen Dampf und Elektrischer Traktion auf Vollbahnen). E. Cserhâti. A discussion of the applicability of electric traction to main railways, based upon the experience with the Valtellina line in northern Italy. 4000 w. Glasers Annalen—Aug. 1, 1903.

A Comparison of Steam and Electric Railway Returns. H. D. Emerson. Calls attention to points of interest brought out by the recently issued bulletin of the United States Census Office. 1800 w. St Ry Jour—Aug. 8, 1903.

Steam or Electricity? (Dampf oder Elektrizität). Alfred Birk. A comparison of steam and electric power for the future attainment of high speed on main-line railways, showing the possibilities of the latter. 5000 w. Oesterr Monatschr f d Oeff Baudienst—Oct. 10, 1903.

Some Notes on Acceleration—Electric v. Steam. P. Walter d'Alton, and Dr. John Mannheim. A comparison of the systems, showing that speed and economy are in favor of electricity. 4400 w. Engr, Lond—Nov. 6, 1903.

New Conditions in the Machinery Business—Must the Locomotive Go? H. H. Lane. Discusses the effect on this business of the use of electric power on railways. 2000 w. Am Mach—Dec. 31, 1903.

The Future of Electric Traction on Main-Line Railways (Considerations sur l'Avenir de la Traction Electrique sur les Grandes Lignes de Chemins de Fer). R. Bonnin. A comparison of the results attained upon local and municipal railways with the requirements for main-line service. Two articles. 6000 w. Revue Technique—Jan. 10, 25, 1904.

The Railways and the Tramways. Editorial discussion of the attitude of the great railways toward the tramways. 2000 w. Engng—Feb. 19, 1904.

Electricity as a Substitute for Steam in Heavy Railroad Service. Arthur M. Waitt. Considers features relating to the practicability of the introduction of electricity on roads now using steam. 4800 w. Ry Age—March 4, 1904.

The Railway Electrification Problem. F. F. Bennett. Read before the Inst. of Elec. Engrs. Discusses the question as related to traffic in England and Wales. Serial. 1st part. 2000 w. Mech Engr—March 12, 1904.

Developments in Heavy Electric Traction. C. L. de Muralt. Discusses the alternating current systems in use, and the problems connected with the electrification of existing steam roads. 1500 w. R R Gaz—April 15, 1904.

Application of Electricity to Steam Roads. Prof. L. S. Randolph. Paper before the Richmond Ry. Club. Discusses the advantages and disadvantages of the electrical system. 4500 w. Ry & Engng Rev—July 30, 1904.

Application of Electricity to Steam Roads. L. S. Randolph. Paper before the Richmond Railroad Club, containing a general discussion of the subject. 4000 w. Elec Rev, N Y—Aug. 13, 1904.

Electrification of Steam Railways in England. Philip Dawson. General discussion. 2000 w. Ry Age—Aug. 19, 1904.

President's Address. Bion J. Arnold. Address at the St. Louis meeting discussing how to determine the dividing line between steam and electricity in railway operation. 3300 w. Trans Am Inst of Elec Engrs—Oct., 1904.

The Application of Electricity to Steam Railroads. Bion J. Arnold. Extracts from the President's address before the International Electrical Congress, St. Louis. 2500 w. R R Gaz—Vol. XXXVII., No. 17.

The Electrification of Steam Railways. F. F. Bennett. An endeavor to show that electrification of railways would be remunerative in thinly populated districts, as well as thickly populated, if the various companies would combine. 7800 w. Public Works—Oct. 15, 1904.

The Substitution of Electricity for Steam as a Motive Power. Abstract of a paper by Alexander Siemens, before the Int. Engng. Cong. A statement of conclusions reached thus far from the experimental work on the line between Marienfelde and Zossen. 2000 w. R R Gaz—Vol. XXXVII., No. 18.

Electrification of Railways. A statement showing the great increase in tramway passengers carried in the United Kingdom since the introduction of electricity, with a comparison of the positions of the railways and tramways, and conclusions. 1700 w. Elec Rev, Lond—Oct. 28, 1904.

The Application of Electricity to Steam Roads. L. S. Cass. Gives results from practice on 80 miles of track over which are operated electric street cars, electric interurban cars, electric switch engines, and standard and Mogul steam locomotives. Discussion. 3800 w. Pro Iowa Ry Club—Dec. 12, 1904.

Some Notes on High-Speed Electric Railway Work. F. W. Carter. Read before the Rugby Engng Soc. Considers in a general way the problem of operating high-speed passenger trains making few stops. 2800 w. Prac Engr—Dec. 16, 1904.

High-Speed Electric Railway Work. F. W. Carter. Read before the Rugby Engng. Soc. Discusses the conditions of actual service; heavy trains taking power almost continually, train resistance, speed, &c., stating conclusions. 1600 w. Mech Engr—Dec. 24, 1904.

Discussion on "Problems of Heavy Electric Traction." Discussions at New York, and at Pittsburg, of the paper by Messrs. Lyford and Smith. 13000 w. Pro Am Inst of Elec Engrs—Jan., 1905.

Why Steam Locomotives Must Be Replaced by Electric Locomotives for the Heaviest Freight Service. H. Ward Leonard. Presents facts and arguments tending to show that the electric locomotive will, because of its great economic superiority, replace steam locomotives for the heaviest freight traffic. 4500 w. Elec Wld & Engr—Jan. 7, 1905.

Developments in Electric Traction. W. B. Potter. Compares alternating and direct current systems, gives statistics of steam and electric operation, describes recent equipment, and other features of interest pertaining to electric traction. General discussion. Ills. 19400 w. Pro N Y R R Club—Jan. 20, 1905.

Development in Electric Traction. Discussion of paper presented by W. B. Potter at the Jannuary meeting. 11800 w. Pro N Y R R Club—March 17, 1905.

The Electrification of Trunk Lines. L. R. Pomeroy. A study of the comparative cost of operating, and the cost of installation. 4800 w. R R Gaz—Vol. XXXVIII., No. 20.

Electricity vs. Steam for Heavy Haulage. A. H. Armstrong. An inquiry into the limitations of steam locomotives, and comparing with the tests made upon the electric locomotives designed for the N. Y. C. R. R. 3500 w. St Ry Jour—May 6, 1905.

The Attitude of the Steam Roads. Louis Bell. Discusses some phases of the present situation in railway operation. 2000 w. St Ry Jour—May 6, 1905.

Electric Traction on Railways. Discusses the main points which are essential for success of electric traction on the railways, and reviews briefly the various alternating-current motors which have been tried on a large scale. 6000 w. Engng—May 26, 1905.

Heavy Traction Problems in Electrical Engineering. Carl L. de Muralt. Considers only problems relating to traction on through lines. 9000 w. Am Inst of Elec Engrs—June, 1905.

Choice of Motors in Steam and Electric Practice. William McClellan. Discusses railway motive power and speaks of lack of systematic classification of locomotives and electric motors. 4 tables of locomotive data. 2500 w. Am Inst of Elec Engrs—June, 1905.

Electric Railway Developments. Prof. Horace T. Eddy. A general review of developments, especially of interurban lines, and the displacement of steam equipment. 2500 w. Sci Am—July 8, 1905.

Electrification of Railways. H. W. Wilson. Read before the Liverpool Engng. Soc. Outlines various methods of electrical operation of railways and considers their adaptability to varying conditions. Serial. 1st part. 5000 w. Mech Engr—Sept. 30, 1905.

Electric Traction for Railroad Service. J. A. Shaw. Read before the Can. Ry. Club. Discusses the advantages of electricity over steam, the systems at present available for heavy electric traction, and the merits of each. 3500 w. Eng Rec—Oct. 14, 1905.

English Electric Railway Practice. Particulars regarding features of recent permanent way and conductor rail work on roads changed from steam to electric traction. Ills. 2300 w. Prac Engr—Nov. 3, 1905.

Heavy Electric Railroading. Bela Valatin. A comparison of the direct current, the single-phase, and the three-phase systems, particularly for installations to be used for moving heavy train units, and where electricity is to replace the steam locomotive. 3000 w. Elec Wld & Engr—Nov. 18, 1905.

See also **Acceleration Test; Berlin-Lichterfelde; Burnley; Freight; German Main Lines; High Speed; Hudson Valley; International Ry. Congress; Italy; Long Island; N. Y. Central; N. Y., N. H. & H.; Oerlikon; Polyphase; Sweden; Switzerland; Third Rail; Zossen; ELECTRIC RAILWAY SHOP; ELECTRIC STATION—Railway; LIGHT RAILWAY.**

Steam Competition.—Some Relations Between Electric and Steam Roads. Editorial discussion of relations brought about by the developments of electric traction; some of the difficulties encountered, and the conditions in New York City are discussed. 3000 w. St. Ry Jour—March 2, 1901.

Competition of Steam vs. Electric Parallels. C. H. Davis. Read before the Canadian Soc. of Civ. Engrs. Showing that it is the created or induced traffic of electric roads and not that taken from parallel steam roads, which makes their success, and that if the same methods were applied to steam roads the results would be the same or greater. 4200 w. St Ry Jour—March 29, 1902.

Railway and Tramway Competition in England. W. M. Acworth. A discussion of conditions in England, the reasons why competition has not become serious sooner, the policy to be adopted, &c. 2300 w. Ry Age—May 20, 1904.

Electric Railway Competition. Ray Morris. A study of the effect of interurban roads on short-haul passenger traffic, giving the reports of conditions on various lines, and discussing questions bearing on the subject. 4500 w., R R Gaz—Vol. XXXVIII., No. 19.

See also **Connecticut; Massachusetts.**

Sterling & Eastern, Ill.—Sterling, Dixon & Eastern Electric Railway. Illustrated description of this line along the Rock River, in Illinois. 2500 w. St Ry Rev—Nov. 20, 1904.

Steubenville, O.—The Railway System of the Steubenville Traction & Light Co. Illustrates and describes this company's system and power house which includes a gas-producing plant, an electric lighting plant, and an electric traction plant. 6500 w. St Ry Rev—Feb. 20, 1904.

Stopping Effect.—See **STREET RAILWAY MANAGEMENT.**

Storage Battery.—See **Paris-Arpajon; ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY, ACCUMULATOR; STORAGE BATTERY.**

Stray Currents.—See **STRAY CURRENTS.**

Stubai Valley, Austria.—The Stubai Valley Railway (Die Stubaitalbahn). Illustrated account of a single-phase electric railway between Innsbruck and Fulpmes, in the Tyrol, with data as to operating costs. 2000 w. Elektrotech Zeitschr—Feb. 16, 1905.

The Stubaital Single-Phase Railway. Illustrated detailed description of this single-phase current railway in Austria. 1100 w. Elect'n, Lond—May 5, 1905.

The Stubai Valley Railway. Egon E. Seefehlner, in "Elektrische Bahnen und Betriebe." Illustrated description of the first line equipped for working with single-phase alternating current of high tension and frequency, which has been in satisfactory operation for 15 months. Serial. 1st part. 3000 w. Elec Engr, Lond—Dec. 29, 1905.

Sub-Station.—See **ELECTRIC SUB-STATION—Railway.**

Suburban Development.—The Development of Suburban Territory. J. C. Brackenridge. Shows the effect of the trolley roads on the property through which they pass, and the tendency to seek suburban homes when they are accessible. Ill. 2500 w. St Ry Jour—Oct. 5, 1901.

Sunderland, Eng.—Sunderland District Tramways. Illustrated description of a system serving a moderately populated district. 2200 w. Tram & Ry Wld—July 13, 1905.

Surface Contact.—See **ELECTRIC RAILWAY, CONTACT.**

Sutton and Howth.—The Sutton and Howth Tramway. Illustrated description of a line which gives a fine view of Dublin Bay. 1800 w. St Ry Jour—Aug. 2, 1902.

Swansea, Wales.—Swansea Electricity Undertaking and Tramway Department. C. A. L. Prusmann. Briefly describes the pump-room, boiler-house, economiser shed, engine-room, battery-room, feeders and distributing mains, equipment, &c. Ills. 3000 w. Elec Engr, Lond—July 28, 1905.

Sweden.—The Adoption of Electric Traction on the Swedish State Railways. R. Dahlander. Abstract of a report made to determine whether electric traction was advisable under the conditions existing, and the limited traffic. 5300 w. Bul Internat Ry Cong—Aug., 1903.

Switzerland.—Electric Traction on the Main Railway Lines of Switzerland (Elektrischer Betrieb auf den Schweizerischen Hauptbahnen). L. Thormann. A study of the possibility of operating the main Swiss railways by electricity, using water power plants. Serial. Part I. 2000 w. Schweizerische Bauzeitung—Nov. 9, 1901.

Electric Traction on the North-Eastern Railway of Switzerland (Elektrische Betriebssysteme bezogen auf das Netz der Ehemaligen Nordostbahn). L. Thormann. A discussion of the availability of continuous three-phase and single-phase systems for the Swiss railways. Serial. Part I. 2000 w. Schweiz Bauzeitung—Nov. 15, 1902.

See also **Alstaetten; Bex; Bremgarten; Burgdorf; Fribourg; Germany and Switzerland; Gruyeres; Lausanne; Montreux; St. Gall; Schaffhausen; Schwanden; Stansstadt; HYDRO-ELECTRIC PLANT.**

Sydney, Australia.—The Electric Railway in Sydney. An illustrated detailed description of the largest and most complete electric railway system in Australia. 3300 w. St Ry Jour—Dec. 6, 1902.

The Electric Tramways of Sydney. An illustrated description of the fine system of tramways constructed and maintained by the State of New South Wales. 3000 w. Tram & Ry Wld—July 9, 1903.

Electric Traction in Sydney, New South Wales. Arthur C. W. Webb. An illustrated detailed description. 3300 w. Elec Wld & Engr—Aug. 29, 1903.

Sydney's Tramway System. An illustrated article giving an historical review of its growth and progress, fully describing the present electric system, the power, rolling stock, traffic, financial condition, &c. 15800 w. Aust Min Stand—May 19, 1904.

Syracuse, N. Y.—Street Railway Evolution in Syracuse. E. G. Connette. An account of how the improved conditions in this city were brought about. 2500 w. St Ry Jour—July 6, 1901.

The Street Railway System of Syracuse, N. Y. An illustrated description of improvements which have greatly increased the efficiency of the road, with report of operation. 4200 w. St Ry Jour—May 3, 1902.

See also **Auburn & Syracuse; Rochester & Eastern; STREET RAILWAY MANAGEMENT.**

Tangential Traction.—Tangential Traction. Translation of an article from the "Madrid Mining Review" on a system of electric traction. 1100 w. U S Cons Repts, No. 1214—Dec. 14, 1901.

Tangential Traction. An explanation of a new system of electric traction invented by two young Russian engineers, and based upon the direct application of polyphase currents. Serial. 1st part. 2400 w. Elec Rev, Lond—Aug. 21, 1903.

See also **Magnetic Polyphase.**

Terminal Problems.—See **Interurban and City; BRIDGE TERMINAL; ELECTRIC RAILWAY STATION; ELECTRIC RAILWAY TERMINAL; ELECTRIC RAILWAY YARD; RAILWAY TERMINAL.**

Terre Haute, Indiana.—The Street and Interurban Railway System at Terre Haute, Indiana. States the conditions which have led to the rapid increase in population in this district, and gives an illustrated description of the street and interurban railway development. 6500 w. St Ry Jour—Feb. 4, 1905.

Testing.—See **Indiana; Valtellina; ELECTRIC CAR.**

Third Rail.—Third-Rail Interurban Railways. Maurice Hoopes. Read at the Rochester meeting of the New York State St. Ry. Assn. States the reasons why third-rail construction is preferable to the trolley where its use is possible, compares cost, notes its disadvantages, and commends the system for a large class of roads. 3700 w. St Ry Rev—Sept. 15, 1901.

The Third Rail for High-Speed Electric Service. Ernest Gonzenbach. Discusses interurban railways having a schedule speed of 20 miles per hour and above, considering construction details, and related matters. General discussion. 10600 w. Jour W Soc of Engrs—April, 1903.

See also **Baltimore & Ohio; Berlin-Lichterfelde; Columbus, O.; Hudson Valley; Jackson & Battle Creek; Lackawanna; Liverpool-Southport; Milan-Gallarate; Paris-Orleans; San Francisco-San Rafael; Scioto Valley, O.; Varese, Italy; Wilkesbarre & Hazleton; ELEVATED RAILWAY; RAIL CONTACT; THIRD RAIL; UNDERGROUND RAILWAY.**

Third Rail, Sleet.—See **THIRD RAIL—Sleet Removal.**

Three-Wire.—The Three-Wire Feeder System of the Electric Railway between Nürnberg and Fürth (Die Stromversorgung der Nürnberg-Fürther Strassenbahn nach dem Dreileitersystem). Ph. Scholtes. With plan of the line and diagrams showing the change from the two-wire to the three-wire system. 2000 w. Elektrotech Zeitschr —May 25, 1905.

See also **Grenoble-Chapareillan; ELECTRIC DISTRIBUTION; ELECTRIC RAILWAY, ACCUMULATOR.**

Time—Speed Curves.—See **Speed—Time Curves.**

Tokio.—Tokio Street Railway and Foreign Capital. A draft of the agreement by which a British syndicate will supply the Japanese company with needed capital; also some information regarding the attitude of the Japanese to foreign capital. 1000 w. Engr, Lond—March 20, 1903.

The Tokio Metropolitan Railway. Describes in detail a new line, wholly in bank or viaduct, through the heart of the city. Ills. 2500 w. Engng—Nov. 11, 1904.

The Tokio Tramway Company. E. A. Baldwin. Brief illustrated description. 1000 w. St Ry Jour—Feb. 18, 1905.

Toledo, Ohio.—The Toledo Railway and Terminal Company. Map and illustrated description of the lines and equipment of this company. 1800 w. Ry Age—Sept. 11, 1903.

Toledo & Indiana.—The Toledo & Indiana Railway. Illustrated description of a recently opened extension from Wauseon to Bryan. 5500 w. St Ry Jour—Oct. 21, 1905.

Toledo & Western.—An Important Freight-Handling Road. An illustrated description of the methods adopted by the Toledo and Western Railway, an interurban line operating 68 miles of road. 2000 w. St Ry Jour—Nov. 29, 1902.

Equipment of the Toledo & Western Railway. An illustrated description of the track and line construction, rolling stock and power plant of this important interurban electric road in Ohio. 3500 w. St Ry Jour—Dec. 20, 1902.

Freight Development on the Toledo & Western Railway. Illustrated account of the growing freight business of an interurban electric railway in Ohio and Michigan. 3000 w. St Ry Jour—Sept. 2, 1905.

Toledo-Detroit.—Completion of the Interurban Link Between Toledo and Detroit. Illustrated description of the new construction from Monroe to Detroit. The total length of the system as now operated is 56 miles, the extension embracing 35 miles of the distance. 4500 w. St Ry Jour—Jan. 28, 1905.

Toledo, Fostoria & Findlay.—Interurban Road Through Ohio Oil Field. Illustrated description of the Toledo, Fostoria & Findlay Railway, and its operation. 2000 w. St Ry Jour—Sept. 27, 1902.

Toledo Interurban.—Permanent Way and Structures of the Toledo Urban and Interurban Railway. John S. Worley. Describes the construction of this road as an example of high grade work. Ills. 2800 w. Eng News—July 13, 1905.

Improvements to a Toledo Road. An illustrated account of the extensive improvements to the system of the Toledo, Bowling Green & Southern Traction Company. 5000 w. St Ry Jour—Aug. 12, 1905.

Toledo-Monroe.—The System of the Toledo and Monroe Railway. William S. Conant. Illustrates and describes this portion of a proposed line to connect the cities of Detroit and Toledo. 3500 w. St Ry Jour—Aug. 3, 1901.

Toledo-Port Clinton.—The Toledo, Port Clinton & Lake Side Railway. Illustrated detailed description of a line which has opened up territory in northern Ohio, hitherto without adequate transportation facilities. 3700 w. St Ry Jour—Dec. 30, 1905.

Topeka, Kan.—The Reconstruction of the Topeka Railway. An account of a thorough reconstruction of the physical equipment, and reorganization of operating methods which brought such an increase in net earnings as made the returns on the investment entirely satisfactaory. Ills. 2700 w. St Ry Jour—Nov. 11, 1905.

Topeka Railway Company. An illustrated description of the roadbed, shops, equipment, generating station and park. 4000 w. St Ry Rev—Nov. 15, 1905.

Toronto.—The Toronto Street Railway Agreement. Francis S. Spence. Read before the Toledo convention of the League of Am. Munic. Gives the history and the details of the agreement under which the company operates, explaining the situation. 3000 w. Munic Jour & Engr—Oct., 1905.

Toulon, France.—The Electric Tramways of Toulon. (Les Tramways Electriques de Toulon). P. Cafourier. With map of the line's views in the power house and a general account of the equipment. 2000 w. Génie Civil—Aug. 20, 1904.

Track.—See **Overhead Construction; TRACK.**

Trail Car.—See **ELECTRIC CAR—Trailer.**

Train Despatching.—See **Despatching; RAILWAY OPERATION.**

Train Resistance.—See **Acceleration; Speed-Time Curves; TRAIN RESISTANCE.**

Train Sheets.—The Use of the Train Diagram in Determining the Best Location of Power-House and Sub-Stations for Interurban Railways. Edward P. Roberts. An outline of the more usual factors to be considered in connection with the design of an interurban electric road, indicating something of the value of a train sheet. 5500 w. Stevens Ind—April, 1901.

Train Staff.—See **RAILWAY OPERATION.**

Trinidad, Colo.—Trinidad Electric Railroad Co. Illustrated description of the plant, roadbed, and rolling stock of the new urban and interurban lines recently put into operation in Trinidad, Colorado. 1000 w. St Ry Rev—May 20, 1904.

Trolley.—See **Overhead Construction; TROLLEY; TROLLEY WIRE.**

Trolley Wire.—See **Overhead Construction; ELECTRIC LINE; TROLLEY WIRE.**

Trunk Line.—See **Steam Compared; ELECTRIC LOCOMOTIVE.**

Tyneside, Eng.—The Tyneside Tramways and Tramroads. Brief illustrated description of this recently opened line. 3400 w. Elec Engr, Lond—Oct. 3, 1902.

Electric Traction on Tyneside. Illustrated description of the line and its equipment. 3000 w. Tram & Ry Wld—Nov. 13, 1902.

The Use of Electricity on the Northeastern Railway and Upon Tyneside. Charles H. Merz and William McLellan. Read before the British Assn. A short account of the most recent development in the use of electricity on Tyneside, indicating some of the main principles governing the cheap generation and distribution of electricity for industrial purposes. Ills. 2500 w. Engr, Lond—Sept. 9, 1904.

See also **Newcastle.**

Underground.—See **Danger; UNDERGROUND RAILWAY.**

United Power & Transportation Co.—System of the United Power & Transportation Company. Considers reasons which have brought about the practice of pooling the interests of roads having no physical connection, explaining the organization, and giving the amount of capital owned by the company named, with illustrated description of some of the property. 3500 w. St Ry Jour—May 4, 1901.

United States and Canada.—Street and Elevated Railway Mileage, Cars, and Capitalization in the United States and Canada. Table showing the standing for 1902, with remarks. 700 w. St Ry Jour—July 4, 1903.

Utica & Mohawk Valley.—The Utica & Mohawk Valley Railway. Illustrated description of an important electric railway system in Central New York. 9300 w. St Ry Rev—Oct. 20, 1903.

Valtellina, Italy.—Electric Traction on Main Line Railways (Der Elektrische Betrieb von Vollbahnen). Fr. Ross. With especial reference to the operation of the section of the Valtellina Railway, between Lecco and Chiavenna by electric locomotives, using the hydraulic power of the Adda. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—May 24, 1901.

The Valtellina Electric Railway (Chemin de Fer Electrique de la Valteline). H. Martin. A very full description of the three-phase high pressure system, as applied to 65 miles of main-line railway. 3500 w. 1 plate. Génie Civil—June 15, 1901.

The Ganz Electric Line of Valtellina. Illustrated description of a line representing the highest development of the Ganz three-phase high-tension system of electric traction. 800 w. Sci Am—June 29, 1901.

The Valtellina Electric Railway (Le Chemin de Fer Electrique de la Valteline). A general description of the application of three-phase electric traction to 106 kilometers of main railway between Lecco and Sondrio, Italy. The Ganz system is employed. 2000 w. Revue Technique —Aug. 10, 1901.

Some Features of the Valtellina Three-Phase Railway. Cesare Pio. Illustrated description of interesting features of a very successful line. 1600 w. Elec Wld & Engr—Nov. 1, 1902.

Electric Traction on the Valtelline Railway (La Trazione Elettrica sulle Ferrovie della Valtellina). E. Fumero. A very complete account of the road and its equipment and of the hydro-electric power station at Morbegno. 8000 w. L'Elettricita—Nov. 2, 1902.

Valtellina High-Tension Three-Phase Railway. An interesting account of this line which is exciting much interest, as it is testing the application of electricity to the conditions of steam roads, and may lead to the conversion to electric traction of all roads of Northern Italy. Ill. Serial. 1st part. 3000 w. Engr, Lond—Jan. 30, 1903.

The Operation of the Valtelline Railway by High Tension Polyphase Currents (Der Betrieb der Valtellina-Bahn mit Hochgespanntem Drehstrom). E. Cserhati & K. von Kando. A very complete account of the Valtelline electric railway, in which the Ganz polyphase system is used. Serial. Part I. 3000 w. Zeitschr d Ver Deutschr Ing—Feb. 7, 1903.

High Tension Polyphase Electric Traction as Applied on the Valtelline Railway (Traction par Moteurs Triphasés à Haute Tension (Systéme Ganz et Cie.) Appliquée sur la Ligne de la Valteline). D. Korda. An illustrated comprehensive article on the Valtelline electric railway in Italy, built on the Ganz tri-phase system, and a discussion of high tension polyphase traction in general. 10,000 w. Bull Soc Internationale des Electriciens—March, 1903.

Main-Line Polyphase Electric Traction in Upper Italy (Elektrische Vollbahn mit Hochespanntem Drehstrom in Oberitalien). E. Cserhati. A general illustrated description of the Valtelline railway, using the Ganz system. Two articles. 4000 w. Zeitschr f Elektrotechnik—Feb. 22, March 1, 1903.

The Electric Equipment of the Valtellina Railway in Upper Italy (Elektrische Einrichtung der Valtellina-Bahn in Ober-Italien). Eugen Cserhâti. A well illustrated description of this electric railway on the Ganz tri-phase system. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—March 27, 1903.

The Valtellina High-Voltage Polyphase Electric Railway (Die Valtellina-Hochspannungs-Drehstrom-Vollbahn). Eugen Cserhâti. An illustrated description of this electric railway near Lake Como, Italy, on the Ganz tri-phase system, and its power station, rolling stock, and overhead construction. Serial. 2 parts. 3500 w. Elektrotech Zeitschr—April 23 and 30, 1903.

The Valtellina Railway. An account of the circumstances under which the project was carried out, with detailed description of the plant. Ill. Serial. 2 parts. 1500 w. Elect'n, Lond—April 24 and May 1, 1903.

The Valtellina Electric Railway. Emile Guarini. An interesting account of the working of this line in Italy, and of the difficulties and trials, with related matter. 2700 w. Ry Age—May 29, 1903.

The Three-Phase Railway at Valtellina. An illustrated description of the electrical equipment and novel features of this Italian line, and its operation. 3500 w. St Ry Jour—May 30, 1903.

The Valtellina Electric Railway. An illustrated description of this line, which forms part of the Adriatic railway system in Italy. Serial. 1st part. 2800 w. Elec Rev, Lond—Oct. 2, 1903.

Experiences and Results with Polyphase Current on the Valtellina Railway (Erfahrungen und Ergebnisse mit Hochgespanntem Drehstrom auf der Valtellina Bahn). Eugen Cserhati. Results of the past two years' operation, showing the success of the line from a technical and commercial standpoint. 3500 w. Zeitschr d Ver Deutschr Ing—Jan. 28, 1905.

Two Years' Work on the Valtellina Electric Railway (Chemins de Fer Electriques de la Valteline—Résultats de Deux Ans d'Exploitation). An abstract of the report of the engineers to July, 1904. 1000 w. Génie Civil—Feb. 11, 1905.

Measurements on the Valtellina Railway (Messungen auf der Valtellina Bahn). M. Novi & A. Donati. Results of measurements, showing a consumption of energy of 48 watt-hours per ton-kilometer. On down gardes more than 50 per cent. of the energy of the train can be returned to the line. 2000 w. Elektrotech Zeitschr—Feb. 16, 1905.

The Valtellina Railway. An explanation of the conditions that led to the adoption of electric locomotives for this line, with much interesting information in regard to tests made and their general working; also a report of the working costs. 2600 w. Engr, Lond—May 5, 1905.

The Valtelina Railway. E. Cserhati. Discusses the working costs and test figures obtained with three-phase traction. 3500 w. Elec Engr, Lond—May 5, 1905.

The Valtellina Railway. E. Cserhâti. A summary of experience and results of tests of the working efficiency and other important features of three-phase railway working. 3500 w. Tram & Ry Wld—June 8, 1905.

Investigations of the Performance of Polyphase Traction on the Valtellina Railway (Versuchsergebnisse über Stromverbrauch und Rückgewinn auf der Valtellinabahn und einige Eigenheiten der Drehstromtraktion). Eugen Cserhâti. A detailed examination of the efficiency of polyphase traction with the new locomotives on the Valtellina railway. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—June 9, 1905.

Operating Results of the Valtellina Railway—Peculiarities of the Three-Phase Traction. Eugen Cserhati. Gives a summary of results in operating costs, curent consumption, recuperation of energy, energy consumption, fly wheel effect, etc. 3500 w. St Ry Jour—Aug. 26, 1905.

The Valtellina Line and the Electrical Operation of Railroad Main Lines. Theodore Köhn. Translated from the "Organ fuer die Fortschritte des Eisenbahnwesens." Introductory remarks with a comparison between three-phase and three-phase d.-c. operation for main lines are given in the present number. Serial. 1st part. 2700 w. R R Gaz—Vol. XXXVIII. No. 9.

The Ganz Three-Phase Electric Railway System. G. Leve. A discussion of the advantages and disadvantages of the three-phase motor, and information concerning the Valtellina line. Ills. 3800 w. R R Gaz—Vol. XXXVII., No. 16.

See also Ganz System; Italy; ELECTRIC ENGINEERING—Europe; ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY—Steam Compared.

Varese, Italy.—The First Third-Rail Electric Railway in Italy. Enrico Bignami. An illustrated description of the Varese Railway system and its equipment. 4000 w. Elec Rev, N Y—May 30, 1903.

Variable Load.—The Relation of Variable Load to Cost of Transmission in Electric Railway Problems. Sydney W. Ashe. Shows how the line loss may be found from the load diagram, giving examples. 600 w. Eng News—July 13, 1905.

Ventimiglia-Bordighera.—The Ventimiglia-Bordighera Electric Tramway. Enrico Bignami. Brief illustrated description of an Italian road. 500 w. Elec Rev, N Y—Aug. 16, 1902.

Vienna.—The Metropolitan Railway of Vienna (Le Chemin de Fer Métropolitain de Vienne). René Philippe. An illustrated description of the overhead, surface, and underground municipal railway of Vienna. Two articles, 1 plate. 5000 w. Génie Civil—Jan. 31, Feb. 7, 1903.

The Street Railways of Vienna (Die Städtischen Strassenbahnen in Wien). Gustav Wärmer. A very complete account of the electric tramway system of Vienna, showing the growth during the past ten years. 5000 w. 3 plates. Oesterr Wochenschr f d Oeffent Baudienst—April 22, 1905.

See also **ELECTRIC RAILWAY, CONDUIT; ELEVATED RAILWAY.**

Wabash-Marion, Ind.—The Indiana Northern Traction Company. Illustrates and describes an important interurban connection of 20 miles between Wabash and Marion. 1700 w. St Ry Jour—Sept. 10, 1904.

Walsall, Eng.—Municipal Tramways at Walsall. An illustrated account of this electric tramway undertaking. 3000 w. Tram & Ry Wld—June 9, 1904.

Walthamstow, Eng.—The Light Railways of Walthamstow. Gives briefly the history of the undertaking, with an illustrated detailed description of the tracks, overhead equipment, generating station, &c. 5500 w. Tram & Ry Wld—May 4, 1905.

Wannsee, Berlin.—Electric Traction on the Wannsee Railway (Elektrische Zugförderung auf der Wannseebahn). H. Bork. A paper read before the Railway Society at Berlin, giving full details of the construction and operation, with discussion. 6000 w. Glaser's Annalen—Dec. 1, 1900.

The Wannsee-Berlin Electric Railway. Illustrates and describes a line that has been in operation since August, 1900, and that is equipped for heavy traffic. It is mainly used as a steam-locomotive line, running an electric train. 2800 w. Engr, Lond—Dec. 6, 1901.

See also **Germany.**

Ward Leonard System.—An Electrical System for Heavy Railway Work. William Hand Browne, Jr. An illustrated description of the Ward Leonard System. 2500 w. Elec Rev, N Y—Nov. 22, 1902.

Multiple Unit, Voltage Speed Control for Trunk Line Service. H. Ward Leonard. A description of a single phase, high tension, alternating current system for operating trunk line railways. Conversion takes place on each locomotive and sub-stations are eliminated. Ill. 1200 w. Trans Am Inst of Elec Engrs—Dec., 1902.

Warrington.—Electric Tramways at Warrington. Illustrated description of the tramway construction in this English town. Current for lighting and power will be furnished and a destructor plant is connected. 3600 w. Tram & Ry Wld—Sept. 11, 1902.

Washington, Baltimore & Annapolis.—See **Single-Phase.**

Wellington, N. Z.—The Wellington, N. Z., Tramways. Brief, illustrated description of the construction work. 1200 w. St Ry Jour—Dec. 3, 1904.

Wellington City Tramways. An illustrated article describing the recent extensions and electrification of the tramway lines in this city of New Zealand. 4000 w. Tram & Ry Wld—Nov. 9, 1905.

Westchester.—See **New York, Westchester & Boston.**

West Ham, Eng.—The Tramway System of West Ham. Describes the conditions in and around this borough, illustrating and describing the construction of the electric tramways, the power station, rolling stock, &c. 5000 w. Tram & Ry Wld—April 6, 1905.

West Penn.—The West Penn Railways and Lighting System. An illustrated detailed description of electric railway system in Western Pennsylvania with power station at Connellsville. 7800 w. St Ry Jour—Sept. 5, 1903.

The West Penn Railways System. Illustrated description of a system formed by the union of several disconnected lines in western Pennsylvania. 3500 w. St Ry Rev—April 15, 1905.

Wetzikon-Meilen, Switzerland.—The Wetzikon-Meilen Electric Railway (Chemin de Fer Electrique de Wetzikon-Meilen). H. Somach. Describing the interurban trolley line between Meilen on the Lake of Zurich and a number of inland towns. The overhead wire is used, and Oerlikon equipment. 2500 w. 1 plate. Génie Civil—Dec. 26, 1903.

New Interurban Railway in Switzerland. Henri Somach. Brief illustrated description of the line between Wetzikon and Meilen. 800 w. St Ry Jour—Dec. 26, 1903.

Wigan, Eng.—Wigan System Corporation Electric Tramways. Illustrated detailed description of the present system which will probably be extended. 2700 w. Tram & Ry Wld—Nov. 14, 1901.

Wilkesbarre & Hazleton.—Protected Third-Rail Interurban Road in Pennsylvania. An illustrated detailed account of the Wilkesbarre & Hazleton railroad in the anthracite coal regions, which is intended to compete with steam roads for freight as well as passenger business. 600 w. St Ry Jour—March 7, 1903.

Some Operating Data on the Wilkesbarre & Hazleton Ry. J. E. Wallace. Illustrates and describes physical features of the road, protection of third rail, new form of shoe, tests, etc. 6000 w. St Ry Rev—Nov. 20, 1903.

Notes on Equipment of the Wilkesbarre & Hazleton Railway. Describes novel features, particularly the covered third rail and the special form of collecting shoe employed. Ills. 4000 w. Int Elec Cong of St. Louis—Sept., 1904.

High-Speed Electric Railways for Freight and Passengers. Ralph Scott. A description of the Wilkes-Barre and Hazleton Railway and the Lackawanna and Wyoming Valley Railroad, being electric railways for heavy traffic in the anthracite coal region of Pennsylvania. 3500 w. Engineering Magazine—Oct., 1904.

Williamsburg Bridge.—Electrifying the New Williamsburg Bridge. Brief illustrated description of electrical equipment of the double tracks on this East River bridge at New York. 600 w. St Ry Jour—Nov. 19, 1904.

Worcester, Mass.—Rearrangement of Power Generating and Distributing Scheme at Worcester, Mass. Discusses questions involving the relative economy of alternating and direct-current transmission, the utilizing of present power-house equipments when roads are consolidated, output, capacity, etc. Ill. 3000 w. St Ry Rev—Jan. 15, 1902.

The Worcester Consolidated Street Railway Company. Illustrated description of an extensive interurban system in Massachusetts, its power stations, rolling stock, etc. 4000 w. St Ry Jour—April 5, 1902.

Worcester & Southbridge.—The Worcester & Southbridge Street Railway. An illustrated detailed description of this interurban line in Massachusetts, and its equipment. 4200 w. St Ry Jour—Dec. 6, 1902.

Wrexham.—Electric Tramways in Wrexham. An illustrated description of recently completed lines in North Wales, to take the place of horse tramways. 2800 w. Tram & Ry Wld—June 11, 1903.

Wyoming Valley.—See **Lackawanna & Wyoming; Wilkesbarre & Hazleton.**

Yarmouth.—Yarmouth Tramways. An illustrated detailed account of the municipal tramways of Great Yarmouth, Eng. 4000 w. Elec Engr, Lond—Aug. 22, 1902.

Youngstown-Sharon.—The System of the Youngstown-Sharon Railway and Light Company. Illustrated description of a recently opened line which is a good example of modern construction. 2000 w. St Ry Jour—Aug. 2, 1902.

Zossen.—High Speed Electric Traction at Berlin. A concise statement of what has been undertaken at Berlin by the experimenters in this field, what has been accomplished, and what remains to be done. 900 w. U. S. Cons Repts, No. 1103—Aug. 2, 1901.

Electric High Speed Railways (Elektrische Schnellbahnen). W. Reichel. An account of the equipment of the electric railway to make 200 kilometers per hour on the Marienfeld-Zossen line. Serial, Part I. Elektrotech Zeitschr—Aug. 22, 1901.

The Zossen Polyphase Railway Installation for Experimental Trials with Speeds Up to 125 Miles an Hour. Walter Reichel. Describes a high-speed railway and experimental cars, power requirements, and details of a trial road about 14 1-4 miles in length. Ill. 4000 w. Elec Wld & Engr—Sept. 7, 1901.

The High-Speed Cars of the General Electric Company of Berlin (Der Schnellbahnwagen der Allgemeinen Elektricitäts-Gelleschaft, Berlin). O. Lasche. A very complete description of the electric motor cars and machinery for the new express railway, to make 200 kilometers an hour. Two articles. 7000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Sept. 7, 14, 1901.

High-Speed Electric Railway Car of the Allgemeine Elektricitäts Gesellschaft, Berlin. O. Lasche. An illustrated account of the arrangements being made for the study of the economy of the electric system as compared with steam, and the speed possibilities. The trials will be made on the military railway track, Berlin-Zossen. 4500 w. Elec Wld & Engr—Sept. 14, 1901.

The High-Speed Electric Motor Car of the Allgemeine Elektricitäts Gesellschaft (Der Elektrische Schnellbahnwagen der Allgemeinen Elektricitäts-Gesellschaft). O. Lasche. A German version of the author's paper presented at the Glasgow Engineering Congress. 3000 w. Elektrotech Zeitschr—Sept. 26, 1901.

The Electrical High-Speed Experiments at Berlin. Describes the means by which the high-speed problem is to be tested in Germany, and the preparations for the experiments. Ill. 1000 w. U S Cons Repts, No. 1154—Oct. 5, 1901.

The Siemens and Halske High-Speed Motor Car (Der Schnellbahnwagen von Siemens & Halske A. G. Berlin). W. Reichel. A very full description of the electric motor cars designed for the Marienfeld-Zossen line, with details as to wind resistance, motive power, etc. 7500 w. 1 plate. Three articles. Zeitschr d Ver Deutscher Ing—Sept. 28, Oct. 5, 12, 1901.

High-Speed Electrical Traction in Germany. A description of the apparatus built for the high-speed traction experiments on the Berlin-Zossen military railway, with critical remarks concerning its adaptation to the use for which it is intended. 4200 w. Elec Rev, N Y—Nov. 30, 1901.

High-Speed and Long-Distance Electric Railways (Ueber Elektrische Schnell und Fernbahnen). O. Lasche. A paper before the Verein für Eisenbahnkunde, by the chief engineer of the Allgemeine Elektrizitätsgesellschaft, giving a general account of the advantages of electric traction, and details of the high-speed experiments between Berlin and Zossen. Diagrams. 6500 w. Glasers Ann—Dec. 15, 1901.

High-Speed German Railway at Zossen. Frank C. Perkins. Illustrations and description of the car equipment for the high-speed, polyphase railway experiments, where more than 100 miles an hour has been attained. 1500 w. Sci Am—Feb. 8, 1902.

The Berlin-Zossen High-Speed Electric Railway Experiments. Enrico Bignami. Notes recent progress in Europe in regard to electric traction and begins an illustrated description of this experimental line and its working. Serial. 1st part. 3000 w. Elec Rev, N Y—March 8, 1902.

The Berlin-Zossen Electric Railway. An account of the results so far obtained. 2000 w. Engng—April 25, 1902.

The Speed Tests on the Military Railway between Marienfelde and Zossen (Die Versuchsfahrten auf der Militäreisenbahn zwischen Marienfelde und Zossen). H. Lochner. Data and results of the trials of September to November, 1901. Speeds of 130 Kilometers per hour were attained. Two articles, two plates. 7500 w. Glasers Annalen—May 15, June 1, 1902.

Results of the Tests on the Berlin-Zossen Experimental High-Speed Line. Extracts from a paper by Geheimer Baurath Lochner, printed in "Glasers Annalen," giving new information not before published. 2800 w. St Ry Jour—Aug. 2, 1902.

A Critical Review of the High-Speed Electric Trains at Zossen. Robert Grimshaw. 3000 w. Sci Am Sup—Sept. 6, 1902.

High Speed Electric Traction (Essais de Traction Electrique à Grande Vitesse). F. Drouin. An illustrated account of the trials of high-speed trains between Berlin and Zossen. Two articles, 2 plates. 5000 w. Génie Civil—Jan. 10, 17, 1903.

The Electric Operation of Standard Railways Neues aus dem Gebiete Elektrischen Betriebes für Vollbahnen). Hr. Reichel. An illustrated paper before the "Verein für Eisenbahnkunde" on high-speed electric railways for heavy traffic, with high voltages, with reference to the Zossen and other German experimental work. 7000 w. Glasers Annalen—April 1, 1903.

Electric Railways in Europe. An account of the recently resumed high-speed trials at Zossen, near Berlin, where a speed of 118 miles an hour was attained. 1500 w. Elec Rev, Lond—Oct. 2, 1903.

High-Speed Electric Traction at Berlin. Brief review of the trials on the Marienfelde-Zossen line and the great speed attained. Illustration of car used. 1200 w. U S Cons Repts, No. 1783—Oct. 24, 1903.

High-Speed Trials on the Berlin-Zossen Electric Railway. Brief review of interesting features in these trials, and the results. Ill. 2000 w. Tram & Ry Wld—Nov. 12, 1903.

The High-Speed Electric Railway Experiments between Marienfelde and Zossen (Schnellbahnversuche Marienfelde-Zossen). Illustrated description of the Siemens-Halske car and the track and roadbed. 700 w. Elektrotech Zeitschr—Dec. 31, 1903.

The Marienfelde-Zossen High-Speed Electric Railway Trials. Dr. A. Gradenwitz. A description of the road and the mechanism by means of which a speed of more than 130 miles an hour was attained. 4000 w. Engineering Magazine—Jan., 1904.

Experiments in High-Speed Electric Traction on the Marienfelds-Zossen Line (Les Experiences de Traction Electrique Rapide sur la Ligne de Marienfelde-Zossen). Alfred Gradenwitz. An illustrated account of the experiments of 1901-1903, at speeds of 160 to 210 kilometers per hour. Rev Gen des Sciences—April 5, 1904.

High-Speed Electric Railway Experiments on the Marienfelde-Zossen Line. Alexander Siemens. Read before the Inst. of Elec. Engrs. A short history of the trials made on this military railway and of the preparation for them and results. Serial. 1st part. 4800 w. Elect'n, Lond—June 10, 1904.

High-Speeds on Main-Line Railways (Schnellbetrieb auf Hauptbahnen). H. von Borries. A discussion of the results of the Marienfelde-Zossen trials and description of the steam locomotives to be tried on the same line. 5000 w. 1 plate. Zeitschr d Ver Deutscher Ing—June 25, 1904.

The Marienfelde-Zossen High-Speed Trials. Dr. Alfred Gradenwitz. Illustrates and describes the line, and gives an account of the trials of 1901-3. 3800 w. St Ry Rev—July 20, 1904.

The Berlin-Zossen Tests and Their Results. Abstract of an address by Charles A. Mudge, at a meeting of the N. Y. Elec. Soc. Describes the apparatus installed in the Allgemeine car, giving report of tests, and other information of interest. Ills. 3500 w. St Ry Jour—June 3, 1905.

The Berlin-Zossen High-Speed Tests of 1901. An extensive résumé of these electric railway experiments, particularly on train resistance and braking, with curves and tables. 8000 w. St Ry Jour—Sept. 9, 1905.

The Berlin-Zossen Tests of 1902. Abstracts of the results of the 1902 tests of train resistance and braking at high speed. 4800 w. St Ry Jour—Oct. 28, 1905.

See also Germany; High-Speed; Steam Compared; **AIR RESISTANCE; ELECTRIC DISTRIBUTION—Railway; ELECTRIC LOCOMOTIVE; TRAIN, FAST.**

Zurich.—The Street Railway System of Zurich. An illustrated detailed description of the construction and operation of a system owned by the city of Zurich, Switzerland. 3900 w. St Ry Jour—Nov. 1, 1902.

ELECTRIC RAILWAY ACCIDENT.

See **ELECTRIC RAILWAY—Danger; STREET RAILWAY ACCIDENT; STREET RAILWAY MANAGEMENT.**

ELECTRIC RAILWAY, ACCUMULATOR.
See also ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY; MINE HAULAGE; STORAGE BATTERY.

Broca & Johannet.—Traction by Accumulators (La Traction par Accumulateurs). A discussion of the report of MM. Broca and Johannet at the International Tramway Congress at Paris. 3000 w. Electricien—Dec. 15, 1900.

Deri System.—See ELECTRIC RAILWAY.

Ludwigshafen-Worms.—The Use of Accumulator Cars on Standard Railways (Verwendung von Akkumulatoren für den Omnibusbetrieb auf Hauptbahnen). Hr. Gayer. A paper before the Verein für Eisenbahnkunde, giving an illustrated account of the operation of accumulator cars in local service about Ludwigshafen, Worms and Neustadt, Germany, with diagrams. 3 plates. 5000 w. Glasers Ann—March 15, 1901.

Multiple Supply.—Accumulators in Electric Traction. A discussion, with formulae, of the advantages of a combined accumulator and trolley or conduit system, the accumulators being charged on that part of the line equipped with wires, and driving the car the rest of the way. 1400 w. Elec Engr, Lond—Jan. 9, 1903.

The Multiple Supply Electric Railway System. Describes the use of high-tension, three-phase current, with three wires on roads now operated by steam. 2400 w. Elec Rev, Lond—Nov. 6, 1903.

The Multiple Supply Electric Railway System for Heavy Traffic. W. N. Stewart. On electric railways supplied with current from trolley wire and from storage battery on car, with a reference to the Edison nickel-iron-alkali cell. 1500 w. Tram & Ry Wdl—Dec. 10, 1903.

The Use of Storage Batteries in Long Distance Railway Work. W. N. Stewart. Urging the use of the Edison battery for this work. 1600 w. Elec Rev, Lond—Sept. 9, 1904.

See also Paris.

Paris.—The Malakoff-Les Halles Electric Tramway (Tramway Electrique de Malakoff-Les Halles). An account of a Paris suburban tramway, using overhead trolley without the city, and storage battery within the fortifications, the battery being charged from the line. 1000 w. 1 plate. Génie Civil—Oct. 12, 1901.

The Nogentais System, Paris, France. C. L. Durand. An illustrated description of an interurban traction system, combining storage battery, conduit and overhead trolley. 1600 w. Elec Rev, N Y—Dec. 13, 1902.

See also ELECTRIC RAILWAY—Paris-Arpajon; ELECTRIC RAILWAY, CONDUIT.

ELECTRIC RAILWAY, CONDUIT.
See also ELECTRIC RAILWAY.

A New Slotted Conduit. A conduit designed with the object of reducing the cost necessary in the open slot conduit due to the depth of excavation required. Ill. 1500 w. Elec Rev, Lond—March 1, 1901.

Electric Conduits. Reviews three articles on conduit railways published in the June numebr of "Traction and Transmission." 2000 w. Elec Rev, Lond—Oct. 4, 1901.

Bournemouth, Eng.—The Bournemouth Corporation Tramways. An illustrated description of a combined conduit and overhead trolley electric railway at Bournemouth, England. 2500 w. Elect'n, Lond—Jan. 9, 1903.

Combined Conduit and Overhead System at Bournemouth. A. N. Connett. An illustrated detailed description of this combined conduit and overhead construction and the arrangement for changing the car from the one to the other. The conduit under one track rail was adopted. 3000 w. Tram & Ry Wld—Jan. 15, 1903.

Electric Traction at Bournemouth. Illustrates and describes a combined conduit and trolley system with extensions in three boroughs. 2800 w. Tram & Ry Wld—Nov. 9, 1905.

Brussels.—New Conduit Work of the Brussels Tramway Company. Illustrated description of work being carried out. The conduit is laid under one of the rails, instead of between the rails, as in America. 2500 w. St Ry Jour—Sept. 6, 1902.

London.—The Proposed Electric Conduit for the London County Council's Tramways. Illustrated description of the electric conduit which has been devised for use on the routes between Westminster Bridge and Tooting, and other routes. 1800 w. Elect'n, Lond—Feb. 22, 1901.

The London County Council and Electric Tramways. Discusses briefly the general aspect of the question of electrical traction in London, and gives an illustrated description of the conduit system devised by A. B. W. Kennedy. 2500 w. Engng—Feb. 22, 1901.

London County Council Slot Electric Tramways. Illustrated description of the conduit system proposed, noting the essential features. 3000 w. Engr, Lond—Feb. 22, 1901.

London's First Electric Tramway. Frederick A. Talbot. An account of the great opposition encountered, and an illustrated description of the line and its equipment. 2200 w. St Ry Jour—March 2, 1901.

The Proposed Electric Conduit System of the London County Council. Illustrated description, with special reference to designs adopted in other cities. 4200 w. Tram & Ry Wld—March 7, 1901.

The Cost of the London Tramway Conduit System. A report of the proposed conversion of the tramway lines to this system of electric traction, the present position of the undertaking, cost, etc. 1700 w. Engr, Lond—Feb. 21, 1902.

Conduit Electric Tramways. Illustrated description of the reconstruction of the Tooting lines of the London County Council Tramways. 4600 w. Tram & Ry Wld—Sept. 11, 1902.

The Electrification of the South London Tramways. Begins an account of the work of reconstruction, stating why the conduit system was adopted, and the proposed extensions. Ill. Serial. 1st part. 1800 w. Engng—Oct. 3, 1902.

The London County Council Tramways—A Defence of the Conduit System. Considers the various objections made to the system. 1600 w. Elec Engr, Lond—May 22, 1903.

The London County Council Tramways. Gives a sketch of the general history and scope of the scheme, and an illustrated detailed description of the plant and equipment. A conduit line. Serial. 1st part. 2200 w. Elect'n, Lond—April 24, 1903.

Electrification of the London County Council Tramways. An illustrated detailed description of the work of constructing this conduit system, with information relating to it, its electrical equipment, cars, stations, etc. 9000 w. Tram & Ry Wld—May 14, 1903.

The London County Council Electric Tramways. An illustrated detailed description of the construction and equipment of the Westminster-Tooting section. 10,000 w. Elec Rev, Lond—May 15, 1903.

A Conduit Electric Railway in London, England. Information concerning this line, with map and illustrations. 3700 w. Eng News—April 21, 1904.

South London Conduit Tram Lines. Illustrates and describes the reconstruction of these tramways on the conduit system. 3500 w. Engr, Lond—Sept. 23, 1904.

See also ELECTRIC RAILWAY.

New York.—Difficult Construction Work on the Lines of the Third Avenue Railroad Company, New York. Brief illustrated description of work at the post-office loop. 450 w. Elec Rev, N Y—Dec. 12, 1900.

See also ELECTRIC RAILWAY.

Paris.—An Electric Tramway with Side Conduits (Tramway Electrique à Caniveau Latéral). Henry Martin. A well illustrated description of a Paris tramway, with the conduit under one of the rails, running from the Bastille to St. Ouen. 1 plate. 3000 w. Génie Civil—April 6, 1901.

The Extensive Paris System of Conduit Electric Roads. C. L. Durand. An illustrated description of the track construction and other features of the Paris electric conduit railways. 1800 w. Elec Rev, N Y—Jan. 10, 1903.

Electric Railway Construction in Paris. Francis Paul. Illustrates and describes the conduit system of the General Parisian Tramways Company. 4000 w. Am Elect'n—Feb., 1904.

A Novel Conduit Line. Brief illustrated description of the new electric conduit line of Bastille-Charenton. 1500 w. Sci Am Sup—June 3, 1905.

See also **ELECTRIC RAILWAY; ELECTRIC RAILWAY, ACCUMULATOR.**

Surface Contact Compared.—The Slot-Conduit System and the Schuckert Surface-Contact System. A comparison of working expenses of the Brussels and Paris slot-conduit systems, with the surface-contact system named, to the advantage of the latter. 3500 w. Elec Engr, Lond—Aug. 21, 1903.

Trolley Combined.—Combined Trolley and Conduit Tramway Systems. A. N. Connett. Read before the Inst. of Mech. Engrs., London, with discussion. Considers means of solving the problem when the current must in certain places be furnished otherwise than from the overhead wire; especially studying the open-slot conduit. Serial. 1st part. Ill. 4300 w. Engng—March 22, 1901. See also Bournemouth, Eng.

Trolley Compared.—Comparative Cost and Advantages of the Underground Conduit and the Overhead Trolley Systems. A report by Messrs. Maurice Fitzmaurice and Alfred Baker, presented to the London County Council. 3300 w. Tram & Ry Wld—June 11, 1903.

Vienna.—The Arrangement of the Underground Conductors of the Vienna Electric Tramways (Die Elektrische Einrichtung für die Unterleitung der Wiener Städtischen Strassenbahnen). P. Poschenrieder. With general plan of the system, and sections of the underground conduits showing the arrangement of the conductors. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 18, 1904.

Conduits and Conductors of the Electric Tramways of Vienna (Caniveaux el Prises de Courant des Tramways Electriques de Vienne). With sections of the underground conduits, arrangement of feeders, crossings, switches, etc. 1500 w. Génie Civil—Jan. 7, 1905.

See also **ELECTRIC RAILWAY.**

ELECTRIC RAILWAY, CONTACT.

See also **ELECTRIC RAILWAY; ELECTRIC RAILWAY, CONDUIT; STREET RAILWAY.**

Surface Contact Systems of Electric Traction. An illustrated review of the various systems of surface contact and conduits. Serial. 1st part. 3000 w. Prac Engr—March 1, 1901.

Surface-Contact Systems. Abstract of a paper by G. Paul, of Nuremberg. A criticism of some of the systems. 1400 w. Engng—Nov. 21, 1902.

Barbillon-Griffisch. — The Barbillon and Griffisch Surface-Contact Tramway (Traction Electrique des Tramways Système Barbillon et Griffisch par Distributeur Automobile à Echappement). J. Reyval. An illustrated description of a system in which a small electric motor car runs in a closed conduit parallel to the tracks and successively energizes contact plugs between the rails. 2800 w. Revue Technique—Dec. 25, 1901.

Cruvellier.—Surface-Contact Electric Traction System (Traction Electrique par Contact Superficiel). A description of the Cruvellier system, in which two insulated conductors are used. 1200 w. Génie Civil—May 24, 1902.

A New Surface Contact Tramway System. From "Le Génie Civil." Brief illustrated description of the novel features of the invention of M. Cruvellier. 1300 w. Engr, Lond—June 13, 1902.

The Cruvellier Surface Contact System. Illustrates and describes a new system that has been tested at Neuilly, near Paris, and which claims to have overcome some of the disadvantages of other contact systems. 2000 w. Engng—Aug. 15, 1902.

The Cruvellier Surface Contact System. Illustrated description of the application of this system to long-distance traveling, with three-phase current at 3000 volts. 1300 w. Engng—Jan. 2, 1903.

Diatto.—The Magnetic Surface-Contact System. G. Paul. Points out some of the failings of this system and makes a comparison of the Diatto and the Lorain systems. Ill. 2300 w. Elec Engr, Lond—May 29, 1903.

See also **STREET RAILWAY—Paris.**

Dolter.—The "Dolter" Surface Contact System. A review of a book giving an illustrated detailed description of this system. 2800 w. Elec Rev, Lond—Sept. 19, 1902.

Surface Contact. Illustrations with brief description of the Dolter system. 1500 w. Elec Times—Nov. 6, 1902.

The Surface-Contact Tramways of the Bois du Boulogne (Tramways du Bois de Boulogne à Contacts Superficiels). E. Dieudonné. A description of the Dolter system, now being tried in Paris; the contact switches are operated by electro magnets carried on the car. 2500 w. Revue Technique—Feb. 10, 1903.

The Dolter Surface-Contact System. Illustrated description of this system and its operation. A line in France has been at work for over a year and is highly praised. 2000 w. Engr, Lond—March 13, 1903.

England.—Surface Contact Systems. Brief discussion of the four systems on trial in England—the Lorain, the Dolter, the G. B., and the Kingsland. Ills. 2200 w. Elec Rev, Lond—Nov. 10, 1905.

Feeders.—See **ELECTRIC DISTRIBUTION—Railway.**

General Electric Co.—General Electric Company's Surface-Contact System. Illustrated description of this system, which consists of two rows of metal contacts, bedded in the pavement, and brought into connection with the car through the agency of light steel skates. The contacts of one row is energized by the car, those of the other supply power to the car. 4500 w. Engng—May 29, 1903.

Griffiths-Bedell.—The G. B. Surface-Contact System. An illustrated description of the principal details of this system, a trial line having been placed in operation in England. 2200 w. Elec Engr, Lond—Jan. 8, 1904.
See also England.

Hillischer.—Surface Contact Systems for Electric Street Railways (Knopfkontactsysteme für Elektrische Strassenbahnen). Josef Löwy. A paper giving an illustrated description of many of the surface-contact systems, and particularly of the electro-magnetic system of Dr. Hillischer, of Vienna. Also discussion. Serial. 2 parts. 4500 w. Zeitschr f Elektrotechnik—May 17 and 31, 1903.

Kingsland.—The Kingsland System of Electric Traction. An illustrated description of a contact system and the working of an experimental line. 3000 w. Prac Engr—May 17, 1901.

See also England.

Lorain.—The Lorain Surface Contact System. Illustrated detailed description of the equipment of the Wolverhampton Corporation tramways. 2500 w. Elec Engr, Lond—Feb. 7, 1902.

Surface-Contact Electric Tramways at Wolverhampton. Illustrated description of a line equipped with the Lorain surface-contact system. The construction is described in detail, also the rolling stock. 5000 w. Tram & Ry Wld—Feb. 13, 1902.

Surface Contact Systems.—The Lorain System. Report by Mr. C. E. C. Shawfield, borough electrical tramway engineer to the Wolverhampton Corporation, on the surface-contact tramways running in that town. Also brief notes on other systems. 6000 w. Elect'n, Lond—April 24, 1903.

Surface Contact Tramways at Wolverhampton. Illustrates and describes the Lorain system to be introduced on the new lines to be constructed, giving also facts regarding the advantages claimed. 2700 w. Tram & Ry Wld—Nov. 12, 1903.

See also Diatto; England.

Munich.—See **Schuckert.**

Paris.—Surface Contact Systems on the Paris Traction Lines. C. L. Durand. Illustrates and describes two of the leading systems. 3500 w. Elec Rev, N Y—Sept. 5, 1903.

Schuckert.—The Schuckert Contact System of Electric Traction. Illustrated detailed description of the improved system as introduced in Munich. 1900 w. Elec Engr, Lond—Nov. 16, 1900.

The Schuckert Contact System. Illustrated description of the surface contact system of electric traction which has been tried in Munich. 2200 w. Tram & Ry Wld—Jan. 10, 1901.

The Munich Surface-Contact Tramway. An illustrated description of recent improvements in this system, and the working of the trial line in Munich. Serial. 1st part. 3200 w. Engr, Lond—Oct. 25, 1901.

Schuckert Surface Contact System. An illustrated description of the present designs as a whole, improvements having been recently made. 1600 w. Tram & Ry Wld—March 12, 1903.

The Schuckert Surface Contact Tramway System. Brief illustrated description of this system, which is to be tested in England. A trial section in Munich was pronounced satisfactory. 2000 w. Engng—March 27, 1903.

Schuckert Surface-Contact Street Railway System. S. N. Taylor. An illustrated description of an experimental street railway, known as the "Contact Knob" system. 1200 w. Elec Wld & Engr—Aug. 29, 1903.

Electric Traction by the Schuckert System of Superficial Contacts. Emile Guarini. Brief illustrated description, with statement of advantages claimed. 500 w. Sci Am Sup—Sept. 26, 1903.

See also **ELECTRIC RAILWAY, CONDUIT—Surface Contact Compared.**

Stobrawa.—Electro-Magnetic Contact System for Tramways (Elektromagnetisches Kontaktsystem für Elektrische Bahnen). J. P. Doflein. A description of the Stobrawa system, used by the Helios Company. 2500 w. Elektrotech Zeitschr—Nov. 8, 1900.

Trolley Compared.—Commercial Practicability of Electric Traction by Surface Contacts. C. E. C. Shawfield. A comparison between the overhead system and the surface-contact system. Ills. Serial. 1st part. 5000 w. Elec Engr, Lond—July 1, 1904.

Wolverhampton, Eng.—See **Lorain.**

ELECTRIC RAILWAY LEGISLATION.

See **ELECTRIC RAILWAY; STREET RAILWAY LEGISLATION; STREET RAILWAY MANAGEMENT.**

ELECTRIC RAILWAY MANAGEMENT.

See **STREET RAILWAY MANAGEMENT.**

ELECTRIC RAILWAY PARK.

See **PARK.**

ELECTRIC RAILWAY SHOP.

See also **ELECTRIC CAR HOUSE; RAILWAY SHOP.**

Accounting.—A Departure in Repair Shop Accounting. Describes a system in which all repair work, except that required for the bare operation of the cars, is done by estimate. The plan was instituted by W. E. Harrington, and has been in use several years on the S. Jersey Div. of the Public Service Corporation. 2500 w. St Ry Jour—May 20, 1905.

See also **COST-KEEPING; RAILWAY SHOP; STREET RAILWAY MANAGEMENT.**

Baltimore.—See **MACHINE TOOL.**

Birmingham, Ala.—New Car House and Repair Shops of the Birmingham Railway, Light & Power Co., Birmingham, Ala. Illustrated description. 2000 w. St Ry Jour—Jan. 20, 1903.

British Electric Car Co.—The British Electric Car Company. Illustrated description of the factory and its equipment, and the electric cars built. 2300 w. Engng—Feb. 20, 1903.

Brooklyn Rapid Transit.—The Repair Shops of the Brooklyn Rapid Transit Company. Illustrated description of shops, showing the most complete modern methods of systematically handling street-railway repairs. 2200 w. St Ry Jour—Dec. 1, 1900.

New Repair Shops of the Brooklyn Rapid Transit Company. Brief illustrated description of plans for convenient and extensive shops. 1000 w. St Ry Jour—Dec. 13, 1902.

See also **ELECTRIC RAILWAY YARD.**

Camden & Suburban.—Repair Shop Practice on the Camden & Suburban Road. Illustrates and describes the shops and explains the system in use. 2200 w. St Ry Jour—Dec. 26, 1903.

Chicago.—Modern Repair Shop Methods. Richard McCulloch. An illustrated description of the equipment, operation and methods of the repair shop of the Chicago City Ry. and giving much valuable information. 4800 w. St Ry Jour—Aug. 29, 1903.

New Shops for the Chicago City Ry. Illustrated description of street railway shops and their equipment. 2500 w. St Ry Rev—Dec. 20, 1902.

Modern Shops and Methods of the Chicago City Railway Company. Illustrates and describes shops representing the most modern ideas as to construction and equipment. 3500 w. St Ry Jour—March 7, 1903.

Chicago Elevated.—Improvements in Metropolitan Elevated Shops, Chicago. An illustrated article giving information concerning the improvements introduced. 2000 w. St Ry Jour—July 1, 1905.

Columbus, Ohio.—Repair Shop Practice in Columbus, Ohio. Brief illustrated description of these shops and their work. 2000 w. St Ry Jour—July 9, 1904.

Compressed Air.—See **COMPRESSED AIR.**

Concrete Reinforced.—The New Reinforced-Concrete Shops and Car Houses of the Central Pennsylvania Traction Company, at Harrisburg, Pa. Mason D. Pratt. Well illustrated description Reinforced concrete is used throughout. 2000 w. St Ry Jour—Sept. 2, 1905.

Reinforced Concrete Shops and Car Houses, Central Pennsylvania Traction Co., Harrisburg. Mason D. Pratt. Illustrates and describes new buildings, built entirely of reinforced concrete, and covering an area of 53,000 sq. ft. 1400 w. Eng Rec—Sept. 30, 1905.

The New Repair Shop Plant of the Detroit United Railway. An illustrated account of the new repair shop installation and the methods pursued there. 3800 w. St Ry Jour—Feb. 11, 1905.

Shop Equipment of the New Repair Shops Installation of the Detroit United Railway Company. An illustrated account of some of the more important features of the mechanical equipment and operative methods. 3500 w. St Ry Jour—Feb. 18, 1905.

Shop Methods at the Repair Shops of the Detroit United Railway Company. A supplementary article to two preceding, relative to this new repair shop. Describes method of handling cars, truck shop, erecting shop, storage air brakes, etc. Ills. 6000 w. St Ry Jour—Feb. 25, 1905.

See also **Philadelphia.**

Dubuque, Iowa.—New Car House and Repair Shop at Dubuque, Iowa. Illustrated description of the arrangements for the proper maintenance of a large equipment. 2500 w. St Ry Jour—Nov. 12, 1904.

Harrisburg, Pa.—See **Concrete Reinforced.**

Jackson & Battle Creek Ry.—Repair Shop Practice on the Jackson & Battle Creek Third-Rail System. An illustrated description of the repair shop facilities and methods. 4800 w. St Ry Jour—Jan. 7, 1905.

Kansas City.—Extensive Repair Shops at Kansas City. Illustrated description of the repair shops of the Metropolitan St. Ry. Co. of Kansas City, now in progress of construction. 1200 w. St Ry Jour—Dec. 7, 1901.

Liverpool.—The Car Repairing Works of Liverpool Corporation Tramways. Illustrated detailed description. 2000 w. Tram Ry Wld—Sept. 8, 1904.

Los Angeles.—Repair Shop Practice of the Pacific Electric Railway Company. Illustrated description of the Los Angeles shops and their equipment. 6500 w. St Ry Jour—March 19, 1904.

See also **ELECTRIC RAILWAY.**

Management.—The Most Economical Management of the Repair Shop. Charles S. Banghart. Read at meeting of the Penn. St. Ry. Assn. Gives a list of machines found most generally useful, with suggestions as to their arrangement, and the work of the shop in general. 1700 w. St Ry Rev—Sept. 20, 1902.

Manchester, Eng.—Manchester Tramway Car Works. Brief illustrated description of a recently completed works in England. 1000 w. Tram & Ry Wld—Nov. 9, 1905.

Montclair, N. J.—Division Terminal Improvements in New Jersey—New Shop Methods. An illustrated article describing new work recently carried out in the mechanical and electrical departments of the Public Service Corporation of New Jersey. 4000 w. St Ry Jour—Dec. 10, 1904.

Newark, N. J.—Repair Shops of the North Jersey Street Railway Co. Illustrates and describes machines and devices for facilitating repairs, at Newark, N. J., giving a list of prices for all street-car repair work. 5200 w. St Ry Rev—April 15, 1902.

New Car Shops and Houses for the Public Service Corporation of New Jersey. Martin Schreiber. Gives plans and description of one of the most complete and modern railways shop and car-house plants in the country, soon to be erected at Newark, N. J. 6500 w. St Ry Jour—July 22, 1905.

New York.—New Wheel-Shop of the New York City Railway Company. States the peculiar conditions which make the wheel problem a matter of great importance in New York, and gives an illustrated description of the new shop and its equipment. 2000 w. St Ry Jour—Nov. 25, 1905.

Philadelphia.—A New Concrete Paint and Overhauling Shop—Philadelphia Rapid Transit Company. Illustrated description of improvements made in shop facilities at the Kensington avenue shops, especially the reinforced concrete construction and other interesting details. 4800 w. St Ry Jour—Sept. 3, 1904.

Portland, Me.—An Important New Street Railway Repair Shop at Portland, Me. Illustrated description of a new shop installation under construction. 1700 w. St Ry Jour—July 2, 1904.

Providence, R. I.—The New Repair Shops at Providence. Illustrated description of one of the most carefully equipped of modern electric car repair shops. 2500 w. St Ry Jour—May 3, 1902.

New Repair Shops at Providence, Rhode Island. Illustrates and describes details of building construction, equipment, shop methods, method of keeping records, etc. 4000 w. St Ry Jour—May 20, 1902.

New Repair Shops of the Rhode Island Suburban Railway. Illustrated description of the arrangement and equipment of these shops for the repairing of the rolling stock of the street railway system. 1200 w. Eng Rec—Aug. 2, 1902.

Rochester.—Shop Practice. Alfred Green. The writer's experience, describing the plant of the Rochester Ry. Co. and the practices in vogue. Ill. 8500 w. St Ry Rev (Daily Ed)—Sept. 3, 1903.

Car Shops of the Rochester Railway. An illustrated detailed description of new shops, equipped for car building and for the construction and repair of apparatus. 4200 w. St Ry Jour—April 11, 1904.

St. Louis.—The Repair Shops of the St. Louis Transit Company. An illustrated detailed description of these extensive shops and their equipment, with editorial. Many new features in labor-saving machinery. 6500 w. St Ry Jour—Nov. 14, 1903.

Car Shops of the St. Louis Transit Co. Illustrated description of the shops and their equipment. 4000 w. St Ry Rev—Nov. 20, 1903.

St. Paul, Minn.—New Car House and Shops for the Twin City Rapid Transit Company. Illustrated description of new buildings at St. Paul, Minn., in process of construction. 1400 w. St Ry Jour—Aug. 27, 1904.

Steam Compared.—The Problems of the Master Car Builder on the Electrified Steam Road. H. H. Vreeland. Also editorial. Shows that an extensive substitution of electricity for steam power would cause almost a complete revolution of repair-shop methods. 3000 w. St Ry Jour—June 25, 1904.

Wheel.—See **New York.**

ELECTRIC RAILWAY SIGNAL.

See **INTERLOCKING; RAILWAY SIGNAL.**

ELECTRIC RAILWAY STATION.

Chicago.—Fifty-second Avenue Terminal in Chicago. Brief illustrated description of an elaborate terminal station for the transfer of passengers, and storage of cars. 700 w. St Ry Jour—June 6, 1903.

Cincinnati.—Large Interurban Terminal Station in Cincinnati. Illustrated description of a building being erected by the Interurban Terminal Company. 800 w. St Ry Jour—Aug. 30, 1902.

Terminal Station and Freight-Handling System for Interurban Electric Railways at Cincinnati, O. Illustrated description of a station for the accommodation of passenger and freight traffic, now under construction. 1500 w. Eng News—Jan. 29, 1903.

Indianapolis.—Indianapolis Traction Terminal Building. Illustrated description of a recently completed building, said to be the most modern and complete electric terminal railway station in the world. 1000 w. St Ry Jour—Nov. 12, 1904.

The New Terminal Station of the Indianapolis Traction Terminal Co. Illustrated description of a fine building in Indianapolis, which compares favorably with the buildings provided by steam railroads. 3000 w. St Ry Rev—Jan. 15, 1905.

New York Central.—See **ELECTRIC RAILWAY.**

ELECTRIC RAILWAY, STORAGE-BATTERY.

See **ELECTRIC RAILWAY, ACCUMULATOR.**

ELECTRIC RAILWAY TERMINAL.

See also **BRIDGE TERMINAL; ELECTRIC RAILWAY STATION; ELECTRIC RAILWAY YARD.**

Coney Island.—An Improved Terminal for Handling the Heavy Coney Island Crowds—Brooklyn Rapid Transit Company. Illustrates and describes the new terminal plan for handling the enormous traffic at this resort. 2000 w. St Ry Jour—June 11, 1904.

N. Y. Central.—See **ELECTRIC RAILWAY.**

ELECTRIC RAILWAY YARD.

Brooklyn Rapid Transit.—A New Storage Yard and Shop Plant for the Brooklyn Transit Company. Illustrates and describes the yard under construction for the accommodation of the elevated and surface lines of the eastern district of the city. 2500 w. St Ry Jour—June 3, 1905.

ELECTRIC RESISTANCE.

See also **ELECTRIC CONDUCTIVITY; ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC TESTING; INSULATION; RHEOSTAT.**

Alternating Current Measurements.—See **ELECTRIC INSTRUMENT—Resistance Box.**

Alternating Currents.—The Resistance Offered by Iron Conductors to Alternating Currents. Abstract of an article by C. Feldmann and J. Herzog, in "Elektrotechnische Zeitschrift." A study of this subject, showing its practical importance in regard to railways worked by multiphase currents, where the rails are used as a return. 2200 w. Elec Engr, Lond—Nov. 23, 1900.

Armature.—See **ARMATURE—Resistance.**

Bearings.—See **BEARING—Electric Resistance.**

Carbon Cast Iron Contact.—The Variation of Electrical Resistance in the Contact of Carbon and Cast Iron. Eric Schoenau. Reports investigations of the variations of the resistance of such contacts. 500 w. Elec Wld & Engr—July 15, 1905.

Combination.—Methods of Combining Resistances. Edwin F. Northrup. A summary of methods which have been used, with descriptions of some new useful ones. 1700 w. Elec Rev, N Y—June 20, 1903.

Current Density.—The Current Density in Resistance Wires (Ueber die Stromdichte in Widerstände). Georg J. Erlacher. A record of experiments for determining the rise in temperature and allowable current density in nickelin wires. Tables. 1600 w. Electrotech Zeitschr—May 8, 1902.

Differential Galvanometer.—See **ELECTRIC INSTRUMENT—Galvanometer.**

Earths.—See **Grounds.**

Electric Furnaces.—See **ELECTRIC FURNACE—Resistance.**

Electrolyte.—See **ELECTROLYTE.**

Graphite.—An Improved Graphite Resistance (Ein Neuer Graphitwiderstand). R. Hopfelt. The graphite is used in the form of powder compressed in cylindrical cases. 1500 w. Elektrotech Zeitschr—Oct. 8, 1903.

Grounds.—Earth Connections. W. Moon. Gives information of value concerning the resistance of various materials and discusses the placing of earth-plates. Serial. 1st part. 1600 w. Elec Rev, Lond—March 18, 1904.

See also **ELECTRIC DISTRIBUTION.**

High Frequency.—The Resistance of Metallic Wires to High-Frequency Currents (Sur la Resistance des Fils Métalliques pour les Courants Electriques de Haute Fréquence). MM. Andre Broca and Turchini. Discussing the application of Kelvin's law to very high frequencies. 1500 w. Comptes Rendus—May 8, 1905.

Human Body.—The Electrical Resistance of the Human Body. W. L. Hooper. From "Tuft's Engineer." An account of experimental investigations. 1100 w. Elec Rev, N Y—June 29, 1901.

See also **ELECTRIC SHOCK.**

Insulating Materials.—On the Electrical Resistance of Glass, Quartz, Mica, Ebonite and Gutta-percha. Ogden N. Rood. Gives measurements of the external and internal resistances of certain insulating substances, describing the mode of experimenting. 1500 w. Am Jour of Sci—Aug., 1902.

See **ELECTRIC MEASUREMENT; INSULATION.**

Iron Conductors.—See **Alternating Currents.**

Kelvin Bridge.—See **ELECTRIC INSTRUMENT.**

Liquids.—See **INSULATION—Oils.**

Low Temperatures.—The Diminution of Resistance by Cold (Ueber Widerstandverminderung durch Kälte und deren Theoretische Prüfung). R. Mewes. A discussion of the researches of Tesla, Dewar and Fleming. 5000 w. Elektrochemische Zeitschrift—Jan. 1, 1901.

Rail Bond.—See **RAIL BOND—Conductivity.**

Rails.—Notes on the Resistivity of Track and Collector Rails as Affected by the Chemical Composition, etc. Sydney Woodfield. Considers the constituents of ordinary rails and their effects, giving experimental investigations and information from other sources. 2200 w. Elec Rev, Lond—June 27, 1902.

See also **Alternating Currents; ELECTRIC RAILWAY—Return Current.**

Storage Battery.—See **STORAGE BATTERY—Resistance Measurement.**

Switch.—See **ELECTRIC SWITCH—Liquid Resistance.**

ELECTRIC RESONATOR.

Oudin Bipolar.—See **SPACE TELEGRAPHY—Rochefort.**

ELECTRIC SAFETY APPLIANCE.

See **ELECTRIC PROTECTIVE APPARATUS; LIGHTNING PROTECTION.**

ELECTRIC SEARCHLIGHT.

See **SEARCHLIGHT.**

ELECTRIC SEPARATION.

See also **ELECTRO-CHEMISTRY; ELECTRO-METALLURGY; MAGNETIC SEPARATION.**

See also **MAGNETIC SEPARATION.**

Blake-Morscher.—Static Electricity Applied to Ore Dressing. W. G. Swart. Illustrates and describes a method of ore separation which consists in bringing the ore particles into contact with a statically charged metallic surface, the separation being effected by the difference of conductivity. The invention of Lucien I. Blake and Lawrence N. Morscher. 1300 w. Eng & Min Jour—Jan. 24, 1903.

The Blake-Morscher Electro-Static Separator. Ernest A. Weinberg. Read before the Inst. of Min. & Met. An illustrated description of the principle involved, and giving some practical working results. 3700 w. Min Jour—Nov. 26, 1904.

The Blake-Morscher Electrical Ore Separator. A. M. Plumb. An account of the application of this process to the complex ores of the old Galena district in Illinois and Wisconsin. Ills. 1600 w. Min Mag—June, 1905.

Electrostatic Concentration. Lucien I. Blake. Discusses the electrostatic separation of ores, describing devices used and their operation. Ills. Serial. 1st part. 2000 w. Eng & Min Jour—June 1, 1905.

ELECTRIC SHOCK.

See also **ELECTRIC MACHINERY—Accident; ELECTRIC PROTECTIVE APPARATUS—Accidents; ELECTRIC RESISTANCE—Human Body; LIGHTNING.**

Electric Shocks. F. B. Aspinall. Discusses points on which information is desired, in the hope of learning better methods of giving aid in case of accident. 5000 w. Inst of Elec Engrs—Feb. 27, 1902.

Electric Shocks. Archibald Wilson. Showing that the conditions are extremely improbable under which accidental contact with electric wires can result in dangerous shock. 3500 w. Cassier's Mag—July, 1903.

Coal Mine.—Death by Electricity. Discusses the accident at Exhall Colliery, and discusses electric power services in mines, and the precautions necessary. 3500 w. Col Guard—Nov. 15, 1901.

See also **ELECTRIC EQUIPMENT.**

Coat of Mail.—A Protection Device Against the Dangers of High Voltage Currents (Ueber eine Schutzkleidung gegen die Gefahren Hoher Spannungen). N. Artemieff. Describing a garment with hood and sleeves of woven metallic fabric, preventing the discharge from injuring the operator. 2000 w. Elektrotech Zeitschr—March 12, 1903.

Artemiev's Electrical Coat of Mail. Emile Guarini. An illustrated article describing this garment for affording protection against high electrical tensions. 600 w. Sci Am—May 16, 1903.

Firemen.—See **ELECTRIC CONDUCTIVITY—Fire-stream.**

500 Volts.—Electric Shocks at Five Hundred Volts. Alexander Pelham Trotter. Records a few experiments and discusses the conditions under which shocks at 500 volts are devoid of danger. 4000 w. Inst of Elec Engrs—Feb. 27, 1902.

Electric Shocks at 500 Volts. Alexander P. Trotter. A record of experiments and a discussion of the conditions under which shocks of 500 volts are devoid of danger. The subject is divided into three parts. (1) The physiological and electrical conditions; (2) the dangers connected with trolley wires; (3) the dangers of third rails of electric railways. Serial. 2 parts. 8700 w. Aust Min Stand—April 24, May 1, 1902.

Legislation.—Electric Shock and Legislation Thereon. C. E. Webber. Concerning the scientific aspect, liability to exposure and legislation. 5800 w. Inst of Elec Engrs—Feb. 27, 1902.

Physiological Effect.—The Action of High Frequency Currents upon Animals (Action des Courants de Hautes Fréquence [Application Directe] sur les Animaux). H. Bordier et Lecompte, with remarks by M. d'Arsonval. A description of experiments proving that these currents penetrate into the bodies of animals, when electrodes are directly applied. 1200 w. Comtes Rendus—Dec. 30, 1901.

Resuscitation.—Resuscitation from Electric Shock. E. E. Noble. Read before the Ohio Elec. Lgt. Assn. States some facts learned from experimental investigations, and urges promptness in applying restoratives, giving directions. 2500 w. Cent Sta—Oct., 1905.

ELECTRIC SIGN.

See also **ELECTRIC LIGHTING—Decorative; "Elblight."**

The Evolution of the Electric Sign. E. Trier. Illustrates and describes the various kinds of electric signs, especially those operated automatically. 1800 w. Elec Wld & Engr—March 2, 1901.

Automatic, Changeable Electric Signs. Illustrated description of a new form of electric sign advertising. 1500 w. Sci Am Sup—March 23, 1901.

"Signs of the Times." E. Leavenworth Elliott. Discusses the various uses of electric signs and the methods and principles involved in their construction. 2800 w. Cent Sta—Nov., 1904.

Sign and Decorative Lighting. La Rue Vredenburgh. Deals only with the commercial side of the subject. 2500 w. Cent Sta—Aug., 1905.

ELECTRIC SIGNAL.

See also **ELECTRIC APPARATUS; ELECTRIC INSTRUMENT; INTERLOCKING; MINE SIGNAL; RAILWAY SIGNAL.**

Station Indicator.—See **STATION INDICATOR.**

Submarine.—See **SIGNAL.**

Time.—See **TIME SIGNAL.**

ELECTRIC SMELTING.

See ELECTRIC FURNACE; ELECTRO-METALLURGY.

ELECTRIC SPARK.

See also COMMUTATOR—Sparking; ELECTRIC DISCHARGE; IGNITION.

Recorder.—See ELECTRIC APPARATUS—Spark Recorder.

ELECTRIC STATION.

See also AUTOMOBILE GARAGE—Electric; ELECTRIC DISTRIBUTION; ELECTRIC ENGINEERING; ELECTRIC GENERATING SET; ELECTRIC LIGHTING; ELECTRIC PLANT; ELECTRIC POWER; ELECTRIC RAILWAY; ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT; REFUSE DISPOSAL; WATER POWER.

Recent Development in Central Station Equipment. P. Junkersfeld. Abstract of a lecture delivered before the Engng. Col. of the Univ. of Illinois. Recent developments in distributing systems and apparatus, and in other fields are briefly considered. 1400 w. W Elect'n—April 27, 1901.

Electric Railway Power Stations (Betrachtungen über Bahncentralen). Dr. M. Eisig. A general review of the boilers, engines, gas engines, turbines, dynamos, storage batteries and other equipment of power stations, as well as of sub-stations and distribution. Diagram. Two parts. 10,000 w. Elektrotech Zeitschr—July 3 and 10, 1902.

Abbazia, Austria.—The Abbazia Electric Station Das Elektrizitätswerk Abbazia). A brief illustrated description of the steam power electric-lighting station at Abbazia in the Austrian Riviera. 1200 w. Zeitschr d Ver Deutscher Ing—Jan. 26, 1901.

Aberdeen.—The New Aberdeen Electricity Works. Illustrated detailed description of a new generating station in Scotland. 3500 w. Elec Rev, Lond—May 1, 1903.

Accumulator.—See STORAGE BATTERY—Electric Power Station.

Ada, O.—Electric Light, Water Works and Central Hot-Water Heating Installation at Ada, O. A. E. Buchenberg. A general illustrated description of a successful installation. 1600 w. Elec Wld & Engr—Sept. 30, 1905.

Akron, O.—See STEAM TURBINE.

Aldershot Camp, Eng.—See ELECTRIC LIGHTING.

Alstaetten, Switzerland. — See ELECTRIC RAILWAY.

Altbach Deizisau.—The Altbach Deizisau Central Station. Dr. Alfred Gradenwitz. Illustrated description of an installation supplying power and light to numerous towns of the Neckar and Fils Valleys in Southern Germany. 2500 w. Elec Rev, N Y—Oct. 22, 1904.

Amsterdam.—Electrical Works in Amsterdam. A statement of the cost of establishing an electric plant to furnish electricity for street cars, lighting, and motive power. Also a comparative table of cost in different continental cities of Europe. 1500 w. U S Cons Repts, No. 935—Jan. 15, 1901.

Anderlecht, Belgium.—See Brussels.

Anderson, Ind.—See Indiana.

Antwerp.—The Power House of the Antwerp Electric Tramways (Station Centrale des Tramways Electriques d'Anvers). A general description, with photographs of the engines, and section of the building. There are three generating sets, of 1200 h. p. each. 1200 w. Génie Civil—Dec. 17, 1904.

Apscheron.—See Caspian Oil Wells.

Askov, Denmark.—See WIND MILL.

Astoria, N. Y.—See New York and Queens Co.

Atlanta, Ga.—Bringing Up to Date an Old-Style Central Station. Illustrates and describes the remodeled plant of the Georgia Electric Light Company. 3000 w. Am Elect'n—Oct., 1901.

Aurora, Elgin and Chicago Ry.—The Aurora, Elgin & Chicago Railway Power Plant. An illustrated detailed description of a new generating station and its equipment. 3400 w. Steam Engng—Sept. 10, 1902.

Power Plant of the Aurora, Elgin & Chicago Railway. Illustrates and describes a plant for furnishing power for a road 56 miles in length, which has been constructed and equipped for speeds equal, if not greater, than steam roads. 3000 w. Eng Rec—Feb. 7, 1903.

Austria.—Alternating-Current Development in Austria. Frank C. Perkins. An illustrated account of some installations of interest. 1500 w. W Elect'n—Feb. 23, 1901.

Austria-Hungary.—Electricity in Austria-Hungary. Felix Horschitz. Describes important and interesting plants, showing what has been accomplished. Ill. 2200 w. Elec Wld & Engr—May 3, 1902.

Auxiliary Plant.—Steam v. Electrically Driven Auxiliary Plant. C. D. Taite and R. S. Downe. Read before the Manchester (Eng.) Section of the Inst. of Elec. Engrs. A comparison, considering the reliability, economy, first cost and up-keep of feed pumps, and also condensing plants. 2500 w. Mech Engr—April 18, 1903.

Comparison Between Steam and Electrically-Driven Auxiliary Plant in Central Stations. C. D. Taite and R. S. Downe. Abstract of a paper read before the Manchester Soc. of the Inst. of Elec. Engrs. 2000 w. Elect'n, Lond—Aug. 21, 1903.

Central Station Auxiliary Plant. Francis H. Davies. A detailed discussion of pumps, injectors, stoking and economiser gear, etc. 2300 w. Elec Rev, Lond—Sept. 25, 1903.

See also BOILER PLANT; ELECTRIC PLANT; POWER PLANT; STEAM PLANT.

Baden Railway, Germany.—See Durlach.

Baku.—See Caspian Oil Wells.

Baltimore.—New Power Plant at Baltimore. Illustrated description of the reconstruction of the plant of the United Railways and Electric Co. 3000 w. Steam Engng—May 15, 1902.

The Construction of a Reinforced Concrete Power House. Brief illustrated description of a building just completed for the Baltimore Electric Power Company. 1000 w. Sci Am Sup—Dec. 9, 1905.

See also ELECTRIC RAILWAY; STEAM PLANT.

Bangor, Me.—Electrical Supply in Bangor, Maine. Alton D. Adams. Describes the system for supplying light and power. 1100 w. Elec Wld & Engr—Aug. 24, 1901.

Barnes and Mortlake, Eng.—Barnes and Mortlake Electricity Works. Illustrated detailed description, with account of opening ceremony. Serial. 1st part. 2500 w. Elec Engr, Lond—May 3, 1901.

Basle, Switzerland.—Electric Power Plant—Basle Tramways. A general illustrated description of the extension of the Basle sysem. 1400 w. Trac & Trans—Oct., 1904.

Battersea, Eng.—Battersea Electricity Works. An illustrated description of an English electric-lighting installation. 3300 w. Elec Rev, Lond—Oct. 4, 1901.

Bellows Falls, Vt.—See STEAM PLANT.

Bergen Co., N. J.—See ELECTRIC LIGHTING.

Berlin.—The Berlin Electric Stations in 1902 (Die Berliner Elektricitäts-Werke im Jahre 1902). L. Datterer. A very comprehensive and well illustrated paper. In this part special attention is given to the engines in the Oberspree and Moabit stations. Serial. Part I. 2 plates. 6000 w. Zeitschr d Ver Deutscher Ing—Feb. 8, 1902.

The Oberspree and Moabit Power Stations of Berlin, Germany. Arthur H. Allen. Illustrated detailed description of these two large stations. 5000 w. Engr, U S A—June 16, 1902.

The Moabit Central Station at Berlin, Germany. Emile Guarini. A brief illustrated description of a very large station. 1800 w. Cent Sta—June, 1905.

See also Charlottenburg; ELECTRIC GENERATOR—Allgemeine Elek. Gesell.; ELECTRIC RAILWAY; ELEVATED RAILWAY.

Bermondsey.—Bermondsey Combined Refuse Destructor and Electricity Supply Works. Illustrated description of an installation in a suburb of London, said to constitute a part of the most complete and up-to-date municipal undertaking to be found in the United Kingdom. Serial. 1st part. 2400 w. Elec Engr, Lond—Jan. 24, 1902.

Bexley, Eng.—See **ELECTRIC RAILWAY.**

Birkdale, Eng.—Electricity for Birkdale. Illustrates and describes a new generating station erected to supply electricity for tramways and lighting. 3200 w. Tram & Ry Wld—Sept. 11, 1902.

Birmingham, Ala.—A Modern Southern Central Station. J. R. Williams. Illustrates and describes the new power house equipment of the Consolidated Light & Power Co., at Birmingham, Ala. 1200 w. Am Elect'n—Sept., 1901.

Birmingham, Eng.—See **ELECTRIC POWER.**

Bloomsburg, Pa.—See **HYDRO-ELECTRIC PLANT.**

Bogota, Colombia.—A Modern South American Light and Power Plant. Frank C. Perkins. Brief illustrated description of the electric plant at Santa Fé de Bogota, which is 8,300 feet above the sea level, and interesting because of the difficulties in its construction and its general arrangements. 2000 w. Elec, N Y—Aug. 20, 1902.

See also **HYDRO-ELECTRIC PLANT.**

Bolton.—Electric Generators for the Bolton Corporation. Illustrates and describes the special tests of the two 1100-kilowatt generators, with brief history of the company that built them. 2300 w. Engr, Lond—Jan. 24, 1902.

Bordeaux-St. Jean.—Central Power Station of the Central Railway of France at Bordeaux-Saint-Jean (Station Centrale d'Energie de la Compagnie du Midi à Bordeaux-Saint-Jean). A. Laurent. An illustrated description of the central electric power plant at Bordeaux where 1500 horse power is generated and electrically distributed for railway shop and other uses. 3500 w. 2 plates. Rev Gen des Chem de Fer—Nov., 1902.

Boston, Mass.—Two Examples of Modern American Central Stations. Alton D. Adams. Illustrated detailed descriptions of the Atlantic Avenue Stations of the Boston Edison Company, and the arc lighting plant of the Hoboken Division of the United Electric Company of New Jersey. 5600 w. Am Elect'n—June, 1901.

Recent Construction at the Atlantic Avenue Station of the Edison Electric Illuminating Company of Boston. I. E. Moultrop and R. E. Curtis. An account of some of the new features introduced and of the conditions under which they were developed. Ill. 7200 w. Trans Am Soc of Mech Engrs, No. 0944—May, 1902.

The Power Plants Which Light Boston. Describes and illustrates the Atlantic Avenue, and the South Boston stations. The former supplies direct current, and the latter the street lighting circuits and alternating current. 9800 w. Engr, U S A—Sept. 1, 1902.

The Lincoln Power Station, Boston, Mass. An illustrated description of this new station, which is to supplement the other stations in supplying power for the Boston Elevated Ry. 4000 w. Eng Rec—Aug. 17, 1901.

The Edison System in Boston—Its Development and Present Status. E. S. Mansfield. An illustrated detailed description showing the development and standing of one of the most important and successful systems in the United States, using the latest and best methods. 18500 w. Elec Wld & Engr—May 18, 1901.

Expansion of the Boston Edison System. Illustrated detailed description of the steam turbine station at South Boston, which is to have a capacity of 60,000 kilowatts. 6500 w. Elec Wld & Engr—May 21, 1904.

The New Generating Station of the Edison Electric Illuminating Company. Illustrated detailed description of the steam turbine plant on L street, South Boston, Mass., and its relation to the Edison Company's system. 6000 w. Elec Rev, N Y—May 21, 1904.

Modern Central Station Design as Exemplified by the New Turbo-Generator Station of the Edison Electric Illuminating Company of Boston. I. E. Moultrop. An illustrated detailed description of this station and its equipment. 5700 w. Pro Am Inst of Elec Engrs—Jan., 1905.

The New Turbine Station of the Edison Electric Illuminating Company of Boston. Illustrated detailed description. 3800 w. Power—July, 1905.

See also **ELECTRIC CONDUIT—Edison Station, Boston; ELEVATED RAILWAY.**

Boston & Worcester Ry.—See **South Framingham, Mass.**

Boston Elevated Ry.—New Power Stations of the Boston Elevated Railway. Illustrates and describes the Charlestown station, and the Lincoln Wharf station, giving information of interest. 4800 w. Engr, U S A—Sept. 1, 1902.

New Power-Station Equipment of the Boston Elevated Railway Company. Illustrates and describes equipment which will increase the present power supply 10 per cent. It includes a d. c. 2000-kw. turbo generator outfit to be added to the Dorchester station, a 875-kw. gas engine plant at Salem St. station, Medford; and a 700-kw. gas-engine plant for W. Somerville. 3000 w. St Ry Jour—Nov. 4, 1905.

See also **ELEVATED RAILWAY.**

Bradford, Eng.—Recent Extensions of the Bradford Corporation Electrical Undertakings. An illustrated description of the developments of the last few years. Serial. 1st part. 1700 w. Elec Rev, Lond—Dec. 18, 1903.

Bradford, Pa.—Central Station Operated by Gas Power. An illustrated detailed description of the plant of the Bradford Electric Light & Power Co., in Pennsylvania. 2300 w. Am Elect'n—Jan., 1904.

Bridlington, Eng.—Bridlington Electricity Works. An illustrated article giving the history of this undertaking in England, with description of the works and their equipment. 3300 w. Elec Engr, —Lond—March 3, 1905.

Brigham City, Utah.—The Electric Light and Power Plant of Brigham City, Utah. W. P. Hardesty. Illustrated detailed description of a municipal light and power plant erected in 1902 and 1903. Describes the equipment and gives information of the service and low cost of power. 3200 w. Eng News—Sept. 7, 1905.

Brimsdown, Eng.—Power Supply to Tramways in North London. Illustrated description of station of the North Metropolitan Electrical Power Supply Co., furnishing current at 11,000 volts. Serial. Part I. 2000 w. Elect'n, Lond—Aug. 12, 1904.

Bristol, Eng.—The Power House of the Bristol Railway. Illustrates and describes a fire-proof steel building 140 ft. long, 50 ft. wide, and 116 ft. high, constructed in America, and erected in England by employees sent for the purpose. 1600 w. Eng Rec—Sept. 21, 1901.

Some Notes on the Bristol Electricity Works Fire. H. Faraday Proctor. Read before the Incor. Munic-Elec. Assn. A statement of the facts in regard to the fire which occurred Dec. 23, 1903, and the damage and the cause. Discussion. 4800 w. Elect'n, Lond—July 29, 1904.

British.—Connections to Electricity Supply Works. Deductions from the large table of electric station statistics in the United Kingdom, published as a supplement, with diagrams showing the growth of business in both London and the Provinces. 600 w. Elect'n, Lond—Jan. 9, 1903.

"Electrical Review" List of Electricity Supply Works of the United Kingdom. Supplement. Serial. 2 parts. Elec Rev, Lond—June 12, 1903.

Some British Central Electric Power Stations. H. F. Parshall. Brief illustrated descriptions of the more important stations designed by the writer, representing modern practice in Great Britain. 3000 w. Cassier's Mag—June, 1904.

Electric-Power Supply from Central Stations in Great Britain. G. L. Addenbrooke. A complete survey of the projects under consideration, with illustrated descriptions of the South Wales, Newcastle, Thornhill, and other power stations. 5000 w. Engineering Magazine—Feb., 1905.

See also **ELECTRIC POWER.**

Brooklyn, N. Y.—A Representative American Central Station. An illustrated detailed description of the plant of the Edison Electric Illuminating Company of Brooklyn. 3800 w. Am Elect'n—Jan., 1901.

The Kings County Station of the Edison Illuminating Company of Brooklyn. Illustrates and describes this station as representing standard practice in high-tension generation. 1600 w. Elec Rev, N Y—Aug. 17, 1901.

The Power Stations and Distributing System of the Brooklyn Rapid Transit Company. C. E.

Roehl. An illustrated account of the proposed power development outlining the present equipment. 3500 w. St Ry Jour—Oct. 5, 1901.

The Bay Ridge Station of the Edison Electric Light Co. of Brooklyn. Illustrated description of the new installation of vertical engines. Calls attention to the rapid development in electric stations, as illustrated by the installation less than four years ago of 8000 h. p. double horizontal tandem compound direct-connected alternating current unit. 3000 w. Power—Dec., 1901.

The New Third Avenue Station of the Brooklyn Rapid Transit Co. Arthur L. Rice. An illustrated detailed description of the building construction of this new station and its equipment. 3000 w. Engr, U S A—July 15, 1903.

New Power Plant of the Brooklyn Rapid Transit Company. Illustrated detailed description of the new Williamsburg station now under construction on the Wallabout Canal. 3200 w. Elec Wld & Engr—Sept. 23, 1905.

The New Williamsburg Power Plant of the Brooklyn Rapid Transit Company. Describes the general arrangement of this new fireproof station, its boilers, forced draft, flues and stacks, coal and ash handling machinery, piping, pumps, and heaters, turbines, electrical distribution, etc. Ills. 5600 w. St Ry Jour—Sept. 23, 1905.

See also **STEAM ENGINE.**

Brunots Island.—See **Pittsburg.**

Brussels.—St. Gilles Electric Power and Luttiches Street Railway. Frank C. Perkins. An illustrated description of an electric power station near Brussels, Belgium, operated in connection with the Liége railway. 1000 w. Elec Rev, N Y—Dec. 27, 1902.

Electrical Installation of the City of Brussels, Belgium. Enrico Bignami. An illustrated article describing the character of the work necessary to keep up with the growth of the city and demand for increased service. 2800 w. Elec Rev, N Y—Aug. 15, 1903.

The Central Station of the Brussels, Belgium, Tramways. Emile Guarini. Illustrated description. 1700 w. Elec Rev, N Y—Nov. 14, 1903.

The New Brussels Electric Power Station at Anderlecht. Frank C. Perkins. Illustrated description of a railway power station and its equipment. 1200 w. Engr, U S A—Aug. 15, 1904.

See also **ELECTRIC RAILWAY.**

Buenos Aires.—The Buenos Aires Electric Station of the German Transmarine Electric Company (Das Elektricitätswerk der Deutsch-Ueberseeischen Elektricitäts-Gesellschaft in Buenos Aires). H. Baehcker. An illustrated description of a large station for light and power, on the Rio de la Plata, Argentina. 2000 w. Elektrotech Zeitschr—May 8, 1902.

The Power Plant of the Anglo-Argentina Tramway Company at Buenos Aires (Versuchs- und Betriebsergebnisse an der Maschinenanlage der Compania de Tramways Anglo-Argentina, Ltd., in Buenos Aires). Ad. Frel. A general description with load diagrams and indicator cards. 1800 w. Zeitschr d Ver Deutscher Ing—Jan. 30, 1904.

Buffalo, N. Y.—See **ELECTRIC DISTRIBUTION.**

Bury St. Edmunds, Eng.—Bury St. Edmunds Electricity Works. Brief history of the town and its illumination, with illustrated detailed description of the plant. 3500 w. Elec Engr, Lond—Nov. 2, 1900.

Cambridge, Mass.—Power Plant of the Cambridge Electric Light Company, Cambridge, Mass. Illustrates and describes this recently completed plant. It is an alternating-current one with a three-phase 60-cycle supply furnished from direct-connected vertical compound condensing generating units. 3200 w. Eng Rec—Nov. 4, 1902.

Canandaigua, N. Y.—A Modern Electric Railway Power Plant, Canandaigua, N. Y. An illustrated description of a finely equipped plant. 2000 w. Eng Rec—Jan. 16, 1904.

Canton, Ohio.—Some Details of an Electric Railway Power Station at Canton, Ohio. Gives illustrated description of interesting details from the standpoint of design, in the station serving the Canton-Akron railway. 1800 w. Eng Rec—June 25, 1904.

Cape Town.—Cape Town Corporation Electricity Works. Information concerning the new electricity works recently opened. Ils. Serial. 1st part. 3200 w. Elect'n, Lond—May 27, 1904.

Carville, Eng. — The North-Eastern Railway and Carville Power House. Illustrated detailed description of this station. The arrangement of the switch gear is of special interest. Serial. 1st part. Elect'n, Lond—July 1, 1904.

Caspian Oil Wells.—Power Transmission Plant of the Apscheron Electric Co., of Baku (Kraftübertragungsanlage der Apscheroner Elektrizitäts-Gesellschaft Baku). A description of a three-phase central station and power transmission plant for boring and operating oil-wells on the Apscheron peninsula, near Baku, on the Caspian Sea. 1600 w. Elektrotech Rundschau—July 15, 1903.

The Production and Use of Electricity in a Russian Petroleum Field. Frank Koester. Brief account of the application of electricity to the drilling and pumping of the wells on the Apscheron peninsula near Baku, on the Caspian Sea. Ill. 1000 w. Elec Rev, N Y—May 27, 1905.

Power Transmission in the Naphtha District of Baku. A. Gradenwitz. Illustrated description of the electric power station erected near the Caspian Sea to furnish power for boring the naphtha wells and pumping. 1000 w. Engr, U S A—July 1, 1905.

Cement, Chicago.—Cement in Central Station Design. Eugene B. Clark. On the use of cement in the building of power-houses, as illustrated in a recently completed plant of the Illinois Steel Company in South Chicago. 4000 w. Am Inst of Elec Engrs—April, 1905.

The Use of Concrete in an Electric Power Station. Eugene B. Clark. Read before the Chicago Branch of the Am. Inst. of Elec. Engrs. Considers the use of cement in foundation, floors, roofs, etc., especially considering a recently completed plant in South Chicago. 3000 w. Eng News—May 4, 1905.

Central Ry., France.—See **Bordeaux.**

Ceres, N. Y.—See **Olean.**

Changing Over.—See **Atlanta; Evolution; Sheffield; ELECTRIC DISTRIBUTION; ELECTRIC STATION MANAGEMENT.**

Charlottenburg.—The Charlottenburg (Germany) Electric Station (Das Elektricitätswerk Charlottenburg). F. Collischon. A well illustrated description of a handsome central station, which furnishes polyphase current for lighting and power, and direct current for traction, the distribution system and methods of operation. Plans, tables and load diagrams. Serial. 2 parts. 3500 w. Elektrotech Zeitschr—May 21 and 28, 1903.

See also **Berlin.**

Chattanooga, Tenn.—The Power Plant of the Chattanooga Electric Company, Chattanooga, Tenn. Illustrates and describes an important addition, with the installation of Curtis steam turbines, and other novel features. 1800 w. Elec Rev, N Y—Feb. 25, 1905.

Cheltenham, Eng.—Cheltenham Electrical Undertaking. Full text of the report of James Swinburne on the municipal plant at Cheltenham, England, with editorial comment. 7200 w. Elec Engr, Lond—Nov. 18, 1904.

Chicago.—New Polyphase Plant of the Commonwealth Electric Company. Illustrated detailed description of a new station on the South Side of Chicago. 5000 w. W Elect'n—Jan. 12, 1901.

Modern High Pressure Installations in American Cities (Moderne Hochspannungsanlagen in Amerikanischen Grossstädten). W. Blanck. Describing various generating plants and transforming stations, mainly in the business district of Chicago. Two articles. 7500 w. Elektrotechnische Zeitschr—July 31, Aug. 7, 1902.

Recent Development of the Chicago Edison and Commonwealth Electric Systems. An account of the remarkable progress in this field, describing the great Fiske Street station, now under construction, designed for the use of 5,000-kw. Curtis steam turbine units and other interesting apparatus to be installed. Also describes briefly other stations of interest. Ill. 4800 w. Elec Wld & Engr—May 23, 1903.

New Central Station of the Commonwealth Electric Company of Chicago. Illustrates the

Curtis steam turbines to be installed in the new Fisk street station, and gives an outline of the plant. 2500 w. Ir Age—June 18, 1903.

See also Cement; ELECTRIC DISTRIBUTION; ELECTRIC SUB-STATION.

Chicago Elevated.—The South Side Overhead Electric Railway of Chicago. Illustrated description of the power-station, which furnishes power for Sprague multiple-unit system. 2500 w. Trans & Ry Wld—Jan. 10, 1901.

Chicago Stock Yards.—Swift & Co.'s Chicago Central Power Plant. An illustrated description of a 2800 H. P. electric generating station at the Union Stock Yards. 3500 w. Steam Engng—March 10, 1903.

Cincinnati.—See ELECTRIC LIGHTING.

Cleckheaton, Eng.—Cleckheaton Electricity Works. Illustrated detailed description of works for the supply of light and power, and a refuse destructor from which it is hoped to get much of the steam required. 1800 w. Elec Engr, Lond—Nov. 28, 1902.

Cleckheaton Electricity Works. An illustrated description of a combined electric generating station and refuse destructor in Yorkshire. 1600 w. Elec Rev, Lond—Dec. 12, 1902.

Cleveland, O.—The Evolution of Electric Railway Power Plant Apparatus, as illustrated by the Cedar Avenue Station of the Cleveland Electric Railway Company. H. W. Woodward. An illustrated descriptive article. 3500 w. Engr, U S A—April 1, 1902.

See also ELECTRIC RAILWAY.

Cleveland & Southwestern Ry.—Improvements in the Power Equipment of the Cleveland & Southwestern System. Illustrated description of one of the first steam turbine installations for electric railway work in the United States. 7500 w. St Ry Jour—Jan. 30, 1904.

Clyde Valley.—See Glasgow.

Coal Consumption.—See BOILER PLANT.

Coal Handling.—See COAL HANDLING.

Coal Question.—See ELECTRIC STATION MANAGEMENT.

Cologne.—See ELECTRIC STATION MANAGEMENT.

Colombia.—See Bogota; Medellin.

Columbus, O.—The Combined Lighting and Heating Plants of the Columbus, Ohio, Public Service Company. Illustrates and describes a recently installed plant for heating by means of hot water, as an auxiliary service from an electric generating plant. 2200 w. Elec Wld & Engr—Dec. 3, 1904.

Combined A. C. & D. C.—The Combined Use of Alternating and Direct Current for Central Station Work. Prof. F. C. Caldwell discusses various phases of the problem of what proportion of each should be used. 3500 w. Elec Rev, N Y—Nov. 28, 1903.

The Combined Use of Alternating and Direct Current for Central Station Work. F. C. Caldwell. Read before the Ohio Elec. Soc. States the conditions that have led to the combined use, considering the question from the point of view of the consumer, the distribution and the station. 3300 w. Engr, U S A—May 15, 1904.

Concrete.—See Cement; CONCRETE; CONCRETE REINFORCED.

Concrete Reinforced.—See Baltimore; CONCRETE REINFORCED.

Conduit, Boston.—See ELECTRIC CONDUIT—Edison Station, Boston.

Connellsville.—Power Plant of the Pittsburg, McKeesport and Connellsville Railway. Illustrated detailed description of a plant of 6,000 kilowatts capacity, built to operate a system of electric railways and furnish electric current for lighting and power. 4000 w. Eng Rec—Sept. 5, 1903. See also ELECTRIC RAILROAD—West Penn.

Construction, Pittsburg.—See BUILDING CONSTRUCTION.

Cooling Towers.—See COOLING TOWER.

Copenhagen.—The Ostre Electric Station at Copenhagen (Das Ostre Elektricitätswerk in Kopenhagen). C. Hentzen. Illustrated description of a large generating station in the Danish capital. 3500 w. Elektrotech Zeitschr—Oct. 29, 1903.

Cranford, N. J.—The Cranford Plant of the Public Service Corporation of New Jersey. A building constructed of concrete blocks and a system of piping that includes a steam header 81 feet long without a single valve in it are conspicuous features of this electric railway plant. 3000 w. Eng Rec—March 19, 1904.

Crewe, Eng.—Crewe Corporation Electricity Works. Illustrated description of a three-wire system. 3000 w. Elect'n, Lond—Dec. 7, 1900.

Crottorf, Saxony.—The Country Power Station at Crottorf, Saxony (Die Hochspannungs-Ueberlandcentrale Crottorf i S.). Dr. Richard Apt. A description of an electric power station for the generation and distribution of power to country users. 3000 w. Elektrotech Zeitschr—Nov. 28, 1901.

Dayton & Troy Ry.—The Performance of the Dayton & Troy Electric Railway Power House. An account of the performance of a direct-current power house supplying boosters for feeding the distant portions of the line, describing the equipment, character of the road, tests made, etc. Ill. 3800 w. St Ry Jour—Feb. 28, 1903.

De Kalb, Ill.—A Very Modern Central Station of Medium Size. J. R. Cravath. An illustrated description of the central station at De Kalb, Ill., and its equipment. 2200 w. Am Elect'n—June, 1903.

Denver.—See ELECTRIC RAILWAY.

Derby, Eng.—See ELECTRIC RAILWAY—England.

Design.—Some Engineering Hints on a Tramway System. W. Dalton. A discussion of some of the chief points in the design and running of an electric railway power station, cables, electrolysis, etc. 2800 w. Elec Engr, Lond—Dec. 19, 1902.

The Design of Electric Stations (Ueber die Ausführung von Elektricitätswerken). E. Wikander. A paper on the general design and planning of electric stations, their location, size, arrangement, etc. 2500 w. Elektrotech Zeitschr—July 2, 1903.

The Design and Construction of Buildings Connected with the Generation and Supply of Electricity Known as Central Stations. C. Stanley Peach. Abstract of paper discussing this subject, read before the Royal Inst. of British Architects. 3500 w. Arch't, Lond—April 1, 1904.

Notes on the Design and Construction of Buildings Connected with the Generation and Supply of Electricity Known as Central Stations. Charles Stanley Peach. Also discussion, illustrations and 20 plates. 2300 w. Jour Roy Inst of Brit Archts—April 2, 1904.

Power Station Design. C. H. Merz and William McLellan. Abstract of a paper read before the Inst. of Elec Engrs. Discusses the unnecessary expenditure often bestowed on the power station, considering the main principles governing the design, and discussing the effects on actual design. Serial. 1st part. 4500 w. Elect'n, Lond—April 29, 1904.

Modern Power-Plant Design and Economics. Franz Koester. The first article discusses location, design of buildings and general adaptability; comparing American and European practice. 3500 w. Engineering Magazine—Aug, 1905.

Modern Power Plant Design and Economics. Franz Koester. The second article discusses the steam generating portion of the plant, including coal and ash handling, water supply, mechanical draft, etc. 5000 w. Engineering Magazine—Sept., 1905.

Modern Power Plant Design and Economics. Franz Koester. The third article of this series discusses the steam turbine and the reciprocating engine and their auxiliaries, with many illustrations. 3000 w. Eng Mag—Oct., 1905.

Modern Power-Plant Design and Economics. Franz Koester. Mr. Koester's fourth paper treats of the electrical equipment of the generating room installation and operation. 3000 w. Engineering Magazine—Nov., 1905.

The Power Station. Fred N. Bushnell. Read before the Am. Ry. Mech. & Elec. Assn. Also editorial. Discusses problems and development in power station design and operation. Ills. 9800 w. Elec Rev, N Y—Oct. 21, 1905.

See also ELECTRIC STATION MANAGEMENT.

Des Moines, Iowa.—The New Power Plant of the Des Moines City Railway Co. Illustrated description of the method of rebuilding a power station without interfering with the traffic. 1700 w. Eng Rec—July 12, 1902.

Detroit.—Power Stations of the Detroit United Railway. Thomas Farmer. Illustrated detailed description. 2800 w. St Ry Rev—Sept. 20, 1902.

New Turbo-Generator Station of the Detroit Edison Company. Illustrates and describes a plant in which Curtis turbines are the prime movers, arranged to run either condensing or non-condensing. The plant is electrical throughout and strictly alternating-current. 3300 w. Engr, U S A—Oct. 1, 1904.

Central Station Work in Detroit. Begins an illustrated description of a large central generating plant with its equipment and the use of steam engines at certain sub-stations, and the supply of steam heat from these stations, and other features of interest. Serial. 1st part. 4500 w. Elec Wld & Engr—Feb. 4, 1905.

See also **ELECTRIC RAILWAY.**

Diesel Motor.—See **OIL ENGINE.**

Doncaster, Eng.—See **ELECTRIC RAILWAY.**

Dresden.—The Municipal Electric Plant at Dresden (Das Städtische Elektricitäts-Wesl-Kraftwerk zu Dresden). Walter Meng. A description of the new generating station recently erected in Dresden. Five generating sets of 1200 H. P. each are in use. 4000 w. Elektrotech Zeitschr—June 20, 1901.

See also **HEATING**—Dresden Central Station.

Dublin.—Electricity Supply in Dublin. Reviews the history of the Dublin works, explaining the backward condition of electricity supply matters, and begins an illustrated description of the new works just completed, at Pigeon House Fort. Serial. 1st part. 2200 w. Elect'n, Lond—Sept. 25, 1903.

Dublin Three-Phase Central Station. Illustrated description of an electric lighting system which employs the four-wire, three-phase distributing system. 2500 w. Elec Wld & Engr—Nov. 7, 1903.

Three-Phase Working, with Special Reference to the Dublin System. William Brew. Read before the Dublin Soc. of the Inst. of Elec. Engrs. The present article considers the generating plant. Serial. 1st part. 800 w. Elec Engrs, Lond—Jan. 15, 1904.

Dubuque, Iowa.—A Large New Steam Turbine Power Plant Installation for Dubuque, Iowa. Description and plans of a proposed power plant planned for the exclusive use of steam turbines. 5500 w. St Ry Jour—Aug. 6, 1904.

Duluth.—Rebuilding the Duluth, Minn., General Electric Company's Station. Clifford L. Higgins. An illustrated account of the changes made in remodeling. 1200 w. Elec Wld & Engr—June 13, 1903.

Durban, South Africa.—Durban (S. Africa) Electric Light and Tramways. An illustrated description of a new combined power station, reviewing also the old works. Serial. 1st part. 1500 w. Elec Rev, Lond—Dec. 11, 1903.

Electrical Installations of the Natal Government Railways, South Africa. An illustrated description of the new power station at Durban, and its equipment. 2500 w. Elec Rev, Lond—Feb. 10, 1905.

See also **ELECTRIC ENGINEERING**—South Africa.

Durlach, Germany.—The Electric Station of the Baden State Railways at Durlach (Das Elektrizitätswerk der Badischen Staatseisenbahnen bei Durlach). K. Freyss. An illustrated description of the new station furnishing current for lighting the buildings of the Baden railway system. 3500 w. Elektrotech Zeitschr—Aug. 10, 1905.

Eastbourne, Eng.—Eastbourne Electricity Works. Illustrated detailed description of new English works. 4200 w. Elec Engr, Lond—March 6, 1903.

East Ham, London.—See **ELECTRIC RAILWAY.**

Economy.—Economies in the Installation of Electric Tramway Plant. W. H. Booth. Discusses things to be considered in designing a plant. 1900 w. Elec Rev, Lond—Jan. 18, 1901.

Economy in Plant for Traction Stations. Discusses methods of determining the most economical design. 1800 w. Elec Rev, Lond—Dec. 13, 1901.

Fuel Economy in Central Generating Stations. John B. C. Kershaw. Reviews and discusses some recently published papers and articles on this subject, calling attention to points of importance. Ills. 4000 w. Elec Rev, N Y—Oct. 15, 1904.

The Efficiency of Electrical Power Generating Stations. H. M. Hobart. A study of the net annual efficiency of electric supply stations. Also editorial. 3000 w. Elec Wld & Engr—Nov. 25, 1905.

See also Design; **BOILER PLANT; ELECTRIC PLANT; ELECTRIC STATION MANAGEMENT.**

Edison, London.—The First Central Station for Incandescent Lighting. W. J. Hammer. An account of the first installation of the Edison "Jumbo" dynamo in the 3,000-light central station on Holborn Viaduct, London, started on Jan. 12, 1882. 1700 w. Elec Wld & Engr—March 5, 1904.

Edison, N. Y.—Mr. Edison's Reminiscences of the First Central Station. 4800 w. Elec Rev, N Y—Jan. 12, 1901.

The Edison Illuminating Company's First Plant. Charles S. Bradley. An account of the plant at 257 Pearl, near Fulton street, New York. 2000 w. Elec Rev, N Y—Jan. 12, 1901.

See also **New York.**

Elmira, N. Y.—See **ELECTRIC RAILWAY.**

Energy Diagrams.—Energy Diagrams of Small Electric Lighting Plants. Illustrated description of a graphical method of indicating the transformation of energy in two small stations. 800 w. Eng Rec—June 15, 1901.

Erith, Eng.—Erith Electricity Works. An illustrated description of works employing the four-wire three-phase system of distribution. 2000 w. Elect'n, Lond—Jan. 16, 1903.

Etampes, France.—See **GAS-POWER PLANT.**

Europe.—Some Notes on Continental Power-House Equipment. H. L. Riseley. Read before the Newcastle Sec. of the Inst. of Elec. Engrs. Illustrated description of stations examined during a recent visit. 4800 w. Elec Engr, Lond—Feb. 20, 1903.

Evanston, Ill.—Evanston, Ill., Central Station for Heating and Lighting. Illustrates and describes the combination of a hot-water system, supplying heat to a territory of six or eight square miles, and an electric-lighting system, both distributed from the same central station. 2000 w. W Elect'n—Dec. 29, 1900.

Everett, Wash.—Design of the New Power Plant and System of the Everett Railway & Electric Co. Edward P. Burch. From a recent address before the students in power plant design at Minnesota State Univ. Illustrates and describes this plant for a city in Washington. 3000 w. St Ry Rev—May 20, 1903.

Everett (Wash.) Railway and Electric Co.'s New Power Plant. Illustrations, plan and cross-section, with description. 2700 w. Engr, U S A—Nov. 16, 1903.

Evolution.—The Evolution of One Electric Light Plant. W. H. Wakeman. Description of the installation and subsequent changes made, giving information concerning plants appropriate for cities of 50,000 to 300,000 inhabitants. 1400 w. Am Gas Lgt Jour—Dec. 3, 1900.

See also **ELECTRIC STATION MANAGEMENT—Reconstruction.**

Exeter, Eng.—The New Electricity Works at Exeter. Illustrates and describes a two-phase system. 3300 w. Elect'n, Lond—Dec. 11, 1903.

Exhaust Steam.—See **HEATING; STEAM ENGINEERING; STEAM TURBINE.**

Farnworth, Eng.—Farnworth Electricity Works and Tramways. Illustrated detailed description of plant for power and lighting. 3700 w. Elec Engr, Lond—Aug. 23, 1901.

Fife, Scotland.—The Fife Electric Power Company. Illustrates and describes particulars of the work which has been accomplished in the development of power supply in the country of Fife. 1800 w. Elec Engr, Lond—Sept. 1, 1905.

The Fife Electric Power Co.'s Station. Illustrated description of moderate size electric station near Dumfermline, Scotland. 800 w. Elect'n, Lond—Sept. 8, 1905.

Fire, Bristol, Eng.—See Bristol.

Fitchburg, Mass.—Electrical Supply in Fitchburg. Illustrates and describes the generating station of the Fitchburg (Mass.) Gas & Electric Light Co., giving interesting features of the city as well. 2200 w. Elec Wld & Engr—Oct. 3, 1903.

Foundation, N. Y.—See FOUNDATION—Power House, N. Y. Rapid Transit.

Framingham, Mass.—Power Plant of the Boston and Worcester Street Railway. Describes and illustrates a plant that operates an electric interurban system about 40 miles long. 1700 w. Ir Age—Aug. 31, 1905.

France Western Railway.—See Paris; ELECTRIC RAILWAY—Multiple-Unit.

Franklin, Ind.—A Combination Public Service Plant. Illustrates and describes a successful example of consolidation of public water, gas and electricity supply at Franklin, Indiana. 1600 w. Elec Rev, N Y—Jan. 4, 1902.

Fulham, London.—See London; REFUSE DISPOSAL.

Future.—The Electric Generating Station of the Future. A. W. Whieldon. Read before the Dublin Soc. of the Inst. of Elec. Engrs. Considers the wastage that is taking place, the latest developments in the use of high-pressure currents, and suggests a studied uniformity in districts with the view to linking together scattered installations. Serial. 1st part. 2800 w. Elec Engr, Lond—May 29, 1903.

Galveston.—New Lighting and Power Plant of the Galveston City Railway Co. An illustrated description of an electric station for railway, lighting and power service, built to replace one destroyed in the great storm of September, 1900. 3000 w. St Ry Rev—Dec. 20, 1902.

Gardiner, Mont.—A Frontier Electric-Light Plant. George D. Shepardson. Illustrated description of the plant at Gardiner, Mont., a village having a population of about 100 inhabitants. 900 w. W Elect'n—Nov. 10, 1900.

Gas and Hydraulic.—See HYDRO-ELECTRIC PLANT—Gas Engine Combined.

Gas Combined.—Gas-Power for Central Stations. J. R. Bibbins. On the advantage of operating electric stations in connection with gas works. 4000 w. Trans Am Inst of Elec Engrs—Dec. 18, 1903.

Gas Combined, California.—Gas and Power Engineering Development in Monterey County, Cal. George P. Low. An illustrated account of the upbuilding, growth, development, and engineering features of the Salinas and Monterey properties of the Monterey County Gas and Electric Company of Monterey, California. 10000 w. Jour of Elec—Sept., 1904.

Gas Engine.—See Bradford, Pa.; Tunis; Walthamstow, Eng.; ELECTRIC RAILWAY—Orleans; GAS ENGINE—Electric Generation; GAS POWER; GAS POWER PLANT.

Gas Engine vs. Steam.—See ELECTRIC PLANT.

Gas Producer.—See Gas Combined; ELECTRIC RAILWAY—Steubenville; GAS ENGINE; GAS POWER; GAS POWER PLANT.

German Practice.—Some Details of German Electrical Generating Station Practice. E. Kilburn Scott. Illustrated article commenting on points of interest observed during a recent visit by the British Inst. of Elec. Engrs. 1700 w. Elec Wld & Engr—Aug. 31, 1901.

See also ELECTRIC ENGINEERING.

German Statistics.—Statistics of Electric Plants in Germany (Statistik der Elektrizitätswerke in Deutschland). The usual annual review of the growth of electric stations in Germany, with full tabulated data of all plants. 15000 w. Elektrotech Zeitschr—Sept. 5, 1901.

Statistics of Electric Stations in Germany (Statistik der Elektrizitätswerke in Deutschland). The usual annual statement of the electric generating stations in Germany, with comparisons with preceding years. Also editorial. 15000 w. Elektrotech Zeitschr—Dec. 18, 1902.

Statistics of the Electric Stations in Germany (Statistik der Elektricitätswerke in Deutschland). Complete statistical tables of all the German central stations on April 1, 1903, with editorial. 12000 w. Elektrotech Zeitschr—Dec. 24, 1903.

Statistics of Generating Stations in Germany (Statistik der Elektrizitätswerke in Deutschland). The annual tabular review of the electric power and lighting stations in the German empire, with summary and review in comparison with preceding years. 20000 w. Elektrotech Zeitschr—Jan. 12, 1905.

See also ELECTRIC RAILWAY.

Glasgow, Scotland.—The Pinkston Power Station of the Glasgow Corporation Electric Tramways. Arthur H. Allen. Illustrated description of what is undoubtedly the finest station yet built in the United Kingdom. 9000 w. Engr, U S A—Jan. 1, 1902. Special number.

The Central Power Station of the Glasgow Municipal Electric Tramways. Illustrated detailed description of this station and its equipment. 3500 w. Power—Aug., 1902.

The Clyde Valley Electrical Power Company, Limited. Gives a diagram showing the area covered, and an illustrated description of the Yoker generating station. 3000 w. Elec Engr, Lond—June 23, 1905.

The Clyde Valley Electrical Power System, Glasgow, Scotland. Illustrated description of the Yoker generating plant, with an outline of the power scheme to serve the most important manufacturing and coal producing district of Scotland. 2200 w. Elec Wld & Engr—Aug. 5, 1905.

See also ELECTRIC RAILWAY; REFUSE DISPOSAL—Partick.

Gold Mines.—The Johannesburg Electrical Scheme. Notes indicating the character of the proposals and the different items of expenditure relating to a scheme for furnishing electric light, power, and tramways. 3000 w. Elec Rev, Lond—Feb. 20, 1903.

Central Electric Power Stations for Gold Mines. J. W. Kirkland. Read before the Mech. Engrs. Assn. of the Witwatersrand. Points out mistaken principles in operating arrangements of deep-level gold mines, advocating centralization of power to the greatest possible extent and the distribution by means of electricity. 4800 w. Mech Engr—April 4, 1903.

The Rand Central Electric Works. Brief illustrated description of the largest central power station now at work in the British South Africa colonies. 2200 w. Elec Rev, Lond—July 10, 1903.

Central Power Stations for Mines. An account of an innovation being introduced in South Africa, with report of cost. 3500 w. Engr, Lond—June 2, 1905.

See also ELECTRIC EQUIPMENT; GOLD MINE.

Gravesend, Eng.—Gravesend Borough Electricity Supply. B. Pontifex. An illustrated description of alterations and additions to an English plant. Low-tension continuous current is supplied on the three-wire system. 1600 w. Elec Engr, Lond—Nov. 6, 1903.

Grimsby, Eng.—Great Grimsby Municipal Electricity Works. An illustrated detailed description. 2000 w. Elect'n, Lond—May 17, 1901.

Description of the Grimsby Corporation Electricity Works. Walter A. Vignoles. Ills. 2500 w. Elec Engr, Lond—May 6, 1904.

Halfweg, Holland.—The Power Station of the Amsterdam-Haarlem Electric Ry. An illustrated detailed description of the power house at Halfweg. 2200 w. Eng Rec—Jan. 7, 1905.

Halle, Germany.—See GAS ENGINE—Electric Generation.

Hamburg.—The Stations of the Hamburg Electric Works (Die Anlagen der Hamburgischen Elektrizitätswerke). Max Rupprecht. Fully illustrated descriptions of stations and substations. Direct current and storage batteries are used. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—Aug. 26, 1905.

See also ELECTRIC DISTRIBUTION.

Hampton, Va.—A Combined Railway, Lighting and Ice Plant at Hampton, Va. An illustrated detailed description of a noteworthy example of a combined plant. 4000 w. St Ry Jour—Aug. 15, 1903.

Hanover.—The Municipal Central Power Station of Hanover, Germany. Illustrated description of a new alternating current plant and the features of special interest. 2800 w. Power—Oct., 1905.

Hartford, Conn.—Hartford Street Railway Co. An illustrated article describing additional power generating facilities and new car house at Hartford, Conn. 4800 w. St Ry Rev—July 20, 1903.

The Dutch Point Plant of the Hartford Electric Light Company. Illustrated detailed description of a steam-turbine electric central station of 4,000 kw. rated capacity, interesting because of its rapid erection and because of details in design, arrangement of turbine and boiler rooms, and systems of steam piping. 3500 w. Eng Rec—Feb. 25, 1905.

The New Station of the Hartford Electric Light Company. Well illustrated description of the 5500 kw. plant at Dutch Point, Conn., equipped with Westinghouse-Parsons steam turbines to supplement the company's water-power plants. 2500 w. Elec Rev, N Y—Sept. 9, 1905.

Electrical Supply in Hartford. Describes the Hartford, Conn., system, which derives its energy from the Farmington River, and steam power. Curves are given showing the rise of output since 1898. 1600 w. Elec Wld & Engr—Oct. 21, 1905.

See also **HYDRO-ELECTRIC PLANT.**

Hartford-Springfield Ry.—Power Plant of the Hartford and Springfield Street Railway Co. Illustrated description of a direct-current generating station having compound condensing engines. 1400 w. Eng Rec—May 24, 1902.

Hastings, Eng.—Electricity Supply in Hastings. An illustrated description of an electric station at Hastings, England, and an account of experiments made with the Andrews "discriminating" transformer and choking coil and with other apparatus. 5000 w. Elec Rev, Lond—Dec. 26, 1902.

Heating Combined.—See also **Ada; Columbus; HEATING—Dresden Central Station.**

History.—The Railway Power Station. Reviews the progress and development of the last ten years, and the various systems, and equipment. 4000 w. St Ry Rev—Jan. 15, 1901.

The Development of Electric Station Power Plant. Elihu Thomson. Read before the Nat. Elec. Lgt. Assn. Reviews the development of the last twenty-five years, discusses the probable change to turbine driven plants, the possible use of internal combustion engines, etc. 2200 w. Ir Age—June 25, 1903.

See also **Edison; Massachusetts Municipal.**

Hoboken, N. J.—The Hoboken Power Plant of the United Electric Company of New Jersey. Illustrates and describes a plant changed from a belted plant containing engines and generators of various types and capacities, to a modern plant of direct-connected units, and the change of e. m. f. from 1040 to 2400, all accomplished without shutting down any circuit. 1500 w. Elec Wld & Engr—March 23, 1901.

The Hoboken Station of the United Electric Company. Illustrated description of a steam plant mainly noteworthy for the unusual system of piping made necessary during the reconstruction of the station in order to avoid any interference with the supply of current. 1800 w. Eng Rec—July 19, 1902.

See also **Boston.**

Holborn Viaduct.—See **Edison, London.**

Holland.—Stations for Electric Supply of Small Districts (Centraalstations voor Electrische Stroomlevering in Klemere Gemeenten). C. D. Nagtglas Versteeg. Giving data of a number of moderate sized stations in Holland, and a description of the plant at Hilversum. 3000 w. De Ingenieur—Nov. 23, 1901.

Hoylake and West Kirby, Eng.—Hoylake and West Kirby Electricity Works. Illustrates and describes details of the plant and equipment. 1500 w. Elec Engr, Lond—Aug. 16, 1901.

Hydro-Electric.—See **HYDRO-ELECTRIC PLANT.**

Hydro-Steam.—See **HYDRO-ELECTRIC PLANT.**

Ilford, Eng.—Ilford Electricity Works. Illustrated detailed description. 3300 w. Elec Engr, Lond—May 24, 1901.

Indiana.—The Power Generating and Distributing System of the Union Traction Co. of Indiana. Illustrated description of the new power house at North Anderson and information concerning the lines. 9000 w. St Ry Rev—April 15, 1901.

The Power House of the Union Traction Company at Anderson, Ind. Illustrated description of a 3,000-K. W. station for operating an interurban system of 163 miles; describes mainly the design of the steam power plant, but outlines the electrical plant and system of distribution to eight sub-stations. 2700 w. Eng Rec—May 25, 1901.

Central Station Economies. W. E. Goldsborough and P. E. Fansler. An account of a comprehensive test made to determine the economies of the main power station of the Union Traction Co., of Indiana. Ill. 7800 w. Trans Am Inst of Elec Engrs—July, 1903.

See also **ELECTRIC RAILWAY.**

Indianapolis.—See **HEATING.**

Interborough, N. Y.—See **New York.**

Ipswich, Eng.—Ipswich Electric Lighting and Tramways Undertaking. Illustrated description of an English electric station and its equipment. 2000 w. Elec Rev, Lond—Aug. 5, 1904.

Isle of Thanet.—See **ELECTRIC RAILWAY.**

Ithaca, N. Y.—The Ithaca, N. Y., Electric System. An illustrated description of a very unusual system. 5300 w. Engr, U S A—Sept. 15, 1903.

Jersey City.—Steel Work of the Marion Power Station, Public Service Corporation of New Jersey. Illustrated description of a power house in Jersey City, designed for an installation of boilers and Curtis turbo-generators of about 64,000 K. W. ultimate capacity. 1800 w. Eng Rec—Aug. 19, 1905.

Jewett City, Conn.—See **OIL ENGINE—Central Station.**

Johannesburg.—See **Gold Mines; ELECTRIC EQUIPMENT—Gold Mining.**

Johnstown, Pa.—The Broad Street Station of the Citizens' Light, Heat & Power Company, Johnstown, Pa. Illustrated detailed description of this station and its equipment. 2000 w. Power—Sept., 1904.

Kansas.—See **ELECTRIC STATION MANAGEMENT.**

Kansas City, Kan.—The Central Avenue Power Station. H. S. Badger and G. E. Schreiber. An illustrated detailed description of a recent installation in Kansas City, Kan. 6500 w. Power—May, 1903.

Kansas City, Mo.—The Missouri River Power Station of the Metropolitan Street Railway Company of Kansas City, Mo. Illustrated detailed description of one of the largest power stations in the United States. Curtis steam turbines are to be installed. 4000 w. St Ry Jour—Aug. 1, 1903.

A Rapidly Growing Western Central Station. E. A. Barth. Illustrated description of the generating plant of the Kansas City Electric Light Company. 5800 w. Am Elect'n—June, 1904.

The Missouri River Power Station of the Metropolitan Street Railway Company of Kansas City, Mo. Howard Prescott Quick. Explains the situation in Kansas City, giving an illustrated detailed description of the design, and arrangement of the plant, its equipment, &c. Ills. 8000 w. St Ry Rev—June 20, 1904.

The Missouri-River Power-House of the Metropolitan Street Railway Company, Kansas City, Missouri. F. G. Cudworth. Illustrated detailed description of the 40,000 K. W. station of the Metropolitan Street Railway Co. 8000 w. Eng News—Oct. 19, 1905.

Karlsruhe, Baden.—The Electric Plant at Karlsruhe (Das Elektricitätswerk der Stadt Karlsruhe). F. Winawer. A fully illustrated account of the steam and electric plant. A polyphase system, with transformers is used. 2000 w. Elektrotech Zeitschr—Oct. 10, 1901.

The New Polyphase Generators at the Karlsruhe (Baden) Central Station (Die Neuen Drehstrommaschinen der Gesellschaft für Elektrische Industrie, Karlsruhe). F. Winawer. A short illustrated description of the large machines. 700 w. Elektrotech. Rundschau—Jan. 15, 1902.

New Electric Stations (Neuere Elektrizitätswerke). Felix Winawer. An illustrated description of the electric station at Karlsruhe, Baden, and the distribution plant. 2000 w. Elektrizität—Jan. 18, 1902.

See also ELECTRIC EQUIPMENT.

Kensington and Notting Hill, Eng.—The Kensington and the Notting Hill Companies' Joint Electricity Works. An account of generating works erected in a London suburb at a cost of £100,000. Ill. Serial. 1st part. 2800 w. Elec Rev, Lond—June 21, 1901.

The Kensington and Notting Hill Companies' Joint Electricity Supply Works. Illustrated detailed description of the works. The alternating-current system is used, and three-phase generators. Serial. 1st part. 4000 w. Elect'n, Lond—Sept. 6, 1901.

Kingsbridge, N. Y.—See New York.

Laar, Germany.—See GAS—POWER PLANT.

Labor-Saving Machinery.—Labor-Saving Machinery in Central Stations. Discusses the reckless adoption of labor-saving machinery under unsuitable conditions. 2000 w. Elec Rev, Lond—April 7, 1905.

Lagos.—The Electric Station at Lagos (Die Elektrische Centrale in Lagos). C. Hohl. A general description of the modern generating station for lighting, power and tramway service, in the capital of British West Africa. 3000 w. Elektrotech Zeitschr—Aug. 21, 1902.

Lancashire, Eng.—Lancashire Electric Power Co.'s System of Generation and Distribution. Illustrates and describes this system which is the first electric power undertaking in England to work with 10,000 volt overhead bare conductors. Also editorial. 3000 w. Elect'n, Lond—Oct. 13, 1905.

Lebring, Austria.—The 20,000-Volt Power Transmission Plant. A. J. Bloemendal. Illustrated description of plant at Lebring, Austria, in which 3,000 horse-power is transmitted 20 miles. Details of transformers and line are given. 2500 w. Engng—Feb. 26, 1904.

Leeds, Eng.—Leeds Tramway Plant. Illustrated description of the horizontal cross compound engines used in this English plant. 1800 w. Engr, Lond—Dec. 14, 1900.

Leeds Electric Power Station. An illustrated description of a 9,000-kilowatt electric station at Leeds, England. 1000 w. Elec Rev, N Y—Jan. 3, 1903.

Leek, Eng.—Leek Electricity Works. Illustrated description of small English electric station, driven by town gas. 1600 w. Elec Rev, Lond—Aug. 12, 1904.

Lighting.—See ELECTRIC LIGHTING—Central Station.

Lima, Ohio.—An Economical Power Plant at Lima, Ohio. Frank B. Rae. An illustrated description of a plant embracing the latest ideas of equipment in connection with reciprocating engines, and introducing a novel floor arrangement of apparatus. 5500 w. St Ry Jour—Nov. 26, 1904.

Liverpool.—See ELECTRIC RAILWAY.

Location.—See ELECTRIC RAILWAY—Train Sheets; ELECTRIC STATION MANAGEMENT.

London.—Electric Central Station Practice in England. Frank C. Perkins. The St. Luke's and the Wandsworth stations are described and illustrated as typical examples. 3000 w. Engineering Magazine—Dec., 1900.

The Direct-Current Plant at Bankside. Illustrated description of the plant and engine-room with which the continuous-current supply has been given. 2300 w. Elec Times—Feb. 27, 1902.

The City of London Electric Lighting Company's works. Illustrated article describing the extension and changes from alternating to continuous current at the Bankside Works. 3000 w. Elec Engr, Lond—Feb. 28, 1902.

Bow Electric Generating Station. W. H. Patchell. Abstract of a paper read before the Inst. of Elec. Engrs. illustrating and describing the station and its equipment. Serial. 1st part. 2500 w. Mech Engr—Dec. 16, 1905.

The Electricity Works of the Central Electric Supply Company. An illustrated description of a London central station generating three-phase currents at 6000 volts. 1200 w. Elect'n, Lond—Jan. 9, 1903.

A 57,000 Kilowatt Steam Turbine Station. Brief illustrated description of the principal features of the generating station under construction at Chelsea, Eng., by the Underground Elec. Ry. Co., of London, Ltd. 1000 w. Power—Aug., 1903.

The Underground Electric Railways Power-Station at Chelsea. Illustrations, with historic notes and outline description. 3300 w. Tram & Ry Wld—Nov. 12, 1903.

The London Underground Electric Railways Power Station. Illustrations and description of partially completed Chelsea station, in which will be installed ten 5500-kilowatt Westinghouse steam-turbine generators. 400 w. Tram & Ry Wld—Aug. 11, 1904.

The Great London Power Station. Harold J. Shepstone. Brief, illustrated description of the great generating station at Chelsea, London, to furnish the necessary power for working the Metropolitan District and other London railroads. 1500 w. Sci Am—Dec. 17, 1904.

The Lot's Road Generating Station of the Underground Electric Railways Co. of London. Illustrated description of the largest station of its kind in Great Britain. 3500 w. Elect'n, Lond—Oct. 21, 1904.

A London Electric Railway Power House. Illustrated description of the generating station in Lot's Road, Chelsea. 2800 w. Elec Wld & Engr—Jan. 14, 1905.

The Chelsea Generating Station of the London Underground Railways. An illustrated description of this power station. 2000 w. Eng Rec—Feb. 25, 1905.

The Crystal Palace District Electricity Supply Works. A detailed description of the station as it is since the recent alterations. Ill. 1700 w. Elect'n, Lond—Jan. 10, 1902.

The New Shoreditch Electricity Works. Illustrated description of the new works which have been erected in London, England. 3700 w. Elec Engr, Lond—June 20, 1902.

London United Tramways Power Station. An illustrated detailed description of this interesting generating station, with information in regard to the object for which this company was formed, and the area with which it deals. 2400 w. Engr, Lond—June 5, 1903.

Recent Types of British Central Stations. Illustrates and describes the central station at West Ham, London, and features of some other English plants. 3500 w. Am Elect'n—Jan., 1901.

New Electricity Works at West Ham. Illustrated description of this new electric generating station which is one of the largest English municipal undertakings. 3500 w. Elect'n, Lond—April 1, 1904.

Electrical Extensions at Willesden. A detailed description of the engines and alternators added, explaining the conditions to be met. Serial. 1st part. 1700 w. Engr, Lond—April 10, 1903.

Recent Developments of the Metropolitan Electric Supply Co.'s Installations. Illustrated description of the progress made at Willesden, and in the sub-stations. Serial. 1st part. 3000 w. Elec Rev, Lond—Nov. 13, 1903.

See also Edison; Kensington; ELECTRIC RAILWAY; REFUSE DISPOSAL; UNDERGROUND RAILWAY—London Metropolitan.

London Conduit Railway.—See ELECTRIC RAILWAY CONDUIT.

Long Island City, N. Y.—Long Island City Power House of the Pennsylvania Railroad. Illustrated description of an installation designed to supply power for the operation of trains through the East River tunnel and for lines now being equipped with electricity by the Long Island Railroad Co. 1800 w. St Ry Jour—Jan. 7, 1905.

Los Angeles, Cal.—The System of the Los Angeles Electric Company. Illustrates and describes the new power house of the Los Angeles Elec. Co. and its equipment. 1500 w. Jour of Elec—Feb., 1902.

See also ELECTRIC RAILWAY; HYDRO-ELECTRIC PLANT.

Lowestoft, Eng.—Lowestoft Electricity Works. An illustrated detailed description of the electric lighting installation. 2200 w. Elec Engr, Lond—March 1, 1901.

Ludwigshafen.—The Municipal Electric Plant at Ludwigshafen on Rhine (Städtisches Elektricitätswerk Ludwigshafen a. Rh.). Rudolf Gassner. With plans of the buildings and general description of the entire plant. 2000 w. Elektrotech Zeitschr—July 24, 1902.

Luton, Eng.—Luton Electricity Works. Illustrated description and brief history of this municipally owned electric lighting plant in England. 1600 w. Elec Engr, Lond—July 12, 1901.

Madison, Wis.—See GAS ENGINE.

Madrid.—The Reconstruction of the Electric Station at Madrid, Spain (Umbau des Elektricitätswerkes der Electricity Supply Co. for Spain, Ltd., Madrid). H. Baswitz. An illustrated description of the new plant, giving details of generators, transformers, and distribution. 3000 w. Elektrotech Zeitschr—May 23, 1901.

Maidenhead, Eng.—Maidenhead Electricity Supply Works. An illustrated general description of a continuous-current, three-wire system lately installed at the municipal works of Maidenhead, England, near the Thames. 4000 w. Elec Engr, Lond—Dec. 19, 1902.

Maidstone, Eng.—Maidstone Electricity Works. Illustrated description of recently opened electric-lighting works. 2000 w. Elec Engr, Lond—Jan. 3, 1902.

Malden, Mass.—See ELECTRIC LIGHTING.

Manaos, Brazil.—Electricity at Manaos, Brazil. Charles S. Seibert. An illustrated description of an electric light plant; also of a railway plant operating 15 miles of single track road; and a third company which furnishes electricity for general use. 1600 w. Elec Wld & Engr—July 5, 1902.

See also ELECTRIC EQUIPMENT.

Manchester, Eng.—Extension of the Manchester Corporation Electricity Works. An illustrated description of the new power station at Stuart-street, Bradford, an industrial suburb of Manchester, and its equipment. Also outlines the schemes in connection with this station. 5000 w. Elect'n, Lond—June 6, 1902.

New Power Station and Car House at Manchester, England. An illustrated article giving particulars of interest in regard to the new Stuart Street works, which combines under one roof two complete stations of considerably different design. 2500 w. St Ry Jour—Sept. 6, 1902.

The New Electricity Works of the Manchester Corporation. An illustrated detailed description of the largest electric power distribution undertaking in Great Britain. Serial. 1st part. 4000 w. Elec Rev, Lond—June 26, 1903.

The Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board's Scheme. An illustrated article giving information of recent work in the development of this scheme in the neighborhood of Manchester, Eng. 3000 w. Elec Rev, Lond—Nov. 11, 1904.

See also Trafford Park; ELECTRIC DISTRIBUTION.

Manchester, N. H.—See ELECTRIC DISTRIBUTION.

Manhattan Ry., N. Y.—See New York.

Massachusetts.—See ELECTRIC INDUSTRY; ELECTRIC LIGHTING; ELECTRIC STATION MANAGEMENT—Coal; Massachusetts.

Massachusetts, Municipal.—Equipment and Operation of Municipal Electric Light Plants in Massachusetts. Alton D. Adams. Notes the progress since the first municipal plant in 1889. 1000 w. Munic Engng—Dec., 1902.

Mechanical Stoking.—See MECHANICAL STOKING—Electric Stations.

Medellin, Colombia.—The Electric Plant at Medellin, Colombia, S. A. C. H. Hines. Describes a typical plant in the tropics, showing the difficulties to be overcome. 1500 w. Elec Wld & Engr—April 15, 1905.

Melbourne, Aust.—City of Melbourne Electric System. A. J. Arnot. Illustrated detailed description of a comprehensive light and power plant. 2000 w. Aust Min Stand—Dec. 26, 1901.

Meriden, Conn.—Reconstructed and enlarged Central Station. An illustrated description of the reconstructed plant of the Meriden Electric Light Company. 5000 w. Am Elect'n—Dec., 1903.

Metuchen, N. J.—A Modern District Supply Central Station. Illustrated description of the plant of the Central Electric Company at Metuchen, N. J. 2700 w. Am Elect'n—July, 1902.

Middlesbrough, Eng.—300-Kilowatt Triple-Expansion Engine; Middlesbrough Electricity Works. Illustrated description of a direct-driven electric generating plant. 1200 w. Engng—Dec. 26, 1902.

See also ELECTRIC EQUIPMENT—Docks, Middlesbrough.

Middleton, Eng.—Middleton Electric Lighting and Tramways. Illustrated description of small supply works recently opened in England. 1600 w. Elect'n, Lond—April 11, 1902.

Midland, Eng.—The Midland Electric Power Station. Illustrations and information concerning the development of electric power distribution for lighting and traction work at Ocker Hill. 2500 w. Engng—Nov. 14, 1902.

Minneapolis.—New Power Installation of the Twin City Rapid Transit Company. Illustrates and describes the addition to the power equipment recently found necessary for the line connecting Minneapolis and St. Paul, Minn. 4800 w. St Ry Rev—July 20, 1904.

Mechanical Features of the Twin City Rapid Transit Company's New Power Plant. Howard S. Knowlton. Illustrated description of the coal bunkers and conveyors, boiler plant, engine room, etc. 2500 w. Eng Rec—Dec. 10, 1904.

Monterey Co., Cal.—See Gas Combined.

Montreal.—Recent Additions to the Generating Plant of the Montreal Street Railway. Ralph D. Mershon. Illustrates and describes the addition of machinery and switchboard apparatus required for receiving power transmitted from hydraulic generating plant 17 miles distant. 900 w. St Ry Jour—June 6, 1903.

The Frequency Changers at Montreal. B. A. Behrend. Illustrates and describes this plant and gives report of its power and efficiency. 1200 w. Elec Wld & Engr—Feb. 13, 1904.

See also HYDRO-ELECTRIC PLANT—Lachine.

Morgantown, W. V.—See ELECTRIC RAILWAY.

Moulineaux, Paris.—See Paris.

Mountain.—Electric Plants in the Mountains. Describes plants whose design depended on the facilities for transporting the parts to the site of the stations: burros, rope-ways and wagon roads furnishing the basis of classification of the different designs. 2200 w. Eng Rec—June 15, 1901.

Munich.—The Electric Plants of the City of Munich (Die Elektrizitätswerke der Stadt München). K. Meyer. A general description of the electric generating and transforming stations in Munich. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—Jan. 14, 1905.

Municipal.—See Nashville; Taunton; Massachusetts; ELECTRIC STATION MANAGEMENT; MUNICIPAL OWNERSHIP.

Nanticoke, Pa.—The Power System of the Lackawanna R. R. in Luzerne Co., Pa. H. M. Warren. Deals with the preliminary estimates, plans and details of the plant under construction in the Nanticoke district, near Scranton, with its sub-stations and transmission lines. 3800 w. Eng Rec—Nov. 4, 1905.

Naphtha, Russia.—See Caspian Oil Wells.

Naples, Suburban.—See ELECTRIC RAILWAY; MOUNTAIN RAILWAY—Vesuvius.

Narragansett Co.—See Providence, R. I.

Nashville, Tenn.—Municipal Lighting for Nashville. Illustrates and describes a large electric lighting plant and its successful operation. 2300 w. Munic Jour & Engr—June, 1903.

Natal.—See Durban; Pietermaritzburg.

Natural Gas.—See Olean, N. Y.

Navy Yard, Brooklyn. — See ELECTRIC EQUIPMENT.

Neuchatel. — The Steam Electric Station at Neuchatel, Switzerland (Usine Electrique à Vapeur de Neuchatel). Roger Chavannes. Well illustrated description of building and plant, including Parsons-Brown-Boveri steam turbines and table of steam consumption of these tubines in various plants. Serial. 3 parts. 4500 w. Bull Tech d l Suisse Romande—April 25, May 25, June 10, 1903.

The New Electric Works at Neuchatel, Switzerland. A. Steere. Illustrated description of a steam turbine-driven electric plant to supplement the hydro-electric plant. 1600 w. Eng Rec—June 4, 1904.

Neversink, N. Y.—The Power Plant of the Neversink Light and Power Company. Illustrated description of a plant to furnish power to the towns of Monticello, Middletown and Port Jervis, N. Y. 1200 w. Eng Rec—June 6, 1903.

Newark, N. J.—A Rebuilt and Enlarged Central Station. Illustrated description of the River Station of the United Electric Company of New Jersey, at Newark. 4000 w. Am Elect'n—Oct., 1902.

Newcastle-on-Tyne.—The Beginning of Electric Power Distribution. An illustrated description of the first three-phase electric power supply system in Great Britain. The inauguration of the station at Neptune Bank in Wallsend, Newcastle-on-Tyne. 4300 w. Lightning—June 20, 1901.

Electric Power Supply at Newcastle-on-Tyne. An illustrated detailed account of this undertaking for supplying electric power "in bulk." Serial. 1st part. 5000 w. Elect'n, Lond—June 21, 1901.

Neptune Bank Power Station at Newcastle-on-Tyne. Illustrated detailed description of a station designed to supply electric energy for industrial purposes, lighting and traction. 5300 w. Tram & Ry Wld—July 11, 1901.

Electric Power Supply on the Tyne. The present article gives an illustrated description of the Neptune Bank Station, with the history of the undertaking. Serial. 1st part. 1800 w. Engr, Lond—Sept. 13, 1901.

Newcastle and District Electric Lighting Co.'s Power Stations. W. D. Hunter. Illustrates and describes the Forth Banks and Close power stations and their equipment. 8 plates. 4000 w. Inst of Mech Engrs—July 29, 1902.

The Electric-Supply Power-Station at Neptune Bank, Newcastle-Upon-Tyne. W. B. Woodhouse. An illustrated description of the first station to supply electric power in bulk in England, and also of its equipment. 2800 w. Inst of Mech Engrs—July 29, 1902.

See also **ELECTRIC RAILWAY.**

New England.—See **Massachusetts; ELECTRIC TRANSMISSION.**

New Orleans.—The Power Plants of the New Orleans Railways Company. An illustrated detailed description of the plants, and information of related interest. 4000 w. St Ry Jour—June 18, 1904.

New Rochelle, N. Y.—A Modern District Central Station. Illustrated detailed description of the plant of the Westchester Lighting Company, at New Rochelle, N. Y. 2200 w. Am Elect'n—March, 1902.

Newton, N. J.—See **GAS-POWER PLANT.**

New York.—Comparative Review of the Steam Plants of Three Large Electric Traction Main Stations in New York City. William Kent. The article criticizes the lines that have been followed and suggests means by which considerable economy would have been effected. Ill. 11600 w. St Ry Jour—Oct. 5, 1901.

Estimates for an Electric Plant for Public Lighting in New York City. Gives the report of Dr. Cary T. Hutchinson on the cost of building and opening a plant to furnish 10,000 arc and 160,000 incandescent electric lamps for lighting the streets, public buildings and places of the boroughs of Manhattan and the Bronx. 2800 w. Eng News—May 28, 1903.

Proposed Municipal Electric Power Station for the City of New York. Drawings showing the general plan of the power plant, and discussing the general features; also reviewing the report of the Commission on Electric Lighting, submitted to the Mayor on June 19, 1905. 2500 w. Elec Rev, N Y—July 15, 1905.

The New Waterside Station of the New York Edison Co. Illustrated description of this station which furnishes current for lighting and power purposes. 6600 w. Power—Jan., 1902.

The New Power Station of the New York Edison Company. Gives a brief description of the plants now in use and an illustrated description of the Waterside station, situated on the East River, between 38th and 39th sts. 5400 w. Eng Rec—Jan. 4, 1902.

The Waterside Station of the New York Edison Company. The first of a series of fully-illustrated articles describing this large station, its equipment and operation. Serial. 1st part. 4500 w. Elec Wld & Engr—Jan. 4, 1902.

Structural Details of the Waterside Power Station, New York. Illustrated description of the steel work, including columns and coal pockets, roof-trusses, and smoke-stack platforms in a 197x272 ft. power station rising 155 ft. above the ground. 6700 w. Eng Rec—March 15, 1902.

The Waterside Electric Station (Station Centrale Electrique de Waterside). F. Drouin. An illustrated description of the Waterside station of the New York Edison Company with comments from a French point of view. 3000 w. 1 plate. Génie Civil—Dec. 13, 1902.

Waterside Station No. 2 of the New York Edison Company. Well illustrated description of light and power station with 7500 and 8000 kw. turbo generators, with ultimate capacity of over 100,000 horse-power. Serial. 2 parts. 4500 w. Elec Wld & Engr. Sept. 2 and 9, 1905.

The New Waterside Station of the New York Edison Co. Illustrated detailed description of a turbine driven plant known as "Waterside Station No. 2." 3500 w. Eng Rec—Sept. 9, 1905.

The New Waterside Station of the New York Edison Company. Fully illustrated detailed description of this large station on the East river water-front, Manhattan, New York. 1300 w. Power—Dec., 1905.

The Electrical Equipment of the Manhattan Elevated Railway. A comprehensive series of articles relating to this great work in progress in New York. The magnitude of the work, the engineering problems, and special features introduced make the subject of great interest. This issue describes the generating station and distributing system in detail. Ill. 26200 w. St Ry Jour—Jan. 5, 1901.

Electric Plant of the Manhattan Elevated Railway. An illustrated account of the main features of this installation. 4200 w. Elec Wld & Engr—Jan. 5, 1901.

Opening the Power Station of the Manhattan Elevated Railway. Illustrated description of the powerful stationary engines for driving the alternators for the New York Elevated railways. The total horse-power of the station will be 100,000. Also editorial. 2200 w. Sci Am—Jan. 11, 1902.

Electrical Machinery in the Power Station and Sub-stations of the Manhattan Ry. Co. Illustrates the more important machines, with brief descriptions. 2000 w. Eng News—Jan. 30, 1902.

The Power Station of the Manhattan Elevated Railway. Illustrated description of the new power station on the East River, between 74th and 75th streets, New York. 4400 w. Power—April, 1901.

Structural Details of the Manhattan Railway Power House, New York. Illustrated description of the heavy steel framing in a 100,000-H. P. power station; full details are given of the trusses and columns of the coal pockets. 2800 w. Eng Rec—July 13, 1901.

Some Features of the Manhattan Elevated Railroad Company's Station Equipment. Illustrated description. 2500 w. Am Elect'n—Feb., 1902.

New Power Station of the Manhattan Railway Company. Illustrations and descriptive notes on the engines and generators of the electrical system being installed on the Manhattan Elevated Railway, in New York. 2000 w. St Ry Jour—Feb. 1, 1902.

Power System and Generating Station of the Manhattan Railway Co., New York. Arthur L. Rice. An illustrated detailed description of the power station, boiler plant, feed water system, steam piping, engines, exhaust system, etc. 10500 w. Engr, U S A—Feb. 1, 1902.

Electrical Equipment of the Manhattan Railway. Brief description with illustrations of the largest electrical plant yet built in the United States. 1400 w. St Ry Rev—Feb. 15, 1902.

The Power Station of the Manhattan Railway, New York. An illustrated detailed description of the electric power station for the elevated system in New York. 5300 w. Ir Age—March 13, 1902.

Some Features of the New York Rapid Transit Power House. Illustrations with brief description of interesting features. 1800 w. Power—Dec., 1902.

The Power House of the Interborough Rapid Transit Company, New York. Brief illustrated description prepared on the occasion of a recent visit of the Am. Soc. of Civ Engrs. 2000 w. Eng Rec—Jan. 23, 1904.

The Power House of the Interborough Rapid Transit Company, New York. Illustrated description of this plant and its equipment. 4500 w. Power—Sept., 1904.

Largest Steam-Driven Power Station in the World. Illustrates and describes the steam plant of the New York Interborough Rapid Transit Company. 6700 w. Am. Elect'n—Oct., 1904.

The Power House of the Subway Division, Interborough Rapid Transit Co., New York. An illustrated comprehensive description of this station. Serial. 1st part. 5800 w. Eng Rec—Oct. 1, 1904.

The Steam Generating and Engine Equipment of the Power Plant. John Van Vleck. An illustrated detailed description of the construction and equipment of the power plant for the New York Rapid Transit Subway. 9500 w. St Ry Jour—Oct. 8, 1904.

The Electric Generating Equipment and Power Distribution System of the New York Rapid Transit Subway. L. B. Stillwell. A full illustrated description of the details of this system, with related information of interest. 5000 w. St Ry Jour—Oct. 8, 1904.

Opening of the New York Rapid Transit Subway. An illustrated article dealing mainly with the great power station at Fifty-ninth Street and the North River. 2000 w. Sci Am—Oct. 29, 1904.

Incidents in the Operation of a Large Power Plant and Distribution System. H. G. Stott. Gives incidents which occurred in the 74th St. plant and transmission system of the Interborough Rapid Transit Co. of New York City. 1500 w. Elec Club Jour—May, 1905.

Kingsbridge Power Station of the New York City Railway Company. Illustrated detailed description. 4500 w. Eng Rec—July 2, 1904.

The Kingsbridge Power Station of the New York City Railway Company. Illustrated detailed description of this large power plant and its equipment. 6500 w. St Ry Jour—July 2, 1904.

Notes on the Metropolitan Street Railway Power Plants. M. G. Starrett. Gives the results of the operation of the Ninety-sixth street power house, the largest electric railway power house in the world. Ill. 4200 w. St Ry Jour—Oct. 5, 1901.

See also Edison; ELECTRIC GENERATOR; ELEVATED RAILWAY; STEAM ENGINE; UNDERGROUND RAILWAY.

New York and Queens Co.—Reconstructed Central Station and Sub-Stations. Illustrated detailed description of the plant of the New York & Queens Electric Light & Power Company at Astoria, Jamaica and Flushing, L. I. 3600 w. Am Elect'n—Aug., 1902.

N. Y. Central Ry.—See Port Morris; ELECTRIC RAILWAY.

1903.—Central Station Progress During 1902. W. S. Barstow. A general review of electric generating station practice. 1800 w. Elec Wld & Engr—Jan. 3, 1903.

Northwich, England.—Northwich Electricity Works. illustrated detailed description of an installation having interesting features. 2800 w. Elec Rev, Lond—Feb. 1, 1901.

Norway.—See GAS ENGINE—Electric Plant, Norway.

Nottingham, Eng.—See ELECTRIC RAILWAY.

Nuneaton, Eng.—Nuneaton Electricity Works. An illustrated account of the electric station and distribution system at Nuneaton, Warwickshire, and curves of costs and accounts. 2500 w. Elec Engr, Lond—Dec. 12, 1902.

Oakland, Cal.—The Key Route Electric Railway Power Plant, Oakland, Cal. An illustrated detailed description of the plant provided for the San Francisco, Oakland & San José Railway, which has many features of interest. 2700 w. Eng Rec—May 7, 1904.

Ocker Hill, Eng.—See Midland.

Oil Engine.—See San Francisco; OIL ENGINE.

Old Colony Street Ry.—See Quincy Point, Mass.

Olean, N. Y.—Power Stations of the Olean, N. Y., Street Ry. Brief illustrated description of the Olean and the new Ceres generating plants, using natural gas as fuel. 1000 w. Steam Engng—July 10, 1903.

Omaha.—Electric Supply in the Gate City. Alton D. Adams. An illustrated account of the service in Omaha. 2000 w. Elec Rev, N Y—Jan. 14, 1905.

Operation.—See ELECTRIC STATION MANAGEMENT.

Ottawa.—New Electric Lighting Plant for Ottawa, Canada. A. A. Dion. An illustrated description of the several stations as they are since the reconstruction made necessary by the destructive fire in 1900. 5600 w. Elec Wld & Engr—June 7, 1902.

Paris.—The Malakoff Power Station (Usine Electrique de Malakoff). Ch. Dantin. Describing an important generating station in the southwestern part of Paris, supplying current to four tramway systems with a total length of 40 kilometers. 2000 w. 1 plate. Génie Civil—Oct. 5, 1901.

The Electric Station of the Eastern Paris Lighting Company (Installations Electriques de la Cie. Est-Lumière). Henry Martin. A well illustrated description of a central station, substation and electric distribution system in the east suburbs of Paris. 1 plate. 4000 w. Génie Civil—May 10, 1902.

A Large, Modern Paris Generating Plant. C. L. Durand. Illustrated description of a large plant recently erected by the Compagnie Parisienne de l'Air Comprimé. 3000 w. Elec Rev, N Y—May 28, 1904.

Equipment of a Large French Railway Power House. C. Domar. Illustrated description of a generating station for the Paris Metropolitan road. 3000 w. Am Elect'n—March, 1904.

The Power Plant for the Metropolitan Street Railway of Paris. Emile Guarini. Illustration of interior of plant, with descriptive notes. 3000 w. Sci Am Sup—Aug. 8, 1903.

The Moulineaux Traction Station at Paris. Illustrated description of the largest electrical generating station in France. 1100 w. Tram & Ry Wld—Oct. 11, 1900.

The Electric Installations of the Western Railway of France (Les Installations de la Compagnie des Chemins de Fer de l'Ouest). E. Cappeau. A description of the plant for lighting, miscellaneous power, and for the traction on the Paris-Versailles line. Serial. Part I. 2500 w. Revue Technique—May 10, 1901.

Electric Traction on the Invalides-Versailles Line (La Traction Electrique sur la Line des Invalides à Versailles). F. Drouin. Describing especially the power station at Moulineaux, containing nine direct-connected generating sets of 800 kilowatts each. 2500 w. 1 plate. Génie Civil—Sept. 14, 1901.

A Large Parisian Electric Generating Plant. Francis Paul. Illustrated detailed description of the Moulineaux power station in Paris. 2500 w. Am Elect'n—July, 1904.

See also ELECTRIC RAILWAY; ELECTRIC RAILWAY, CONDUIT.

Paris-Orleans Ry.—The Electric Plant of the Orleans Railway (Installations Electriques de la Compagnie des Chemins de Fer d'Orléans). A general description of the generating station for the operation of the electric section between the Pont d'Austerlitz and the Quai d'Orsay, Paris. 2500 w. Revue Technique—Aug. 10, 1901.

See also ELECTRIC RAILWAY.

Partick, Glasgow.—See REFUSE DISPOSAL.

Peekskill, N. Y.—New Power House of the Peekskill Lighting and Railroad Company. Illustrated description of a small modern equipment in which provision has been made for expansion and for marked changes in loads. 4000 w. St Ry Jour—July 19, 1902.

Philadelphia.—Electric Lighting in the City of Benjamin Franklin. W. C. L. Eglin. An account of the consolidation and reconstruction of the electrical supply interests with illustrated detailed description of the main generating station and its equipment. 3000 w. Elec Wld & Engr—March 5, 1904.

Power Equipment of the Philadelphia Rapid Transit Co. Illustrated descriptions of the direct-current stations, and the alternating-current station, sub-stations, and their equipment. 5800 w. St Ry Rev—Sept., 1905.

Power Plant Improvements of the Philadelphia Rapid Transit System. Illustrates and describes the Wyoming Ave. station, and the steam turbine Delaware Ave. station, and their equipment. 3000 w. Eng Rec—Sept. 23, 1905.

Generation and Distribution of Power in the Philadelphia Rapid Transit System. Describes the general power scheme, the direct-current stations, alternating-current stations, new turbine station, etc. Ills. 9000 w. St Ry Jour—Sept. 23, 1905.

Pietermaritzburg, Natal.—Pietermaritzburg (Natal) Electric Lighting and Tramways. Brief, illustrated description of the plant. All the cables are laid underground. Maps. 3000 w. Elec Rev, Lond—Dec. 9, 1904.

Pittsburg.—Brunots Island Power Station of the Pittsburg Railways Co. Illustrated detailed description of the station and its equipment. 1600 w. St Ry Rev—July 15, 1905.

Pittsfield, Mass.—Power Plant of the Berkshire Street Railway Co., Pittsfield, Mass. Illustrated description of a plant with two 750-k. w. units distributing alternating current at 13,300 volts, for a 40-mile country road. Describes particularly the piping. 2000 w. Eng Rec—July 26, 1902.

The Berkshire Street Railway Power House. Illustrates and describes a new generating station at Pittsfield, Mass. 2500 w. Steam Engng—Nov. 10, 1902.

Power House of the Berkshire Street Railway Co., Pittsfield, Mass. Illustrated detailed description. 2500 w. St Ry Rev—Nov. 20, 1902.

New High Tension Alternating Current Installation of the Berkshire Street Railway Company at Pittsfield, Mass. W. G. Viall. Illustrated detailed description. 3000 w. Am Elect'n—Aug., 1903.

Plymouth, Mass.—Electric Light in the Home of the Pilgrims. Alton D. Adams. A small system which carries an important motor load is described. 1000 w. Elec Rev, N Y—Aug. 16, 1902.

Polyphase.—Choice of Type and Periodicity for Electric Traction Plant. H. M. Hobart. Thinks the rotary converter should be superseded by the motor generator, and the periodicity should be still further lowered for the case of very slow speed steam engines; but it may be advantageous to employ rotary converters, and at 25 cycles per second, for plants where the generators are direct connected to high-speed engines. 1100 w. Elec Rev, Lond—May 24, 1901.

On Polyphase Generating and Sub-Station Plant for Electric Traction. A. C. Eborall. Discusses points in a recent paper by H. M. Hobart. Serial. 1st part. 2300 w. Elec Rev, Lond—June 1, 1901.

On Polyphase Generating and Sub-Station Plant for Electric Traction. H. S. Meyer. Discussing points in article by A. C. Eborall. 1800 w. Elec Rev, Lond—July 5, 1901.

The Influence of Polyphase Apparatus on the Design of Railway Power Stations. J. E. Woodbridge. On the need of modifying the design to suit the electrical apparatus, illustrating the influences by preventing actual designs based as nearly as possible on usual practice. Ill. Serial. 1st part. 3400 w. Elec Wld & Engr—Oct. 5, 1901.

See also under names of places.

Poplar, Eng.—Poplar Electricity Works. An illustrated detailed description of these works, with map of the district. 6800 w. Elec Engr, Lond—June 19, 1903.

Port Huron.—Steam Turbine and Other Features of the Port Huron Light and Power Company's Station. James E. Davidson. An illustrated description of this company's installation of the Curtis steam turbine, with a review of the general conditions of the station. 6500 w. Elec Wld & Engr—April 9, 1904.

Port Morris, N. Y.—Construction of the Port Morris Power House for the New York Central R. R. Brief description of methods of constructing the foundations for a 30,000 k.w. power house. Ills. 1800 w. Eng Rec—March 4, 1905.

Electrification of the New York Suburban District of the New York Central & Hudson River Railroad. Illustrated descriptions of the power stations at Yonkers and at Port Morris, and of a typical sub-station, and their equipment and operation. 3800 w. Elec Rev, N Y—Nov. 11, 1905.

Power-Stations of the Electric Zone of the New York Central & Hudson River Railroad. Illustrates and describes the stations at Yonkers and Port Morris, with a typical sub-station and its equipment. 4000 w. St Ry Jour—Nov. 11, 1905.

Power Cost.—See ELECTRIC STATION MANAGEMENT; POWER COST.

Prague, Bohemia.—The Electrical Power Station of the City of Prague. Notes on this plant, taken from the "Zeitschrift," of the society of German Engineers. Ill. 2500 w. Eng Rec—Aug. 31, 1901.

Protection.—See ELECTRIC PROTECTIVE APPARATUS; ELECTRIC STATION MANAGEMENT.

Providence, R. I.—The Narragansett Electric Lighting Company's System. An illustrated description of the installation that furnishes light and motive power for half the State of Rhode Island. 3800 w. Elec Rev, N Y—Nov. 9, 1901.

Design for a Power Station in Providence. Illustrated detailed description of a plant in process of construction. 1800 w. St Ry Jour—March 1, 1902.

Railway Power Plant at Providence, R. I. Illustrates and describes a new station, having a capacity of 10,500 Kw. Both direct and alternating current is furnished. 4800 w. St Ry Jour—Feb. 20, 1904.

Manchester Street Power Station of the Rhode Island Company, Providence. Illustrated description of a plant of special interest because of the arrangements and details of the machinery and apparatus, and the fireproof construction of fine design. Serial. 1st part. 2700 w. Eng Rec—Feb. 20, 1904.

The Narragansett Electric Lighting Company's Plant. Illustrated detailed description of the plant which supplies current for light and power to the city of Providence, R. I., and the territory included in a circle of about fifteen miles radius. 2800 w. Elec Rev, N Y—Feb. 11, 1905.

Pueblo, Colo.—See HYDRO-ELECTRIC PLANT.

Quincy Point, Mass.—Power Generating and Distributing System of the Old Colony Street Railway. Illustrated detailed description of the Quincy Point power house and its equipment, and the power scheme of an extensive system. 3000 w. St Ry Jour—June 10, 1905.

See also ELECTRIC RAILWAY—Massachusetts Electric Co.

Railway.—An Arrangement of Power Stations for Operating Steam Railways Electrically. C. J. Spencer. Discusses the applying of electric traction to a steam railroad. Also editorial. 3000 w. Elec Wld & Engr—Feb. 14, 1903.

Central Stations of Electric Tramway Systems. Charles Thonet. A discussion and technical information regarding the maintenance, consumption and efficiency of the different parts of a generating station installation; the cost of the electrical energy measured at the switchboard when using steam, power gas, and hydraulic power. 7000 w. Bul Internat Ry Cong—June, 1903.

Tramway Power-House Equipment. E. Kilburn Scott. A series of notes and specifications on electric tramway power equipment. Serial. 1st part. 4800 w. Tram & Ry Wld—July 9, 1903.

The Power Station. Fred N. Bushnell. Read before the Am. Ry. Mech. & Elec. Assn. Describes the type of station most generally adopted for street railway work, the apparatus employed, and matters of interest in regard to the service. Ills. 8000 w. St Ry Jour—Sept. 30, 1905.

See also History; Polyphase; and under subhead names of places; ELECTRIC RAILWAY.

Rand, South Africa.—See Gold Mines.

Rapid Transit, N. Y.—See New York.

Reeses, Ohio.—The Power Station of the Scioto Valley Traction Company. Illustrated detailed description of the plant at Reeses, Ohio, of a typical high-grade interurban railway. 2000 w. Eng Rec—Dec. 3, 1904.
See also ELECTRIC RAILWAY—Columbus.

Refuse Destructor.—See REFUSE DISPOSAL.

Reconstruction.—See ELECTRIC STATION MANAGEMENT.

Rheydt-Gladbach.—The Rheydt-Gladbach Electric Installation (Das Electricitätswerk Rheydt-Gladbach). H. Leisse. An illustrated description of the electric station at Rheydt and the electric railway between that town and Gladbach, in Rhenish-Prussia. 2000 w. Elektrotech Zeitschr—Jan. 2, 1901.

Rhyl, Wales.—The Rhyl Electricity Works. An illustrated description of dynamos, engines, boilers, steam-pipes, switchboard, cables and arc lamps used. 2000 w. Elec Engr, Lond—March 28, 1902.

Richmond, Ind.—The Municipal Lighting and Power Plant of Richmond, Ind. Illustrated detailed description. 2500 w. Engr, U S A—Nov. 1, 1902.

Municipal Electric Light and Power Plant at Richmond, Ind. James B. Nelson. Abstract of a paper read at the annual meeting of the Indiana Engng. Soc. Descriptive. 2000 w. Eng News—Jan. 29, 1903.

Richmond, Va.—Hydraulic and Steam Power Plant of the Virginia Electrical Railway and Development Company, Richmond, Va. Illustrated description of the new central station for supplying railway power and lighting current, and the elaborate hydraulic works in the James River rapids. 2400 w. Elec Rev, N Y—Jan. 26, 1901.

Electric Power Station of the Virginia Electrical Railway & Development Co., Richmond, Va. Illustrated description of one of the largest plants in the South. 1500 w. Eng News—May 2, 1901.

Combined Steam and Hydraulic Power Plant at Richmond, Va. An illustrated description of the plant of the Virginia Electrical Railway and Development Co. 1500 w. Power—Nov., 1901.

The New Plant of the Virginia Electrical Railway & Development of a plant in which the generating units are direct connected both to the turbine shafts of a hydraulic plant and the main shafts of a plant with vertical steam engines. The character of the water power, the nature of the service and the structural features are explained. 4400 w. Eng Rec—Nov. 9, 1901.

The Steam Hydraulic Plant of the Virginia Passenger & Power Company, Richmond, Va. Illustrated description of new features introduced in this enlarged plant, especially the new type of dam, and a rack-cleaning mechanism for clearing the intakes of obstructions. 2500 w. Eng Rec—Jan. 2, 1904.

Rochester, N. Y.—The Central Station of the Citizens' Light and Power Company, Rochester, N. Y. History of this company, with illustrated description of the plant and equipment. 7200 w. Elec Rev, N Y—Feb. 1, 1902.

The New Power Plant of the Citizens' Company of Rochester, N. Y. Illustrated detailed description of a first-class modern electrical station. 6000 w. Elec Wld & Engr—Feb. 1, 1902.

Romanshorn, Switzerland.—The Romanshorn Gas Engine Driven Central Power Station. Frank C. Perkins. An illustrated description of a Swiss installation. 1100 w. Elec Rev, N Y—Aug. 9, 1902.

Rotherham, Eng.—Rotherham Electricity Works. An illustrated description of English works, recently inaugurated. 3000 w. Elec Engr, Lond—May 31, 1901.

Rushville, Ind.—Power House of the Indianapolis & Cincinnati Traction Company. Illustrated detailed description of the power station at Rushville, Ind., and its equipment. 3500 w. St Ry Jour—March 18, 1905.

Ryde, Isle of Wight.—The Ryde Electricity Works. Illustrates and describes the features of interest in this recently completed plant on the Isle of Wight, which circumstances limited to the least expensive type. 2500 w. Elect'n, Lond—Oct. 23, 1903.

Safety Device.—See ELECTRIC PROTECTIVE APPARATUS—Station; ELECTRIC STATION MANAGEMENT.

Saginaw and Bay City Ry.—New Power Station of the Saginaw and Bay City Railway and Light Company. Illustrated detailed description. 3300 w. Engr, U S A—July 15, 1905.

St. Gilles.—See Brussels.

St. Louis, Mo.—New Power Stations of the St. Louis Transit Co. Illustrated detailed descriptions of the stations and their equipment. 5000 w. St Ry Rev—Nov. 15, 1901.

Power Plants of the St. Louis Transit Co. Describes and illustrates the Central Power station in the present number. 3000 w. Eng News—April 3, 1902.

See also ELECTRIC STATION MANAGEMENT.

St. Louis Exposition.—The Temporary Power Station at the World's Fair, St. Louis, Mo. An illustrated description of the machines installed in a temporary station, in order to furnish electrical energy for the dedication ceremonies. 2300 w. Elec Engr, Lond—July 10, 1903.

The 60,000 Horse-Power Plant at the World's Fair. Godfrey L. Carden. Information of interest in regard to the power plant and the work it is to do. 1300 w. Sci Am—Oct. 3, 1903.

Service Power Plant of the Louisiana Purchase Exposition. Illustrated description. 5000 w. Elec Wld & Engr—Feb. 27, 1904.

The Largest Generating Unit at the World's Fair. Illustrated description of a 5000-horse-power Allis-Chalmers engine and Bullock three-phase generator, in operation in Machinery Hall. 2000 w. Elec Wld & Engr—Aug. 13, 1904.

The Electric Generating Plants at the St. Louis Exposition (Die Stromerzeugungsanlage auf der Weltausstellung in St. Louis). Clarence Feldmann. A detailed description of the various generating sets, forming exhibits, and furnishing current for the St. Louis Exposition. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 10, 1904.

The Power Plant of the St. Louis Exhibition. Illustrated detailed description of the plant furnishing electric current for the various lighting and power purposes. . 4800 w. Eng News—Sept. 15, 1904.

Power Plant of the Intramural Railway at the St. Louis Exposition. Detailed description with illustrations. 4500 w. Eng News—Oct. 13, 1904.

See also ELECTRIC EXHIBITION; ST. LOUIS EXPOSITION.

St. Louis, Mich.—The Water and Lighting Plant at St. Louis, Mich. Brief description of a combined water-works, pumping station and electric lighting plant capable of being operated either separately or together, and run by both water and steam power. 1400 w. Eng Rec—Nov. 15, 1902.

St. Paul-Minneapolis Ry.—See Minneapolis.

St. Petersburg.—The St. Petersburg Central Station Built by the "Société Anonyme Electricité et Hydraulique" (Centrale der Société Anonyme "Electricité et Hydraulique" in St. Petersburg). W. Multhauf. An illustrated description of a single-phase station with a capacity of 7000 kilowatts. 3600 w. Elektrotech Zeitschr—June 19, 1902.

Salford, Eng.—The Electricity Works of the Salford Corporation. Illustrated description of new works to furnish current for lighting and power. Serial. 1st part. 3600 w. Engng—Dec. 13, 1901.
See also ELECTRIC RAILWAY.

Saltley, Eng.—See GAS ENGINE—Electric Generation.

San Francisco.—The Independent Electric Light and Power Company. Illustrated description of a San Francisco plant representative of the latest and best American ideas of modern steam station practice. 6000 w. Jour of Elec—Dec., 1901.

Plant of the Independent Electric Light and Power Company, San Francisco. Illustrated detailed description of a recently built plant. 1600 w. Elec Wld & Engr—Jan. 4, 1902.

The Stations of the Independent Electric Light and Power Co., San Francisco, Cal. Illustrated description of a large electric central station in which oil is used exclusively for the generation of heat in the boiler furnace. 1500 w. Power—March, 1902.

New Power Plans of the United Railways of San Francisco. Illustrates and describes the new central power station and its equipment, and the three substations which are now in course of construction. 3300 w. St Ry Jour—April 18, 1903.

A Large Power Station Operated with Fuel Oil. W. D. Chamberlain. Illustrated detailed description of the North Boach power station of the United Railroads of San Francisco, and its equipment and operation. 6800 w. Power—Aug., 1905.

See also ELECTRIC RAILWAY.

San Mateo Co., Cal.—See ELECTRIC POWER.

Santa Barbara, Cal.—The Systems of the United Electric, Gas and Power Company. Illustrates and describes the systems at Santa Barbara and Santa Monica. 4500 w. Jour of Elec—Jan., 1903.

Santa Monica, Cal.—A Steam-Driven Electrical Transmission Plant. J. R. Cravath. Illustrates and describes the 22,000-volt system of the United Electric, Gas and Power Company at Santa Monica, California. 1400 w. Am Elect'n—June, 1901. See also **Santa Barbara, Cal.**

Scioto Valley Ry.—See **Reeses, Ohio.**

Seattle.—The Seattle Municipal Light and Power Plant. R. E. Heine. Illustrated description of a plant under construction for furnishing light and power at Seattle, Washington. 2200 w. Elec Wld & Engr—Feb. 27, 1904.

Sheffield, Eng.—The New Two-Phase Station at Sheffield. Illustrated description, the arrangement of the boilers and their furnaces, a regenerative system of induced draught, being of special interest. 3500 w. Elect'n, Lond—July 8, 1904.

Two-Phase Turbo-Generator Station at Sheffield, England. Brief illustrated description of the change from the single to the two-phase system. 900 w. Elec Wld & Engr—July 30, 1904.

Shoreditch.—See **London.**

Signalling.—See ELECTRIC STATION MANAGEMENT.

Single-Phase Motors.—See ELECTRIC MOTOR—**Single-Phase, Station.**

Single to Two-Phase.—See **Sheffield, Eng.**

Southampton, Eng.—Southampton Corporation Electric Tramway and Lighting System. H. G. Nichsolson. The electricity works were formerly for lighting purposes only, and how they have been adopted for supplying the necessary power for tramways is illustrated and described. Serial. 1st part. 2400 w. Elect'n, Lond—Jan. 11, 1901.

South Boston.—See **Boston.**

South Framingham, Mass.—The Boston & Worcester Street Railway Power Plant. H. D. Jackson. An illustrated description of the plant in South Framingham, Mass., which represents the latest developments in steam and electrical progress. 1400 w. Engr, U S A—July 1, 1903.

The Power Plant of the Boston & Worcester Street Railway. Howard S. Knowlton. Illustrated detailed description. 2500 w. Eng Rec—Oct. 14, 1905.

South Norwalk, Conn.—New Installation at City of South Norwalk Electric Works. An illustrated description of the third enlargement within five years of this very successful municipal plant. 2200 w. Elec Wld & Engr—Feb. 20, 1904.

Spezia Arsenal.—See ELECTRIC PLANT.

Springfield, O.—A Combined Electric Lighting and Steam Heating Plant. An illustrated description of a plant in Springfield, Ohio, where incandescent and arc lamps and steam radiators are all supplied from one power house. 4000 w. Am Elect'n—May, 1901.

Staten Island, N. Y.—Lighting and Railway Development on Staten Island. Max Lowenthal. Illustrated description of the New York & Staten Island Electric Company's system. History of the consolidation is given. 3000 w. Elec Wld & Engr—Dec. 28, 1901.

Steam Engine vs. Diesel Motor.—See POWER COST.

Steam Plant.—See BOILER PLANT; STEAM ENGINE; STEAM PLANT; STEAM TURBINE.

Steam Turbine.—See also ELECTRIC GENERATING SET; STEAM TURBINE.

Steam Turbine vs. Reciprocating.—Reciprocating Sets vs. Turbo-Generators. I. William Chubb. Reports trials made, as a contribution to the discussion on the relative advantages in connection with power-house plants. 1800 w. Power—April, 1904.

Steel Construction.—See **Jersey City.**

Steubenville, O.—See ELECTRIC RAILWAY.

Stockholm.—See MOTOR GENERATOR.

Storage Battery.—See STORAGE BATTERY.

Stuyvesant Falls, N. Y.—See HYDRO-ELECTRIC PLANT.

Sub-Station Equipment.—See ELECTRIC DISTRIBUTION; ELECTRIC SUB-STATION; ROTARY CONVERTER; STORAGE BATTERY.

Sunderland, Eng.—Sunderland Electricity Works. Notes and illustrations descriptive of this station and the extensive work recently carried out. 3000 w. Elec Engr, Lond—Sept. 12, 1902.

The Sunderland Corporation Electricity Works. Gives illustrations and descriptions of some of the equipment, with an account of this municipal enterprise and its growth. 4500 w. Trac & Trans—Feb., 1903.

Switching Apparatus.—See ELECTRIC SWITCH; ELECTRIC SWITCHBOARD.

Switzerland.—See HYDRO-ELECTRIC STATION.

Sydney, Australia.—An Australian Station Having Compound-Wound Dynamos Paralleled with Accumulators. E. Kilburn Scott. Brief illustrated description of the station and its equipment. 1000 w. Elec Rev, Lond—June 30, 1905.

See also ELECTRIC LIGHTING.

Sydney University.—Power for Sydney University. E. Kilburn Scott. Read before the Univ. Engng. Soc. Describes a proposed scheme for a distribution and lighting system, and power station to meet the needs of the University. Serial. 2 parts. 5500 w. Aust Min Stand—Aug. 25 and 30, 1905.

Syracuse, N. Y.—The Central Station of the Syracuse Lighting Company. An illustrated description of an interesting, well-constructed station of medium size. 1200 w. Elec Rev, N Y—Jan. 25, 1902.

Tacoma, Wash.—Municipal Light and Power in Tacoma, Wash. Howard Joslyn. Abstract of a paper read before the Pacific N. W. Soc. of Engrs. A full account of the cost and earnings since the purchase of the plant in 1898, and the arrangements that have been made possible the exceedingly low rates of the past two years. 2800 w. Elec Rev, N Y—May 13, 1905.

Tasmania.—Electric Lighting of Devonport, Tasmania. Illustrated description of a small electric station. 1200 w. Elec Engr—Aug. 5, 1904.

Taunton, Mass.—The Largest Municipal Plant in New England. Alton D. Adams. Illustrated description of the new plant at Taunton, Mass. 2500 w. Elec Rev, N Y—March 4, 1905.

Teplitz-Schönau.—The Municipal Electrical Works at Teplitz-Schönau, Bohemia (Das Städtische Elektrizitätskerk in Teplitz-Schönau). A Frühwirth. An illustrated description of the station and distributing three-wire system, their cost and the charges for current. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—March 13, 1903.

Testing.—See STEAM ENGINE TEST.

Thornhill, Eng.—See **Yorkshire.**

Trafford Park, Eng.—The Trafford Park Power Works. Illustrated detailed description of the first electrical station to be worked in England with the special object of supplying power in bulk to large manufacturers. Serial. 1st part. 2800 w. Elec Engr, Lond—March 15, 1901.

Transvaal.—See **Gold Mines**; ELECTRIC DISTRIBUTION; ELECTRIC EQUIPMENT—**Gold Mining, Transvaal**; ELECTRIC POWER.

Treforest.—See ELECTRIC POWER—**South Wales.**

Tunis.—See GAS-POWER PLANT.

Two-Phase.—See **Sheffield, Eng.**

Tynemouth, Eng.—Tynemouth Electricity Works. Illustrated detailed description of a plant for electric light and traction at an English health resort. 2700 w. Elec Engr, Lond—June 7, 1901.

Type and Periodicity.—See **Polyphase.**

United States.—Central Electric Light and Power Stations in the United States. From a report published by the Bureau of the Census, giving statistics of interest, showing the growth of this industry. 2800 w. Eng Rec—Sept. 30, 1905.

U. S. Western.—Some Typical Western Electric Lighting Plants. Brief illustrated descriptions of interesting details in what may be regarded as typical installations. 1200 w. Elec Rev, N Y—May 24, 1902.

Urbana, Ill.—A Modern Small Central Station. W. H. Zimmerman. The plant of the Urbana (Ill.) Light, Heat and Power Company is illustrated and described. 1500 w. Am Elect'n—Oct., 1901.

Utah, Brigham City.—See **Brigham City.**

Utah Light & Ry. Co.—The Utah Light & Railway Co. O. A. Honnold. History and description of the engineering and operating features of a system uniting several generating stations by one transmission network. Ills. 5000 w. St Ry Rev—Oct., 1905.

Utica, N. Y.—Power House for the New York Central Electric Lines. An illustrated description of the generating station under construction at Utica, N. Y., from which power will be distributed east and west along the lines of electric railway that parallel the New York Central R. R. 1800 w. Elec Wld & Engr—July 15, 1905.

Vesuvius.—See **MOUNTAIN RAILWAY.**

Vienna.—The Heiligenstadt Power House of the Vienna Municipal Railway (Das Krafthaus der Wiener Stadtbahn in Heiligenstadt). O. Budil. Illustrated description of this recent plant, with details of the 600 h. p. generating sets. 2500 w. 2 plates. Zeitschr d Ver Deutscher Ing—June 15, 1901.

The Vienna Municipal Electric Station (Die Städtischen Elektrizitätswerke in Wien). Hugo Fach. A paper, giving an illustrated description of a great generating station, in two parts, one for lighting, the other for traction purposes, in both of which 5500-volt, three-phase current is generated. Map. 1 plate. 5500 w. Zeitschr f Elektrotechnik—May 24, 1903.

The Municipal Electric Stations in Vienna (Die Städtischen Elektrizitätswerke in Wien). Gustav Klose. A very full illustrated account of the large generating stations at Vienna furnishing current for tramways, lighting and power. Three articles. 10,000 w. Zeitschr d Oesterr Ingr Arch Ver—Sept. 25, Oct. 2, 9, 1903.

The Vienna, Austria, Municipal Light and Power Plant. Franz Köster. Illustrated detailed description. 3300 w. Elec Rev, N Y—Jan. 9, 1904.

See also **Austria**; **ELECTRIC RAILWAY.**

Walthamstow, Eng.—Walthamstow Electricity Works. Illustrates and describes the buildings, gas plant, gas engines, dynamos, etc. 500 w. Elec Rev, Lond—Oct. 18, 1901.

A Gas-Driven Electric Light and Traction Plant. Arthur H. Allen. An illustrated detailed description of the Walthamstow Electricity Works in England. 4500 w. Public Works—Sept. 15, 1904.

The Walthamstow Electric Lighting and Tramways Undertakings. Ilustrated description of a new traction and lighting plant in which the energy is supplied from gas-driven plant, supplementary to the original installation. This is the largest gas-driven plant in England. 1500 w. Elec Rev, Lond—Sept. 15, 1905.

Wappinger's Falls, N. Y.—A Model Small Central Station. C. W. Obert. An illustrated description of the municipal lighting plant at Wappinger's Falls, N. Y. 1900 w. Am Elect'n—Dec., 1901.

Warren, O.—See **WATERWORKS.**

Warren, R. I.—Steam-Turbine Power Plant of the New York, New Haven & Hartford Railroad at Warren, R. I. Illustrates and describes a plant noteworthy from the directness of the steam lines and the absence of a multiplicity of pipes. 1500 w. St Ry Jour—Jan. 21, 1905.

Waterside, N. Y.—See **New York.**

Waterworks Combined.—Combined Plants for Small Towns. Oscar Claussen. Shows how water and electric lighting plants can be worked together to advantage in small towns. 1000 w. Munic Jour & Engr—June, 1905.

See also **WATERWORKS.**

Weehawken, N. J.—Modern Railroad Terminal Power Plant. Illustrates and describes the fine generating station of the New York Central & Hudson River Railroad at Weehawken, N. J. 3500 w. Am Elect'n—Oct., 1905.

West Albany, N. Y. Central.—See **ELECTRIC PLANT.**

Westchester, N. Y.—Modernized District Central Station. Illustrated description of the power plant of the Bronx Gas & Electric Co., at Westchester, N. Y. 2200 w. Am Elect'n—Nov., 1903.

West Ham.—See **London.**

Whitehall, Ill.—A Progressive and Profitable Small Central Station. J. R. Cravath. An illustrated detailed description of the plant of the Whitehall (Ill.) Electric Co. 3400 w. Am Elect'n—June, 1902.

Willesden, Eng.—See **London.**

Wigan, Eng.—Wigan Electricity Works. Illustrated description of the works and their equipment. 6600 w. Elec Engr, Lond—Feb. 1, 1901.

Wigan Corporation Electric Supply and Tramway Works. Illustrated detailed description. 1500 w. Elect'n, Lond—June 7, 1901.

Wimbledon, Eng.—Wimbledon Electricity Works. Illustrated description of a combined refuse destructor and electricity works for a residential suburb of London. The town has a very remarkable development of street lighting by electricity, which is entirely controlled by the generating station. 2800 w. Elec Rev, Lond—Aug. 14, 1903.

Wind Driven.—See **WIND MILL—Electric Station.**

Winterthur, Switzerland.—The Municipal Electric Station at Winterthur (Das Städtische Elektrizitätswerk in Winterthur). S. Herzog. Illustrating and describing especially the transformer station and rotary converter plant. 1800 w. Zeitschr f Elektrotechnik—March 12, 1905.

Yoker, Scotland.—See **Glasgow.**

Yonkers, N. Y.—See **Port Morris.**

Yorkshire, Eng.—The Yorkshire Electric Power Company. An illustrated description of a station for the supply of power, and its equipment. 2800 w. Elec Engr, Lond—Sept. 8, 1905.

The Yorkshire Electric Power Co.'s System of Generation and Distribution. Well illustrated detailed description of present condition of this undertaking, particularly of power station just completed at Thornhill, near Leeds. Serial. 1st part. 2000 w. Elect'n, Lond—Sept. 1, 1905.

Yreka, California.—The Yreka Light and Power Transmission. Leon M. Hall. An illustrated detailed description of this plant and its equipment. 2500 w. Jour of Elec—March, 1904.

Zanesville, O.—A Modern Railway, Light and Power Plant. An illustrated account of the reconstruction of the property of the Zanesville Railway, Light and Power Company. Equipped with both steam and water turbines. 1200 w. Elec Rev, N Y—March 19, 1904.

Zanesville Railway Light and Power Co. Illustrated description of this company's new plant, which comprises a steam turbine equipment and a water-power plant, combined with storage battery for reserve. 2500 w. St Ry Rev—March 20, 1904.

ELECTRIC STATION MANAGEMENT.

See also **ELECTRIC INDUSTRY; ELECTRIC METER; ELECTRIC STATION; ELECTRIC WIRING; STREET RAILWAY MANAGEMENT; WORKS MANAGEMENT.**

Principles and Profits in Electric Supply. (A Reply to Critics.) W. B. Esson. An answer to criticisms, and supplemental to a previous article. 3200 w. Elect'n, Lond—Feb. 7, 1902.

The Supply of Electricity in Bulk. Hardman A. Earle. Abstract of a paper read before the Manchester Soc. of the Inst. of Elec. Engrs. Discusses the opposition to electric supply schemes due to the opinion that they are unnecessary and likely to prove financial failures. The present article outlines the general system, and discusses cost. Serial. 1st part. 3500 w. Elect'n, Lond—Feb. 7, 1902.

Electrical Station Practice. W. H. Radcliffe. The first of a series of articles aiming to prove of special value to dynamo tenders, station engineers, and all interested in the construction, equipment and management of these plants.

Serial. 1st part. 2000 w. Elec, N Y—Sept. 9, 1903.

Central Station Management. George S. Carson. Suggestions tending to economy of operation, and good service. 1700 w. Elec Wld & Engr—April 15, 1905.

Some Suggestions on Operation and Construction in the Electric Department. George C. Holberton. Read before the Pacific Coast Gas Assn. General suggestions on the selection and care of meters, the character of the service, etc. 3500 w. Jour of Elec—Aug., 1905.

The Management of Small Central Stations. Henry Joseph. Discusses day loads and the necessity of keeping capital costs as low as possible on small systems. Meters and the prepayment system are also considered. 2800 w. Elec Rev, Lond—Dec. 29, 1905.

Accounting.—Modern Electric Light Accounting. A S. Knight. Abstract of a paper read at the Buffalo meeting of the Assn. of Edison Ill. Co.'s, describing the accounting system of the Boston Edison Company. 3300 w. Elec Wld & Engr—Nov. 2, 1901.

Customers' Accounts for Electric Light Companies. S. E. Moore. Read before the Accountants' Assn. Suggestions relating to the accounting department. 2300 w. St Ry Rev—Oct. 12, 1901.

See also Cost; Sherwin-Williams.

Alternating Motors.—See ELECTRIC MOTOR—Alternating.

British.—Electricity Supply Works Costs in 1898 and 1899. Tables and curves giving the actual and average figures of costs, etc., arrived at in analysis of accounts, in the United Kingdom. 4300 w. Elect'n, Lond—Jan. 4, 1901.

Electricity Supply Works Costs in 1900 and 1901. Tables and curves, with explanatory text, which summarize data obtained by analyses of the accounts of electric stations, both municipal and company, in the United Kingdom. 2000 w. Elect'n, Lond—Jan. 2, 1903.

Some Statistics of Electricity Supply. J. P. Smith. A review of the progress of the last seven or eight years, giving statistics, and favoring municipal undertakings, claiming they show lower capital expenditure, lower working costs, and lower tariffs. Also discussion. 7500 w. Elect'n, Lond—July 17, 1903.

Some Observations on Electricity Supply and Methods of Stimulating Demand. J. E. Panton. Brief review of the development of electric supply undertakings in England, with discussion of important features. Considers reliability of service and cost of first importance, and suggests means of increasing the supply. 4800 w. Elec Engr, Lond—July 31, 1903.

The Sphere of Utility of a Power Company. Alderman G. Pearson. Read before the Municipal Elec. Assn. at Newcastle-on-Tyne. Discusses the question as related to England particularly, with aim of finding some common ground of agreement between power companies and municipalities, whereby they may be able to avoid competition. 3300 w. Elec Engr, Lond—July 24, 1903.
See also Cost.

Card System.—The Card System Applied to Central Electric Supply Stations. F. W. Farrerwhite. An outline of the method adopted at a central station in England, showing the applicability of this system to the requirements. Serial. 1st part. 900 w. Elec Rev, Lond—March 22, 1901.

Circuit Breaker Repairs.—See ELECTRIC PROTECTIVE APPARATUS.

Coal.—Electrical Incomes and Outputs per Ton of Coal. Alton D. Adams. Presents figures derived from the report of the Gas and Electric Light Commissioners of Massachusetts, considering information gained from the study. 2200 w. Elec Wld & Engr—Nov. 16, 1901.

The Coal Question in Generating Stations. Discusses the cause of such wide variation in prices, and gives a brief study of the varieties in use. 3800 w. Elec Times—April 3, 1902.
See also Cost; Fuel Economy.

Cologne.—See Rates, Cologne.

Cost.—Central Station Economy. The first of a series of articles calling attention to matters affecting the cost of operation. Serial. 1st part. 1500 w. Elec Rev, Lond—April 19, 1901.

The Equitable Allocation of Costs in Combined Lighting and Traction Stations. W. H. Tittensor. Read at the Glasgow Congress of the Munic. Elec. Assn. Discusses the cost of generation in a combined station. 3500 w. Elec Engr, Lond—June 28, 1901.

Expenses of Electric Stations. Alton Adams. Discusses the increase in expenses, the need of economy, and the points where the largest savings have been effected. 1500 w. Elec Rev, N Y—July 19, 1902.

The Cost of Energy in Electricity Supply. Alton D. Adams. A comparison of accurate figures from steam and water-power stations, showing the influence of local conditions upon the elements of cost. 2500 w. Engineering Magazine—November, 1902.

The Cost of Electric Light and Electric Light Plants to Municipalities. Comparison of data from reliable sources, particularly with reference to cities of about 50,000 population. 2000 w. Munic Engng—Jan., 1903.

Cost of Power in Street Railroad Service. R. C. Carpenter. Gives tabulated results showing the actual performance of street railroad power plants operating under wide ranges of conditions. 1200 w. Sib Jour of Engng—Dec., 1904.

The Power Station Load Factor as a Factor in the Cost of Operation. Lawrence P. Crecelius. Read at the convention of the Am. Ry., Mech. & Elec. Assn. Outlines a method employed by the United Ry. Cos. of St. Louis, in increasing the load factors of the main power stations, showing how the load factor plays a part in the cost of power per car-mile. 1800 w. St Ry Jour—Sept. 30, 1905.

Cost of Generating Electric Power. F. A. Giffin. Gives formulae and figures intended to be applicable to a modern power station containing four 1000-kw. units, and assumptions are made regarding the manner in which the efficiency of each piece of apparatus varies with the load. 2000 w. St Ry Jour—Dec. 30, 1905.

See also British; Coal; Economy; Fuel Economy; ELECTRIC STATION—Amsterdam; ELECTRIC SUB-STATION—Equipment; POWER COST.

Coventry, Eng.—The Financial Improvement of Electricity Supply Works. Joseph A. Jeckell. Abstract of a paper before the Incor. Munic. Elec. Assn. Outlines the principles to be considered, showing how they were applied at Coventry, and the result. 4000 w. Elect'n, Lond—Aug. 21, 1903.

Current Theft.—See ELECTRIC CURRENT—Theft.

Day Loads.—A Day Load as a Factor in Central Station Earning Capacity. Lehman B. Holt. Read before the Ohio Elec. Lgt. Assn. A brief consideration of some of the essential features of electric power, transmission, and the compartive relations of costs, returns and load factor. 2000 w. Elec Rev, N Y—Sept. 10, 1904.

Depreciation.—See TELEPHONE EXCHANGE.

Detroit.—An Analysis of the Sixth Detroit Municipal Plant Report. The report of the Detroit Public Lighting Commission. 3500 w. Elec Wld & Engr—Feb. 15, 1902.

Distribution Combinations.—See ELECTRIC DISTRIBUTION—Combinations.

Diversity Factor.—The Diversity Factor, and Its Influence on Motor Load Charges. A. M. Taylor. An investigation of the charges and how they are affected by diversity factor, motor load factor, etc. 2000 w. Elec Rev, Lond—June 23, 1905.

Economy.—The Economical Design and Management of Small Central Stations. Considers some of the conditions of economical and efficient design and management of small electric light undertakings. 4200 w. Elec Eng, Lond—April 17, 1903.

Possible Economies in Central Station and Distribution Systems. Philip Dawson. A résumé of current practice in power station operation, discussing the problem of economical production and distribution of electrical energy. 4500 w. St Ry Jour—Aug. 29, 1903.

Central-Station Economy. F. H. Davies. Calls attention to many small losses in central-station practice, which, if corrected, would aggregate a considerable saving. 3300 w. Elec Engr, Lond—April 15, 1904.

Economies in Supply Stations. A. J. Arnot. Read before the Elec. Assn. of Sydney. Discusses points of importance in the economical equipment and control of stations. Serial. 2 parts. 7500 w. Aust Min Stand—June 23 and 30, 1904.

See also Coal; Cost; Fuel Economy; BOILER PLANT; ELECTRIC STATION; MOTOR—Efficiency.

Exhaust Steam.—See HEATING; STEAM ENGINEERING.

Failure.—Electrical Plant Failures, Their Origin and Prevention. A. Campbell Cormack. Statistics of accidents, showing their nature, the origin, and giving an analysis of the causes. 3000 w. Elect'n, Lond—Aug. 14, 1903.

Franchises.—Street Franchises for Electric Circuits. Alton D. Adams. A discussion of the powers of towns and cities over their streets. 1200 w. Elec Wld & Engr—Nov. 17, 1900.

Electricity in Paris. An explanation of the action of the Paris Municipal Council in their refusal to grant franchises to private concerns for the establishment of electric stations and the results. 2000 w. Engng—Sept. 8, 1905.

Fuel Economy.—Economy of Fuel in Electric Generating Stations. Henry McLaren. Remarks based on table of costs published by "The Electrical Times," London, with suggestions for better economy. 4500 w. Inst Mech Engr—July, 1903.

Coal Consumption in Central Stations. Alfred S. Giles. Slightly condensed paper read before the Manchester Soc. of the Inst. of Elec Engrs. A study of the question of fuel economy. 3500 w. Mech Engr—Jan. 23, 1904.

See also Coal; Cost; Economy.

Gas Combined.—See ELECTRIC STATION; GAS ENGINE; GAS INDUSTRY—Electricity Combined; GAS-POWER PLANT; GAS WORKS.

Government Supervision.—Official Supervision of Electric Plants (Die Beabsichtigte Staatliche Ueberwachung Elektrischer Anlangen). H. Passavant. A discussion of the proposed government supervision of electric stations, showing that many other departments of industry are far more dangerous. 6000 w. Elektrotech Zeitschr—Dec. 28, 1905.

Incomes.—Incomes of Electric Stations. Alton D. Adams. An investigation of the incomes for service to commercial arc lamps, commercial incandescent lamps, electric motors and arc and incandescent street lamps, as based on the reports from stations in Massachusetts. 3800 w. Elec Rev, N Y—Sept. 13, 1902.

Instruction.—Instruction of Men Operating Interconnected High and Low-Tension Systems, with Reference to Safety of Employees, Reliability of Service, and Resumption of Same After Partial or Total Interruption. W. F. Wells. Abstract of a paper at meeting of the Assn. of Edison Ill. Cos. 2800 w. Elec Rev, N Y—Nov. 18, 1905.

Kansas.—See Reconstruction.

Lamp Renewals.—Should Central Stations Furnish Incandescent-Lamp Renewals Free? C. A. Vallette. Read before the Illinois State Elec. Assn. Concludes that it depends altogether on local conditions and on the operating expenses. 1800 w. W. Elect'n—April 6, 1901.

Legal Relations.—The Relation of Electric Light Companies to Municipalities from a Legal Standpoint. D. L. Gaskill. Selections from a paper read before the Ohio Elec. Lgt. Assn. Considers the relations under the headings of franchises, contracts for lighting, private lighting and right of way on public streets as affecting private property. 2800 w. Elec Rev, N Y—Oct. 5, 1901.

Lighting Contract, N. Y.—New York Retail Contract. George T. Hanchett. An explanation of the details of the contract upon which electricity for lighting is sold. 2000 w. Cent Sta—May, 1904.

Load.—Loads on Electric Stations. Alton D. Adams. Curves and data illustrating the changes of energy outputs from month to month of different supply systems; also illustrates the variations in the ratio of average to maximum loads. 2000 w. Elec Rev, N Y—Nov. 8, 1902.

On What Lines Shall We Reach New Business to Improve our Load Curve and Increase Our Net Earnings? George Hayler, Jr. Read at Cleveland meeting of the Ohio Elec. Lgt. Assn. Suggestions from the standpoint of stations operating from dusk to daylight and supplying light only. 1500 w. Elec Rev, N Y—Nov. 8, 1902.

Stand-by Charges and Motor Load Development. A. M. Taylor. A short abstract of a paper read before the Birmingham Local Sec. of the Inst. of Elec. Engrs. Also discussion. Gives a method of determining the actual cost of the load at any time of the day. 4000 w. Elec Engr, Lond—Jan. 13, 1905.

Load Diagram.—A Station Load Diagram. C. R. Van Trump. Extracts from a paper read before the Nat. Elec. Light Assn. Shows a simple and effective method of tabulating station data, showing the advantage of such records. Ill. 1500 w. Elec Rev, N Y—May 25, 1901.

Load Factor.—The Influences of the Load Factor on the Design and Operation of a Lighting and Power System. J. R. Robertson. Discusses the means of increasing the load factor without appreciably increasing the investment and fixed charges. 8500 w. Can Elec News—July, 1901.

Electricity Works Load Factors. J. Gray Scott. Read before the Glasgow Technical College Scientific Society. Explains the peculiar conditions which control the generation and distribution of electricity for the purposes to which it is applied, the effect on the cost, and the means whereby the conditions may probably be made more favorable. 5400 w. Elec Engr, Lond—Dec. 20, 1901.

The Influence of "Load-Factor" on the Cost of Electrical Energy. Edmund L. Hill. Gives an explanation of the meaning of "load factor," showing its effect on the economy of the system. 3300 w. Elect'n, Lond—Feb. 10, 1905.

Effect of Load Factor on Cost of Power - Abstract of a paper by E. M. Archibald, read before the Canadian Soc. of Civ. Engrs. Discusses the effect of load factor on the cost of producing power, the cost of management, and distribution. 2500 w. Elec Wld & Engr—Feb. 11, 1905.

Load Factor—Its Effect Upon an Electricity Station. Alex. Sinclair. Read before the Incor. Munic. Elec. Assn. An explanation of the effect of the load-factor upon the electricity supply works. Also discussion. 3300 w. Elect'n, Lond—June 30, 1905.

The Load Factor of Electric Generating Stations (Der Belastungsfaktor Elektrischer Beleuchtungssentralen). Norberg Schulz. A discussion of the operation of the generating station at Kristiania, Norway, with load curves and load-factor diagrams. 3000 w. Elektrotech Zeitschr—Oct. 5, 1905.

See also Diversity Factor; Motor Loads.

Location.—Application of Graphics to Power House Location. Sidney Diamant. Describes an ingenious graphical method of locating the electrical centroid of an area, where the position and intensity of the loads is known. 800 w. Elec Wld & Engr—Feb. 13, 1904.

Location of Electric Stations. Alton D. Adams. Reviews the practice of early plants and the movement later toward cheap land with free condensing water and direct boat or rail transportation. 3700 w. Elec Wld & Engr—Sept. 3, 1904.

See also ELECTRIC RAILWAY—Train Sheet.

Losses.—Loss by Electric Lighting Companies Through Poor Meters and Transformers. Information furnished by the Westinghouse Company in regard to a case where great loss was detected due to these causes. 1200 w. Eng News—June 25, 1903.

Lost Current.—Lost and Unaccounted for Current. L. G. Van Ness. Classifies the losses under both alternating and direct systems, endeavoring to show that they may be accounted for and suggests means of reducing the loss. 2200 w. Cent Sta—Oct., 1903.

See also ELECTRIC CURRENT—Theft; ELECTRIC DISTRIBUTION—Losses.

Madison, Wis.—Central Station Distribution. Full abstract of paper by C. H. Williams, read before the Northwestern Electrical Assn., describing practice in Madison, Wis., and discussing good practice. 3000 w. Elec Wld & Engr—Jan. 28, 1905.

Massachusetts.—An Analysis of Central Station Operating Costs and Revenue. H. S. Knowlton. A discussion of the costs of electric lighting as deduced from the report of the Massachusetts

State Board, covering returns from 115 modern stations. 2500 w. Engineering Magazine—May, 1905.

See also Coal: Rates, Mass.; ELECTRIC INDUSTRY ELECTRIC LIGHTING; ELECTRIC STATION.

Maximum Demand Charging.—The Wright Current Tariff System (Das Wright'sche Stromtarifsystem). Edmund Hohmann. Giving formulas and a description of a maximum consumption meter upon which charges for electricity supply may be based. 4000 w. Elektrotech Zeitschr—Jan. 17, 1901.

Some Principles Underlying the Profitable Sale of Electricity. Arthur Wright. A defence of the maximum demand system, with suggestions for its modification. Serial. 1st part. 4800 w. Elect'n, Lond—Dec. 20, 1901.

Principles and Profits in Electrical Supply. W. B. Esson. A discussion of electricity tariffs, called out by paper of Mr. Arthur Wright. Considers the maximum demand system erroneous and sketches a proposed method of charging. 3300 w. Elect'n, Lond—Jan. 3, 1902.

Maximum Demand. J. S. Codman. Discusses the best method of determining the demand in this system of charging for electric light. 2200 w. Elec Wld & Engr—Sept. 23, 1905.

See also Rates.

Meter Department.—The Organization and Management of a Central Station Meter Department. A. J. Cridge. Outlines some of the methods adopted in the equipment, maintenance and working of a meter department in connection with an electricity supply undertaking. Also discussion. 7000 w. Elec Engr—July 8, 1904.

The Organization and Management of a Central Station Meter Department. A. J. Cridge. Outlines some of the methods adopted in the equipment, maintenance and working of a meter department in connection with an electricity supply undertaking. 3800 w. Elec Rev, Lond—July 29, 1904.

Electricity Supply by Free Wiring and Prepayment Meters. Alfred R. Sillar. Read before the Incor. Munic. Elec. Assn. Describes the author's method of introducing this system, the method of reading and collecting, etc. Short discussion. 3500 w. Elect'n, Lond—June 30, 1905.

See also ELECTRIC METER.

Mine.—See ELECTRIC EQUIPMENT.

Motor Hire.—Should Electric Supply Undertakings Advance Motors on Hire or Hire-Purchase Systems? Sidney E. Britton. Read before the Glasgow Loc. Sec. of the Inst. of Elec. Engrs. Discussing both sides of this question, but favoring these systems. 2500 w. Elec Engr, Lond—Feb. 26, 1904.

Motor Loads.—Motive Power Supply from Central Stations. R. A. Chattock. Abstract of a paper before the Leeds Sec. of the Inst. of Elec. Engrs. and of the discussion. Treats of the motor load of electricity supply stations and the cost of generation. 3500 w. Elect'n, Lond—Feb. 27, 1903.

See also Diversity Factor; Load; Single-Phase.

Multiple vs. Independent.—Multiple versus Independent Operation of Units and Central Stations. Peter Junkersfeld. Practical difficulties encountered in the operation of central station systems are discussed. An argument for independent or sectional operation. 6000 w. Trans Am Inst of Elec Engrs—April 24, 1903.

See also Parallel.

Municipal.—Municipal Electric Light Plants. An unfavorable report on municipal plants by a committee of the Worcester, Mass., board of aldermen. 2000 w. Elec Rev, N Y—Feb. 8, 1902.

Investments and Earnings of Municipal Electric Plants. Alton D. Adams. Aims to determine the ratio of net earnings to investments in plants built by towns in Massachusetts, comparing the results with the ratio in similar plants owned by private corporations. 1800 w. Munic & Engng—May, 1903.

Municipal Electricity Undertakings. Claims that municipal balance sheets are not kept in a way that shows the actual state of affairs. Gives example, analyzing balance sheets. 1400 w. Elec Rev, Lond—May 15, 1903.

See also Detroit; Government Supervision; ELECTRIC STATION; MUNICIPAL OWNERSHIP.

Municipal, Germany.—Financial Results of Municipal Electric Plants (Finanzielle Ergebnisse Städtischer Elektrizitätswerke). Fritz Hoppe. A review of the commercial operation of electric plants in the various cities of Germany, based on data for 1903. 7500 w. Elektrotech Zeitschr—July 20, 1905.

Municipal vs. Private.—See GAS INDUSTRY.

Operation.—Electrical Operation in Central Stations. Howard W. Leitch. Describes the method of operating a station designed on the three-phase system. 3000 w. Power—July, 1903.

See also Parallel Operation; Small.

Operating Cost.—See Cost.

Organization.—The Organization of Working Forces in Large Power-Houses. W. P. Hancock. Read before the Nat. Elec. Lght. Assn. Describes the organization of the Boston Edison Illuminating Co., at the Third, Fourth and Turbine stations. 6500 w. Eng Rec—June 10, 1905.

The Organization of Working Forces in Large Power-Houses. W. P. Hancock. Gives an outline of the generating department organization of the Boston Edison Company. Also editorial. 6800 w. Cent Sta—Sept., 1905.

Parallel Operation.—Some Practical Experiences in the Operation of Many Power Plants in Parallel. R. F. Hayward. A review of the lessons learned from the long-distance transmission plants operating in parallel, and supplying power over large areas of territory. 6300 w. Int Elec Cong of St. Louis—Sept., 1904.

See also Multiple; ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING.

Paris Franchise.—See Franchise.

Pontiac, Ill.—The Pontiac Light and Water Co., Pontiac, Ill. An illustrated account of a company uniting most of the public utilities under one management, for a town of about 6500 inhabitants. 3200 w. Elec Wld & Engr—May 23, 1903.

Power Sale.—The Sale of Power. Robert S. Hale. Discusses questions involved in the sale of power from small plants. 3800 w. Engr, U S A—Jan. 15, 1903.

Prepayments.—See Meter Department; Rates; ELECTRIC METER.

Protection.—Central Station Protection. A symposium of ideas on the protection of central stations from interrupted service. 5000 w. Elec Rev, N Y—June 3, 1905.

See also Reserve; ELECTRIC PROTECTIVE APPARATUS.

Rates.—The 4-C Method of Charging for Electric Current. Ralph J. Patterson. Discusses methods of selling current. 1700 w. Am Elect'n—Dec., 1900.

The Rate Question. Henry L. Doherty. Read at the Milwaukee meeting of the Northwestern Elec. Assn. Describes the system advocated by the writer, and gives his reasons for objecting to the usual methods of charging. 1800 w. Elec Rev, N Y—Jan. 26, 1901.

The Rate Question. H. L. Doherty. A discussion of the relative value of the meter and the flat rate systems, and advocating the charging for electric power by a combination of fixed and variable charges. 100 w. Am Gas Lgt Jour—Feb. 4, 1901.

The Determination of the Price of Current for Electric-Supply Stations (Die Bemessung des Strompreises bei Elektrizätswerken). K. Wilkens. An examination of daily and monthly diagrams for the purpose of determining an equitable basis for charges; the results are compared for a number of stations. 3000 w. Elektrotech eltschr—Feb. 7, 1901.

The Foresee (4-C) System of Charging. L. R. Wallis. Extracts from a paper read before the Nat. Elec. Lgt. Assn. Discusses briefly various proposed plans and explains the system given the name of this title, showing how it meets the needs of the public. 2500 w. Elec Rev, N Y—May 25, 1901.

Central Station Tariff System. Arthur Wright. Discusses the system described by Mr. Wallis in his recent paper before the Nat. Elec. Lgt. Convention. 1200 w. Elec Wld & Engr—July 13, 1901.

Reform in the Charges of Electric Works (Vorschläge zur Tarifreform der Elektricitätswerke).

K. Wilkens. Discussing rational formulas upon which proper charges for electrical energy supply may be based. 2000 w. Elektrotech Zeitschr—Dec. 5, 1901.

The Influence of Tariffs on Electricity Supply. C. Ashmore Baker. Commences an examination of undertakings to ascertain the influence the various methods of charging for electrical energy may exert on the load factors and financial results. Serial. 1st part. 800 w. Elec Rev, Lond —March 21, 1902.

The Influence of Tariffs on Electricity Supply. J. R. Dick. Critical reply to articles by C. Ashmore Baker on methods of charging for electric energy. 1400 w. Elec Rev, Lond—April 25, 1902.

The Flat Rate Nuisance. Thomas D. Miller. Read at meeting of the Southwestern Gas, Electric and Street Railway Assn. Condemning flat rates as applied to the lighting business. 1600 w. Am Gas Lgt Jour—May 12, 1902.

Rates. Louis A. Ferguson. Read before the Nat. Elec. Lgt. Assn. A discussion of methods of charging. Serial. 1st part. 1800 w. Elec, N Y—June 4, 1902.

The Determination of Central Station Rates. C. J. Spencer. Considers the several systems of charging for current. 900 w. Elec Wld & Engr—Nov. 22, 1902.

Rates and Methods of Charging. J. W. Shuster. Read at meeting of the Northwestern Elec. Assn. Outlines methods of charging for electric current in use in the United States. 2500 w. Am Gas Lgt Jour—Feb. 9, 1903.

The Question of Charges for Electric Current (Zur Tariffrage der Elektricitätswerke). Max Schwabach. A discussion of the cost of supplying current from electric stations and the proper system of fixing tariffs. Diagrams. 1600 w. June 25, 1903.

A Method for Determining Rates and Prices for Electric Power. Frank B. Perry. Gives a method for rearranging a schedule of rates based on the "step system." 2400 w. Trans Am Soc of Mech Engrs, No. 012—Dec., 1903.

Methods of Charging for Electrical Energy. Ellis H. Crapper. Abstract of a paper read before the Leeds Soc. of the Inst. of Elec. Engrs. Discusses the uniform meter rate, the two-rate meters and other systems. 3200 w. Elect'n, Lond—Dec. 18, 1903.

Method of Charging for Electrical Energy. Review of a paper by Ellis H. Crapper before the Leeds Local Sec. of the I. E. E. 1800 w. Elec Rev, Lond—Jan. 1, 1904.

Methods of Charging for Electrical Energy. Ellis H. Crapper. Read before the Leeds Sec. of the Inst. of Elec. Engrs. Discusses the nature of the business and the uniform meter rate, etc. 9000 w. Elec Engr, Lond—Jan. 15, 1904.

The Question of Charges for Electricity Supply (Beitrag zur Tariffrage der Elektrizitätswerke). H. Schönborn. With diagram showing the variation in consumption and its influence upon charges. 2500 w. Elektrotech Zeitschr—May 12, 1904.

The Cost of Electric Energy. G. L. Addenbrooke. A study of the prices at which electric supply can be furnished in England, especially considering supply from a central source. 4800 w. Engng—June 3, 1904.

The Tariff Question Again (Nochmals die Tariffrage). Dr. Rasch. A discussion of the proper division of the charges for electricity supply. 2000 w. Elektrotech Zeitschr—June 23, 1904.

A Proposed Method of Determining Meter Rates for the Sale of Current, with an Example from Data of a Large Steam-Driven Plant. A. M. Hunt. Read before the Pacific Coast Elec. Trans. Assn. Explains a system worked out by the writer. 1200 w. Jour of Elec—July, 1904.

The Tariff Question in Electric Stations (Zur Tariffrage der Elektricitätswerke). Fritz Hoppe. Discussing the best methods of charging for electric current supply, considering the side both of the producer and the consumer. 7000 w. Elektrotech Zeitschr—Aug. 25, 1904.

Rates for Electricity Supply. Etienne de Fodor. A discussion of the conditions which led to the present rates, reviewing the history of electrical current tariff, and considering the advantages to be derived from a unit price. 5000 w. Int Elec Cong of St. Louis—Sept., 1904.

Methods of Charging for Electric Current (Ueber einige Stromtariffragen). Dr. Gotthold Stern. A discussion of the various methods of determining the price to be charged the customer for electric current supply. 3000 w. Zeitschr f Elektrotechnik—Feb. 19, 1905.

The Charges for Municipal Electric Lighting Plants (Städische Lichtwerke und deren Besteuerung). Paul Hecht. Giving data of operating costs, and discussing the best method of distributing charges. 1800 w. Zeitschr f Elektrotechnik Feb. 26, 1905.

The Supply of Cheap Electrical Energy for Industrial Purposes. J. A. Jeckell. Read before the Birmingham Elec. Club. Considers the supply from central stations, the advantages of a cheap supply, and the possibility of cheap rates. 5500 w. Elec Engr, Lond—May 19, 1905.

Notes on Costs and Tariffs for Electric-Supply. Hamilton Kilgour. Read before the Incor. Munic. Elec. Assn. Shows a scientific basis for the determination of prices or discounts. Also discussion. 4800 w. Elect'n, Lond—June 30, 1905.

Charges for Supply from Combined Lighting and Traction Stations. John Hall Rider. Read before the Munic. Elec. Assn. Analyzes the cost of producing electrical energy. Also short discussion. 2500 w. Elec Engr, Lond—July 7, 1905.

The Supply of Electricity in Industrial Areas from a Municipal Point of View. William Hodgson. Read before the Incor. Munic. Elec. Assn., at Edinburgh. Remarks on present conditions and the demand for electric power, and the factors demanding municipal attention, especially cost of production and rates. 2200 w. Prac Engr—Aug. 25, 1905.

See also **Maximum Demand; Meter Department;** ELECTRIC DRIVING—Cheap Power; ELECTRIC METER—Area.

Rates, Cologne.—The Development of the Electric Stations of Cologne (Die Entwickelung der Cölner Elektricitätswerke). H. Overmann. Discussing especially the prices charged for current under the operation of a double-tariff system for different parts of the day. 5000 w. Elektrotech Zeitschr—Jan. 21, 1904.

Rates, Mass.—Regulation of Gas and Electric Rates in Massachusetts. Alton D. Adams. Gives a collection of cases, involving gas and electric rates, which have come before the Massachusetts Commissioners, giving the facts that determined the rates, and the reasons, without any expression of opinion. Serial. 1st part. 2200 w. Elec Wld & Engr—Aug. 19, 1905.

Regulation of Electric Rates in Massachusetts. Alton D. Adams. A series of digests of the leading decisions of the Massachusetts Gas and Electric Commission. 2500 w. Serial. 1st part. Elec Wld & Engr—Sept. 2, 1905.

Rates, Tramway.—Dundee Power Supply. An explanation of a system of charging for electrical energy recently placed before the Tramway Committee of the Dundee Corporation. 1800 w. Elec Engr, Lond—April 7, 1905.

Reconstruction.—Reconstructing or Modernizing Central Stations. O. M. Rau. Presents a plan for reconstructing many small stations which are operating with old, inefficient apparatus. The installing of alternating current machinery. 1800 w. Elec Rev, N Y—Jan. 25, 1902.

The Economy of Reconstructing Central Stations to Modern Methods. C. R. Maunsell. Outlines an old and a modern plant showing the gain on investment by modern methods. Special reference to Kansas stations. 1500 w. Am Gas Lgt Jour—Dec. 15, 1902.

See also ELECTRIC STATION—Evolution.

Records.—Notes on the Design of Central-Station Records and Returns. F. H. Davis. Notes describing the practice in several well-managed stations. 6000 w. Elec Engr, Lond—May 8, 1903.

Regulations.—See Stretford; ELECTRIC INDUSTRY.

Reserve.—Duplication of Electrical Apparatus to Secure Reliability of Service. H. W. Buck. Discusses the question of the proper reserve in an electrical installation, considering the several classes of apparatus and their liability to injury. 2500 w. Am Inst of Elec Engrs—May, 1905.

Reversals.—The Reversal of a Large Power Station. L. H. Pike. Describes conditions which led to the necessity of feeding lines in multiple with other stations, and the troubles met and overcome. Diagrams. 1500 w. Eng, U S A—Dec. 1, 1903.

St. Louis, Mo.—The Electric Light and Power Situation in St. Louis. An illustrated article reviewing the past history and present condition of the electric light and power business and outlining the future policy. 4200 w. Elec Wld & Engr—Oct. 17, 1903.

See also ST. LOUIS.

Sherwin-Williams System. — Power Plant Supervision and Accounting. F. W. Ballard. Read before the Ohio Soc. of Mech., Elec., and Steam Engrs. Describes the system of the Sherwin-Williams Co., of Cleveland, O. 2500 w. Engr, U S A—June 1, 1905.

Signalling.—Methods of Communication in Electric Generating Stations. Considers the methods used in stations, and their value, and advises the addition of a private telephone. 2200 w. Elec Rev, Lond—Aug. 16, 1901.

Single-Phase Motors.—Single-Phase Motors as a Means of Increasing Station Earnings. An explanation of the ways the single-phase alternating current motor tends to the development of economic production. Serial. 1st part. 2000 w. Can Engr—July, 1903.

See also ELECTRIC MOTOR.

Size.—Economical and Safe Limits in the Size of Central Stations. H. A. Lardner. Discusses the advantages and disadvantages of large central stations; and the probable effect of steam turbine development on the size of generating units. 4000 w. Trans Am Inst of Elec Engrs—April 24, 1903.

Small.—Combination and Operation of Small Central Station Plants. Abstract of a paper by Cleon L. Williams on "Erection and Maintenance of Electric Lighting Plants," before the International Association of Municipal Electricians. 2000 w. Elec Wld & Engr—Sept. 9, 1905.

Specifications.—Power Plant Specifications. Cloyd Marshall. Discusses the more important elements to be decided in planning an electric station and distribution system. 2300 w. Engr, U S A—Aug. 15, 1901.

Stretford Regulations.—The Stretford Regulations as to the Supply of Electrical Energy. A copy of the regulations drafted by C. H. Wordingham. 3500 w. Elec Engr, Lond—Jan. 17, 1902.

Superintendent.—The Central Station Superintendent. J. H. Vail. A prize article discussing this subject in an able manner. 3000 w. Elec Rev, N Y—July 13, 1901.

The Qualifications of a Central Station Superintendent. Considers the desirable characteristics as a man and the professional attainments he should possess. 3900 w. Cent Sta—Dec., 1902.

Testing.—The Economic Value of Testing. Prof. George D. Shepardson. Abstract of paper read before the Northwestern Elec. Assn. Urges the buying of accurate instruments and having men competent to use them, in central stations for the manufacture and sale of electrical energy. 4000 w. Elec Wld & Engr—Feb. 9, 1903.

See also ELECTRIC GENERATOR TEST; ELECTRIC TESTING.

Theft of Current.—See ELECTRIC CURRENT.

Troubles.—Some Power Plant Experiences. H. C. Reagan. A review of difficulties and accidents in an interurban power station near New York. 1800 w. St Ry Rev—Nov. 20, 1904.

An Unusual Power Station Trouble. L. H. Pike. Gives an account with diagrams, of an actual occurrence, and the method of remedying it. 2500 w. Power—March, 1905.

Uniform Equipment.—Uniform Equipment in Electric Power Plants. H. S. Knowlton. Presents the advantages of uniform equipment. 1400 w. Cassier's Mag—Oct., 1905.

Voltage Selection.—The Selection of Working Voltage for a New Electric Plant (Die Wahl der Verbrauchsspannung für Neu Anzulegende Elektrizitätswerke). E. Wikander. A comparison of the relative advantages of various pressures for continuous and alternating currents. 3000 w. Elektrotech Zeitschr—Oct. 12, 1905.

Wright System.—See **Maximum-Demand Charging.**

ELECTRIC SUB-STATION.

See also ELECTRIC DISTRIBUTION; ELECTRIC STATION; ELECTRIC TRANSMISSION; ROTARY CONVERTER; STORAGE BATTERY; TRANSFORMER.

Notes on Sub-Station Practice. On the proper location, design and operation of sub-stations for railway service. 2500 w. St Ry Jour—July 4, 1903.

Berne, Switzerland.—The Monbijou Transformer Station (Die Umformerstation Monbijou). S. Herzog. An illustrated description of the sub-station in the city of Berne, receiving an alternating current at 16,000 volts from the Kander Hydro-electric station, and transforming it to 120 volts continuous for local distribution. 2000 w. Zeitschr f Elektrotechnik—Oct. 8, 1905.

Brooklyn Rapid Transit.—The New Parkville Concrete Sub-station of the Brooklyn Rapid Transit Company. Illustrated description. 2000 w. St Ry Jour—May 7, 1904.

Improved Power Facilities for the Brooklyn Rapid Transit Company. Plans and interior views of four of the principal sub-stations are given, with descriptive notes. 3000 w. St Ry Jour—Feb. 14, 1903.

See also CONCRETE REINFORCED—Sub-station.

Buffalo.—The New Buffalo Terminal Transformer Station of the Cataract Power and Conduit Company. Fred. P. Woodbury. Illustrated detailed description of a station representing the most advanced practice. 1300 w. Am Elect'n—Aug., 1901.

See also ELECTRIC DISTRIBUTION.

Chicago.—The Development, Equipment, and Operation of the Sub-Stations and Distributing Systems of the Chicago Edison Co. and Commonwealth Electric Co. Ernest F. Smith. General description of methods and details. 4800 w. Jour W Soc of Engrs—April, 1903.

The Lay-Out and Construction of a Modern Sub-Station. S. O. Swenson. An illustrated description of the design of the Ohio Street substation of the Chicago Edison Co. 2800 w. Am Elect'n—Dec., 1904.

See also ELECTRIC DISTRIBUTION; ELECTRIC STATION.

Colorado City.—New Switching Station at Colorado City. Illustrated detailed description. 1500 w. Elec Rev, N Y—July 30, 1904.

Comparison.—Energy Distribution to Sub-Stations. C. Alfred Smith. Abstract of a paper read before the Birmingham Loc. Sec. of the Inst. of Elec. Engrs. Compares the cost of two different systems. In the first the power is transmitted electrically from a gas engine station and distributed by means of sub-stations; in the second the gas is transmitted to gas-engine sub-stations, other conditions remaining the same. 6000 w. Elect'n, Lond—April 1, 1904.

Concrete.—See **Brooklyn Rapid Transit;** CONCRETE REINFORCED—**Sub-Station.**

Equipment.—Some Notes on the Influence of the Sub-Station Equipment and Transmission Line on the Cost of Electricity Supply. Andrew Stewart. Read before the Newcastle section of the Inst. of Elec. Engrs. Discusses the distribution system under present conditions, and some points in the equipment of sub-stations. Serial. 1st part. 2400 w. Elec Engr, Lond—Jan. 31, 1902.

Influence of Sub-Station Equipment on the Cost of Electricity Supply. Andrew Stewart. Part of a paper read before the Newcastle Sec. of the Inst. of Elec. Engrs. Discusses types of sub-stations and their equipment and present methods of distribution, giving results of investigations. 4900 w. Elect'n, Lond—Feb. 21, 1902.

The Electrical Equipment of Sub-Stations. R. Parry and W. Casson. An illustrated description of the arrangements and apparatus in sub-stations of electric distribution systems, as designed by H. F. Parshall, with plans and diagrams. 6500 w. Trac and Trans—Dec., 1902.

Polyphase Sub-Stations: Their Equipment and Working. S. L. Pearce. Deals with various types of sub-station equipments, considering some practical points which have arisen in connection with their working. Serial. 1st part. 5400 w. Elec Engr, Lond—July 8, 1904.

Flushing, N. Y.—See **ELECTRIC STATION—New York and Queens Co.**

Gas Compared.—See **Comparison.**

Glenside.—See **Philadelphia.**

Hamburg.—See **ELECTRIC STATION.**

Helena, Mon.—The Sub-station of the Helena Light and Traction Company. Illustrated detailed description of a new sub-station made necessary by a fire. 2000 w. Jour of Elec—Dec., 1904.

Jamaica, N. Y.—See **ELECTRIC STATION—New York and Queens Co.**

London.—Sub-Station Plant of the London United Tramways. Illustrated description of the sub-station. Tram & Ry Wld—March 18, 1902.

The Fisher-Street Sub-Station of the Metropolitan Electric Supply Co. Illustrated description of the largest sub-station with rotary machinery, running in England. Its present capacity is 8,000 kw., and it is to be increased to 5,000 kw. Its interesting features are noted. 3000 w. Elect'n, Lond—Jan. 20, 1903.

The Fischer Street Sub-Station of the Metropolitan Electric Supply Co., Ltd. Illustrated detailed description, especially of switch gear. 2400 w. Elec Rev, Lond—July 28, 1905.

The Westminster Electric Supply Co.'s "Italian Garden" Sub-Station. Illustrated description of a sub-station in Grosvenor Square, London, where the station is in the basement, and the roof forms the Italian garden, at a level of some 8 ft. above the street. 3700 w. Elect'n, Lond—Sept. 22, 1905.

London Metropolitan Ry.—See **RAILWAY SIGNAL.**

Manhattan Ry., N. Y.—See **New York Elevated Ry.**

Montreal.—See **ELECTRIC STATION.**

Munich.—See **ELECTRIC STATION.**

Moscow.—The Moscow-Road Sub-Station of the Metropolitan Electric Supply Co. Illustrated description. 1500 w. Elect'n, Lond—Oct. 13, 1905.

New York Central.—See **ELECTRIC RAILWAY; ELECTRIC STATION—Port Morris, N. Y.**

New York Elevated Ry.—Sub-stations of Manhattan Railway. A well-illustrated description of the construction, architecture and electrical equipment of the rotary converter sub-stations for the elevated railway in New York. 5000 w. St Ry Jour—Jan. 3, 1903.

The Sub-Stations of the Elevated Railways in New York (Die Unter-Stationen der New Yorker Hochbahn). S. S. G. Freund. Illustrated description of the transforming sub-stations in New York, in which the current from the main station at 77th street is reduced and converted for delivery to the third rail. 2500 w. Elektrotech Zeitschr—Aug. 6, 1903.

North Eastern Ry.—Equipment of Sub-Stations—North-Eastern Railway. Illustrates and describes very interesting plants in England. 1500 w. Tram & Ry Wld—March 10, 1904.

See also **ELECTRIC RAILWAY—Newcastle.**

Paris, Batignolles.—The Electric Installation of the Batignolles Freight Station of the Western Railway of France (Installations Electriques de la Campagnie de l'Ouest à la Gare de Batignolles-Marchandises). M. Soubrier. Describing a transformer sub-station, with details of switchboards and distribution. Serial. 1st part. 3000 w. Revue Tech—May 25, 1904.

Philadelphia.—Glenside Sub-Station. Illustrates and describes this new rotary converter sub-station of the Philadelphia Rapid Transit Co. 3000 w. St Ry Rev—Sept. 15, 1905.

See also **ELECTRIC STATION.**

Polyphase.—See also **ELECTRIC STATION.**

Portable.—Portable Sub-Station for Cincinnati & Columbus Traction Company. John R. Hewett. Illustrated description of this car and the apparatus installed. 1500 w. St Ry Jour—July 8, 1905.

Railway.—Equipment of Railways with Converter Sub-Stations. Alton D. Adams. Reviews the various plans for generating alternating currents for a railway that extends beyond the limits of a single power station, describing the types of equipment, methods, etc. 3000 w. St Ry Rev—Feb. 20, 1903.

The Relation of Railway Sub-Station Design to its Operation. Sydney W. Ashe. Considers only sub-stations in which high-tension alternating current is received and converted into low-tension direct current. Discusses factors of importance in securing reliability of service. 4000 w. Ills. Am Inst of Elec Engrs—Dec., 1905.

Some Considerations Determining the Location of Electric Railway Sub-Stations. C. W. Ricker. Outlines a general method for determining the number and location of sub-stations. Serial. 1st part. 1800 w. Am Inst of Elec Engrs—Dec., 1905.

See also **ELECTRIC DISTRIBUTION; ELECTRIC RAILWAY; ELECTRIC STATION.**

Rutland, Vt.—See **HYDRO-ELECTRIC PLANT.**

St. Louis Transit Co.—See **ELECTRIC RAILWAY—St. Louis.**

San Francisco.—See **ELECTRIC STATION.**

Sao Paulo, Brazil.—See **HYDRO-ELECTRIC STATION—Parnahybo.**

Schenectady Ry.—The New Dock Street Sub-Station of the Schenectady Railway Company, Schenectady, N. Y. Illustrated detailed description. 2000 w. Elec Rev, N Y—April 23, 1904.

Switchgear.—See **ELECTRIC SWITCH.**

Waterbury, Conn.—See **ELECTRIC TRANSMISSION.**

Winterthur, Switzerland.—See **ELECTRIC STATION.**

ELECTRIC SUBWAY.

See **ELECTRIC CABLE; ELECTRIC CONDUIT; ELECTRIC DISTRIBUTION; PIPE GALLERY; SUBWAY; UNDERGROUND RAILWAY.**

ELECTRIC SUPPLY.

See **ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC EQUIPMENT; ELECTRIC INDUSTRY; ELECTRIC POWER; ELECTRIC STATION; ELECTRIC STATION MANAGEMENT; ELECTRIC TRANSMISSION.**

ELECTRIC SWITCH.

See also **CONTROLLER; ELECTRIC APPARATUS; ELECTRIC PROTECTIVE APPARATUS; ELECTRIC SWITCHBOARD.**

Some Points in Switch Construction. Alf. H. Mayes. Calls attention to easily remedied faults. 700 w. Elec Rev, Lond—June 13, 1902.

Automatic.—Automatic Cut-Out Switch for Heavy Currents (Selbstthätiger Starkstrom-Hebelschalter). Friedrich Natalis. An illustrated description of a switch which is cut out automatically in emergencies, and which cannot be closed again before the automatic cut-out device is set. 1000 w. Elektrotech Zeitschr—April 11, 1901.

Automatic Protective Device for Reversing Switches with Continuous Current Motors (Selbstschutzvorrichtungen für Gleichstrommotoren an Wendeanlassern). Rudolph Krause. An illustrated description of starting and reversing apparatus by which sparking and excessive currents are prevented. 600 w. Elektrotech Zeitschr—Dec. 26, 1901.

Improved Automatic Switch (Neue Selbstschalter). Max Vogelsang. An illustrated description of the new switch of Voigt & Haeffner, adapted for use with high-tension currents without danger. 3000 w. Elektrotech Zeitschr—Sept. 18, 1902.

The Use of Automatic Means for Disconnecting Disabled Apparatus. H. G. Stott. Discusses generating apparatus, transmission apparatus, and receiving apparatus, giving suggestions for safety. 1200 w. Trans Am Inst of Elec Engrs—July, 1903.

Automatic Release for High-Tension Switches (Ueber die Auslösung von Automatischen Hochspannungsschaltern). Max Vogelsang. Illustrating a special form of automatic switch for action by continuous current. 1800 w. Elektrotech Zeitschr—July 30, 1903.

See also **Long Distance; Oil; Starting; Transformer.**

Automatic Voltage Regulator.—A New Electromagnetic Contact Arrangement for Automatic Switches (Ueber eine Neue Elektromagnetische Kontaktvorrichtung für Selbsttätige Schaltwerke). Paul Thieme. Describing an improved form of automatic switch for maintaining a constant voltage between given points. 3000 w. Elektrotech Zeitschr—Feb. 23, 1905.

Cellular.—Future Types of Switchgears. W. E. Warrilow. Describes recent types in American and Continental stations, commending the cellular type of gear. 2000 w. Elec Engr, Lond—Sept. 5, 1902.

Compressed Air.—See **High Voltage.**

D. C. Low Voltage.—Types of Direct-Current Low-Tension Switchgears. W. E. Warrilow. Illustrates and describes various types. Serial. 1st part. 2200 w. Elec Engr, Lond—March 11, 1904.

Dynamo Parallel.—See **Storage Battery.**

Ferranti Gear.—The New Ferranti Switch Gear. Illustrates and describes this switch gear, which has been almost entirely remodelled to meet the conditions of modern generating stations. 3000 w. Elect'n, Lond—Oct. 20, 1905.

Fisher St., London.—A British Switchgear for Sub-Station Control. Illustrated description of the switch gear of the Fisher Street sub-station, London. 5000 w. Elec Wld & Engr—Feb. 18, 1905.

Switchgear for the Fisher Street Sub-station of the Metropolitan Electric Supply Company, Limited, London. Illustrates and describes the unique features of this gear, such as the remote control from one platform, the protected extra high tension connections, the depressor method of starting, etc. 3000 w. Elec Engr, Lond—Feb. 24, 1905.

General Electric.—The Latest General Electric Types. H. C. Wirt. Illustrates and describes oil switches and expulsion circuit breakers. 800 w. Jour of Elec—June, 1901.

Group.—The Use of Group-Switches in Large Power Plants. L. B. Stillwell. Information concerning the group-switch as used in the plant of the Manhattan Ry Co., N. Y., given as introductory to a discussion. Diagram. 1300 w. Trans Am Inst of Elec Engrs—Jan., 1904.

See also **Station.**

High-Voltage.—A New High Voltage Cut-Out Switch (Ueber Einen Neuen Hochspannungsausschalter). J. Froitzheim. Describing a heavy apparatus using compressed air, for service in large stations. 1200 w. Elektrotech Zeitschr—Nov. 22, 1900.

High-Tension Switching and Fusing Devices. R. S. Masson. Read before the Pacific Coast Elec. Trans. Assn. An illustrated article giving some suggestions in high-tension switching. 1800 w. Jour of Elec—June, 1901.

A Discussion of High Tension Switching and Fusing Practices. A discussion upon the papers presented at the convention of the Pacific Coast Elec. Trans. Assn. 7200 w. Jour of Elec—July, 1901.

The Control of High Potential Systems of Large Power. E. W. Rice, Jr. Read before the Am. Inst. of Elec. Engrs., at Buffalo, Aug. 23, 1901. Outlines the principal features of the switching device employed by the Metropolitan Traction Co. of N. Y., and discusses the principles that should govern the control of current. Ill. 4000 w. Elec Rev, N. Y.—Sept. 7, 1901.

The Control of High Potential Systems of Large Power. E. W. Rice, Jr. Briefly outlines the principles which the writer believes should govern in the layout of stations of normally large output, giving illustrated description of devices for controlling and switching used in the Metropolitan and Manhattan stations of New York City. 3900 w. Trans Am Inst of Elec Engrs—Dec., 1901.

The Construction of High-Tension Central-Station Switchgears, with a Comparison of British and Foreign Methods. Henry W. Clothier. Read before the Manchester Soc. of the Inst. of Elec. Engrs. Brief outline of switchgear practice for alternating currents, and illustrates the main features of the apparatus produced in Germany as compared with English productions. Ill. Serial. 1st part. 2400 w. Elec Times—Feb. 20, 1902.

Recent High-Voltage Switches (Neuere Hochspannungsschalter). A. Gerhardt. Illustrated descriptions of switches for electrical plants with high voltages. 2800 w. Elektrotech Zeitschr—April 9, 1903.

The Design of Extra High Tension Switchgears. W. E. Warrilow. Begins an illustrated description of recent designs showing the developments which have resulted from experience. Serial. 1st part. 1700 w. Elec Engr, Lond—July 3, 1903.

High-Tension Switchgear. L. Andrews. Read before the Manchester Sec. of the Inst. of Elec. Engrs. The present article considers mechanical v. electrical remote control, separation of phases in circuit breakers, discriminating circuit breakers, etc. Serial. 1st part. 2500 w. Mech Engr—Jan. 7, 1905.

High-Tension Switch Gear. L. Andrews. Abstract of a paper read before the Manchester Sec. of the Inst. of Elec. Engrs. Discusses methods of control, the devices used, etc. Brief general discussion. 2200 w. Elect'n, Lond—Dec. 30, 1904.

Improved Switch System for High Voltages in Mining Plants (Moderne Hochspannungs-Schaltanlagen für den Betrieb in Bergwerks-Anlagen). H. Mack. Especial attention is given to the prevention of ignition of mine gases; oil switches are described, and the general arrangement of underground installations. 1800 w. Elektrotech Zeitschr—Nov. 30, 1905.

See also **Automatic; Ferranti; Long Distance; Martin; Oil; Station; Transformer; ELECTRIC PROTECTIVE APPARATUS; ELECTRIC TRANSMISSION—Protective Device.**

Knife.—Switch Construction. N. C. Woodfin. An illustrated description of a recently designed single-knife switch, aiming at simplicity and effectiveness. 1400 w. Elec Rev, Lond—Dec., 25, 1903.

Liquid Resistance.—Liquid Resistance Switch. Illustrated description of a new form of liquid resistance switch, which combines a circuit-breaking and direction-reversing arrangement with a regulating resistance. 800 w. Engr, Lond—Oct. 9, 1903.

Long Distance.—The Use of the Long-Distance High-Pressure Cut-Out (Der Hochspannungs-Fernschalter und Seine Verwendung). J. Schmidt. Describing an apparatus for cutting out transformers in a distribution system, when not required. Serial. Part I. 2000 w. Elektrotech Zeitschr—June 12, 1902.

Long-Distance Switches (Ueber Fernschalter). Fr. Lindenstruth and O. Forster. Illustrating details of switches to be operated electrically at a distance, employing a variety of contact breakers. 2500 w. Elektrotech Zeitschr—July 28, 1904.

Long-Distance Switches. F. Lindenstruth and O. Forster. Translation of an article in "Elektrotechnische Zeitschrift." Considers the construction of certain long-distance switches which can be operated by hand or automatically. Ills. Serial. 1st part. 1500 w. Elec Engr, Lond—Aug. 19, 1904.

Martin.—The Martin High Potential Switch. F. V. T. Lee. Illustrated description of a switch designed for fulfilling the requirements of the Yuba Power Co. on its 16,500-volt line. 2000 w. Jour of Elec—June, 1901.

Mine.—Colliery and Mining Switch Gear for High and Low Tension Alternating-Current Service. A. M. Randolph. Illustrates and describes a special line of switch gear developed by the British Westinghouse Co. Serial. 1st part. 1500 w. Ir & Coal Trds Rev—June 30, 1905.

Colliery and Mining Switchgear for High and Low Tension Alternating Current Service. A. M. Randolph. Describes a special line of switchgear and control apparatus for use in connection with mining operations. Serial. 1st part. 1400 w. Elec Rev, Lond—Nov. 3, 1905.

See also **ELECTRIC EQUIPMENT.**

Mine Safety.—Electric Switches and Description of a Patent Safety Switch for Use in Mines. William Maurice. Read at Nottingham meeting of Nat. Assn. of Col. Mgrs. Gives the rules relating to the design and application of switches formulated by the Inst. of Elec. Engrs, and gives an illustrated description of design. 2000 w. Ir & Coal Trds Rev—April 7, 1905.

Motor Starting.—See **Starting; ELECTRIC MOTOR—Starting.**

Oil.—High Pressure Oil Switches (Hochspannungs-Oelschalter). Dr. G. Benischke. A discussion of the advantages of oil insulation for switches for-high-pressure currents, with examples of construction. 2500 w. Elektrotech Zeitschr—July 30, 1903.

Switching Transmission Circuits. Alton D. Adams. Outlines facts that have led to the development of oil switches, describing these switches and their operation. 4000 w. Elec Rev, N Y—Aug. 22, 1903.

Oil-Break Switches and Fuses. Discusses the advantages of oil-break switches for alternating currents of high potentials, their design, etc., and gives a summary of the best developments of switchboard design. 4500 w. Elec Engr, Lond—Oct. 30, 1903.

Oil-Switches for High Pressures. E. M. Hewlett. Compares the oil-break switch with the air-break switch, as introductory to a discussion. 350 w. Trans Am Inst of Elec Engrs—Jan., 1904.

Automatic High Pressure Switches (Automatischer Hochspannungschalter). Max Vogelsang. Describing a form of oil insulated switch adapted for automatic parallel operation. 4000 w. Elektrotech Zeitschr—May 11, 1905.

High Voltage Oil Switches. Alfred Gradenwitz. Illustrates and describes the design of a German oil switch suggested by Dr. Benischke. 900 w. Engr, U S A—June 15, 1905.

High Tension Circuit Breaking Devices. W. T. Fernandez. Describes the mechanical and electrical features of several types of oil-break switches. Ills. 1600 w. Am Elect'n—Oct., 1905.

Oil-Bath Switchgear. Leonard J. Pumphrey. Considers some of the points of a good oil for switch work. 1500 w. Elec Rev, Lond—Nov. 24, 1905.

See also General Electric; High Voltage; Station; SWITCHBOARD.

Relay.—See Time; ELECTRIC PROTECTIVE APPARATUS.

Reversing.—See Automatic; Liquid Resistance.

Shunt Motor.—See Starting.

Sparking.—Sparking in Switches. A. Russell. Resumé of a paper communicated to the "Journal" by the Inst. of Elec. Engrs., giving results of experiments made to find a better method for the rating of switches. 1500 w. Elec Times—July 31, 1902.

Spark Preventing.—A New Spark-Preventing Device for Battery Switches (Ueber eine Neue Funkenentziehvorrichtung an Zellenschaltern). Paul Thieme. Describing the use of an auxiliary switch arrangement, preventing the sudden interruption of the current. 2000 w. Elektrotech Zeitschr—Feb. 12, 1903.

Stanley.—The Latest Stanley Types. W. Currie. Illustrated descriptions of apparatus. 2000 w. Jour of Elec—June, 1901.

Starting.—The Switching Out of Shunt-Wound Electric Motors Without Sparking (Bedingungen des Funkenfreien Ausschaltens für Nebenschlussmotoren). Rudolf Krause. A description, with diagrams, of methods of avoiding sparking at the starting switch of continuous current motors. 800 w. Elektrotech Zeitschr—March 14, 1901.

Some Notes on the Design of Motor-Starting Switches. F. W. Davies. Notes and a few suggestions with reference to starting-switch design. Ill. 1800 w. Elec Engr, Lond—July 26, 1901.

The Evolution of the Starting Switch. Discusses the essential requirements of a satisfactory starting switch. 1600 w. Elec Engr, Lond—Sept. 4, 1903.

Motor Starting Switches and Resistances. F. O. Hunt. Abstract of a paper read before the Birmingham Local Sec. of the Inst. of Elec. Engrs., with discussion. Discusses quantities affecting the working of the starter, and the lasting capabilities of the switch. 2500 w. Elect'n, Lond—July 15, 1904.

Notes on Motor-Starting Switches. Considers the requirements of a good starting switch, and begins a detailed study of the construction of some of the higher class starters used for special purposes. Serial. 1st part. 4000 w. Elec Engr, Lond—Oct. 7, 1904.

A New Automatic Starting Switch (Ein Neuer Selbstanlasser). Johannes Jessen. Illustrated description of automatic starting switch and resistances for electric motors. 2500 w. Elektrotech Zeitschr—Aug. 31, 1905.

See also ELECTRIC MOTOR.

Station.—The Design of Switching Apparatus for High Tension Central Stations (Ueber den Entwurf von Schaltanlagen für Hochspannungssentralen). Dr. G. Benischke. A paper giving an illustrated description of modern high-tension switching apparatus. 3000 w. Zeitschr f Elektrotechnik—March 15, 1903.

An Emergency or Master Switch for Central Stations. W. M. Thornton. Suggests that an auxiliary switch be so fitted that, in emergency, all the fields could be simultaneously short-circuited. 1500 w. Elect'n, Lond—Jan. 15, 1904.

Distance-Control Switches and Their Lay-Outs in Stations. W. E. Warrilow. Deals with the chief types of oil switches in use, their design and assembly in conjunction with other apparatus to form a power-house or substation switchgear. Serial. 1st part. 2000 w. Elec Engr, Lond—Jan. 6, 1905.

See also ELECTRIC SWITCHBOARD.

Storage Battery.—Connecting and Disconnecting Switches (Les Conjoncteurs-Disjoncteurs). G. Fiévé. Describing special forms of switches used in connection with the charging of accumulators and with the operation of dynamos in parallel. 4500 w. Mem Soc Ing Civ de France—Oct., 1901.

An Automatic Storage Battery Switch (Ueber einen Neuen Selbstthätigen Zellenschalter). Paul Thieme. An illustrated description of a switching apparatus for automatically cutting in and out cells of arc accumulator battery, and a general review of such switches. 2000 w. Elektrotech Zeitschr—Feb. 27, 1902.

Switch Connections for Storage Battery Plants (Ueber Leitungen Sparende Zellenschalter für Akkumulatorenbatterien). C. Liebenow. Describing switch connections for a storage battery by which the cells may be thrown into service in various combinations. 2500 w. Elektrotech Zeitschr—May 4, 1904.

Three-Phase.—See ELECTRIC SWITCHBOARD.

Time.—An Electric Time Switch (Ueber einen Elektrischen Zeitschalter). Hans Carl Steidle. Describing a device for use on telegraph systems and elsewhere, which will operate only after a certain time interval, and which can be restored immediately to its normal condition. 2500 w. Elektrotech Zeitschr—Oct. 15, 1903.

See also ELECTRIC PROTECTIVE APPARATUS—Relay.

Transformer.—Switch for Reducing the Loss in Unloaded Transformers (Schaltvorrichtung zur Vermeidung des Leerlaufstromes Unbelasteter Transformatoren). Ph. Scholtes. An illustrated account of the Schuckert device for disconnecting the primary coil when unloaded, as used by the Nuremberg Electric Station. 1500 w. Elektrotech Zeitschr—April 25, 1901.

The Economy of Automatic Transformer Switches (Ueber die Oekonomie von Hochspannungsfernschaltern). E. H. Geist. A discussion showing that only in exceptional cases is it economical to instal switches which automatically cut out the primary winding of a transformer when there is no load on the secondary. 1200 w. Elektrotech Zeitschr—Jan. 16, 1902.

The Automatic Transformer Switch (Der Automatische Transformatorenschalter). J. Schmidt. Describing a device for automatically cutting out the transformers of a distribution system as the demand falls off. 6000 w. Elektrotech Zeitschr—Sept. 15, 1904.

Switching System for the Reduction of Losses in Single and Polyphase Transformers when Operating Unloaded (Schaltungsanordnungen zur Vermeidung bezw. Verringerung der Leerlaufsarbeit bei Ein- und Mehrphasen-Wechselstromtransformatoren). J. Schmidt. Describing hand operated and automatic switches for the cutting out of transformers. Two articles. 7500 w. Zeitschr f Elektrotechnik—Oct. 22, 29, 1905.

See also Long Distance; TRANSFORMER.

Voight & Haeffner.—See Automatic.

Westinghouse.—The Latest Westinghouse Types. W. M. McFarland. Illustrates and describes circuit-breakers constructed on the general principle employing the open arc and carbon break. 900 w. Jour of Elec—June, 1901.

ELECTRIC SWITCHBOARD.

See also **ELECTRIC APPARATUS; ELECTRIC INSTRUMENT; ELECTRIC METER; ELECTRIC PROTECTIVE DEVICE; ELECTRIC STATION; ELECTRIC SWITCH; TELEPHONE SWITCHBOARD.**

Switchboard Construction. John H. Hertner. Discusses points to be considered in switchboards of various sizes and purposes, the materials used, etc. Ill. 2300 w. Engr, U S A—Feb. 1, 1901.

Switchboards for Electric Lighting. J. H. Hertner. Brief review of the development and an illustrated description of the connections and arrangements of the modern switchboard. 2000 w. Engr, U S A—Feb. 15, 1901.

Modern Switchboard Practice. H. P. Davis. Illustrates and describes types and systems, discussing their limitations and faults, their operation, protection, etc. 9000 w. St Ry Jour—Nov. 1, 1902.

Alternating Current.—Alternating Current Switchboards. Stephen Q. Hayes. The first of a series of articles giving illustrated descriptions of boards made by the Westinghouse Company. Serial. 1st part. 1600 w. Elec Wld & Engr—Sept. 26, 1903.

American.—American Switch Systems (Ueber Amerikanische Schaltanlagen). Artur Hruschka. A general account of American switchboard construction as applied in traction plants, long-distance transmission systems, and general service. Two articles. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 28, Nov. 4, 1904.

Base.—An Ideal Switchboard Base. Leonard J. Pumphrey. Gives results of experiments made on marble, slate and opaline switchboards, showing the superiority of the last named material. 1200 w. Elec Rev, Lond—Feb. 24, 1905.

Care.—The Care of Switchboards. Edwin W. Creed. An illustrated article calling attention to the care required. 2800 w. Power—Nov., 1903.

Connections.—Central-Station Switchboard Connections. J. A. Seager. Discusses points in the arrangement of high and low-tension connections. 1600 w. Elec Engr, Lond—Jan. 4, 1901.

Design.—Switchboards. T. D. Boyles. Considers points in design which affect the safety and reliability. 3300 w. Engr, U S A—April 15, 1901.

The Design of Switch Gear. W. E. Warrilow. The present number is principally devoted to high pressure gears. Serial. 1st part. 1700 w. Elec Rev, Lond—Sept. 6, 1901.

The Traffic Design of Central Office Switchboards. A. Dallam O'Brien. Discusses the features that must be carefully considered in providing for the requirements of a proposed installation from a traffic standpoint. 3000 w. Am Elect'n—Sept., 1904.

Switchboard Design . A. S. Loizeaux. Illustrates and describes some of the most distinct types, giving the purposes for which they are used; also their general layout and equipment. 2500 w. Stevens Ind—Oct., 1904.

European.—Some European High Tension Switchboards. F. Niethammer. Illustrates and describes some of these boards. Serial. 1st part. 900 w. Elec Wld & Engr—June 3, 1905.

High-Voltage.—Modern High-Potential Switchboard Practice. Bertrand Perry Rowe. An illustrated description of modern switchboard practice, especially in connection with high-tension work. Serial. 1st part. 2500 w. Elec Rev, N Y—Oct. 29, 1904.

See also **ELECTRIC SWITCH.**

Isolated Plant.—Switchboard Construction for Isolated Electric Plants. J. E. Woodwell. Describes the usual switchboard construction, calling attention to points of importance, and giving facts concerning the selection of the type of instruments and circuit breakers. 2500 w. Power—Dec., 1903.

See also **ELECTRIC PLANT.**

Larks, St. Louis.—The Larks Switchboard at the St. Louis Exposition. Illustrated description. 1000 w. Elec Wld & Engr—July 2, 1904.

Niagara Power Co.—The Niagara Falls Power Company's Switchboards. Arthur B. Weeks. Illustrated description of recent developments and improvements; feeder stands, emergency switches, etc. 1300 w. Elec Rev, N Y—March 2, 1901.

Railway.—Modern Electric Railway Switchboard Practice. G. U. G. Holman. Considers the more recent practice in switchboards for railway installations. 8500 w. St Ry Jour—Nov. 2, 1901.

See also **ELECTRIC STATION; ELECTRIC RAILWAY.**

St. Louis Exposition.—See **Larks, St. Louis.**

Three-Phase.—On Three-Phase Switch Gear. A. C. Eborall. An illustrated article, giving the writer's reasons for not favoring the cellular and backless type of switchboard in connection with high-pressure symptoms, and outlining the lines upon which such switchboards should be constructed. Serial. 1st part. 5500 w. Engng—Sept. 25, 1903.

ELECTRIC SYMBOLS.

See also **ELECTRIC TERMINOLOGY; ELECTRIC UNIT.**

A System of Fundamental Notation (Einheitliche Formelzeichen). K. Strecker. Suggestions for a general system of fundamental notation of physical quantities. 10,000 w. Elektrotech Zeitschr—March 31, 1904.

Graphical Symbols for Elements in the Technology of Weak Currents. (Einheitliche Graphische Bezeichungen in der Schwachstromtechnik). J. Baumann. Advocating the use of certain symbols for batteries, transformers, interrupters, etc. 2500 w. Elektrotech Zeitschr—June 2, 1904.

ELECTRIC SYSTEM.

See **ELECTRIC INDUSTRY—Systems.**

ELECTRIC TERMINOLOGY.

See also **ELECTRIC SYMBOL; ELECTRIC UNIT.**

Voltage, Potential and Direction of Transmission. J. Stanley Richmond. Gives the writer's conception of these terms. 500 w. Elec Wld & Engr—July 30, 1904.

Voltage, Voltage-Difference, Potential, Potential-Difference, Electromotive Force (Spannung, Spannugsdifferenz, Potential, Potentialdifferenz, Elektromotorische Kraft). Frits Emde. A mathematical examination of electric potential relations, deriving critical definitions in accordance with the notation of the vector analysis. 4000 w. Zeitschr f Elektrotechnik—Dec. 10, 1905.

Electrode.—See **ELECTRODE—Terminology.**

Rigidance.—Rigidance, a New Name for the Reciprocal of Capacity. James E. Ives. Discussion of mechanical analogies of electrostatic capacity, with formulae and diagrams. Also editorial. 800 w. Elec Wld & Engr—Aug. 13, 1904.

ELECTRIC TESTING.

See also **DYNAMOMETER; ELECTRIC APPARATUS; ELECTRIC GENERATOR TEST; ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC METER; ELECTRIC MOTOR; ELECTRIC STATION; ELECTRIC STATION MANAGEMENT—Testing; INSULATION; INCANDESCENT LAMP; MAGNETIC TESTING; PHOTOMETRY.**

Testing and Other Things. N. C. Woodfin. An inquiry into the meaning and object of testing electrical apparatus, and things related to this work. Serial. 1st part. 1200 w. Elec Rev, Lond—Oct. 17, 1902.

Air Calorimeter.—See **CALORIMETRY—Electric Generator Test.**

Alternating Current.—Alternating Current Laboratory Testing. George H. Rowe. The first of a series of articles based on lectures delivered to students engaged in the experimental study of alternating current phenomena. Experimental investigations. Ill. Serial. 1st part. 1600 w. Jour of Elec—Jan., 1905.

See also **ELECTRIC CURRENT, ALTERNATING.**

Alternators.—See **ELECTRIC GENERATOR TEST.**

Armature.—See **ELECTRIC MEASUREMENT—Milli-Voltmeter.**

Aron Meter.—See **ELECTRIC METER—Testing.**

Behrend.—See **ELECTRIC GENERATOR TEST.**

Cable.—Methods of Eliminating Corrections for the Leads, etc., in Cable Testing. H. Savage. Begins an explanation of methods. Ill. Serial. 1st part. 1200 w. Elec Rev, Lond—Jan. 17, 1902.

The Testing of Electric Cables (Note sur les Essais des Cables Electriques). P. Charpentier. A paper on the testing of heavy-current and high-tension cables. 10000 w. Bull Soc Internationale d'Electriciens—March, 1902.

Some Notes on Cable Testing. W. Dalton. The first of a series of articles giving practical points on cable testing, illustrated by examples. Serial. 1st part. 2500 w. Elec Engr, Lond—April 24, 1903.

See also ELECTRIC CABLE; ELECTRIC MEASUREMENT; SUBMARINE CABLE.

Dielectric Strength.—See DIELECTRIC—Strength; Testing.

Dynamo and Motor.—Leaves from a Testing Engineer's Note Book. Fred W. Davies. A brief statement of some of the faults which have occurred in dynamo-electric machines, with an explanation of them and the method adopted for their remedy. Shafts, bearings and armature cores are considered in the present article. Serial. 1st part. 1500 w. Elec Engr, Lond—Oct. 10, 1902.

Practical Dynamo and Motor Testing. Charles F. Smith. Describes the method of carrying out a number of typical tests and measurements, pointing out some conclusions to be drawn from the results. Serial. 1st part. 2500 w. Mech Engr—Nov. 8, 1902.

Shop Testing of Motors and Generators for Commercial Service. Bertrand B. Abry. Considers the usual shop tests as applied to new designs of direct and alternating current motors and generators. Serial. 1st part. 1500 w. Elec Rev, N Y—Sept. 19, 1903.

Dynamo and Motor Testing. C. F. Smith. Abstract of a paper read before the Civil and Mech. Engrs. Soc. Deals with the equipment of a test house, and methods of testing. 2200 w. Prac Engr—April 8, 1904.

Some Notes on Testing. Describes some simple tests of dynamos and motors. 1200 w. Elec Engr, Lond—July 8, 1904.

The Testing of Electric Generators and Motors. Dr. Charles V. Drysdale. An illustrated explanation of the methods of testing and the construction of the testing plant. 4800 w. Engng—Nov. 24, 1905.

See also Hopkinson; Motor; ELECTRIC GENERATOR TEST; ELECTRIC MACHINERY; ELECTRIC MOTOR.

Eddy Currents.—See EDDY CURRENTS.

Eddy Current Brake.—See DYNAMOMETER.

Factory.—Factory Testing of Electrical Machinery. E. R. Cross and R. E. Workman. The present number considers the organization, work and equipment of the testing department. Ill. Serial. 1st part. 3000 w. Elec Club Jour—Feb., 1904.

Friction Losses.—The Separation of the Friction Losses in Electrical Machines. Dr. Leo Fenzl. Translated from the "Elektrotechnische Zeitschrift." Gives methods for determining the air friction and bearing friction. 800 w. Elec Engr, Lond—Aug. 28, 1903.

Grounds.—See ELECTRIC MEASUREMENT.

Heyland Motor.—See ELECTRIC MOTOR.

Hopkinson.—A Hopkinson Test for Multiphase Induction Motors. R. W. Weekes. Describes tests carried out, the method of testing, &c., giving results. 3000 w. Elec Engr, Lond—June 17, 1904.

The Hopkinson Test as Applied to Induction Motors. W. E. Sumpner and R. W. Weekes. Gives experimental details of a test made of a number of induction motors, by this method. 2000 w. Elec Engr, Lond—Aug. 26, 1904.

Testing Electrical Machinery. An editorial explaining the methods used, especially the Hopkinson test, the Swinburne test, and the method devised by Dr. Charles V. Drysdale. 1400 w. Elec Rev, N Y—Dec. 9, 1905.

Instrument.—See ELECTRIC INSTRUMENT—Testing.

Laboratory.—See Alternating Current; LABORATORY.

Magnetic Link.—See ELECTRIC MEASUREMENT.

Meter.—See ELECTRIC METER—Testing.

Motor.—The Testing and Management of Electric Motors. P. T. White. A discussion of methods of testing is commenced in the present article. Serial. 1st part. 1400 w. Elec Rev, Lond—Dec. 27, 1901.

The Testing of Motor Losses. W. E. Sumpner. Read before the Birmingham Sec. of the Inst. of Elec. Engrs. Suggests three methods of making measurements each of which possesses some advantages. 3000 w. Elect'n, Lond—Feb. 7, 1902.

How to Test Electric Motors. A practical talk on methods of testing, explaining the principles upon which the test depends. 3000 w. Steam Engng—May 15, 1902.

A Precise Brake Method for the Determination of the Efficiency of Motors (Eine Genaue Bremsmethode zur Bestimmung des Wirkungsgrades von Elektromotoren). Paul Jobst. Illustrating a convenient arrangement of electric brake, speed indicators, and volt and ammeters for motor testing. 1800 w. Elektrotech Zeitschr—July 17, 1902.

Brake Horse Power and Efficiency of a Small Motor. J. L. Dickson. A description of a method of measurement used for various loads. 800 w. Elec Wld & Engr—July 18, 1903.

A Small Motor Testing Equipment. Roy T. Wells. Describes an outfit for factory testing of small electric machines. 1000 w. Elec Wld & Engr—Nov. 25, 1905.

The Commercial Testing of Small Motors up to 15 B. H. P. Read before the Newcastle Sec. of Inst. of Elec. Engrs. Explains the tests usually made on motors of this size, and describes the apparatus used. Serial. 1st part. 4500 w. Elec Engr, Lond—Dec. 15, 1905.

Complete Commercial Test of Polyphase Induction Motors Using One Wattmeter and One Voltmeter. A. S. McAllister. An interesting article offering suggestions tending toward the elimination of all unnecessary apparatus. Shows what may be computed from the use of a single wattmeter in connection with a polyphase induction motor, supplied from constant potential mains. 1800 w. Elec Wld & Engr—Jan. 11, 1902.

Method for Measuring the Output of Induction Motors. E. Alexanderson. Explains an interesting method of testing induction motors. It is essentially a method for determining torque and applies to power only when the speed is taken into account. 1300 w. Elec Wld & Engr—Aug. 6, 1904.

See also Dynamo and Motor; Hopkinson Test; ELECTRIC MOTOR.

Portable Apparatus.—See ELECTRIC INSTRUMENT—Cable Testing.

"Pump Back" Method.—Commercial Testing of Electrical Machinery. The "Pump Back" Method. H. B. Foote. Describes the method of testing sets of machines by what is known as the "pump back" or "loss supply" method. Diagrams. 1000 w. Sib Jour of Engng—Oct., 1905.

Resistance Measurements.—Testing by Resistance Measurements. Considers the tests made in central stations and the methods used. Ill. 2200 w. Cent Station—March, 1902.

See also ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE.

Standards.—See ELECTRIC APPARATUS; ELECTRIC INDUSTRY—Regulations.

Stray Power Method.—The Stray Power Method of Testing Direct-Current Motors and Generators. William Lincoln Smith. Calls attention to the advantages of this method of testing the efficiency of direct-current machines. 1300 w. Elec Wld & Engr—Dec. 14, 1901.

Swinburne.—See Hopkinson.

Telephone.—See TELEPHONE—Testing.

Temperature Rise.—Notes on Testing. M. A. Sammett. Calls attention to the importance of temperature rise of apparatus under load in testing machines, and describes method giving accurate results. 1800 w. Elec Rev, N Y—Aug. 27, 1904.

Notes on Testing. M. A. Sammett. Calls attention to the importance of temperature rise of apparatus under load. 1800 w. Can Elec News—Oct., 1904.

See also ELECTRIC GENERATOR TEST; ELECTRIC MOTOR.

Transformer Iron.—See **MAGNETIC TESTING.**

Wagon.—Testing Wagon for Electric Stations (Kabelmesswagen für Elektrische Zentralstationen). Illustrated description of the portable testing plant designed for use in connection with central station work by the Allgemeine Elektrizitäts-Gesellschaft. 2 articles. 3000 w. Elektrizität—Nov. 24, Dec. 8, 1900.

Water Rheostat.—See **RHEOSTAT—Water.**

ELECTRIC THAWING.

See **THAWING.**

ELECTRIC THEORY.

See **ELECTRIC UNIT; ELECTRON; ELECTRO-PHYSICS; MATTER; RADIOACTIVITY.**

ELECTRIC TIMING.

See **CHRONOGRAPH; CHRONOMETER; CLOCK.**

ELECTRIC TOWER.

See **ELECTRIC EXHIBITION; ELECTRIC LIGHTING—Decorative.**

ELECTRIC TRACTION.

See **CANAL HAULAGE; ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY; MINE HAULAGE.**

ELECTRIC TRAMWAY.

See **ELECTRIC RAILWAY; STREET RAILWAY.**

ELECTRIC TRANSFORMER.

See **DYNAMOTOR; ELECTRIC CURRENT CONVERTER; MOTOR GENERATOR; ROTARY CONVERTER; TRANSFORMER.**

ELECTRIC TRANSMISSION.

See also **ELECTRIC CONDUCTOR; ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC LINE; ELECTRIC POWER; HYDRO-ELECTRIC PLANT; WATER POWER.**

Elements of Design Particularly Pertaining to Long-Distance Transmission. F. A. C. Perrine. Presented at the annual convention of Am. Inst. of Elec. Engrs., at Buffalo. Considers important phenomena in connection with long-distance problems. 2500 w. Elec Rev, N Y—Aug. 31, 1901.

High-Tension Electric Power Transmission. Geo. H. Gibson. A discussion of the extent to which high-tension transmission enters as a factor in the utilisation of natural forces, with illustrations from important installations. 3500 w. Engineering Magazine—April, 1902.

Success in Long-Distance Power Transmission F. A. C. Perrine. A consideration of the problems met by the transmission engineer, the difficulties he must solve which differ from those presented in ordinary electric lines and currents. 6000 w. Tech Qr—June, 1902.

Long Distance Power Transmission. F. A. C. Perrine. A study of some of the problems to be solved in securing continuity and regulation. 5000 w. Sci Am Sup—Sept. 13, 1902.

Rise of Electrical Transmission. Alton D. Adams. A description of some of the largest long-distance transmissions of electrical energy in the world. 5000 w. Ill. Mines & Min—Oct., 1902.

Electric Transmission of Power (Ueber Elektrische Kraftübertragung). Friedrich Drexler. An address, giving general historical and descriptive review of electric power transmission. 2 plates. 4000 w. Zeitschr d Oesterr Ing u Arch Ver (Supplement)—March 20, 1903.

Long-Distance Power Transmission. Charles F. Scott. Considers its economic, and particularly its engineering aspects. 4500 w. Cassier's Mag—June, 1904.

The Development of Electric Power Transmission. Lewis Buckley Stillwell. Illustrating and describing cables, insulators, and general details of long-distance high-tension transmission. 8000 w. Cassier's Mag—June, 1904.

Report of Committee on High-Tension Transmission. Presents in a condensed form answers to a set of questions sent out. Also discussion on the report. Ills. 19000 w. Trans Am Inst of Elec Engrs—Sept., 1904.

Electrical Power-Generating Stations and Transmission. L. B. Stillwell. Read before the International Engng. Cong., St. Louis. A review of the changes that have occurred during the last ten years, the progress in transmission, &c. 7000 w. Elec Rev, N Y—Oct. 29, 1904.

Electrical Transmission. G. W. Worrall. Read before the Liverpool Univ. Engng. Soc. Discusses efficiency of transmission, the form of current best adapted, high tension transmission, inductance and capacity, with brief description of the system of M. Thury, a Swiss engineer. 2800 w. Elec. Engr, Lond—March 17, 1905.

High-Voltage Power Transmission. Clarence P. Fowler. Discussion of the general question and of conductors, insulators and pole line. 1500 w. Am Electr'n—Sept., 1905.

The Transmission of Power by Alternating Currents. Alfred Still. Considers single-phase, two-phase and three-phase transmission, and the points to be borne in mind when considering a scheme of power transmission to a distance by means of alternating currents. Serial. 1st part. 3000 w. Elec Engr, Lond—Sept. 15, 1905.

Electric Mains for Power Transmission Work. Prof. John T. Morris. Read before the Junior Inst. of Engrs. A brief account of some of the main considerations which affect high-tension transmission. Deals with the apparatus used for transmission of currents at voltages from 5000 to the maximum voltage used. Serial. 1st part. 4500 w. Elec Engr, Lond—Dec. 29, 1905.

Albion (N. Y.) Power Co.—See **HYDRO-ELECTRIC PLANT—Waterport—Albion.**

Allgau, Würtemberg.—A Three-Phase Power Transmission Plant Using High-Tension Motors. Frank C. Perkins. Illustrates and describes an interesting plant in Würtemburg, Germany, built by the Oerlikon Works. 1600 w. Elec Rev, N Y—July 25, 1903.

American River, Cal.—Typical American Hydraulic and Transmission Plant. C. W. Whitney. Illustrated detailed description of the American River Electric Company's system in central California. 6800 w. Am Elect'n—Jan., 1905.

Analogies.—See Belt Drive Analogy; **ELECTRIC DISTRIBUTION—Hydraulic Analogy; ELECTRO-PHYSICS — Hydraulic Analogies; TELEPHONE LINE—Long-Distance Analogies.**

Apple River—St. Paul.—See **HYDRO-ELECTRIC PLANT—Apple River, Wis.**

Arnold-Bragstadt-Lacour.—See **ELECTRIC DISTRIBUTION—Polycyclic.**

Artificial Line.—Performance of an Artificial Forty-Mile Transmission Line. William S. Aldrich and George W. Redfield. An account of a test carried out in the Elec. Engng. Laboratory of the Univ. of Illinois, the results representing closely what might be expected under commercial conditions of a similar line. 4200 w. Trans Am Inst of Elec Engrs—June and July, 1901.

Atmospheric Losses.—Some Problems in Electrical Engineering Due to the Conductivity of the Atmosphere. Harris J. Ryan. An analysis of the factors that produce the energy losses through the atmosphere in high-voltage lines. 5000 w. Sib Jour of Engng—April, 1904.

See also **ELECTRIC CONDUCTIVITY—Air; ELECTRIC DISCHARGE—Air; Transmission Lines.**

Aude, France.—The Distribution of Electrical Energy at 20,000 Volts in the Department of the Aude. Enrico Bignami. An illustrated detailed description of a system with 400 kilometres (250 miles) of lines. 3500 w. Elec Rev, N Y—May 23, 1903.

Electric Transmission in France. Daniel Bellet. Illustrates and describes an installation designed to distribute power and light throughout the Aude, in the Pyrenean district, by high tension mains branched off from a central distributing station located 43.5 miles from the power house. 2800 w. Trac & Trans—Sept., 1904.

Australia.—Transmission of Electrical Energy From Brown Coal. Henry C. Jenkins. Considers the case of transmission of the power from Morwell to Melbourne, Australia. Serial. 1st part. 1600 w. N. Z. Mines Rec—March 16, 1901.

Bay Counties.—See **California** .

Bedell System.—Some Engineering Features of the Bedell System of Composite Transmission. A. S. McAllister. Gives illustrated detailed description of methods for the joint transmission of direct and alternating currents of two frequencies. Also editorial. 3000 w. Elec Wld & Engr—Feb. 28, 1903.

Composite System of Electrical Transmission and Distribution. Frederick Bedell. Read before the Cleveland Electric Club. Shows some of the ways this system is used for transmission and distribution, pointing out its advantages. 1600 w. Elec Wld & Engr—July 4, 1903.

Belt Drive Analogy.—Belt Transmission of Power as an Analogue of Electric Transmission. Byron B. Brackett. Develops an analogy between the electric transmission and the belt drive. Also editorial. 3500 w. Elec Wld & Engr—Dec. 9, 1905.

Birmingham, Eng.—See ELECTRIC POWER.

Bohemian Factory.—See ELECTRIC DRIVING—Sugar Factory, Bohemia.

Boston.—Some Operating Experiences in High-Tension Transmission. D. L. Huntington. Read before the Assn. of Edison Illuminating Cos. at Newcastle, N. H. An account of operating experiences with reference to unexpected problems, and methods of solving them, at Boston. 4000 w. Elec Rev, N Y—Oct. 29, 1904.

British.—See ELECTRIC RAILWAY.

Butte, Mont.—See Montana.

California.—Practical Power Transmission. John Martin. Read before the Pacific Coast Gas Assn. States the conditions in California and the satisfactory service now possible within reasonable distances. Also discussion. 7200 w. Am Gas Lgt Jour—Aug. 26, 1901.

The Water and Electric Systems of the South Yuba. Rudolph Warner Van Norden. An interesting illustrated detailed description of these systems, with map and engineering data. 13600 w. Jour of Elec—Jan., 1903.

A Proposed Transmission for Pumping Purposes. Lewis A. Hicks. A discussion of the project suggested by J. B. Lippincott in a paper on the "Storage of Water on Kings River, California." Ill. 3800 w. Jour of Elec—June, 1903.

High Potential, Long Distance Transmission and Control. F. G. Baum. Gives the practice and results on the greatest transmission system in existence—the California Gas and Electric Corporation. 5000 w. Int Elec Cong of St. Louis—Sept., 1904.

See also American River; Frequency; Los Angeles; U. S. Western; ELECTRIC LINE; HYDRO-ELECTRIC PLANT.

California, Bay Counties.—Transmission System of the Bay Counties Power Company, California. Describes a large undertaking designed for 60,000 volts line pressure, supplying power to the mining districts in Yuba and Nevada Co.'s and to Oakland. 1200 w. Elec Wld & Engr—Feb. 16, 1901.

The World's Longest Electric Power Transmission. George P. Low. An illustrated popular description of the system of the Bay Counties' Power Co., in California, introductory to technical descriptions to follow. 10200 w. Jour of Elec—July, 1901.

The 142-Mile Electric Power Transmission Plant of the Bay Counties' Power Company, California. J. D. Galloway. Illustrated description of a plant using a pressure of 40,000 to 60,000 volts. All the general features are discussed, especially the remarkable manner in which the current is carried across the Straits of Carquinez. 2000 w. Eng News—Oct. 3, 1901.

The Longest Power-Transmission in the World. Thomas Commerford Martin. An illustrated article giving much interesting information in regard to the allied Bay Counties Power and Standard Electric companies of California. 3600 w. Rev of Revs—March, 1902.

The Bay Counties Power Co.'s Transmission System. L. M. Hancock. Gives an outline of the general and controlling features, dealing more at length with the organization of the forces to operate the plant and to carry on construction and repairs of a long distance plant in California. 5500 w. Int Elec Cong of St Louis—Sept., 1904.

California Northern.—The Northern California Power Company's Transmission. An illustrated detailed description of the system of this company for furnishing light and power. 3800 w. Jour of Elec—Dec., 1902.

The 22,000-Volt Transmission Installation Supplying Current to Mines by the Northern California Power Company. Frank C. Perkins. Illustrated description of a recently completed high tension service in Northern California. 1700 w. Min Rept—March 26, 1903.

Caspian Oil Wells.—See ELECTRIC STATION.

Cauvery Falls-Kolar.—The Cauvery Falls Electrical Power Transmission. An illustrated account of a long-distance transmission scheme by which the power of these falls in Mysore will be applied to driving mining machinery in the Kolar goldfields, nearly 100 miles away. 3000 w. Engr, Lond—June 6, 1902.

The Cauvery Power Transmission. Illustrates and describes this interesting transmission in India by which power is transmitted from Cauvery Falls to the Kolar gold fields, a distance from 90 to 100 miles. 3400 w. Elec Engr, Lond—Oct. 31, 1902.

See also ELECTRIC ENGINEERING—India; HYDRO-ELECTRIC PLANT—India.

Chambly-Montreal.—The Chambly-Montreal Power Transmission. Illustrated description of an important medium-distance high-tension two-phase transmission line in Canada. 2400 w. Elec Rev, N Y—Sept. 14, 1901.

Chaux-de-Fonds—Locle.—See Direct Current.

Circle Diagram.—See ELECTRIC CURRENT, ALTERNATING.

Clermond-Ferrand, France.—A 20,0000 Volt Power Transmission Scheme. Illustrated description of a new water-power scheme inaugurated at Clermond-Ferrand, in France. 2500 w. Elect'n, Lond—Oct. 6, 1905.

Climate.—Climatological Influences and Electrical Transmission. Prof. Alexander G. McAdie. Read at convention of the Pacific Coast Elec. Trans. Assn. Discusses the effect on insulators, generators, lines, switchboards, and the whole plant. Ill. 3300 w. Jour of Elec—Sept., 1901.

Coal Mine Sources.—The Generation and Transmission of Electric Energy at and from Coal Pit Centers. B. H. Thwaite. The first of a series of articles on long-distance transmission, showing the tendency of modern practice. Serial. 1st part. 1000 w. Elec Rev, Lond—March 1, 1901.

Electrical Transmission from Coal Mines. Fred Wilson Hart. An illustrated account of the power for the Cochiti Gold Mining Co., transmitted 32 miles from the coal deposits at Madrid, New Mexico, with comparison of the old and new methods. 2800 w. Elec Wld & Engr—March 2, 1901.

Electrical Transmission Direct from the Coal Mine. Frank C. Perkins. Brief illustrated description of a German coal mine plant at Essen-Ruhr, the current being used for lighting and power. 700 w. Ir Age—March 21, 1901.

Electrical Transmission of Power From Mines. F. C. Caldwell. Read before the Ohio Inst. of Min. Engrs. The methods and principles, and the limit of the profitable distance to which electric power may be transmitted from coal mines. 2000 w. Mines & Min—May, 1901.

See also Australia; ELECTRIC POWER.

Coal Transportation Compared.—Transmission of Power versus Shipment of Fuel. A. J. Bowie, Jr. Read before the Pacific Coast Elec. Trans. Assn. Gives figures on the relative values of the two plans for a large power transmission scheme. 1000 w. Jour of Elec—July, 1904.

See also POWER COST.

Commercial Success.—Commercial Success in Long-Distance Electric Power Transmission. Extract from the Presidential address of Dr. Chas. W. Van Norden, before the Pacific Coast Elec. Trans. Assn. 1200 w. Eng News—Sept. 4, 1902.

Composite.—See Bedell System.

Continuous Current.—See Direct Current.

Control.—The Arrangement and Control of Long-Distance Transmission Lines. E. W. Cowan and L. Andrews. Abstract of paper read before the Manchester Sec. of the Inst. of Elec. Engrs. A discussion of the systems used and present practice. Serial. 1st part. 3800 w. Elect'n, Lond—July 10, 1903.

Costs and Losses.—Costs and Losses of Electric Transmission Lines. Alton D. Adams. Gives a comparison of figures shown in operating a number or representative plants. 2500 w. Mines & Min—Feb., 1903.

Cripple Creek, Colo.—See **ELECTRIC EQUIPMENT.**

Design.—Elements of Design Particularly Pertaining to Long-Distance Transmission. F. A. C. Perrine. Discusses points arising in carrying out a long-distance transmission. 2800 w. Trans Am Inst of Elec Engrs—June and July, 1901.

Diagram.—A Simple Diagram Showing the Regulation of a Transmission System for Any Load and Any Power Factor. F. G. Baum. A graphical study of certain problems, with computations and editorial notes. 2500 w. Elec Wld & Engr—May 18, 1901.

Difficulties.—Some Difficulties of Long-Distance Electrical Transmission. P. M. Lincoln. Address delivered before the Cleveland Elec. Club. Considers some of the troubles that arise and means of avoiding some of them. General discussion. 4500 w. Engr, U S A—May 1, 1903.

Some Difficulties in High-Tension Transmission and Methods Mitigating Them. J. F. Kelly and A. C. Bunker. Discussing the conditions which affect and limit the constants and operation of high-tension lines, considering only pressures of over 30,000 volts and lines of over 50 miles in length. 5000 w. Int Elec Cong of St. Louis—Sept., 1904.

Direct Current.—High-Tension Continuous-Current Systems. A. S. Barnard. Showing that the advocates of the continuous-current plant are able to offer a reliable alternative to the three-phase generator and transformer. Also brief discussion. 3800 w. Elec Engr, Lond—July 4, 1902.

Transmission of Energy from St. Maurice to Lausanne, Switzerland. Enrico Bignami. Illustrates and describes an interesting plant transmitting power about 40 miles. A continuous, constant current system was adopted. Editorial comment. 2000 w. Elec Rev, N Y—Aug. 2, 1902.

The Transmission of Power between St. Maurice and Lausanne (Transport d'Energie de Saint-Maurice à Lausanne). A. Dumas. Describing the transmission of 5,000 horse-power over a distance of 56 kilometres, by a continuous current under a pressure of 23,000 volts. 4000 w. 1 plate. Génie Civil—Aug. 2, 1902.

Continuous Current for Power Transmission. Alton D. Adams. Considers systems of transmission by continuous current, showing that they should cost less for equipment than the alternating for power alone, and discussing their advantages. 3000 w. Elec Rev, N Y—March 21, 1903.

The Transmission of a 23,000-Volt Direct Current Over a Distance of Thirty-five Miles. Emile Guarini. Illustrates and describes the hydro-electric plant at St. Maurice, near Lausanne, Switzerland. 1800 w. Sci Am Sup—Aug. 29, 1903.

High Tension Continuous-Current Power Transmission at 20,000 Volts. An illustrated article describing an installation for furnishing electric light and power for the Swiss town of Lausanne. 2700 w. Elect'n, Lond—Jan. 1, 1904.

The 70,000-Volt Continuous Current Transmission Experiments at Sécheron. A. Steens. Describes tests and claims superiority of direct over alternating-current. 2800 w. Eng Rec—Aug. 6, 1904.

Experiments with Continuous Currents at High Tensions (Expériences sur les Courants Continus à Haute Tension). An account of experiments at Geneva with the transmission of continuous currents at pressures as high as 70,000 volts. 1500 w. Génie Civil—Sept. 17, 1904.

70,000-Volt, Direct-Current Tests Made at Geneva, Switzerland. B. F. Hirschauer. An account of important experiments with high voltage distribution on the direct-current system which have been carried out by M. Réné Thury. 4000 w. Elec Rev, N Y—Sept. 24, 1904.

Direct Current Transmission at 70,000 volts. A. Steens. An account of interesting experiments recently carried out by the Compagnie de l'Industrial Electrique at Mécanique of Geneva, with a view to ascertaining the extent to which insulators would withstand the direct current as compared with alternating current. 2500 w. Elec Rev, Lond—Oct. 14, 1904.

Chaux-de-Fonds-Locle Hydraulic Plant. C. L. Durand. Illustrated description of a Swiss plant using the high-potential direct-current system, with generators and motors in series. 3200 w. Elec Rev, N Y—Nov. 5, 1904.

High Voltage Direct Current Transmission. G. W. Worrall. Describes the system developed by M. Thury, which generates continuous current, transmits it to the nearest point of demand, continues it in series through all points supplied and returns it through an insulated line. 2000 w. Power—June, 1905.

The Distribution of Power. Prof. W. E. Ayrton. Abstract of a lecture delivered at the meeting of the British Assn., in South Africa, in which the use of high-tension continuous current for long-distance transmission is advocated. Also editorial. 6200 w. Elect'n, Lond—Sept. 22, 1905.

See also **South Africa; Switzerland; Victoria Falls.**

Direct vs. Alternating.—The Continuous and Alternating Current. Alton D. Adams. Considers the relative advantages of each for power transmission as shown on long-distance lines in Switzerland. 3200 w. Mines & Min—May, 1903.

The Determination of Drop in Voltage in Parallel Three-Phase Lines (Zur Bestimmung des Induktiven Spannungsabfalles Paralleler Drehstromleitungen). Leo Lichtenstein. A mathematical discussion, showing possible sources of error in voltage measurements. Two articles. 6000 w. Zeitschr f Elektrotechnik—April 24, May 1, 1904.

Earth.—Use of the Earth in High-Tension Transmissions. Emile Guarini. An account of the results obtained by M. Thury and the French commission of electricians, with remarks. 1600 w. Sci Am Sup—Dec. 30, 1905.

Economics.—Economics of Transmission Problems. F. A. C. Perrine. Abstract of a lecture delivered before the Brooklyn, N. Y., Poly. Inst. Considers electric transmission a problem of economics rather than of engineering. 1500 w. Elec Rev, N Y—March 4, 1905.

See also **ELECTRIC DISTRIBUTION.**

80,000-Volts.—Calculation of a 50,000-Horse-Power, 80,000-Volt, 200-Mile Transmission Line. C. W. Hutton and R. Crowell. Read before the Pacific Coast Elec. Trans. Assn. Considers the proper construction and working qualities of long transmission lines from an electrical standpoint. 2200 w. Jour of Elec—July, 1902.

80,000-Volts, Cal.—A Sixteen-Mile, 80-000-Volt Experimental Line. A. C. Balch. A paper before the Pacific Coast Electric Transmission Assoc., giving an illustrated account of experience in Southern California, particularly with insulators. 2500 w. Jour of Elec—Aug., 1904.

Electromotive Force.—Formula for Calculating the Electromotive Force at Any Point of a Transmission Line for Alternating Current. M. Leblanc. Establishes a formula for giving the voltage at any point. 500 w. Trans Am Inst of Elec Engrs—June 20, 1902.

Five-Phase.—A Theoretical Treatment of a Five-Phase System (Theoretische Behandlung eines Fünfphasenstromsystemes). E. W. Ehnert. An application of the vector analysis to the study of a proposed polyphase system. 2500 w. Zeitschr f Elektrotechnik—Feb. 15, 1903.

Frequency.—A Coming Problem for the Pacific Coast Engineer. W. F. Lamme. Read at Con. of Pacific Coast Elec. Trans. Assn. States the advantages of 3,000 alternations instead of 7,200, and the problem is how to change from high to low. 700 w. Jour of Elec—July, 1903.

Choice of Frequency for Very Long Lines. P. M. Lincoln. Discusses which is the better frequency for a very long line, 60 or 25 cycles per second, considered purely as a transmission problem. 1200 w. Trans Am Inst of Elec Engrs—July, 1903.

Fritts.—See **TELEPHONE LINE.**

Gas Compared.—See **POWER TRANSMISSION.**

Gas Engines.—See **GAS ENGINE—Electric Generation.**

Geneva Experiments.—See **Direct Current.**

Goldfield & Tonopah, Nevada.—A Long-Distance Electric Power Transmission Line in Nevada. E. Prince. Brief description of a line to the Goldfield and Tonopah mining districts of Nevada and the interlying towns, now being constructed. 900 w. Eng News—July 6, 1905.

Graphical Computation.—The Graphical Computation of Power Transmission Lines with Converters

(Graphische Berechnung von Kraftübertragungslinien mit Umformern). A. Hruschka. Developing graphical diagrams for computing the various elements of a power transmission line operated by a main station in connection with converter stations. Two articles. 3500 w. Zeit für Elektrotechnik—Oct. 11, 1903.

Gromo-Nembro, Italy. — The Three-Phase 40,000-Volt Power Transmission from Gromo to Nembro (Lombardia). States the conditions which had to be fulfilled and gives an illustrated description of the carrying out of the scheme, with reasons for the adoption of an extra high working pressure. 5400 w. Elec Rev, Lond—Sept. 23, 1904.

The First Transmission of Power in Europe at 40,000 Volts. Enrico Bignami. Illustrated description of the electric transmission system from Gromo to Nembro, in Lombardy. 2400 w. Elec Rev, N Y—Jan. 7, 1905.

The First European Tranmission at 40,000 Volts from Gromo to Nembro (La Prima Trasmissione Europea a 40,000 Volt tra Gromo e Nembro). Describing the new line over which the 2000 horsepower of the Gromo station is delivered to Nembro, a distance of 32 kilometres. Two articles. 3500 w. L'Elettricita—Jan. 20, 27, 1905.

The Gromo-Nembro Power-Plant. Emile Guarini. Illustrated description of the three-phase 40,000-volt power-transmission from Gromo to Nembro (Lombardia), said to be the first plant of its kind in Europe. 2500 w. Cent Sta—Feb., 1905.

The Electric Transmission of Energy at 40,000 Volts between Gromo and Nembro (Transport d'Energies à 40,000 Volts entre Gromo et Nembro). L. J. Sidler. An illustrated description of the transmission portion of the Gromo hydro-electric plant, in northern Italy. 2500 w. 1 plate. Génie Civil—July 8, 1905.

See also HYDRO-ELECTRIC PLANT.

Grounding Protection.—See ELECTRIC DISTRIBUTION; ELECTRIC PROTECTIVE APPARATUS.

Guanajuato, Mexico.—See HYDRO-ELECTRIC PLANT.

Hamilton, Canada.—The Largest Electrical Transmission in Canada. Alton D. Adams. Illustrated description of the plant of the Hamilton Electric Light and Cataract Power Company, which transmits current from the Welland Canal to Hamilton. 1200 w. Elec Rev, N Y—Aug. 30, 1902.

History.—Electrical Power Transmission. Dr. Louis Bell. Reviews the development and remarks its steady progress without failures. 2600 w. Elec Wld & Engr—Jan. 5, 1901.

I. The History of Power Transmission. II. Electric Power Transmission To-Day and To-Morrow. The first article reviews the development. The second, by L. B. Stillwell, considers the present state of this art, and the outlook. 1200 w. Elec Rev, N Y—Jan. 12, 1901.

Evolution in High-Voltage Transmission. Charles F. Scott. A general sketch of the advance that has been made to present practice. 1600 w. Elec Rev, N Y—Jan. 10, 1903.

Hochfelden-Oerlikon.—A European 30,000-Volt Three-Phase Power Transmission. Illustrated description of the high-tension plant between Hochfelden and Oerlikon. 2500 w. Elect'n, Lond—Dec. 5, 1902.

The First Three-Phase Power Transmission Plant in Europe Operating at 30,000 Volts. Dr. H. Behn-Eschenburg. A well-illustrated description of power house and transmission line, and experience in operation of the power transmission from Hochfelden to Oerlikon. Switzerland. 5000 w. Elec Wld & Engr—Jan. 3, 1903.

The First Transmission of Energy in Europe by Means of Triphase Currents. Emile Guarini. Illustrated description of the Hochfeld-Glattfeld-Oerlikon line. 2000 w. Sci Am Sup—Oct. 17, 1903.

Hydrodynamic Analogies.—See ELECTRIC DISTRIBUTION; ELECTRO-PHYSICS; TELEPHONE LINE—Long-Distance Analogies.

India.—See Cauvery Falls-Kolar; ELECTRIC ENGINEERING; HYDRO-ELECTRIC PLANT.

Indiana Railway. — Cost of Electric Railway Power Production and Transmission in the State of Indiana. A. S. Richey. Read before the Indiana Elec. Ry. Assn. Valuable statistics and analysis of costs. 2400 w. St Ry Jour—Jan. 21, 1905.

Inductance and Capacity.—The Effects of Self-Induction and Capacity in Electric Transmission. G. H. Baillie. Considers to what extent they should be taken into account in practical work, giving formulae applicable to the different systems of transmission. Serial. 1st part. 1700 w. Elect'n, Lond—July 18, 1902.

Transmission Circuit. Charles F. Scott. An elementary consideration of self-induction, regulation and mutual induction. The first of a series of articles treating generally of induction and capacity in electric circuits. 4500 w. Elec Jour—Dec., 1905.

See also Static Effects; Surges; ELECTROSTATIC CAPACITY.

Insulation Losses.—See INSULATION—Energy Loss.

Interconnected Circuits.—See ELECTRIC DISTRIBUTION.

Janesville, Wis.—See HYDRO-ELECTRIC PLANT.

Kalamazoo Valley, Mich.—A Water-Power Railway Plant with Alternating-Current Transmission. Illustrated description of the transmission plant and sub-stations of the Kalamazoo Valley Electric Company. 1400 w. Am Elect'n—July, 1901.

Kern River-Los Angeles, Cal.—See HYDRO-ELECTRIC PLANT—Kern River, Cal.

Lausanne, Switzerland.—See Direct Current.

Leakage.—See ELECTRIC DISCHARGE; ELECTRIC LINE.

Lebring, Austria.—See ELECTRIC STATION.

Lighting Protection.—See LIGHTING PROTECTION—Transmission Line.

Limits.—The Physical Limits of Electric-Power Transmission. Alton D. Adams. A discussion of the possibilities of high voltages and the methods required in apparatus and line for long-distance power transmission. 3000 w. Engineering Magazine—October, 1902.

Limitations of Long-Distance Electric Power Transmission. Paul M. Lincoln. Considers the commercial limits and the engineering limits. 5000 w. Cassier's Mag—June, 1904.

The Maximum Distance to Which Power Can Be Economically Transmitted. Ralph D. Mershon. States the assumptions on which the reasoning is based, and discusses the cost of line conductors as limiting the distance. 5500 w. Trans Am Inst of Elec Engrs—Dec. 23, 1904.

The Maximum Distance to Which Power Can Be Economically Transmitted. Discussions at New York and at Pittsburg of recent paper by Ralph D. Mershon. 10600 w. Am Inst of Elec Engrs—Feb., 1905.

Line Characteristics.—See ELECTRIC LINE—Properties and Computations.

Line Construction.—See ELECTRIC LINE.

Los Angeles, Cal.—Los Angeles Transmission Plants. Deals mainly with the two large plants, giving results of operation. 2000 w. Elec Wld & Engr—June 22, 1901.

The Generating, Transmission and Distribution Systems of the Edison Electric Company of Los Angeles, Cal. George P. Low. An illustrated detailed description of the principal hydraulic, mechanical, and electrical features. 24,800 w. Jour of Elec—Jan., 1903.

See also ELECTRIC STATION; HYDRO-ELECTRIC PLANT.

Lucerne Co., Pa.—See ELECTRIC STATION—Nanticoke.

Mexico.—The Electrical Transmission of Energy at San Ildefonso, Mexico (Transports Electriques d'Energie de la Compagnie de San Ildefonso à Mexico). E. Pinson. Describes the hydro-electric stations at Monte Alto and at Tlalnepantla, with details of the pipe lines and of the transmission. 3500 w. Génie Civil—Oct. 12, 1901.

The Transmission System of the Compania Explotadora De San Ildefonso of the City of Mexico. Stephen Q. Hayes. An illustrated description of a remarkable system where a number of generating stations supply power to a single sub-station. 3000 w. Elec Wld & Engr—March 15, 1902.

Electric Power Developments in Mexico. Francis O. Blackwell. An illustrated article reviewing the progress in power developments. 4000 w. Cassier's Mag—July, 1905.

Development of the Necaxa, Mexico, Water Power. Illustrated detailed description of a great power transmission system, notable for its size and for constructional features of interest. 2000 w. Elec Wld & Engr—Oct. 28, 1905.

See also **HYDRO-ELECTRIC PLANT.**

Mexico City.—Power Transmission at Mexico City. C. R. Mundinger. Brief account of the water-power plants for power transmission to this city. 1400 w. Elec Wld & Engr—April 20, 1901.

Mines and Smelters.—See **ELECTRIC DISTRIBUTION.**

Montana.—Some Experiences with High Tension. A. C. Pratt. Observations on troubles and peculiarities incident to this class of work. 2000 w. Engs' Year Bk, Univ of Minn.—1901.

Notes on Electric Light and Power Work at Butte, Mont. J. R. Cravath. Illustrates and describes the water-power plant of the Montana Power Transmission Co., on the Big Hole River, 20 miles from Butte, the transmission line, and the steam plant at the sub-station in Butte. 1500 w. Elec Wld & Engr—Jan. 26, 1901.

Missouri River Power Company's 50,000-Volt Transmission Plant. Illustrates and describes a 70-mile three-phase line being built in the Rocky Mountain district from Canon Ferry to Butte, Montana. 500 w. Elec Wld & Engr—July 13, 1901.

The 50,000-Volt Transmission of the Missouri River Power Company. W. G. McConnon. Illustrated detailed description of a plant using the highest transmission voltage, and transmitting power for 65 miles. 2400 w. Jour of Elec—June, 1902.

The 50,000-Volt-Transmission Plant of the Missouri River Power Company. W. G. McConnon. An illustrated account of the project with description of the plant and line near Helena, Montana. 2000 w. Elec Rev, N Y—June 7, 1902.

50,000-Volt Transmission Plant of the Missouri River Power Co., at Canon Ferry, Montana. W. G. McConnon. Describes a plant for transmitting electric power for 65 miles. 2000 w. Mines & Min—July, 1902.

The 50,000-Volt Transmission Plant of the Missouri River Power Company. W. G. McConnon. Illustrated detailed description. 1000 w. Am Elect'n—July, 1902.

Missouri River Power Company's 50,000-Volt Transmission Plant. A. W. Clapp. An illustrated account of improvements added to the Canon Ferry plant, and of the new sub-station at Butte. 2500 w. Elec Wld & Engr—Aug. 9, 1902.

Electric Power Installation Near Butte, Montana. An illustrated article describing a plant using a 50,000 voltage, owned by the Missouri River Power Company. 3200 w. Sci Am Sup—Oct. 18, 1902.

A High-Voltage Power Transmission. M. H. Gerry, Jr. An illustrated description of the various details of the reconstructed plant of the Missouri River Power Co. 6600 w. Pro Am Soc of Civ Engrs—Jan., 1903.

A High-Voltage Power Transmission. Discussion of the paper by M. H. Gerry, Jr., on the reconstructed plant of the Missouri River Power Co., in Montana. 3800 w. Pro Am Soc of Civ Engrs. April, 1903.

The Butte Lighting and Power Company. Illustrates and describes this electric transmission plant. 5000 w. Jour of Elec—April, 1903.

Annual Address to the Montana Society of Engineers. Joseph H. Harper. Reviews the engineering progress within the state of Montana, and discusses the advances made in power transmission and in wireless work. 8500 w. Jour Assn. of Engng Socs—May, 1903.

See also **HYDRO-ELECTRIC PLANT.**

Montreal.—Montreal the Greatest Center of Transmitted Power. Alton D. Adams. The first installment of an illustrated account of the Montreal system. A great consolidation and the long-distance transmission problem are being worked out. Serial. 1st part. 4000 w. Elec Wld & Engr—Dec. 5, 1903.

See also Chambly; **ELECTRIC STATION; HYDRO-ELECTRIC PLANT.**

New England.—Some Aspects of New England Central Station Development. An illustrated article giving an interesting account of the development and transmission of electric energy. 3000 w. Elec Wld & Engr—May 21, 1904.

See also **ELECTRIC INDUSTRY; ELECTRIC STATION MANAGEMENT; HYDRO-ELECTRIC PLANT.**

New York.—See **ELECTRIC DISTRIBUTION.**

New York Central.—See **ELECTRIC RAILWAY; ELECTRIC RAILWAY TERMINAL.**

New Zealand.—See **HYDRO-ELECTRIC PLANT—Rotorua.**

Niagara.—Recent Developments at the Niagara Falls Power Plant. Arthur B. Weeks. Illustrations and brief description of the aluminum transmission line by means of which electric current will be sent to the Pan-American Exposition; the changes in the lightning arrester apparatus, etc. 1000 w. Sci Am—April 13, 1901.

See also **Pan-American Exposition; HYDRO-ELECTRIC PLANT.**

Niagara-Buffalo.—See **ELECTRIC DISTRIBUTION—Buffalo.**

Niagara-Toronto.—Transmission of Niagara Power to Toronto. The present article gives an illustrated description of the steel towers which are to carry four circuits for the transmission of 40,000 H. P. at 60,000 volts. Serial. 1st part. 1500 w. Elec Wld & Engr—July 1, 1905.

See also **ELECTRIC POWER—Toronto.**

Oerlikon.—See **Hochfelden-Oerlikon.**

Pacific Coast Convention.—In Eighth Annual Convention Assembled. A complete unofficial report of the discussions held upon the papers read before the Monterey convention of the Pacific Coast Electric Transmission Assoc. 40,000 w. Jour of Elec—Aug., 1904.

Pan-American Exposition.—Niagara Falls Power Development and the Pan-American Exposition. Orrin E. Dunlap. An illustrated detailed description of features of the power plant, and the transmission of the power for exposition use. 4600 w. W. Elect'n—May 18, 1901.

Peru.—A Peruvian High-Voltage Transmission Plant. A. L. Kenyon. Brief illustrated description of the highest voltage long-distance transmission plant in South America. 1000 w. Elec Wld & Engr—July 2, 1904.

Physical Limitation.—See **Limits.**

Pike's Peak.—The Pike's Peak Power Transmission. R. M. Jones. Illustrated description. 3500 w. Jour of Elec—Sept., 1902.

Polycyclic.—See **ELECTRIC DISTRIBUTION.**

Portsmouth, N. H.—Long Transmission from a Steam Station for Electric Traction. Illustrates and describes a system, the main purpose of which is to operate electric car lines for a distance of 50 miles, but also furnishes current for Portsmouth, N. H., and other points. 6200 w. Elec Wld & Engr—Oct. 11, 1902.

Potential Rise.—See **ELECTRIC DISTRIBBUTION—High Power Surges.**

Pressure Rise.—See **Static Effects; Surges.**

Protective Devices.—See **ELECTRIC PROTECTIVE APPARATUS—Transmission Systems; LIGHTNING PROTECTION.**

Puyallup River-Seattle.—See **HYDRO-ELECTRIC PLANT.**

Puyallup River-Tacoma.—See **HYDRO-ELECTRIC PLANT.**

Railway.—The Transmission of Power by Electricity (Le Transport de la Force par l'Electricité). A review of the development of the electrical transmission of power, with especial relation to the requirements in case of the introduction of electric driving on main line railways. 2000 w. Revue Technique—June 25, 1901.

Electric Railway Service as Supplied by Long-Distance Power Transmission. Allen H. Babcock. Read at Con. of the Pacific Coast Elec. Trans. Assn. A brief review of the present situation and future outlook, especially on the Pacific Coast. 1800 w. Jour of Elec—July, 1903.

Power Transmission for Interurban Lines. J. B. Storer. Read at Syracuse meeting of the N. Y. State St. Ry. Assn. Considers some of the possible improvements that may be made in electrical systems. 2000 w. St Ry Jour—Oct. 17, 1903.

High Tension Transmission for Electric Railways. W. J. Davis, Jr. Read before the New England St. Ry. Club. Considers present practice, discussing regulation, connections, construction, and insulators. 2000 w. St Ry Jour—June 25, 1904.

See also ELECTRIC DISTRIBUTION; ELECTRIC RAILWAY; ELECTRIC STATION.

Regulation.—Regulation of Transmitted Power. Alton D. Adams. Considers the work of regulation in transmission systems. 3300 w. Elec Rev, N Y—Sept. 12, 1903.

Regulation and Efficiency of Transmission Lines. Harold Pender. Calls attention to an error in the table found on page 126 of Foster's "Electrical Engineer's Pocket Book." 700 w. Elec Wld & Engr—July 1, 1905.

Regulator.—See ELECTRIC APPARATUS—Tirrill Regulator.

Resonance.—Resonance Phenomena in Long Distance Transmission (Resonanserscheinungen in Fernleitungen). W. Blanck. A mathematical investigation of the relations between resonance and length of line in power transmissions. 1000 w. Zeitschr f Elektrotechnik—Jan. 4, 1903.

Rock Creek, Oregon.—Rock Creek, Oregon, Power and Transmission System. An illustrated description of an interesting power development in a thinly populated district of the West. 2000 w. Elec Wld & Engr—Sept. 3, 1904.

Rotorua, N. Z.—See HYDRO-ELECTRIC PLANT.

Russia.—A Proposed Water Power Electric Transmission Plant for St. Petersburg, Russia. Brief account of the project for the development of extensive water powers near St. Petersburg with electrical transmission to that city. 1100 w. Eng News—Oct. 24, 1901.

St. Croix Power Co.—See HYDRO-ELECTRIC PLANT—Apple River, Wis.

St. Maurice-Lausanne.—See Direct-Current; HYDRO-ELECTRIC PLANT—St. Maurice, Switzerland.

Santa Monica, Calif.—See ELECTRIC STATION.

Sécheron, Switzerland.—See Direct-Current.

Single-Phase.—Transmission and Distribution by Single-Phase Alternating Current. E. W. Monkhouse. Showing the advantages of this system. Short general discussion. 2000 w. Elect'n, Lond—June 26, 1903.

Possibilities of Single-Phase Currents in Electric Power Transmission. H. A. Bullard and Sidney Sprout. Read before the Pacific Coast Elec. Trans. Assn. Shows various advantages in favor of single-phase transmission. 3000 w. Jour of Elec—July, 1904.

See also ELECTRIC RAILWAY; HYDRO-ELECTRIC PLANT—La Goule.

Single-Phase vs. Polyphase.—Single-Phase vs. Polyphase Transmission Lines. H. S. Watson. Presents arguments in favor of single-phase transmission. 1000 w. Elect'n, Lond—Oct. 6, 1905.

60,000-Volts, Mexico.—See HYDRO-ELECTRIC PLANT—Guanajuato.

Snoqualmie, Wash.—Electric Power Transmission for 153 Miles. A statement of an experiment by the Snoqualmie Falls Power Co., made by connecting in one continuous circuit its 3-phase transmission lines between Seattle, Tacoma, and the Falls. 700 w. Eng Rec—Dec. 15, 1900.

The Power Transmission From Snoqualmie Falls. An illustrated detailed description of this great transmission plant of Washington, with a discussion of its topographical and meteorlogical features, by Charles H. Baker. 13,600 w. Jour of Elec—Jan., 1901.

Aesthetics in, and Extensions of the Snoqualmie Transmission. Gives an illustrated description of the tower over the shaft crowning the elevator entrance to the subterranean works, and the new sub-stations in Seattle and Tacoma. Also describes the extension to be carried out. 3400 w. Jour of Elec—Oct., 1901.

See also HYDRO-ELECTRIC PLANT.

South Africa.—Experience with Electric Power Transmission in South Africa. Abstract of a paper by H. J. S. Heather, presented to the Institution of Civil Engineers, describing troubles caused by lightning, in electric transmission plants in South Africa, and the growth of a direct current system, and its final transformation to an alternating plant. 2200 w. Eng Rec—Feb. 9, 1901.

See also Victoria Falls.

South Bend, Ind.—See HYDRO-ELECTRIC PLANT.

South Wales.—See ELECTRIC POWER.

Spokane, Wash.—A One-Hundred Mile Transmission Line. Robert Howes. Read before the Nat Elec Lgt Assn. Briefly describes the essential features of the plant, the results obtained and difficulties encountered. 3800 w. Elec Rev, N Y—May 28, 1904.

Springfield, Mass.—See HYDRO-ELECTRIC PLANT—Birchem Bend.

Static Effects.—Static Strains in High Tension Circuits and the Protection of Apparatus. Percy H. Thomas. Discusses the "static effects" in high tension circuits, especial attention being given to the disturbances produced by lightning, switching, grounding, and the like. Ill. 19,000 w. Trans Am Inst of Elec Engrs—March, 1902.

Static Strains in High Tension Circuits, and the Protection of Apparatus. Discussion of Percy H. Thomas' paper. 5000 w. Trans Am Inst of Elec Engrs—June and July, 1902.

An Experimental Study of the Rise of Potential on Commercial Transmission Lines Due to Static Disturbances Caused by Switching, Grounding, etc. Percy H. Thomas. Describes tests made in an experimental study of "static effects" on full-sized commercial systems. 4000 w. Am Inst of Elec Engrs—June 19, 1905.

See also Resonance; Surges.

Sumatra.—A Power Transmission Plant in Sumatra. Illustrates and describes a water-driven three-phase power-transmission plant installed at the Redjang-Lebong gold mine. 2000 w. Elect'n, Lond—Feb. 8, 1901.

Surges.—Surges in Transmission Circuits. A. E. Kennelly. Considers electrical oscillations in circuits containing inductance and capacity. 4560 w, Elec Wld & Engr—Nov. 23, 1901.

Surges in Transmission Circuits. F. G. Baum. Read before the Pacific Coast Elec. Trans. Assn. Discusses opening a line under a load or short circuit; closing a high-potential line switch to charge the line; opening a high-potential line switch to deaden the line. 1700 w. Jour of Elec—June, 1902.

Pressure Rise in High-Tension Transmission. W. B. Woodhouse. Considers the causes of excessive pressure rise and the means of safeguarding the system against undue stress. 1600 w. Elect'n, Lond—Sept. 5, 1902.
See also Static Effects.

Swan Falls-Trade Dollar, Idaho.—The Swan Falls-Trade Dollar Transmission. An illustrated detailed description of the hydro-electric plant on the Snake River, Idaho, and the transmission line built to furnish power for the Trade Dollar Mines. The pole line is 32 miles in length. 1500 w. Jour of Elec—Oct., 1902.

Switzerland.—Electric Power Transmission and Supply in Switzerland. Illustrates and describes features of Swiss practice observed during a series of recent visits. Serial. 1st part. 2800 w. Engr, Lond—Sept. 26, 1902.

Synchronous Motor Regulation.—Some Tests on the Use of the Synchronous Motor in Compensating for Lagging Currents in a Circuit. E. A. Regestein. Explains the considerations involved and describes tests made by the writer. 1800 w. Elec Rev, N Y—Feb. 25, 1905.

Theory.—The Theory and Calculations of Alternating-Current Transmission Lines. Charles W. Startsman. A discussion aiming to point out the difficulties attending electric power transmission and to show how far they have been overcome. 3500 w. Elec Rev, N Y—Dec. 28, 1901.

Thury System.—See Direct Current.

Tivoli-Rome.—See HYDRO-ELECTRIC PLANT.

Toulon, France.—A French 28,000-Volt Power Transmission. Illustrated description of a high-voltage plant recently placed in service to supply power to Toulon. 2400 w. Elec Rev, Lond—July 21, 1905.

Tullahoma, Tenn.—Tullahoma, Tenn., Water and Light Plant. Granbery Jackson. Brief history and description of a high-voltage transmission line, with report of results obtained. 2800 w. Munic Engng—May, 1904.

Twickenham-Teddington, Eng.—The Twickenham and Teddington Electricity Undertaking. Max J. E. Tilney. An illustrated outline of a high-tension scheme now in progress. 2300 w. Elect'n, Lond—Sept. 16, 1904.

200-Mile.—Economics of a 200-Mile Transmission. J. Eugene Wallace. An explanation of rules and formulas resulting from a study of the methods of calculating voltages and line efficiencies, illustrating by an assumed enterprise. 1500 w. Elec Wld & Engr—Nov. 5, 1904.

See also **80,000 Volts.**

U. S. Western.—Western Practice in Long Distance Transmission. Begins a general review of Western practice and a comparison of methods in different plants. Also editorial. Serial. 1st part. 3800 w. Elec Wld & Engr—July 13, 1901.

Utah.—Power Transmission in Utah. J. R. Cravath. Results and lessons from the operation of the long-distance power transmission and distribution systems of the Utah Light & Power Company. Ill. 5800 w. Elec Wld & Engr—March 30, 1901.

Vaud, Switzerland.—The Installations of the Compagnie Vaudoise (Les Installations de la Compagnie Vaudoise). C. H. Perrin. A very complete account of the hydraulic generation and electrical transmission of 7000 horse-power from lakes Joux and Orbe, in the canton of Vaud, Switzerland. Serial. Part I. 4000 w. Bull Tech de la Suisse Romande—Sept. 25, 1904.

Victoria Falls.—The Electrical Transmission of Power from the Victoria Falls to the Rand. Prof. W. E. Ayrton. From "The Times" Engng. Sup. Gives the writer's views in regard to this scheme, and compares them with the views of Mr. Wilson Fox. 2000 w. Mech Engr—Nov. 25, 1905.

The Zambesi Power Scheme. W. B. Esson. Discusses the scheme proposed by H. Wilson Fox. 1700 w. Elec Rev, Lond—Dec. 15, 1905.

Long Distance Power Transmission by Direct Current. Frank J. Sprague. Discusses the economic side of direct-current transmission, referring to the Victoria Falls project. Also editorial. 3800 w. Elec Wld & Engr—Dec. 30, 1905.

Harnessing the Victoria Falls for Electrical Power. An illustrated article giving information of the power scheme to be carried out in Africa on the Zambesi River. 1500 w. Sci Am—April 29, 1905.

Voltage.—Selection of Transmission Voltages. Alton D. Adams. Suggestions of value, discussing the factors that determine the voltage. 1200 w. Sci Am—June 17, 1905.

Waterbury, Conn.—Electric Transmission and Distribution in New England. Illustrates and describes stations of the Connecticut Railway & Lighting Company at Waterbury, Connecticut. 3400 w. Am Elect'n—June, 1905.

Waterport-Albion, N. Y. — See **HYDRO-ELECTRIC PLANT.**

Wave Distortion.—See **ELECTRIC CURRENT, ALTERNATING; TELEPHONE LINE.**

Weak Points.—Weak Points in Long-Distance Electric Transmission. James C. Bennett. Outlines the nature of the service required for lead-smelting, and some of the problems to be solved, and the trouble arising from interrupted service. 2500 w. Jour Assn of Engng Socs—March, 1905.

Wireless.—See **SPACE TRANSMISSION.**

Zambesi River.—See **Victoria Falls.**

ELECTRIC TRAVERSER.

See **TRANSFER TABLE.**

ELECTRIC UNIT.

See also **ELECTRIC MEASUREMENT; ELECTRIC TERMINOLOGY; MAGNETIC UNIT; MEASUREMENT; WEIGHTS AND MEASURES.**

Theory and Practice. E. A. N. Pochin. A criticism of statements, given by eminent professors, explaining the unreliability found in the information concerning the electrical units. 1200 w. Elec Rev, Lond—Sept. 1, 1905.

Am. Inst. Elec. Engs.' Report.—Report of the Committee of the American Institute of Electrical Engineers on Units and Standards. Also discussion. 5000 w. Trans Am Inst of Elec Engs—Nov., 1900.

See also **ELECTRIC APPARATUS—Standardization.**

Emde.—Electrotechnical Measuring Systems (Ueber Elektrotechnische Mass-systeme). Fritz Emde. Outlining a general system of physical measurements and units for discussion at the St. Louis Electrical Congress. 10,000 w. Elektrotech Zeitschr—May 26, 1904.

Electrotechnical Systems of Units. Prof David Robertson. A review of a paper by Fritz Emde before the Electrotechnischer Verein, on fundamental and derived units, with diagram. 1200 w. Elect'n, Lond—Aug. 12, 1904.

Giorgi.—Rational Electromagnetic Units. A paper contributed to the Physical Society of London, by Signor Giovanni Giorgi, explaining his system, which has been recommended for adoption by a committee of an Italian Congress. 3500 w. Elec Wld & Engr—Sept. 6, 1902.

The Giorgi System of Units (Das Giorgische Mass-systeme). Fritz Emde. An explanation and discussion of the system of units proposed by Giovanni Giorgi, and of particular convenience and consistency for electrical measurements. Tables. 3000 w. Zeitschr f Elektrotechnik—June 7, 1903.

International.—The So-Called International Electrical Units. Dr. Frank A. Wolff. Historical review and discussion of units and standard cells. 9500 w. Int Elec Cong of St. Louis—Sept., 1904.

Notation.—See **ELECTRIC SYMBOL.**

Ohm.—Standards for the Legal Ohm (Les Etalons de l'Ohm Légal). G. Girousse. An account of the work of the laboratory of the Superior School of Posts and Telegraph, with especial reference to the production and comparison of mercury standards for the ohm. 3500 w. Bull de la Soc Int des Electriciens—Dec., 1905.

Theory.—Electrical Units and Introduction to Alternating Currents (Die Masse in der Elektrotechnik. Einführung in das Wechselstromgebiet). Dr. Johann Sahulka. Lecture before the Oesterr. Ing. und Arch. Verein on the elements of electrical engineering. Diagrams. 6000 w. Supplement to Zeitschr d Oesterr Ing u Arch Vereines—July 4, 1902.

Transformation.—Theory of Units. Antonio Llano. Derives an easy and practical method for effecting the transformation from one system of units to another. Mathematical. 2500 w. Stevens Ind—Oct., 1903.

Two Dimension.—A Modification in the System of Absolute Units (Ueber eine Aenderung des Absoluten Mass-systemes). Dr. G. Dompieri. A discussion of the absence of uniformity in the units of mass and time, with suggestions as to a new two-dimensional system. 2500 w. Zeitschr f Elektrotechnik—March 8, 1903.

ELECTRIC VEHICLE.

See **AUTOMOBILE, ELECTRIC; ELECTRIC CAR.**

ELECTRIC VESSEL.

See **BOAT, ELECTRIC.**

ELECTRIC VOTING.

See **VOTING—Electric.**

ELECTRIC WAVES.

See also **ELECTRIC CURRENT, ALTERNATING; ELECTRO-PHYSICS; SPACE TELEGRAPHY.**

The Unobtained Wave Lengths Between the Longest Thermal and the Shortest Electric Waves Yet Measured. Prof. E. F. Nichols. A brief survey of present knowledge suggesting several experiments directed toward the production and measurement of short electric waves. 1200 w. Int Elec Cong of St. Louis—Sept., 1904.

An Experimental Study of Electric Waves and Their Applications. Dr. Edward Branly. An illustrated article studying the production, application, interference, etc. 3000 w. Sci Am Sup—June 24, 1905.

Analysis.—See **ELECTRIC CURRENT, ALTERNATING—Wave Analysis.**

Harmonics.—See **TELEPHONE—Overtones.**

Human Brain.—See **ELECTRO-PHYSICS—Waves on Brain.**

Length Standard.—On a New Standard of Wave-length. Dr. James E. Ives. Illustrates and describes the apparatus used, and the method. Also editorial. 3000 w. Elec Wld & Engr—June 4, 1904.

De Forest-Ives Electric Wave-Length Standard. A. Frederick Collins. Illustrated description of instrument and its operation. It is said to be capable of measuring any length of wave employed in the present practice of wireless telegraphy. 1500 w. Sci Am Sup—Feb. 4, 1905.

Measurements.—See **Reichsanstalt; ELECTRIC MEASUREMENT—High Frequency.**

Ondometer Telefunken.—See **SPACE TELEGRAPHY.**

Photography.—See **OSCILLOGRAPH — Duddell; Spencer.**

Pupin.—See **ELECTRO-PHYSICS—Wave Transmission; TELEPHONE LINE.**

Rapid Oscillations.—Apparatus for Experiments upon Rapid Electric Oscillations (Vorführung von Experimenten über Schnelle Elektrische Schwingungen). Dr. Georg Seibt. A lecture before the Elektrotechnische Verein with experiments upon the wireless transmission and reception of electric waves. 3000 w. Elektrotech Zeitschr—Feb. 5, 1903.

Reichsanstalt.—The Measurement of the Wave Lengths of Electric Oscillations (Ueber die Messung der Wellenlänge Elektrischer Schwingungen). E. Gehrcke. Describing the apparatus and methods used at the Physikalisch-Technische Reichsanstalt. 3000 w. Elektrotech Zeitschr—July 27, 1905.

Resonance Coils.—On Resonance Coils. T. Misuno. Shows the advantages of the coil system in investigating electric waves, and describes methods of investigation. Ill. Serial. 1st part. 1500 w. Elect'n, Lond—Aug. 7, 1903.

Three-Phase Transformer.—See **ELECTRIC CURRENT, ALTERNATING—Wave in Transformer.**

Transmission Line.—See **ELECTRIC CURRENT, ALTERNATING—Wave Distortion; ELECTRIC TRANSMISSION; TELEPHONE LINE.**

Transmission Mechanism.—On the Mechanism of Electric Power Transmission. Dr. A. E. Kennelly. Considers wireless as well as wire transmission of electric waves, illustrating by example the application of the principles. 2500 w. Elec Wld & Engr—Oct. 24, 1903.

Vegetable Absorbtion.—See **SPACE TELEGRAPHY.**

Wires.—Electric Waves in Wires (Elektrische Drahtwellen). G. Seibt. An examination of the action of electric waves in metallic wires, with reference to the utilization of electric waves in wireless telegraphy. Serial. Part 1. 4000 w. Electrotech Zeitschr—April 10, 1902.

See also **ELECTRO-PHYSICS.**

ELECTRIC WELDING.

See also **RAIL JOINT; WELDING.**

Electric Welding Development. Elihu Thomson. Reviews applications made of the electric weld, showing its importance in the industries. Ills. 2000 w. Cassier's Mag—June, 1904.

Aluminum.—See **ALUMINUM—Welding.**

Blast-Furnace Machinery.—The Dynamo as an Adjunct to the Blast Furnace. Horace Allen. Describes electric welding of broken machinery and burning out of "frozen" furnaces. 1000 w. Elec Rev, Lond—Jan. 3. 1902.

See also **BLAST FURNACE—Obstruction Removal.**

Chain.—See **CHAIN—Electric Welding.**

Pimlico Wheel Works.—See **ELECTRIC PLANT.**

Rail Joint.—Electric Welding of Rail Joints. An illustrated description of the machines used and methods of operation. 700 w. Ir Age—Sept. 25, 1902.

Improvements in Electric Track Welding. George E. Walsh. Describes the process of welding under the present system. 1500 w. Elec Rev, N Y—July 25, 1903.

Electric Welded Joints. William Pestell. An illustrated article describing the work as carried out by the Johnson Co. and their successor. 2800 w. St Ry Rev (Daily Ed)—Sept. 5, 1903.

Electric Rail Welding on the Glasgow Tramway System. Benjamin Taylor. Illustrated description of the work as carried out by the Lorain Steel Company, of Lorain, Ohio. 2500 w. Engng Rev—Feb., 1904.

See also **RAIL JOINT.**

Screw Caps.—See **SCREW CAPS.**

ELECTRIC WIRE.

See also **ELECTRIC CABLE; ELECTRIC CONDUCTOR; ELECTRIC LINE; ELECTRIC RAILWAY—Overhead Construction; ELECTRIC WIRING; INSULATION; TROLLEY WIRE; WIRE.**

Electrolytic Manufacture.—See **ELECTRO-CHEMISTRY—Wire Manufacture.**

Electrostatic Capacity.—See **ELECTROSTATIC CAPACITY.**

High Frequency Resistance.—See **ELECTRIC RESISTANCE—High Frequency.**

Stresses.—See also **ELECTRIC LINE—Sag of Wires.**

ELECTRIC WIRING.

See also **ELECTRIC CONDUCTOR; ELECTRIC CONDUIT; ELECTRIC DISTRIBUTION; ELECTRIC LINE.**

Some Notes on Electric Wiring. George A. Clark. Abstract of a paper read before the Glasgow Sec. of the Inst. of Elec. Engrs. Points out some of the most serious defects, and suggests a remedy where possible. 1500 w. Elect'n, Lond—April 12, 1901.

Some Notes on Electric Wiring. George A. Clark. Read at Glasgow meeting of the Inst. of Elec. Engrs. Pointing out a few of the more serious defects in the present methods, and, where possible, suggesting a remedy. 2500 w. Elec Engr, Lond—Sept. 5, 1902.

Electric Wiring Methods of To-Day. Fred. Bathurst. Discusses this subject with especial reference to conduit systems. 3800 w. Elec Rev, Lond—April 11, 1902.

Alternating Current.—Alternating Current Wiring. Cecil P. Poole. Tables, formulae and directions for making the necessary calculations. 2000 w. Am Elect'n—Aug., 1903.

Alternating Current Wiring. George T. Hanchett. Gives means of calculating wires for alternating current circuits of small magnitude. 1200 w. Cent Sta—Jan. 19, 1904.

British.—See **Rules.**

Buildings.—See **Interior.**

Car Lighting.—See **CAR LIGHTING—Wiring Diagrams.**

Conduit Neutral.—See **Three Wire.**

Diagram.—The Use of the Multiple Pole Diagram in Graphical Wiring Computations (Der Mehrpolige Polplan in der Zeichnerischen Leitungsberechnung). G. König. Showing the application of the pole diagram and cord polygon to wiring computations in a manner similar to that used in graphostatics. 2500 w. Elektrotech Zeitschr—Jan. 29, 1903.

Fire Hazard.—Electric Wiring and Fire Risks. E. C. de Segundo. Read before the International Fire Prevention Cong. On the importance of sound work in the wiring of buildings for electric light and power. 3000 w. Archt, Lond—Aug. 14, 1903.

Fire Protection.—See **ELECTRIC CONDUCTOR.**

Formulae.—See **ELECTRIC CURRENT, ALTERNATING.**

French Regulations.—See **ELECTRIC INDUSTRY.**

Grounded Neutral.—See **Three-Wire; ELECTRIC DISTRIBUTION.**

Insulation.—See **Protection;ELECTRIC CABLE; INSULATION.**

Insulation Resistance.—See **INSULATION—Resistance.**

Interior.—Future Development of Interior Wiring. H. Ward Leonard. Describes the method advocated by the writer, and considers the important requirements. 2800 w. Elec Wld & Engr—Jan. 5, 1901.

The Wiring of Buildings. Review of a paper by O. L. Falconar, read before the Newcastle Section of the Inst. of Elec. Engrs. 2200 w. Elec Rev, Lond—Jan. 23, 1903.

Interior Wiring. Describes methods and gives tables for computing. 2000 w. Am Elect'n—Dec., 1901.

Methods of Bringing High Tension Conductors into Buildings. C. E. Skinner. Discusses the general requirements, referring to specific methods. Ill. 1200 w. Trans Am Inst of Elec Engrs—July, 1903.

Notes on Interior Wiring. Arthur B. Weeks. Suggestions for the wiring of buildings for electric lighting. Ills. 1600 w. Am Elect'n—March, 1904.

See also **Fire Hazard; Office Building, N. Y.; Steel Building; Theatre.**

Interior Conduit.—Pipes for Carrying Wires. P. I. Panamolo. Considers some points in regard to the bending of pipes used to carry wires, and the work generally. Ill. 1800 w. W Elect'n—Dec. 15, 1900.

Interior Conduit Construction and the National Electrical Code. Edward Sullivan. Calls attention to points that should be observed in installing the conduit system of wiring. 2400 w. Elec Rev, N Y—Nov. 16, 1901.

Lamps and Motors.—Wiring for Lamps and Motors—Meeting an Emergency. W. H. Wakeman. Describes the writer's plan of wiring and the changes made to meet an emergency. Serial. 1st part. 900 w. Elec, N Y—Sept. 6, 1905.

Lead-Covered.—See **Protection.**

Leonard.—See **Interior.**

Machine Tools.—Electric Wiring of Machine Tools. O. Bodler. Shows the way of determining the size of the wire, and forms of wiring. Ills. 1200 w. Ry Mas Mech—April, 1904.

Mines.—Electric Wiring in Mines. Alton D. Adams. The difficulties which must necessarily be met, and some means of reducing the dangers of faulty insulation. 2000 w. Mines & Min—Nov., 1900.

See also **ELECTRIC EQUIPMENT.**

Motor.—See **Lamp.**

Office Building, N. Y.—Interior Wiring. Charles E. Knox. Illustrated description of the wiring of the thirty-two story Park Row building in New York City. 2000 w. Am Elect'n—Dec., 1900.

Protection.—On Metallic Protection for Conductors. J. Prentice. Considers the metallic tube systems, as usually installed, utterly untrustworthy. 700 w. Elec Rev, Lond—Jan. 23, 1903.

Methods of Supporting and Protecting Inside Conductors. O. L. Falconar. Read before the Newcastle Local Sec. of the Inst. of Elec. Engrs. Illustrated description of some of the methods in general use. 4500 w. Elec Engr, Lond—Jan. 30, 1903.

The Insulation and Mechanical Protection of Electric Wiring. Remarks based on practical experience of various systems, enumerating features which may prove of assistance in determining which is the most suitable arrangement for given requirements. 2000 w. Elec Rev, Lond—June 5, 1903.

The Continuous Protection of Conductors. Briefly reviews the wiring systems in general use, considering their advantages, and describes screwed stud fittings. Ills. 1100 w. Elec Rev, Lond—June 10, 1904.

Some Actual Results Obtained During the Use of Various Electric Wiring Systems. Discusses metal tubing, wood casing, etc. 800 w. Elec Engr, Lond—July 15, 1904.

Lead-Covered Wiring. John D. MacKenzie. Presents the advantages and disadvantages of this system, showing how some of the disadvantages may be minimized. 2000 w. Elec Rev, Lond—Nov. 10, 1905.

See also **ELECTRIC PROTECTIVE APPARATUS; INSULATION.**

Rules.—Notes on Wiring Rules. F. Broadbent. Abstract of a paper read before the Newcastle Sec. of the Inst. of Elec. Engrs. Compares the rules and requirements of various companies on specific subjects. 4300 w. Elect'n, Lond—April 12, 1901.

I. Wiring Rules. C. H. Wordingham. II. Coventry Wiring Regulations. Jos. A. Jeckell. III. Letter. T. P. Wilmshurst. Three communications on the subject of wiring. 4400 w. Elect'n, Lond—Nov. 8, 1901.

The Institution of Electrical Engineers' New Wiring Rules. Gives a copy of the new set of general rules recommended for wiring for the supply of electrical enegry. 6000 w. Elect'n, Lond—March 20, 1903.

See also **Interior Conduit; ELECTRIC APPARATUS; ELECTRIC INDUSTRY.**

Steel Building.—The Wiring of Exposed Steel Frame Buildings. Arthur B. Weeks. Sketches and notes describing methods used. 1500 w. Am Elect'n—June, 1904.

See also **Office Building.**

Supporting Method.—See **Protection.**

Tables, B. & S.—How to Remember the Wire Table. Charles F. Scott. An explanation of a few simple relations of the wire table for the B. & S. gauge copper wire that will enable the whole table to be constructed mentally. 1400 w. Elec Club Jour—April, 1905.

Telephone.—Interior Wiring for Telephones. Charles H. Coar. Discusses points of importance, and gives rules applicable in many cases. 2200 w. Elec Wld & Engr—Oct. 15, 1904.

Theatres.—See **ELECTRIC LIGHTING.**

Three Wire.—Electric Lighting in the Union Trust Company's Building, Providence, R. I. The three-wire system installed makes use of its metallic conduits to replace the neutral wire, thus saving about 40,000 feet of wire, and, it is claimed, making it impossible for fire to start from an electrical source. Ill. 1200 w. Eng Rec—Oct. 25, 1902.

Three-Wire Direct-Current Wiring. P. C. Percy. Directions for wiring, determining the size of the neutral wire, etc. 1600 w. Am Elect'n—Feb., 1903.

See also **ELECTRIC DISTRIBUTION.**

Wastes.—The Wastes of Wiring. J. Whitcher. Means of reducing waste are discussed. 2000 w. Elec Engr, Lond—April 4, 1902.

ELECTRIC WORKS.

See also **ELECTRIC ENGINEERING; ELECTRIC INDUSTRY; ELECTRIC PLANT; ELECTRIC POWER; ELECTRIC STATION.**

A. E. G., Berlin.—The Coming Visit of the Institution of Electrical Engineers to Berlin. A series of brief illustrated descriptions of the works to be visited. The present article gives a sketch of the machine and apparatus works of the Allgemeine Elektricitäts-Gesellschaft. Serial. 1st part. 1400 w. Elec Engr, Lond—April 26, 1901.

Belfort.—Electric Works at Belfort. Illustrated detailed description of these model shops. 1000 w. Engr, Lond—July 31, 1903.

Brighton.—The Brighton Works of the Reason Manufacturing Co., Ltd. Illustrated description of the works and some of the meters, fans, arc lamps and other accessories manufactured. 3300 w. Elec Mag—May 23, 1905.

British Westinghouse.—The Works of the British Westinghouse Electric and Manufacturing Company. The present article describes the buildings of this large plant. The equipment will be dealt with in subsequent articles. Plans and illustrations are given. Serial. 1st part. 2300 w. Engng—March 28, 1902.

The Power Equipment of the Westinghouse Works at Trafford Park. A brief general description of these works near Manchester, England, with illustrations. 1800 w. Elec Rev, Lond—Sept. 12, 1902.

The Westinghouse Works, Manchester. G. R. Dunell. A finely illustrated article, giving detailed description of those fine engineering works and their equipment. Also gives particulars of some of the principal manufactures. 14500 w. Trac & Trans—Aug., 1903.

See also **BUILDING CONSTRUCTION.**

Brown, Boveri & Co.—The Electric Manufacturing Works of Brown, Boveri & Co. at Mannheim, Germany (Die Fabrikanlagen von Brown, Boveri & Cie, A. G. in Käferthal bei Mannheim). A well-illustrated description of works for the manufacture of electrical apparatus, where electric driving is employed. 1200 w. Zeitschr d Ver Deutscher Ing—June 21, 1902.

The Works of Messrs. Brown, Boveri & Co., of Baden, Switzerland. Emile Guarini. Illustrated detailed description of large electric construction works and their equipment. 1800 w. Am Mach—Vol. 28, No. 20.

Bruce Peebles.—See **Edinburgh.**

Brush, England.—The Brush Electrical Engineering Company. Illustrations with description of the works at Loughborough, England. Serial. 1st part. 2200 w. Engng—Feb. 7, 1902.

The Brush Electrical Engineering Company's "Falcon" Works. Illustrated detailed description. Serial. 1st part. 1500 w. Elec Rev, Lond —March 17, 1905.

Bullock.—The Plant of the Bullock Electric Manufacturing Company and Its Work and Cost System. Illustrated detailed description of one of the finest modern plants, located near Cincinnati, and its methods. 5000 w. Ir Trd Rev—April 3, 1902.

Centralized Management.—See **WORKS MANAGEMENT—Electrical Properties.**

Costs.—See **COST KEEPING—Dynamo Manufacture.**

Crocker-Wheeler.—The Crocker-Wheeler Plant at Ampere, N. J., and Its Power Distribution. Illustrated detailed description. 4000 w. Ir Trd Rev —April 7, 1904.

Crompton, Chelmsford.—See **ELECTRIC GENERATOR TEST.**

Eddy, Windsor, Conn.—The Works of the Eddy Electric Manufacturing Company. Illustrated description of works at Windsor, Conn., for making direct-current apparatus, and the methods of manufacture. 1500 w. Elec Rev, N Y—April 13, 1901.

Edinburgh.—Messrs. Bruce Peebles & Co.'s New Works at East Pilton, Edinburgh. An illustrated detailed description of a plant for the manufacture of electrical machinery and its general arrangement. 4000 w. Elec Engr, Lond—Nov. 25, 1904.

The East Pilton Works of Messrs. Bruce Peebles & Co., Ltd. Illustrated description of the largest works for making electrical machinery in Scotland, at Edinburgh. Serial. 1st part. 1800 w. Elec Rev, Lond—Nov. 17, 1905.

Edison, West Orange, N. J.—The Edison Interests at West Orange, N. J. An illustrated description of the extensive works where some of the inventions of Thomas A. Edison are manufactured. 2500 w. Elec Rev, N Y—Aug. 8, 1903.

Ferranti, Eng.—The Ferranti Works at Hollinwood. Illustrates and describes the works and some of the products of one of the oldest electrical engineering concerns in England. Serial. 1st part. 2200 w. Elec Times—Aug. 28, 1902.

Fontainebleau.—See **Schneider & Co.**

Fort Wayne, Ind.—The New Fort Wayne Electric Works. An illustrated description of the extensive improvements made to increase the capacity and facilities. 4000 w. Engr, U S A—Feb. 1, 1904.

General Electric Co.—The Schenectady Works of the General Electric Company. The first of a series of articles giving illustrated description of the equipment of these fine shops. The present paper gives a general view of the works and the methods. Serial. 1st part. 2200 w. Elec Rev, N Y—March 16, 1901.

A Visit to the Works of the General Electric Company, Schenectady. Lyman B. Thompson. An illustrated detailed description of these extensive works. 5800 w. Am Mach—Sept. 4, 1902.

The Works of the General Electric Company. A general review of the Schenectady works, with plan and illustrations of tools, Curtis steam turbine, etc. Serial. 2 parts. 600 w. Engng—Aug. 5 and 12, 1904.

General Electric Co., England.—The Witton Works of the General Electric Company, Limited. Plan, and illustrated detailed description of the works thus far developed. 3800 w. Elec Engr, Lond—Feb. 13, 1903.

The Plant and Operations of the General Electric Company, Ltd., at Witton. An illustrated descriptive account. 1800 w. Ir & Coal Trds Rev—April 17, 1903.

Glover, Manchester.—See **ELECTRIC CABLE WORKS.**

Inspector's Report.—Report of the Electrical Inspector of Factories and Workshops. G. S. Ram. The first report to the Home Office, suggesting improvements tending to safety in working, and calling attention to the variety of methods in use and absence of standard practice. 5500 w. Elect'n, Lond—July 3, 1903.

Lancashire.—The Lancashire Dynamo and Motor Company's Works. An illustrated detailed description of these shops and their development, and some of their products. 3500 w. Engr, Lond—Nov. 18, 1904.

Oerlikon.—Electrical Works of the Maschinenfabrik Oerlikon. Frank C. Perkins. Illustrates and describes details of this great Swiss manufacturing plant, near Zürich. 2500 w. Mach, N Y—April, 1902.

Peebles & Co.—See **Edinburgh.**

Rugby, Eng.—See **Thomson-Houston.**

Schneider & Co., France.—Messrs. Schneider and Co.'s New Electricity Works. Brief description, with illustrations, of the new electric construction works near Fontainebleau. 900 w. Engng —Dec. 31, 1904.

Schuckert, Nuremberg.—The Schuckert Electric Works at Nuremberg, Germany. S. N. Taylor. An illustrated article describing these fine works and their equipment. 2200 w. Elec Wld & Engr—Aug. 1, 1903.

Shibaura, Japan.—See **ELECTRIC INDUSTRY—Japan.**

Stanley.—The Works of the Stanley Electric Manufacturing Company. Illustrates and describes the buildings and equipment of a new plant at Pittsfield, Massachusetts. 2200 w. Elec Rev, N Y—Nov. 2, 1901.

Some Features of the Works of the Stanley Elec. Mfg. Co. Illustrated description of the general arrangement of an electric manufacturing plant and the details of the power plant. 2700 w. Eng Rec—July 5, 1902.

Thomson-Houston, Rugby.—The Rugby Works of the British Thomson-Houston Company. An illustrated detailed description of these works and their equipment. 4500 w. Elec Engr, Lond—Oct. 24, 1902.

The British Thomson-Houston Company's Works. Illustrated description of large works for the manufacture of electrical machinery. 5000 w. Tram & Ry Wld—Nov. 13, 1902.

The British Thomson-Houston Works at Rugby. Editorial account of a visit to their works at Rugby and description of the Curtis turbine. 3000 w. Engng—May 19, 1905.

Western Electric Co., Eng.—The Western Electric Co.'s Factory, North Woolwich. Illustrates and describes these works, which have recently made extensive changes. 3000 w. Elec Rev, Lond—March 3, 1905.

Westinghouse.—The Works of the Westinghouse Electric and Manufacturing Company. An illustrated detailed description of these interesting works and their fine equipment. Serial. 1st part. 1800 w. Elec Rev, N Y—May 11, 1901.

See also **British Westinghouse; MACHINE SHOP; WESTINGHOUSE.**

Witton, Eng.—See **General Electric Co., England.**

ELECTRO-CAPILLARITY.
See **ELECTRO-PHYSICS—Capillarity.**

ELECTRO-CHEMISTRY.

See also **ELECTRIC CELL; ELECTRIC FURNACE; ELECTROLYSIS; ELECTROLYTE; ELECTRO-METALLURGY; STORAGE BATTERY.**

Electro-Chemistry and Electro-Metallurgy. Francis B. Crocker. Part first presents the theory, discussing the principles and the general relation between the electrical quantities. Serial. 1st part. 7000 w. Sch of Mines Quar—Jan., 1901.

Electro-Chemistry. Carl Hering. Comments on the rapid progress of the last four years, and reviews what is being accomplished, and the future outlook. 5200 w. Elec Wld & Engr—Jan. 5, 1901.

Electrochemical Action. C. J. Reed. A study of electrochemical actions, explaining the conditions necessary, the systems, kinds of electrodes, etc. Serial. 1st part. 7500 w. Jour Fr Inst—May, 1901.

Selected Chapters in Electro-Chemistry. Harry C. Jones. A series of papers on interesting and important matters in electro-chemistry, first studying some phenomena on which it is founded. This first chapter considers osmotic pressure. Serial. 1st part. 3300 w. Elec Rev, N Y—July 20, 1901.

Electrochemical and Electrometallurgical Industry. John B. C. Kershaw. This introductory article deals with progress in the United States. Serial. 1st part. 2800 w. Elec Rev, N Y—Oct. 12, 1901.

The Electrochemical Industries. A general review of the present condition of these industries.

Storage and primary batteries and electrotyping are not considered. 5000 w. Trans Am Inst of Elec Engrs—June and July, 1902.

The Development of Industrial Electrochemistry. Dr. E. F. Roeber. Aims to bring out some general principles which have manifested themselves during the development of the electrochemical industries. 4500 w. Elec Wld & Engr—March 5, 1904.

Electrochemical Industries. F. B. Crocker and M. Arendt. Considers electrolytic chemistry, electro-thermal chemistry and chemical action due to electrical discharges. 6000 w. Sch of Mines Qr—Nov., 1903.

Industrial Electrochemistry and Electrometallurgy. John B. C. Kershaw. The first section of a second series of notes dealing with recent progress in the industrial application of electrochemical and electrometallurgical processes. Serial. 1st part. 3700 w. Elec Rev, N Y—Dec. 5, 1903.

The Chemistry of Electro-Chemistry. Wilder D. Bancroft. Read before the Am. Elec.-Chem. Soc. A study of electrochemical phenomena with special reference to chemistry. 6000 w. Elec Rev, N Y—Oct. 7, 1905.

Acetylene.—See **ACETYLENE—Electro-Chemistry.**

Acker.—The Acker Process for the Electrolytic Production of Alkalies and Chlorine. John B. C. Kershaw. Illustrated description of the process which is in operation at Niagara Falls. 1500 w. Elect'n, Lond—Oct. 25, 1901.

The Acker Electrolytic Alkali Process. Clinton Paul Townsend. Reviews the work of prior investigators, and compares this process with the Castner-Kellner mercury cathode process. Ill. 2300 w. Elec Wld & Engr—April 5, 1902.

The Acker Process for Alkali and Bleaching Powder by the Electrolysis of Fused Common Salt. Report of the Committee on Science and the Arts of the Franklin Inst. Ill. 900 w. Jour Fr Inst—Sept., 1903.

Agriculture.—See **AGRICULTURE.**

Alkali.—The Electrical Separation of Metals of the Alkalies from Fused Alkaline Chlorides. Arthur Fischer. Giving details of apparatus used in practical work. 2500 w. Zeitschr f Elektrochemie—Dec. 6, 1900.

The Attainable Electrical Efficiency in the Electrolytic Production of Alkali, Hypochlorites and Chlorates (Ueber die bei der Elektrolytischen Darstellung von Alkali-Hypochloriten und Chloraten Erreichbaren Strom- und Energie- Ausbeuten). F. Foerster and Erich Müller. An account of experiments to determine the profitable utilisation of current and energy in electrolysis. 4500 w. Zeitschr f Elektrochemie—Jan. 2, 1902.

Progress in the Electrolytic Alkali and Bleach Industry. John B. C. Kershaw. Notes in regard to the position of the industry in the various countries. 1800 w. Elec Rev, N Y—May 27, 1905.

The Electrolytic Production of Caustic Alkalies (Verfahren zur Elektrolytischen Herstellung von Aetzalkali). H. A. Cohn and E. Geisenberger. Description of apparatus for decomposing alkaline chlorides and the production of caustic alkalies and chlorine. 1200 w. Electrochemische Zeitschr—Sept., 1901.

The Present Position of the Electrolytic Alkali Industry. . John B. C. Kershaw. The present article gives details of plants in the United Kingdom and in Germany. Ill. Serial. 1st part. 1200 w. Elect'n, Lond—Nov. 14, 1902.

See also Acker Process; Becker Process; Bell; Carbide; Caustic Soda; Hargreaves-Bird; Hypochlorite; Middlewich; Outhenin; Soda; Solnay; ELECTROLYSIS.

Aluminum.—See **ALUMINUM—Electrolytic; ALUMINUM ALLOYS; ELECTRODE.**

Aluminum Cell.—See **ELECTRIC-CURRENT RECTIFIER.**

Anhydrous Solutions.—See **Solutions.**

Antimony.—See **ANTIMONY—Electrolysis.**

Autoxidation.—Autoxidation and Its Connection with the Theory of Ions (Ueber die Autoxydation und ihren Zusammenhang mit der Theorie der Ionen). F. Haber. An examination of the theory of ions in connection with the electrochemical action of galvanic elements. 3000 w. Zeitschr f Electrochemie—Jan. 31, 1901.

Barium Chloride.—Electrochemical Reactions in Solid Electrolytes. Prof. F. Haber and H. Tolocsko. Report of investigations, especially of the electrolysis of solid barium chloride at about 400 deg. below its melting point. 2000 w. Elec-Chem & Met Ind—March, 1905.

Becker Process.—The Manufacture of Sodium by the Becker Process. C. F. Carrier, Jr. An illustrated critical review of this process as described by the inventor. 2000 w. Elec Chem Ind—Sept., 1904.

See also **Sodium.**

"Bell" Process.—The "Bell" Gravity Process for the Electrolytic Production of Alkalies and Chlorine. John B. C. Kershaw. A description of the "Bell" cell and estimates of costs. 1100 w. Elect'n, Lond—Feb. 7, 1902.

Berthelot.—Recent Electrical Researches by Berthelot. Translated from the French. The relation between the intensity of the voltaic current and the manifestation of the electrolytic output. 3600 w. Sci Am Sup—Dec. 26, 1903.

Bibliography.—See **Classification.**

Bleaching.—Electrolytic Production of Bleaching Liquor. W. H. Walker. Reviews the development of bleaching liquors, the apparatus used, and the systems that have had extensive trial. 3300 w. Electro-Chem Ind—Sept., 1903.

Bleaching at the Anode by Electro-Chemical Action. Woolsey McA. Johnson. An illustrated description of experimental work, giving the details of the process. 900 w. Elec Wld & Engr—May 11, 1901.

Bleaching by Electricity. George E. Walsh. Briefly reviews the methods, showing the advancement made. 1000 w. Elec Rev, N Y—June 15, 1901 .

Electrolysis in Bleaching Textiles. Detailed description of an invention for producing bleaching liquor out of ordinary brine, the product being sodium hypochlorite. Ill. 700 w. U S Cons Repts, No. 1004—April 6, 1901.

The Haas & Oettel System of Electrical Bleachine (Die Elektrischen Bleichapparate, System Haas & Oettel. Dr. Felix Oettel). Giving the details of the improved apparatus for the production of chlorine by the electrical decomposition of common salt, for bleaching purposes. 2500 w. Zeitschr f Elektrochemie—Nov. 22, 1900.

Electrical Bleaching (Elektrische Bleiche). A description of the Haas & Oettel process for the electrolytic production of bleaching solutions. 1800 w. Elektrochemische Zeitschr—Nov., 1903.

Two New Forms of Electrolytic Cell for Production of Bleaching Solutions. John B. C. Kershaw. An illustrated description of two new forms of apparatus for the production of hypochlorite solutions. 1700 w. Elec Rev, Lond—Dec. 25, 1903.

See also **Alkali.**

Calcium.—See **ELECTRO-METALLURGY.**

Calcium Carbide.—See **CALCIUM CARBIDE.**

Camp Address.—Recent Examples of Applied Chemistry. James M. Camp. Address of the retiring president of the Engrs.' Soc. of W. Penn. Deals largely with applications made possible by electrochemistry. 3500 w. Pro Engrs' Soc of W Penn—Feb., 1905.

Cantor Lectures.—Recent Advances in Electro-Chemistry. Bertram Blount. The Cantor lectures in London, giving a general review of copper refining and many other branches of electrochemistry. Diagrams. Serial. Part I. 7000 w. Jour Soc of Arts—Aug. 12, 1904.

Carbides.—Alkali Carbides (Ueber Alkalicarbide). Prof. Henri Moissan. A brief account of researches in the production of carbides of the alkali elements. 800 w. Elektrochem Zeitschr—June, 1903.

See also **CALCIUM CARBIDE; CARBIDES.**

Carbon.—See **CARBON.**

Carbon Bisulphide.—See **CARBON BISULPHIDE.**

Castner.—The Electrolysis of Fused Caustic Soda and Potash (Die Elektrolyse von Geschmolzenem Aetznatron und Aetzkali). MM. Leblanc & Brode. An examination of the operation of the Castner process, as conducted at Neuhasen, in the light of the authors' experiments. Serial. 3500 w. Zeitschr f Elektrochemie—Sept. 11, 1902.

The Castner Mercury Process for Producing

Chlorine and Alkali (Das Quecksilberverfahren von Castner zur Gewinnung von Chlor und Alkali). M. Le Blanc. Laboratory experiments of Dr. Carlo Cantoni, at the Karlsruhe Technische Hochschule, with illustrations and tables. 1500 w. Zeitschr f Elektrochemie—Sept. 8, 1905.

Catalytic Action.—Electrolysis and Catalysis. Prof. Dr. W. Ostwald. Shows what a very essential and important part the catalysers are able to play in electrolytic action. 3500 w. Int Elec Cong of St. Louis—Sept., 1904.

Some Examples of Catalytic Action in Electrolysis. C. J. Thatcher. Illustrates the use of catalytic agents in analyzing electrode processes; and the practical use to which such agents may be put in synthetic electrodes. 1800 w. Elec-Chem Ind—Nov., 1904.

Caustic Soda.—Electrolytic Manufacture of Caustic Soda and Hypochlorites. Discusses the difficulties and gives a brief account of a number of processes. 4000 w. Sci Am Sup—June 20, 1903.

See also **Diaphragm Process.**

Cerium.—The Electromotive Force of Cerium Oxide (Ueber das Elektromotorische Verhalten der Oxyde des Cers). E. Baur and A. Glaessner. An experimental investigation of the oxidation and reduction electric potentials of solutions of cerium salts. 2000 w. Zeitschr f Elektrochemie—June 25, 1903.

Chlorates.—The Electrolytic Manufacture of Chlorates. John B. C. Kershaw. A review of early processes and the early development of this industry. 2000 w. Ill. Elec Rev, N Y—Oct. 4, 1902.

The Electrolytic Production of Chlorates. John B. C. Kershaw. Describes the cell used by the National Electrolytic Co. of Niagara Falls. Ill. 1700 w. Elect'n, Lond—Dec. 13, 1901.

Chlorine.—Some Notes on the Uses of Electrolytic Chlorine. F. Winteler. Gives suggestions for the manufacture of products other than bleaching powder to utilise the excess of chlorine. 3300 w. Elec Chem Ind—Sept., 1904.

Classification.—Notes on a Classification of Electro-Chemistry. Clinton Paul Townsend. Gives an outline classification dealing with the technical applications of the subject, with notes. Serial. 1st part. 1500 w. Electro-Chem Ind—March, 1903.

A System of Classification for an Electro-Chemical Bibliography. Adolpt L. Volge. An explanation of a system on the decimal system for arranging a card index. 2400 w. Elec-Chem & Met Ind—March, 1905.

Cleveland, O.—Cleveland as a Center in Electro-chemical Development. Cecil L. Saunders. Reviews the industries in this field which had their beginnings in this city, and those that grew out of them. 2300 w. Elec Wld & Engr—Nov. 15, 1902.

Colloids.—Colloids. W. R. Whitney. A study of the electrical action of colloidal suspensions or solutions. 3000 w. Trans Am Inst of Elec Engrs—June and July, 1902.

Columbia University.—Laboratory Notes for Students in Practical Electrochemistry. S. A. Tucker. Gives an account of experimental work at Columbia University. 3000 w. Sch of Mines Qr—July, 1903.

Compressible Atoms.—The Relation of the Hypothesis of Compressible Atoms to Electrochemistry. Prof Theodore William Richards. Shows that this hypothesis, dealing as it does with very intimate relations of energy and material, is not without suggestiveness to the electrochemist and electrician. 3500 w. Int Elec Cong of St. Louis—Sept., 1904.

Conductivity.—Chemical Valency, Electrical Conductivity and Hardness of Metals. John G. A. Rhodin. A study of the conductivity of metals from an electro-chemical standpoint. 2500 w. Electro-Chem & Met—Sept., 1903.

See also **ELECTRIC CONDUCTIVITY.**

Convention, Bonn.—The Bonn Meeting of the German Society of Electro-Chemists. Gives abstracts of the most interesting papers. 2500 w. Engr, Lond—June 10, 1904.

The Bonn Meeting of the German Society of Electro-Chemists. John B. C. Kershaw. Brief review of the papers and discussions which attracted attention. 2500 w. Elec Rev, Lond—June 24, 1904.

Convention, Niagara.—Convention of the American Electro-Chemical Society. A report of the meeting at Niagara Falls, with abstracts of papers presented. 7700 w. Eng News—Sept. 25, 1902.

Copper-Arsenic.—Note on the Relation Between Arsenic and Electro-Motive Force in Copper-Electrolysis. L. Webster Wickes. Summary of experimental investigations. 1200 w. Trans Am Inst of Min Engrs—Feb., 1904.

Copper Refining.—See **COPPER METALLURGY—Electrolytic; ELECTRIC CONDUCTIVITY—Copper Electrolyte.**

Copper, Sulphide.—Investigations upon the Electrolytic Properties of Copper Sulphide (Versuche ueber das Elektrolytische Verhalten von Schwefelkupfer). G. Bödlander and K. S. Idaszewski. Data and results of exhaustive experiments bearing upon the electrolytic separation of copper direct from the sulphide. 7500 w. Zeitschr f Elektro-Chemie—March 24, 1905.

Corbin Chlorates.—The Corbin Process and Cell for the Electrolytic Production of Chlorates. John B. C. Kershaw. Illustrated description of the process as operated at Cheddie, in Savoy. 1000 w. Elec Rev, Lond—Jan. 17, 1902.

Current Generation.—The Theory of the Generation of Currents (Theorie der Stromerzeugung). A review of recent electrochemical investigations, taken from various sources. 1400 w. Zeitschr f Elektrochemie—Dec. 19, 1901.

Cyanide Solutions.—The Electromotive Force of Metals in Cyanide Solutions. S. B. Christy, Gives an outline of the development of the modern electro-chemical theory, an account of experimental work on the subject given, and the methods used in this investigation. 23,300 w. Trans Am Inst of Min Engs—Sept., 1899. (Published in Vol. 30, page 864.)
See also **CYANIDE; CYANIDE PROCESS.**

Diamond.—See **DIAMOND—Electric Furnace.**

Diaphragm.—A New Form of Diaphragm Cell for the Electrolytic Production of Alkalies and Chlorine. John B. C. Kershaw. Reviews briefly the types of diaphragm cells in actual use, and describes the cell patented by Moore, Allen, Ridlon and Quincy. 1500 w. Elect'n, Lond—Nov. 15, 1901.

Concerning Diaphragms (Ueber Diaphragmen). Dr. M. Le Blanc. A paper before the German Electro-chemical Society discussing the action of various kinds of diaphragms used in connection with electrolytic work. 3500 w. Zeitschr f Electrochemie—May 30, 1901.

Metal Diaphragms (Ueber Metalldiaphragmen). André Brochet. Communication from the Electro-Chemical Laboratory of the Ecole de Physique et de Chimmie Industrielles de Paris, giving an account of experiments with metal partitions in electrolytic cells, and of their practical applications. 2000 w. Zeitschr f Elektrochemie—May 28, 1903.

A New Form of Diaphragm for Electrolytic Cells. F. Mollwo Perkin. Description, with illustration, of a diaphragm consisting of two cylinders of glazed ware, with five perforations, and asbestos, or other substance, filling the space between them. 700 w. Elec-Chem & Met—July, 1904.

Diaphragm Process.—Caustic Soda by the Diaphragm Process. Clinton Paul Townsend. Illustrated description of the electrolytic method. 800 w. Elec Wld & Engr—July 5, 1902.

Discoveries.—See **Niagara.**

Disinfectant.—See **ELECTROLYSIS—Hypochlorites.**

Dissociation.—The Present Position of the Theory of Electrolysis. Principally a discussion of the dissociation theory. 3300 w. Engng—Nov. 13, 1903.

The Development of the Theory of Electrolytic Dissociation. Prof. Svante Arrhenius. Address before the Royal Institution of Great Britain, with diagrams. 4000 w. Pop Sci Monthly—Sept., 1904.

The Theory of Electrolytic Dissociation (La Théorie de la Dissociation Electrolytique). Max Roloff. A review of recent studies in electrolytic dissociation, based upon the theory of ions. Serial. Part I. 3000 w. L'Electrochimie.—Jan., 1905.

The Theory of Electrolytic Dissociation (Versuch einer Theorie der Elektrolytischen Dissociation). R. Malmström. A mathematical examination of the theory of Jahn and Nernst upon the weakening of a strong electrolyte by dissociation, taking into account the electrical energy of the ions. 5000 w. Zeitschrift f Elektrochemie—Nov. 17, 1905.

See also ELECTRO-THERAPEUTICS.

Düsseldorf Exposition.—The Industrial Applications of Electro-Chemistry at the Düsseldorf Exposition (Elektrochemie und Verwandte Gebiete auf der Ausstellung in Düsseldorf). H. Danneel. The first instalment of a complete review of the electro-chemical exhibits at Düsseldorf. Serial. Part I. 4000 w. Zeitschr f Elektrochemie—Sept. 25, 1902.

Electrodes.—See ELECTRODE.

Electromotive Force.—Researches on Electromotive Forces (Recherches sur les Forces Electromotrices). M. Berthelot. A theoretical discussion of chemical action and electromotive force, and comparison of calculated and experimental results with various combinations of materials. 4000 w. Comptes Rendus—April 14, 1902.

See also Cyanide Solutions.

Energon Theory.—The Energon Theory of Electrolysis (Elektrolyse nach der Energon Hypothese). A. Reuterdahl. With diagrams explaining the dynamic theory of electrolytic disassociation. 2500 w. Elektrochemische Zeitschr—Sept., 1904.

Engelhardt Address.—Electro-Chemistry (Ueber Elektrochemie). Viktor Engelhardt. An address, giving a general review. 2000 w. Zeitschr d Oesterr Ing u Arch Ver (Supplement)—March 20, 1903.

Engineering.—See Haber Address.

Equivalents.—Table of Electrochemical Equivalents and Their Derivations. Carl Hering. Probably the fullest table ever published. A complete re-calculation based upon the most recent and best fundamental values. Applications of the table are illustrated by a series of typical examples. 6800 w. Electro-Chem Ind—Jan., 1903.

Experimental.—Experimental Electrochemistry. N. Monroe Hopkins. This introduction to a series of papers gives a review of the historical work, with important classic researches and discoveries, and simple diagrams of the use of the electric current to electrolysis. Ills. Serial. 1st part. 4400 w. Sci Am Sup—Dec. 3, 1904.

Faraday's Law.—See ELECTRO-PHYSICS—Electron.

Fluorine.—See FLUORINE.

Formulae.—On the Fundamental Formulae of Chemical and Electrical Energy. Prof. F. Haber. Notes these different stages in the development of knowledge of the relation between heat of reaction and energy of reaction, discussing each and especially considering the simplification possible. 1500 w. Elec-Chem & Met Ind—Aug., 1905.

Galvanizing.—See ELECTRO-GALVANIZING.

Garuti Process.—The Garuti Process of Generating Oxygen and Hydrogen. Emile Guarini. An illustrated description of the apparatus of Dr. Pompes Garuti for the electrolytic production of oxygen and hydrogen. 1200 w. Sci Am Sup—June 27, 1903.

Gold Analysis.—See GOLD ASSAYING—Electrolytic.

Haber Address.—The Role of Electrochemistry in Modern Technology (Die Rolle der Elektrochemie in der Modernen Technik). Dr. Haber. An address showing the relation between electrochemistry and engineering work. 4500 w. Zeitschr d Ver Deutscher Ing—March 18, 1905.

See also Formulae; United States.

Hargreaves-Bird.—Hargreaves-Bird Process for the Electrolytic Production of Soda and Bleach. Edward Walker. Illustrated detailed description of the works and plant, with account of the principles of the process. 1500 w. Eng & Min Jour—April 5, 1902.

See also Middlewich.

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History.—The Beginning of Electrolytic Chemistry. Discusses the early work in this field. 800 w. Elec-Chem & Met—Aug., 1901.

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Hydro-Electric Power.—See HYDRO-ELECTRIC PLANT—Electro-Chemical Works.

Hydrogen and Oxygen.—Production of Hydrogen and Oxygen for Industrial Purposes by Electrolysis. Illustrated description of the process and apparatus used. 1300 w. Engr, Lond—April 26, 1901.

See also Garuti Process; ELECTROLYSIS—Schuckert.

Hypochlorite.—The Manufacture of Hypochlorite of Soda. Edward Walker. Describes a cell designed by G. J. Atkins of London for electrolyzing solutions of common salt, manufacturing hypochlorite of soda, which is used for bleaching. 600 w. Eng & Min Jour—Nov. 22, 1902.

Some Observations Respecting the Relation of Stability to Electro-Chemical Efficiency in Hypochlorite Production. W. Pollard Digby, before the Faraday Soc. Reports results of tests which show that no test of the efficiency of any apparatus for the electrolytic productions of the hypochlorites can be regarded as complete without an estimation of losses through instability, and a mention of the volume of the contents of the electrolyzing tank. 1800 w. Elec Engr, Lond—Nov. 24, 1905.

The Production of a Disinfectant (Hypchlorite of Sodium) by Electrolysis. C. V. Biggs. Discusses the possibility of rendering the process a commercially successful one. 800 w. Elec Engr, Lond—Dec. 22, 1905.

Ion Theory.—The Ion Theory. F. G. Wiechmann. A brief account of this theory, upon which electrochemistry is largely based. 6000 w. Sch of Mines Qr—April, 1902.

Ionization.—See ELECTRO-PHYSICS.

Iron.—See ELECTRO-METALLURGY; IRON—Electro-Chemistry.

Iron Rusting.—See IRON—Rusting.

Jackson Address.—Electro-Chemical Industries. A. H. Jackson. Abstract of a lecture delivered before the Victorian Society of Chemical Industry. Serial. 1st part. 1900 w. Aust Min Stand—May 2, 1901.

Laboratory.—See also Columbia University; LABORATORY.

Laboratory, Mass. Tech.—The Electro-Chemical Laboratory of the Massachusetts Institute of Technology. Prof. H. M. Goodwin. Illustrated description of the essential features of the equipment and arrangements. 2200 w. Elec-Chem Ind—July, 1904.

Laboratory, Niagara.—The Ampere Electro-Chemical Company. An account of an experimental company, with a laboratory at Niagara Falls, whose object is to originate and develop new electro-chemical processes to the point of commercial application. 900 w. Ir Age—Dec. 18, 1902.

Laboratory, Owens College.—The Electrochemical Laboratory at Owens College. R. S. Hutton. Illustrates and describes the new Physical Laboratories of the Owens College, Manchester, Eng., which are equipped for electrochemical and especial electrometallurgical work. 1800 w. Elec Chem & Met—May, 1901.

Laboratory, U. of P.—An Electro-Chemical Laboratory at the University of Pennsylvania. Prof. Edgar F. Smith. An illustrated description of a laboratory and installation sufficient to accommodate eighteen students. 2200 w. Electro-Chem & Met—May, 1902.

Lead and Galena.—See LEAD METALLURGY—Electrolytic.

Lithography.—See LITHOGRAPHY.

McDonald Cell.—The McDonald Electrolytic Cell as a Chlorine Producer. Titus Ulke. An illustrated description of this cell based upon the plant in operation at the Clarion paper mill, at Johnsonburg, Pa., stating its advantages. 1200 w. Eng & Min Jour—June 6, 1903.

Mercury Process.—The Mercury Processes for the Production of Caustic Alkalies and Chlorine. John B. C. Kershaw. Gives details concerning the present position of the non-diaphragm mercury processes. Ill. 1300 w. Elec, N Y—June 5, 1901.

Metal.—See ELECTRIC CONDUCTIVITY—Electro-Chemistry; ELECTRO-METALLURGY.

Metallic Arc.—See ARC LIGHT—Metallic.

Metal Series.—The Electrochemical Series of the Metals. Prof. Louis Kohlenberg. A detailed study of the differences of potential between metals and solutions, showing that it may very greatly with a change in the solute as well as with a change in the solvent. 2500 w. Int Elec Cong of St Louis—Sept., 1904.

Middlewich Works.—Electrolytic Production of Alkali. An illustrated description of the Middlewich Works and the processes, with an account of the investigations of Dr. Sproesser, concerning the suitability of various carbons as anodes for the electrolysis of sodium chloride. 2800 w. Engng—March 14, 1902.

The Electrolytic Alkali Company's Works. Illustrated description of the works at Middlewich, where the Hargreaves-Bird process is used. 2700 w. Elec Engr, Lond—March 14, 1902.

Molecules in Solution.—Molecules in Solution. Editorial review of paper by G. T. Beilby before the British Assn. Consides some aspects of extreme dilution, and the explanation of the physical properties of liquids. Discusses the case of gold contained in sea water. 2500 w. Engng—Sept. 29, 1905.

Neuhausen.—See Castner.

Niagara.—The Electrochemical Industries of Niagara Falls. A review of the address of Francis A. J. FitzGerald at the Buffalo meeting of the Am. Chem. Soc. Discusses the electro-chemical products made at Niagara Falls. 3300 w. Elec-Chem & Met Ind—July, 1905.

The Electro-Chemical Industries at Niagara Falls. Abstract of a lecture by Prof. Joseph W. Richards before the N. Y. Elec. Soc. describing the manufacture of aluminum, the Acheson carborundum and graphite, the Castner sodium process and caustic soda process, the manufacture of carbide, and the Salom lead reduction process. 2800 w. Ir Age—April 3, 1902.

Electrochemical Discoveries. Reviews the industries that have grown up around Niagara, and the experimental companies formed for the purpose of discovering new processes. 1500 w. Sci Am—Aug. 1, 1903.

See also Chlorates; Laboratory.

Niagara, Raw Materials.—The Sources of Raw Materials for Niagara's Electrochemical Industries. Morris M. Green. Discusses in detail the most convenient sources and the approximate cost of the salt, coke, pure glass sand, anthracite coal, and lime used. 800 w. Elec-Chem & Met Ind—Aug., 1904.

1900.—The Electro-Chemical and Electro-Metallurgical Industries in 1900. John B. C. Kershaw. Gives details of the various industries and processes in various countries. Serial. 1st part. 5600 w. Elect'n, Lond—Jan. 4, 1901.

1901.—The Electro-Chemical and Electro-Metallurgical Industries in 1901. John B. C. Kershaw. The present article reviews the condition of alkalies and bleach, aluminum, calcium carbide, and the chlorate industry. Serial. 1st part. 4000 w. Elect'n, Lond—Jan. 3, 1902.

Electro-Chemistry in 1901 (Die Elektrochemie im Jahre 1901). Dr. M. Krüger. A general review. The present number is devoted to theoretical investigations and publications. Serial. Elektrochemische Zeitschr—Jan., 1902.

1902.—Electrochemistry in the Year 1902 (Die Elektrochemie in Jahre 1902). Dr. M. Krüger. The annual review of the progress of applied electrochemistry in Europe and America. Serial. Part I. 2500 w. Elektrochem Zeitschr—Jan., 1903.

The Progress of Electro-Chemistry in 1902. George P. Scholl. A general review. 2500 w. Elec Wld & Engr—Jan. 3, 1903.

1903.—Electrochemistry in 1903 (Die Elektrochemie im Jahre 1903). Dr. M. Krüger. A general review. Serial. 1st part. 4000 w. Elektrochem Zeitschr—Jan., 1904.

The Present Status of the Electro-Chemical Industries. Joseph W. Richards. Reviews briefly the various industries showing promising progress in most of them. 2500 w. Elec-Chem Ind—Jan., 1904.

Progress in Electro-Chemistry and Electro-Metallurgy in 1903. John B. C. Kershaw. A résumé of the progress giving details of processes and manufactures. Serial. 1st part. 1800 w. Elec Rev, Lond—Feb. 5, 1904.

1904.—Progress in the Electrochemical and Electro-metallurgical Industries in 1904. John B. C. Kershaw. Gives some details of new processes and reviews the position of the older industries during the year. 2000 w. Elec Rev, N Y—Jan. 14, 1905.

Progress in Electro-Chemistry and Electro-Metallurgy in 1904. John B. C. Kershaw. A review in detail. Serial. 1st part. 1800 w. Elec Rev, Lond—Jan. 20, 1905.

Nitric Acid.—The Production of Nitric Acid by Means of Electric Discharges (Sur la Production de l'Acide Nitrique par Décharges Electriques). J. de Kowalski. A description of a process for extracting nitrogen, which then forms nitric acid, from the atmosphere by means of electric discharges, a discussion of the theory, and a review of other similar processes. 2500 w. Bull Soc Internat d Electriciens—June, 1903.

The Electrical Production of Nitric Acid—A Review. H. R. Carveth and C. L. Rand. A review of methods of investigators and of work up to the present time. 4000 w. Sib Jour of Engng—May, 1905.

Nitrogen Fixation.—See NITROGEN.

Organic Base.—The Behavior of Cerium, Lanthanum, Neodymium, Praseodymium, Thorium, and Zirconium Toward Organic Bases. Burt Laws Hartwell. A report of investigations made, in the hope of finding an organic base that would lead to quantitative separations. 2500 w. Am Gas Lgt Jour—Nov. 23, 1903.

Oscillations.—Electrochemical Oscillations. Woolsey McA. Johnson. An account of some interesting observations on what may be termed electrolytic memory. 800 w. Elec Wld & Engr—Dec. 13, 1902.

Outhenin-Chalandre.—The Outhenin-Chalandre Electrolytic Alkali Process. John B. C. Kershaw. Illustrated description of a process for the production of alkalies and chlorine compounds by the electrolysis of solutions of sodium or potassium chloride. 1000 w. Elect'n, Lond—March 29, 1901.

Pan-American.—Electro-Chemistry at the Pan-American Exposition (Die Elektrochemie auf der Panamerikanischen Ausstellung in Buffalo). Dr. Konrad Norden. A general account of the electro-chemical products at the Exposition, particularly those manufactured at Niagara Falls. 1800 w. Zeitschr f Elektrochemie—Dec. 12, 1901.

Paris Exposition.—Electro-Chemistry at the Paris Exhibition. H. Borns. Commences a review of this department and the exhibits. Serial. 1st part. 2800 w. Engng—Nov. 9, 1900.

Persulphuric Acids.—Persulphuric Acids. Prof. H. E. Armstrong and T. Martin Lowry. Read before the Royal Soc. Reviews various experiments, reporting results. 1700 w. Elect'n, Lond—July 11, 1902.

Phonograph.—See PHONOGRAPH.

Polarization.—Electrochemical Polarization. C. J. Reed. Concludes that polarization is a progressive change in the composition and electromotive force of an electrochemical system necessitated by the progressive exhaustion of one or more of the electro-chemical reagents. 3500 w. Jour Fr Inst—April, 1902.

Progress.—Conditions of Progress in Electro-chemistry. Joseph W. Richards. Classifies the progress made under six headings, discussing them seriatim. 5500 w. Am Elec-Chem Soc—April 18, 1903.

Recent Progress in Electro-Chemistry (Neuere Fortschritte der Elektrochemie). Prof. Alfred Coehn. An address before the "Elektrotechnischer

Verein" on electro-chemistry and its practical applications, particularly in the preparation of organic products. 3000 w. Elektrotech Zeitschr—March 26, 1903.

Rhodin Process.—See Sault Ste. Marie.

Sault Ste. Marie.—Electrochemistry at Sault Saine Marie. Joseph W. Richards. Describes the general situation, its facilities for manufacturing and its possibilities in the electro-chemical line. Also gives a description of the Rhodin process of manufacturing caustic alkali and bleaching powder, which is installed here. Ill. 3000 w. Elec-Chem Ind—Nov., 1902.

See also **ELECTRIC INDUSTRY; HYDRO-ELECTRIC PLANT; SAULT STE. MARIE; WATER POWER.**

Soda.—The Electrolytic Manufacture of Soda (Etude sur la Fabrication de la Soude Electrolytique). A description of the Heibling process, as conducted at Caudéran, near Bordeaux. 2000 w. L'Electrochimie—Nov., 1904.

Soda-Potash.—See **ELECTROLYSIS.**

Sodium.—The Sodium Industry in France. P. Letheule. An explanation of the electrolytic and electrochemic processes of H. Becker. 2000 w. Elec-Chem Ind—Dec., 1903.
See also Becker Process.

Sodium Chloride.—Sodium Chloride in Electrolytic Caustic Alkali. Clinton Paul Townsend. A paper considering the movement of undecomposed sodium chloride into the caustic compartment of an electrolytic cell, with curves. 1800 w. Elec-Chem Ind—Dec., 1902.

Solutions.—Anhydrous Solutions (Nichtwässerige Lösungen). A review of recent research in this department of electro-chemistry. 2000 w. Zeitschr f Elektrochemie—Dec. 12, 1901.

Solvay Cell.—The Solvay Electrolytic Alkali Cell. John B. C. Kershaw. Illustrated description of the principles and design of this new form of cell. 600 w. Elect'n, Lond—March 15, 1901.

Solvay-Kellner. — The Electrolytic Production of Chlorine and Alkalis by the Solvay-Kellner Process (Ueber Elektrolytische Gewinnung von Chlor und Alkali nach dem Solvay-Kellnerschen Quecksilber-Prozess). F. Glaser. A cathode of quicksilver and an anode of platin-iridium are used. 2500 w. Zeitschr f Elektrochemie—Aug. 7, 1902.

Storage Battery.—See **STORAGE BATTERY—Electro-Chemistry.**

Swan Address.—Electro-Chemical Industry. J. W. Swan. Abstract of the presidential address delivered before the Soc. of Chem. Ind., at Glasgow, with editorial. 8200 w. Elect'n, Lond—July 26, 1901.

Theory.—The Propagation of Electrical Energy (Ueber die Fortpflanzung der Elektrischen Kraft). Dr. Gustav Platner. An examination of the various theories from the electrolytic point of view; discussing the relation between electrical and chemical energy. 5000 w. Electrochemische Zeitschr—Feb., 1901.

The Present Position of the Theory of Electrolysis. W. C. Dampier-Whetham. Read before the Faraday Society. Reviews the early investigations made which establish the convective view of electrolysis, gives arguments supporting the dissociation theory, and an experimental study of the phenomena of electrolysis and the osmotic properties of electrolysis. 7500 w. Elektrochem & Met—July 1, 1903.

The Present Position of the Theory of Electrolysis. W. C. Dampier-Whetham. Read before the Faraday Society. Reviews the investigations made to explain the phenomena of electrolysis, and the results thus far established. 7000 w. Elect'n, Lond—Oct. 9, 1903.

Tin.—Spongy Tin and Tin Crystals in Electrolysis (Zinnschwamm und Zinnkrystall durch Elektrolyse). Dr. W. Pfanhauser. An account of investigations to determine the conditions under which tin is deposited in spongy form and in crystals. Diagrams. 1200 w. Zeitschr f Elektrochemie—Jan. 16, 1902.

See also **ELECTRO-METALLURGY; TIN METALLURGY.**

United States.—Technical Instruction and Electro-Chemistry in the United States (Ueber Hochschulunterricht und Elektrochemische Technik in den Vereinigten Staaten). F. Haber. An address before the Bunsen Society, giving the results of the author's observations during his visit to the United States in 1902. The technical instruction in chemistry is discussed, and there is a review of the electrochemical industry. Tables, maps and illustrations. Serial. 3 parts. 33000 w. Zeitschr f Elektrochemie—April 16, 30, May 7, 1903.

Prof. F. Haber on Electrochemistry in the United States. Abstracts of lectures delivered in Germany after a visit to America. 2500 w. Elec-Chem Ind—June, 1903.

Voltage or Potential.—See also **ELECTRODE.**

Walther.—Modern Discoveries in Chemistry. Dr. J. Ohly. Some notes on recent achievements in electro-chemistry made by Julius Walther, a young Russian. 2200 w. Min Rept—Jan. 28, 1904.

Water Purification.—See **WATER PURIFICATION—Electric Sterilizer.**

Wire Manufacture.—The Electrolytic Manufacture of Very Fine Wires (Fabrication Electrolytique de Fils Métalliques très Fins). Henri Abraham. The wire forms a positive electrode and is slowly dissolved in the electrolyte; the increase in its resistance measures its fineness. 1000 w. Comptes Rendus—May 29, 1905.

ELECTRODE.

See also **ELECTRIC CELL; ELECTRO-CHEMISTRY; ELECTROLYSIS; ELECTRO-METALLURGY; STORAGE BATTERY.**

Aluminum Anodes.—Dimensions of the Films on Aluminum Anodes. William Roy Mott. Investigation of the thickness of the film. 3000 w. Elec-Chem Ind—July, 1904.

The Electrical Properties of the Films that Form on Aluminum Anodes. William Roy Mott. Considers these insulating films as regards their specific resistance, insulating strength, and specific inductive capacity. 4000 w. Elec-Chem Ind—Sept., 1904.

Colloidal Precipitation Upon Aluminum Anodes. William Roy Mott. An explanation of phenomena in the anode film, based on extended experimental investigations. 3000 w. Elec-Chem Ind—Nov., 1904.

Resistance and Polarization of Aluminum Anodes (Uebergangswiderstand und Polarisation an der Aluminum-anode). Franz Fischer. A discussion of the conditions for the successful electro-deposition of aluminum. 4500 w. Zeitschr f Elektrochemie—Nov. 11, 1904.

See also **ELECTRIC CURRENT RECTIFIER.**

Anode, Wasting Away.—The Wasting Away of the Anode (Das Zerfallen der Anode). Dr. Emil Wohlwill. A discussion of the phenomena taking place at the anode in electro-chemical and electrometallurgical processes, and particularly the abnormal wasting away of the anode in the form of small particles or dust. 12000 w. Zeitschr f Elektrochemie—April 23, 1903.

Bipolar.—Bipolar Electrodes (sur les Electrodes Bipolaires). MM. Brochet & Barillet. A discussion of the effect of a metallic mass placed in an electrolyte and not connected with either electrode. 1500 w. Comptes Rendus—Nov. 17, 1902.

Bipolar Electrodes and Metal Diaphragms (Ueber Zweipolige Elektroden und Metalldiaphragmen). H. Danneel. An account of experiments, at the Institut für Metallhüttenwesen und Elektrometallurgie, in Aachen, with bipolar electrodes, or metal partitions in electrolytic cells which act as both anode and cathode; also discussion of experiments of Messrs. Brochet and Barillet. 2500 w. Zeitschr f Elektrochemie—March 26, 1903.

Bipolar Electrodes (Ueber Bipolare Elektroden). André Brochet and C. L. Barillet. An account of experiments in the Laboratorie d'Electrochimie, Ecole de Physique et de Chimie Industrielles de Paris, with bipolar electrodes, or metal partitions in electrolytic cells which act as both anodes and cathodes. 2600 w. Zeitschr f Elektrochemie—March 26, 1903.

Catalytic Action.—See **ELECTRO-CHEMISTRY.**

Current Distribution.—The Distribution of Current on the Surface of Electrodes. (Ueber die Bestimmung der Stromvertheilung auf Elektrodenflachen). Dr. K. Norden. A paper before the German Electrochemical Society, showing the method of determining the value of electrode surface. 3000 w. Zeitschr f Elektrochemie—Nov. 22, 1900.

See also **VACUUM TUBE.**

Graphite Artificial.—Artificial Graphite and Platino-Iridium as Materials for Anodes (Ueber Künstlichen Graphit und über Platiniridium also Anodenmaterialien). F. Foerster. Data and results of experiments to determine the durability of anodes of artificial graphite under various conditions. 2500 w. Zeitschr f Elektrochemie—March 6, 1902.

Electrodes of Artificial Graphite (Ueber Elektroden aus Künstlichen Graphit). Dr. Alfred Gradenwitz. A comparison of natural and artificial graphites as electrodes in commercial electrolytic operations. 1500 w. Elektrotechnische Zeitschr—May, 1904.

Lead.—The Anode Potential During the Formation of Lead Carbonate and Lead Chromate (Ueber Anodenpotentiale bei Bildung von Bleikarbonat und Bleichromat). G. Just. Electrolytic experiments with lead electrodes. Tables. 1000 w. Zeitschr f Elektrochemie—July 2, 1903.

Platinum Anodes.—Electrolysis at Smooth and Platinized Platinum Anodes. Prof. F. Foerster. Explains the difference in the behavior of smooth and platinized anodes at which no oxygen is evolved. 6500 w. Electro-Chem Ind—Sept., 1903.

Potential Measurement.—See **ELECTRIC MEASUREMENT—Electrode-Potential.**

Rotary.—The Electrodeposition of Metals on Rotating Cathodes. Abstract of paper by J. G. Zimmerman, read before the Am. Elec. Chem. Soc. Showing that in electroplating smooth deposits can be obtained with comparatively high current densities, if the cathode is revolved. 900 w. Elec-Chem Ind—May, 1903.

Electrodeposition on Rotating Cathodes. J. G. Zimmerman. Gives data and observations obtained from an investigation of such means recently carried on at the Univ. of Wisconsin. 2000 w. Wis Engr—June, 1903.

Recent Electro-Analytic Methods (Neue Elektronalytische Behelfe). Dr. Heinrich Paweck. Describing especially the action of rotary electrodes and their uses in electrolytic work. 2000 w. Elektrochemische Zeitschr—Feb., 1904.

Spectra.—Electrode Glowing and a New Spectroscopic Method (Ueber Elektrodisches Leuchten und eine Neue Spektroskopische Methode). Dr. Werner von Bolton. An examination of the light effects produced in connection with the electrolysis of aqueous solutions. 3000 w. Zeitschr f Elektrochemie—Nov. 19, 1903.

Standard.—Standard Electrodes. Woolsey McA. Johnson. Discusses the various standard electrodes from several points of view. 2500 w. Electro Chem Ind—Nov., 1903.

Temperature.—The Relation Between Electrolytic Action and the Temperature of Electrodes (Uber Beziehungen Zwischen Electrolytischen Vorgängen und der Elektrodentemperatur). Wilhelm Moldenhauer. An exhaustive review of experiments upon a great variety of solutions at different temperatures. 10,000 w. Zeitschr f Elektrochemie—May 26, 1905.

Terminology.—Terminology of Primary and Storage Battery Electrodes. A. L. Marsh. Calls attention to the confusion existing on the subject of the polarity of voltaic battery electrodes, and the need of revising the terminology. 2800 w. Elec Wld & Engr—Nov. 15, 1902.

Electrode Terminology. Albert M. Lewers. On the desirability of selecting some accurate system of designating the electrodes of secondary batteries and ending the confusion arising from the use of "positive" and "negative." 1800 w. Elec Wld & Engr—July 12, 1902.

See also **ELECTRIC TERMINOLOGY.**

Voltage or Potential.—Electrode Voltage or Electrode Potential. Woolsey McA. Johnson. An explanation of this term is given. 1800 w. Electro-Chem Ind—July, 1903.

ELECTRO-DYNAMOMETER. See **ELECTRIC INSTRUMENT—Electro-Dynamometer.**

ELECTRO-ENGRAVING.

Rieder Electrogravure.—An Electro Mechanico-Chemical system of Die Sinking and Engraving. Describes the Rieder process for automatically cutting away steel surfaces in irregular and delicate shapes. Ill. 1400 w. Am Mach—Nov. 7, 1901.

The Rieder Electro-Engraving Apparatus. Illustrated description of a machine exhibited at Paris, explaining the principle of its operation. 700 w. Sci Am—Nov. 3, 1900.

ELECTRO-GALVANIZING.

See also **GALVANIZING.**

Commercial Electro-Galvanizing. H. H. Thayer, Jr. Describes some of the processes developed by the U. S. Electro-Galvanizing Co. Ill. 1500 w. Sib Jour of Engng—Nov., 1900.

Some Notes on Electro-Galvanizing. Sherard Cowper-Coles. Illustrates and describes a recently erected plant for this work, and suggests the means of securing successful work. 700 w. Elec Rev, Lond—May 23, 1902.

Electro-Galvanizing. C. F. Burgess and Carl Hambuichen. Discusses the electrolytic deposition of zinc as a protective coating on structural iron, its characteristics, cost, process, etc. 7200 w. Elec Wld & Engr—Sept. 13, 1902.

The Galvanic Deposition of Zinc upon Iron (Galvanische Zinkniederschläge auf Eisen). O. Gabran. Giving data and results with various solutions at different current densities. 1800 w. Electrotech Zeitschr—Nov. 12, 1903.

ELECTROGRAPH.

See **TELECTROSCOPE; TELEGRAPH.**

ELECTROLYSIS.

See also **ELECTRO-CHEMISTRY; ELECTRODE; ELECTROLYTE; ELECTRO - METALLURGY; STRAY CURRENTS.**

General Characteristics of Electrolysis. Harry S. Coyle. Discusses mainly its usefulness in the sciences and arts and its laws. 2200 w. Telephony—Dec., 1902.

Alkali Earths.—The Electrolysis of Sulphides of the Alkali Earths (Ueber die Elektrolyse der Erdalkalisulfide). André Brochet and Georges Ranson. An account of experimental researches, principally with barium sulphide. 1500 w. Zeitschr f Elektrochemie—June 25, 1903.

Alternating-Current.—Notes on Electrolysis with Alternating Currents (Beiträge zu Unseren Kenntnissen über die Elektrolyse mit Wechselströmen). A. Brochet and A. Petit. A long paper upon the methods by which alternating currents may be used for electrolytic purposes. 6000 w. Zeitschr f Elektrochemie—Dec. 2, 1904.

Alternate Current Electrolysis. Prof. Ernest Wilson. Read before the Faraday Society. An account of experiments made to determine what may be the effect upon certain metals of passing alternating currents between them and certain electrolytes under given conditions. 2800 w. Elec Engr, Lond—Sept. 15, 1905.

Alternate-Current Electrolysis. Ernest Wilson. Abstract of paper before the Faraday Society, giving account of experiments with various metals and electrolytes, with table and curves. 2000 w. Elec'n, Lond—Sept. 8, 1905.

Electrolysis with Alternating Currents (Elektrolyse mit Wechselstrom). Dr. Max Le Blanc. Discussing especially the action of alternating currents upon complex solutions. 2000 w. Zeitschr f Elektrochemie—Oct. 27, 1905.

Alternating-Current Electrolysis? S. M. Kintner. Illustrated description of a test made under as nearly service conditions as possible, showing the action to be very slight. 1000 w. Elec Jour—Nov., 1905.

Alternate-Current Electrolysis as Shown by Oscillograph Records. W. R. Cooper. Read before the Faraday Soc. Reviews briefly recent views on this subject, and gives a report of experimental investigations, giving records obtained by a double oscillograph. 1800 w. Elec Engr, Lond—Nov. 3, 1905.

Antimony.—See **ANTIMONY—Electrolytic Production.**

Arsenic.—See **ARSENIC.**

Bipolar Electrodes.—See **ELECTRODE.**

Condenser Tubes.—See **CONDENSER.**

Copper.—See **COPPER ASSAY—Electrolytic; COPPER METALLURGY.**

Fused Salts.—The Electrolysis of Fused Salts. C. C. Garrard. Reviews an article by Prof. Lorenz, giving a sketch of the present position of the investigations at Zürich. 1700 w. Elec Chem & Met—Sept., 1901.

The Electrolysis of Fused Salts. Richard Lorenz. Discusses questions raised in an article by C. C. Gerrard, reviewing work of Mr. Lorenz. 1800 w. Elec Chem & Met—Dec., 1901.

The Electrolysis of Fused Salts (Demonstration zur Elektrolyse Geschmolzener Salze). Dr. R. Lorenz. A paper read before the German Electrochemical Society, giving data of practical importance in electro-chemistry, with discussion. 4000 w. Zeitschr f Elektrochemie—Nov. 15, 1900.

Gas Pipes.—See **STRAY CURRENTS.**

Hypochlorites.—See **ELECTRO-CHEMISTRY.**

Jahn Theory.—See **ELECTRO-CHEMISTRY—Dissociation.**

Laboratory.—See **LABORATORY—Electro - Analytical.**

Metal Corrosion.—See **METAL CORROSION; STRAY CURRENTS.**

Metals.—Estimation of Metals by Electrolysis. Charles Nathan. Remarks on the history of electrolysis as applied to analysis, with description of apparatus and general conditions. Serial. 1st part. 2000 w. Elec Chem & Met—Feb., 1901.

See also **ELECTRO-METALLURGY.**

Moving Electrolyte.—The Theory of the Separation of Metals from Rapidly Moving Electrolytes (Zur Theorie der Metallabscheidung aus Stark Bewegten Elektrolyten). R. Amberg. Showing the influence of current density, degree of concentration and speed of circulation upon the rate of deposit. 1800 w. Zeitschr f Elektro-Chemie—Nov. 4, 1904.

Nernst Theory.—See **ELECTRO-CHEMISTRY—Dissociation.**

Ozone.—See **OZONE.**

Potassium and Sodium Chloride.—Differences in the Electrolysis of Potassium Chloride and Sodium Chloride. F. Winteler. Discusses in detail the differences stated. 2000 w. Elec Chem Ind—Oct., 1904.

Rotary Electrodes.—See **ELECTRODE.**

Schuckert Apparatus.—The Electrolytic Production of Hydrogen and Oxygen for Welding Purposes. Dr. Alfred Gradenwitz. Illustrates and describes the Schuckert apparatus which produces the oxygen and hydrogen gases by the decomposition of water. 800 w. Sci Am—Aug. 12, 1905.

See also **ELECTRO-CHEMISTRY—Hydrogen and Oxygen; WELDING—Blowpipe.**

Secondary Reactions.—Secondary Reactions in Electrolysis. Joseph W. Richards. States some of the laws of primary elctrolysis and secondary reactions, giving a classification of the latter, and discussing examples under each heading by way of illustration and suggestion. 7000 w. Jour Fr Inst—Sept., 1901.

Soda-Potash.—The Electrolysis of Fused Caustic Soda and Potash (Die Elektrolyse von Geschmolzenem Aetznatron und Aetzkali). M. le Blanc and J. Brode. Data and results of experimental work in the laboratory of the Technical High School at Karlsruhe. 2500 w. Zeitschr f Elektrochemie—Oct. 23, 1902.

Water.—The Electrical Decomposition of Water on a Large Scale (Ueber Elektrische Wasserzersetzung im Grossem). Dr. O. Schmidt. A discussion of the electrolytic decomposition of water on the large scale for the commercial production of oxygen and hydrogen. 4500 w. Zeitschr f Elektrochemie—Nov. 15, 1900.

The Commercial Electrolysis of Water (Die Kommerzielle Elektrolyse des Wassers). W. Dürer. An examination of the practical difficulties met in the electrolysis of water on a large scale, with data as to cost, etc. 1000 w. Elektro-Chemische Zeitschr—April, 1901.

The Technical Electrolysis of Water (Die Technische Elektrolyse des Wassers). Victor Engelhardt. An illustrated historical and general review of processes for the electrolysis of water and the resulting production of oxygen and hydrogen. 6500 w. Zeitschr d Oesterr Ing u Arch Ver—May 9, 1902.

Apparatus for the Electrolysis of Water (Vorrichtungen zur Elektrolyse des Wassers). L. Tiersot. Describing the apparatus of Siemens & Halske for decomposing water on a large scale by the electric current. 1200 w. Elektrochemische Zeitschr—Nov., 1903.

The Electrolysis of Water. Joseph W. Richards. Divides the subject into its experimental, its theoretical, and its applied phases, treating each in detail. Ills. 5000 w. Jour Fr Inst—Nov., 1905.

Water Pipes.—See **STRAY CURRENTS.**

Zinc.—See **ELECTRO-METALLURGY; ZINC METALLURGY.**

ELECTROLYTE.

See also **ELECTRIC CELL; ELECTRO-CHEMISTRY; ELECTRODE; ELECTROLYSIS; STORAGE BATTERY.**

Accumulator. — See **STORAGE BATTERY — Acids; Electrolyte.**

Conduction.—Electrolytic Conduction Without Electrodes. Carl Hering. Gives arguments supporting the belief that electrolytic conduction is possible. 2400 w. Trans Am Inst of Elec Engrs—June & July, 1902.

Current Distribution.—The Distribution of Current Lines in Elektrolytes (Streuung der Stromlinien in Elektrolyten). W. Pfanhauser. An examination of the manner in which the current flows from anode to cathode in electrolytic baths. 1500 w. Zeitschr f Elektrochemie—Sept. 26, 1901.

Moving.—See **ELECTROLYSIS.**

Resistance.—Observations on the Ohmic Resistance of Electrolytes and Its Determination. J. Wright. An illustrated discussion of the difficulties of measuring the resistance of electrolytes and of various methods for doing so. 2000 w. Elec Rev, Lond—Jan. 2, 1903.

Storage Battery.—See **STORAGE BATTERY—Electrolyte.**

ELECTROMAGNET.

See also **BRAKE—Electric; ELECTRIC GENERATOR; ELECTRIC GENERATOR DESIGN; INDUCTION COIL; MAGNET.**

Electro-Magnetic Coils and Plungers. Rankin Kennedy. Illustrates and describes various cases, treating the combination as an electro-motor. 1600 w. Elec Rev, Lond—April 19, 1901.

Powerful Electromagnets. Emile Guarini. An illustrated article showing the remarkable results obtained by M. De Mare. 700 w. Elect'n, Lond—Aug. 28, 1903.

Alternating Current.—Alternating-Current Electromagnets. Charles R. Underhill. Discussion of operation, with account of tests, and curves and illustrations. 1200 w. Am Electr'n—Sept., 1905.

Brake.—See **BRAKE—Electric; Magnetic.**

Design.—See **Windings; ELECTRIC GENERATOR DESIGN; ELECTRIC MOTOR.**

Flux Distribution.—The Distribution of Magnetic Flux in Large Electromagnets. W. M. Thornton. Read before the Newcastle Soc. of the Inst. of Elec. Engrs. Describes a method giving precise knowledge of the flux at any desired point of the circuit and of its variation with magnetizing current or with time. It has been the aim to do for magnetic observations what the indicator diagram does for engine testing. Serial. 1st part. 5000 w. Elec Engr, Lond—April 11, 1902.

Heating.—The Heating of Magnet Coils. S. S. Neu. A. J. Levine, and O. A. Havill. An account of investigations made to determine the distribution of heat under various conditions, relation between rise of temperature and watts per sq. in. of radiating surface, etc. Ill. 2000 w. Elec Wld & Engr—July 13, 1901.

The Heating of Magnet Coils (Ueber Erwärmung von Magnetspulen). H. Lacroix. Deriving an approximate formula for computing the heating from the size and winding. 1800 w. Electrotech Zeitschr—Nov. 24, 1904.

Lifting.—Lifting Electromagnets. E. B. Clark. Considers the use of electromagnets, the objections urged against them, the amount of power consumed, etc. 2800 w. Am Elect'n—Dec., 1900.

Electro-Magnets for Iron-Working Establishments. William Baxter, Jr. On the lifting capacity of magnets and the conditions giving the best results. 3700 w. Mach, N Y—May, 1901.

Electro-Magnets for Heavy Lifting. George E. Walsh. On their use and economy in shops, their design, present stage of development, etc. 1800 w. Elec Rev, N Y—July 13, 1901.

Electric Lifting Magnets. Illustrates and describes the device for handling plates at the New York Shipbuilding Company's yard, at Camden, N. J. 900 w. Sci Am—Oct. 26, 1901.

See also **Machine Shop; Tractive.**

Long Stroke.—Long Stroke Electro-Magnets for Industrial Purposes (Electro-Aimants Industriels à Longue Course). R. Bérard. Describing various forms of electro-magnets and solenoids suitable for actuating signals, and operating brakes, etc. 5000 w. Mem Soc Ing Civ de France—Feb., 1904.

Machine Shop.—Practical Applications of Electro-Magnets in the Modern Machine Shop, Iron and Steel Works and Shipyard. Frank C. Perkins. Illustrated descriptions of electro-magnetic machines, their uses, types, &c. 2,000 w. Mod Mach—May, 1904.

Multiple Coil.—The Design of Multiple-Coil Windings. Charles R. Underhill. Explains the principle of the multiple-coil winding for electromagnets, and the method of ascertaining the safe current carrying capacity of the winding. 1000 w. Elec Wld & Engr—Oct. 14, 1905.

Performance.—The Performance of Different Types of Electromagnets. Charles R. Underhill. Shows the relations between the types in common use. 1000 w. Am Elect'n—June, 1905.

Plunger.—See **Solenoid.**

Solenoid.—Predetermining Solenoid Characteristics. William A. Del Mar. Considers the design of a solenoid for tractive work, illustrating by examples which show that the gradient formula gives results which agree fairly well with practice. 2000 w. Am Elect'n—April, 1904.

Cores for Solenoids (Ueber Solenoid-Kerne). F. G. Pero. Discussing the construction of solenoids for use in connection with electrical measuring instruments, including the best form and choice of material. 1200 w. Zeitschr f Elektrotechnik —Oct. 9, 1904.

The Predetermination of Plunger Electromagnets. Prof. Silvanus P. Thompson. Read before the Int. Elec. Cong. at St. Louis. A brief account of rules worked out by the author for the design of plunger electromagnets to fill required specifications. Ills. 5500 w. Elec Wld & Engr —Dec. 10, 1904.

Predetermination of Solenoid Characteristics. Paul C. Percy. Describes method of getting approximate dimensions and excitation for designing a stopped solenoid, giving tables for use, and illustrating their application by examples. 1200 w. Am Elect'n—March, 1905.

The Practical Design of the Solenoid. Charles R. Underhill. Discusses the law controlling the action when a current is passed through the winding. 1200 w. Elec Wld & Engr—April 29, 1905.

Calculation of Pull Due to Solenoids. Charles R. Underhill. Gives data obtained by tests, and applies these data to practical design. 1800 w. Elec Wld & Engr—May 13, 1905.

The Law of the Plunger Electromagnet. Charles R. Underhill. Showing that the formula given by Prof. Sylvanus P. Thompson is not strictly correct when applied to this type. 1000 w. Elec Wld & Engr—May 20, 1905.

The Mechanical Efficiency of Solenoid Magnets (Die Mechanische Arbeitsleistung von Hubmagneten). Paul Schieman. An application of the law of the conservatism of energy to the performance plunger armatures in solenoid coils. 1500 w. Zeitschr f Elektrotech—Aug. 13, 1905.

The Approximate Calculation of Plunger Electromagnets. Charles R. Underhill. Shows graphically the relation between pull, area, ampere-turns, and length of air-gap, or stroke of plunger, with mathematical explanation. 400 w. Elec Wld & Engr—Dec. 16, 1905.

See also **Long Stroke.**

Tractive.—Tractive Magnets for Straight and Circular Movements (Hubmagnete für Gerade und Kreislinige Bewegungen). F. R. Dietze. An illustrated description of electromagnets, with variously shaped cores and pole-pieces, for lifting and tractive purposes. 1000 w. Elektrotech Zeitschr—Feb. 13, 1902.

Tractive Force.—The Influence of the Forms of Pole Upon Magnetic Traction (Ueber den Ein fluss der Polform Magneten auf die Zugkraft derselben). W. Beneke. A computation of the form of maximum magnetic traction for iron and steel. 2000 w. Elektrotech Zeitschr—July 4, 1901.

Valve, Test.—Test of a Valve Magnet. C. P. Nachod. Gives a test on a magnet, showing the effect which the position of the magnetising coil with respect to the working air gap has on the pull produced. 400 w. Elec Wld & Engr—Dec. 28, 1905.

Windings.—The Computation of Windings (Berechnung des Durchmessers bei Gegebener Zahl der Amperewindungen, der Spulendimensionen, und der Spannung). Arthur Löwit. Deriving convenient formulas for the proper diameter of wire for a given number of ampere turns, coil diameter and pressure. 600 w. Elektrotech Zeitschr—Oct. 25, 1900.

The Calculation of Magnet-Windings. Cecil P. Poole. An explanation of method used by the writer, giving tables, formulae, etc. 4500 w. Am Elect'n—Jan., 1904.

Predetermining Magnet Windings. George W. Malcolm. An explanation of the method used by the writer. 1200 w. Am. Elect'n—Feb., 1904.

Coil Windings for Electrical Purposes. Richard Varley and Charles R. Underhill. Read before the Northwestern Elec. Assn. A study of electromagnets and economy in winding. 3000 w. Elec Rev, N Y—Feb. 13, 1904.

Calculation of the Equivalent Ampere-Turns of Windings for Single and Polyphase Currents. C. F. Guilbert. The object is to deduce formulas of simple form for the cases apt to occur. Serial. 1st part. 600 w. Elec Wld & Engr—March 12, 1904.

A Comparison of Common Methods of Magnet Coil Winding. Charles R. Underhill. 1400 w. Am Elect'n—May, 1905.

Easy Method of Approximating Magnet Windings. Charles R. Underhill. Describes a graphic system, giving charts and citing actual cases to facilitate following the methods employed. 900 w. Am Elect'n—Dec., 1905.

See also **ARMATURE WINDING.**

ELECTROMAGNETIC CIRCUIT.

Alternating Current.—See **ELECTRIC CURRENT, ALTERNATING—Electromagnetic Circuit.**

ELECTROMAGNETISM.

See **ELECTROMAGNET; ELECTRO-PHYSICS; MAGNETISM.**

ELECTRO-METALLURGY.

See also **ELECTRIC FURNACE; ELECTRO-CHEMISTRY; ELECTROLYSIS; METALLURGY;** and under the different metals.

The Financial Basis and Design of Electrolytic Metal Refineries. Arnold Philips. From a forthcoming work entitled "The Electro-plating and Electro-refining of Metals." Information aiming to aid in the designing of an electrolytic refinery upon a sound financial basis. Considers the establishment of an electrolytic copper refinery. Serial. 1st part. 2000 w. Elect'n, Lond—Aug. 1, 1902.

Electrolytic Production of Metals, with Special Reference to Copper and Nickel. William Koehler. An interesting discussion of this subject, explaining the method of working, the reactions and the different processes in use. 4000 w. Can Min Rev—April 30, 1902.

A Process for the Electrolytic Production of Metals (Elektrolytische Metallgewinnung). Hans Albert Frasch. An illustrated description of a process for the production of metals by converting the ores into chlorides and conveying them through a series of electrolytic baths, in which different metals are separated out at different stages. 1200 w. Elektrochem Zeitschr—June 19, 1903.

Notes on the Quantitative Electrolytic Separation of Metals (Beiträge zur Kenntnis der Quantitativen Elektrolytischen Metallabscheidung). P. Denso. A description of laboratory methods of analysis, with illustration, diagrams and tables. 3500 w. Zeitschr f Elektrochemie—June 4, 1903.

The Development of Electro-Metallurgy (Ueber die Fortschritte der Elektrometallurgie). Dr. Heinrich Paweck. Paper before the Oesterr. Ing.- und Architektenverein, giving a general review, with bibliography. 2 parts. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 13 and 20, 1903.

Some Applications of the Theory of Electrolysis to the Separation of Metals from One Another. A. Hollard. A study of applications of the theory of electrolysis under the following headings: I. Reduction of the resistance of the bath by suppressing the formation of gas at the anodes; II. Influence of the nature of the kathode; III. Formation of complex salts. Ill. 3300 w. Electro-Chem & Met—Jan., 1904.

Some Applications of the Theory of Electrolysis to the Separation of Metals from One Another. A. Hollard. Read before the Faraday Soc. Presents applications of the theory of electrolysis permitting of effectual analytical separations. 3500 w. Elec Rev, N Y—Feb. 27, 1904.

The Applications of Electricity to Metallurgy. Joseph W. Richards. Classifies the electro-metallurgical processes and explains the principles on which they are based. 6600 w. Tech Qr—March, 1904.

Some Electric Furnace Processes. J. Wright. Deals with some of the more important industries which have been made possible by the intense heat of the electric furnaces. Ills. 7200 w. Cassier's Mag—May, 1904.

The Electrolytic Separation of Metals (Die Elektrolytische Fällung der Metalle). Arthur Fischer and R. J. Boddaert. Discussing especially the effect of an active agitation of the electrolyte in the separation of the more important metals. 4000 w. Zeitschr f Elektrochemie—Dec. 23, 1904.

The Commercial Development of Electro-Metallurgy. George E. Walsh. Shows how the electric furnace has made possible the production of certain metals at a cost that would make them commercially profitable. 2000 w. Min & Sci Pr—July 1, 1905.

Recent Electro-Chemical Methods. J. W. Richards. Notes progress in electro-metallurgy. 1000 w. Eng & Min Jour—July 21, 1904.

Alloys.—Electro-Deposition of Alloys. R. A. Lehfeldt. Reviews the methods proposed for the practical preparation of alloys by electrolysis. 2400 w. Elec Chem & Met—June, 1901.
See also **ALLOY.**

Aluminum.—See **ALUMINUM.**

Antimony.—See **ANTIMONY.**

Arsenic.—See **ARSENIC—Electro-Metallurgy.**

Cadmium.—See **CADMIUM—Electric Deposition.**

Calcium.—The Winning of Metallic Calcium (Verfahren zur Gewinnung Metallischen Calciums). W. Borchers & L. Stockem. Describing experiments at the Technical High School at Aix-la-Chapelle in connection with the isolation of calcium in the electric furnace. 1200 w. Zeitschr f Elektrochemie—Oct. 2, 1902.

Calcium and Strontium.—The Production of Calcium and Strontium. H. Danneel. An illustrated description of an electric furnace and process used at the Institute for electro-metallurgy at Aachen, Germany, by which pure calcium and strontium are obtained from their chlorides. 1000 w. Elec Wld & Engr—Dec. 20, 1902.

Calculations.—Metallurgical Calculations. J. W. Richards. The first article of a serial on this subject, giving the scope of the treatise and introductory remarks, and discussing the chemical equation, weights and volumes of gases, correction of gas volumes for temperature and pressure, with problems. Serial. 1st part. 4000 w. Elec-Chem & Met Int—March, 1905.

Chloride Solutions.—Historical Sketch of the Development in the Production of Copper, Nickel, and Zinc from Chloride Solutions. William Koehler. Ill. Serial. 1st part. 2000 w. Electro Chem Ind—Nov., 1903.

Chlorine Smelting.—See **METALLURGY.**

Compounds.—Electrolytic Production of Metallic Compounds. Prof. C. F. Burgess and Carl Hambruchen. Abstract of paper read before the Am. Elec.-Chem. Soc An account of experimental study of various processes, especially for the production of white lead 3700 w. Elec-Chem Ind—May, 1903.

Copper.—See **COPPER METALLURGY—Electric.**

De-Tinning.—Methods of Removing the Tin from Tin-Plate Wastes (Fortschritte auf dem Gebiete der Entzinnung von Weissblechabfällen). Dr. H. Mennicke. A review of the development of electrolytic process for recovering the metallic tin from tin-plate scrap. Serial. Part I. 2000 w. Electrochem Zeitschr—Feb., 1905.

Electrostatic Separation.—See **ELECTRIC SEPARATION.**

English Co.—The English Electro-Metallurgical Company, Limited. An illustrated account of the new works of a newly organized company, and their equipment, the methods employed, etc. 2000 w. Engng—May 16, 1902.

Europe.—Electro-Metallurgy in Europe in 1900. John B. C. Kershaw. Reports concerning aluminum, copper, nickel, silver and gold, and zinc. 1800 w. Elec, N Y—March 20, 1901.

Electric Smelting in Europe. From the "Canadian Manufacturer." Principal facts in the report of the commission sent to Europe to investigate electric smelting processes. Describes experiments with the Keller furnace. 1500 w. Ir Age—June 16, 1904.

Ferronickel.—Electric Smelting Experiments for the Manufacture of Ferronickel from Pyrrhotite. Ernst A. Sjostedt. Read at meeting of the Am. Elec-Chem. Soc. An account of electric smelting experiments made at Sault Ste. Marie. Ills. 2400 w. Elec Rev, N Y—May 14, 1904.

Ferrosilicon.—See **IRON ALLOY—Silicon.**

France.—Electro-Metallurgy in France. Illustrated article describing the works of the Société Electro-Metallurgique Française. 2500 w. Trac & Trans—Nov., 1903.

Frasch Process.—The Frasch Electrolytic Process for Nickel, Cobalt and Copper Ores. Describes the method and illustrates a form of apparatus by which it may be carried out. 1200 w. Min Rept—May 9, 1901.

Germany.—The Electrochemical Metal Industries of Germany (Von der Elektrochemischen Metall-Industrie Deutschlands). H. Danneel. A review of the present conditions of the electrochemical production of metals, with data as to export quantities, and mehods of operation. 3000 w. Zeitschr f Electrochemie—March 6, 1902.

Gin.—See Iron and Steel; **ELECTRIC FURNACE.**

Gold.—See **CYANIDE PROCESS; GOLD—Colloidal; GOLD METALLURGY.**

Goldschmidt.—See 1903; **ALUMINOTHERMY.**

Greenawalt Electro-Chlorination.—See **GOLD METALLURGY.**

Héroult Process.—See Iron and Steel.

Hoho-Process.—The Hoho Process of Heating and Working Metals by Electricity. Paul Hoho. Outlines the principal characteristics of this process, discussing its practical applications. 2200 w. Elec Wld & Engr—Sept. 30, 1905.

Iron and Steel.—Electric Furnace for Smelting Iron. Translated from "Echo des Mines et de la Metallurgie." A résumé of the claims of a recently patented process taken out by the French Electro Metallurgical Society of Froges. 1500 w. Ir & Coal Trds Rev—April 19, 1901.

Is the Smelting of Iron Ore by Electricity Practicable? Editorial discussion concluding that under the most favorable circumstances the cost would be several times as great as with present methods. 1500 w. Eng News—May 2, 1901.

The Electro-Chemistry of Iron (Ueber die Elektrochemie des Eisens). Dr. R. Abegg. A study of the relations of iron to other metals, considered from an electro-chemical viewpoint, suggesting electro-chemical methods of analysis for the study of iron. 2500 w. Stahl u Eisen—July 15, 1901.

Recent Developments in the Electro-Metallurgy of Iron and Steel. Marcus Ruthenberg. Considers the magnetic concentration of low-grade ores in the electric furnace; describes the Conley electric steel-smelting process for the production of steel direct from the ore; and the Harmet process for the production of steel direct from the ore. Ill. 3000 w. Electro-Chem & Met—March, 1902.

The Ruthenberg Electric Iron Process. Marcus Ruthenberg. Extract from a paper presented to the Am. Electro-Chem. Soc., describing the author's method of fusing fine concentrates by the electric arc, into lumps suitable for the blast furnace. 1200 w. Ir Age—Sept. 25, 1902.

The Stassano Electric Furnace (Forni Elettrici Stassano). S. Lussati. With illustrations of the Stassano electric furnace arranged for smelting iron; also its application to steel furnaces with rotating inclined hearth on the Pernot type. 1200 w. L'Elettricita—Oct. 5, 1902.

The Electric Smelting of Iron Ore. A. J. Rossi. A statement of what the writer thinks could legitimately be expected from the electric smelting of pig iron in the present state of the arts. 6500 w. Ir Age—Nov. 20, 1902.

Manufacture of Steel by the Electric Furnace. Translation, with additions by P. McN. Bennie, of a paper by Charles Bertolus, of St. Etienne, France. Describes the operation of the Keller process at Kerrousse, near Hennebont, giving cost and equality obtained. 4800 w. Ir Age—Dec. 11, 1902.

A French Plant for Making Steel in the Electric Furnace. An illustrated description of the Keller process used at Kerrousse. 2000 w. Electro-Chem Ind—Jan., 1903.

An Attempted Defence of the Electric Smelting of Iron Ores. Editorial criticising statements made by A. J. Rossi in a paper published in the "Iron Age" of Nov. 20, 1902. 1000 w. Eng News—Jan. 8, 1903.

Electric Steel-Smelting at Gysinge (Die Herstellung von Elektrostahl in Gysinge). F. A. Kjellin. Describing an electric furnace without carbon electrodes for smelting steel, in practical operation at Gysinge, Sweden; with data as to its performance. 1500 w. Glückauf—Jan. 24, 1903.

Electric Manufacture of Steel. George E. Walsh. Describes the furnaces at Kerrousse, France, for the treatment of iron and steel. 1600 w. Am Elect'n—March, 1903.

The Electro-Metallurgical Production of Iron and Steel. Describes various designs of electric furnaces and processes which are being tried for the reduction of iron are and direct production of steel in one operation. Ill. 1700 w. Engr, Lond—March 13, 1903.

The Electric Reduction of Iron Ores and the Conversion of Iron into Steel in an Electric Furnace. Louis Simpson. Concerning the quality and cost. 2200 w. Electro-Chem Ind—April, 1903.

The Application of the Electrical Furnace in Metallurgy. Albert Keller. A paper before the Iron and Steel Institute, which considers this subject, the figures given being based on experiments carried out on an industrial scale at various electric works driven by water power. 7000 w. Ir & Coal Trds Rev—May 8, 1903.

The Electrometallurgy of Iron (L'Electrométallurgie du Fer). A review of Dr. Goldschmidt's report on the Stassano process in Italy and of some American views on the electric furnace for producing iron and steel. Serial. 2 parts. 2000 w. Revue Mineralurgique—April and June, 1903.

The Kjellin Electric Furnace (Four Electrique de M. Kjellin). Illustrated description of a furnace for steel manufacture. 1200 w. Revue Industrielle—Juin, 1903.

Electric Furnace Methods of Iron and Steel Production. John B. C. Kershaw. Gives details of electric furnaces designed for the production of iron and steel which have had actual trial, with diagrams where possible. Serial. 1st part. 1800 w. Elec Rev, N Y—June 6, 1903.

Manufacture of Steel by the Electric Furnace. Translation published in "Iron Age," with additions by P. McN. Bennie of a paper by Charles Bertolus, of St. Etienne, France, entitled "Notice sur la Fabrication des Aciers au Four Electrique." 4800 w. Sci Am Sup—Aug. 1, 1903.

The Electric Steel-Furnace at Gysinge, Sweden. F. A. Kjellin. Illustrated description of the furnace and smelting process. 1600 w. Trans Am Inst of Min Engrs—Oct., 1903.

On the Manufacture of Ferro-Alloys in General and of Ferro-Titanium in Particular in the Electric Furnace. Auguste J. Rossi. Treats of the electrical smelting and the reduction. 5000 w. Electro-Chem Ind—Nov., 1903.

A Brief Study of the Ferro Metals and Their Electrical Manufacture. Auguste J. Rossi. Describes the methods followed in the manufacture of ferro metals in general, and specially gives the results of four years' study of ferro-titanium. 7000 w. Ir Age—Nov. 12, 1903.

Production of Iron and Steel in the Electric Furnace. Dr. H. Goldschmidt. Abstract translation from the "Zeitschrift für Elektrochemie." A descriptive article on electrical smelting of iron, giving a comparative statement of the various processes, the cost, &c. Ill. 3000 w. Elect'n, Lond—Nov. 20, 1903.

Kjellin's Electric Furnace of Gysinge, Sweden, for the Manufacture of Steel. Frank G. Perkins. Illustrated description. 1500 w. Elec-Chem Ind—Dec., 1903.

The Electrical Manufacture of Steel. P. McN. Bennie. An abridged translation of M. Gustave Gin's description of his latest process for the production of steel by electrical means. Ill. 3300 w. Elec-Chem Ind—Jan., 1904.

The Electric Smelting of Iron and Steel. An illustrated article describing various processes and investigating the electric methods of smelting steel, concluding that under existing conditions the actual manufacture of iron and steel by electric methods cannot be profitably carried on. 4500 w. Ir & Coal Trds Rev—Jan. 15, 1904.

The Electrical Manufacture of Steel. Gustave Gin. Abridged translation of M. Gustave Gin's description of his latest process for the production of steel by electrical means. 3500 w. Elec-Chem & Met—March, 1904.

The Electrothermic Production of Iron and Steel. Alfred Stansfield. Discusses the commercial possibility of producing iron and steel in the electric furnace, reviewing the attempts that have been made, the cost, &c. 4000 w. Can Soc of Civ Engrs, Adv Proof—March, 1904.

The New Swedish Electric Furnace Plant for the Manufacture of Steel. Frank C. Perkins. Illustrated description of the steel plant at Gysinge, Sweden, where the Kjellen electric furnace is used. 1800 w. Elec, N Y—March 16, 1904.

The Electric Smelting of Iron Ores. Gives the conclusions of the best authorities who have investigated this subject. 2000 w. Can Min Rev—April 30, 1904.

Electrolytic Iron. Prof. C. F. Burgess and Carl Hambuechen. Read at the Washington meeting of the Electro-chemical Soc. A report of experimental investigations of the conditions suitable for electrolytically depositing iron, showing that it can be produced in such quantities and at such cost as to make it of commercial importance. 2300 w. Sci Am Sup—May 7, 1904.

Electrometallurgy in the Iron Industry (Electrometallurgie. Industrie du Fer). L. Francois and L. Tissier. The first of a series discussing the production of iron and steel in the electric furnace. 2000 w. Revue Technique—May 10, 1904.

The Electric Smelting of Iron and Iron Alloys (Die Elektrothermische Erzeugung von Eisen und Eisenlegierungen). B. Neumann. Illustrating and describing various forms of electric furnaces for smelting iron and refining steel. Serial. Part 1. 3500 w. Stahl u Eisen—June 15, 1904.

The Electric Furnace for Iron and Steel. P. McN. Bennie. Abstract of a paper read before the Found. Assn. at Philadelphia. Alludes to the limitations of the electric furnace, considering the progress made in Europe in its application to iron and steel production, the classes of electric reduction, and of electric furnaces describing the Keller process. 3500 w. Ir Trd Rev—June 16, 1904.

The Electro Metallurgy of Iron and Steel. Emile Guarini. Reviews the progress made thus far in melting metals by electricity. Serial. 1st part. 1200 w. Sci Am Sup—July 30, 1904.

Application of the Electric Furnace to the Metallurgy of Iron and Steel. P. McN. Bennie. Abstract of a recent paper, giving a classification of electric iron and steel processes and descriptive notes. 3000 w. Elec-Chem Ind—Aug., 1904.

The Electro-Metallurgy of Iron and Steel. A. F. Schneider. Reviews some of the processes which have been successful and are now in use, illustrating and comparing them 1500 w. Min Mag—Aug., 1904.

The Manufacture of Iron by Electro-chemical Processes. Adolphe Minet. A complete and fully illustrated review of the methods of electric smelting, and their results. 5000 w. Engineering Magazine—August 6, 1904.

The Manufacture of Ferro-Alloys in the Electric Furnace. George P. Scholl. Deals only with such ferro-alloys as are manufactured on an industrial scale in practice. The present article reviews the history of their manufacture. Serial. 1st part. 2800 w. Elec Chem Ind—Sept., 1904.

Electrolytic Iron (Ueber das Elektrolyteisen). A. Skrabal. A study of the physical and chemical properties of iron produced by electrolytic deposition. 2000 w. Zeitschr f Elektrochemie—Sept. 23, 1904.

Electric Smelting of Iron and Steel. J. H. Stansbie. Read before the Staffordshire Iron & Steel Inst. Brief notes on the construction and working of the electric furnace and its use for smelting purposes. 1200 w. Ir & Coal Trds Rev—Nov. 4, 1904.

The Production of Iron and Steel by the Electric Furnace. W. McClure. An illustrated article reviewing the various systems proposed, describing types of furnaces, and considering applications of the electrical system. 4300 w. Engng Rev—Dec., 1904.

The Froges-Heroult Electro-Metallurgical Process (Procédé Electro-Métallurgiques Froges-Héroult). Ch. Combes. A description of the manufacture of steel by the Héroult electric process at La Praz. 3000 w. L'Electrochimie—Dec., 1904.

Electric Furnace Processes for Iron and Steel Manufacture. A summary of the report of the Commission appointed by the Canadian Government to investigate the different electrothermic processes for the smelting of iron ore and the making of steel in operation in Europe, calling attention to points that are new. 9000 w. Elec-Chem Ind—Dec., 1904.

Electric Furnace Methods in Iron and Steel Manufacture in Comparison with the Ordinary Metallurgical Processes. B. Neumann. A review of this subject, with the conclusion that only for making special steels and high-per cent. ferro-alloys can the electric furnace be used economically. 2500 w. Elec-Chem Ind—Dec., 1904.

The Production of Iron and Steel by Electric Process (Die Herstellung von Eisen und Stahl auf Elektrischem Wege). Dr. Albert Neuburger. A very complete account of the practical applications thus far made of the electric furnace for smelting and refining iron and steel. Two articles. 8000 w. Glasers Annalen—Nov. 15, Dec. 1, 1904.

Report of the Canadian Commission on Electro-thermic Processes for the Production of Iron. Review of the report of a commission appointed to investigate the different electrothermic processes for the smelting of iron ores and the making of different classes of steel. 2500 w. Elec Rev, N Y—Dec. 3, 1904.

The Neuburg-Minet Electric Furnace for the Production of Iron and Steel. Dr. Albert Neuburger and A. Minet. Illustrates and describes an electrical furnace for which it is claimed that the process may be carried out with small consumption of electricity, and that the electricity may be generated cheaply, and allows of the use of cheap waste gases in the manufacture. 2000 w. Min Jour—Dec. 31, 1904.

The Electric Furnace in the Iron and Steel Industry. Auguste J. Rossi. A letter discussing the metallurgical side of the question, the cost, &c. 1700 w. Elec-Chem & Met Ind—Feb., 1905.

The Thermo-Chemistry of Iron Ore Reduction and Steel Making in the Electrical Furnace. Horace Allen. Discusses the limits necessitated by the chemical reactions. 2500 w. Cassier's Mag—March, 1905.

The Kjellin Process for the Electric Refining of Steel (Das Kjellinsche Verfahren zur Elektrischen Erzeugung von Stahl). V. Engelhardt. A description of the plant at Gysinge in Sweden, and data concerning the cost of the electric smelting of steel. Three articles. 5000 w. Stahl u Eisen—Feb. 1, 15, March 1, 1905.

Electro-Production of Iron and Steel. Details from the report of the Canadian Commission, appointed to investigate the different electro-thermic processes for the smelting of iron ores and the making of steel. 2500 w. Engr, Lond—March 3, 1905.

Recent Developments in Electric Smelting in Connection with Iron and Steel. F. W. Harbord. Read before the Faraday Society. Mainly a résumé of the report of the Canadian Commission. 3800 w. Ir & Coal Trds Rev—March 10, 1905.

Operative Results of Some Electric Iron and Steel Processes (Betriebsergebnisse einiger Elektrischer Eisen-und Stahlprozesse). B. Neumann. Data and results of work with the Héroult, Keller, Stassano, and Kjellin furnaces. 3500 w. Stahl und Eisen—May 1, 1905.

The Electrometallurgy of Iron and Steel (Beiträge zur Elektrometallurgie des Eisens und Stahls). Dr. Albert Neuberger. Discussing the practical working of the processes of Harmet, Girod, Neuberger-Minet, Ruthenberg, and Conley. 3000 w. Glückauf—May 13, 1905.

Electrometallurgy of Iron and Steel before the Faraday Society. New information from a paper by F. W. Harbord, read before the Faraday Society. 2500 w. Elec-Chem & Met Ind—June, 1905.

The Present Status of the Electric Smelting of Iron and Steel (Ueber den Gegenwärtigen Stand der Elektrischen Eisen und Stahlerzeugung). Dr. W. Borchers. A general review of the furnaces which have been actually employed in electric smelting, with data as to the cost of production. 3500 w. Stahl u Eisen—June 1, 1905.

The Present Status of Electric Smelting of Iron and Steel (Der Gegenwärtige Stand der Elektrischen Eisen- und Stahl, Erzeugung). Dr. H. Borchers. An examination of the commercial operation of existing processes, holding them all to be yet in the experimental stage. 2000 w. Zeitschr d Ver Deutscher Ing—June 10, 1905.

Electrometallurgy in the year 1904 (Die Elektrometallurgie im Jahre 1904). Dr. Franz Peters. The first installment discusses the electric smelting of iron and steel. 5000 w. Glückauf—June 10, 1905.

The Galbraith Electric Furnace. Illustrates and describes a furnace designed to deal especially with the iron sands found in large quantities at Calliope Dock, Auckland, New Zealand, and elsewhere. 1200 w. Elec Engr, Lond—July 21, 1905.

The Refining of Steel in the Electric Furnace (Ueber Gewinnung von Stahl im Elektrischen Ofen). Viktor Engelhardt. A general review of electric smelting methods followed by a discussion of the Kjellin induction furnace. Serial. Part I. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 5, 1905.

The Electric Furnace in Steel Making. Extract from an article by F. W. Harbord, in the London "Times," concerning the place the electric furnace may be expected to take in the British steel industry. 1800 w. Ir Age—Aug. 24, 1905.

The Heroult Process (Der Prozess Héroult). Illustrated description of electric furnace and process for the production of iron and steel. Serial

Part 1. 700 w. Elektrochem Zeitschr—Sept., 1905.

The Kjellin Electric Steel Furnace. Translated from "Stahl und Eisen." V. Engelhardt. An illustrated account of the plant at Gysinge, Sweden, and its operation. 4500 w. Ir Age—Oct. 19, 1905.

Recent Advances in the Electro-Metallurgy of Iron and Steel. R. S. Hutton. Abstract of a paper in "Jour. Soc. of Chem. Ind." Reviews the electric-furnace methods and what has been accomplished in electric steel production, discussing the outlook. 1800 w. Eng & Min Jour—Oct. 28, 1905.

Preliminary Report on the Smelting of Magnetic Iron Ore by Electricity. Preliminary report submitted by Dr. David T. Day on the subject of smelting by electricity the magnetic iron ores obtained from various points on the Pacific beach. 1200 w. Min Rept—Dec. 28, 1905.

See also **ELECTRIC FURNACE.**

Kjellin Process.—See Iron and Steel.

Keller Process.—See Iron and Steel.

La Praz, France.—A French Electro-Metallurgical Works. A short illustrated description of the La Praz installation, with remarks on other works in France. 2300 w. Min Rept—Dec. 1, 1904.

Electro-Metallurgical Works at La Praz. Illustrates and describes this interesting industrial concern near Grenoble, France, and the work carried on there. 800 w. Electro-Chem & Met—Jan., 1904.

Lead.—See **COPPER METALLURGY; LEAD METALLURGY.**

Lead and Tin Oxides.—See Tin and Lead Oxides.

Magnetic Separation.—See **MAGNETIC SEPARATION.**

Mercury.—See **MERCURY.**

Nickel.—See Ferro-Nickel; **NICKEL—Electrolytic Refining.**

1900.—Electrometallurgy in 1900 (L'Electrométallurgie en 1900). Paul Chalon. Reviewing especially the work of the electric furnace and its practical applications during 1900. 6000 w. 1 plate. Rev Univ des Mines—Nov., 1901.

See also **ELECTRO-CHEMISTRY.**

1903.—Electro-Metallurgy in 1903. A résumé of the year's progress, giving details of the industrial applications of the Vautin and Goldschmidt process for obtaining high temperatures, and of the electric steel processes. Serial. 1st part. 2800 w. Engr, Lond—Jan. 29, 1904.

See also **ELECTRO-CHEMISTRY.**

1904.—Electro-Metallurgy in 1904. A survey of the year's progress in these industries. 2500 w. Engr, Lond—Feb. 10, 1905.

See also **ELECTRO-CHEMISTRY.**

Physical Characteristic.—The Physical Character of Metal Deposits. Prof. C. F. Burgess and Carl Hambuechen. An illustrated article giving information of value and interest in regard to the deposition of metals. 2500 w. Elec Chem Ind—Feb., 1903.

Sault Ste. Marie.—See Ferronickel; **ELECTRIC INDUSTRY; ELECTRO-CHEMISTRY; SAULT STE. MARIE.**

Separation.—See **ELECTRIC SEPARATION; MAGNETIC SEPARATION.**

Slime.—Electrolytic Treatment of Electrolytic Slime. Anson G. Betts. An illustrated account of experimental investigation. 4500 w. Elec-Chem & Met Ind—April, 1905.

See also **CYANIDE PROCESS; GOLD METALLURGY.**

Stassano Furnace.—See Iron and Steel; **ELECTRIC FURNACE.**

Stripping.—Electrolytic Stripping of Metals. Prof. Charles F. Burgess. An illustrated detailed description of the process used. 4000 w. Elec-Chem Ind—Jan., 1904.

Sulphide Ores.—The Electric Smelting of Complex Sulphides. A. A. Beadle. A brief description of the more important electro-metallurgical methods of treatment of lead, zinc, silver ores. 2000 w. Eng & Min Jour—March 24, 1904.

Electrolytic Production of Zinc and Lead from Complex Sulphide Ores. Charles H. Burleigh. On the treatment of refractory zinc sulphides, giving facts which have been tested and proved on a commercial scale. 3000 w. Elec Chem Ind—Sept., 1904.

Electricity as an Agent in Treating Sulphide Ores. M. Vaygouny. Describes a series of experiments made by the writer and gives the results. 4300 w. Cal Jour of Tech—Nov., 1904.

See also **ORE TREATMENT.**

Swinburne-Ashcroft Process.—See also **SMELTING—Chloro-Electrolytic.**

Tin.—See De-Tinning; **ELECTRO-CHEMISTRY; TIN METALLURGY.**

Tin and Lead Oxides.—Some Recent Electric Furnace Products. Clinton Paul Townsend. Concerning the methods for producing powdered oxides of tin and lead by means of the electric arc in conjunction with an air blast. Elec Wld & Engr—April 5, 1902.

Trail, British Columbia.—See **GOLD METALLURGY.**

United States.—The Present Status of the Electrolytic Refining Industry in the United States. Titus Ulke. Part first considers the refining of copper. Silver and gold will be considered in articles following. Serial. 1st part. 1000 w. Elec Rev, N Y—Jan. 12, 1900.

Vautin.—See 1903.

Zinc.—See Sulphide Ores; **COPPER METALLURGY; CYANIDE PROCESS; ZINC METALLURGY.**

ELECTROMETER.

See **ELECTRIC INSTRUMENT—Electrometer.**

ELECTRON.

See **ELECTRO-PHYSICS; RADIOACTIVITY.**

ELECTRO-PHYSICS.

See also **ELECTRIC CURRENT, ALTERNATING; ELECTRICITY; ELECTRIC UNIT; ELECTRIC WAVE; ELECTRO-CHEMISTRY; MATHEMATICS; PHYSICS; RADIOACTIVITY; RADIOGRAPHY; VACUUM TUBE.**

Accumulator.—See **STORAGE BATTERY—Design.**

Alternating-Current Curves.—See **ELECTRIC CURRENT, ALTERNATING—Wave.**

Aluminum Cell.—See **ELECTRIC CURRENT RECTIFIER; ELECTRO-PHYSICS.**

Atmospheric Electricity.—See Electron; **ELECTRIC CURRENT—Earth;** Meteorology.

Capillarity.—Electro-Capillarity. An experimental study made by C. Christiansen of the movements and changes of a globule of mercury in an electrolyte, and of falling drops of mercury in an electrolyte. 2000 w. Elec Rev, Lond—Feb. 19, 1904.

Condensation Nuclei.—The Ionization of Water Nuclei. C. Barus. An account of experimental investigations on the Lenard effect, referring to the work of J. J. Thompson, and giving the result of the writer's study. Ill. 4200 w. Am Jour of Sci—Feb., 1903.

Condensation Nuclei. Prof. C. T. R. Wilson. An explanation and discussion of the theory of condensation of water vapor on ions. 5000 w. Int Elec Cong of St. Louis—Sept., 1904.

Conductors.—See **ELECTRIC CONDUCTOR—Physical Properties.**

Constants.—See **PHYSICS.**

Convection.—On Electric Convection (Sur la Convection Electrique). M. Vasilesco-Karpen. An account of experiments to show that a moving electrified body produces a magnetic field, as first proved by Rowland. 700 w. Comptes Rendus—March 9, 1903.

Electric Convection Experiments (Sur l'Entrainement de la Charge dans les Expériences de Convection Electrique). N. Vasilesco-Karpen. An account of experiments to determine the effect of the supporting body on its electric charge where an electrified disc revolves and produces a magnetic field. 600 w. Comptes Rendus—April 27, 1903.

Researches in Electric Convection (Recherches sur la Convection Electrique). V. Crémieu and H. Pender. An account of experiments to determine the influence of a moving electrified body on a magnet. 600 w. Comptes Rendus—April 20, 1903.

Electric Convection—An Historical Summary with a Bibliography. J. Frank Meyer. 2500 w. Jour Fr Inst—Dec., 1903.

Dielectric Constant.—See DIELECTRIC.

Discharge Current.—See ELECTRIC DISCHARGE.

Eddy Currents.—See EDDY CURRENT.

Electric Touch.—On Electromotive. Wave Accompanying Mechanical Disturbance in Metals in Contact with Electrolyte. Prof. J. Chunder Bose. The full paper presented before the Royal Society upon "Response in Organic Substances," showing electromotive effects produced by molecular disturbance. Two articles. 4500 w. Elect'n, Lond Aug. 29, Sept. 5, 1902.

See also COHERER—Bose.

Electrodynamics.—General Equations of Electrodynamics in Conductors and Perfect Dielectrics at Rest (Equations Générales de l' Electrodynamique daus les Conducteurs et les Diélectriques Parfaits en Repos). S. Carvallo. A generalization of Kirchhoff's two laws, with interpretation, application and comparison with Maxwell's results. 800 w. Comptes Rendus—Jan. 6, 1902.

Electrodynamics of Moving Bodies (Electrodynamique des Corps en Mouvement). E. Carvallo. The application of electrodynamic equations, founded on a generalization of Kirchhoff's two laws, to moving bodies. 700 w. Comptes Rendus—Jan. 20, 1902.

Electron.—The Development of the Electron Idea. W. Kaufmann. From the "Physikalische Zeitschrift." Lecture delivered at Hamburg, with editorial. 5200 w. Elect'n, Lond—Nov. 8, 1901.

The Electronic Theory of Electricity. Dr. J. A. Fleming. A sketch of this theory showing the evolution of the idea that electricity is atomic in structure, and thus these atoms of electricity called electrons attach themselves to material atoms and are separable from them. 9800 w. Pop Sci M—May, 1902.

Problems and Conclusions in the Electron Theory (Ergebnisse und Probleme der Elektronentheorie). H. A. Lorentz. A general review of the theory of electrons and the observations upon which it is based, together with some of the influences upon molecular physics. Two articles. 10,000 w. Elektrotech Zeitschr—June 15, 22, 1905.

On Electrons. Sir Oliver Lodge. Paper before the Institution of Electrical Engineers, giving full account of the latest theory of electricity and magnetism. Also editorial comment. Serial. Part I. 4000 w. Elect'n, Lond—Dec. 12, 1902.

On Electrons. Abstract of an address by Sir Oliver Lodge, explaining the present state of knowledge of electrical theories. 5300 w. Engng —Dec. 5, 1902.

The Nature of Electrons (Ueber die Natur der Elektronen). Dr. Gustav Platner. A discussion of the theory of electrons as a means of explaining electric and other phenomena, with particular reference to a book by Joh. Stark on "Electricity in Gases." 3000 w. Elektrochem Zeitschr—May, 1903.

Ions and Electrons. Abstract of a paper by Dr. Louis A. Parsons, read before the Am. Elec.-Chem. Soc. A review of investigations which led to the modern electronic hypothesis. 1200 w. Elec-Chem Ind—May, 1903.

A Theory of Ons: In Reconciliation of the Undulatory Theory of Electricity with Ionization and the Electron Hypothesis. R. R. Bowker. Presents an hypothesis for the consideration of investigators. Also editorial. 2800 w. Elec Wld & Engr—Sept. 26, 1903.

Electrons and Atmospheric Electricity. Discusses the value of the theory of electrons in determining weather probabilities and atmospheric changes. 2000 w. Elec Rev, Lond—Nov. 20, 1903.

Note on the Size and Inertia of Electrons. Oliver Heaviside. A review of the work that has been done in determining the physical constants of the electron. 700 w. Elect'n, Lond—April 4, 1902.

The Dynamics of the Electron (Sur la Dynamique l'Electron). H. Poincaré. A mathematical examination of the theory of Lorentz, in comparison with the investigations of Laplace upon the action of gravity. 2000 w. Comptes Rendus—June 5, 1905.

The Measurement of Bodies Smaller Than Atoms. S. N. Taylor. An explanation of how the masses and velocities of the particles which constitute cathode rays are measured. 3200 w. Elec Wld & Engr—Nov. 15, 1902.

Faraday's Law and the Theory of Electrons. Letter from Dr. H. C. Cooper. 600 w. Electro-Chem Ind—Jan., 1903.

The Development of the Electron Idea. W. Kaufmann. Authorised translation of an address before the Gesellschaft Deutscher Naturforscher und Aerste. A summary of the electron theory up to date, tracing the history of the development of the electron idea. 5000 w. Elec Wld & Engr—April 18, 1903.

See also Condensation Nuclei; RADIOACTIVITY; VACUUM TUBE.

Electrostatic Capacity.—See ELECTROSTATIC CAPACITY.

Electrostatic Field.—A Novel Reaction between Electrostatic Tubes of Force and Insulators (Sur une Nouvelle Réaction entre les Tubes Electrostatiques et les Isolateurs). W. de Nicolaïève. A record of experiments with insulating bodies in an electrolyte conveying a current. 6000 w. Comptes Rendus—Dec. 30, 1901.

The Electrostatic Field about an Electric Current and the Theory of Professor Poynting (Sur le Champ Electrostatique autour d'un Courant Electrique et sur la Théorie du Professeur Poynting). W. de Nicolaïève. A description and record of experiments. 600 w. Comptes Rendus—Jan. 6, 1902.

Electrostatics.—To Whom Do We Owe the Experiment of the Ball and Hemispherical Conductors, Showing That the Charge Resides on the Outer Surface of an Electrified Body? Brother Potamian. Shows that the experiment was first performed by Cavendish, in 1773, and that the benefit to the world came through the work of Coulomb, 1788. 1700 w. Elec Wld & Engr—Aug. 22, 1903.

Notes on Electrostatics, Treated Opsigraphically. Hugh Erat Harrison. The present article is introductory and explanatory. Serial. 1st part. 1700 w. Elec Times—Nov. 12, 1903.

Electrostatic Transmission.—Electrical Transmission Electrostatically Treated. J. Stanley Richmond. Aims to show that the science of electricity is really one of electrostatics, or of the rotative pressures of the electrical conditions of bodies of matter. 1500 w. Elec Rev, N Y—Aug. 6, 1904.

Electrostriction.—See ELECTROSTRICTION.

Energy Conversion.—The Conversion of Energy in the Magnetization and Electrification of Media (Energieumwandlung während der Magnetisierung und Elektrisierung von Medien). Dr. Johann Sahulka. A mathematical study based upon experiments with permanent magnets and with electrical condensers. 5000 w. Elektrotech Zeitschr—Feb. 2, 1905.

Geissler Tubes.—Contribution to the Study of Geissler Tubes in a Magnetic Field (Contribution à l'Etude des Tubes de Geissler dans un Champ Magnetique). H. Pellat. An experimental study of electric discharges in vacuum tubes. 800 w. Comptes Rendus—Dec. 23, 1901.

Harmonic Analysis.—See MATHEMATICS.

History.—Adaptation to Discovery. James Wilson. Reviews the early work of Oerstod and Faraday, which showed the relation between magnetism and electricity. 1100 w. Am Mach—Oct. 3, 1901.

Holtz Machine.—See ELECTRIC INSTRUMENT; ELECTRO-THERAPEUTICS.

Hydraulic Analogies.—Hydraulic Analogies of Inductance and Capacity Combinations. George T. Hanchett. An explanation of the behavior of current and voltage in circuits containing inductance and capacity. Ill. 2000 w. Cent Station—Oct., 1902.

See also ELECTRIC DISTRIBUTION; TELEPHONE LINE—Long Distance Analogies.

Induction.—Laws of Electric Energy (Lois de l' Energie Electrique). E. Carvallo. A note criticising Maxwell's laws of electromagnetic induction and offering substitutes, with short account of experiments. 700 w. Comptes Rendus—Dec. 23, 1901.

Induction Experiments.—See **ELECTRIC CURRENT CONVERTER—Guarini.**

Induction Standards.—See **ELECTRIC INSTRUMENT.**

Inductive Circuit.—On an Inductive Circuit with an Harmonically Varying Resistance. T. Mizuno. Mathematical investigation. 400 w. Elect'n, Lond—May 30, 1902.

Inertia.—On Electric Inertia and the Inertia of Electric Convection. Professor Arthur Schuster. Mathematical investigations. 4300 w. Elect'n, Lond—April 5, 1901.

Ionisation.—Ionisation of Gases by Ionic Shock. J. Stark. Abstracted from "Ann. der Physik." Explains the ionic theory and the work in this field. The object of the paper is to find theoretical guides for experimental work. 3800 w. Elect'n, Lond—March 21, 1902.

Some Effects Produced by Positive Ions. Prof. John S. Townsend. A statement of the writer's theory, with an outline of the method in which it has been experimentally verified. 1200 w. Elect'n, Lond—April 3, 1903.

The Theory of Ionization by Collision. Prof. J. S. Townsend. Describes this theory in order to explain some of the phenomena which occur in the development of the large currents in a gas. 5800 w. Int Elec Cong of St. Louis—Sept., 1904.

See also **Condensation Nuclei; Electron; ELECTRO-CHEMISTRY; RADIOACTIVITY.**

Kirchhoff's Laws.—Extension of Kirchhoff's Two Laws (Extension des Deux Lois de Kirchhoff). E. Carvallo. Extension of Kirchhoff's laws of currents in a network to conductors in three dimensions, to variable currents and to dielectrics. 800 w. Comptes Rendus—Dec. 30, 1901.

Lenz.—The Contributions of H. F. E. Lenz to the Science of Electromagnetism. W. M. Stine. Reviews the history of the science in the present number, especially the investigations of Lenz. Serial. 1st part. 5000 w. Jour Fr Inst—April, 1903.

Light and Temperature.—See **LIGHT—Temperature Relation.**

Low Temperatures.—Electrical Phenomena at Low Temperatures (Les Phénomènes Electriques aux Basses Températures). M. d'Arsonval. An illustrated account of the liquefaction of gases, and electric, magnetic and other phenomena at very low temperatures. 8000 w. Bull Soc Internationale d Electriciens—March, 1902.

See also **LOW TEMPERATURE.**

Luminescence.—See **VACUUM TUBE.**

Magnetization.—See **MAGNETIZATION.**

Matter, Theory.—See **Theory; MATTER—Theory.**

Moving Charge.—The Electromagnetic Effects of Moving Charged Spheres. Edwin P. Adams. A description of experimental investigations, with statement of results. Ill. 3300 w. Am Jour of Science—Aug., 1901.

The Magnetic Effect of Electric Displacement. John B. Whitehead, Jr. Describes a series of experiments. Ill. 6500 w. Am Jour of Sci—Aug., 1902.

The Magnetic Effect of Moving Charges. Dr. Harold Pender. Considers the experimental evidence we have in favor of the assumption that an electric charge in motion produces a magnetic field, shows how the evidence has been obtained, and points out a few of the difficulties which have had to be overcome. 5000 w. Int Elect Cong of St. Louis—Sept., 1904.

See also **Convection.**

Notation.—See **ELECTRIC SYMBOL; ELECTRIC UNIT.**

Oscillations.—Theoretical Investigations of Some Oscillations of Extremely High Potential in Alternating High Potential Transmissions. Charles Proteus Steinmetz. Gives a series of investigations on the effect of the exponential term in the general equation of alternating currents. 4200 w. Trans Am Inst of Elec Engrs—Oct., 1901.

Discussion of President Steinmetz's Paper on "Oscillations of Extremely High Potentials in Alternating High Potential Transmissions." Communicated after adjournment by Percy H. Thomas. 900 w. Trans Am Inst of Elec Engrs—March, 1902.

Electrical Oscillation of High Frequency. Arthur V. Abbott. Outlines the behavior of the three fundamental attributes of every electrical circuit—resistance, inductance and capacity—showing by illustrations how each acts and the results of their mutual relations. Ill. 7300 w. Jour W Soc of Engrs—Oct., 1901.

See also **Wave; ELECTRIC CURRENT, ALTERNATING; ELECTRIC WAVE.**

Oscillator, Skin Effect.—An Experimental Investigation into the "Skin Effect" in Electrical Oscillators. C. A. Chant. An account of investigations made in the Jefferson Physical Laboratory, Harvard University. Ill. 5300 w. Am Jour of Sci—Jan., 1902.

Photo-Electric Effects.—Photo-Electric Experiments. A. Frederick Collins. Illustrated description of experiments in photo-electric action. 1700 w. Sci Am Sup—Dec. 20, 1902.

Plants.—Electromotive Force in Plants. Amon B. Plowman. Reviews the work of Prof. J. Burden Sanderson on electrical phenomena in vegetation. 3000 w. Am Jour of Sci—Feb., 1903.

See also **AGRICULTURE—Electricity.**

Poynting Theory.—See **Electrostatic Field.**

Resonance.—Resonance (Ueber Resonanzerscheinungen). Dr. Gustav Benischke. A paper before the Elektrotechnischer Verein, giving various examples of mechanical and electrical resonance, and describing experiments with a small revolving weight, which set a table vibrating. 3000 w. Elektrotech Zeitschr—Jan. 30, 1902.

Oscillograms.—A Study of the Phenomenon of Resonance in Electric Circuits by the Aid of Oscillograms. M. B. Field. Abstract of a paper read before the Glasgow Soc. of the Inst. of Elec. Engrs. The present number considers the conditions under which electric resonances may occur. Serial. 1st part. 2000 w. Elec Rev, Lond—March 6, 1903.

A Study of the Phenomenon of Resonance in Electric Circuits by the Aid of Oscillograms. M. B. Field. Describes experiments made with one of the instruments invented by Mr. Duddell, the high frequency pattern of oscillograph. Ill. Serial. 1st part. 4000 w. Elec Times—March 19, 1903.

See also **OSCILLOGRAPH.**

Rotating-Disc Condenser.—Condenser Effects with Rotating Discs. A. G. Dill. An account of experiments with description of apparatus used. 1000 w. Elec Wld & Engr—March 29, 1902.

Rotations.—Electro-Magnetic Rotations. Howard B. Dailey. Illustrates and describes experiments showing the rotational features of electro-magnetism. 1300 w. Sci Am—Dec. 27, 1902.

Static Discharge.—See **ELECTRIC DISCHARGE.**

Sun-Spots.—See **SUN-SPOTS.**

Theories.—Electrical Theories. John Trowbridge. Reviews the theories that have been advanced, those discarded, and those attracting attention at the present time. 2000 w. Elec Wld & Engr—Jan. 5, 1901.

Electrical Theories. Dr. John Trowbridge. A review of present theories of electrical and magnetic phenomena. 800 w. Elec Rev, N Y—Jan. 10, 1903.

Outline of Modern Theories of Electricity and Magnetism. Harold B. Smith. Briefly outlines the theories and hypotheses and recent discoveries in electrical phenomena. 4000 w. Jour Worcester Poly Inst—Nov., 1901.

The Scientific Foundations of Electrical Engineering (Die Wissenschaftlichen Grundlagen der Elektrotechnik). Prof. Max Reithoffer. An illustrated lecture on the fundamentals of electricity and magnetism. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—Special supplement, Feb. 14, 1902.

The Real Nature of Electricity and Magnetism.

Arthur A. Skeels. Gives results and conclusions from experimental investigations, discussing special cases. 3800 w. Jour Assn of Engng Socs—June, 1902.

The Old and the New Electrical Theory. Alex. P. Trotter. The object of the paper is to bring together the valuable contributions to electrical science which form a part of what is termed the "new theory." Serial. 1st part. 3000 w. Elec Rev, Lond—Aug. 8, 1902.

Electricity and Matter. Sir Oliver Lodge. A lecture delivered at Bedford College for Women. 3800 w. Sci Am Sup—Sept. 26, 1903.

See also Electron; Ionisation; CATHODE RAYS; ELECTRO-CHEMISTRY; MATTER; PHYSICS; RADIOACTIVITY; RADIOGRAPHY.

Thermo-Electricity.—See THERMO-ELECTRICITY.

Ultra-Violet Light.—See ELECTRIC DISCHARGE; RADIOACTIVITY.

Unipolar Induction.—See ELECTRIC GENERATOR.

Wave.—Electrical Oscillations and Electric Waves. J. A. Fleming. Cantor lecture. The first of a series of lectures studying this subject. The present article considers the practical method of producing electrical oscillations, experimental investigations, frequency, etc. Ill. Serial. 1st part. 7800 w. Jour Soc of Arts—Dec. 28, 1900.

On the Reflection of Electric Waves at the Free End of a Parallel Wire System. Henry A. Bumstead. Explains phenomenon observed and its cause. 1500 w. Am Jour of Sci—Nov., 1902.

The Rapid Determination of Harmonic Waves (Methode zur Schnellen Bestimmung Harmonischer Wellen). J. Fischer-Hinnen. Deriving equations for use in plotting multiple period waves. 2500 w. Elektrotech Zeitschr—May 9, 1901.

See also Oscillations; ELECTRIC CURRENT, ALTERNATING; ELECTRIC INSTRUMENT—Oscillator; ELECTRIC WAVE.

Wave Frequency.—See ELECTRIC INSTRUMENT—Frequency.

Waves on Brain.—Electric Waves and Their Effect on the Human Brain. A. Frederick Collins. An illustrated detailed account of experiments made for the purpose of establishing the nature of the relationship existing between electric storms and certain forms of nervous diseases. 2300 w. Elec Rev, Lond—May 23, 1902.

The Effect of Electric Waves on the Human Brain. D. McIntosh and J. Graham-Willmore. Experimental investigations disagreeing with the results given in an article by A. Frederick Collins, claiming that brains exhibit the "coherer effect," and drawing conclusions. 2500 w. Elec Wld & Engr—May 31, 1902.

Wave Transmission.—Electrical Wave-Transmission. Michael I. Pupin. Gives conclusions derived from experimental investigations, and the application to telephony and telegraphy. 900 w. Tech Quar—June, 1901.

See also TELEPHONE LINE—Pupin Long Distance.

Wave Velocity.—See DIELECTRIC—Constant Paraffin.

Wire Waves.—The Variation of Potential Along a Wire Transmitting Electric Waves. C. A. Chant. Reviews briefly experiments made by investigators of these "wire-waves," giving description of recent experiments made and their results. Ill. 4000 w. Am Jour of Science—Jan., 1903.

See also ELECTRIC WAVE.

ELECTRO-PLATING.

See also ELECTRO-CHEMISTRY; ELECTRO-ENGRAVING; ELECTRO-GALVANIZING; ELECTRO-TYPING.

The Chemistry of Electroplating. Prof. Wilder D. Bancroft. Shows that a study of chemical reactions and chemical analogies will at least give the outlines of a theory of electroplating. 2800 w. Int Elec Cong of St. Louis—Sept., 1904.

Electroplating. Herbert J. Hawkins. An explanation of up to date methods. Serial. 1st part. 1200 w. Met Work—Feb. 18. 1905.

Notes on Physical Characteristics of Electro-Deposited Metals. Woolsey McA. Johnson. Discusses the influence of the chemical nature of the solution from the point of view of the electrolytic dissociation theory. 2700 w. Elec Chem Ind—Feb., 1903.

Abuse.—The Abuse of Electroplating. H. L. Haas. Briefly notes old methods and the important advances made, with remarks on knowledge still needed. 1100 w. Elec Chem Ind—Feb., 1903.

Alloying.—The Alloying of Metals as a Factor in Electroplating. Prof. Louis Kahlenberg. Shows that the alloying power of the electrolytic deposit with the coated metal underneath is a factor determining not only the strength with which the deposit adheres, but the length of time the plated article will wear. 1500 w. Elec Chem Ind—Feb., 1903.

Aluminum.—Electroplating Upon Aluminum. Chas. F. Burgess and Carl Hambuechen. Describes an interesting method of applying a coating that sticks. 1200 w. Electro-Chem Ind—March, 1904.

Anode Corrosion.—Anodes for Electroplating. Prof. C. F. Burgess and Carl Hambuechen. Considers some of the factors which influence the corrosion at the anode, and gives results of some measurements which have been made upon nickel anodes in a nickel-ammonium sulphate plating solution. Ill. 1600 w. Elec Chem Ind—June, 1903.

Chemistry.—The Chemistry of Electroplating. Wilder D. Bancroft. Presents the most recent facts relating to the electrolytic precipitation of the metals. 2500 w. Jour Fr Inst—Aug., 1905.

Copper.—Rapid Copper Plating Without Agitation or Warming (Schnell-Kupferplastik ohne Umrührung und Erwarmung). Sergius v. Maximowitsch. The electrodes are placed horizontally, with the cathode beneath, the sulphate of copper sinking by gravity. 1000 w. Elektrochem Zeitschr—Nov., 1904.

The Replacement of Sodium Monosulphite by Sodium Bisulphite in Potassium Cyanide Copper Baths (Ueber den Ersatz des Mononatriumsulfits durch Dinatriumsulfit in Cyankalischen Kupferbädern). Dr. Armin Fischer. Descriptions and formulae for electrotypes in copper plating of zinc and iron. 600 w. Elektrochemische Zeitschr—Dec., 1901.

Differential vs. Localized.—Differential or Localized Electro-Plating. Sherard Cowper-Coles. Illustrated description of methods. 1100 w. Elec-Chem & Met—Dec., 1903.

Dynamo.—See ELECTRIC GENERATOR DESIGN—Electroplating.

Leaves and Flowers.—The Electroplating of Leaves and Flowers (Métallisation et Galvanoplastie Artistique des Feuilles et des Fleurs). Francis Marre. Describing an albumino-nitrate of silver process for metallising fragile objects, permitting them to be electroplated with various metals. 1500 w. Génie Civil—May 20, 1905.

Nickel.—Nickel Cathodes. David H. Browne. On the phenomenon of curling up of electrolytic-deposited nickel sheets. A study of the problem of nickel plating, with an account of experiments. Elec-Chem Ind—June, 1903.

See also Anode Corrosion.

Rotary Electrode.—See ELECTRODE.

ELECTROSCOPE.

See ELECTRIC INSTRUMENT—Electroscope.

ELECTROSTATIC CAPACITY.

See also DIELECTRIC; ELECTRIC CABLE; ELECTRIC MEASUREMENT; ELECTRO-PHYSICS—Electrostatic Field; INSULATION; TELEPHONE LINE.

Alternating Current Working.—Capacity in Alternate-Current Working. W. M. Mordey. Considers some of the effects of electrostatic capacity in insulated cables for alternate-current working, especially as regards the power and plant. Serial. 1st part. 3700 w. Elect'n, Lond—Jan. 18, 1901.

Capacity in Alternate-Current Working. An interesting letter from Dr. Maurice de Hoor, criticising some statements in W. M. Mordey's paper. 1800 w. Elect'n, Lond—Feb. 8, 1901.

Cable.—The Capacity of Cables (Die Kapacität von Kabeln). Dr. Hubert Kath. A discussion of the influence of resonance and Tesla effects upon the capacity of long cables for power transmission. 2000 w. Elektrotech Zeitschr—Jan. 15, 1903.

Capacity Relations in Cables (Kapacitätsverhältnisse in Kabeln). Dr. H. Andriessen. A theoretical discussion of the electrostatic capacity of cables, taking the most general case. 1600 w. Elektrotech Zeitschr—April 30, 1903.

The Numerical Determination of the Capacity of Aerial Conductors and Cables (Ueber die Rechnerische Bestimmung der Kapacität von Luftleitern und Kabeln). Leo Lichtenstein. Giving formulas anl diagrams and showing their applications to practical examples. Serial. Part I. 5000 w. Elektrotech Zeitschr—Feb. 11, 1904.

Paraffin.—Dielectric Constant of Paraffins. Will G. Hornell. Presents some experiments in which, by means of a modified form of the Blondlot oscillator, the dielectric constants of four commercially different paraffins were obtained for 40, 60 and 80 centimeter waves. Also the relative velocities of waves along magnetic and non-magnetic wires, and other investigations of interest. Ill. 4000 w. Am Jour of Sci—Dec., 1901.

Wires.—The Electrostatic Capacity of Wires. George D. Shepardson. Considers the capacity in some of the more important cases of electrical conductors. 2200 w. Engrs' Soc, Univ of Minn—Year Book, 1904.

The Electrostatic Capacity of Wires. George D. Shepardson. Considers the things upon which the capacity of a wire depends, stating important cases. 2000 w. Reprint from Year Book of the Soc. of Engrs., Univ. of Minnesota—Vol. XII., 1904.

ELECTROSTATICS.

See **ELECTRO-PHYSICS; ELECTROSTATIC CAPACITY.**

ELECTROSTRICTION.

A Critical Rreview of Electrostriction. Louis T. More. Explains the term, which means the mechanical strains that electrical forces produce in a non-conductor, and reviews investigations made, criticizing the claims made. Also bibliography and editorial. 5000 w. Elec Wld & Engr—Jan. 16, 1904.

On Electrostriction. Prof. Louis Trenchard More. An account of new experiments, describing the apparatus used, giving results. 4500 w. Int Elec Cong of St. Louis—Sept., 1904.

ELECTRO-TELLUROGRAPH.

See **ELECTRIC CURRENT—Earth.**

ELECTRO-THERMICS.

See **THERMO-ELECTRICITY.**

ELECTRO-THERAPEUTICS.

See also **ELECTRIC SHOCK.**

Actinic Light.—Some Experiments with Actinic Light. J. W. Kime, M. D. An account of experiments made to determine which bands of the solar spectrum are rich, and which poor in the rays. The object was to gain information bearing on the use of these rays in the treatment of disease. Ill. 2000 w. Sci Am—June 20, 1903.

Current Curves.—Graphic Tracings of the Faradic and Other Interrupted Currents. H. Lewis Jones. Gives results of examination of the characteristic curves of certain medical induction coils. 3400 w. Elec Rev, N Y—Nov. 26, 1904.

Dissociation Theory.—Some Applications of the Electrolytic Dissociation Theory to Medicine and Biology. Wilder D. Bancroft. Lecture before the Am. Phil. Soc. A critical summary of the achievements in medicine and biology, due to applications of the dissociation theory. 3000 w. Elec-Chem Ind—May, 1903.

Holtz Machines.—A Few Experiments with Holtz Machines. Samuel Sheldon. Abridged report presented to the Am. Electrotherapeutic Assn. A report of experimental trials, and what they appear to have established. 2300 w. Elec Rev, N Y—Feb. 13, 1904.

Lupus Treatment.—See **ARC LIGHT.**

Oudin Resonator.—See **SPACE TELEGRAPHY—Rochefort.**

Roentgen Rays.—See **RADIOGRAPHY; ROENTGEN RAY.**

Thorium.—See **RADIOACTIVITY.**

Ultra-Violet Light.—See **ELECTRIC DISCHARGE; RADIOACTIVITY.**

ELECTROTYPING.

See also **ELECTRO-ENGRAVING; ELECTROPLATING.**

Gramophone Record.—Electrotyping. Dr. F. Mollwo Perkin, in "Knowledge and Scientific News." Describes the processes of electrotyping, facing and stereotypes, reproduction of gramophone records, etc. 1700 w. Sci Am Sup—Aug. 5, 1905.

Rapid.—Rapid Methods for Producing Electrotypes. Sherard Cowper-Coles. Illustrated descriptions. 800 w. Elec-Chem & Met—Dec., 1903.

ELEMENTS.

Rare.—See **METAL; RADIOACTIVITY.**

ELEVATED RAILWAY.

See also **ELECTRIC RAILWAY; SINGLE RAIL; SUSPENDED RAILWAY; UNDERGROUND RAILWAY.**

Accident.—See **RAILWAY ACCIDENT.**

Berlin.—Electric Traction on the Berlin City and Belt Line (Der Elektrische Betrieb auf der Berliner Stadt und Ringbahn). D. Pforr. A comparison of electric with steam traction under similar conditions. 4000 w. Glaser's Annalen—Dec. 15, 1900.

The Electric Operation of the Berlin "Ringbahn" (Der Elektrische Betrieb auf der Berliner Stadt und Ringbahn). Hr. Schimpff and Prof. Kübler. A discussion of the substitution of electricity for steam on the city railway of Berlin. The subject is considered from every side, and electrical operation is strongly recommended. 5000 w. Glasers Ann—April 1, 1901.

Electric Driving on the Berlin Belt Railway (Der Elektrische Betrieb auf der Berliner Stadt und Ringbahn). D. Prorr. An examination of the conditions of operation of the Berlin municipal railway in view of the substitution of electric driving for steam. 2200 w. Glasers Ann—June 1, 1901.

The Electric Elevated and Underground Railways in Berlin (Die Elektrischen Hoch und Tiefbahnen in Berlin). Hngo Koestler. A very well illustrated account of this rapid transit system. 8 plates. 7500 w. Oesterr Wochenschr f d Oeffent Baudienst—Nov. 23, 1901.

Interesting Constructions on the Berlin Electric Elevated and Underground Railway (Interessante Montagen der Elektrischen Hoch- und Untergrundbahn su Berlin). Hans Dominik. A well illustrated account of various interesting features of the construction work. Two parts. 3000 w. Ill Zeitschr f Klein-u Strassenbahnen—Jan. 1, 16, 1902.

The Electric Elevated and Underground Railway in Berlin (Die Elektrische Hoch- und Untergrundbahn in Berlin). Hr. Frahm. A well illustrated description, particularly of the elevated structure and details of construction. 3500 w. Stahl u Eisen—Feb. 1, 1902.

The Berlin Electric Elevated and Underground Railway (Die Elektrische Hoch- und Untergrundbahn in Berlin). Gisbert Kapp. A well illustrated description of the road, the cars and the power station. 3500 w. Elektrotech Zeitschr—Feb. 13, 1902.

The Berlin Electric Elevated and Underground Railway (Die Elektrische Hoch- und Untergrundbahn in Berlin). Hr. Langbein. A very well illustrated and complete account of all the features of this road, which has lately been opened for traffic. Serial. 3 parts. Map. 24,000 w. Zeitschr d Ver Deutscher Ing—Feb. 15, 22, March 1, 1902.

Opening of the Electric Elevated and Underground Road, Berlin, Germany. An illustrated account of this important engineering work. 900 w. Elec Wld & Engr—March 1, 1902.

The Berlin Elevated and Underground Electric Railway.. Abstract translation of an article by Mr. Gisbert Kapp, which appeared in the "Elektrotechnische Zeitschrift," giving a description of the undertaking. Ill. Serial. 2 parts. 2200 w. Elec Engr, Lond—March 7 and 14, 1902.

The Metropolitan Railways of Berlin (Les

Chemins de Fer Métropolitains de Berlin). R. Philippe. Fully illustrated description of the system of railways of Berlin, including the earlier steam roads and the latest electric system. Two articles. 8000 w. Two plates. Génie Civil—March 15, 22, 1902.

The Financial Prospects of the Berlin Elevated and Underground Railway (Betrachtungen zur Wirtschaftlichkeit der Berliner Hoch- und Untergrundbahn). Hans Dominik. A discussion of the costs, traffic and profitableness of this railway, with favorable conclusion. 1200 w. Ill. Zeitschr f Klein und Strassenbahnen—March 16, 1902.

The New Electric Underground and Elevated Railway at Berlin. An account of this recently completed enterprise, showing the novel features and German municipal methods. Ill. 2200 w. U S Cons Repts, No. 1302—March 29, 1902.

The New Electric Railroad at Berlin. A descriptive account of the elevated and underground electric railroad recently opened. 1100 w. R R Gaz—April 4, 1902.

The Berlin Overhead and Underground Electric Railway. Illustrated detailed description with brief resumé of the history of the undertaking. Serial. 1st part. 2700 w. Elec Rev, Lond—April 18, 1902.

The Berlin Elevated and Underground Railway. Illustrated description of the 13-mile rapid-transit electric railway in Berlin, explaining mainly the superstructure and power station. 3000 w. Eng Rec—April 26, 1902.

The Berlin Combined Overhead and Underground Railway. P. T. J. Estler. Illustrated detailed description of this interesting engineering work. 3400 w. Tram & Ry Wld—May 8, 1902.

The New Electric Rapid Transit Railway in Berlin, Germany. An illustrated description abstracted from a series of articles by Herr Langbein, published in the "Zeitschrift des Vereins Deutscher Ingenieure." 5700 w. Eng News—May 15, 1902.

The Berlin Metropolitan Railway (Métropolitain Electrique de Berlin). H. Martin. Illustrating and describing especially the power station and the rolling stock of the Berlin electric railway. 2500 w. 1 plate. Génie Civil—May 17, 1902.

The Metropolitan Railway of Berlin (Le Chemin de Fer Metropolitain Electrique de Berlin). A general description of the electric elevated railway in Berlin, with views of the important bridges and other structures. 8000 w. Rev Gen d Chemins de Fer—Aug., 1902.

The Latest Developments of the Berlin Elevated and Underground Railway. Frank C. Perkins. An illustrated description of the line and its equipment. 2800 w. Elec Rev, N Y—Oct. 11, 1902.

The Underground and Elevated Electric Railways in Berlin—Now Completed and in Operation. Frank C. Perkins. Begins an illustrated detailed description of this great engineering undertaking. Serial. 1st part. 1500 w. Sci Am Sup—Nov. 1, 1902.

Tram Unit Control System Used on the Berlin Elevated Railway. A description, with diagrams, of a system of electric train control, installed by Siemens & Halske, in which only two motor cars per train can be used. 1000 w. St Ry Jour—Jan. 3, 1903.

A North-South Berlin City Railway. D. Feldmann. Translated from "Zentralblatt der Bauverwaltung." Discusses the location of such a line, and the construction. Thinks it is only possible if built sufficiently high to cross over the houses. Map. 2500 w. Bul Int Ry Cong—March, 1904.

Recent Elevated Practice in Berlin. John P. Fox. An illustrated article describing how noise was largely prevented, the road made attractive, etc. 2800 w. St Ry Jour—June 4, 1904.

The Electric Elevated and Underground Railway at Berlin. An illustrated detailed description of the line, with an account of the project. Serial. 1st part. 5700 w. Trac & Trans—July, 1904.

The Electric Elevated and Underground Railway of Berlin. Paul Möller. A fully illustrated description of the features of construction, equipment and operation. 3000 w. Engineering Magazine—August, 1904.

Precautionary Measures on the Berlin Overhead and Underground Railway. Mr. Bork, in the "Zeitung des Vereins." A comparison with the Paris Metropolitan Railway. 3150 w. Bul Int Ry Cong—Aug., 1904.

Berlin and Paris.—See Paris and Berlin.

Boston.—Unique Elevated-Underground Street Railway in Boston. J. A. Stewart. Illustrated description of interesting features of changed plans. 1200 w. Sci Am—Feb. 2, 1901.

New Power Station and Elevated Railway System in Boston. Illustrated detailed description of the system of elevated, surface and subway tracks, and the power station, car house, etc. 4500 w. St Ry Jour—March 2, 1901.

The Boston Elevated. An illustrated description of a few features of interest in this recently opened railway system. 1100 w. St Ry Jour—May 15, 1901.

The Boston Electric Elevated Railway. Illustrated notes on the equipment of the Boston Elevated Railway Company's new lines, power stations and trains. 1500 w. Elec Rev, N Y—June 29, 1901.

Operating Features of the Boston Elevated. Francis H. Shepard. An illustrated article calling attention to interesting features of operation. 3000 w. Elec Wld & Engr—Aug. 10, 1901.

The Boston Elevated Railway. J. A. Stewart. Particulars of interest, especially in regard to the recently opened Atlantic Avenue circuit. Ill. 1300 w. Sci Am Sup—Nov. 2, 1901.

A Description of the Feeder Requirements and Installation on the Elevated Section of the Boston Elevated Railway Company's System. C. H. Hile. Ill. 1200 w. Wis Engr—April, 1902.

Effect of the Boston Elevated on Traffic. An estimate of the value of the service rendered and the striking features of the present situation. 1100 w. St Ry Rev—May 20, 1902.

Results with the Third Rail in Boston. A report of the operation of this extensive system, the construction and the problems in its working. Ill. 1500 w. Elec Wld & Engr—Jan. 24, 1903.

Maintenance and Inspection of Electrical Equipment. John Lindall. Read before the Am. Ry. Mech. & Elec. Assn. Suggestions, with a brief description of inspection and repairs of electrical equipment on the Boston Elevated Ry. 2500 w. St Ry Rev—Oct. 12, 1904 (Daily Ed.).

Depreciation on the Boston Elevated Railway. Howard S. Knowlton. Information concerning the conditions on this road, and the work of maintenance as carried out. 1500 w. Elec Rev, N Y—Dec. 3, 1904.

See also Car Test Recorder; ELEVATED RAILWAY STATION; TRANSPORTATION; UNDERGROUND RAILWAY.

Brooklyn.—The Elevated Structure of the Atlantic Avenue Improvements. Discusses some of the peculiar features in the design of elevated railways in Brooklyn. 1200 w. Eng Rec—June 14, 1902.

The Elevated Structure of the Atlantic Avenue Improvement, Brooklyn. Illustrated description of the steel-work designed for the improvements made to remove the Long Island Railway tracks from the surface. 3000 w. Eng Rec—June 17, 1902.

Brooklyn Bonding.—The Bonding of the Brooklyn Elevated Railway System. F. H. Parke. Illustrated description of the method of bonding a structure which has been in use some time. 3000 w. St Ry Jour—Dec. 24, 1904.

Brooklyn, Records.—Important New System of Car Equipment Records for the Brooklyn Elevated Railroads. An explanation of the details of the system adopted. 4700 w. St Ry Jour—Sept. 3, 1904.

Car, N. Y.—See ELECTRIC CAR—New York Elevated.

Car-Test Recorder.—Car-Test Recorder of the Boston Elevated Railway Company. J. M. Ayer and H. S. Knowlton. Illustrates and describes the apparatus for securing automatic test records and its operation. 11,000 w. St Ry Jour—Jan. 14, 1905.

Chicago.—Loop Terminals and Transfer Station, Metropolitan Elevated R. R., Chicago. States the advantages of loop terminals, and gives plans and description of recent work in this city. 1300 w. Eng News—Aug. 14, 1902.

Methods of Increasing the Capacity and Reducing the Noise Upon the Union Elevated Railroad of Chicago. Abstract of the second report of Bion J. Arnold. Ills. 3600 w. St Ry Rev—March 15, 1905.

Report upon Increasing the Capacity and Reducing the Noise of the Union Elevated Railroad of Chicago. A report on these two subjects, by Bion J. Arnold, is given in extract. Ills. 7800 w. St Ry Jour—March 18, 1905.

Concerning Noise in the Operation of Elevated Railways. Describes the plan of J. B. Strauss for reducing the noise on the elevated lines of Chicago, with comments. 2500 w. Eng News—Nov. 17, 1904.

See also ELECTRIC STATION—Chicago Elevated; ELECTRIC RAILWAY—Sprague.

Electric Distribution.—See ELECTRIC DISTRIBUTION.

Fire Protection.—See FIRE CAR—Chicago Elevated.

Inspection.—Inspection on the Manhattan Elevated Railway. A brief review, giving some idea of the vigilance required to maintain such an oversight of the equipment as to prevent accidents. 1600 w. Ry Age—May 17, 1901.

Liverpool.—The Liverpool Overhead Railway New Equipment. An illustrated article describing the equipment of trains with new motors, which enable the trip to be made in about 20 minutes that formerly required 32 minutes. 1000 w. Engr, Lond—March 21, 1902.

New Equipment for the Liverpool Overhead Railway. Describes the new motors, which have made possible a greatly increased acceleration. Ill. 1400 w. Elec Rev, Lond—July 4, 1902.

The Increased Acceleration on the Liverpool Overhead Railway. A description of the equipment being installed to obtain very high acceleration to meet competition. 2000 w. Tram & Ry Wld—Sept. 11, 1902.

The Liverpool Overhead Railway. Results of high acceleration extracted from a recently issued pamphlet. 2000 w. Transport—Oct. 17, 1902.

Liverpool Accident.—See RAILWAY ACCIDENT.

Lead Diagrams.—See STREET RAILWAY MANAGEMENT.

Manhattan.—See Inspection; New York; ELECTRIC STATION—New York Elevated.

New York.—Electric Traction on the New York Elevated Railways. An account of the first trips of electric motor trains over the Manhattan Railway Co.'s elevated structure in Second avenue, New York City, with editorial. Ill. 2200 w. Elec Rev, N Y—Nov. 28, 1900.

Electric Traction Equipment of the Manhattan Elevated—New York City. Discusses the changes to be made, and their advantages. Also editorial. 2700 w. R R Gaz—Nov. 30, 1900.

Construction of the Manhattan Elevated Railway in New York (Baukonstruktion der Manhattan-Hochbahn in New York). F. M. von der Werra. A fully illustrated account of the structural work on the elevated railway in New York. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—June 22, 1901.

Manhattan Railway Co., of New York. Brief account of this system, which comprises the elevated roads on Manhattan Island, and the Suburban Railroad north of the Harlem River. 1800 w. St Ry Rev—Sept. 15, 1901.

Electric Traction on the New York Elevated Railway (Der Neue Elektrische Betrieb der New Yorker Stadtbahn). A. Hruschka. A general account of the plans for the conversion of the New York elevated railway, including the line, the power house and the electric plant. Serial. Part I. Elektrotech Zeitschr—Oct. 17, 1901.

Electric Traction on the Manhattan Elevated Railway (Mittheilungen über den Elektrischen Betrieb auf der Manhattan Bahn). Hr. Sarre. An illustrated general account of the electrical equipment of the road and of the power station, with map and diagrams. 2 plates. 3000 w. Glasers Ann—Dec. 15, 1901.

Electricity on New York's Elevated Railways. Hermann A. Strauss. Outlines the plan of power supply, giving illustrations. 3300 w. Elec Age—Jan., 1902.

Electrical Equipment of the Manhattan Elevated Railway. Facts and views concerning this important installation. Serial. 1st part. 1700 w. Elec Wld & Engr—Jan. 11, 1902.

The Electric Equipment of the Manhattan Elevated. A short description of the train equipment, and a more complete illustrated description of the power plant of the New York Elevated Railway. 2500 w. R R Gaz—Jan. 17, 1902.

Application of Electric Traction to the New York Elevated Railways (Application de la Traction Electrique au Chemin de Fer Metropolitain de New York). H. Martin. A description of the conversion of the New York elevated railway system from steam to electric traction. Serial. Part I. 3000 w. 1 plate. Génie Civil—Sept. 13, 1902.

See also Inspection; ELECTRIC STATION; THIRD RAIL.

N. Y. Bridge Connections.—See ELECTRIC RAILWAY.

N. Y. Interborough.—Elevated Structure of the New York Rapid Transit Railroad. Illustrates and describes interesting details of this viaduct. 1100 w. Eng Rec—Feb. 28, 1903.

See also UNDERGROUND RAILWAY.

Noise, Chicago.—See Chicago.

Open Cars.—See ELECTRIC CAR—Brooklyn Elevated.

Paris and Berlin.—Elevated Construction in Paris and Berlin. John P. Fox. An illustrated article discussing the ballasted construction adopted on the Berlin Stadtbahn, and the ballasted floor of the Paris Metropolitan Railway, and other possible improvements on elevated lines. 1500 w. St Ry Jour—June 24, 1905.

Paris Exposition.—See ELECTRIC RAILWAY; MOVING SIDEWALK.

Paris Metropolitan.—See UNDERGROUND RAILWAY.

Philadelphia.—See UNDERGROUND RAILWAY.

Subway and Surface Compared.—The Relative Advantages of Overhead, Deep Level, and Shallow Subway Lines, for the Accommodation of Uuban Railway Traffic. S. B. Cottrell. Read before the Engng. Con. of the Inst. of Civ. Engrs. Briefly considers each type. Discussion follows. 2500 w. Engr, Lond—June 26, 1903.

Elevated Railways. Gerald Barker. Considers some of the advantages claimed for the deep-level tube railways, the railways in shallow subways, the tramways on the surface, and elevated railways. Also considers the disadvantages that have been alleged against these systems. Ill. 3300 w. Engng—July 24, 1903.

Tokio.—The Elevated Railway of Tokio (Die Hochbahn von Tokio). F. Baltzer. A very full account of the construction and equipment of the elevated railway in Tokio, Japan. Serial. 1st part. 4000 w. Zeitschr d Ver Deutscher Ing—Nov. 21, 1903.

United States and Canada.—See ELECTRIC RAILWAY.

Vienna.—Experimental Electrical Operation of the Vienna City Railway (Der Elektrische Probebetrieb auf der Wiener Stadtbahn). An illustrated account of successful experiments which will robably lead to the electrification of the road. 1000 w. Ill Zeitschr f Klein u Strassenbahnen—Feb. 1, 1902.

The Vienna City Railway (Die Wiener Stadtbahnen). A well illustrated description of this elevated and underground railway, at present operated by steam locomotive, but on which electrical operation is being experimented with. Serial. 2 parts. 3500 w. Schweiz Bauzeitung—Feb. 1, 8, 1902.

Plan for the Extension of the Vienna Municipal Railway (Ein Vorschlag zur Erweiterung des Wiener Stadtbahnnetzes). H. v. Feyrer. A study of the requirements of traffic upon the elevated railway of Vienna with a plan for extending the lines. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 19, 1902.

See also ELECTRIC RAILWAY.

ELEVATED RAILWAY SIGNAL.

See RAILWAY SIGNAL—Boston Elevated.

ELEVATED RAILWAY STATION.

Berlin.—The Stations of the Berlin Electric Elevated and Underground Railway (Die Bahnhöfe der Elektrischen Hoch- und Untergrundbahn zu Berlin). Hans Dominik. A well illustrated description of the stations on the new Berlin electric railway. Two parts. 2500 w. Ill Zeitschr f Klein u Strassenbahnen—Feb. 16, March 1, 1902.

Boston.—Sullivan Square Station of the Boston Elevated. Illustrated description of an unusually fine station. 600 w. R R Gaz—May 3, 1901.

The Sullivan Square Station, Boston. Illustrated description of a double-deck train shed at one of the terminals of the Boston Elevated Ry., and of a large number of electric railways. The roof arches have a span of 175 feet. 1700 w. Eng Rec—June 15, 1901.

ELEVATOR.

See also ELEVATOR, ELECTRIC; HOISTING; HOISTING ENGINE; LIFT.

Elevators: Their Construction and Operation. William Baxter, Jr. An illustrated article discussing in this number the hydraulic elevator, sheave and rope arrangement, methods of control, governors, etc. Ill. Serial. 1st part. 3400 w. Steam Engng—Feb., 1902.

Elevators: Their Construction and Operation—Horizontal Cylinder, Hydraulic Elevators, Pushing Type. William Baxter, Jr. Explains the difference between the pulling and the pushing types of horizontal hydraulic elevators, illustrating details. Serial. 1st part. 1200 w. Engr, U S A—April 15, 1904.

Aero-Hydraulic.—See Hydraulic.

Air Cushion.—A High Drop Test of an Elevator Safety Air Cushion. An account of an interesting test made in the Philadelphia City Hall tower. The passenger elevator, weighing 2,500 lbs., was allowed to drop 290 feet before entering the air cushion. 2000 w. Eng News—Oct. 9, 1902.

Blast Furnace.—See ELEVATOR, ELECTRIC.

Bucket Making.—See STEAM HAMMER—Elevator Buckets.

Car.—See Hydraulic.

Condon Spiral.—See Spiral.

Defects.—See BOILER.

Development.—Vertical Transportation. A brief review of the progress made in elevator development, and the types in use. 1300 w. Sci Am April 4, 1903.

Eiffel Tower.—The New Hydraulic Lifts for the Eiffel Tower (Les Nouveaux Ascenseurs Hydrauliques de la Tour de 300 Metres). Ch. Dantin. A fully illustrated account of the new lifts installed to accommodate the increased travel at the Exposition of 1900. 2000 w. 1 plate. Génie Civil—Oct. 20, 1900.

The New Fives-Lille Elevators at the Eiffel Tower (Les Nouveaux Ascenseurs Fives-Lille à la Tour Eiffel). G. Leugny. A description of the new and enlarged elevator system installed for the service of the exposition of 1900. 2000 w. Revue Technique—Nov. 25, 1900.

The New Elevators of the Eiffel Tower. From "La Nature." An illustrated description of changes made, necessitated by the installation of new elevators, and the difficulties overcome. 1100 w. Sci Am Sup—Dec. 8, 1900.

See also Paris Exposition.

Frazier System.—See ELEVATOR ACCIDENT—New York.

Governor.—Elevator Safety Governors. William Baxter, Jr. Illustrates and describes a safety governor mounted directly upon the elevator car, and driven by a stationary rope which is secured to the top and bottom of the elevator well. Also shows a balanced governor. 1400 w. Am Mach—Sept. 18, 1902.

See HYDRAULIC MINING—Elevator.

Hydraulic.—Low Pressure Hydraulic Elevators. William Baxter, Jr. Illustrated detailed description of a vertical cylinder elevator and its operation. Serial. 1st part. 1700 w. Am Mach—May 2, 1901.

Hydraulic Elevator for Railway Carriages (Ascenseur Hydraulique pour Wagons). Illustrated description of new hydraulic lift at the Rome-Trastevere station of the Mediterranean Railway of Italy. 800 w. 1 plate. Génie Civil—May 18, 1901.

The Selection and Installation of Hydraulic Elevators. Henry D. James. Gives information relating to the proper design, construction and operation of hydraulic elevators. Ill. 3800 w. Eng News—July 31, 1902.

The Evolution of the Hydraulic Elevator; High-Pressure Elevators in the Prudential Buildings, Newark, N. J. Charles L. Duenkel. A brief historical retrospect with illustrated description of this important installation representative of modern practice. 6000 w. Eng News—Feb. 5, 1903.

Hydraulic Plunger Elevators. William Baxter, Jr. An illustrated detailed description of this type and its working. 3000 w. Engr, U S A—Oct. 15, 1904.

The Aero-Hydraulic Elevator. William Baxter, Jr. Illustrated description of a system in which the water pressure required to operate the car is obtained by means of compressed air or steam. 1600 w. Engr, U S A—Dec. 15, 1904.

See also Eiffel Tower; Modern; Standard Plunger Works; Test; HYDRAULIC POWER—Elevator Machinery; HYDRAULIC MINING—Elevator.

Hydraulic vs. Electric.—See ELEVATOR, ELECTRIC—Hydraulic, Compared.

Hydro-Electric.—Electrically Controlled Hydraulic Elevators. William Baxter, Jr. An illustrated description of an elevator so arranged as to not require an attendant, operated by electricity obtained from direct current incandescent lighting circuits. Serial. 1st part. 1300 w. Am Mach—Sept. 12, 1901.

Electrically Driven Hydraulic Passenger Lifts. An illustrated description of the passenger elevators installed at the Shepherd's Bush Station of the Central London underground railway. 1800 w. Engng—Feb. 5, 1904.

The Elevators of the Central London Railway (Ascenseurs du Central London Railway). Illustrated description of the hydraulic lifts at the Shepherd's Bush station of the underground tube railway. 2000 w. 1 plate. Génie Civil—Feb. 20, 1904.

See also ELEVATOR, ELECTRIC—Control.

Inclined.—See Weehawken; CABLE RAILWAY; MOUNTAIN RAILWAY.

London Underground.—See Hydro-Electric; ELEVATOR, ELECTRIC.

Low Pressure.—See Hydraulic.

Modern.—Modern Elevator Types and Elevator Practice. H. S. Knowlton. Describing especially the later electric and hydraulic systems. 3500 w. Engineering Magazine.—Nov., 1904.

Ore.—Notes on Ore Bucket Elevators. Alfred Harvey. Describes a few types most commonly used, giving information in regard to satisfactory speeds and diameters of head pulleys. Ills. 1500 w. Min Rept—Nov. 17, 1904.

Otis.—The Otis Double Power Hydraulic Elevator. William Baxter, Jr. An illustrated description of this system, which is an arrangement to reduce the loss of energy in cases where the average loads are far below the maximum. 1900 w. Am Mach—June 27, 1901.

See also ELEVATOR, ELECTRIC.

Paris Exposition.—The Elevators at the Exposition of 1900 (Les Ascenseurs à l'Exposition de 1900). P. Dumesil. Detailed description of the various elevators, hydraulic, pneumatic, and electric, operated in all parts of the exposition. Three articles. 5000 w. Génie Civil—Jan. 19, 26, Feb. 2, 1901.

See also Eiffel Tower.

Plunger.—See Hydraulic; Standard Plunger Works.

Pneumatic.—See LIFT.

Reichenberg Station.—See ELEVATOR, ELECTRIC.

Safety Appliances.—Elevator Safety Appliances. William Baxter, Jr. An illustrated review of the various appliances employed. Serial. 1st part. 1600 w. Am Mach—March 13, 1902.

Protection of Lift Shafts, and Safety Devices in Connection with Lift-Doors and Controlling Gear. Henry C. Walker. States conditions and describes an elevator with ideal entrance doors, locks, and controlling apparatus. 3400 w. 8 plates. Inst of Mech Engrs—March 21, 1902.

Elevator Safeties. Charles R. Pratt. The defects of old-style safety devices are pointed out, and a new type is described. Ill. 2000 w. Trans Am Soc of Mech Engrs, No. 0946—May, 1902.

Improved Safety Catch for Elevators (Neue Fangvorrichtung an Fahrkörben). W. Schrader. Describing a new wedge device for supporting the cage of a lift in case of breakage of the hoisting cables. 1500 w. Zeitschr d Ver Deutscher Ing—Aug. 16, 1902.

See also Air Cushion; Governor; SAFETY APPLIANCE.

St. Louis Waterworks.—The Elevators at the St. Louis Water Works. E. E. Wall. An account of the trouble caused by anchor or needle ice in the wet well at the Chain of Rocks, and the elevators built to remove it. Ills. 700 w. Eng Rec—May 20, 1905.

Smelting Plants.—An Elevator for Smelting Plants. Joel G. Clemmer. Drawings and description of a very well designed and convenient form of elevator for smelting and other plants. 800 w. Eng & Min Jour—June 22, 1901.

Spiral.—A New Spiral Elevator. Illustrated description of a novel type of elevator. 900 w. Eng Rec—Aug. 29, 1903.

Standard Plunger Works.—The Works of the Standard Plunger Elevator Company. W. A. Waterman. Illustrated detailed description of these works, located at Worcester, Mass. Also details of the elevator manufactured. 3800 w. Mach, N Y—July, 1904.

Tailings.—Tailings Elevators. W. H. Wood and E. J. Laschinger. Abstracted from the Jour. of the Mech. Engrs. Assn. of the Witwatersrand. Treats of appliances, made necessary by the flat nature of the ground, under the subjects of tailings wheels, tailings pumps, bucket belt elevators, and air-lift pumps. Ills. 2700 w. Eng & Min Jour—March 24, 1904.

Test.—Tests of an Hydraulic Elevator System. Reginald Pelham Bolton. Describes the trial of an elevator system installed in a new department store in New York. 1800 w. Trans Am Soc of Mech Engrs—June, 1903.

Tests of Elevator Plant in the Trinity Building, New York City. Arthur J. Herschmann. A report of commercial tests made while the plant was in regular operation. Tables. Ills. 1500 w. Trans Am Soc of Mech Engrs (No. 079)—Dec., 1905.

Tests of Elevator Plant in the Trinity Building, New York. Illustrates and describes the elevator system installed in this 20-story building, giving a report of the tests made. 2500 w. Eng Rec—Dec. 16, 1905.

See also ELEVATOR, ELECTRIC.

Valve Gear.—See VALVE GEAR—Hydraulic Elevators.

Washington Monument.—See ELEVATOR, ELECTRIC.

Weehawken, N. J.—See MOUNTAIN RAILWAY.

Wire Rope.—See WIRE ROPE—Elevator.

ELEVATOR ACCIDENT.

New York.—Some Recent Elevator Accidents. Edward Van Winkle. Discussion with illustrations of elevator accidents in New York and the necessity for more careful inspection. 1500 w. Eng News—Aug. 25, 1904.

Some Notes on a Recent Elevator Accident. Charles R. Pratt. An explanation of the Frasier system which operated the elevators at 74 Broadway, New York, where an accident occurred Feb. 2, 1904. Also refers to other systems. 1600 w. Eng News—Feb. 11, 1904.

ELEVATOR CAR.

Design.—A Graphical Method of Laying Out the Corner of an Elevator Car. F. B. Kleinhaus. Illustrates and describes the method. 500 w. Am Mach—Nov. 14, 1901.

ELEVATOR, ELECTRIC.

See also ELEVATOR—Modern.

The Electric Elevator. H. D. James. Illustrates and describes the mechanism and the operation. 3000 w. Am Elect'n—May, 1902.

Fundamental Features of Electric Elevators. E. R. Carichoff. The first of a number of articles which will cover the field of electric elevator service. The various systems will be described, the method of control, and the various safety devices. Ills. Serial. 1st part. 2000 w. Elec Rev, N Y—June 24, 1905.

Automatic.—An Automatic Electric Lift. Diagram and description of the "Richmond-Carey" press-button patent electric elevator and its working. 1700 w. Mech Engr—May 23, 1903.

Blast Furnace.—See BLAST FURNACE—Charging Apparatus, Electric.

Burgenstock.—The Hammetschwand Elevator on the Burgenstock (Der Hammetschwand Aufzug am Bürgenstock). An illustrated description of an elevator of 118 metres high, giving access to the cliffs on the bank of the lake of Lucerne. 1500 w. Schweiz Bauzeitung—Oct. 7, 1905.

The Electric Elevator on the Burgenstock (L'Ascenseur Electrique du Burgenstock). P. Chignaterie. An illustrated description of the tower and lift giving access to the high cliffs on the banks of the lake of Lucerne, Switzerland. 1000 w. Génie Civil—Oct. 21, 1905.

Control.—Electric Elevator Control. Hayward Cochrane. Abstract of a paper read before the Chicago Elec. Assn. States the requirements of electric elevator controllers, discusses their operation, etc. Ill. 2700 w. Am Elect'n—Nov., 1900.

Electric Elevator Control Systems. H. D. James. Illustrates and describes the fundamental features of some of the representative types of electric elevator control. 2200 w. Am Elect'n—Nov., 1902.

The Arrangement of Controllers for Electric Elevators (Die Elemente der Druckknopfsteuerungen für Elektrische Aufzüge). Dr. K. Kahle. Discussing especially the connections for controlling electric elevators by means of push buttons on the various floors. 7000 w. Elektrotech Zeitschr—Sept. 17, 1903.

The Control of Electric Elevators (Commande des Ascenseurs Electriques). L. Ramakers. A description of the Siemens-Schuckert system, in which the movement of the car is controlled by push buttons, operated by the passenger without requiring special attendant. 2000 w. Génie Civil—Dec. 19, 1903.

See also Automatic.

Design.—Electrically-Driven Lifts. F. O. Hunt. Read before the Newcastle Sec. of the Inst. of Elec. Engrs. An illustrated article discussing features needing to be improved, and the most suitable type of motor. Serial. 1st part. 1800 w. Elec Engr, Lond—April 7, 1905.

Europe.—Electric Elevators (Electrisch Betriebene Aufzüge). S. Herzog. A general discussion and illustrated descriptions of various European systems of electric elevators. Serial. Part I. 1800 w. Schweiz Bauzeitung—July 5, 1902.

Giessen University.—Electric Elevators (Elektrische Aufzüge). O. Pollok. Brief illustrated description of the electric elevator recently installed in the library of the University of Giessen. 1000 w. Zeitschr d Ver Deutscher Ing—July 8, 1905.

Hammetschwand.—See Burgenstock.

Hydraulic.—See ELEVATOR—Hydro Electric.

Hydraulic Compared.—Relative Efficiencies of Electric and Hydraulic Elevators. William C. L. Eglin. Abstract of a paper read at the Assn. of the Edison Ill. Cos. Remarks on the types of hydraulic and electric elevators, with an attempt to compare their mechanical efficiencies and the conclusions. 2000 w. Elec Rev, N Y—Nov. 12, 1904.

Induction Motor.—Induction Motors for Elevators. A. B. Weeks. An illustrated description of some of the apparatus employed and notes on the care of it. 1500 w. Am Elect'n—June, 1903.

London Underground.—The Electric Lifts of the City and South London Railway. Illustrated detailed description of the satisfactory apparatus of the stations for the use of passengers. 1800 w. Tram & Ry Wld—Jan. 9, 1902.

See also ELEVATOR—Hydro Electric.

Mabbs.—The Mabbs Electric Elevator. Illustrated description of a novel and successful machine that has been in service for nearly three years. 2800 w. Engr, U S A—Sept. 1, 1905.

Operation.—Investigations of the Operation of Electric Elevators (Untersuchung des Auslaufweges Elektrischer Aufzüge). Hugo Stahl. With diagrams showing the accelerations, and general action, with various methods of braking and control. 4500 w. Zeitschr d Ver Deutscher Ing—April 8, 1905.

Otis.—The Otis Elevator Company's Electric Elevator for Private Residences. Report of the Committee on Science and the Arts, of the Franklin Inst. 1200 w. Jour Fr Inst—Sept., 1903.

Paris.—The Electric Elevators at the Paris Post Office (Les Montes-Charges Electriques de l'Hotel des Postes de Paris). V. Belugon. Illustrated description of the electric lifts used for handling the mail at Paris. 1500 w. 1 plate. Génie Civil—July 26, 1902.

Electric Elevators. An illustrated review of the principal types used in Paris. Translated from "La Nature." 2500 w. Sci Am Sup—Dec. 27, 1902.

Reichenberg.—Electric Baggage Elevators in the Railway Station at Reichenberg, Bohemia (Elektrische Lastenaufzüge am Banhofe in Reichenberg). W. Krejga. Illustrated description. 1500 w. Zeitschr f Elektrotechnik—Dec. 27, 1903.

Richmond Carey.—See **Automatic.**

Sprague-Pratt.—See **Test.**

Test.—Power Consumption of Elevators Operated by Alternating and Direct-Current Motors. George F. Sever. A report of investigations made to determine the power consumption in the two different lines. Twenty tests were made by senior students in the Elec. Engng. Dept. of Columbia Univ. and the results are tabulated. 1400 w. Trans Am Inst of Elec Engrs—April, 1902.

Test of Sprague-Pratt Elevators in the Park Row Building, New York. Gives the results of test made, and the general conditions. 2000 w. Eng Rec—July 6, 1901.

Test of Electric Passenger Elevators in the Park Row Building, New York City. G. A. Balz, G. I. Branch and T. E. Landvoigt. Graduation Thesis. The object of the test was to determine the energy consumption of the electric elevators in kilowatt hours per car mile, and the average number of passengers carried. 4000 w. Stevens Ind—July, 1905.

Washington Monument.—The Electric Elevator in the Washington Monument. C. M. Lewis. Illustrated description of the light and power plant, elevator machinery, etc. 4800 w. Elec Wld & Engr—Aug. 3, 1901.

The New Electric Elevator at the Washington Monument. Illustrated detailed description of the new elevator, with explanation of the change. 3500 w. Eng News—Aug. 22, 1901.

Self-Contained Electric Elevator (Automobile Electrische Aufzüge). A description of the Wüst system, in which the motor and winding mechanism is carried on the car. 1000 w. Glasers Annalen—Dec. 1, 1901.

ELLIPSE.

See also **BORING MACHINE; DRAWING; DRAWING INSTRUMENT; LATHE.**

A Ready Construction of the Ellipse. W. S. Buvinger. Gives curves giving radii for all ellipses at angles of 15, 30 and 60 degrees, measured from the center line. The curves have been constructed from mathematical calculation and are sufficiently accurate for ordinary work. 300 w. Am Mach—June 26, 1902.

ELLIPTICAL CUTTING MACHINE.

See **BORING MACHINE—Elliptical; LATHE—Elliptical.**

EMBANKMENT.

See **EARTH PRESSURE; EARTHWORK; RAILWAY CONSTRUCTION; RETAINING WALL.**

Consolidation.—See **EARTHWORK—Roller.**

Earth Pressures.—See **EARTH PRESSURE—Lateral.**

Pillar Drain.—See **DRAINAGE.**

EMERALD.

See also **PRECIOUS STONE.**

Colombia.—Emerald Mines in Colombia. From a report by Mr. Lloyd-Owens, describing the celebrated emerald mines of Muso, Colombia. 1300 w. Min Wld—Aug. 26, 1905.

EMERY.

See also **ABRASIVE; GRINDING.**

Emery, Its Occurrence, Uses, &c. Herman Shultz. Notes on the scarcity of crude emery ore, the location of the deposits, the imports into the United States, its uses, &c. 1000 w. Min Wld—Feb. 25, 1905.

EMERY WHEEL.

See also **ABRASIVE; GRINDING; GRINDING WHEEL.**

Bursting.—The Bursting of Emery Wheels. Charles H. Benjamin. Gives illustrations and tabulated results of a number of tests made on wheels of various makes, bought in the open market. 600 w. Trans Am Soc of Mech Engrs—June, 1903.

The Mounting of Emery Wheels. Reproduction of remarks by Mr. Verney on the bursting of emery wheels and means of prevention, with figures. 1000 w. Mech Engr—Aug. 6, 1904.

Foundries.—Emery Wheel Practice in Foundries. Charles G. Smith. Read before the Pittsburg Foundrymen's Assn. Discusses conditions needed to secure good results, and points of importance in grinding. 3000 w. Ir Age—Sept. 10, 1903.

Emery Wheel Practice in Foundries. Charles G. Smith. Read before the Pittsburg Found. Assn. Discusses foundry grinding, especially the uses for emery wheels. 2300 w. Foundry—Nov., 1903.

Manufacture.—The Manufacture of Emery Wheels. Waldon Fawcett. Describes the different processes used in making emery and corundum wheels. Ills. 1200 w. Sci Am Sup—March 12, 1904.

Speed Trial.—A Speed Trial of Emery Wheels as to Strength. T. Dunkin Paret. Gives information from Prof. Grübler's preliminary report concerning tests made in Germany to arrive at some verified data as to the speed which solid emery wheels could safely endure. 1300 w. R R Gaz—July 11, 1902.

Tests.—Experimental Work with Solid Emery Wheels. T. Dunkin Paret. Reports investigations and tests of emery wheels and the results. 6500 w. Jour Fr Inst—Aug., 1904.

ENAMELING.

See also **FURNACE—Enamel.**

Enameling. The first of a series of articles on the commercial enameling industry, considering hollow-ware enameling for domestic use, and for chemical use, enameling locomotive and other tubes, drain and water pipes, and sign-board enameling. Serial. 1st part. 4200 w. Engr, Lond—Aug. 23, 1901.

Dupont Process.—The Dupont Process of Enameling Large Hot Castings (Rapports sur l'Emaillage à Chaud des Pièces de Fonte de Grandes Dimensions d'Après le Procédé de M. P. Dupont). Ach. Livache and P. Dupont. An illustrated description of a machine and process for enameling large objects, such as bath tubs, by spraying the enamel on in a closed chamber. 3000 w. Bull Soc d'Encouragement—March 31, 1903.

ENERGY.

See **CONSERVATION OF ENERGY; POWER.**

ENGINE.

See also **LOCOMOTIVE; MARINE ENGINE; MOTOR; STEAM ENGINE.**

Breakdowns.—See **MOTOR—Longridge Report.**

Munich—Augsburg.—New Products of the Munich and Augsburg Engine Industry (Neuere Leistungen der München—Augsburger Maschinen-industrie). Prof. M. Schröter. An illustrated account of locomotives, compressors, Diesel motors and other engines manufactured in these Bavarian cities. 6000 w. Zeitschr d Ver Deutscher Ing—July 11, 1903.

Pump.—When an Engine Becomes a Pump. W. H. Wakeman. Describes conditions that make this possible. 1600 w. Elec, N Y—Jan. 6, 1904.

Traction.—See **TRACTION ENGINE.**

ENGINE BUILDER.
See **ENGINE WORKS; STEAM ENGINE**—Standardization; **STEAM ENGINE MANUFACTURE.**

ENGINEER.

See also **EDUCATION; ELECTRIC ENGINEER; ENGINEERING; MECHANICAL ENGINEER; MINING ENGINEER; MUNICIPAL ENGINEER; NAVAL ENGINEER; SPECIFICATIONS.**

Building Construction.—See **BUILDING CONSTRUCTION**—Engineer and Architect.

Chemical.—The Chemical Engineer. Report of a paper by J. B. F. Herreshoff, and of the discussion. Deals with the training of a chemical engineer. 3200 w. Electro-Chem Ind—May, 1904.

Consulting.—Consulting Engineers and Their Work. Dr. Alexander B. W. Kennedy. Inaugural Address of the Session 1902-3 of the City and Guilds Central Technical College. On the duties and work of an engineer after his training is over. 5000 w. Engng—March 27, 1903.

The Consulting Engineer. Dr. Alexander B. W. Kennedy. An inaugural address at the City and Guilds Cent. Tech. College. On the duties and work of the engineer. 5500 w. Arch't, Lond—July 10, 1903.

Duty.—The Duty of the Engineer. A topical discussion. I. To Himself and His Profession. Edgar Marburg. II. To His Clients or Employers, John Birkinbine. III. To His Contractors and Employees, L. Y. Schermerhorn. IV. To the Public, John C. Trautwine, Jr., with general discussion. 1600 w. Pro Engrs' Club of Phila—Oct., 1901.

See also **ETHICS.**

Executive.—The Executive Engineer. A lecture by Prof. White on the necessity of executive training for engineers who aspire to places of high honor. 3000 w. Technograph—Nov. 19, 1904-1905.

Fees.—See **FEE.**

Finance.—See **ENGINEERING ECONOMICS; INDUSTRIAL ENGINEERING.**

Government Building.—See **BUILDING**—Government.

Government Service.—Opportunities for Engineering Graduates in the Government Service. John F. Hayford. Read before the Soc. for the Pro. of Engng. Ed. Deals with the opportunities for graduates in civil, mechanical, electrical and mining engineering. 2400 w. Eng News—July 13, 1905.

Hoisting.—See **HOISTING**—Engineer.

Interlapping.—Interlapping of Railway, Civil and Mechanical Engineers. Address by H. Wade Hibbard, followed by general discussion. 8400 w. Cent Ry Club—Nov., 1900.

Legal.—The Legal Position of an Engineer. Gives a general view of an engineer's position and considers the form of agreement under which he may be employed. 3000 w. Engr, Lond—Aug. 25, 1905.

Mattoids.—Mattoids in Engineering. H. F. J. Porter. Extracts from a paper presented to the Am. Water Wks. Assn. Remarks on the growing number of persons with small knowledge and much prejudice, and whose misconceptions lead often to danger. Several examples are given in illustration. 2800 w. Eng Rec—June 22, 1901.

Professor.—To What Extent and in What Direction Is It Desirable for a Professor of Engineering to Accept Engineering Employment. Prof. C. Frank Allen. Read at the Buffalo meeting of the Soc. for the Promotion of Engng Education. 2700 w. R R Gaz—July 19, 1901.

Testing.—See **TESTING ENGINEER.**

Twentieth Century.—The Engineer of the Twentieth Century. Robert Moore. Presidential address before the Am. Soc. of Civ. Engrs. On the relation between engineering and education in the new century. 3300 w. R R Gaz—June 6, 1902.

The Engineer of the Twentieth Century. Robert Moore. Presidential address before the Am. Soc. of C. E. concerning the requirements for successful engineering practice. 3100 w. Eng Rec—May 24, 1902.

ENGINEER EQUIPMENT.

Panama Canal.—The Equipment of Engineers Going to Panama. Henry A. Harris. Valuable information from competent authority in regard to clothing needed, accommodations, cost of living, &c., and the general conditions to be found on the isthmus. 2300 w. Eng News—March 2, 1905.

ENGINEERING.

See also **CIVIL ENGINEERING; ELECTRIC ENGINEERING; ENGINEER; MARINE ENGINEERING; MECHANICAL ENGINEERING; MINING ENGINEERING; MUNICIPAL ENGINEERING.**

Aesthetic.—See **BRIDGE; MACHINE**—Art and Craft.

Agricultural.—See **AGRICULTURE**—Engineering.

Argentina.—Engineering in Argentina. E. L. Corthell. An outline of the physical conditions, the climate, geology, etc., of this country, with an account of important engineering works, and brief review of the history. Ill. 5300 w. Jour W Soc of Engrs—Oct., 1902.

Bavaria.—The Historical Development of Engineering in Southern Bavaria (Die Geshichtliche Entwickelung der Technik im Südlichen Bayern). P. v. Lossow. A general historical and descriptive review of technical progress, with illustrations. 16000 w. Zeitschr d Ver Deutscher Ing—July 4, 1903.

Chemistry.—See **CHEMISTRY**—Engineering.

Commercial.—See **ENGINEERING ECONOMICS; INDUSTRIAL ENGINEERING.**

Comparison.—The Law of Comparison in Engineering Structures. W. F. Durand. Describes the method used in investigating the relation between the characteristic dimensions and the output of operation, illustrating by examples. 4000 w. Sib Jour of Engng—June, 1904.

Efficiencies.—See **EFFICIENCIES**; and under specific machines and processes.

Forrest Lecture.—The James Forrest Lecture. W. H. Maw. A review of this lecture, with extracts. Deals with heat engines, fatigue of metals and other problems. 2500 w. Engr, Lond—June 19, 1903.

Some Unsolved Problems in Engineering. W. H. Maw. Abstract of the eleventh "James Forrest" lecture at the Inst. of Civ. Engrs. Devoted principally to heat engines, and to strength of materials, and showing the desirability of engineers and physicists working together in investigations of engineering problems. 4800 w. Elect'n, Lond—June 19, 1903.

Some Unsolved Problems in Engineering. W. H. Maw. "James Forrest" lecture before the Inst. of Civ. Engrs. Considers the economical generation and distribution of power, steam engines, internal combustion engines, etc.; constructional engineering and the materials employed; cutting tools, etc. 11000 w. Engng—June 26, 1903.

Government Ministry.—A Ministry of Technical Work (Das Ministerium der Technischen Arbeit). Max v. Kraft. A discussion of the importance of system in technical work, and the desirability of making it the subject of an official department. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—March 3, 1905.

Hotel.—The Engineer's Department of a Large Hotel. Storrs Ely Emmons. Gives some idea of the importance of this department and the need of system in its management. 1000 w. Mach, N Y—Oct., 1905.

See also **MECHANICAL PLANT.**

Industrial.—See **INDUSTRIAL ENGINEERING.**

Japan.—Notes of an Engineer in Japan. W. E. Crane. Briefly describes the irrigation works, canals, railroads, highways and bridges, water supply, sanitation, garbage disposal, buildings, etc. 2500 w. Eng News—Dec. 29, 1904.

Law and Industry.—Law, Industry and Technology (Recht, Wirtschaft und Technik). Dr. Herm. Beck. An address showing the relation of technology to the other elements of civilization. Two articles. 8000 w. Zeitschr d Ver Deutscher Ing—May 14, 21, 1904.

Living Structure.—The Borderland of Biology and Engineering: Exemplifications of Engineering Principles in Living Structures. Henry Leffmann. An interesting study. 2000 w. Pro Engrs' Club of Phila—Oct., 1903.

1902.—1902.—A general review of the year's progress in engineering—civil, mechanical, electrical, sanitary, etc. 24000 w. Engr, Lond—Jan. 2, 1903.

1903.—1903—A Retrospect. Editorial review of the past year in the fields of civil, mechanical, electrical engineering, gas and water supply, chemistry, war material and metallurgy. 28000 w. Engr, Lond—Jan. 1, 1904.

Nineteenth Century.—Nineteenth Century Engineering: Its Evolution, and Something of Its Beginnings in America. Edgar Marburg. An interesting review showing the progress and the benefits due to science. 7500 w. Pro Engs' Club of Phila—Feb., 1901.

President's Annual Address Before the Engineers' Society of Western Pennsylvania. W. A. Bole. Progress during the century just completed, dealing only with the industrial side. 5500 w. Pro Engrs' Soc of W Penn—Jan., 1901.

See also **MECHANICAL ENGINEERING.**

Pacific Coast Problems.—Problems that Confront Engineering and Kindred Industries on the Pacific Coast. George W. Dickie. Read before the Pacific Coast Engng. Cong. Explains conditions and discusses cost of materials, cost of labor and other economic problems. 5500 w. Jour of Elec—Sept., 1905.

Wales.—Engineering in Wales. Sir W. H. Preece. An address delivered before the Society of Ancient Britons, Birmingham. Eng. Serial. 1st part. 1800 w. Engng—Nov. 9, 1900.

Water Supply.—See **WATER SUPPLY—Engineering.**

ENGINEERING BUILDING.

The Homes of the Great Engineering Societies. H. H. Suplee. A fully illustrated description of the houses of the great national engineering societies. 4000 w. Engineering Magazine—Jan., 1903.

The Engineering Building. Illustrated description of the principal features of the fine building being erected in New York City, taken from a recently issued report. 1800. Ir Age—Dec. 14, 1905.

ENGINEERING BUREAU.

See **LABORATORY—Engineering.**

ENGINEERING COMPETITION.

See **BRIDGE MANUFACTURE; COMMERCE; COMPETITION.**

ENGINEERING ECONOMICS.

See also **COMMERCE; INDUSTRIAL ENGINEERING.**

The Study of Economics. Editorial discussing the value of this study, its relation to the engineer, etc. 3000 w. Engng—May 9, 1902.

Economy.—The Engineer as an Economist. C. J. H. Woodbury. From an address at Potsdam, N. Y. Calls attention to inventions whose results have raised mankind and improved the conditions of life; and also the economical results obtained. 4000 w. Ir Trd Rev—June 22, 1905.

ENGINEERING ETHICS.

See **ETHICS—Engineering.**

ENGINEERING SOCIETY.

See also **ENGINEER; ENGINEERING; ENGINEERING BUILDING.**

The Engineer of the Twentieth Century. Chas. F. Scott. Address before the Engineers' Club of Philadelphia, urging the closer co-operation of the American engineering societies and the erection of an engineering societies' building in New York. 1200 w. Elec Rev, N Y—Dec. 20, 1902.

Address.—Presidential Address of Mr. James Monsergh before the British Institution of Civil Engineers. Also editorial. Serial. 1st part. 10,200 w. Engng—Nov. 9, 1900.

America.—The Organization and Administration of National Engineering Societies. John W. Lieb, Jr. Presidential address reviewing the four national engineering societies of America, making reference also to corresponding bodies in Europe. 5000 w. Am Inst of Elec Engrs—June 19, 1905.

Am. Soc. C. E.—The First Fifty Years of the American Society of Civil Engineers. Charles Warren Hunt. Briefly reviews the growth in members, character of papers, library, etc. 2900 w. Eng Rec—May 24, 1902.

British and German.—The Engineering Societies of Great Britain and Germany (Développement des Associations d'Ingénieurs en Angleterre et en Allemagne). M. Alby. A review of the principal engineering associations of Great Britain and Germany, their organization, objects, numbers, property, work, etc., with diagrams. 8000 w. Bull Soc d'Encouragement—April, 1902.

Germany.—The Development and Work of the Society of German Engineers (Entwicklung und Leistungen des Vereines Deutscher Ingenieure). H. Peters. A review of the formation and growth of the organisation, and the important work it has accomplished. Two articles. 4500 w. Zeitschr d Ver Deutschr Ing—July 15, 22, 1905.

North-East Coast Inst. of Engrs. and Shipbuilders.—See **EDUCATION.**

ENGINEERING WORKS.

See also **ENGINE WORKS; MACHINE WORKS; MUNICIPAL ENGINEERING; MUNICIPAL IMPROVEMENT; PUBLIC WORKS;** and under specific structures and works.

Some Early Engineering Works in Pennsylvania. Edwin F. Smith. An illustrated review of early work, and the difficulties met and overcome. 7000 w. Pro Engrs' Club of Phila—April, 1904.

Bridges, Foundations, Docks and Water Fronts, and Canals. William H. Burr. Reviews the work in this field during the last quarter of a century, the advances made, etc. 3000 w. Eng Rec—Jan. 3, 1903.

Appraisal.—See **MINE VALUATION; VALUATION; WORKS MANAGEMENT.**

Depreciation.—See **DEPRECIATION.**

Florence.—See **MUNICIPAL ENGINEERING.**

New York.—Changes and Improvements in New York. From the "N. Y. Sun." Concerning the great engineering undertakings in progress, at a cost of many millions. 2500 w. Am Archt—July. 6, 1901.

ENGINE FRAME.

See **MARINE ENGINE; STEAM ENGINE.**

ENGINE HOUSE.

See **LOCOMOTIVE HOUSE; ROUNDHOUSE.**

ENGINE STOP.

See also **VALVE—Steam-Pipe Cut-off.**

Engine Safety Stopping Devices. James F. Hobart. Illustrated description of various forms in use. 1300 w. Am Elect'n—July, 1902.

Monarch.—An Improved System of Engine Stops. An illustrated description of the Monarch system which works automatically. 2000 w. Sci Am Sup—July 11, 1903.

ENGINE WORKS.

See also **LOCOMOTIVE SHOP; LOCOMOTIVE WORKS; MACHINE SHOP; MACHINE WORKS; MARINE ENGINE WORKS; RAILWAY SHOP; SHIPYARD; STEAM ENGINE; STEAM ENGINE MANUFACTURE; WORKS.**

Allis, Milwaukee.—The New Works of the Edward P. Allis Co., at Milwaukee, Wis. Illustrated description. 2000 w. Eng News—May 23, 1901.

The General Scheme of the New Milwaukee Plant of the Allis-Chalmers Company. Illustrates and describes the leading features of the general scheme of one of the finest plants for machine building. 2000 w. Am Mach—June 12, 1902.

Beardmore, Clyde.—See **SHIPYARD.**

See also **MACHINE WORKS.**

Belliss and Morcom.—The Works of Messrs. Belliss and Morcom, Limited. An illustrated description of these works which have attained a high reputation as makers of high-speed engines, and also of their equipment. 5000 w. Engng—Sept. 19, 1902.

Borsig, Germany.—Borsig's Works. Historical review and illustrated detailed description of these extensive works for the manufacture of boilers, locomotives, stationary engines operated by steam and gas, pumps, hydraulic presses, refrigerating appliances, &c. Serial. 1st part. 4800 w. Engng—Oct. 9, 1903.

Cudahy, Wis.—See **GAS POWER PLANT.**

Hamilton, O.—Modernization in Engine Building. Illustrated description of special tools used in the new plant of the Hooven-Owens-Rentschler Company. 3800 w. Ir Age—Jan. 7, 1904.

The New Hamilton-Corliss Engine Works. An illustrated description of the rebuilt and greatly enlarged shops of the Hooven, Owens & Rentschler Co. at Hamilton, Ohio. 2500 w. Mach, N Y—Jan., 1904.

Hardie-Tynes, Birmingham, Ala.—See **MACHINE TOOL—Corliss Engines.**

Harrison, N. J.—Works of the Marine Engine and Machine Co. Illustrates and describes these large modern shops at Harrison, N. J., and the methods and processes used in a wide range of work. 3500 w. Eng Rec—Oct. 31, 1903.

Machine Tools. — See **MACHINE TOOL — Engine Builders,**

Port Huron, Mich.—Plant of the Port Huron Engine & Thresher Co., Port Huron, Mich. Illustrated detailed description of a plant especially noted for the manufacture of high class traction engines. 3000 w. Ir Trd Rev—Oct. 5, 1905. See also **FOUNDRY.**

Power Consumption.—See **POWER—Marine Engine Works.**

Reid.—See **GAS ENGINE.**

Robb, Nova Scotia.—A Canadian Engine Works. Norman Patterson. An illustrated article, giving a brief description of some of the processes of manufacturing practiced in the works of the Robb Engng Co., at Amherst, N. S. 2000 w. Can Elec News—Feb., 1901.

Rugby, Eng.—See **ELECTRIC WORKS—Thomson-Houston.**

Sandon, Eng.—Sandon Engine Works. An illustrated description of the new erecting shop and its equipment. 3000 w. Engr, Lond—June 14, 1901.

Soest, Düsseldorf.—See **MACHINE WORKS.**

Weir, Glasgow.—See **MACHINE WORKS.**

Willans and Robinson.—See **MACHINE SHOP.**

Youngstown, O.—A Modern Engine Building Plant. Illustrated description of the large plant of the William Tod Company, at Youngstown, Ohio. 2300 w. Ir Age—Jan. 5, 1905.

ENGRAVING.

Electric.—See **ELECTRO-ENGRAVING.**

ENGRAVING MACHINE.

An Engraving Machine. Illustrated descriptions of a machine of English origin, used for this work. 500 w. Am Mach—Sept. 26, 1901.

Engraving Machine. Illustrated description of an instrument which will produce both lettering and designs either sunk or in relief on metals and other materials. 1400 w. Engng—May 24, 1901.

ENTROPY.

See also **THERMODYNAMICS.**

Entropy. J. Swinburne. An elboration of the views expressed in the author's recent presidential address before the Inst. of Elec. Engrs., attacking the ordinary definitions of entropy based on completely reversible thermo-dynamic processes. 3500 w. Elec Rev, Lond—Jan. 9, 1903.

Entropy. Prof. John Perry. The writer's explanation of the term. 1800 w. Engr, Lond—Jan. 23, 1903.

Entropy: An Elementary Exposition. Sir Oliver Lodge. An article in response to a special request explaining this term of thermodynamics. 5000 w. Elect'n, Lond—Jan. 23, 1903.

Entropy. Robert H. Smith. A contribution to the discussion of this term, especially referring to the paper by Prof. John Perry. 1600 w. Engr, Lond—Jan. 30, 1903.

Entropy. Prof. H. Poincaré. A contribution to the controversy about entropy. 2700 w. Elect'n, Lond—Feb. 13, 1903.

Entropy. Prof. Robert H. Smith. An explanation of what is meant by the term, and of the causes that have led to misconception. 3200 w. Elec Rev, Lond—March 6, 1903.

Entropy. A review of the controversy of Swinburne vs. Perry; Lodge intervening. 3000 w. Feilden's Mag—March, 1903.

Entropy, or Thermodynamics from an Engineer's Standpoint. J. Swinburne. An explanation of the term as employed in the thermodynamics of reversible and irreversible changes, aiming to make the theory clear. Serial. 1st part. 6500 w. Engng—Aug. 28, 1903.

The Reversibility of Thermodynamics. J. Swinburne. Read before the British Assn. Proposes a different treatment of the subject of thermodynamics in the hope of making the science more easily understood. 5500 w. Elec Rev, Lond—Sept. 18, 1903.

Entropy. John Perry. A criticism of the work by James Swinburne, recently published. 3500 w. Nature—April 14, 1904.

A Criticism of Mr. James Swinburne's "Entropy." Robert H. Smith. Criticizes recent work published in two particulars—the clearness of the theories, and the accuracy of mathematical developments. 2700 w. Elec Rev, Lond—April 15, 1904.

The Entropy Diagram and Its Uses. H. Boyd Brydon. Explains its use in determining just what an engine is doing, its losses, where they are, and the effect of any changes made. 4800 w. Power—June, 1904.

Otto Cycle.—Entropy Analysis of the Otto Cycle. Sidney A. Reeve. Favors the construction of the entropy diagram for all engine tests. 2500 w. Trans Am Soc of Mech Engrs, No. 0962—Dec., 1902.

Rankine.—See **THERMODYNAMICS.**

Steam Engine.—The Study of Steam Engines by Means of the Entropy Diagram. (Etudes des Machines à Vapeur par le Diagramme Entropique). J. Boulvin. A thermodynamic study of the steam engine with many diagrams and a table. Serial. Part I. 5000 w. Rev d Mec—March, 1901.

Entropy in Steam Engine Practice. A study of the temperature-entropy diagram is given in the present number. Serial. 1st part. 1700 w. Mech Engr—Aug. 27, 1904.

EQUALIZER.

Dynamo.—See **ELECTRIC APPARATUS—Equalizer.**

ERICSSON.

Personal Recollections of Captain John Ericsson. Egbert P. Watson. Interesting personal reminiscenses heretofore unpublished; also engraving of oil portrait from life. 3000 w. Engineering Magazine—June, 1901.

ERUPTION.

See **EARTHQUAKE; VOLCANO.**

ESCALATOR.

See **MOVING STAIRWAY.**

ESTIMATING.

See also **CONTRACT; SPECIFICATION; WORKS MANAGEMENT.**

Estimating. Fred. T. Hodgson. Presents the simplest possible methods of obtaining quantities required in estimating materials. Serial. 2000 w. Archts' & Builds' Mag—Nov., 1900.

Tables for Estimating Amount and Cost of Materials and Labor for Buildings. Louis F. Brayton. Presents a method given by the writer in a thesis for the degree of Bachelor of Science in Architectural Engineering. 900 w. Technograph, No. 15—1900-1901.

The Preparation of Estimates. The first of a series of articles in which it is proposed to analyze the reasons for the great disparity in the estimates given by different firms for the same work, and to study the conditions which would ensure more uniformity. Serial. 1st part. 2800 w. Engr, Lond—Jan. 1, 1904.

Engineers' Estimates of Cost. S. Whinery. Argument that the engineers' estimate should include only the engineering features of the work, and that he should not assume responsibility for other contingencies. Also editorial. 5000 w. Eng News—Aug. 11, 1904.

Machine Work.—See **MACHINE WORK—Estimates.**

Underestimate.—The Causes of Underestimates of Cost of Public Works. Editorial on engineers' estimating in general, with some reference to S.

Whinery's article on Aug. 11. Eng News—Aug. 25, 1904.

Weight and Volume.—See WEIGHTS AND MEASURES—Estimating.

ETHER-VAPOR MOTOR.

See BINARY ENGINE.

ETCHING.

Steel Sections.—See METALLOGRAPHY.

ETHICS.

Ethics of the Engineering Profession. Victor C. Alderson. A discussion of the principles underlying this profession and the effect on the mind and character. 3000 w. Jour W. Soc of Engrs—Aug., 1901.

The Regulation of Engineering Practice by a Code of Ethics. Informal discussion of whether engineering practice should be so regulated, and if so, how such a code can be established. 7500 w. Pro Am Soc of Civ Engrs—Aug., 1902.

ETHNOLOGY BUILDING.

See PAN-AMERICAN EXPOSITION—Ethnology Building.

EVAPORATION.

See also DISTILLATION; IRRIGATION; SUGAR; VACUUM PUMP.

Heat Transmission.—The Transmission of Heat in the Evaporation of Water (Die Wärmeübertragung bei der Verdampfung von Wasser). Dr. H. Claassen. Giving data and results of experiments for the determination of the rate of heat transmission, with especial reference to evaporating kettles and vacuum pans. 7000 w. Zeitschr d ver Deutscher Ing—March 22, 1902.

See also Multiple Effect.

Multiple Effect.—Researches on the Transmission of Heat (Recherches sur la Transmission de la Chaleur). M. Sekutowicz. A very complete investigation of the action of heat in multiple-effect evaporating apparatus. 1500 w. Mem Soc Ing Civ de France—Sept., 1903.

Multiple Effect Evaporators. Reviews an article by M. Sekutowicz, in the Sept. "Bulletin" of La Société des Ingenieurs Civils de France. On the evaporation apparatus employed in French sugar factories, and related subjects. 1800 w. Engr, Lond—Nov. 20, 1903.

Multiple Effect Evaporation. Charles Day. Read before the Manchester Assn. of Engrs. Describes the principles on which the system of multiple evaporation is based, and gives illustrations of its application in daily practice. 3400 w. Mech Engr—Feb. 18, 1905.

United States.—Evaporation Observations in the United States. Herbert Harvey Kimball. Read before the Irrigation Congress, at El Paso, Tex. Gives tabulated results of measurements of evaporation made at various points, with explanatory remarks. Map. 2000 w. Eng News—April 6, 1905.

EXCAVATION.

See also CANAL; DREDGING; EARTHWORK; ELECTRIC RAILWAY—Grading; GRADING MACHINE; MECHANICAL HANDLING—Excavated Material; RAILWAY CONSTRUCTION; STEAM SHOVEL.

Excavating and Conveying Machinery in Contract Work. C. H. Wright. A discussion of the cost reductions which have been effected by the use of machinery in earthwork and general construction. 4000 w. Engineering Magazine—Jan., 1905.

Breaking Ground.—Notes on Breaking Ground. T. Lane Carter. Discusses questions of importance in breaking ground economically, and methods of working. 2000 w. Eng & Min Jour—Nov. 1, 1902.

Buffalo Harbor.—Methods of Subaqueous Rock Excavation, Buffalo Harbor, N. Y. Brief illustrated article describing the plant used in this work of improving the Lake Erie entrance to Black Rock Harbor and Erie Basin, N. Y. 1000 w. Eng News—July 6, 1905.

Ditcher.—The Buckeye Traction Ditcher. Frank C. Perkins. Illustrated description of a labor-saving device, designed to cut trenches and ditches. 1500 w. Sci Am—Sept. 10, 1904.

Electric Railway.—See ELECTRIC RAILWAY—Grading.

Freezing Process.—Freezing as an Aid to Excavation in Unstable Material. James H. Brace. Synopsis of the result of a research of the literature on the above subject. 21000 w. Pro Am Soc of Civ Engrs—Jan., 1904.

Freezing as an Aid to Excavation in Unstable Material. Discussion of a paper by James H. Brace on the above subject. 8800 w. Pro Am Soc of Civ Engrs—March, 1904.

See also FOUNDATION; SHAFT SINKING; TUNNELING.

French Machine.—Methods and Cost of French Excavation with a French Digging Machine. Halbert P. Gillette. Gives cost data relating to excavating trenches with a machine, showing that the work can be done at a cost that compares favorably with dredging and hydraulicing. 1800 w. Eng Rec—Dec. 30, 1905.

Hydraulic.—See HYDRAULIC EXCAVATION; HYDRAULIC MINING.

Iron Ore.—See IRON MINING.

North Carolina.—See STEAM SHOVEL.

Rock, Boston.—Rock Trench-Work, Boston, Mass. Frederick I. Winslow. Brief account of the conditions and practice in this city. 500 w. Eng News—Oct. 22, 1903.

Scraper.—A Cable Power Scraper for Earth Excavation. C. G. Newton. Sketches, photographs and brief description of a steam scraper which has been used considerably on the Pacific coast, and has proved an economical machine. 500 w. Eng News—Oct. 20, 1904.

A New Style of Scraper Excavator. Illustrates and describes an excavation consisting of a scraper or bucket of special design, handled by a derrick mounted upon a car or scow. 600 w. Eng News—March 2, 1905.

Steam Shovel.—See STEAM SHOVEL.

Submarine Rock.—See Buffalo Harbor; DREDGING; DRILL.

Trench.—The Practical Working of Trench Exca- and describes a trench-excavating machine and its vating Machinery. Ernest McCullough. Illustrates operation. 2500 w. Eng News—Dec. 24, 1903. See also Rock.

Trench Back Filling.—The Back Filling of Trenches. ..W. F. Raymond. Gives the writer's views of the best method. 1400 w. Munic Engng—Aug., 1903.

Washington Filtration.—See EARTHWORK.

EXCHANGE.

New York.—See COOLING; PNEUMATIC TUBE; STOCK EXCHANGE.

EXHAUST STEAM.

See also HEATING; STEAM; STEAM ENGINEERING.

Rateau Accumulator.—See STEAM ENGINEERING.

EXHIBITION.

See also EXPOSITION; and under specific heads, such as AUTOMOBILE EXHIBITION; PAN-AMERICAN EXPOSITION, etc.

Bradford.—The Bradford Exhibition. Begins an account of this exhibition in England, being held to celebrate the opening of a fine building given as a memorial to Cartwright, the inventor of the power loom, and the originator of the wool-combing machine. Ills. Serial. 1st part. 1800 w. Engr, Lond—June 24, 1904.

Glasgow.—See GLASGOW EXHIBITION.

EXPANDED METAL.

See also CONCRETE REINFORCED; FIREPROOF CONSTRUCTION.

Expanded Metal and Some of the Uses to Which It Is Put. James S. Merritt. Describes the manufacture and the various grades, and gives many interesting uses of this material. 3700 w. Jour Fr Inst—Dec., 1900.

Fireproof Construction.—Expanded Metal in Fire-Proof Construction. James S. Merritt. Describes briefly the origin of this material and the way it is made, and discusses its use in fire-proof construction. Ill. 2800 w. Pro Engrs' Club of Phila—July, 1901.

EXPANSION.

Magnetic.—See **MAGNETIC EXPANSION.**

Metal.—See **METAL.**

EXPLORATION.

Antarctica.—See **ANTARCTICA.**

Montana.—Engineering Explorations in Montana and Elsewhere in the Rocky Mountains. Francis W. Blackford. Presidential address before the Montana Soc. of Engrs. A review of the explorations, beginning with the expedition of Lewis and Clarke, in 1804. 5800 w. Jour Assn of Engng Socs—March, 1901.

EXPLOSION.

See also **BOILER EXPLOSION; COAL MINE EXPLOSION; FIREDAMP; LOCOMOTIVE EXPLOSION; etc.**

Air Compressor.—See Compressed Air Pipes; **AIR COMPRESSOR—Explosion.**

Antwerp Petroleum.—The Antwerp Petroleum Explosion. An illustrated account of the explosion on August 26, discussing the arrangements for storage. 1600 w. Engng—Oct. 21, 1904.

Cast-Iron Valve.—See **VALVE—Explosions.**

Celestial.—Celestial Explosions and Their Relations to Electrical Phenomena. Hudson Maxim. Explains what an explosion really is, and considers some celestial explosions. Ill. 4700 w. Elec Age—Jan., 1902.

Compressed Air Pipes.—Explosion in Compressed Air Pipes at Aberbeeg Colliery, Monmouthshire. R. Jordan. Read before the So. Wales Inst. of Engrs. An account of an explosion occurring April 9, 1902, with discussion of cause. 2700 w. Col Guard—Jan. 22, 1904.

See also **AIR COMPRESSOR; COMPRESSED AIR.**

Electric Conduit.—See **GAS EXPLOSION.**

Gas.—See **GAS EXPLOSION.**

Gas Engine.—See **GAS ENGINE—Explosion.**

Gas, Experimental.—See **GAS ENGINE—Explosion.**

Gun.—The Explosion on H. M. S. "Mars." A discussion of the delayed explosion of a charge of smokeless powder in a 12-inch gun. 1400 w. Engng—April 25, 1902.

Nature.—The Nature of Explosions. Review of the Lecture of Prof. Dixon, at the Midland Institute, Birmingham, Eng. Gives the history of explosives, their use and the advances made, describing various explosions and their action. 3700 w. Col Guard—Dec. 13, 1901.

The Nature of Explosions. Review of Prof. Dixon's second lecture at the Midland Institute, Birmingham, Eng. The writer has been working in connection with this subject for twenty-five years. 3000 w. Quarry—March, 1902.

N. Y. Subway.—Wrecked by Dynamite. Brief account of the terrible explosion in New York rapid transit tunnel, which caused loss of life, many serious injuries, and a destruction of a million dollars worth of property. Ill. 1000 w. Fire & Water—Feb. 1, 1902.

The Effect of a Surface Explosion of Dynamite. Illustrates and describes the surface effect of the explosion at 41st street and Park Avenue. 2200 w. Eng Rec—Feb. 1, 1902.

Explosion of Dynamite at the Rapid Transit Subway. An illustrated account of the disaster in New York at the corner of Park Avenue and Forty-first street. 900 w. Sci Am—Feb. 8, 1902.

The Dynamite Explosion on the New York Rapid Transit Subway. An account of the accident in New York city on Jan. 27, which caused loss of life and great destruction of property. 1300 w. Eng News—Jan. 30, 1902.

Oil Steamer.—See steamer "Progresso."

Pressure Gauge.—See **GAUGE.**

Steamer "Progresso."—Explosion on Oil-Tank Steamer "Progresso." An illustrated account of the terrible accident at San Francisco, on Dec. 4, which caused great loss of life and total destruction of this vessel. 1400 w. Marine Engng—Jan., 1903.

Steam Pipe.—See **STEAM PIPE—Explosion.**

Subway.—See **N. Y. Subway; GAS EXPLOSION.**

Torpedo.—See **TORPEDO—Explosion.**

Water Tube Boiler.—See **BOILER EXPLOSION—St. Louis.**

EXPLOSIVE.

See also **AMMUNITION; BLASTING; COAL MINE EXPLOSION; MINE VENTILATION; SHELL.**

A Brief Sketch of the Essential Requisites of "Powder" as Distinguished from "Explosives." Dr. W. J. Williams. Address of the retiring president setting forth the requirements of a powder and of an explosive. 8800 w. Jour Fr Inst—March, 1901.

The Evolution of Smokeless Powder and Other High Explosives. A review of the development, discussing the shape of the powder, bursting charges, etc. 5200 w. Engng—May 2, 1902.

The Progress of the Technology of Explosives since the Development of Organic Chemistry (Der Fortschrift der Sprengtechnik seit der Entwickelung der Organischen Chemie). Prof. W. Will. Abstract of an address before the Deutsche Chemische Gesellschaft, giving a review of modern explosives. 1100 w. Zeitschr f Elektrochemie—Jan. 1, 1904.

Accidents.—Accidents in the Use of Blasting Explosives. Remarks of H. M. Inspectors of Explosives on each class of accidents, as given in a recent report. 1700 w. Col Guard—July 25, 1902.

British Report.—Annual Report on Explosives. Extracts from the report of the Inspectors of Explosives for the year 1900. 2200 w. Engr, Lond—Aug. 23, 1901.

Annual Report of His Majesty's Inspectors of Explosives, 1903. A review of this report, investigating accidents and giving information of the manufacture, importation, &c. 4500 w. Col Guard—July 15, 1904.

Coal Mine.—Government Explosives and Safety Appliances in the Wilczek Mines at Polnisch-Ostrau, Austria (Ueber die Anwendung ärarischer Sprengmittel und einiger Sicherheits und Sanitätsbehelfe beim Gräflich Wilczek'schen Bergbau in Polnisch-Ostrau). Josef Mauerhofer. An illustrated account of experiences with dynammon, a governitary arrangements at these coal mines. Serial. 3 parts. 3 plates. 7000 w. Oesterr Zeitschr f ment safety explosive, and of safety and san-Berg u Hüttenwesen—Jan. 4, 11, 18, 1902.

Explosives in Coal Mines. Considers British legislation and the "permitted list" of explosives, discussing who should be held responsible in case of accident with these explosives. 1700 w. Col Guard—Aug. 2, 1901.

Explosives in Coal Mines. A list of explosives added to the special list of permitted explosives in British mines. 2000 w. Col Guard—June 28, 1901.

Explosives in Coal Mines. The new order issued by the Home Secretary adding to the special list of permitted explosives and amending previous orders. 2600 w. Col Guard—Sept. 27, 1901.

The Evolution of Mining Explosives. Gives particulars pointing to the conclusion that the departure from gunpowder to high explosives is a failure as regards safety and a loss in the economical working of coal mines. 2600 w. Col Guard—May 23, 1902.

Mining Explosives. James Tonge, Jr. Gives the theory of an explosion, with a description and classification of the explosives used in the coal mines of Great Britain. 3500 w. Mines & Min—July, 1902.

Explosives in Coal Mines. A New Order. Gives the order issued Dec. 20, 1902, revoking all other orders. 3000 w. Ir & Coal Trds Rev—Jan. 9, 1903.

Regulation of Explosives in Coal Mines. James Tonge. Remarks on the risks in the use of explosives, with a description of the nature of the tests at Woolwich. 3500 w. Ir & Coal Trds Rev—Oct. 13, 1905.

Safe Shot-Firing in Coal Mines. George G. André. Briefly considers the quantity of explosive used, slow firing, firing by electricity, &c. 1200 w. Col Guard—Dec. 15, 1905.

See also British Report; Mining; BLASTING; COAL DUST; COAL MINING.

Cold and Frost.—The Effects of Cold and Frost upon Explosives (Effets du Froid et de la Gelée sur les Explosifs). H. Schmerber. Showing that the advantages due to the safe storage of frozen explosives are largely offset by the dangers of thawing. 1800 w. Génie Civil—May 7, 1904.

Detonators.—Testing Caps or Detonators in the Laboratory. A. W. Warwick. Describes a method by which a record of the strength and quality is automatically made. 2500 w. Mines & Min—Feb., 1904.

Dynamite.—The Care and Use of Dynamite. A. W. Warwick. Directions for storing, thawing, preparing cartridges and using. 1400 w. Min Rept—May 22, 1902.

The Chemical Analysis of Dynamites. Graduation thesis by J. P. Benbrook, Jr., and J. H. Fulton. Introductory notes explaining the composition of modern explosives, especially dyna- in the mining industry. 3300 w. Jour Chem & mites, giving two methods of analysis. 2700 w. Stevens Ind—Oct., 1905.

Dynamite By-Products.—The Residual Products of the Dynamite Factory and Their Value to the Gold Industry. William Cullen. Aims to show that many of these by-products could be utilised in the mining industry. 3300 w. Jour Chem & Met Soc of S Africa—Aug., 1902.

Dynamite Storage.—See Storage.

Flameless.—See Safety; COAL MINE EXPLOSION—Wigan, Eng.

Gun-Cotton.—The Manufacture of Gun-Cotton Charges. Illustrates and describes a new method of compressing gun-cotton for charges of locomotive torpedoes, shells, submarine mines, etc. 2700 w. Engng—May 9, 1902.

Handling.—High Explosives; Safe and Economical Methods of Handling. J. H. Karkeet. Condensed paper, read before the L. Sup. Min. Inst. Notes the progress made in the manufacture and use of these explosives, their advantages, methods of handling, etc. 2500 w. Eng & Min Jour—Sept. 19, 1903.

Improvements in Explosives and Igniters (Neuerungen im Spreng und Zündmittelwesen). Describing recent methods of increasing safety in handling high explosives. 1200 w. Glückauf—Jan. 16, 1904.

Hathamite.—Hathamite. Waldon Fawcett. Information concerning a new powerful explosive which may be handled with impunity, under ordinary conditions. Ill. 600 w. Sci Am—Nov. 8, 1902.

High in Shells.—See SHELL.

Hydraulic Cartridge.—See COAL MINING—Hydraulic Cartridge.

Ignition.—Progress in Ignition of Mine Explosives (Fortschritte im Minenzündwesen). Johann v. Lauer. A review of the development of friction primers and electric igniters for mining explosives since 1886. Serial. 2 parts. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 24, 31, 1903.

The Ignition of Explosives (Ueber Zündung von Sprengstoffen). C. E. Bichel. A paper before the Mining Congress at Liége discussing the non ignition of high explosives by impact, with tabulated results of experiments upon a variety of materials. 3500 w. Glückauf—Sept. 23, 1905.

See also BLASTING.

Joveite.—A Safe and Economical Substitute for Dynamite. Reports the results of some tests made of Joveite. Also editorial on the safety powders destined to replace dynamite. 3300 w. Eng News—Jan. 22, 1903.

A New Safety Explosive. Richard T. Dana. Gives tests made by the writer of an explosive known as Joveite, having picric acid and sodium nitrate for the principal constituents, and reports its use, comparing it with other explosives. 3500 w. Pro Am Soc of Civ Engrs—May, 1903.

Lightning Protection.—The Protection of Explosive Magazines from Lightning. Notes embodying the recommendations of an official commission appointed in Belgium to consider the best means of protection. 2000 w. Col Guard—Feb. 6, 1903.

Lyddite.—See WARSHIP—Belleisle Experiments.

Magazine.—See Lightning Protection; Storage.

Manufacture.—The Manufacture of Some High Explosives. R. S. King. Deals with the processes of manufacture of nitroglycerine, gun cotton, dynamite, gelatine and contractors' powder. Ills. 1700 w. Engrs' Soc., Univ of Minn—Year Book, 1904.

Maximite Tests.—Government Tests of Maximite at Sandy Hook. An illustrated article reporting an interesting series of successful tests of a method of discharging shells charged with a high explosive. 1300 w. Sci Am—May 25, 1901.

Metal Mining.—Explosives Used in Metal Mining. Harold Harris. Read before the N. S. W. Chamber of Mines. A brief description of the nitroglycerine mixtures, with remarks on their manufacture and uses in mining. 3200 w. Aust Min Stand—Jan. 10, 1901.

Mining.—The Action of Explosives (Sprengwirkungen). C. E. Bichel. An examination of the action of various mining explosives, with table showing the volume of gas liberated, energy released, and other data. 3000 w. Glückauf—April 15, 1905.

Mining Explosives. A. W. Warwick. Considers the effect of perfect and imperfect detonation, proper strength of caps for different conditions, etc. 2500 w. Mines & Min—Sept., 1902.

See also Coal Mine; Metal Mining.

Missfire.—The Theory of Missfires and Some Conclusions of Practical Value. E. H. Weiskopf. Considers missfires occurring with nitroglycerine explosives. 3200 w. Jour Chem & Met Soc of S Africa—Nov., 1902.

Nature.—See EXPLOSION.

New York.—See Storage.

Nitro.—Nitro Explosives. Howard C. Parmelee. Describes these substances, explaining their action and analysis. 700 w. Min Rept—June 16, 1904.

The Nature of Nitro Explosives (Ueber das Wesen der Nitro-Sprengstoffe). O. Stegemann. Discussing especially the chemistry and action of the nitro-glycerine explosives used in mining operations. 3000 w. Glückauf—Dec. 30, 1905.

Nitro-Glycerine Explosives. Remarks on the increased use of these explosives in mining and the safest way of handling and employing them. 1900 w. Aust Min Stand—Aug. 22, 1901.

Recent Explosives (Neue Sprengstoffe). Dr. Anton Mikolajczak. An examination of the nitroglycerine series, with especial reference to the higher stability of dinitroglycerine. 1200 w. Glückauf—May 28, 1904.

The Manufacture of Nitro-Glycerine Explosives. William Cullen. Notes explaining the different processes involved. 2300 w. Jour Chem Met & Min Soc of S Africa—Oct., 1903.

See also Missfire.

Safety.—The Employment of Safety Explosives in Fiery Mines. P. Chalon, in "Revue Technique." Discusses their advantages and defects, and the practical means of testing. 2500 w. Col Guard—June 28, 1901.

The Use of Safety Explosives (Emploi des Explosifs de Sûreté). P. Chalon. A review of the nature and behavior of mining explosives adapted for safe use in gaseous mines. 2500 w. Revue Technique—June 10, 1901.

See also Coal Mine; COAL MINE EXPLOSION.

Smokeless Powder.—Smokeless Powder. Editorial discussion of the powder used by the British and its disadvantages, quoting from the address of Lieut. A. T. Dawson. 2100 w. Engng—March 15, 1901.

The Development of Smokeless Powder in the United States. F. A. Wilcox. A consideration of the methods and means employed in the development of smokeless propulsive explosives for military purposes. Serial. 1st part. 2500 w. Engng—May 31, 1901.

Smokeless Powders: Their History and Present

Classification. Brief review of different stages in its development, with present classification. 2000 w. Sci Am Sup—July 25, 1903.

Storage.—Magazines for Mine Explosives. M. H. Le Chatelier. From a paper presented at the Paris Congress. Investigations of large underground depots, small underground depots, and surface depots, with conclusions from the safety standpoint. 2500 w. Col Guard—Nov. 23, 1900.

The Storage of Mining Explosives. On magazines and their advantages, considering facts enabling mine owners to decide if the consumption of explosives and available sites for magazines warrant the outlay. Ill. 3000 w. Col Guard—Nov. 30, 1900.

Proposed Rules to Govern the Storage and Use of Explosives in New York City. Gives the important features of rules formulated by the Municipal Explosives Commission appointed by the Mayor. Also editorial. 4300 w. Eng News—Dec. 18, 1902.

The Storage of Explosives in Densely Inhabited Areas. A paper by Capt. Thompson, read at the International Fire-Prevention Congress. Deals with the precautions enjoined by English law. 7000 w. Am Archt—July 23, 1904.

Stowmarket Factory.—Stowmarket Explosives' Factories. Outlines the history of this factory and the processes used in the manufacture of guncotton, reporting a recent visit. The nitric acid factory, and the manufacture of nitro-glycerine, cordite, etc., are also described. Ills. 5000 w. Engr, Lond—June 9, 1905.

Submarine.—The Detonation of Explosives under Water (Détonation sous l'Eau des Substances Explosifs). M. Jacob. A study of the relation of the compressibility of the fluid to the action of the explosive. 1200 w. Comptes Rendus—May 24, 1904.

See also **SUBMARINE MINE.**

Testing.—Practical Means of Testing Explosives. P. Chalon. Abstracts from an article in the "Revue Technique." Reviews the behavior of explosives and methods of testing to determine their strength. 1400 w. Min Rept—Aug. 15, 1901.

Testing Mine Explosives. A. W. Warwick. Showing the difficulties and uncertainties in determining practical values of different explosives. 2000 w. Mines & Min—Oct., 1902.

The Testing of Explosives Used in Engineering. J. B. Porter. Illustrates and describes apparatus and methods used discussing especially closed explosion chambers, crusher gauges, and devices for miniature blasts, reporting recent tests. Ills. 2400 w. Can Soc of Civ Engrs—Nov. 30, 1905. (Ad. proof.)

The Testing of Explosives for Use in Coal Mining. Information from the report of H. M. Inspector, concerning the working of the testing apparatus, the explosives that failed to pass the test, etc. 1400 w. Col Guard—Aug. 1, 1902.

The Testing of Explosives for Coal Mines. Illustrated description of the British Home Office testing station at Woolwich, and of stations on the Continent, with accounts of methods. Also editorial. 5500 w. Ir & Coal Trds Rev—Aug. 18, 1905.

Continental Explosives Testing Stations. Information from a report to the Home Secretary, on visits to certain explosive factories and testing stations in Belgium, Germany and Holland, the methods of testing and results. 4500 w. Col Guard—Aug. 25, 1905.

The Testing of Explosives in Belgium. An account of a new testing station for explosives recently fitted up by the Belgian Administration des Mines, for the investigation of the behavior of explosives under all conditions likely to occur in practice. 1800 w. Col Guard—Jan. 9, 1903.

Experimental Galleries for Testing Explosives in Germany and Belgium. Brief description with illustrations of the installations at Gelsenkirchen, and at Frauseries, near Mons, constructed for testing safety lamps and explosives. 1100 w. Col Guard—Jan. 15, 1904.

Testing Safety Explosives at Gelsenkirchen. Bergassessor Beyling, in "Glückauf." Describes the method of testing and gives tabulated results. 800 w. Col Guard—May 22, 1903.

See also **Coal Mine.**

Thawing, Electric.—An Underground Magazine and an Electric Powder Thawer. William Kelly. Abstract of a paper in Pro. of the L. Superior Min. Inst. Gives an illustrated description of a central underground magazine, and an electric powder thawer. 1200 w. Eng & Min Jour—Aug. 19, 1905.

Transportation.—See **RAILWAY TRANSPORTATION.**

Transvaal.—Explosives on the Witwatersrand. T. Lane Carter. Facts illustrating the cost of dynamite before the war and at the present time, with information regarding other explosives. 1200 w. Eng & Min Jour—Nov. 7, 1903.

EXPORT.

See also **COMMERCE.**

Engineering Exports of Britain, Germany and the United States. W. Pollard Digby. A review of the general industrial situation, showing the trend of trade supremacy. 3000 w. Engineering Magazine—June, 1905.

Engineering Exports of Britain, Germany, and the United States. W. Pollard Digby. Tracing, with the aid of graphic charts, the relative volume of business done by the three great nations in the chief trade zones. Ills. Serial. 2d part. 2500 w. The Engineering Magazine—July, 1905.

Engineering Exports of Britain, Germany, and the United States. W. Pollard Digby. The third and concluding article discusses the trade of the West Indies and adjacent countries, British America, South Africa, and Australasia, in its relation to Great Britain. 3000 w. Engineering Magazine—August, 1905.

Locomotive.—See **LOCOMOTIVE—Export.**

EXPOSITION.

See also **EXHIBITION**; and under specific exhibitions and expositions.

Dresden.—The German Municipal Exposition at Dresren (Deutsche Städteausstellung in Dresden). An illustrated account of an exhibition of the various engineering and other features of modern cities. Serial. Part I. 700 w. Zentralblatt d Bauverwaltung—June 6, 1903.

The German Municipal Exposition in Dresden (Die Deutsche Städte-Ausstellung in Dresden). J. O. Knoke. A general review of this exhibition of engineering and other features of modern cities. 4000 w. Zeitschr d Ver Deutscher Ing—July 4, 1903.

See also **CONCRETE REINFORCED.**

Düsseldorf.—The Exposition of 1902 in Düsseldorf (Die Ausstellung in Düsseldorf 1902). E. Dücker. A general description, with views of the buildings as thus far completed. 2000 w. Zeitschr d Ver Deutscher Ing—Nov. 23, 1901.

The Düsseldorf Exposition of 1902 (L'Exposition Réégionale de Düsseldorf en 1902). P. Dujardin. A general description of the exposition to be opened in the spring of 1902, with illustrations of the buildings, and a review of the economic situation in Germany at the close of 1901. 2000 w. Génie Civil—Feb. 8, 1902.

The Düsseldorf Exposition of 1902 (L'Exposition Régionale de Düsseldorf en 1902). P. Dujardin. A general review of the Düsseldorf exposition from a French point of view. 2500 w. Génie Civil—Aug. 16, 1902.

The Rhenish-Westphalia Exposition of 1902 at Düsseldorf (Rheinisch-Westfälische Industrie Gewerbe-und Kunstausstellung, Düsseldorf, 1902). A fully illustrated description of the Düsseldorf exposition just prior to the opening, with map. 3500 w. Stahl u Eisen—April 1, 1902.

The Düsseldorf Exhibition. Brief illustrated description of the iron, steel, and engineering industries. 1500 w. Engng—March 21, 1902.

Salient Features of the Düsseldorf Exposition. Harrington Emerson. A richly illustrated account of the Rhenish-Westphalian exposition at Düsseldorf as indicating Germany's progress in engineering and metallurgy. 4000 w. Engineering Magazine—October, 1902.

The Rhenish-Westphalian Industrial Exposition (Rheinisch-Westfälische Industrie Ausstellung). An illustrated general review of the engineering features of this large German exposition. 4000 w. Stahl u Eisen—May 1, 1902.

The Düsseldorf Exposition of 1902 (Exposition Industrielle de Düsseldorf en 1902). Alex. Gouvy. A general review of the exposition, with plan, and statistics of the Rheinish-Westphalian district and its industries, particularly coal and iron. 1 plate. 5000 w. Mem Soc Ing Civils de France—Feb., 1902.

The Düsseldorf Exposition of 1902 (Die Düsseldorfer Ausstellung 1902). An illustrated general review of this large German exposition. Serial. 1st part. 1500 w. Glasers Annalen—May 1, 1902.

The Düsseldorf Exposition (Die Industrie-Gewerbe-und Kunstausstellung 1902 in Düsseldorf). A. Seyfferth. An illustrated review of this large German exposition, particularly of the electric and steam plants. Serial. 2 parts. 8000 w. Elektrotech Zeitschr—May 8 and 15, 1902.

The German Industrial Exposition at Düsseldorf. Frank C. Perkins. Illustrated description of this exhibition and some of its important engineering exhibits. 3000 w. Sci Am Sup—Aug. 2, 1902.

The Düsseldorf Exhibition. Illustrated detailed descriptions of the more striking industrial products exhibited, showing the great progress in the German industries. 1500 w. Engng—May 9, 1902.

The Düsseldorf Exhibition. A descriptive account of interesting exhibits, especially in metallurgy and mechanics. 3000 w. Engng—May 16, 1902.

The Building of the Düsseldorf Exposition (Die Industrie und Gewerbeausstellung in Düsseldorf 1902. Bemerkenswerte Bauwerke). O. Leitholf. A well illustrated review of the principal buildings of this large German exposition and their details of construction. Serial. 1st part. 1 plate. 2500 w. Zeitschr d Ver Deutscher Ing—May 3, 1902.

The Düsseldorf Exposition of 1902 (Die Industrie-Gewerbe-und Kunstausstellung in Düsseldorf 1902). O. Leitholf. A general review of this industrial and art exposition of the Westphalian and Rhineland provinces, with illustrations and plans. 2500 w. Zeitschr d Ver Deutscher Ing—May 3, 1902.

A Brief Account of the Düsseldorf Exposition (Kurze Mitteilungen von der Düsseldorfer Ausstellung). Behtrold Braun. An address, giving an account of some of the mechanical features of the Düsseldorf Exposition of 1902, with illustrations. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Bay 1, 1903.

See also **BUILDING MACHINERY; ELECTRIC EXPOSITION;** and under specific heads of machines and materials.

Glasgow.—See **GLASGOW EXHIBITION.**

Görlitz.—See **STEAM ENGINEERING.**

Liége.—The Universal Exposition at Liége, 1905 (L'Exposition Universelle de Liége en 1905). L. Ramakers. A general account of the forthcoming exposition, with plans of the grounds and views of the partially completed buildings. 2000 w. Génie Civil—April 8, 1905.

The Liége International Exposition (L'Exposition Internationale de Liége). L. Ramakers. A fully illustrated description, with plan and views of the various buildings. 3000 w. Génie Civil—July 22, 1905.

The Liége Exhibition. The present article describes the locomotives shown. Ills. Serial. 1st part. 3000 w. Engr, Lond—June 23, 1905.

The Mechanical Features of the International Exposition at Liége. Léon Ramakers. Illustrated description of the mining, metallurgical, railway and other mechanical and engineering exhibits. 2000 w. Engineering Magazine—Oct., 1905.

Mechanical and Technical Notes on the Liége Exposition (Maschinen-technische Reisenotizen von der Lütticher Weltausstellung). Julius Divis. A general descriptive account of the mechanical exhibits, with professional comments. Serial. Part I. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 21, 1905.

The Liége Exhibition. Remarks on the exhibition as a whole, and the lessons which it can convey. 3000 w. Engr, Lond—Aug. 11, 1905.

The Liége Exposition (Lütticher Weltausstellung). A review of the Liége industrial exposition, with especial reference to the mining and metallurgical exhibits. Serial. Part I. 1500 w. Stahl u Eisen—June 1, 1905.

See also under specific heads of machines, etc.

Milan.—The Exposition at Milan in 1906 (Esposizione di Milano 1906). A preliminary account of the buildings and general arrangement of the exposition to be held at Milan in 1906 to celebrate the opening of the Simplon tunnel. 3000 w. Monitore Tecnico—Sept. 10, 1905.

Osaka, Japan.—The Osaka Exhibition, Japan. Editorial review of the exhibits and of the portents which they suggest. Chiefly devoted to the machinery section. 2700 w. Engng—July 10, 1903.

Pan-American.—See **PAN-AMERICAN EXPOSITION.**

Paris, 1900.—See **PARIS EXPOSITION.**

Portland, Ore.—The Lewis and Clark Exposition. Waldon Fawcett. Illustrated description of the grounds and buildings of the several States, with special reference to the mining exhibits. 4200 w. Mines & Min—Aug., 1905.

St. Louis.—See **ST. LOUIS EXPOSITION.**

Vienna.—See **ALCOHOL MOTOR—Vienna Exposition.**

EXTENSOMETER.

See **TESTING MACHINE**—Extensometer.

EYE BAR.

See also **BRIDGE; BRIDGE DESIGN; TESTING.**

Manufacture.—Some Notes on the Development of Eye-Bar Manufacture. Joseph H. Springer, Sr. Reviews the early history of the use and manufacture of eye-bars, and traces the development and progress. 2500 w. Eng News—Aug. 17, 1905.

The Making of 18-inch Steel Eye-bars. William R. Webster. A brief review of recent advances made in the annealing of eye-bars. 1000 w. Eng News—Oct. 8, 1903.

The Method of Manufacturing the Large Eye-bars for the Thebes Bridge. P. S. Hildreth. Describes the making of the largest eye-bars used in bridge construction to date. 1200 w. Eng News—Oct. 8, 1903.

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FACING MACHINE.

See also **MACHINE TOOL—Boring and Facing.**

Developing a Manhole Facing Machine. H. P. G. Nostrand. Illustrated description of a machine designed to face off the flanges of elliptical shaped manhole openings. 800 w. Am Mach—Dec. 13, 1900.

FACINGS.

See **FOUNDRY—Facings; MOLDING—Facing.**

FACTORY.

See also **BUILDING CONSTRUCTION; CONCRETE REINFORCED; WORKS; WORKS MANAGEMENT;** and under specific factories and works.

Architecture.—The Warehouse and the Factory in Architecture. Russell Sturgis. An illustrated critical discussion of buildings of this class. Serial. 1st part. 4800 w. Arch Rec—Jan., 1904.

Babbitt Soap.—See **CONCRETE REINFORCED.**

Belting.—See **BELTING—Factory.**

Gun.—See **GUN WORKS.**

Humidification.—See **MOISTURE; VENTILATION—Factory.**

Long Island City, N. Y.—See **CONCRETE REINFORCED—Factory.**

Overhead Trolley and Dipping Apparatus.—See **MECHANICAL HANDLING — Factory; Overhead Tramrail.**

Piano.—See PIANO FACTORY.

Power Plant.—See MECHANICAL PLANT; POWER PLANT.

Printing Machinery.—See PRINTING MACHINERY.

Springfield, Mass.—See FIBERLOID WORKS.

Steam Plant.—See POWER PLANT; STEAM PLANT.

Sugar, Hawaii.—See BUILDING CONSTRUCTION—Factory, Hawaii.

Facing Machine.—Developing a Manhole Facing Machine. H. P. G. Norstrand. Illustrated description of a machine designed to face off the flanges of elliptical shaped manhole openings. 800 w. Am Mach—Dec. 13, 1900.

Syracuse, N. Y.—See TYPEWRITER WORKS.

Tacks.—See TACK—Atlas Works.

Tool Steel.—See TOOL STEEL.

Typewriter.—See TYPEWRITER WORKS; WORKS MANAGEMENT.

FACTORY LEGISLATION.

See also LABOR; SAFETY APPLIANCES; WORKS MANAGEMENT.

British.—The Factory and Workshop Act, 1901. A short account of the whole act, which has recently passed the British Parliament, emphasizing the portions which are new. 5000 w. Engng—Dec. 13, 1901.

The Factory Act, 1901. Discusses the new matter in the act that came into force on Jan. 1, 1902, in Great Britain. 2200 w. Engr, Lond—Dec. 27, 1901.

FACTORY WASTE.

See also RIVER POLLUTION; SEWAGE DISPOSAL.

Acid Sewage.—See SEWAGE DISPOSAL.

Bacterial Treatment.—The Bacterial Treatment of Trades Waste. William Naylor. Abstract of a paper read before the Inst. of Civ. Engrs. Describes experiments at bleaching works, print works, breweries and dye works. 4000 w. Eng Rec—Sept. 20, 1902.

Bayer System.—See SEWAGE DISPOSAL.

Bradford, Eng.—See SEWAGE DISPOSAL.

Draper Co., Hopedale, Mass.—See SEWAGE DISPOSAL.

Germany.—Sewerage Systems of Industrial Works. An account of methods of construction found desirable in German works where the industrial wastes cause rapid deterioration of ordinary construction. 3800 w. Eng Rec—March 23, 1901.

Sewer.—The Admission of Factory Wastes to the Sewers. Editorial discussion of English law in regard to sewage disposal. 1700 w. Engng—April 3, 1903.

FAMINE.

India.—See IRRIGATION.

FAN.

See also ELECTRIC FAN; HEATING; HEATING AND VENTILATION; MECHANICAL DRAFT; MINE VENTILATION; PUMP—Centrifugal; TUNNEL VENTILATION; VENTILATION.

Air Propellers. Explains the principle of the air propeller and refers to a paper by W. G. Walker describing the tests made to determine the best form of blade for propellers; also gives information on other points. Serial. 1st part. 2800 w. Prac Engr—June 21, 1901.

Centrifugal.—Application of the Principle of the Conservation of Energy to the Operation of Centrifugal Ventilators (Application du Principe de la Conservation de l'Energie au Fonctionnement des Ventilateurs Centrifuges). A. H. Courtois. A long, illustrated, mathematical discussion of the theory of centrifugal pumps and fans. The first part is devoted to pumps. Serial. 1st part. Tables. 1600 w. Rev de Mecanique—Jan., 1902.

Theory of Centrifugal Blowers or Fans. R. C. Carpenter. Abstracted from new edition of Heating and Ventilating. The present article considers the theory of Daniel Murgue. Serial. 1st part. 1800 w. Sib Jour of Engng—Nov., 1902.

Centrifugal Fans. Charles H. Innes. A study of laws, of service in the designing and affecting the efficiency of fans; the measuring of the work done by a fan, etc. Ill. Serial. 1st part. 2500 w. Prac Engr—Jan. 16, 1903.

Designing and Testing Centrifugal Fans. William Gilbert. The paper is supplementary, to a certain extent, to one read by Mr. Heenan in 1895, which dealt chiefly with small fans. The present paper deals with fans of larger size, giving also particulars of tests. Ill. Serial. 1st part. 1400 w. Mech Engr—April 18, 1903.

On the Design and Testing of Centrifugal Fans for Induced Draught and Other Purposes. W. Gilbert. Read before the Civil & Mech. Engrs.' Soc. Somewhat supplementary to a previous paper read in 1895. Describes installations of fans of the larger sizes, and gives particulars of some tests. 4000 w. Engng—Oct. 9, 1903.

Centrifugal Fans and Their Application to the Heating of Industrial Buildings. R. B. Hayward. A study of the application to the heating and ventilating of industrial buildings. General discussion. 11,000 w. Pro Engrs' Soc of W. Penn—June, 1904.

Centrifugal Fans. August J. Bowie, Jr. Describes an apparatus designed by the writer to obtain a suitable velocity gauge for air which would be independent of any existing state of pressure. 2200 w. Trans Am Soc of Mech Engrs, No. 019—Dec., 1904.

The Design of Centrifugal Fans. Max Buch. Gives formulae for the design of centrifugal fans largely used in continental practice, and describes their construction. Deals only with low-pressure fans. Serial. 1st part. 1800 w. Prac Engr—July 21, 1905.

Fans. Charles L. Hubbard. Considers the centrifugal fan and the disk fan, explaining their theories, etc. Ills. Serial. 1st part. 3500 w. Mach, N Y—Oct., 1905.

Centrifugal Fans. Thomas H. Johnson. Data on the performance of fans and a discussion of the influence of the structure or design, reporting tests. General discussion. Ills. 9500 w. Pro Engrs' Soc of W. Penn—Nov., 1905.

See also Cupola; PUMP.

Cupolas.—Note on Centrifugal Fans for Cupolas and Forges. William Sangster. Formulae for the power required, with explanatory notes. 1200 w. Trans Am Soc of Mech Engs, No. 872—Dec., 1900.

The Fan Blower and Its Application to the Cupola Furnace. R. B. Hayward. Read before the Pittsburg Foundrymen's Assn. An explanation of the forms of fan used for the movement of air, the laws under which the forces act, the problems encountered, etc., especially as applied to the cupola. 4200 w. Ir Age—Jan. 8, 1903.

Fan Power for the Cupola. Thomas D. West. Read before the Pittsburg Found. Assn. Discusses the need of a more definite basis for purchasing the necessary power to run foundry fans. Also considers blast pressure gauges, and blast volume. 3000 w. Ir Trd Rev—March 10, 1904.

Cupola Fan Practice. W. H. Carrier. Abstract of paper read before the Am. Found. Assn. Gives data relative to the operation of centrifugal blowers for cupola service, including the air supply required per pound of coke used and per ton of iron produced, etc. 3500 w. Ir Age—June 23, 1904.

Investigations of the Blowing of Foundry Cupolas. Abstract of a paper by W. H. Carrier, giving results of investigations made by the Buffalo Forge Co., with comments. 2500 w. Eng News—July 21, 1904.

Fan Blowers for Cupola Work. G. William Sangster. Read at the A. F. A. Convention, 1904. Notes on the principles of fan blowers. 1700 w. Foundry—Oct., 1904.

Cupola Fan Practice. W. H. Carrier. Read at the A. F. A. Convention, 1904. Gives reliable data relative to the operation of centrifugal blowers for cupola service. 2800 w. Foundry—Oct., 1904.

Air Blast for the Foundry Cupola. W. H. Carrier. Abstract of a paper read before the Buffalo Found. Assn. Discusses the merits of the fan and the positive blowers, and their relative efficiency. 1700 w. Ir Age—May 11, 1905.

Davidson's "Sirocco."—See VENTILATION—Courts, London.

Disc.—See **Centrifugal.**

Electric.—See **ELECTRIC FAN; MINE VENTILATION—Eschweiler, Germany; PUMP—Centrifugal, Electric.**

Electric, Mine.—See **Mine.**

Farcot.—See **TUNNEL VENTILATION—Albespeyre.**

Forges.—Fans and Piping for Forges. William Sangster. Suggestions as to the approximate cost of blowers and piping, with hints on arranging. Ill. 1300 w. Am Mach—April 24, 1902.

Gas Works.—Fans in Gas Works. R. Gordon Mackay. The present article deals with the theory of centrifugal fans, more particularly specialized to the needs of gas engineers. 2500 w. Jour Gas Lgt—Jan. 27, 1903.

Gilbert.—See **Rateau.**

Guibal.—See **MINE VENTILATION.**

High Pressure.—See **PUMP—Centrifugal.**

Heenan.—See **Rateau.**

Luke-Fidler.—Centrifugal Ventilators. R. V. Norris. On the design and tests of the Luke-Fidler colliery fan, with comparison of results and conclusions reached. Ills. 2800 w. Trans Am Inst of Min Engrs—Sept., 1904.

Mine.—A Simple Mine Ventilating Fan. Illustrated description of a simple ventilating fan, designed for metalliferous mines and small collieries. 1200 w. Col Guard—May 2, 1902.

Electrically-Driven Mining Fan. Illustrated description of a fan at Pelton Colliery, in Durham. 600 w. Engr, Lond—June 24, 1904.

See also **MINE VENTILATION.**

Rateau.—Modern Fans. Charles H. Innes. An illustrated article discussing the design of fans with the object of utilising as much of the energy as possible, the unavoidable losses, etc. Describes the Rateau fan, and the Heenan and Gilbert fan in this article. Serial. 1st part. 2000 w. Engng—Nov. 14, 1902.

See also **PUMP—Centrifugal, Rateau.**

Steam Turbine.—See **MINE VENTILATION—Hulton; STEAM TURBINE—Fan Blower.**

Test.—Methods of Testing Blowing Fans. R. C. Carpenter. Read before the A. Soc. of Heat. & Ven. Engs. Considers certain difficulties experienced in testing, the methods, etc. 4600 w. Dom Engng—Dec. 20, 1900.

Test of a Direct-Connected 8-Foot Fan and Engine. E. S. Farwell. Describes a test made to obtain reliable data which would serve as a guide in the selection of size of apparatus for a given case of heating. The methods of conducting the test are outlined and the details discussed. Ill. 3000 w. Trans Am Soc of Mech Engrs—June, 1903.

Fan and Positive Pressure Blower Tests. W. H. M'Faddon. Read before the Pittsburg Found. Assn. Gives history of tests made and conclusions reached. 4800 w. Ir Age—Dec. 8, 1904.

Fan and Positive Pressure Blower Tests. H. E. Field. A report of tests made at Ft. Pitt foundry, Pittsburg. 4000 w. Foundry—Jan., 1905.

See also **PUMP—Electric; Feed.**

Turbo.—See **MINE VENTILATION—Hutton Colliery; STEAM TURBINE—Fan Blower.**

Warship Ventilation.—See **VENTILATION—Warship.**

FAN MOTOR.

See **ELECTRIC FAN.**

FARE REGISTER.

See **STREET RAILWAY MANAGEMENT—Fare Register; Fares.**

FARM MACHINERY.

See **AGRICULTURAL MACHINERY.**

FAST TRAIN.

See **TRAIN, FAST.**

FAUCET.

See **WATER FAUCET.**

FEE.

Germany.—The New Schedule of Fees of German Architects and Engineers. Translation of the schedule adopted by most of the leading German architectural and engineering associations. The first installment gives the principles on which the schedule is based and the directions for computing architects' fees. Serial. 1st part. Eng Rec—May 18, 1901.

FEEDER.

See **ELECTRIC DISTRIBUTION—Railway; ELECTRIC RAILWAY.**

FEED PUMP.

See also **PUMP—Electric; Feed.**

Valve Slip.—See **VALVE—Slip.**

FEED WATER.

See also **BOILER; BOILER PLANT; FEED WATER PURIFICATION; PUMP; STEAM GENERATOR; STEAM PLANT.**

Boilers and Water Supply. F. G. Ansell. The present article discusses the nature of water, and the properties likely to give trouble in the steam boilers. Serial. 1st part. 3000 w. Elec Engr, Lond—Jan. 31, 1902. Supplement.

Feed Water for Boilers. G. James Wells. Abstract of a paper read before the Manchester Soc. of the Inst. of Elec. Engrs. Discusses the difficulties that arise in working boilers, due to impure water, and discusses in detail the various objectionable qualities found in feed waters, and the remedies. 3000 w. Elect'n, Lond—Jan. 17, 1902.

Boiler Feed Waters and Scale. A. M. Wickens. Read before the Can. Soc. of Chem. Ind. Suggestions on the care of boilers and improvement of feed waters. 2400 w. Can Engr—Dec., 1904.

Boiler Scale and Boiler Feed. Harry Spurrier. A study of water, its solvent action, the effect, etc. 2500 w. Can Engr—Jan., 1905.

Air Absorption.—Air in Relation to Boiler-Feeds. Jas. Alex. Smith. Read before the Victorian Inst. of Engrs., at Melbourne. A record of data derived from original observations referring to the absorption by comparatively pure water of atmospheric components, and the effects in relation to some engineering problems. 2500 w. Engng—Oct. 7, 1904.

Analysis.—See **Testing.**

Automobiles.—Water for Automobile Boilers. E. J. Stoddard. A discussion of the subject from the engineer's standpoint, giving tests of waters. 1200 w. Horseless Age—Dec. 26, 1900.

See also **AUTOMOBILE, STEAM—Feed Regulation.**

Economical Feeding.—Plans for Economical Boiler Feeding. W. H. Wakeman. Considers various plans for forcing water into boilers. 1600 w. Elec, N Y—March 12, 1902.

Greasy Condensation.—Greasy Condensation Water as Boiler Feed. William Paterson. Read before the Junior Inst. of Engrs. Discusses the consequences which result from the use of such water. Ills. 4000 w. Mech Engr—July 23, 1904.

Locomotives.—Some Rudimentary Considerations Concerning the Treatment of Water for Locomotive Use. R. P. C. Sanderson. Some points on methods of water doctoring are discussed. 1500 w. Am Engr & R R Jour—Jan., 1902.

Temperature Tests of Injected Water. H. M. Wickhorst. An illustrated article describing tests made to determine whether the water fed into a locomotive by the injector, having greater specific gravity, does not flow to the bottom of the boiler. Also suggests two methods of getting a better mixture of injected water. 1500 w. Ry Age—May 22, 1903.

Water for Locomotive Boilers. William M. Jewell. Notes on the selection and application of water in a boiler, and related matter. 1500 w. R R Gaz—May 15, 1903.

A Plea for Better Boiler Water. John H. Wynne. Discusses the presence of scale-forming materials in water, the effect of scale upon boilers, impurities, etc. Serial. 1st part. 2200 w. Ry Mas Mech—Sept., 1903.

See also **FEED WATER HEATING; FEED WATER PURIFICATION; RAILWAY WATER SERVICE.**

Meter.—See **WATER METER.**

Monongahela River.—Acid in Monongahela River Water. J. A. Mohr. Discusses the use of water from this river, for boiler purposes, giving analyses, method of testing, etc. 1200 w. Pro Engrs' Soc of W Penn—June, 1901.

Oil Filter.—See **OIL SEPARATOR.**

Oil Removal.—See **OIL SEPARATOR; COOLING TOWER.**

Piping.—See **PIPING—Feed-Water; FEED-WATER HEATING.**

Salt Deposit.—See **Test; BOILER SCALE.**

Steam Vehicles.—See **Automobiles; AUTOMOBILE, STEAM.**

Sulphate of Lime.—The Solubility of Sulphate of Lime (Etude sur la Solubilité du Sulfate de Chaux). M. Boyer-Guillon. An exhaustive account of experiments, showing the gradual manner in which the sulphate is precipitated as the temperature rises. 4500 w. Rev de Mécanique—Jan., 1901.

The Solubility of Sulphate of Lime (Etude sur la Solubilité du Sulfate de Chaux). M. Boyer-Guillon. A review of the careful experiments of the author, showing the relations between temperature of feed water and the presence of dissolved sulphate of lime. 3500 w. Revue de Mécanique—Nov. 30, 1901.

Supplying.—Feeding Steam Boilers. R. T. Strohm. Reviews the methods of supplying feed water, discussing their limitations. Ills. 2800 w. Am Elect'n—Sept., 1904.

Temperature Test.—See **Locomotive.**

Test.—The Deposit of Salts in Steam Boilers (Salzausscheidungen in Dampfkesseln). Dr. Steger. Giving analysis of various waters, showing the extent to which the dissolved salts are decomposed in the steam boiler. 1200 w. Gesundheits-Ingenieur—July 20, 1904.

Qualitative Testing of Feed Water. William H. Jenkins. Gives methods by which any engineer can determine the character of the impurities in the feed water he is using. Ills. 2400 w. Power—Dec., 1904.

See also **STEAM ENGINE—Cooper-Corliss.**

Troubles.—Difficulties in a Steel Mill Caused by Bad Feed Water. A. Osgyani. An account of troubles in a plant at Astoria, Long Island, and means taken to remedy. 1400 w. Ir Age—Nov. 6, 1902.

Weight in Boiler.—See **BOILER—Water Weight.**

FEED-WATER HEATING.

See also **BOILER PLANT; ECONOMIZER; FEED WATER; FEED WATER PURIFICATION.**

Boiler Feeding and Feed-Water Heating. L. B. Mather. Discusses some methods of heating and means of delivering the feed water. 1200 w. Am Elect'n—Feb., 1901.

Feed-Water Heaters. D. B. Dixon. Considers it the most essential appliance in a steam power plant, discussing its advantages. 1400 w. Am Mfr—Feb. 27, 1902.

Comparative Methods of Heating Feed Water. Presents the heat balances and cost figures for six of the systems in common use, arranged for comparison. 3500 w. Power—Nov., 1902.

Steam Power Plant Auxiliaries. Horace E. Sibson. Aims to show how a properly designed feed-water heater can produce a great saving and better efficiency. 1500 w. Sib Jour of Engng—March, 1904.

Exhaust Steam Boiler Feed-Water Heaters; Hot Water Pumps and Pumping. W. D. L. Hardie. Read before the Can. Min. Inst. Discusses the objects of feed-water heaters, reviewing the progress and giving information from the writer's experience. Ills. Serial. 1st part. 5000 w. Can Min Rev—May 31, 1904.

Feed-Water Heating. R. T. Strohm. Discusses the economy, safety and purification secured by heating the feed-water, and the methods used. Ills. 2200 w. Am Elect'n—Nov., 1904.

American Practice.—Feed-Water Heaters. William Wallace Christie. Illustrates and describes examples from current American practice. 3000 w. Cassier's Mag—Aug., 1903.

Cochrane.—Open Feed-Water Heaters and Their Application. W. T. Edwards. Illustrated description of feed-water heaters and oil separators for power plants, particularly of the Cochrane type. 2000 w. Am Electr'n—Sept., 1905.

Economy.—Feed-Water Heaters. Ernest R. Briggs. Discusses the commercial economy effected by the feed-water heater, and considers the regenerative system. Ills. 3400 w. Engr, Lond—July 28, 1905.

Home-Made.—A Home-Made Boiler Feed Water Heater. Ernest Stein. Illustrated description. 600 w. Eng & Min Jour—June 23, 1904.

Locomotive.—M. N. Forney's Feed-Water Heater for Locomotives. Illustrated description from advance sheets of a pamphlet by Mr. Forney. 4700 w. R R Gaz—June 27, 1902.

McBride's Locomotive Feed Water Heater. Illustration and statement of the advantages of this system, invented by T. O. McCabe. 1700 w. R R Gaz—July 17, 1903.

Montreal Locomotive Works.—System of Hot Feed Water for Stationary Boilers and Shop Heating. A. A. Maver. Read before the Canadian Ry. Club. Illustrates and describes a system in use at the locomotive works of the Grand Trunk Ry., at Montreal. 1400 w. Dom Engng—June 3, 1905.

Open.—Some Phases of the Feed-Water Heater Problem. Walter E. Harrington. Urging the use of open feed-water heaters and presenting their advantages. 2800 w. St Ry Jour—July 22, 1905.

Piping.—Location of Feed-Water Heaters and Feed Pipes. W. H. Wakeman. Describes arrangements of piping for feed-water heaters, giving diagrams. 1300 w. Engr, U S A—Feb. 15, 1905.

FEED-WATER PURIFICATION.

See also **BOILER CLEANING; BOILER CORROSION; BOILER SCALE; FEED WATER; FEED-WATER HEATING; OIL SEPARATOR; WATER PURIFICATION.**

The Practical Purification of Feed Water (Considerations Pratiques sur l'Epuration des Eaux). J. Bertrand. Discussing especially the removal of carbonates by heat, and sulphates by lime and soda. 1500 w. Génie Civil—Jan. 19, 1901.

The Purification of Feed Water. C. E. Stromeyer. A report dealing with results obtained in practical working with various types of purifiers, and remarks on the cleaning of boilers worked without purifiers. 4500 w. Ill. Engng—Oct. 25, 1901.

The Purification of Boiler Feed Water. Abstract from the memorandum of C. E. Stromeyer, presented at the annual general meeting of the Manchester Steam Users' Assn. Discussion of water softeners is commenced in the present article. Serial. 1st part. 2700 w. Prac Engr—Nov. 22, 1901.

The Purification of Feed Water. From the report of C. E. Stromeyer to the Manchester Steam Users' Assn., dealing with results of an examination into the results obtained in practical working with various types of purifiers for feed water. Also his remarks on the cleaning of boilers worked without purifiers. 6500 w. Sci Am Sup—May 31, 1902.

Feed Waters and Their Action on Boilers. Clifford A. Bowen. Considers the impurities contained in water and their effect on boiler plates; the methods of purification, tests, etc. Serial. 1st part. 4000 w. Elec Rev, Lond—Oct. 3 and 17, 1902.

Feed Water for Boilers (Ueber Kesselspeisewasser). Hr. Bracht. An account of feed waters, their impurities and methods of purification. 1500 w. Glückauf—March 14, 1903.

Formation of Boiler Scale from Fresh Waters and its Prevention. Dr. J. Ohly. Discusses methods of purifying the water before bringing it into the boiler. 1800 w. Min Rept—April 30, 1903.

Four Systems of Softening Water for Industrial Purposes. Illustrated descriptions of the Pittsburg, New York-Continental Jewel, Breda and Tweeddale systems, respectively. 3800 w. Eng News—July 2, 1903.

Water Softening. James O. Handy. Considers the damage done by hard water, methods of softening, the growth and present development, the chemistry, and some municipal water softening plants. Ills. 19,500 w. Pro Engrs Soc of W. Penn—Dec., 1903.

An Inquiry into the Working of Various Water Softeners. C. E. Stromeyer and W. B. Baron. Explains the behavior of various impurities, the difficulties to be overcome, and gives illustrated descriptions of many water softeners, showing the suitability of the various types for special purposes. 16,200 w. Inst of Mech Engrs—Dec. 18, 1903.

Softening and Purification of Water. J. C. W. Greth. Notes the kinds of impurities, considering some of the mechanical devices and methods employed in the purification for boiler-feed purposes, showing them to be only partially successful, and discusses the advantages of the intermittent settling tank system. General discussion. 900 w. Pro Engrs' Soc of W Penn—Feb., 1904.

Impure Feed-Water in Boilers. C. W. U. Adamson. Considers briefly substances in solution, salts in solution, free acids, air and other gases and oil, and indicates the general methods employed to remove them. Serial. 1st part. 1800 w. Aust Min Stand—April 14, 1904.

Purification and Automatic Feeding of Boiler Water (Wasserreinigung und Automatische Speisung). Illustrating several forms of lime and soda softeners, as well as the Körting automatic boiler feeder. 1200 w. Glückauf—June 4, 1904.

Purifying Boiler Feed-Water. R. T. Strohm. Discusses the various methods in use, illustrating a live steam purifier and describing its advantages. Considers an analysis of the water to be treated necessary and a system adopted to meet each case. 2500 w. Am Elect'n—Dec., 1904.

A Simple Method of Calculating Water Analyses and Amounts of Substances to be Added for Preventing Scale and Corrosion of Boilers. Samuel S. Sadtler. Gives curves and tables which are applicable to several schemes of analysis, and save time. 1200 w. Jour Fr Inst—March, 1905.

The Chemical Purification of Boiler Feed-Water. George E. Walsh. A discussion of the different treatments of impure feed-water for boilers, and of water-softening and purifying machines. 1500 w. Am Elect'n—March, 1905.

Notes on Softening and Purification of Water for Steam Raising. Louis J. Le Clair. Read before the Dublin Loc. Sec. of Inst. of Elec. Engrs. On methods of treatment for the softening and the purification of boiler water. 3500 w. Elec Engr, Lond—April 21, 1905.

Water Softening Plants. Remarks on the treatment of boiler waters, giving illustrated descriptions of a number of water softeners. 4500 w. Ir & Coal Trds Rev—Sept. 1, 1905.

Water Softening for Boiler Use. T. W. Snow. A short paper and discussion on the need of removing scale forming substance from the water before it is fed to the boilers. Ills. 3300 w. Jour W Soc of Engrs—Dec., 1905.

Notes on Water Softening. W. M. Gardner and L. L. Lloyd. Treats of the effect of neutral salts, the influence of the apparatus used, the determination of lime factor, and the soda factor, etc. 1700 w. Eng & Min Jour—Dec. 2, 1905.

Archbutt-Deeley.—Water-Softening Plant at the Wilmslow (Stockport) Works. T. Molyneaux. Extracts from a paper read before the Brit. Assn. of Water-Wks. Engrs., with a summary of the discussion. Describes a plant which has a capacity of 25,000 gallons per hour, using the Archbutt-Deeley process. 3800 w. Jour Gas Lgt—Dec. 23, 1902.

Bell.—Water Softening and Purifying. P. A. G. Bell. Read before the West of Scotland Iron & Steel Inst. Describes the Bell system of water purification. Explaining the principles involved and the method of working. 5200 w. Ir & Coal Trds Rev—Nov. 29, 1901.

Breda Softener.—On Some Water Softeners of a Novel Design. Dr. Alfred Gradenwitz. Illustrated description of the Breda water softener. with general remarks. 1800 w. Prac Engr—Nov. 4, 1904.

Clark.—Notes on Softening and Purification of Water for Steam Raising. Louis J. Le Clair. Abstract of a paper read before the Dublin Soc. of the Inst. of Elec. Engrs. Considers the causes of temporary and permanent hardness, and Dr. Clark's method of treating the water for hardness and methods of eliminating oil. 2800 w. Prac Engr—May 19, 1905.

Cold.—The Cold Purification of Boiler Feed Waters. Albert A. Cary. Discussion of N. O. Goldsmith's paper on the Water Softening Plant at the Lorain Steel Co.'s Blast Furnaces, read at the Cincinnati meeting of A. S. M. E. 1300 w. Power—Nov., 1900.

Dutch.—New Controller of Boiler Water. Description, with illustrations, of an apparatus used on Dutch steamers and in Dutch factories where carbonate of soda is added to the water to prevent incrustation. 1200 w. U S Cons Reports, No. 1699—July 17, 1903.

Elkhorn, W. Va.—New Type of Purifying Plant—Industrial Water Company. Illustrated description of plant built for the Houston Coal and Coke Company at Elkhorn, W. Va. 1000 w. R R Gaz—Feb. 12, 1904.

Errors.—Some Sources of Error in Water Treatment. H. Spencer Flyn. A review of accepted methods of purification of waters for boiler feed, showing the necessity for intelligent supervision and care to avoid either under or over treatment. 2000 w. Engng Mag—Nov., 1903.

Greer's Paper.—The Purification of Feed Water. J. B. Greer. Read before the Ry. Club of Pittsburg. A review of what has been accomplished in the purification of water for boiler use. 2000 w. Ry & Engng Rev—Feb. 28, 1903.

Grevenbroich.—Water-Softener of the Maschinenfabrik Grevenbroich. Illustrated description of an apparatus exhibited at Düsseldorf, which is popular in Germany and employed in many large works. 1400 w. Engng—Nov. 21, 1902.

Handy's Paper.—Purification of Water for the Production of Steam. J. O. Handy. Abstract of a paper read before the Int. Cong., St. Louis. A review of the methods for the removal of scale-forming matter as used in the United States. 6200 w. Elec Rev, N Y—Nov. 12, 1904.

Harris-Anderson.—The Harris-Anderson Patent Feed-Water Filter. Illustrated description of an apparatus which it is claimed effects the removal of all oil and leaves the feed-water fit for boiler use. 1700 w. Engng—Aug. 15, 1902.

The Harris-Anderson Water Softener. Illustrated description of this apparatus and its operation. 2300 w. Engng—July 10, 1903.

Ivorydale, O.—The Water Softening Plant of the Procter & Gamble Co., Ivorydale, O. Illustrates and describes a new plant having a capacity of 350,000 gallons per hour. 900 w. Eng News—Jan. 28, 1904.

Jackson's Address.—Water Softening. A. H. Jackson. Presidential address to the Incor. Inst. of Analysts, Assayers and Metallurgists. Remarks on the advantages of treating water before entering the boiler, with review of the Archbutt-Deely process, are given in the present number. Ills. Serial. 1st part. 3400 w. Aust Min Stand—Nov. 10, 1904.

Langwith Coal Mine.—Water-Softening Plant at Langwith Colliery. J. G. Shearer. Read before the Inst. of Min. Engs., England. Illustrated description of the process and apparatus by which very hard water was purified. 1200 w. Mines & Min—April, 1901.

Locomotive.—Water Softening Plant of the Cincinnati, Hamilton & Dayton Railway. Illustrated description of the plant, with report of cost of operating. 900 w. R R Gaz—Jan. 4, 1901.

Some Phases of the Water Treatment Problem. Howard Stillman. A study of the treatment of water for locomotive use only. 1600 w. Am Engr & R R Jour—June, 1901.

The Chicago & North-Western Railway Company's Method of Purifying Water for Locomotive Boilers. G. M. Davidson. On the treatment to remove scale-forming matter, showing that it can be easily and economically accomplished. Illustrated description of apparatus used, and report of cost, etc. Also discussion. 18,500 w. Pro W Ry Club—Feb. 17, 1903.

Water Treatment in Railroad Operation. G. R. Henderson. A brief paper on what has been accomplished and the results of treating water before it is taken on the tender. Followed by lengthy general discussion. 7500 w. W Ry Club—Sept. 22, 1903.

An Extensive Water Softening Installation. Begins a description of the plants of the Pittsburg & Lake Erie R. R., having a total capacity of 348,000 gallons per hour. Serial. 1st part. 1500 w. Am Engr & R R Jour—Nov., 1903.

Foaming Waters and Scaling Waters for Locomotive Boilers. M. E. Wells. Considers boiler troubles due to the water used and the remedies. 2500 w. Eng News—July 21, 1904.

Water Softening. G. M. Campbell. Control and results from a chemical standpoint, based largely on experience with the plants on the Pittsburgh and Lake Erie Railroad. Serial. 1st part. 2000 w. Am Engr & R R Jour—Jan., 1905.

The Development of Water Purification in the United States. C. Herschel Koyl. A review of the subject, especially the work of the Ry. Mas. Mechs.' Assn., commencing in 1870, and a description of water-softening machines. 3500 w. R R Gas—Vol. XXXVIII., No. 19.

See also **Soda Ash; Southern Pacific; Union Pacific; FEED WATER; FEED-WATER HEATING; RAILWAY WATER SERVICE.**

Mechanical Methods.—Feed-Water Purification. Walter W. Edwards. Part first considers the mechanical methods employed. Serial. 1st part. 2200 w. Engr, U S A—Oct. 15, 1903.

Middlepoint, Ohio.—Water-Softening Plants, Pennsylvania Co. Describes the plant at Middlepoint, Ohio, where a machine capable of softening 10,000 gallons of water an hour is in use. 700 w. R R Gas—Oct. 2, 1903.

Oil Separator.—See **OIL SEPARATOR.**

Soda Ash.—The Use of Soda Ash in Locomotive Tanks. S. K. Dickerson. Discusses points of importance in using soda ash, and claims that when properly used it increases the life of the flues, gives less trouble from leaky flues, stay bolts, seams, etc. Ills. 1700 w. Pro Cent Ry Club—Sept., 1904.

Southern Pacific.—Water Softening on the Southern Pacific. H. Stillman. Gives a mechanical description of the apparatus used, with illustrations. 2000 w. R R Gas—June 24, 1904.

Union Pacific.—Water-Softening on the Union Pacific. A. K. Shurtleff. Gives an account of the steps taken to improve the water on a division of this road, and the results obtained. 2500 w. R R Gas—June 24, 1904.

FENDER.

See also **ELECTRIC CAR; STREET CAR.**

Movable Fender for Tramways (Chasse-Corps Mobile à Déclenchement pour Tramways). Ch. Dantin. The fender is normally carried on rollers, close to the ground, but can be lifted over obstructions. 1200 w. Génie Civil—Sept. 7, 1901.

Street Car Fenders (Schutzvorrichtungen an Strassenbahnwagen). M. Kosch. An illustrated description of various kinds of fenders for picking up people in front of street cars. 3000 w. Elektrotech Zeitschr—Jan. 30, 1902.

Düsseldorf.—An Improved Fender Device for Electric Cars (Eine Neue Schutzvorrichtung für Strassenbahnwagen). A. Seyfferth. Illustrating a form of double safety fender used on the electric street railways of Düsseldorf. 1500 w. Elektrotech Zeitschr—Oct. 23, 1902.

Frame.—Safety Apparatus for Electric Sreet Cars (Schutzvorrichtung gegen das Ueberfahren durch Elektrische Strassenbahnwagen). Max v. Leber. An illustrated description of a movable frame, which is automatically dropped in front of the wheels and prevents people from being run over. 600 w. Zeitschr d Oesterr Ing u Arch Ver—March 7, 1902.

Kliemann.—The Kliemann Fender for Street Cars and Automobiles (Die Kliemannsche Schutzvorrichtung für Strassenbahnwagen und Motorfahrzeuge). An illustrated description of a network fender with two pockets, on a frame of iron covered with rubber tubing. 2500 w. Ill Zeitsch f Klein u Strassenbahnen—May 1, 1903.

Watson.—New Automatic Fender and Wheel Guard. Illustrates and describes a fender of this type and its operation. The invention of W. T. Watson. 1100 w. Sci Am—May 30, 1903.

FERRIS WHEEL.

Erection.—Taking Down and Re-erecting the Ferris Wheel. Describes the interesting engineering work in handling a structure of great dimensions and weight, at a great height. Ills. 2300 w. Eng Rec—July 9, 1904.

FERROCYANIDE.

See **CYANIDE.**

FERROINCLAVE.

See **FIREPROOF CONSTRUCTION—Ferroinclave.**

FERROMANGANESE.

See **IRON ALLOY; MANGANESE; STEEEL ALLOY.**

FERROSILICON.

See **IRON ALLOY; SILICON; STEEL ALLOY.**

FERROTITANIUM.

See **ELECTRO-METALLURGY—Iron and Steel; TITANIUM.**

FERROVANADIUM.

See **IRON ALLOY; STEEL ALLOY; VANADIUM.**

FERRY.

See also **FERRYBOAT; FERRY BRIDGE; ICE-BREAKER; TRANSFER BRIDGE; TRANSPORTATION.**

Fort Lee, Hudson River.—See **ELECTRIC RAILWAY—New Jersey & Hudson River.**

Great Lakes.—See **FERRYBOAT; ICEBREAKER.**

Oakland, Cal.—See **ELECTRIC RAILWAY.**

Velsen, Holland.—See **FERRYBOAT—Chain Towing.**

FERRY APRON.

See **TRANSFER BRIDGE.**

FERRYBOAT.

See also **ICE BREAKER; TRANSPORTATION—Maritime Channels.**

Ferry Transportation. Capt. J. M. Cherry. An illustrated review of the old and the modern methods of handling passengers in and around New York. Also gives briefly an account of the ferry service at San Francisco. Discussion. 16,000 w. Pro N Y R R Club—Oct. 21, 1904.

American.—American Ferryboats. Illustrations and brief review of main types in use, with list of the screw and paddle ferryboats of the United States. 2500 w. Naut Gas—Sept. 1, 1904.

"Bremen" Trials.—Progressive Trials of Ferry-Boat Bremen. Col. Edwin A. Stevens. Gives results of the analysis of the trials of this boat for the ferry between New York and Hoboken. 1400 w. Trans Am Soc Nav Archts & Marine Engrs, No. 1—Nov., 1903.

"Cape May."—New Steel Ferryboat. Illustration, with description of the Cape May, the latest addition to the fleet on the Delaware. 2000 w. Naut Gas—Nov. 2, 1901.

Car.—Railway Trains on Ferries. Archibald S. Hurd. Describes and illustrates the ferry systems of Denmark, America and other countries, and discusses the use of such ferries across the English Channel. 4000 w. Cassier's Mag—May, 1903.

See also **Danish; East Ivory; Great Lakes; Mecklenburg; ICE BREAKER.**

Chain Towing.—The Steam Ferry over the North Sea Canal at Velsen (De Stoomponten voor het veer over het Noordzee Kanaal te Velsen). C. Kloos. Illustrating a chain tow ferry system across the North Sea Canal in Holland. 1000 w. De Ingenieur—Oct. 24, 1903.

"Chicago."—Magnificent Ferryboat. Illustration and description of the new screw ferryboat "Chicago," for use in New York waters by the Pennsylvania Co. 2500 w. Naut Gas—Feb. 14, 1901.

Danish.—Danish Government Railroad Ferries William Kolvig. An illustrated article, giving information in regard to these ferries, which furnish a connection between the islands and mainland. 700 w. R R Gas—April 24, 1903.

See also **Mecklenburg-Denmark.**

"Detroit."—Car Ferry Detroit. Illustrated detailed description of an interesting vessel, especially with reference to the machinery. 2200 w. Marine Rev—Feb. 9, 1905.

Car-Ferry Steamer "Detroit"; Michigan Central R. R. Illustrates and describes a four-screw car-ferry steamer of exceptional size and power, designed to serve as an ice-breaker and to maintain service between Detroit, Mich., and Windsor, Ont. 1000 w. Eng News—May 4, 1905.

Car Ferry Steamer Detroit, Michigan Central Railroad. Illustrated description of a vessel used in the Detroit River service, between Detroit, Mich., and Windsor, Canada. 1100 w. Sci Am Sup—June 3, 1905.

New Combination Ferry and Excursion Steamer. Illustration and description of a boat under construction for service on the Detroit River. 2800 w. Naut Gaz—Feb. 27, 1902.

East Ivory, Ill.—East Ivory Car Ferry of the Missouri Pacific. Illustrated description of a car ferry crossing the Mississippi River about six miles below the Eads Bridge, at St. Louis, used for the transfer of freight cars. 1200 w. R R Gaz—Vol. XXXIX., No. 15.

"Edgewater."—New Screw Ferryboat. An illustrated description of the "Edgewater," the latest to be built for New York waters. 1800 w. Naut Gaz—April 24, 1902.

Ferryboat Edgewater. Illustrated description of a boat recently put in service between 130th Street, N. Y., and Edgewater, N. J. 1600 w. Marine Engng—Aug., 1902.

Progressive Trials of the Screw Ferryboat Edgewater. E. A. Stevens and C. P. Paulding. Presents results of the trials of interest to designers. 2000 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 2—Nov., 1902.

Ellis Island, N. Y.—See **New York Immigrants.**

Florida.—A New Southern Ferryboat. Illustrates and describes a wooden-hull screw ferryboat now under construction in Florida. 600 w. Naut Gaz—April 28, 1904.

Gjedser-Warnemünde.—See **Mecklenburg-Denmark.**

Great Lakes.—American Car Ferries. Waldon Fawcett. Illustrations and information concerning the efficient car ferries on the Great Lakes. 1500 w. Sci Am—Jan. 19, 1901.

Pere Marquette 19: A Car Ferry of the Largest Size. Illustrated detailed description. 1000 w. Marine Engng—April, 1904.

See also **ICE BREAKER.**

Ice Breaking.—See **Great Lakes; ICE BREAKER.**

Kennebec River.—A Railroad Ferry Transfer. Illustrated description of the arrangements for ferrying trains across the Kennebec River, between Bath and Woolwich. 1100 w. Eng Rec—Nov. 23, 1901.

"Lakewood."—Fine New Ferryboat. Illustration, with description, of the Lakewood, a double-screw ferryboat for N. Y. harbor, belonging to the Cent. R. R. of N. Jersey. 900 w. Naut Gaz—Aug. 22, 1901.

Mecklenburg-Denmark.—Steam Railroad Ferry Between Gjedser and Warnemuende. Illustrations, with description, of the two large ferryboats of the Mecklenburg government, used for transferring cars across an arm of the Baltic Sea. 1000 w. Sci Am Sup—Jan. 9, 1904.

Train Ferry Boat "Prince Christian" (Eisenbahn-Dampffähre "Prins Christian"). W. Kaemmerer. Illustrated description of new passenger train ferryboat for the railway service between Warnemünde, in Germany, and Gjedser, in Denmark. 1500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Feb. 20, 1904.

The Danish Steam Car Ferry "Prins Christian." Illustrates and describes a vessel built to complete the new direct route between Berlin and Copenhagen. 1300 w. Marine Engng—April, 1904.

"Newark."—The New Ferryboat Newark. An illustrated description of the latest addition to the boats of the Pennsylvania Railroad, operated in New York harbor. 2000 w. Naut Gaz—June 18, 1903.

New York Immigrants.—New Screw Ferryboat. Illustration, with details, of the boat which is to be used in the immigration transfer service at the port of New York. 1000 w. Naut Gaz—Feb. 4, 1904.

Ellis Island Ferryboat. An illustrated detailed description of a new boat for special service. 1800 w. Marine Engng—Sept., 1903.

New York-Staten Island.—New Screw Ferryboats. Illustrated detailed description of craft designed for use by the City of New York for the Staten Island ferry. Serial. 1st part. 3800 w. Naut Gaz—March 31, 1904.

The New Staten Island Ferryboats. An illustrated description of these boats, which will be the finest vessels of their class in the world. 4000 w. Naut Gaz—Sept. 1, 1904.

The New Ferryboats for the New York-Staten Island Service. Illustrated description, with specifications. Serial. 1st part. 1500 w. Marine Engng—Sept., 1904.

The New York Staten Island Ferryboats. Brief general description, with illustrations, of the ferryboat "Manhattan," 250 feet long, with a speed of 18½ knots. 400 w. Marine Engng—Sept., 1905.

"Northfield" Sinking.—See **FERRYBOAT COLLISION; STEAMBOAT INSPECTION—U. S. Service.**

Oil Burning.—See **San Diego.**

"Pere Marquette."—See **Great Lakes.**

"Prince Christian."—See **Mecklenburg-Denmark.**

Propulsion.—See **SHIP PROPULSION.**

Ramona.—See **San Diego.**

San Diego, Cal.—The Oil-Burning Ferryboat Ramona. An illustrated detailed description of a ferryboat to be used in the harbor of San Diego. 2500 w. Marine Engng—Dec., 1903.

Pacific Coast Ferryboat. Illustrated description of the Ramona, built for service in Southern California. 700 w. Naut Gaz—May 12, 1904.

San Francisco Bay.—Fine New Ferryboat. Illustration and description of the "San Pablo," built for service on San Francisco Bay. 1000 w. Naut Gaz—Nov. 8, 1900.

San Francisco Bay Ferryboats, San Jose and Yerba Buena. Illustrates and describes new boats of the double-screw type. 900 w. Naut Gaz—Oct. 15, 1903.

San Francisco Bay Ferryboats, San Jose and Yerba Buena. Illustrates and describes the machinery of these boats designed for fast service. 2000 w. Naut Gaz—Oct. 22, 1903.

New Ferryboats for San Francisco Harbor. Illustrates and describes boats capable of a maximum speed of 17 miles per hour, and of a high power of acceleration for a 15 minute service between San Francisco and Oakland. 1000 w. Marine Engng—March, 1905.

The Southern Pacific Company in Marine Work. W. H. Crawford and T. B. Burnite. Illustrated description of the train ferryboat "Solano" and its recent repairing on a specially built marine railway and of car floats on San Francisco Bay. 1500 w. Marine Engng—Sept., 1905.

"Solano."—See **San Francisco.**

Staten Island.—See **New York-Staten Island.**

Tyne.—See **STEAMBOAT.**

Vancouver.—New Canadian Screw Ferryboat. Illustration, plans and brief description of a vessel under construction for service at Vancouver. 350 w. Naut Gaz—March 10, 1904.

"West Point."—Elegant New Propeller Ferryboat. Illustrated description of the "West Point," the latest addition to the N. Y. harbor fleet. 1400 w. Naut Gaz—March 7, 1901.

FERRYBOAT COLLISION.

"Northfield"-"Mauch Chunk."—The Northfield Accident. Brief illustrated account of the damage to this ferryboat while leaving New York on June 14, by the "Mauch Chunk" colliding. 500 w. Marine Engng—Aug., 1901.

See also **STEAMBOAT INSPECTION—U. S. Service.**

FERRY BRIDGE.

See also **TRANSFER BRIDGE; TRANSPORTATION—Maritime Channels.**

Transporter Bridges (Ponts à Transbordeur). G. Leinekugel Le Cocq. With illustrated descriptions of the bridges at Rouen, Biserta and Nantes. A traveling car is suspended from a high level suspension bridge, thus permitting a clear waterway for ships. Two articles. Two plates. 5000 w. Génie Civil—Nov. 21, 28, 1903.

Bizerta, Tunis.—The Ferry-Bridge at Bizerta. Illustrated description. 800 w. Sci Am Sup—Nov. 3, 1900.

Bordeaux.—A Great Ferry Bridge. Brief notes on bridges of this description at Martrou and at Nantes, with illustrated description of one to be erected at Bordeaux, with a span of a quarter of a mile in length. 2000 w. Engr, Lond—Aug. 28, 1903.

A Transfer Bridge with a Span of 400 Meters (Transbordeur de 400 Mètres de Longeur). An illustrated description of a hinged-arch bridge, from which is suspended a car, for transporting passengers and vehicles across the Gironde River, at Bordeaux, France. 1 plate. 1500 w. Génie Civil—June 20, 1903.

The Proposed Ferry Bridge at Bordeaux. Brief illustrated description of a bridge of the transporter type. 700 w. Eng Rec—April 9, 1904.

Duluth.—The New Ferry Bridge Across the Ship Canal at Duluth, Minn. W. B. Patton. Two-page plate of details, with illustrations and description. 3700 w. Eng News—March 20, 1902.

Aerial Transfer Ferry Bridge Over the Ship Canal at Duluth. Illustration and description. 700 w. R R Gaz—March 14, 1902.

An Electric Aerial Ferry. Frank C. Perkins. Illustrated description of a type of bridge in operation across the Duluth Ship Canal. Electric motors furnish the power for the ferry car. 1200 w. Elec, N Y—Aug. 30, 1905.

The Ferry Bridge Across the Ship Canal at Duluth, Minnesota. C. A. P. Turner. An account of the circumstances and conditions that influenced the selection of this type, with illustrated description of the structure, its construction, and operation. 5500 w. Pro Am Soc of Civ Engrs—Oct., 1905.

Electric.—See **Duluth.**

England.—Flying Ferries. Novel Bridge Construction. General description of transporter, or ferry, bridges, and of those over the Manchester Ship Canal and the Mersey River and over the Usk, at Newport, Monmouthshire. 1200 w. Ir & Steel Trds Jour—Aug. 6, 1904.

See also **Nantes, France.**

Manchester, Eng.—Transporter Bridge Across the Manchester Ship Canal. Illustrated description of a bridge, nearing completion, which has a clear span of 1,000 feet. 1400 w. Sci Am—May 28, 1904.

Martrou.—See **Bordeaux.**

Mersey, Eng.—See **Runcorn.**

Nantes.—The Elastic Deformation of Members Subjected to Horizontal Compression (Déformation Elastique dans les Pièces Comprimées Horizontales). E. Lebert. Discussing analytically the stresses in the members of the proposed transporting bridge across the Loire at Nantes. 10000 w. Annales des Ponts et Chaussées—1 Trimestre, 1902.

Nantes, France.—Suspension Ferry over the Loire at Nantes, France. B. H. Ridgely. Brief illustrated description of ferry or transfer bridges at Nantes and at Newport, England. 1000 w. R R Gaz—Vol. XXXVII, No. 11.

The Nantes Transfer-Bridge. Illustrates and describes a bridge recently built over the Loire differing in many ways from the usual designs. 1200 w. Engng—Jan. 13, 1905.

See also **Bordeaux; BRIDGE DESIGN—Ferry Bridge.**

Rouen.—The Overhead Ferry at Rouen. Reviews the usual methods of crossing channels, and describes the system of a car suspended from a high level bridge as used at Rouen, stating its advantages. Ill. 2000 w. Cons Rept, No. 996—March 28, 1901.

The Transfer Ferry Bridge at Rouen (Die Ueberfuhrbrücke in Rouen). H. Frans. An illustrated account of the high-level suspension bridge, with low-level hanging transport platform recently erected at Rouen. 1500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1901.

Runcorn, Eng.—Widnes and Runcorn Transporter Bridge. Illustrated description of this bridge and its operation. 2200 w. Prac Engr—Aug. 21, 1903.

The Runcorn Transporter Bridge. Illustrations, with brief description of this aerial ferry. 400 w. Engng—April 7, 1905.

Widnes and Runcorn Transporter Bridge. Illustrated description of the bridge and its operation. 1300 w. Elec Engr, Lond—June 16, 1905.

Transporter Bridge Over the Mersey. An illustrated description of a bridge of the "suspended ferry" type, recently completed. 2500 w. Engr, Lond—May 5, 1905.

The Widnes-Runcorn Transporter Bridge. Illustrated detailed description of this bridge on the river Mersey, and its electrical working. 2700 w. Tram & Ry Wld—Sept. 14, 1905.

Widnes, Eng.—See **Runcorn.**

FERRY HOUSE.

New York.—New Lackawanna Ferry House at Twenty-third Street, New York. Illustrates and describes a new ferry house to be built at West Twenty-third street, New York. 500 w. R R Gaz—Jan. 15, 1904.

A Group of New Ferry Houses. Illustration and plans of the new ferry-houses for the C. R. R. of N. J., the D., L. & W. R. R., and the Erie R. R. at West 22d and 23d Sts., New York City, with brief descriptions. 500 w. R R Gaz—Vol. XXXVIII., No. 5.

FERTILIZER.

See **GUANO.**

FIBERLOID WORKS.

The New Works of the Fiberloid Company, at Springfield, Mass. Illustrated description of a fireproof plant comprising twenty buildings, equipped with electric drivers, two steam distribution systems, automatic sprinklers on both wet and dry systems, large water filters, incandescent electric lights and up-to-date plumbing. Serial. 1st part. 3000 w. Eng Rec—Jan. 28, 1905.

FIELD COIL.

See also **ELECTRIC GENERATOR; ELECTRIC GENERATOR DESIGN; ELECTRIC MACHINERY; ELECTRIC MOTOR; ELECTROMAGNET.**

FIELD GLASS.

Porro Prism.—The How and the Why of the Porro Prism Field-Glass. Worcester Reed Warner. An illustrated article giving an analysis of the principles involved. 2600 w. Trans Am Soc of Mech Engrs, No. 926—Dec., 1901.

FILE.

New vs. Re-cut.—The Relative Economy of New and Re-Cut Files. Notes reproduced from a pamphlet issued by the Fairbanks Co., which seem to express the case very fairly. 1000 w. Mech Engr.

FILING.

See also **DRAWING ROOM; INDEX.**

Clippings.—See **INDEX—Filing Clippings.**

FILING MACHINE.

A Foot-Power Filing Machine. Warren E. Willis. Illustrated description of a machine designed for use in die-making. 800 w. Am Mach—Oct. 29, 1903.

FILLING.

See also **COAL MINING—Filling; EARTHWORK; EXCAVATION; RAILWAY CONSTRUCTION.**

Conveyor System.—The Conveyor-System for Filling at the Coal-Face, as Practiced in Great Britain and America. W. C. Blackett and R. G. Ware. Abstract of a paper before the Inst. of Min. Engrs., with discussion. 4700 w. Ir & Coal Trds Rev—June 9, 1905.

Grading Machine.—See **GRADING MACHINE.**

Riker's Island, N. Y.—See **REFUSE DISPOSAL—N. Y., Riker's Island Plant.**

Seattle, Wash.—See **DRAINAGE.**

FILTER PRESS.

See also **CYANIDE PROCESS; GOLD METALLURGY.**

Materials.—Material Used in the Construction of Filter Presses. Emil Hatschek. A brief description of the materials available and employed in filter press construction. Ills. 900 w. Elec-Chem & Met Ind—June, 1905.

FILTRATION.

See also **RIVER POLLUTION; SEWAGE DISPOSAL; WATER PURIFICATION; WATER SUPPLY; WATERWORKS.**

Selecting a System for Filtration of Water. Floyd Davis. Discusses efficiency, original cost and operating expenses. 1000 w. Munic Engng —Feb., 1901.

Filtration of Water for Public Use. Continued informal discussion on the above subject. 1600 w. Pro Am Soc of Civ Engs—March, 1901.

Filtration of River Water. Alfred J. Jenkins. Extracts from a paper read before the Assn. of Munic. & Co. Engrs. at Birmingham. Considers means adopted for treatment. Discussion. 5800 w. Jour Gas Lgt—April 29, 1902.

Modern Filtration. Robert E. Milligan. An explanation of the requirements of modern plants and the processes used. Ill. 1800 w. Munic Engng—Aug., 1902.

Illustrated Description of Some Filter Plants and Results. Morris Knowles. 8500 w. Pro Engrs Soc of W Penn—Dec., 1903.

Progress in the Filtration of Public Water Supplies. Charles Brossmann, Jr. Read before the Indiana Engng. Soc. A discussion of the methods of purification, the efficiency of filtration, etc. 3000 w. Munic Engng—Feb., 1905.

Albany, N. Y.—Results of Water Filtration at Albany. Dr. Martin MacHarg. Extracts from a paper read before the Albany Co. Med. Soc. concerning the reduction in typhoid fever in Albany since the introduction of filtered water. 700 w. Eng Rec—Dec. 1, 1900.

A Filtration Plant at Albany, N. Y. William O. Webber. Brief illustrated description of the plant established at the new intake. 1600 w. Trans Am Soc of Mech Engrs, No. 888—May, 1901.

Alexandria. — Filtration at Alexandria. An illustrated description of this plant in Egypt. 2500 w. Fire & Water—Nov. 21, 1903.

Alum.—The Benefit of Alum in Water Filtration. Charles V. Chapin, in the "Providence Medical Journal." Report concerning the East Providence, R. I., filter, claiming there is no alum in the water after filtration, as shown by tests. 1300 w. San—Nov., 1900.

Anderson, Ind.—The Water Filtration Works at Anderson, Ind. F. B. Leopold. An illustrated detailed description of the plant and its equipment with Jewell filters. 2500 w. Eng Rec—Feb. 4, 1905.

Tests of Copper and Iron Sulphates and Lime with Mechanical Filters at Anderson, Ind. Information from a paper by C. Arthur Brown, read before the American Water Works Association. 2500 w. Eng News—May 25, 1905.

Antietam.—See **Reading, Pa.**

Arad, Hungary.—See **WATERWORKS.**

Automatic Modules.—Automatic Modules for Regulating the Speed of Filtration. Charles Anthony, Jr. Considers the requirements which an apparatus of this kind should fulfil, and describes various forms of controller designed for this purpose. Ill. 1400 w. Pro Am Soc of Civ Engrs —Feb., 1903.

Automatic Modules for Regulating the Speed of Filtration. John H. Gregory's discussion of the paper by Charles Anthny, Jr. 2500 w. Pro Am Soc of Civ Engrs—May, 1903.

Automatic Modules for Regulating the Speed of Filtration. Continued discussion of paper by Charles Anthony, Jr. 2800 w. Pro Am Soc of Civ Engrs—Aug., 1903.

Bacterial.—See **WATER PURIFICATION.**

Belmont Works.—See **Philadelphia, West.**

Binghamton, N. Y.—Mechanical Filter at Binghamton, N. Y. George C. Whipple. Illustrated detailed description. 1500 w. Eng Rec—June 17, 1905.

Bremen, Germany.—Filtration for Public Water Supplies, with Especial Reference to the Double Filtration Plant at Bremen, Germany. Eugen Goetze. An illustrated description of some of the characteristic features of the Bremen filter works. 5000 w. Pro Am Soc of Civ Engrs—Sept., 1903.

Filtration for Public Water Supplies, with Especial Reference to the Double Filtration Plant at Bremen, Germany. Discussion of the paper by Eugen Geotse, Esq. 4500 w. Pro Am Soc of Civ Engrs—Nov., 1903.

Filtration for Public Water Supplies, with Especial Reference to the Double Filtration Plant at Bremen, Germany. Continued discussion of a paper on this subject by Eugen Goetze. 12400 w. Pro Am Soc of Civ Engrs—Dec., 1903.

Brooklyn, N. Y.—Mechanical Filters of the Brooklyn, N. Y., Water Works. Illustrates and describes two mechanical filter plants, built to purify a small portion of the water supply, which have given uniformly good results since completed, about two years ago. 3000 w. Eng Rec —Aug. 26, 1905.

Brooklyn Specifications.—Specifications for a Mechanical Filter Plant. Extracts from specifications prepared for the Brooklyn water-works, giving the features of special interest. 1500 w. Eng Rec—Nov. 17, 1900.

Charleston-Kanawha, W. Va.—See **Levi Mechanical.**

Chester, Pa.—A Rapid Filter Plant for the New Chester Water Company. Illustrates and describes a plant having a capacity of 4,000,000 gallons per day. 2200 w. Eng Rec—Feb. 27, 1904.

Concrete Reinforced.—See **Marietta; New Haven; CONCRETE REINFORCED.**

Covered vs. Uncovered.—Covers for Slow Sand Water Filters. Allen Hazen. From a report to the Trenton Water Board on "Pollution and Filtration of the Delaware River Water Supply for the City of Trenton, N. J." Discusses points to be considered in deciding whether or not to cover filters, with the writer's reasons for recommending open filters. 4500 w. Eng News—Jan. 24, 1901.

Covering Water Filters. A discussion, by Allen Hazen, of the condition under which it is advisable to cover sand filters. 4300 w. Eng Rec —March 23, 1901.

See also **Sweden; Washington.**

Danville, Ill.—The Mechanical Filter Plant for the Danville Water Company. An illustrated detailed description of new works. 1800 w. Eng Rec—Dec. 26, 1903.

See also **WATERWORKS.**

Danville, Va.—A Modern Filter Plant. Freeland Howe, Jr. Illustrates and describes the installation of mechanical filters at Danville, Va., giving details and results. 1200 w. Munic Engng —Nov., 1905.

Desrumeaux.—The Sterilization and Filtration of Potable Water (Sterilisation et Filtration des Eaux d'Alimentatión). F. Gramyr. An illustrated account of the Desrumeaux system of mechanical filtration, employing alum as a coagulant. 3000 w. 1 plate. Revue Technique—July 25, 1903.

East Providence, R. I.—The Efficiency of the East Providence Mechanical Filters. An explanation of the action of a half-million-gallon plant during a run of 20 months, the efficiency in removing color as well as bacteria being given. 600 w. Eng Rec—Dec. 7, 1901.

See also **Alum.**

Elmira, N. Y.—Purification of the Chemung River at Elmira, N. Y. James M. Caird. Describes the system of filtration of the Elmira Water Company. 1500 w. Am Water Wks Assn—June, 1901.

Success of Mechanical Filter at Elmira. James M. Caird. An account of the method and treatment and the gratifying results. 1500 w. Fire & Water—July 20, 1901.

English System.—The English System of Water Filtration. Floyd Davis. Describes the English methods of sand filtration and the care needed. 1500 w. Munic Engng—Dec., 1900.

Experimental Plant.—An Experimental Water Filtration Plant: Its Design, Use, Economy and Value. Floyd Davis. On the wisdom of experimental investigation before installing a system, and suggestions. 1000 w. Munic Engng—Nov., 1900.

Failures.—The Failures and the Possibilities of Water Filtration. Allen Hazen. Abstract of remarks made at the Sanitary Con. of the Health Officers of Conn. Discusses the reasons for some failures. 2000 w. Eng News—Dec. 31, 1903.

Feed Water.—See **FEED-WATER PURIFICATION; OIL SEPARATOR.**

Fischer.—See **WATERWORKS**—Arad, Hungary.

Gathering Ground Compared.—See **WATER SUPPLY**—Protection.

Germany.—Water Filtration in Germany. E. Beer. Translation of parts of an address on the recent history of filtration in Germany, and the features which are yet to be settled. 3900 w. Eng Rec—Nov. 3, 1900.

Hackensack Water Co.—The Mechanical Filters of the Hackensack Water Company. Illustrated description of the purification works. Serial. 1st part. 3000 w. Eng Rec—Nov. 12, 1904.

Harrisburg, Pa.—A Filtration Plant for Harrisburg, Pa. The water supply is taken from the Susquehanna River, and the conditions are described; also the new filtration plant. 1600 w. Eng Rec—March 19, 1904.

Hospital, Poughkeepsie, N. Y.—Small Sand Filter Plant for a Hospital at Poughkeepsie, N. Y. An illustrated description of a small plant, important owing to its novel features. 2000 w. Eng Rec—Jan. 7, 1905.

Hudson, N. Y.—The Slow Sand Filters of the Water-Works of Hudson, N. Y. H. K. Bishop. An illustrated account of these filter beds and their operation. They were constructed in 1874-5, and 1888 respectively. 1100 w. Eng News—Aug. 14, 1902.

Hygiene.—Filtration from the Hygienic Standpoint. Dr. E. G. Matson. Remarks on the diseases usually attributed to impure water, and the value of filtration as a remedy. 2700 w. Pro Engrs Soc of W Penn—Dec., 1903.

Imbeaux.—See Nancy.

Indianapolis.—Operation of Sand Filters of Indianapolis Water-Works. W. C. Mabee. Extract from a paper read before the Indianapolis Technical Club. Illustrates and describes the method of operating these filters. 2500 w. Munic Engng July, 1905.

The Sand Filtration Plant of the Indianoplis Water Works. W. C. Mabee. From a paper before the Indianapolis Tech. Club. Illustrated detailed description of the plant and information concerning the source of supply. 3200 w. Munic Engng—April, 1905.

Ithaca, N. Y.—A Mechanical Filter Plant for the Ithaca Water Works Company. A statement of the conditions to be met and the past history of the water supply, with an illustrated description of the filtration plant near completion. 3400 w. Eng Rec—Aug. 29, 1903.

Jewell Filter.—See Anderson, Ind.

Kurka Stone.—The Kurka Stone Filter System (Steinfilter. System Kurka). With illustrations showing the arrangement of filtering tubes of artificial stone to form large or small units. 1800 w. Glasers Annalen—Aug. 15, 1901.

Laredo, Texas.—The Filter Galleries for the Water Works of Laredo, Texas. A. L. McLane. Detailed description. 1800 w. Eng Rec—Jan. 9, 1904.

Lawrence, Mass.—The Lawrence, Mass., City Filter: A History of Its Installation and Maintenance. Morris Knowles and Charles Gilman Hyde. An account of this engineering work and its operations, that all the necessary data may be in form for reference and study. Ill. 17900 w. Pro Am Soc of Civ Engs—April, 1901.

The Lawrence, Mass., City Filter: A History of Its Installation and Maintenance. Discussion of paper by Morris Knowles and Charles Gilman Hyde. Ill. 15000 w. Pro Am Soc of Civ Engrs—Aug., 1901.

The Lawrence, Mass., City Filter: . A History of Its Installation and Maintenance. Continued discussion of paper on this subject by Morris Knowles and Charles Gilman Hyde. 1130 w. Pro Am Soc of Civ Engrs—Sept., 1901.

The Lawrence Filter. M. F. Collins. Illustrated description of the filter and its method of operation, and certain features of the results. 2500 w. Jour N Eng W Wks Assn—Sept., 1903.

Lawrence Filter Division Walls. An illustrated description of the filter bed division walls at Lawrence, Mass. 1800 w. Fire & Water—Aug. 29, 1903.

Levi Mechanical, W. Va.—Levi Mechanical Filters at Charleston-Kanawha, W. Va. Illustrated description of plant of the pressure type. Revolving bars are used to prevent clogging of the screening system by sand. 700 w. Eng News—April 7, 1904.

Little Falls, N. J.—The Filtration Works of the East Jersey Water Company, at Little Falls, New Jersey. Discussion of paper by George W. Fuller. 6000 w. Pro Am Soc of Civ Engrs—May, 1903.

The Filtration Works of the East Jersey Water Company, at Little Falls, New Jersey. George W. Fuller. History of the undertaking, general description of the pumping station, and detailed description of the filtration works and their operation, with illustrations. 6500 w. Pro Am Soc of Civ Engrs—Feb., 1903.

Filtration at Little Falls, N. J. An illustrated description of this new plant of the East Jersey Water Co., which successfully filters 32,000,000 gallons in twenty-four hours. 3000 w. Fire & Water—Sept. 12, 1903.

Lorain, O.—The Iron Coagulant Process at Lorain. Describes the method of preparing sulphate of iron for use as a coagulant with rapid filters. 1200 w. Eng Rec—May 10, 1902.

Filtration at Lorain. O. H. Jewell. A report on the new iron process, with illustrated description of the plant. 3400 w. Fire & Water—June 7, 1902.

The Use of Sulphate of Iron at Lorain. C. Arthur Brown. Report concerning changes made in a filtration plant on Lake Erie, the methods of analysis, results obtained, etc. 2800 w. Eng Rec—Dec. 5, 1903.

Louisville, Ky.—See **WATER PURIFICATION.**

Maignen Preliminary.—The Maignen Preliminary Filters for the Preparation of Water for Sand Filtration. A description of these scrubbers and a discussion of their efficiency and economy condensed from a report made by Messrs. Rudolph Hering and George W. Fuller to the Maignen Filtration Co., based on experiments at Philadelphia. 3300 w. Eng Rec—Nov. 22, 1902.
See also Philadelphia.

Marborough Brook.—See Slow Sand.

Marietta, O.—A Reinforced Concrete Filtration plant at Marietta, Ohio. Illustrations, detail sections and description of construction. 1200 w. Eng Rec—April 22, 1905.

Mechanical.—The Mechanical System of Water Filtration. Floyd Davis. Describes the filters and their operation. 1000 w. Munic Engng—Jan., 1901.

See also under specific places.

Middletown, N. Y.—New Filter Plant at Middletown, N. Y. Illustrations with brief description. 400 w. Sci Am Sup—July 19, 1902.

Moscow.—Filtration for Moscow, Russia. Extract from article by M. Nicholas Simin, with brief review. 1200 w. Fire & Water—Nov. 3, 1900.

Mount Vernon, N. Y.—Six Years of Slow Sand Water Filtration at Mount Vernon, N. Y. Gives a summary of records kept, and details of operation of this plant, which is modeled closely after the one at Lawrence, Mass., and put in operation less than a year after its model. Also editorial giving comparative figures. 4100 w. Eng News—May 30, 1901.

Mysore, India.—The American System of Filtration Plant in Mysore, India. Edmund B. Weston. An illustrated description of the works for supplying the Kolar gold field with potable water. 4500 w. Eng Rec—Dec. 17, 1904.

Nancy, France.—A New Form of Filter Gallery at Nancy, France. E. A. Gieseler. An illustrated account of the method of Dr. Imbeaux for remodeling the existing filter gallery at Nancy. 1800 w. Eng Rec—Feb. 11, 1905.

Natural.—See **WATER SUPPLY**—Springfield, O.

New Haven, Conn.—A Concrete-Steel-Construction Filtration Plant for the New Haven Water Company. An illustrated description of unusually interesting filtration works. A slow sand filter plant. Serial. 1st part. 3600 w. Eng Rec—March 5, 1904.

New Orleans.—Plants for Investigating the Purification of Mississippi River Water at New Orleans. Illustrated description of recently installed plant. 600 w. Eng News—Feb. 7, 1901.

The Experimental Water Filters at New Orleans. Illustrated description of an inexpensive station for testing various water purification processes involving sedimentation and filtration with or without coagulation. 600 w. Eng Rec—Feb. 9, 1901.

Norfolk, Va.—See **WATERWORKS.**

Nyack, N. Y.—The Construction of Gravity Sand Filters at Nyack, N. Y. G. N. Houston. Gives illustrated description of plant, and details of construction, stating the conditions to be met and the methods adopted. 3500 w. Pro Am Soc of Civ Engs—Dec., 1900.

The Construction of Gravity Sand Filters at Nyack, N. Y. Discussion of paper by G. N. Houston. 3000 w. Pro Am Soc of Civ Engs—March, 1901.

Open Sand.—See **Providence, R. I.; Reading, Pa.**

Open vs. Closed.—See **Covered; Sweden.**

Painesville, O.—The Filter Galleries at Painesville, Ohio. Illustrated description of galleries built close to the low-water line of Lake Erie, so that wave action on the sand keeps the latter from clogging. 500 w. Eng Rec—June 1, 1901.

Philadelphia.—The Lower Roxborough Filter Plant at Philadelphia. Illustrated description of five covered sand filters and a covered clear water basin, all of concrete, having a capacity of 6,400,000 gallons in 24 hours with one filter idle. The work involves a large amount of special concrete construction. 3400 w. Eng Rec—Dec. 8, 1900.

The Upper Roxborough Filter Plant at Philadelphia. Illustrated description of a covered filter plant of 2,100,000 gallons daily capacity, with covered filtered-water basin, all the structures being of concrete. 1800 w. Eng Rec—April 13, 1901.

The New Filtration Works in Philadelphia. J. A. Stewart. An illustrated description of the extensive works under construction, which will probably be the largest and most complete in the United States. 2000 w. Munic Engng—Jan., 1903.

The Philadelphia Filtration System. States the conditions at this city, giving an account of the early supply, and begins an illustrated description of the new system of filtration works. Serial. 1st part. 2800 w. Eng Rec—Jan. 3, 1903.

Filtration at Philadelphia. An illustrated description of the Torresdale filters, Torresdale conduit, and Lardner's Point pumping station. 1400 w. Fire & Water—June 23-26, 1903.

The New Philadelphia Filtration System. H. D. Jones. An illustrated article explaining how the beds are made and how the filtering is done. 1400 w. Sci Am—March 14, 1903.

Sand Washers at the Roxborough Filters. Philadelphia. Illustrates and describes interesting features introduced in these plants. 1500 w. Eng Rec—Oct. 10, 1903.

Base Lines for Construction of Torresdale Filters, Philadelphia. John A. Vogelson. Describes the methods used. 1500 w. Trans Assn of Civ Engrs of Cornell Univ—1904.

The Lower Roxborough Preliminary Filters. P. J. A. Maignen. Reviews the various methods of filtration, giving the reasons for the preliminary filters at Philadelphia, and the principles involved, with details of construction and operation. Ills. 16000 w. Pro Engrs' Club of Philadelphia—July, 1904.

The Philadelphia Filtration System. Illustrated detailed description of the siphon of the Torresdale tunnel conduit, which carries the filtered water to Lardner's Point. 3000 w. Eng News—Dec. 1, 1904.

The Philadelphia Filtration System. General description and plans of the largest filtration system in the world. 4500 w. Eng News—Aug. 18, 1904.

The Work of the Philadelphia Water Filters. Notes taken from an address by John W. Hill before the Engng. Soc. of Princeton University. 1200 w. Eng Rec—May 13, 1905.

The Management of the Roxborough Water Filters, Philadelphia. Explanation of their management reprinted from a report by John W. Hill. Ills. 2200 w. Eng Rec—June 24, 1905.

Report of Board of Investigating Engineers on the Philadelphia Filtration and Boulevard Contracts. Gives full report of the committee appointed to investigate all matters relating to the work on the city's new filtration plant and boulevard system. 11000 w. Eng News—Nov. 2, 1905.

See also **Maignen.**

Philadelphia West.—The Belmont Filtration Works. John W. Hill. Illustrated detailed description of these works for filtering the supply of West Philadelphia. Serial. 1st part. 5500 w. Jour Fr Inst—Jan., 1904.

Pittsburg.—Description of Experimental Filter Plant at Pittsburg, and Results of Experiments. Morris Knowles. An account of the investigations which were carried on at the experimental filter plant, giving a description of the apparatus used, views of interesting details, and a summary of results. Ill. 10000 w. Jour N. E. Water Wks Assn—Dec., 1900.

Settling Basins and Slow Sand Filter Beds for Pittsburg, Pa. An illustrated description of the plan and details of the work proposed. The chief objects are to remove turbidity and bacteria. 2800 w. Eng News—Feb. 13, 1902.

Filtration System for Pittsburg. Howard W. Underwood. An illustrated detailed description of the novel features of this system, now under construction. The plant is equal in area to the largest plant in the world. 6500 w. Trans Assn of Civ Engrs of Cornell Univ—1905.

Poughkeepsie, N. Y.—The Reconstruction of the Poughkeepsie Water Filters. This was the first sand filter built in the United States. It has been completely reconstructed and covered and its new features are illustrated and described. 2800 w. Eng Rec—Dec. 2, 1905.

Providence, R. I.—The Open Sand Filters for the Providence Water-Works. An illustrated detailed description of this plant. Serial. 1st part. 3000 w. Eng Rec—Sept. 24, 1904.

See also **East Providence.**

Puech Gravel.—The Puech Gravel Filters (Les Filtres Degrossiseurs Puech). Hippolyte Fontaine. A short, illustrated account of this filtration system, in which the water flows successively through three beds of gravel, the coarsest first. 1500 w. Bull Soc d'Encouragement—Jan., 1902.

Quincy, Mass.—Ferrous Sulphate as a Coagulant in the Mechanical Filtration of Water. Ernest E. Irons. Describes the plant at Quincy, Mass., where solutions of ferrous sulphate and lime water in the proper proportions, are added to the water, with resulting coagulation followed by rapid subsidence. 2500 w. Eng Rec—Aug. 8, 1903.

Reading, Pa.—A Small Open Sand Filter at Reading, Pa. Description, with illustrations, of the Egelman filter plant. 1600 w. Eng Rec—Nov. 7, 1903.

The Antietam Filters of the Reading Water Works. Illustrated detailed description of the second slow sand filter plant in this city. 1800 w. Eng Rec—March 25, 1905.

Regulation.—See **Automatic Modules.**

Roofing.—See **Covered vs. Uncovered; Washington, D. C.**

Roxborough.—See **Philadelphia.**

St. Louis.—Proposed Filtration of the Water Supply of St. Louis, Mo. Statement of Edward Flad describing the proposed plan and the reasons why prompt action is desirable. 1500 w. Eng News—July 3, 1902.

See also **WATER PURIFICATION; WATERWORKS.**

Sand.—Note upon the Operation of Sand Filters (Contribution à l'Etude des Filtres à Sable). M. Marboutin. A study of the action of open sand filters by an examination of the proportion of dissolved oxygen in the filtered water. 1200 w. Comptes Rendus—April 18, 1904.

See also **Slow Sand**; and under names of places;

SEWAGE DISPOSAL; WATER PURIFICATION.

Scrubbers.—Scrubbers for Preparing Water for Filtration. P. A. Maignen. Abstract of a paper before the Am. W. Wks. Assn. Illustrated description of a rapid filter of broken stone, with notes on results obtained with its use. 1000 w. Eng Rec—July 26, 1902.

Sedimentation.—See WATER PURIFICATION.

Slow Sand.—Notes on Designing and Constructing Slow Sand Filters. James H. Fuertes. A discussion of the method of estimating the total area of filters and the size of the individual beds. Serial. 1st part. 2000 w. Eng Rec—Jan. 26, 1901.

The Marborough Brook Filter Beds. Walter W. Pach. Illustrates and describes the construction and operation of these filter beds, as an illustration of the application of the principles of slow sand filtration of water to a case presenting many unusual features. 3000 w. Eng News—April 16, 1903.

On the Design and Construction of Slow Sand Filters. John H. Gregory. Discusses certain elements which enter into the design and construction of filters as viewed from the standpoint of American practice. Ill. 4800 w. Eng Rec—June 20, 1903.

See also Covered vs. Uncovered; and under names of places.

South Bethlehem, Pa.—Water Purification at South Bethlehem, Pa. Illustrated description of the filtration. 3800 w. Eng Rec—July 15, 1905.

South Bethlehem Filtration Plant. P. A. Maignen. Digest of a paper read before the Am. W. Wks. Assn. Illustrated general description of an improved slow sand system and its operation. 2500 w. Munic Jour and Engr—July, 1905.

Superior, Wis.—See WATER PURIFICATION—Iron Removal.

Sweden.—Open or Covered Filters? Frans Engstrom. Shows how the problem has been solved in Sweden, where the climate is much colder, and gives opinions of expert engineers. 1800 w. Pro Engrs Soc of W. Penn—Dec., 1903.

Testing Sand.—The Employment of Restraining Culture Media in Testing the Hygienic Efficiency of Sand Water Filters. A. Robin. Remarks on the defects of methods employed for testing filters, giving tabulated results, and discusses the employment of restraining media for determining the hygienic efficiency, especially bile and salt agar, and the results. 4500 w. Eng News—Aug. 17, 1905.

Torresdale.—See Philadelphia.

Trenton, N. J.—See Covered vs. Uncovered.

Trieste, Austria.—See WATERWORKS.

Turkish Bath.—See HEATING.

Washington, D. C.—Slow Sand Filtration Plant for Washington, D. C. J. S. Schultz. An illustrated description of the proposed plant, with brief account of the investigations that led to its recommendation. 3500 w. Eng Rec—March 14, 1903.

The Roofing of the Washington Filters. E. D. Hardy. Illustrated description of the methods of construction. 1500 w. Eng Rec—Nov. 5, 1904.

A Modern Filtration Plant. James G. Fernald. Illustrated description of the plant now under construction at Washington, D. C., the second largest in the world. 2000 w. Sci Am—July 29, 1905.

Watertown, N. Y.—A Mechanical Filtration for Watertown, New York. Illustrated detailed description of this plant, with information related. Serial. 1st part. 3500 w. Eng Rec—May 21, 1904.

Whitestown, N. Y.—The Sand Filters at Whitestown, N. Y. William G. Stone. Illustrated description of open sand filters with rather unusual arrangements of pipe for outlets and inlets. 1200 w. Eng Rec—March 30, 1901.

Wilmington, Del.—A Remarkable Contract for Engineering Services and Water Filtration Patents. Abstract of the contract for the city of Wilmington, Del., with editorial comment. 2500 w. Eng News—Nov. 26, 1903.

Winchester, Ky.—Aerator for Mechanical Filter Plant at Winchester, Ky. Leonard Metcalf. Illustrated description. 500 w. Eng News—June 6, 1901.

Yonkers, N. Y.—Open Slow Sand Filters at Yonkers, N. Y. Illustrated detailed description of filtered water basin, gate chambers, filter beds and piping. 2500 w. Eng Rec—July 2, 1904.

Youngstown, O.—The Mechanical Filters at Youngstown. Illustrated detailed description of a plant with a normal capacity of 10,000,000 gal. per 24 hours, built to treat the water of the Mahoning River. 3500 w. Eng Rec—Oct. 7, 1905.

FINANCE.

Engineering.—See ENGINEER—Finance; ENGINEERING ECONOMICS; INDUSTRIAL ENGINEERING.

FIRE.

See also FIREPROOF CONSTRUCTION; FIRE PROTECTION.

Baltimore.—Baltimore's Conflagration. An illustrated account of the fire that destroyed $85,000,000 worth of property, with opinions of prominent architects. 5200 w. Ins Engng—Feb., 1904.

The Record of the Fire-Proof Building in the Baltimore Conflagration. The story of this fire and the destruction wrought based upon careful study by experts. Ill. 3500 w. Eng News—Feb. 18, 1904.

The Recent Great Fire in Baltimore. Some facts in regard to the electrical service. 800 w. Elec Wld & Engr—Feb. 20, 1904.

The Baltimore Fire. An illustrated account of the fire, describing the condition of the burned buildings and giving much information of interest. Map. 7500 w. Eng Rec—Feb. 20, 1904.

An Account of the Baltimore Fire, with Some General Deductions. H. D. Bush. 1700 w. Eng Rec—Feb. 20, 1904.

Detail Studies of Fireproof Buildings in the Baltimore Conflagration. An illustrated article giving reports of various engineers who have examined the ruins. 8000 w. Eng News—Feb. 25, 1904.

Steel structures in the Baltimore Fire. Gives 32 illustrations and an account of the effect of the fire upon different types of buildings, remarking on the lessons in fire-proofing taught by this disaster. 7000 w. Ir Age—Feb. 25, 1904.

Lessons of the Baltimore Fire. F. W. Fitzpatrick, in "Fireproof." An interesting account of the strange freaks of the fire, the materials that best withstood the intense heat, and lessons of importance taught by the disaster. 5400 w. Sci Am Sup—March 12, 1904.

The Protection of Fireproof Buildings Against Exposure Fires. Editorial review of the Baltimore and Rochester fires, and the lessons taught by them. 1800 w. Eng News—March 17, 1904.

Report to the Chief of Engineers, U. S. A., on the Baltimore Fire. John Stephen Sewell. Reports observations made with the view of arriving at some measure of the efficiency of current methods of fireproofing under some tests. 6500 w. Eng News—March 24, 1904.

The Report of an Expert. Views of E. C. Shankland of Chicago Concerning Steel Structures in the Baltimore Fire. Ills. 3400 w. Ir Age—March 24, 1904.

The Baltimore Fire. Charles A. Miller, Jr. An illustrated account of this $85,000,000 fire, describing the buildings, and commenting on the lessons to be learned. 6000 w. Archts & Bldrs Mag—April, 1904.

The Effects of the Baltimore Fire. W. N. Hazen. General discussion of the effects of this great fire on the buildings, fireproof and otherwise, with illustrations. 6500 w. Pro Engrs' Soc of W Pa—May, 1904.

The Recent Conflagration in Baltimore. C. L. Norton. Calls attention to technical lessons to be learned from this disaster. Ills. 3500 w. Tech Qr—June, 1904.

Some lessons of the Baltimore Conflagration. The principal part of a report submitted to the Insurance Engineering Experiment Station by Prof. C. L. Norton and Joseph P. Gray. 2500 w. Eng News—June 2, 1904.

Water Service at the Baltimore Fire. Extracts from a paper before the Am. Water Works Ass'n, by Alfred M. Quick. Describes the distribution system in Baltimore, and discusses whether any water service could successfully cope with such an emergency, the effectiveness of private fire services, and the possibility of the waste in buildings destroyed by the fire temporarily crippling the service. 5000 w. Eng Rec—June 11, 1904.

Lessons of the Baltimore Fire. Abstract of an address by Capt. J. S. Sewell. Corps of Engineers, U. S. A., before Nat'l Board of Fire Underwriters, particularly on the construction of buildings so as to protect them against fire from outside. 2000 w. Eng Rec—Aug. 20, 1904.

The Adjusted Fire Losses on the Fireproof Buildings at Baltimore, Md. Report of the Baltimore Convention of the National Board of Fire Underwriters, giving much information in regard to the destruction wrought to fireproof buildings by the Baltimore conflagration. 11400 w. Eng News—Feb. 9, 1905.

See also **FIREPROOF CONSTRUCTION; FIRE PROTECTION—Freeman Address.**

Baltimore, Brick.—The Survival of the Fittest—Brick Tried by Fire and Not Found Wanting. Albert D. Klein. Read before the Nat. Brick Mfrs.' Assn. Remarks on the effect of the Baltimore fire upon brick as a building material. 1800 w. Brick—Feb., 1905.

Bristol Electric Station, Eng.—See **ELECTRIC STATION—Bristol Fire.**

Cotton Mill, Eng.—Destruction of an English Mill. Account of a fire which destroyed the Vernon cotton mill in Stockport, England, showing the inability of unprotected iron to withstand fire. Ill. 1200 w. Ins Engng—Feb., 1903.

Madison, Wis.—See **WATERWORKS—Fire Service.**

Oil Well.—See **PETROLEUM WELL—Fire.**

Paterson.—The Conflagration at Paterson, N. J., February 8 and 9, 1902. An illustrated description of this disastrous fire and a discussion of the lessons to be learned from it. 4000 w. Br Build—March, 1902.

Rochester.—Fireproof Buildings in the Rochester Fire. Explains the conditions existing in the burned district, discussing the damage. About $3,000,000 of property was destroyed. Ills. 1800 w. Eng News—March 10, 1904.

The Lessons of the Rochester Fire. An illustrated article, with map of the burned district and study of the conditions. 2000 w. Ir Age—March 17, 1904.

The Rochester Conflagration. An illustrated report of the fire of Feb. 26, which destroyed property to the value of $3,200,000. 2800 w. Fire & Water—April 9, 1904.

See also **Baltimore.**

Theatre, Chicago.—Iroquois Theatre Fire. F. J. T. Stewart. A full report of this unfortunate disaster, with 6 places and line illustrations. 4000 w. Ins Engng—Jan., 1904.

The Chicago Theatre Fire. Gives a description of the Iroquois Theatre, showing sketch plans and sections, and reviewing the causes of the disaster. 3500 w. Eng News—Jan. 7, 1904.

The Structural Effects of the Iroquois Theatre Fire. An illustrated article showing the condition of the building after the fire, and explaining the arrangement. Also editorial. 2000 w. Eng Rec—Jan. 9, 1904.

The Chicago Theatre Fire. Edwin O. Sachs. Gives facts relating to the burning of the Iroquois Theatre. 3200 w. Engng—Feb. 26, 1904.

Williamsburg Bridge.—See **BRIDGE ACCIDENT; CABLE—Bridge, Williamsburg.**

FIRE ALARM.

See also **ELECTRIC SIGNAL; FIRE PROTECTION.**

Progress in Fire Alarm Telegraphy. Joseph W. Stover. Extracts from a paper read before the International Assn. of Fire Engrs. Reviews the history and development of this system. 3300 w. Ins Engng—Oct., 1902.

Suggested Improvements in Fire Alarm Telegraph Systems. William Brophy. Read before the Int. Assn. of Munic. Electn's. Suggests improvement in the circuits, showing the weakness of the present method of distribution. 5000 w. Fire & Water—Sept. 16, 1905.

Fire Alarm Telegraph Systems. William Brophy. Read before the Int. Assn. of Munic. Electn's. Suggests some improvements needed, but considers the present system excellent. 5000 w. Ins Engng—Oct., 1905.

Automatic.—Electro-Telethermometer of Juan Vila Forns. Brief illustrated description of a device for automatically announcing at any distance an elevation of temperature in its vicinity. 400 w. Sci Am—Sept. 12, 1903.

Chicago.—The Transmission of Fire Alarms. E. B. Ellicott. An illustrated detailed description of the modern fire alarm system, especially as used in Chicago. Discussion. 8000 w. Jour W Soc of Engrs—Dec., 1902.

Guarini Wireless.—See **SPACE TELEGRAPHY—Fire Alarm.**

New York.—The Fire-Alarm Telegraph Service in Greater New York. An investigation and report by the committee on fire-alarm service for the borough of Manhattan of the New York board of fire underwriters. Ills. 4500 w. Elec Rev, N Y—Oct. 14, 1905.

Siemens and Halske.—The Siemens and Halske Fire Alarms. Illustrated description. 1500 w. Sci Am Sup—Sept. 19, 1903.

Theatre.—Electric Fire Alarm System for Warehouses and Theatres (Elektrische Feuer-Alarmanlagen in Warenhäusern und Theatern). K. Miram. The apparatus sounds the alarm and indicates the nearest exits when the alarm button at any point is pressed. 2000 w. Elektrotech Zeitschr—Sept. 15, 1904.

Vienna.—The Vienna Fire Alarm System (Die Organisation des Nachrichtendienstes der Wiener Feuerwehr). W. Ohitil. An illustrated general review of the telegraphic, telephonic and automatic fire-alarm service of Vienna. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—May 9, 1902.

Warehouse.—See **Theatre.**

FIRE APPARATUS.

See also **FIRE ENGINE; FIRE PROTECTION.**

Berlin Exposition.—Electrical Exhibits at the Fire Protection Exposition (Die Elektricität auf der Feuerschutz-Ausstellung). F. Wiking. Describes electric fire alarms, pumps and other apparatus shown at the Berlin Exposition. 2000 w. Elektrotech Zeitschr—Sept. 19, 1901.

The Berlin Exposition for Fire Protection Appliances, 1901 (Die Internationale Austellung für Feuerschutz und Feuerrettungswesen in Berlin, 1901). Kaemmerer & Meyer. Illustrating and describing numerous forms of fire engines and other appliances. 2500 w. Zeitschr d Ver Deutscher Ing—Dec. 7, 1901.

See also **FIREPROOF CONSTRUCTION; FIRE PROTECTION—Mines.**

Clayton.—Fire Extinguishing Apparatus for Ships. Brief illustrated description of the Clayton fire extinguishing apparatus, which uses sulphur dioxide. 2000 w. Prac Engr—Nov. 28, 1902.

Fire Extinguishing Apparatus for Ships. John H. Heck. Read before the N. E. Coast Inst. of Engrs. & Shipbuilders. Reviews various methods that have been tried, and describes briefly the Clayton fire extinguisher. Ill. 2000 w. Engrs' Gas—March, 1903.

See also **FIRE BOAT—"Clayton."**

Dublin.—Dublin's New Central Station and Fire Escape. Concerning the new fire station to cost $125,000, and the improved fire appliances. Ill. 700 w. Sci Am Sup—June 7, 1902.

Electric.—See **Berlin Exposition; FIRE ALARM; FIRE ENGINE.**

Fire Escape.—The Schapler Fire-Escape. Illustrations, with brief description of a telescope fire-ladder built of metal and in use in Frankfort, Germany. 1200 w. Engr, Lond—July 25, 1902.

Fire-Escapes in American Commercial Buildings. Charles A. Daubney. Considers points having a bearing on the safety of persons in case of fire, describing types of fire-escapes in use, and discussing their features. Gives suggestions for fire protection. Ill. 10300 w. Jour Roy Inst of Brit Archts—Dec. 6, 1902.

First Aid.—"First Aid" Fire-Extinguishing Appliances. Edward George Rivers. Describing the best appliances known for quickly extinguishing fire, and remarks on the importance of their extended use. 900 w. Engng—July 25, 1902.

Hose Couplings.—A Suggested Standard Number-Code for Hydrant and Fire-Hose Couplings. C. E. Loetzer. Notes the difficulties to be met in establishing a uniform size, and gives a system for standardizing the existing varying sizes. 1500 w. Eng News—July 21, 1904.

Life Saving.—Some Modern Appliances for Life Saving at Fires. Illustrates and describes mechanical and other devices used, and methods of rescue. 1200 w. Sci Am—April 4, 1903.

Pittsburg.—A Pneumatic Fire Escape and Tower. William S. Crandall. Illustrated description of the pneumatic telescopic aerial truck of the city of Pittsburg. 800 w. Sci Am—March 8, 1902.

Sprinklers.—Eliminating the Conflagration Hazard. Everett U. Crosby. Devoted to a discussion of the possible elimination of conflagrations in cities by the universal installation of automatic sprinkler systems. Gives information of the system in an appendix, and also a general discussion. 11500 w. Jour N E Water Wks Assn—Dec., 1900.

Sprinkler Test in Cleveland. A summary of tests made to determine the value of this system of fire protection. Ills. 1400 w. St Ry Jour—June 3, 1905.

FIRE-BOAT.

"Abram S. Hewitt."—New York City Fire-Boat "Abram S. Hewitt." Illustrated detailed description. 2400 w. Naut Gaz—Dec. 10, 1903.

"Clayton."—Fire-Extinguishing and Disinfecting Steamer "Clayton." Illustrated description of a steel twin-screw steamer and its equipment. 1000 w. Engng—June 2, 1905.

Gasoline.—See BOAT, GASOLINE—Fire Boat; FIRE ENGINE.

"George H. Williams."—See Portland, Ore.

Isle of Wight.—See TOWBOAT.

Kings Lynn.—See STEAMBOAT.

Manchester Ship Canal.—Fire Launch. Illustrated description of a powerful salvage vessel for service on the Manchester Ship Canal. 700 w. Engr, Lond—Feb. 10, 1905.

Milwaukee.—New and Powerful Steel Fire Boat. Illustrates and describes a new boat to be built for the city of Milwaukee. 2200 w. Marine Rev—Jan. 16, 1902.

Natal.—Twin-Screw Fire Float for Durban Harbor. Illustrations, with brief description, of a boat recently built for the Natal Government. 400 w. Engng—Jan. 10, 1902.

New York City.—New York Fireboat. Illustrated description of the fireboat designed by H. de B. Parsons, and its equipment. 1500 w. Marine Engng—March, 1903.

See also "Abram S. Hewitt."

Portland, Ore.—Pacific Coast Fire-Boat. Illustrated description of a boat recently built for the city of Portland in Oregon. 900 w. Naut Gaz—Sept. 22, 1904.

Portland's New Fireboat George H. Williams. Illustrated description of an interesting fire tug. 1600 w. Naut Gaz—March 23, 1905.

The Fire-Boat George H. Williams, of Portland, Oregon. General description, with illustrations, of a successful fire-boat which has been in service about one year. 1400 w. Marine Engng—Aug., 1905.

"Triton."—Fire, Tug, and Police Boat for the Mexican Government. Illustrated description of the "Triton," the second and larger of two vessels of the same type for the Mexican government. 1000 w. Engng—Oct. 24, 1902.

See STEAMBOAT.

United States.—The Evolution of the Fire Boat. An illustrated article showing the development in the United States. 2000 w. Fire & Water—Sept. 5, 1903.

FIREBOX.

See also BOILER; FURNACE; GRATE; LOCOMOTIVE FIREBOX.

Locomotive.—See LOCOMOTIVE FIREBOX.

Pattern Sheets.—See PATTERN—Fireboxes.

FIRE BRICK.

See BRICK—Fire; FIRE CLAY; FOUNDRY—Cupola Linings; REFRACTORY MATERIAL.

FIRE BRIGADE.

See FIRE DEPARTMENT; FIRE PROTECTION.

FIRE CAR.

Chicago Elevated.—Elevated Car for Fire Fighting. Illustrated description of a novel car equipment for fire protection used on the elevated railway of Chicago. It consists essentially of an outfit of chemical extinguishers of large capacity housed in a fireproof car body. 1500 w. St Ry Jour—June 11, 1904.

FIRE CLAY.

See also BRICK—Fire; CLAY; REFRACTORY MATERIAL.

Fireclay. A study of the clays of Clinton County, Pa., explaining what constitutes fireclay, and how it is deposited. 2000 w. Mines & Min—March, 1904.

Coal Measures.—A Short Discussion of the Origin of the Coal Measures Fire Clays. T. C. Hopkins. Outlines the theory of their origin and discusses points seemingly opposed to it, giving the author's conclusions. 1700 w. Am Geol—July, 1901.

Missouri.—The Fire-Clays of Missouri. H. A. Wheeler. Remarks on the importance of the clay industry in the United States, with information concerning the Missouri fire-clays. 5000 w. Am Inst of Min Engrs—Jan., 1905.

FIREDAMP.

See also BLASTING; COAL GEOLOGY—Origin; COAL MINE EXPLOSION; EXPLOSIVE; MINE GAS; MINE VENTILATION; RESCUE APPARATUS; SAFETY APPLIANCES; SAFETY LAMP.

When is Firedamp Dangerous in a Coal Mine? A discussion of this subject as presented in the inquiry into the McLaren Colliery disaster. 2000 w. Col Guard—Oct. 10, 1902.

Outbursts of Firedamp in Mines. A review of experimental investigations and a statement of theories advanced to explain these accumulations of firedamp and guard against the terrible consequences attending outbursts. 3000 w. Col Guard—April 3, 1903.

Analysis.—Notes on the Investigation of Firedamp (Beiträge zur Untersuchung der Grubenwetter). R. Nowicki. Application of laboratory methods of gas analysis. 3500 w. Glückauf—March 18, 1905.

Barometer.—The Barometer in Mining. F. Z. Schellenberg. Read before the W. Penn. Cent. Min. Inst. Discusses the possibilities and importance of the use of this instrument in guarding against gas in mines. 1000 w. Mines & Min—Feb., 1902.

See also Dortmund; MINE VENTILATION.

Broockmann-Schondorff.—The Investigation of Firedamp (Beiträge zur Untersuchung der Grubenwetter). F. Schrieber. A description of the Broockman-Schondorff apparatus for the analysis of mine gases. 1200 w. Glückauf—Aug. 30, 1902.

Dortmund, Germany.—Fire-Damp Explosions in the Dortmund District (Die Schlagwetter-Explosionen im Obergamtsbezirk Dortmund). A review of the explosions during 1900, compared with the barometrical readings, showing the relation between the flow of gas and the atmospheric pressure. 1200 w. 1 plate. Glückauf—Sept. 21, 1901.

The Relation Between Firedamp Explosions and the Height of the Barometer in the Dortmund District, Germany, in 1901 (Die Schlagwetterexplosionen in Oberbergamtsbezirk Dortmund mit Beziehung auf den Barometerstand im Jahre, 1901). A record of observations, with tables and curves, and discussion. 1 plate. 2000 w. Glückauf—June 28, 1902.

Firedamp Explosions in the Dortmund District, Germany, With Relation to the State of the Barometer in 1902 (Die Schlagwetter-Explosionen im Oberbergamtsbezirk Dortmund mit Beziehung auf den Barometerstand im Jahre 1902). Statistics and discussion of the relation between firedamp and atmospheric pressures. 1 plate. 1200 w. Glückauf—June 18, 1903.

Electric Tester.—See Indicator.

Formation.—The Sudden Disengagement of Firedamp (Les Dégagements Instantanés de Grisou). Henri Ghysen. A general discussion of the formation and disengagement of explosive gases in mines, with data from numerous instances in practice. 12000 w. 2 plates. Rev Univ des Mines—July, 1902.

Indicator.—An Electric Firedamp Indicator (Sur un Grisoumetre Electrique). G. Leon. The apparatus depends for its action upon the difference in electrical resistance between two platinum wires, heated by the same current, and placed, one in air, the other in the fire damp. 1200 w. Comptes Rendus—June 10, 1901.

Electrical Tester for Firedamp. G. Leon, in "Annales des Mines." Illustrated description of the apparatus with statement of the advantages claimed. 1000 w. Col Guard—Nov. 14, 1902.

Detection of Small Percentage of Gas in Mine Air. J. T. Beard. Describes an attachment for safety lamps by which the presence of small amounts of gas is made visible. 2500 w. Mines & Min—May, 1903.

Inflammability Limits.—Determination of Firedamp by the Limits of Inflammability. J. Potier, in "Revue Universelle des Mines." Describes a modification of the Lebreton and Rateau methods, giving drawing of apparatus. 800 w. Col Guard—March 27, 1902.

Methanometer.—Protection Against Firedamp. Describes the instrument called a methanometer, recently installed in a large colliery in Pennsylvania, and its successful working. 1400 w. Sci Am—Aug. 5, 1905.

Petit Sampler.—Precautions Against Firedamp at the Saint Etienne Collieries. Illustrates and describes the automatic sample-taker of mine air, invented by Paul Petit. 1500 w. Col Guard—Jan. 18, 1901.

Rescue Apparatus.—See **RESCUE APPARATUS.**

South Wilkes-Barre.—See **COAL MINE.**

Surface Explosion.—Firedamp Explosions on the Surface (Schlagwetterexplosionen über Tage). H. Einecker. An account of an explosion of firedamp on the surface of the earth, being in the washing tower of the Dahlbusch colliery near Ratthausen, East Essen. 1200 w. Glückauf—Aug. 17, 1901.

Test, Electric.—See Indicator.

Test Pipettes.—The Graduation of Firedamp Test Pipettes (Un Nouveau Mode de Graduation des Eprouvettes à Grisou). J. Potier. The graduations indicate directly the inflammable limits of the mixture. 2500 w. 1 plate. Rev Univ des Mines—Dec., 1901.

Utilization.—An Interesting Utilization of Mine Gas (Ueber einen Interessanten Fall von Grubengasverwertung). Karl Fric. Gas from a coal mine at Dombrau, Austria, is used for fuel under a steam boiler. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 9, 1905.

FIRE DEPARTMENT.

See also **FIRE APPARATUS; FIRE ENGINE; FIRE ENGINE HOUSE; FIRE PROTECTION.**

Chicago.—See **FIRE PROTECTION.**

European.—The Continental Fire Service. Edwin O. Sachs. Notes on Continental fire-brigade organisations, and the lessons to be learned. The present article is largely introductory. Serial. 1st part. 2800 w. Engng—Jan. 13, 1905.

London.—The Reorganisation of the Metropolitan Fire Brigade. An editorial discussion of the present state of affairs in regard to the fire protection of London, with suggestions for a remedy as given in a scheme by Edwin O. Sachs. 4000 w. Engng—July 4, 1902.

FIRE ENGINE.

See also **FIRE APPARATUS; FIRE PROTECTION.**

The Modern Steam Fire Engine. F. F. Loomis. Read before the Ohio Soc. of Mech., Elec., and Steam Engrs. A review of the history of steam fire engines, and a discussion of the requisites for a modern steam fire engine. 2000 w. Engr, U S A—Dec. 1, 1904.

The Modern Steam Fire Engine. F. F. Loomis. Abstract of a paper before the Ohio Soc. of Mech. & Steam Engrs. Considers the requirements of fire engines and describes modern engines and the methods of handling that will give the best results. 1500 w. Ir Age—April 6, 1905.

Automobile.—Automobile Fire Equipment of Paris. Illustrated description of fire apparatus used at the French capital since March, 1908. 700 w. Fire & Water—Nov. 17, 1900.

Motor Steam Fire Engine. An illustrated description of a fire engine in England, recently converted from a horse-drawn engine into a self-propeller. 700 w. Engr, Lond—May 6, 1901.

Self-Propelled Fire Engines. Waldon Fawcett. Illustration and information concerning these engines as used in Boston. 800 w. Sci Am—Aug. 17, 1901.

Some Foreign Motor Fire Engines. Illustrated descriptions of fire apparatus run by alcohol, steam and electricity. 1200 w. Munic Jour & Engr—Dec., 1902.

Motor Steam Fire-Engines. Illustrations and descriptions of these engines, particularly the one built for Leyland, England. 1100 w. Autocar—July 4, 1903.

New Motor Steam Fire Engine for Liverpool. Brief illustrated description. 500 w. Engr, Lond—July 10, 1903.

Automobile Fire Engine (Pompe à Incendie Automobile). F. Drouin. An illustrated account of the Weyher & Richemond automobile steam fire engine as shown at the recent exhibition in Paris. 1800 w. 1 plate. Génie Civil—Feb. 6, 1904.

Automobile Fire Engines. Emile Guarini. Illustrates some foreign engines, describing a recent engine for the fire department of Paris. 1100 w. Sci Am Sup—April 16, 1904.

Automobile Steam Fire Engines. M. Reichel. Illustrated description of steam-motor fire engines in Hanover, Germany, and their successful operation. 2000 w. Engr, Lond—Aug. 12, 1904.

Automobiles and Fire Fighting (La Lutte contre les Incendies et l'Automobilisme). Daniel Bellet. Describing various forms of automobile fire engines, and their success in actual fire service. 3000 w. Rev Technique—Feb. 10, 1905.

Automobile Fire Engines. George Glendon. An illustrated article presenting the advantages of these machines. 1000 w. Cassier's Mag—June, 1905.

"Merryweather" Self-Propelled Fire-Engines. Illustrations, with brief description. 500 w. Auto Jour—Sept. 9, 1905.

See also **Chemical; Electric; Gasoline; German; AUTOMOBILE—Novelties.**

Chemical.—Chemical Motor Fire Engine. Illustrations and brief description of the Tottenham combined motor chemical fire-engine and fire-escape. 1000 w. Auto Jour—July 4, 1903.

Electric.—A New Electrical Fire Engine. A. Frederick Collins. Describes an engine recently tested at Rouen, France, and proved satisfactory. 800 w. Sci Am—April 18, 1903.

Motor Fire-Appliances for Vienna. Illustrations and descriptions of chemical and steam fire apparatus electrically propelled by the Lohner-Porsche storage-battery system. 1000 w. Engng—Nov. 10, 1905.

Electric Light Plant.—English Fire Engine Portable Electric Light Operated with Liquid Fuel. Frank C. Perkins. Illustrations and drawings showing the details of construction and method of operating a steam-driven electric light plant for fire department service. 500 w. Elec, N Y—March 1, 1905.

Gasoline.—The Application of Petrol Motors to Fire-Engines. Illustrates the application to a fire-boat, and also to a motor-driven land engine, with descriptions. 1300 w. Engng—May 20, 1904.

German.—Modern German Fire Engines. Illustrated description of motor fire-engines of various types. 700 w. Sci Am Sup—Nov. 16, 1901.

See also **FIRE APPARATUS—Berlin Exposition.**

Rouen, France.—See **Electric.**

FIRE-ENGINE HOUSE.

Paris.—The New Barracks of the Paris Firemen (La Nouvelle Caserne de Vapeurs Pompiers). M. Marchand. A well-illustrated description of engine-house, barracks and apparatus for fire fighting in Paris. 1 plate. 2500 w. Génie Civil—June 6, 1903.

FIRE ESCAPE.

See **FIRE APPARATUS**—Fire Escape.

FIRE EXTINGUISHER.

Clayton.—See **FIRE APPARATUS.**

FIRE FIGHTING.

Electric Wires.—See **ELECTRIC CONDUCTIVITY**—Fire Streams.

FIRE HAZARD.

See also **FIREPROOF CONSTRUCTION; FIRE PROTECTION.**

Car House.—See **ELECTRIC CAR HOUSE**—Fire Hazard.

Electric.—Improvement of Electrical Hazards. Editorial introduction with an illustrated article on the need of legal municipal inspection, and the adoption of suitable electric ordinances. 2900 w. Ins Engng—Nov., 1902.

Some Electrical Fire Hazards. Washington Devereux. An examination of some of the causes that may create a fire from electricity. Also discussion. 6000 w. Pro Engrs' Club of Phila—Jan., 1903.

The Electrical Fire Hazard. C. J. H. Woodbury. Abstract of an address before the Brooklyn Inst. of Arts & Sciences. A discussion of the underwriter's rules. 1500 w. Elec Rev, N Y—Dec. 10, 1904.

The Electrical Fire Hazard. William T. Benallack. Briefly reviews the development of artificial lighting, the various applications of electricity, etc., and discusses fires caused from an electrical source. Discussion. Ills. 13000 w. Jour W Soc of Engrs—June, 1905.

See also **ELECTRIC EQUIPMENT**—Fire Hazards.

Electric Plants.—The Reduction of Fire Hazards in Electric Plants. Howard S. Knowlton. Discussing especially the relation of electricity to fire risks, with a review of methods which minimise the hazards from this source. 3500 w. Engineering Magazine. June, 1904.

Electric Wiring.—See **ELECTRIC WIRING.**

Illuminant.—See **LIGHTING**—Fire Hazard.

New York Exchange Schedule.—The New York Fire Insurance Exchange Schedule. Discusses some features of this schedule. 1000 w. Br Build—Dec., 1900.

Railways.—Fire Risks of Railways. W. S. Worman. Discusses the causes of fires and the remedies. Also general discussion. 7200 w. W Ry Club—Sept., 1901.

Transformer.—See **TRANSFORMER**—Fire Hazard.

FIRE PREVENTION.

See **FIRE PROTECTION.**

FIREPROOF CONSTRUCTION.

See also **BUILDING CONSTRUCTION; CONCRETE REINFORCED; EXPANDED METAL; FIRE; FIREPROOFING; FIRE PROTECTION; FLOOR; FLOOR TEST; METAL PROTECTION.**

Fireproof Building Construction. J. T. Richards. Discusses the materials used, the systems of construction, etc. Ill. 1800 w. Wis Engr—May, 1901.

Rational Methods of Fireproofing. William Copeland Furber. Some suggestions, especially to manufacturers of fire clay materials. Ill. 1500 w. Br Build—Feb., 1902.

Different Building Materials Considered as to Their Adaptation for Fireproofing and Fire Retarding Purposes. Adler Muller. Considers brick, terra cotta, concrete, cast iron, wrought iron and steel, stone, timber and wired glass. Serial. 1st part. 3500 w. Engng—April, 1902.

Fire-Resisting Construction. R. Clarence Backhouse. Read before the Inst. of Archts., N. S. W. Discusses methods of construction, especially aiming to find something inexpensive but effective. 3600 w. Aust Min Stand—April 3, 1902.

Fireproof Building Construction. Frank W. Skinner. An outline of some types, conditions and results. 7700 w. Trans Assn of Civ Engrs of Cornell Univ—1903.

Simple ways of Fireproofing. Russel Sturgis. An illustrated article outlining the method of building of actually fireproof buildings. 3700 w. Arch Rec—Feb., 1903.

Building Construction from a Fire Brigade Officer's Point of View. Arthur Pordage. Read before the International Fire Congress. Showing that construction called "fireproof" often adds to the danger, and discussing accepted theories in regard to fireproof materials. Short discussion. 4000 w. Builder—July 11, 1903.

Fireproof Construction. Hon. Peres M. Stewart. Discusses some phases of modern methods, materials, etc., outlining the essentials in fireproof construction. 4000 w. Am Archt—Oct. 24, 1903.

Notes on Fireproofing City Buildings. Peres M. Stewart. Extracts from a paper on "The Fire Resistance of Modern High Buildings," read before the International Assn. of Fire Engineers, at Chattanooga, Tenn. Considers the horizontal, vertical and exposure hazards, substituting for wood, incombustible furnishings, etc. 3000 w. Engs News—Sept. 22, 1904.

Fireproof Construction the Only Method of Reducing the Nation's Enormous Fire Loss. Alcide Chaussee. Read before the Am. Soc. of Munic. Imps. Gives statistics of losses by fire, urging the importance of strict building regulations. 1800 w. Eng News—Sept. 21, 1905.

America.—Fireproof Construction in America (Feuersichere Eisenbauten in den Vereinigten Staaten von Amerika) M. Gary. A fully illustrated description of the method of steel skeleton building construction, with casing of fire brick. 4000 w. Zeitsch d Ver Deutscher Ing—Jan. 9, 1904.

American vs. European.—The Prevention of Loss by Fire in the United States of America. Edward Atkinson. Prepared for the International Fire Prevention Congress. Calls attention to the different conditions which govern architecture in the United States, as compared with European states; discusses the construction of towns and cities, and their needs, and general conclusions in regard to fire protection. 7000 w. Am Archt—Aug. 8, 1903.

Apartment House.—Two Interesting Examples of Fireproof Construction. Brief illustrated descriptions of double houses lately built in Pittsburg; and the Campania apartments, built in Akron, Ohio. 1000 w. Br Build—Feb., 1905.

Baltimore.—See **FIRE.**

Berlin Exposition.—The Protection of Iron Construction Against Fire (Die Hülfsmittel zum Schutze des Eisens gegen Feuersgefahr). M. Gary. Describing the fireproofing methods shown at the Berlin exposition, 1901. 2000 w. Stahl u Eisen—Nov. 1, 1901.

See also **FIRE APPARATUS; FIRE PROTECTION**—Mines.

Building Laws, U. S.—See **Standard Regulations.**

Cars.—See **CAR**—Steel; **ELECTRIC CAR**—Steel; **FIREPROOFING.**

Concrete Reinforced.—See **CONCRETE REINFORCED**—Fireproof Qualities; **METAL PROTECTION.**

Dwelling.—A $3,000 Fireproof House. F. W. Fitzpatrick. Illustrates and describes pleasing dwellings of hollow tile fireproof construction. 2200 w. Ins Engng—Dec., 1905.

Economy.—The Economics of Construction. John Lyman Faxon. The first of a series of papers urging a departure from the present system of steel framing and the adoption of solid masonry construction, and burnt clay products, claiming not only greater endurance, but less cost. Serial. 1st part. 2300 w. Br Build—April, 1903.

Effects of Fire.—See **FIRE.**

Expanded Metal.—See **EXPANDED METAL**—Fireproof Construction.

Ferroinclave.—"Ferroinclave," a New Fireproofing. Illustrates and describes a new plant of the Brown Hoisting Machinery Company, in Cleveland, Ohio, using this new material. 1300 w. Ins Engng—April, 1903.

Ferroinclave—A Fireproof Building Material. H. F. Cobb. Read before the Civil Engr.'s Club of Cleveland. An illustrated description of a fireproof roofing construction of reinforced concrete. 2300 w. Ir Trd Rev—Dec. 17, 1903.

Ferroinclave: A Fireproof Building Material. H. F. Cobb. Gives an illustrated description of this material as made for roofing and other uses, and its manufacture. 3000 w. Jour Ass'n of Engng Socs—Jan., 1904.

Floor.—Fireproof Floor Construction. J. T. Montgomery. Remarks on concrete construction, explaining the application of this material to the protection of structural steel in buildings, its advantages and disadvantages. Ills. 2700 w. Jour W Soc of Engrs—Oct., 1904.

See also **Printing Office, Washington; CONCRETE REINFORCED; FLOOR.**

Floors and Doors.—Resistance to Fire of Floors and Doors. Edwin O. Sachs. Considers those two forms of construction, showing what has been done, and giving report of tests. 3800 w. Ins Engng—June, 1902.
See also **Windows and Doors.**

Grain Elevator.—See **GRAIN ELEVATOR—Fireproof.**

Guastavino.—Tests of the Strength of Guastavino Floor Arches. Illustrated report by W. W. Ewing on weight tests of 6, 10, and 12-ft. arches. 1000 w. Eng Rec—Aug. 3, 1901.

Hennebique.—See **CONCRETE REINFORCED.**

Hollow Tile.—A New Type of Reinforced Hollow Tile Wall Construction. Illustrated description of walls for mill buildings made of hollow tiles bonded with strap iron—the "Phoenix" hollow tile wall. 600 w. Eng News—Nov. 5, 1903.

See also **CONCRETE.**

Lock-Woven.—See **Test, Lock-Woven; CONCRETE REINFORCED.**

London Buildings.—How to Make Existing London Buildings More Fire-Resisting. Max Clarke. Read before the International Fire-Congress. Deals with constructional details. 2700 w. Builder—July 11, 1903.

Majestic Building, Chicago.—The Majestic Building. Illustrated description of a fireproof combination theater and office building in Chicago. 1800 w. Ins Engng—Dec., 1905.

Mill.—The Underwriters' View of Some Failures of Construction. F. Elliot Cabot. Read before the Boston Soc. of Archts. Discusses the weaknesses in mill construction, and fireproofing construction. 2000 w. Am Archt—Feb. 25, 1905.

Slow-Burning or Mill Construction. Edward Atkinson. Extracts from report No. V., of Insurance Engineering Experiment Station, Boston. 4000 w. Ins Engng—Jan., 1903.

New York.—Reduction of Fire Hazards in Building Construction. Perez M. Stewart and Rudolph P. Miller. Reviews the work in this field in the city of New York, presenting in detail the attitude of the Bureau of Buildings on many points of the building code, showing where improvements may be expected and the features of construction that tend to accomplish the desired results. 10,000 w. Ins Engng—Dec., 1902.

New York Insurance Schedule.—See **FIRE HAZARD.**

Orchestra Building, Chicago.—Concrete Seat-Bank Construction in the Chicago Orchestra Building. Illustrated description of features in an auditorium where special effort has been made to secure fireproof construction. 1000 w. Eng News—April 6, 1905.

Partitions.—See **Tests, New York.**

Philadelphia.—Fire-Proof Construction in Philadelphia. Edwin F. Bertolett. Considers the developments of the past and present in the matter of rendering structures invulnerable to fire and flame. Ill. 7500 w. Pro Engrs' Club of Phila—July, 1901.

Portland Cement Concrete.—Portland Cement Concrete as a Protection from Fire. Charles L. Norton. An illustrated account of tests made to find the temperature of steel framework during a very severe fire test. 1000 w. Ins Engng—Feb., 1902.

Printing Office, Washington.—The Fireproofing of the Government Printing Office, at Washington, D. C. An account of the competition for construction of the fireproof floors and steel protection, with illustrations of the designs submitted by the successful bidders, and those executed by the Government. 1800 w. Br Build—Nov., 1900.

Floor Construction and Fire-Proofing in the Government Printing Office, Washington, D. C. An illustrated description of the construction work of this new building, which is being built under an appropriation of $2,429,000, which must include the equipment. 2000 w. Eng Rec—Dec. 6, 1902.

Providence, R. I.—See **ELECTRIC STATION.**

Rochester.—See **FIRE.**

Standard Regulations.—Standard Regulations for Fire-Proof Buildings. Abstract of the National Board of Fire Underwriters' suggestions to be incorporated in building laws. 4200 w. Eng Rec—March 26, 1904.

Uniform Building Laws. Gives the recommendations of the National Board of Fire Underwriters for the construction of fireproof buildings. 5000 w. Ins Engng—July, 1905.

Steel Construction.—An Attempt to Devise a System of Absolute Fireproofing for Interior Steel Construction. Description, with illustrations of the latest improvements of the U. S. Clay Mfg. Co., and their adaptation in detail to buildings. 1200 w. Br Build—April, 1901.

Tall Buildings.—The Fireproofing of High Office Buildings. Peter B. Wight. Considers the effect of fireproof materials on building design, discussing the plans, materials, and constructive methods. General discussion follows. 6600 w. Pro Engrs' Soc of W Penn—June, 1902.

See also **BUILDING CONSTRUCTION.**

Terra Cotta.—Test of a New System of Terra-Cotta Floors. Describes a new floor construction made by the National Fireproofing Co., and to be employed throughout the floors of a system of forty warehouses now being built in Pittsburg. An illustrated description of the test made. 2000 w. Eng Rec—Feb. 25, 1905.

Tests.—Resistance to Fire of Floors and Doors. Edwin O. Sachs. From a paper read before the School of Military Engineering, England. A report of experimental tests, describing the construction, method of testing and effect. 4500 w. Arch't, Lond—Jan. 31, 1902.

See also **Vulcanite; CONCRETE; CONCRETE REINFORCED.**

Test, British.—The Results of Some Tests with Fire-Resisting Materials. Ellis Marsland. Read before the Soc. of Archts., London. Account of tests and experiments conducted by the British Fire Prevention Committee. Serial. 1st part. 4500 w. Archt, Lond—May 3, 1901.

Fire Tests with Concrete and Reinforced Concrete. An account of the fire and water tests conducted by the British Fire-Prevention Committee. 1800 w. Engng—Nov. 17, 1905.

Test, Columbian.—Fire and Weight Tests of Columbian Fireproof Floor; Boston, Mass., July, 1901. Frank P. McKibben. An illustrated account of tests made to demonstrate the capacity of this system when under heavy loads to resist the action of fire and water. 900 w. Eng News—Nov. 21, 1901.

Test, Concrete Arch.—Fire and Load Test of a Concrete Arch. Charles L. Norton. An illustrated report of tests made with very satisfactory results of reinforced concrete arch, the concrete being made of "Atlas" Portland cement.

Test, Lock-Woven.—Fire Test of a Lock-Woven Metal Concrete Floor. Describes a test made and reported by W. W. Ewing. Ill. 1100 w. Eng Rec—Oct. 11, 1902.

See also **CONCRETE REINFORCED — Lock-Woven.**

Tests, New York.—Tests of Fireproof Partitions of the New York Building Department. A record of results obtained in a series of tests, with illustrations and editorial comment. The types tested were metal lath and plaster, terra cotta block, plaster composition block, and concrete block. 7700 w. Eng News—Dec. 26, 1901.

Tests of Fireproof Partitions by the New York City Building Department. Brief report of interesting series of tests of the effect of fire and water on various forms of partitions. 2200 w. Br Build—Jan., 1902.

Fire Tests of Fireproof Floors by the New York Building Department. Gives the construction, with illustrations, of three new forms of fireproof floors which have been submitted with successful results to the standard fire and water tests. 1800 w. Eng News—May 29, 1902.

To Render Buildings Fireproof. An illustrated description of how the New York Building Department tests all fire-resisting material. Also editorial. 2800 w. Fire & Water—Nov. 8, 1902.

Test, Pittsburg.—An Important Test of Fireproof Construction. Gives the official report of Prof. Ira H. Woolson of a test made in a Pittsburg warehouse. Ills. 1800 w. Br Build—Feb., 1905.

Timber.—See **TIMBER—Combustibility.**

Uralite.—See **URALITE.**

Vienna Model Theatre.—See **FIRE PROTECTION.**

Vulcanite.—Fire and Water Test of Vulcanite Fireproof Floor, Philadelphia, Pa. Illustrates the floor and test house, and gives the conditions and results of the tests. 1200 w. Eng News—Feb. 6, 1902.

Window.—See **GLASS; WIRE GLASS.**

Window and Door Coverings.—Fire Protecting Coverings for Window and Door Openings. Abstract of a committee report presented at meeting of the Nat. Fire Pro. Assn. Opinions in regard to materials in use, with suggestions. 1000 w. Eng News—June 1, 1905.
See also **FIRE PROTECTION—Freeman Address.**

FIREPROOFING.

See also **FIREPROOF CONSTRUCTION; FIRE PROTECTION; TIMBER; TIMBER PRESERVATION.**

Fire Retardant Treatments of Wood. Abstract of a committee report presented at meeting of the Nat. Fire Pro. Assn. Considers chemically treated wood, and retardant coatings for wood. 2500 w. Eng News—June 27, 1901.

The Fireproofing of Wood. A. H. Eldredge. Methods of fireproofing are described and results given of tests on wood that has been treated. 1700 w. Mach, N Y—Sept., 1901.

Fireproofed Wood as a Building Material. Prof. Ira H. Woolson. Prepared for the International Fire Prevention Congress. Discusses the increasing use, especially in New York, of fire-resistant wood, the testing, quality, etc., the advantages and failings of the material. 4000 w. Archt, Lond—July 31, 1903.

Fire-Resisting Materials. An illustrated article discussing the materials used in buildings and reporting the success of so treating fabrics and stage properties as to render them safe. 4000 w. Fire & Water—July 9, 1904.

British Tests.—Non-Flammable Materials. An illustrated account of tests made of materials rendered non-flammable, by the British fire-prevention committee. 1200 w. Fire & Water—Dec. 1, 1900.

Cars.—The Fire Protection of Railway Trains (Feuerschutzmittel für Eisenbahn Fahrzeuge). H. Schumacher. Giving the results of experiments upon the fire-proofing of the materials of construction used for railway cars. 2000 w. Glasers Annalen—Nov. 15, 1902.

See also **CAR—Steel; ELECTRIC CAR—Steel; ELECTRIC RAILWAY—Danger.**

Ferrell.—Ferrell's Apparatus and Process for Fireproofing Wood. Report of the Committee on Science and the Arts on the invention of Joseph L. Ferrell. Ills. 1200 w. Jour Fr Inst—Aug., 1904.

A Discussion of Recent Developments in the Fireproofing of Wood. Joseph L. Ferrell. Illustrated description of the methods, and tools used and a statement of the efficacy of the treatment. 4000 w. Jour Fr Ins—March, 1901.

Laboratory.—See **LABORATORY.**

Nodon and Bretonneau.—The Rapid Ageing and Fireproofing of Wood. Translated from the "Revue de Chémie Industrielle." Gives a brief analysis of the principal methods which have given fairly good results, and describes the Nodon and Bretonneau process which utilizes electricity. 6300 w. Sci Am Sup—Sept. 6, 1902.

Testing.—A New Method of Testing Fire-Resisting Qualities of Fireproof Wood. Ira H. Woolson. Deals with the results obtained in a long series of experimental tests, describing methods and discussing other qualities that must be considered in the use of fireproofed wood. 4200 w. Eng News—Feb. 20, 1902.

Results of Tests of Fireproof Wood at the Insurance Engineering Experiment Station. Report of Prof. Charles L. Norton, of tests made of specimens. 3500 w. Eng News—Oct. 5, 1905.

Testing Oven.—Testing Oven at the Underwriters' Laboratories. Benjamin H. Glover. An illustrated description of an oven for testing various types of fire retardants used in these Chicago laboratories. 1200 w. Ins Engng—Dec., 1902.

See also **LABORATORY—Fireproofing.**

Timber.—See **TIMBER—Combustibility.**.

FIRE PROTECTION.

See also **FIRE APPARATUS; FIRE BRIGADE; FIRE ENGINE; FIREMEN; FIREPROOF CONSTUCTION; FIREPROOFING; WATERWORKS —Fire Service.**

Fire Prevention and Fire Resistance. Horatio Porter. Considers the means employed for both purposes, their advantages and the difficulties. Also general discussion. 11000 w. Jour Ry Inst of Brit Archts—April 4, 1903.

British Committee.—The British Fire Prevention Committee and its Work. An account of the work of this committee, which includes the education of the public, to undertake independent investigations and tests of materials, methods and appliances and selected work. 2200 w. Sci Am Sup—June 20, 1903.

See also **FIREPROOFING.**

Chicago.—Fire Extinguishment in Chicago. William H. Musham. An account of the present organization of the fire department, its houses, apparatus, etc., showing that it has not kept pace with the growth of the city, and suggesting a revision of the building laws, compelling owners of high buildings to have a standpipe for each floor with proper connections. Ill. Discussion. 10300 w. Jour W Soc of Engrs—Dec., 1902.

Chicago Elevated.—See **FIRE CAR.**

Dock.—Fire Patrol Service for Dock Property. W. H. Hunter. Read before the International Fire-Prevention Congress. An account of the system of fire-preventive methods in operation at the docks of the Manchester Ship Canal. 4500 w. Engng—Aug. 21, 1903.

See also **DOCK—New Orleans; PIER—Hoboken.**

Electric Conductor.—See **ELECTRIC CONDUCTOR.**

Factories.—The Relation of Water-Works Engineers to the Fire Service of Factories. Edward Atkinson. A discussion of the fire service of textile factories, paper mills, machine shops, etc., and the need of co-operation between water-works engineers and underwriters; inspectors; meters, etc. General discussion. 12000 w. Jour N Eng W-Wks Assn—March, 1903.

Freeman Address.—Shutters and Other Devices for Protection Against Exposure Fires. John R. Freeman. Extracts from an address before the Nat. Board of Fire Underwriters, New York. Facts learned from a study of the Baltimore fire. 2200 w. Eng News—July 14, 1904.

An Engineer's Suggestions to Fire Underwriters. John R. Freeman. Address at the banquet of the Nat. Board of Fire Underwriters, New York. On lessons from the Baltimore fire. 4800 w. Am Archt—July 16, 1904.

Gas Engine Station.—See **WATERWORKS—Fire Service.**

Hartford Street Ry. Buildings.—Fire Inspections and Fire Precautions in Hartford, Conn. An illustrated account of the system of inspection in conjunction with methods of construction in all the buildings belonging to the Street Railway Company. 2000 w. St Ry Jour—Feb. 4, 1905.

Laws.—Existing Laws, By-Laws, and Regulations Relating to Protection from Fire, with Criticisms and Suggestions (Fothergill Prize Essay). T. Brice Phillips. An outline of British laws as to fire protection, explaining the principle underlying them, and considering the subject generally. Also papers by George H. Paul, and by W. Craig Henderson, on this subject, with discussion. 2500 w. Jour Soc of Arts—March 13, 1903.

Mines.—Mine Appliances at the Berlin Fire Protection Exposition (Der Bergbau auf der Internationalen Ausstellung für Feuerschutz in Berlin). R. Danilot. With illustrations of nozzles and connections especially adapted for mine service. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen —Sept. 28, 1901.

See also COAL MINE FIRE; COAL MINE EXPLOSION; MINE FIRE; SAFETY LAMP.

Navy Yard.—See WATERWORKS—Fire Service.

Oil Room.—See OIL ROOM.

Oil Well.—See PETROLEUM WELL—Fire.

Philadelphia Station.—See WATERWORKS—Fire Service.

Pier.—See Dock; PIER—Hoboken.

Railway.—Railway Fire Prevention. Major Fox. Considers the most important points relating to fire dangers and fire appliances in their relation to railway companies. 2200 w. Transport—July 4, 1902.

Fire Prevention of Railroad Risks. E. D. Sompayrac. Discusses the importance of preventing fires causing loss of railroad property. Cites cases due to carelessness, and suggests steps tending to the elimination of fires. 2300 w. Ry Age—Nov. 27, 1903.

Railway Property and Fire Protection. An illustrated article discussing principally fire-extinguishing machinery. 3500 w. Transport—July 15, 1904.

Railway Shops.—See RAILWAY SHOP—Fire Protection.

Ship.—Fire Prevention on Board Ship. Edwin O. Sachs. Read before the Inst. of Naval Archts. Considers safeguards of construction and equipment, administrative arrangements, fire extinguishing, &c. 4500 w. Engng—May 6, 1904.

See also Steamboat.

Sprinklers.—See FIRE APPARATUS.

Steamboat.—Fire Protection for Steam Vessels and Government Regulations. J. H. Morrison. Reviews the fire equipment of steamboats from the earliest vessels. 1500 w. Sci Am Sup—July 16, 1904.

Telephone Exchange.—See TELEPHONE EXCHANGE.

Temporary Buildings.—Minimising the Risk of Fire in Temporary Buildings. T. W. Aldwinckle. Read at meeting of the Incor. Assn. of Munic. & Co. Engrs. Describes the ordinary temporary building, and considers what steps may be taken to minimise the fire risk. 3000 w. Builder—July 11, 1903.

Theatre.—Theatre Cut-offs and Fire Protection. Robert Palm. Discusses prevailing conditions and the requirements for proper protection. 2800 w. Ins Engng—Feb., 1904.

Necessary Reforms in the Fire Protection of Theatres (Ueber die Feuersicherheit der Theater und die Notwendigen Reformen). Hermann Helmer. With plans of a number of existing structures, and suggestions for an improved design. 5000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—May 20, 1904.

The Safeguarding of Life in Theaters. A Study from the Standpoint of an Engineer. John R. Freeman. Presidential address before the A. S. M. E. A statement of present conditions, the problem presented and the solution, with a discussion of the subject generally, chiefly fire protection. Also editorial. 15500 w. Ills. Eng News Dec. 14, 1905.

The Vienna Model Theatre for Fire Tests (Das Wiener Modelltheater für Brandversuche). H. Harder. An account of the tests made upon a model building to determine the best methods of protecting theatres against fire. 3000 w. Gesundheits Ingenieur—Dec. 20, 1905.

See also FIRE.

Toledo, O.—See WATERWORKS—Fire Service.

Water Supply.—See also WATERWORKS—Fire Protection; Fire Service; WELL.

Work Shops.—Fire Protection of Work Shops. J. W. G. Simonds. Considers such apparatus as may be useful to managers of small works to enable them to deal with an outbreak of fire. Ill. 5800 w. Page's Mag—July, 1903.

FIRE SERVICE.

See FIRE DEPARTMENT; GAS POWER PLANT; WATERWORKS—Fire Service.

FIRE STREAM.

Conductivity.—See ELECTRIC CONDUCTIVITY—Fire Stream.

FIRING.

See also BOILER—Firing; COMBUSTION; FUEL; FURNACE; GRATE; LOCOMOTIVE OPERATION; MECHANICAL STOKING.

Firing and Handling Steam Boilers. Charles L. Hubbard. Describes systems of firing and gives suggestions for the care of boilers and their management. 2300 w. Am Elect'n—Feb., 1902.

Rational Boiler Firing (Rationelle Kesselfeuerungen). F. Krull. Referring especially to internally fired boilers showing the advantages of the admission of air at the bridge way. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—May 16, 1902.

Practical Hints on Firing. William Kavanagh. Illustrated discussion of different methods. 1700 w. Power—July, 1902.

Practical Hints on Firing. William Kavanagh. Suggestions for safe and economical firing and care of boilers. Ill. 1900 w. Power—Aug., 1902.

Smokeless and Economical Burning of Fuel. Charles Barter. Read before the Inst. of Heat & Ven. Eng. at Liverpool. A general survey of the subjects. 3000 w. Plumb & Dec—Aug. 1, 1904.

Progress in the Technology of Firing (Ueber Fortschritte in der Feuerungstechnik). Gustav Deutsch. A discussion of the firing of boiler furnaces, with special reference to underfed stokers. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 2, 1904.

Automatic Signals.—See Water-Tube Boilers.

Coal Dust.—See COAL DUST.

Coke Breeze.—See COKE BREEZE.

Gaseous.—See FUEL GAS; GAS FUEL.

Kilroy Indicator.—See STOKING INDICATOR.

Locomotives.—See LOCOMOTIVE OPERATION.

Marine Boilers.—An Aid to Systematic Firing of Marine Boilers. H. E. Lackey. Brief illustrated description of a device used on the "Galveston" to secure systematic firing. 700 w. Pro U S Nav Inst—Sept., 1905.

Mechanical vs. Hand.—Comparative Economy of Stoking and Hand Firing. Julius Geldard. Particulars of tests with account of the measuring methods employed. Ill. 2700 w. Mech Engr—Jan. 3, 1903.

The Mechanical Stoker and the Human Operator. Edwin Yawger. Presents some of the general considerations that bear on the art of combustion of fuel in boiler furnaces. 3000 w. Am Gas Lght Jour—June 20, 1904.

See also MECHANICAL STOKING.

Mehrtens.—An Improved Method of Economical Firing (Eine Neue Feuerungsweise zur Einschränkung des Kohlenmissbrauches). J. H. Mehrtens. A discussion of possible improvements in furnace construction, including the use of hollow grate bars to supply heated air. Serial. Part I. 3500 w. Glasers Annalen—Nov. 1, 1902.

Natural Gas.—See NATURAL GAS—Boiler Firing.

Regenerator Furnace.—Coal Firing in Full Depth Regenerator Furnaces. G. W. McKee. Describes experiments made with the view of ascertaining in what way the consumption of fuel might be lessened and the efficiency of the furnace maintained. 1600 w. Pro Age—June 1, 1904.

Soft Coal.—On Firing with Soft Coal. Reprint of an article published by this same paper thirteen years ago, on the management of soft coal fires. Ill. 1200 w. Locomotive—Oct., 1902.

Steamship.—Firing on Ocean Steamships. Lawrence Irwell. Remarks on the service, class of men, their accommodations at sea, and customs, especially on English ships. 3000 w. Marine Rev—Sept. 25, 1902.

Water-Tube Boilers.—Methodical Stoking for Large Installation of Water-Tube Boilers. Dagnino

Attilio. Explains the necessity of uniform charging and means taken to secure good results, describing an apparatus for giving the signals automatically. Ill. 1800 w. Marine Engng—Nov., 1902.

FISHING BOAT.

See BOAT; BOAT, GASOLINE; STEAMBOAT.

FIT.

See also INTERCHANGEABILITY; MACHINE SHOP; MACHINE WORK.

Forced and Shrink Fits. C. D. King. Describes methods and explains the action of the metals and why the rough surface holds stronger than the very smooth. 800 w. Sci Am—June 28, 1902.

Fits and Fitting. Stanley H. Moore. An investigation of recent practice in forcing, shrinking, driving and running fits, and limits for limit gauges. 8000 w. Trans Amer Soc of Mech Engrs—June, 1903.

Running Fit Limits. Henry Hess. Gives diagram and explanation. 500 w. Am Mach—Jan. 21, 1904.

Fits in Machine Construction (Die Passungen im Maschinenbau). Dr. G. Schlesinger. A discussion of the proper allowances to be made for running, driving and forcing fits in machine work, with results of experiments. 8000 w. Zeitschr d Ver Deutscher Ing—Oct. 22, 1904.

Allowances.—Allowances for Press and Running Fits and for Limits in Bored and Turned Work. Tables and explanatory notes giving the practice of the C. W. Hunt Co. in limits of workmanship for various kinds of work. 900 w. Am Mach—July 16, 1903.

Removing.—Removing Shrink Fits—Freeing a Set Idler. D. S. Cole. Illustrations with description of methods used by the writer. 2500 w. Am Mach—Feb. 4, 1904.

FIXTURE.

See MACHINE TOOL—Fixture.

FLAME.

See also GAS; GAS BURNER; GAS ENGINE; GAS LIGHTING; LIGHTING; PHOTOMETRY.

Light Theory.—Why a Flame Emits Light—The Development of the Theory. Prof. Robert Montgomery Bird. Gives a review of ancient ideas in regard to artificial light, and explains the "acetylene theory" advanced by Prof. Vivian B. Lewes. Ill. 4000 w. Pop Sci M—July, 1903.

Temperature.—The Temperature of Flames (Sur la Temperature des Flammes). Ch. Féry. Giving the results of recent determinations of the temperatures of flames of illuminating gas, in various fumes, hydrogen, acetylene, etc., by a new spectroscope method. 1500 w. Comptes Rendus—Nov. 10, 1903.

See also GAS ENGINE—Explosion; Flame Temperature.

Velocity.—See GAS—Explosive Wave.

FLANGE.

See also PIPE; PIPE JOINT; PIPING; STEAM PIPE.

Emergency.—An Emergency Flange. Illustrates and describes an invention for providing a ready means for making good a faulty or broken joint, or fractured pipe in case of emergency, applicable for steam, water, compressed air or gas mains. 1000 w. Col Guard—Nov. 8, 1901.

Facing Machine.—See FACING MACHINE.

High-Pressure.—High-Pressure Steam-Pipe Flanges. Franz Koester. Comments and description of types. Ills. 1700 w. Power—Dec., 1905.

See also PIPE JOINT; STEAM PIPE.

Joint Packing.—See PACKING—Flange Joints.

Lovekin.—Some New Forms of Flanged Pipe Connections for High-Pressure Superheated Steam and Hydraulic Work. Luther D. Lovekin. Gives illustrations, with brief descriptions, of joints which the writer considers most suitable for the uses named. 1800 w. Am Mach—Vol. 28, No. 23.

See also Standardization; Test; FLANGING MACHINE.

Paris Exposition.—See METALLURGY.

Standardization.—The Standardization of Flanges. Robert E. Atkinson. Read at the Oct. meeting of the Inst. of Heat. and Ven. Engs., in London. A general discussion of the subject. 4800 w. Plumb & Dec—Dec. 1, 1900.

Standardization of Extra Heavy Flanges. A statement of the dimensions selected for heavy fittings and piping in the United States. 500 w. Eng Rec—Oct. 12, 1901.

Standardization of Extra Heavy Flanges. A committee report of the recommendations and schedule for standard at a meeting held in New York City, June 28, 1901. 900 w. Stevens Ind—Jan., 1902.

Standardization of Pipe Flanges and Flanged Fittings. Robert E. Atkinson. An illustrated paper giving statements of sizes of pipe flanges, with number of bolts in use by several manufacturers in England, with similar particulars about general practice in Germany and America. Particulars and scale drawings of special joints, etc. 5400 w. Inst of Mech Engrs—April 18, 1902.

Suggestions as to the Adaptability of a Universal Standard Flange List for Marine Work. Luther D. Lovekin. Discusses the need of a universal standard, and submits a series of flanges which have been designed with a view to overcoming all objections, explaining points in relation. 3800 w. Jour Am Soc of Nav Engrs—Aug., 1905.

See also STEAM PIPE—German Standards.

Strength.—See MATERIALS' STRENGTH—Flanged Rings.

Test.—Test of Pipe Joints. From a report by Com. T. F. Burgdorff. Describes tests in expanding, flaring and facing a 20-in. lap-welded steel pipe, 3-8 in. thick, into a grooved steel flange by a Lovekin pipe-flanging machine, and the testing of various forms of flanges by hydraulic pressure. Ills. 5500 w. Jour Am Soc of Nav Engrs—May, 1905.

Tests of Cold-Rolled Flanged Pipe Connections. Luther D. Lovekin. Gives results of a series of tests made to demonstrate the practicability of copper pipes rolled into steel flanges by machinery, and the ability of machinery to place flanges on steel pipe. Ills. 2500 w. Marine Engng—Aug., 1905.

Union.—See PIPE JOINT.

FLANGING MACHINE.

Lovekin.—The Lovekin Pipe Flanging Machine.—Illustrated description of the largest machine for expanding and flanging iron, steel, or other metal pipes into flanges of the lightest possible construction. 2500 w. Ir Age—Feb. 16, 1905.

Lovekin's Pipe-Flanging Machine. Illustrates and describes machinery and tools for putting flanges on copper pipes by means of expansion, in such a way as to make a tight joint, without any brazing. Also applicable to wrought iron or steel pipe. 1800 w. Engng—March 24, 1905.

Modern Expanding and Flanging Machinery and Tools—Luther D. Lovekin. Illustrates and describes machinery for expanding pipe into flanges. Serial. 1st part. 2000 w. Jour Fr Inst—June, 1904.

See also FLANGE.

Rochester Plant.—A Large Cold Flanging Machine. E. A. Suverrop. Illustrated description of a Rochester, N. Y., plant for the manufacture of glass-lined steel tanks. 3000 w. Am Mach—Vol. 28, No. 14.

FLASH BOILER.

See AUTOMOBILE STEAM—Gardner Serpollet; Serpollet; BOILER WATER-TUBE; CAR MOTOR DRIVEN—Steam Serpollet.

FLASK.

See MOLDING MACHINE.

FLAT PLATE.

See MATERIALS' STRENGTH; PLATE.

FLINT.

Flint, an Ancient Industry. Robert T. Hill. Brief account of the flint industry in England, with remarks on chalk and flint deposits. 1300 w. Eng & Min Jour—Nov. 7, 1903.

Tube Mills.—Flints and Other Hard Rocks as Material for Tube Mills. Prof. Arthur Lakes. Explains the origin of flint and other hard rocks, used in tube mills for grinding ores. 1200 w. Mines & Min—Sept., 1905.

See also **GOLD MILLING.**

FLOATING BRIDGE.

See **BRIDGE—Military; Northwich, Eng.**

FLOATING CRANE.

See **CRANE—Floating.**

FLOATING DOCK.

See also **DRY DOCK.**

Floating Docks. Illustrates and describes details of the Bermuda dock and the Algiers dock. 1000 w. Engng—May 2, 1902.

Floating Docks. Lyonel E. Clark. Abstract of a paper read before Inst. of Civ. Engrs., England. Describes types, and discusses the problems in design, the advantages and the disadvantages, etc. 2000 w. Eng Rec—Feb. 25, 1905.

Floating Docks. Lyonel Edwin Clark. On types of floating docks, their advantages and capabilities, showing them to be thoroughly reliable and having in some cases distinct advantages. Discussion and correspondence. Ills. 51,500 w. (No. 3500.) Inst of Civ Engrs.

Algiers, La.—Additional Particulars of the Floating Dry Dock for Algiers, La. Particulars and details of the construction. Ill. 2000 w. Marine Engng Jan., 1901.

The New Floating Drydock for the United States Navy. Illustrated detailed description of this steel floating drydock, now nearing completion, to be located at Algiers, La. 1700 w. Sci Am—June 15, 1901.

Official Test of Algiers Floating Dry Dock. Extract from the report on this dock at New Orleans, with the docking of the collier Sterling and the battleship Illinois, giving changes recommended. 1300 w. Marine Rev—Jan. 30, 1902.

Test of the New Floating Dry-Dock at Algiers, La. Frederick Moore. A brief account of this dock and its test by the battleship "Illinois." 600 w. Sci Am—March 8, 1902.

Floating Drydocks—Their Military Possibilities and Value. John D. Ford. An illustrated discussion of the construction, cost, advantages and value of drydocks, giving detailed description of the drydock at New Orleans. 5000 w. Jour Am Soc of Nav Engrs—Feb., 1903.

See also **Bermuda.**

Barcelona.—Barcelona Depositing Dock. Two-page plate and brief description of a floating dock of the single-sided type, attached by hinged booms to a floating outrigger. Describes the method of depositing. 800 w. Engng—March 27, 1903.

The Barcelona Depositing Dock. Illustrates and describes a depositing floating dock which is an ingenious combination of pontoons and staging, which enables several vessels to be repaired at the same time. 700 w. Marine Engng—July, 1903.

A 6,000-Ton Floating Depositing Pontoon Dock. An illustrated description of the dock at Barcelona. 1800 w. Sci Am—July 11, 1903.

Floating Transfer Dock at Barcelona (Le Dock Flottant à Transfert de Barcelone). Daniel Bellet. With illustrations of the 6,000-ton off-shore depositing dock in actual service. 2000 w. Revue Technique—May 10, 1904.

Bermuda.—The New Bermuda Floating Dock. Illustrated description of this recently launched floating dock, which is the largest and heaviest yet constructed. 2500 w. Engng—Feb. 14, 1902.

The New Bermuda Floating Dock. H. J. Shepstone. Illustration with description of this latest equipment to the British Navy. 1200 w. Sci Am—April 5, 1902.

Testing the New Bermuda Dock. Harold J. Shepstone. An illustrated description of the test of this large dock by lifting the battleship "San Pareil." 1000 w. Sci Am—July 12, 1902.

The Great Floating Docks of Bermuda and Algiers, La. Robert C. Fyfe. Illustrations, descriptions and comparison. 1700 w. Sci Am—Aug. 9, 1902.

Cunningham.—See **Philippines.**

Design.—Floating Dock Design (Ueber Schwimmdock Anlagen). Alexander Dietzius. With sections and data of a number of executed examples by various German firms, and diagrams and curves of stability. 4000 w. 1 plate. Schiffbau—Feb. 22, 1905.

Development.—The Evolution of the Floating Dock. An illustrated historical review. Serial. 1st part. 2000 w. Engrs' Gaz—March, 1903.

Development in Floating Dry-Docks. Joseph J. Schultz. Points out their striking advantages over the graving type, especially in economy and range of adptability, and gives in brief the structural features of all the important forms of floating dock. Illustrated. 4000 w. The Engineering Mag—Aug., 1903.

"Dewey."—See **Philippines.**

Dieckhoff System.—The Floating Dock of the Aktien Gesellschaft "Neptun," Shipyard and Engine Works, of Rostock, in Mecklenburg. Karl Zublin. Illustrates and describes a dock constructed on the new "Dieckhoff" system. 2700 w. Marine Engng—June, 1905.

Durban.—Durban Floating Dock. Illustrates and describes the launch of this floating dock built to the order of the Natal Government. 1000 w. Engrs' Gaz—Sept., 1902.

A Floating Workshop. Illustrations, with brief description of a vessel recently completed for Durban Harbor. 500 w. Engr, Lond—Sept. 25, 1903.

New Pontoon Dock and Floating Workshop for Natal. Brief illustrated description. 400 w. Sci Am Sup—Jan. 23, 1904.

The Durban Floating Dock and Workshop. Illustrated description of the 8,500-ton floating dock just completed for this port in Natal, South Africa. 1200 w. Sci Am—Jan. 2, 1904.

Hamburg.—The New Off-Shore Floating Dock for the Reiherstieg Schiffswerfte und Maschinenfabrik, Hamburg. Two-page plate with description. 1200 w. Engng—Feb. 12, 1904.

A New Offshore Floating Dock. Illustrated description of a new dock for the port of Hamburg. 700 w. Sci Am Sup—Dec. 31, 1904.

Havana.—The Floating Dry-Dock at Havana. An illustrated general description of this steel dock bought of the Spanish government for $185,000, and intended for use in the Philippine Islands. 3200 w. Marine Rev—Aug. 8, 1901.

Havana Floating Dry-Dock. Now at Navy Yard, Pensacola, Florida. An illustrated description of this dry-dock, with an outline of its eventful history. 1100 w. Marine Engng—Dec., 1903.

Hoboken, Belgium.—Floating Dock of 11,500 Tons Capacity (Schwimmdock von 11,500 t Tragfähigkeit). W. Kaemmerer. Describing a new floating dock built by the Gutehoffnungshütte for use at Hoboken, near Antwerp. 1500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Oct. 22, 1904.

Khartoum.—Floating Dock for Khartoum. Drawings and description. 1400 w. Engr, Lond—Oct. 25, 1901.

Minorca.—Floating Dock for the Spanish Government. Illustrates and describes the largest dock afloat, just completed. It is a self-docking, pontoon dock, to be located at Port Mahon, Minorca, but was formerly intended for the Philippines. 1400 w. Engr, Lond—July 5, 1901.

Mobile.—The Wooden Floating Dry Dock at Mobile. Illustrations, with brief description. 700 w. Marine Engng—Nov., 1905.

Natal.—See **Durban.**

New Orleans.—See **Algiers, La.**

Philippines.—The Cavité Steel Floating Dry-Dock. A. C. Cunningham. A description of this dock, giving the specifications and describing details in design and operation, showing its value in defending the Philippines. Illustrations, plates, etc. 10,000 w. Jour Am Soc of Nav Engrs—May, 1903.

The U. S. Steel Floating Dry-Dock for Cavite, Philippine Islands. J. S. Schultz. Illustrations showing the characteristic features, with explanation of the method of self-docking. 2000 w. Eng News—Dec. 10, 1903.

Floating Dry Docks in Many Navies. Remarks on the value of this type of ship-repairing basin, giving facts in regard to modern dry-docks, and describing the new steel dry-dock for Manila. Ills. 4000 w. Naut Gaz—June 8, 1905.

The Cavité Floating Dock. Day Allen Willey. Illustrated description of this drydock recently completed for the United States Government in the Philippines. It is entirely of American design and construction, has the greatest lifting capacity of any mechanism ever designed, and many features of interest. 2000 w. Sci Am Sup—July 1, 1905.

Tests of the Cavite Steel Floating Dry Dock. A. C. Cunningham. An illustrated report of the docking tests of the "Dewey" dock. 1800 w. Jour Am Soc of Nav Engrs—Aug., 1905.

The Self-Docking Tests of the Steel Floating Dry Dock for Cavité, P. I. Leonard M. Cox. An illustrated account of the self-docking operations. 2000 w. Jour Am Soc of Nav Engrs—Aug., 1905.

The Self-Docking Steel Floating Dry-Dock Dewey. Illustrated detailed description of this large dry-dock built for service in the Philippine Islands. 2800 w. Marine Engng—Oct., 1905.

Cavité Steel Floating Dry Dock. N. A. Berner. Brief illustrated description of a dock costing $1,225,000, for the Philippine waters. 2000 w. R R Gaz—Vol. XXXVIII. No. 25.

Rostock.—See **Dieckhoff System.**

Sectional.—A 10,000-Ton Balanced Sectional Dry-Dock. William T. Donnelly. Reviews the past history of the docking of vessels, and gives an illustrated detailed description of the largest timber floating dry-dock that has ever been constructed. 5500 w. Eng News—May 2, 1901.

See also **Development; Philippines.**

Stability in Immersion.—The Influence of Admission and Discharge of Water upon the Stability of Floating Docks (Ueber die Verminderung der Stabilität der Schwimmdocks durch die in denselben Vorhandenen Wasser-Ein-besw.-Austrittsöffnungen). Alexander Dietzius. With diagrams showing the effect of various degrees of immersion upon the stability. 4000 w. Schiffbau—Nov. 22, 1905.

Wooden.—See **Mobile; Sectional.**

FLOATING SANITARIUM.

See **HOSPITAL SHIP.**

FLOOD.

See also **RIVER; RIVER DISCHARGE; RIVER REGULATION; SHORE PROTECTION.**

Austria.—See **Warning.**

California.—See **RIVER REGULATION—Sacramento, Cal.**

Coal Mines.—See **COAL MINE—Floods; MINE FLOOD.**

Discharge.—See **RIVER DISCHARGE—Flood; WATER FLOW.**

Galveston.—See **SHORE PROTECTION.**

Heppner, Ore.—The Heppner Disaster. John T Whistler. Copy of a report made to the U. S. Geol. Survey. An account of a destructive storm causing great loss of life and property. 1800 w. Eng News—July 16, 1903.

Irrigation.—See **IRRIGATION—Flood.**

Kansas.—Engineering Aspects of the Kansas Floods. Waddell & Hedrick. Brief outline of the damage, with short descriptions of the bridges destroyed—17 in all. Ill. 2400 w. Eng Rec—Sept. 12, 1903.

The Kansas City Flood of 1903. An illustrated description of the great flood, the damage done, etc. 2500 w. Eng News—Sept. 17, 1903.

The Kansas River Flood. Charles Alma Byers. Remarks on the changes made in the river channel. 2000 w. Sci Am Sup—Feb. 18, 1904.

Mississippi.—Increasing Height of Floods in the Lower Mississippi; the Problem and Its Solution. L. W. Brown. Slightly condensed from a paper read before the Louisiana Engng. Soc. A statement of facts and a discussion of the cause and the remedy. 5300 w. Eng News—April 18, 1901.

The Increasing Elevation of Floods in the Lower Mississippi River. Linus W. Brown. Gives statistics and facts concerning these floods and an outline of the author's views of the cause producing the conditions, and the remedy. Also discussion. 2100 w. Jour Assn Engng Socs—June, 1901.

Controlling the Floods of the Mississippi River. Prof. Lewis M. Haupt. Considers the great destruction of life and property by these floods, and gives suggestions of remedies that may be applied to alleviate the disasters. 5000 w. Jour Fr Inst—Oct., 1903.

Are Flood Heights Increasing in the Lower Mississippi River? W. J. Hardee. Condensed from a paper read before the Louisiana Engng. Soc. in discussion of the paper by L. W. Brown, in disproof of the conclusions reached. 6200 w. Eng News—May 23, 1901.

The Recent Mississippi Floods and Their Relation to the Levees. T. G. Dabney. Extracts from a manuscript report on the high water of 1903 made to the Mississippi River Commission. 2000 w. Engng News—July 9, 1903.

See also **RIVER REGULATION—Mississippi Flood.**

Mountains.—See **FORESTRY; RIVER REGULATION.**

N. J. Central R. R.—See **RAILWAY CONSTRUCTION—Flood Repairs.**

Passaic Valley.—The Floods in the Passaic Valley. Editorial on the destruction caused by the recent heavy rainfall, with remarks on the need of immediate investigation and remedy. 1000 w. Eng Rec—Oct. 17, 1903.

Flood Damage to Bridges at Paterson, N. J. An illustrated article showing the condition of bridges after the flood, and discussing points of interest to engineers. 1600 w. Eng News—Oct. 29, 1903.

Pribram.—See **RESERVOIR.**

Railway Protection.—Protecting a Railroad from Flood Currents. Day Allen Willey. An illustrated description of a piece of revetment along the Missouri River, which has attracted attention on account of the plan of construction, low cost and permanent protection afforded. 1200 w. Sci Am—Nov. 29, 1902.

See also **RAILWAY CONSTRUCTION.**

Rhine.—See **RIVER.**

St. Louis, East.—Floods and Flood Protection Works at East St. Louis, Ill. James F. Parr. Abstract of a paper read before the Illinois Soc. of Engrs. & Survs. Relates to the experience of East St. Louis during the flood in June, 1903. 3300 w. Eng News—Feb. 4, 1904.

Sanitation.—See **SANITATION—Floods.**

Santa Fe Ry.—Floods on the Santa Fe System. A. F. Robinson. Illustrated description of the remarkable results of floods on the Arizona division. 600 w. Ry Age—Dec. 16, 1904.

Subsidence.—The Subsidence of Floods in Rivers (Sur les Décrues des Rivières). Edmond Mallet. A comparison of observations upon the relative subsidence of swollen streams in cold and warm seasons. 1000 w. Comptes Rendus—April 25, 1905.

U. S. Southern.—A Study of the Southern River Floods of May and June, 1901. An abstract of the report of E. W. Myers to the U. S. Geol. Survey. 4400 w. Eng News—Aug. 7, 1902.

Warning, Austria.—The Flood Warning Service on the Danube and its Tributaries in Upper Austria (Vorschrift für den Hochwassernachrichten und Warnungsdienst fur die Donau und ihre Nebenflüsse in Oberoesterreich). With map showing the location of stations and very complete telegraphic connections. 2000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 3, 1903.

Warning, Bohemia.—The Prediction of the Height of Water in the Elbe and Moldau Rivers in Bohemia (Die Wasserstandsvoraussagen an der Elbe und Moldau in Böhmen). An account of the work of the Austrian Hydrographic Office in observing river levels and giving warning of floods, with tables and diagrams. 2 plates. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 7, 1901.

York, Haven, Pa.—Flood Damage to the York Haven Power Plant. O. P. Waters. An account of damage caused by the recent ice freshet on the

Susquehanna River. 700 w. Eng Rec—March 19, 1904.

FLOOR.

See also BUILDING CONSTRUCTION; CONCRETE REINFORCED; FIREPROOF CONSTRUCTION.

Arch.—See Johnson; Rapp Tests.

Concrete Reinforced.—See CONCRETE REINFORCED.

Crowds.—See CROWDS—Weight.

Deflection Test.—A Method of Measuring Deflections in Floor Tests. Edward Godfrey. Brief illustrated discription of simple method. 850 w. Eng News—Aug. 25, 1904.

De Valliere.—See CONCRETE REINFORCED.

Failure, Minneapolis.—The Failure of a Warehouse Floor in Minneapolis, Minn. Sketches of the construction and particulars of the accident which occurred Nov. 7. 2000 w. Eng News—Nov. 20, 1902.

Fireproof Construction.—See FIREPROOF CONSTRUCTION.

Johnson System.—The Johnson System of Floor Construction. Peter B. Wight. An illustrated description of a system which does away with the I beams, only retaining small I beam struts between the columns, in opposite directions to the girders. Reports of tests made. 2500 w. Br Build—Oct., 1902.

Standard Floor Arch Construction. E. V. Johnson. General remarks on the standard floor arch construction, with statement of the advantages of the standard steel and tile construction. Discussion. 7700 w. Jour W Soc of Engrs—Oct., 1904.

Machine Shop.—See MACHINE SHOP—Floor.

Ransome.—See CONCRETE REINFORCED.

Rapp Tests.—Weight Tests of Rapp Floor Arches. Illustrated description of 6, 10 and 12 ft. arches of brick on light iron frames, tested with loads up to 3,000 lbs. per sq. ft. without serious deflection. 400 w. Eng Rec—Nov. 9, 1901.

Siegwart.—See CONCRETE REINFORCED.

Test, Paris Exposition.—See CONCRETE REINFORCED—Hennebique.

White System.—See CONCRETE REINFORCED.

FLOOR TEST.

See CONCRETE REINFORCED; FIREPROOF CONSTRUCTION; FLOOR.

FLOW.

Elastic Fluids.—See GAS FLOW; STEAM FLOW.

Gas.—See GAS FLOW.

Metals.—See METAL—Flow.

Semi-Fluids.—The Flow of Semi-Fluids Through Orifices. Willis Whited. The experiments described were performed with wheat. Also discussion. Ill. 3400 w. Pro Engs Soc of W Penn—April, 1900.

Steam.—See STEAM FLOW.

Water.—See RIVER DISCHARGE; WATER FLOW.

FLUE.

See CHIMNEY; COMBUSTION.

FLUE DUST.

See BLAST FURNACE; BLAST-FURNACE GAS; SMELTING.

FLUE GAS.

See also BLAST-FURNACE GAS.

Testing.—See BOILER TEST; GAS ANALYSIS.

FLUME.

See also HYDRO-ELECTRIC PLANT; IRRIGATION; WATER POWER.

California.—Flume Construction. W. C. Ralston. Read before the California Miners' Assn. An accurate account of costs of construction of a flume in Calaveras County, California, with descriptive notes. Ill. 600 w. Eng & Min Jour—May 23, 1903.

Steel.—Design of a Steel Water Flume. H. G. Balcom. Considers schemes of design for a steel water flume of approximately 450 sq. ft. cross-section and more than 1,000 feet long. General discussion. 4500 w. Pro Engrs' Soc of W Penn—Dec., 1904.

Transporting.—Flumes for Transporting Logs, Lumber, and Sugar Cane. Photographs and description of flume construction. 3000 w. Eng News—May 18, 1905.

Turlock Irrigation, Cal.—Reconstructing the Flumes on the Turlock Irrigating Canal. H. A. Crafts. Describes the permanent construction to take the place of the wooden flumes, which are already in serious decay. Ills. 1000 w. Eng Rec—Sept. 2, 1905.

FLUORINE.

See also ELECTRO-CHEMISTRY.

Electrolytic Apparatus.—Apparatus for the Commercial Production of Fluorine (Appareil pour la Fabrication Industrielle du Fluor). MM. Poulenc et Meslans. A description of an electrolytic process based on that of Moissan. 1200 w. L'Electricien—Nov. 3, 1900.

Production of Fluorine in Moissan's Electrolytic Apparatus. Illustrates the electrolytic apparatus used, explaining how the gas is obtained in a pure state. 800 w. Sci Am—July 4, 1903.

Moissan.—Moissan's Researches on Fluorine and the Fluorine Compounds. Dr. H. F. Keller. An account of the researches of this chemist in the field named. Ill. 4500 w. Jour Fr Inst—Aug., 1901.

FLUOROSCOPE.

See RADIOGRAPHY; ROENTGEN RAY.

FLUOR SPAR.

See also FLUX; ORE TREATMENT—Kentucky.

The Fluor Spar and Zinc Mines of Kentucky and Illinois. F. H. Harwood. Begins an illustrated detailed account of the mines of this district. Serial. 1st part. 1000 w. Min & Sci Pr—Feb. 7, 1903.

Fluor Spar Deposits of the Kentucky-Illinois District. H. Foster Bain. On the grades and genesis of the ore, and the geology of the district. 2500 w. Mines & Min—Nov., 1904.

Principal American Fluorspar Deposits. H. Foster Bain. Information concerning the Kentucky-Illinois fluorspar district, explaining the uses and value of the different grades. 2000 w. Min Mag—Aug., 1905.

FLUX.

See also BLAST FURNACE; CASTING; FOUNDRY; LIMESTONE.

Flux Casting.—See CASTING—Fluxing Metals.

Nevada Mines.—A District Which Will Supply Fluxing Ores for the Tonopah (Nev.) Mines. W. J. Stoneham. Information concerning the Lone Mountain Mining District, and the large bodies of fluxing ore found there. 1200 w. Min Wld—Oct. 7, 1905.

FLYING MACHINE.

See AERONAUTICS.

FLYWHEEL.

See also ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING — Parallel; SPEED VARIATION; STEAM ENGINE—Regulation.

Building a Fly Wheel. An illustrated description of methods employed. 1800 w. Power—Jan., 1902.

Flywheels, Their Purpose, Principle and Design—Calculation for Speed Variation. William Burlingham. Gives an idea of some of the difficulties in the work, and the reasons for the adoption of the varying types. Ill. 3000 w. Mach, N Y—June, 1903.

Flywheels. William H. Boehm. Considers the more frequent causes of flywheel disruptions, discussing points of interest in connection with the design and operation of flywheels of various types. Serial. 1st part. 2400 w. Engr, U S A—July 15, 1903.

Flywheels and Flywheel Accidents. R. T. Strohm. Considers the stresses set up when a flywheel revolves at a constant velocity, the causes of flywheel destruction and their prevention of disasters. 3300 w. Am Elect'n—Nov., 1903.

Accident.—See **Bursting; BOILER EXPLOSION—Germany.**

Alternator.—The Weight of Flywheels for Alternating Current Units. J. Begtrup. Gives method of determining the weight, illustrating by examples, and giving displacement curves of various types of engine. 1800 w. Am Mach—July 10, 1902.

Engine Speeds for Direct-Connected Alternators. Edgar Knowlton. Discusses the influence of speed on the amount of flywheel effect required in parallel operation. 1300 w. Elec Wld & Engr—July 26, 1902.

Flywheel Capacity for Engine-Driven Alternators. Walter I. Slichter. Discusses the function of a flywheel and the causes which make the force on the crank-pin vary during a revolution. 8500 w. Trans Am Soc of Mech Engrs, No. 0967—Dec., 1902.

The Wheel Capacity for Engine-Driven Alternators. H. F. Schmidt. Discusses the steam engine side of the flywheel question and certain electrical requirements, with a suggestion. 1500 w. St Ry Jour—Dec. 13, 1902.

Weight of Flywheels for Engines Driving Direct Connected Alternators. A. M. Levin. Derives a formula from well-established theory, supplemented by a few approximations, which conform to a number of carefully plotted displacement curves. 1500 w. Am Mach—April 23, 1903.

See also **Test; ELECTRIC GENERATOR, ALTERNATING—Parallel.**

Bursting.—The Bursting of Small Cast-Iron Fly-Wheels. Charles H. Benjamin. A series of experiments and description of the new apparatus used and the results obtained by testing flywheels to destruction at the Case School of Applied Science, Cleveland, O. Ill. 2500 w. Trans Am Soc of Mech Engrs, No. 916—Dec., 1901.

The Bursting of Four-Foot Flywheels. Charles H. Benjamin. An illustrated account of experimental investigations. 2200 w. Trans Am Soc of Mech Engrs, No. 017—Dec., 1904.

Belt-Wheel Explosion at Mishawaka, Ind. Ira C. Boles. An illustrated account of an unexplained accident on March 31, 1904. 700 w. Power—July, 1904.

Flywheel Explosions. William H. Boehm. Remarks on the frequency of these disasters, their causes, the safe speeds for various types of wheels, etc. Ills. 4000 w. Ins Engng—June, 1905.

Cast Iron.—See **Bursting.**

Design.—The Strength of Fly Wheels (Festigkeit der Schwungräder). R. Bredt. A mathematical examination into the nature and magnitude of centrifugal stresses and strains on fly wheels, with formulas for safe design. 5000 w. Zeitschr d Ver Deutscher Ing—Feb. 23, 1901.

Determination of Fly-Wheels to Keep the Angular Variation of an Engine Within a Fixed Limit. J. J. Astrom. Attempt to indicate a method by which the regulating capacity of a fly-wheel upon the motion of an engine may be positively determined. 5000 w. Trans Am Soc of Mech Engrs, No. 892—May, 1901.

The Design of Flywheels. A. Kemp. Discusses things that must be taken into consideration in the designing of flywheels and gives method of plotting diagrams. 1600 w. Feilden's Mag—May, 1903.

Graphic Method for Determining the Weight of Flywheels. Diagrams are given, with explanation. 800 w. Prac Engr—July 8, 1904.

The Design of Fly-Wheels. A. H. Gibson. Considers the design and construction, showing the conditions which they must fulfil under certain circumstances, and the suitability of various designs for fulfilling these conditions. Ills. Serial. 1st part. 3500 w. Engng Rev—Dec., 1904.

The Graphical Determination of Fly-wheel Weights (Die Graphische Ermittlung des Schwungradgewichtes). F. Wittenbauer. A study in graphical dynamics, showing the method of plotting the varying forces in such a way as to enable the regulating weight to be determined. 4000 w. Zeitschr d Ver Deutscher Ing—March 25, 1905.

Exact and Approximate Methods of Fly-Wheel Computation (Die Genaue und die Angenäherte Schwungradermittlung). Dr. R. Proell. An examination of the graphical and analytical methods of computing fly-wheel weights for given cylinder conditions. 2000 w. Zeitschr d Ver Deutscher Ing—Oct. 21, 1905.

See also **Alternator; Speed.**

Directional Tendency.—The Directional Tendency of the Inertia of the Flywheels and Vehicle Wheels. E. J. Stoddard. A study of rotation with an application to automobile running. 1200 w. Horseless Age—Nov. 26, 1902.

Drum-Head Casing.—Drum-Head Casing for Fly-Wheels. E. E. Clock. Remarks on the power consumed in moving air, and the advantage of casing, describing how the work should be done. Ill. 800 w. Power—March, 1904.

Electric Generator.—The Design and Construction of Fly Wheels for Slow Speed Engines for Electrical Lighting and Traction Purposes. A. Marshal Downie. Read before the Inst. of Engrs. & Shipbuilders in Scotland. Discusses the design and application of fly-wheels to large slow speed engines. Serial. 1st part. Ill. 2000 w. Engrs' Gas—Jan., 1902.

Notes on Fly-Wheels. H. H. Barnes, Jr. An outline of comparative tests of generating sets with both light and heavy fly-wheels, discussing the effect upon the uniformity of speed. 4000 w. Trans Am Inst of Elec Engrs—May 17, 1904.

See also **Alternator; ELECTRIC GENERATOR—Flywheel.**

Experiments.—See **Bursting; Electric Generator.**

Explosion.—See **Bursting.**

Internal Combustion Motors.—The Computation of Fly Wheels for Internal Combustion Motors (Berechnung das Schwungradgewichtes der Verbrennungsmotoren). H. Güldner. A discussion of the proper weight for two and four cycle motors to give a predetermined steadiness of motion. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—March 16, 1901.

Machine Tool.—The Use of Flywheels upon Machine Tools. J. C. Steen. Discusses briefly the application to various classes of machinery. 1500 w. Am Engr & R R Jour—Dec., 1903.

See **MOLDING—Flywheels.**

Pit Lathe.—Boring, Turning and Keyseating Flywheels on a Pit Lathe. Illustrated description of the application of a pit lathe to flywheel making. 700 w. Am Mach—Vol. 28, No. 10.

Rim Tension.—See **CENTRIFUGAL FORCE—Diagrams.**

Rim Weight.—The Weight of a Flywheel Rim. R. T. Strohm. Explains the method of computing. 2000 w. Power—Nov., 1903.

Shields.—Reducing the Windage of Flywheels. F. W. Salmon. Illustrated article on the advantages of making shields for flywheels, resulting in a saving in fuel and less liability of accident. 1000 w. Power—Dec., 1903.

Speed.—Speed for Fly-Wheels. W. H. Boehm. How to determine the speed at which disrupture will occur. 800 w. Ir & Coal Trds Rev—Aug. 29, 1902.

Safe Speeds for Flywheels. William H. Boehm. From the "Monthly Bulletin" of the Fidelity and Casualty Co. Gives solution of the problem of finding the speed at which disruption will occur. 1200 w. Eng News—Oct. 2, 1902.

A Convenient Rule for Computing Maximum Revolutions for Flywheels. William H. Boehm. From the monthly bulletin of the Fidelity and Casualty Co. Gives a rule based upon the practice of allowing a rim-speed of one mile per minute for well-made cast-iron wheels. 200 w. Eng News—Jan. 29, 1903.

Strength.—See **Design.**

Transportation.—See **STEAM ENGINE—Crimmitschau.**

Weight.—See **Design.**

Windage.—See **Shields.**

FOG.

Electric Discharge.—Means for Electrifying the Atmosphere on a Large Scale. Sir Oliver Lodge, before the Physical Society. Outlines the method.

of discharging electricity into the air in times of fog, describing some effects. 1500 w. Elect'n, Lond—Nov. 20, 1903.

Dispelling Fog by Electricity—An Experimental Proof. A. Frederick Collins. An account of the experimental investigations in this field, made by Sir Oliver Lodge. Ills. 2000 w. Sci Am—Sept. 3, 1904.

Lightning Rods, Wireless Telegraphy and the Dispersion of Fogs by Electricity. A. Frederick Collins. A short review of the use of wires for the first two purposes, with comparison with the third use named. Describes the investigations for the dispersion of fogs. 2800 w. Elec Wld & Engr —Nov. 26, 1904.

Fog Dispersion by Electricity. Describes the process worked out by Sir Oliver Lodge, illustrating the apparatus used. 1800 w. Sci Am—Feb. 11, 1905.

Lodge's Fog-Dispelling Apparatus. Abstract of specifications for an invention of Sir Oliver J. Lodge, for "improvements in means for the production of continuous high potential electrical discharges applicable for the deposition of dust, fume, smoke, fog and mist, for the production of rain and for other purposes." 1200 w. Sci Am Sup—Oct. 21, 1905.

Light Penetration.—See **LIGHT—Fog; LIGHT-HOUSE.**

FOG DISPELLER.

Lodge.—See **FOG—Electric Discharge.**

FOG SIGNAL.

See also **RAILWAY SIGNAL; SEA SIGNAL; SUBMARINE SIGNAL.**

Sound Signals. E. Price-Edwards. A review of experiments made with fog-signals and a discussion of the many difficulties met. 12,600 w. Jour Soc Arts—March 7, 1902.

Clayton.—Clayton's Fog-Signalling Apparatus. An illustrated description of a mechanical apparatus for use on railways. 1100 w. Engng—June 5, 1903.

Coast.—Coast Fog Signals. N. G. Gedye. Read before the Civ. & Mech. Engrs.' Soc. Deals with the signals established on the coasts where fog is prevalent, for the guidance of the mariner. Ill. Serial. 1st part. 2800 w. Engr, Lond—July 4, 1902.

Foster.—Foster's Fog Signals. Illustrated description of this apparatus, which is in the form of a single automatically revolving megaphone, which turns to each of the eight points of the compass in turn, and gives a signal. 1000 w. Sci Am—Sept. 28, 1901.

Railway.—See **RAILWAY SIGNAL—Fog.**

St. Catherine's, Ontario.—Experiments at St. Catherine's with Fog Signals. H. C. Fyfe. An illustrated article giving an account of a series of tests mainly devoted to comparisons of efficiency between the siren principle and the reed principle of producing sound. 900 w. Sci Am—Oct. 11, 1902.

Topophone.—The Topophone. Illustrates and describes a device for determining the direction of a fog signal at sea, and to enable the sounds to be heard at greater distance. 1100 w. Sci Am—March 30, 1901.

FOOD SUPPLY.

See also **COMMERCE; INDUSTRY.**

England and America.—American Control of England's Food Supply. J. D. Whelpley. Concerning the dependence of England upon the United States for food, giving information of interest concerning the value of meat, grain, etc., exported, and the causes that have brought about the present conditions. 4000 w. N Am Rev—June, 1902.

FORCE.

See **MECHANICS—Force.**

FORESTRY.

See also **IRRIGATION; TIMBER; WOOD.**

The Forester, an Engineer. B. E. Fernow. An illustrated article showing the many applications of engineering knowledge to the business of wood production. Also discussion. 7200 w. Jour W Soc of Engrs—Oct., 1901.

English Black Country.—The Utilization of Pit Tips for the Growing of Pit Timber. Abstract of a paper by Mr. Herbert Stone before the So. Staffordshire Iron & Steel Inst. Showing that trees can be grown on these pit mounds to advantage. 3500 w. Col Guard—Jan. 23, 1903.

Mountains.—The Reforestation of Mountains (Le Reboisement des Montagnes). A discussion of the regulation of mountain torrents showing the influence of forests upon the distribution of rainfall and the importance of forest preservation and cultivation. 2000 w. Génie Civil—Sept. 26, 1903.

Pennsylvania.—Pennsylvania Forests and What Is Necessary to Their Restoration. Joseph T. Rothrock. Considers the forests as they were, are and ought to be, and what is necessary to bring about the desired condition. Also discussion. 10,000 w. Pro Engrs' Club of Phila—April, 1901.

The Forest Policy of Pennsylvania. George H. Wirt. Reviews the policy of this State in the past, and discusses what it should be in the future. 5600 w. Jour Fr Inst—May, 1903.

FORGE.

See also **FOUNDRY; IRON WORKS; STEEL WORKS.**

Boonton, N. J.—The Old Boonton Forge. Brief illustrated description of a pre-revolutionary foundry where cannon balls were cast for the continental army, which is about to disappear in the building of a great reservoir. 600 w. Sci Am—March 16, 1901.

FORGING.

See also **METALLURGY; SHAFT; STEEL FORGING; STEEL METALLURGY.**

Some Characteristics of Good Forgings and Some Things to Avoid. James H. Baker. 1200 w. Pro Engrs Soc of W Penn—June, 1903.

The Manufacture of Forgings. Frank Somers. Read before the Staffordshire Iron & Steel Inst. A review of the tools used to save human labor in the manufacture of iron forgings from the earliest invention to the present. 2500 w. Ir & St Trds Jour—Dec. 16, 1905.

Die.—Die Forging. Joseph Horner. The first of a series of articles written with the object of illustrating the methods of stamping engineers' forgings in dies, to the lessening or exclusion of anvil work, and of hand finishing. Serial. 1st part. 2300 w. Engng—May 3, 1901.
See also **Drop; DIE—Forging; HAMMER.**

Drop.—Drop Forgings. Dwight Goddard. Explains the making of drop forgings. 2000 w. Pro Engrs' Soc of W Penn—June, 1903.
See also **Die; DIE; HAMMER.**

Locomotive Rods.—See **LOCOMOTIVE RODS.**

Machinery.—Forging Machinery. Jas. H. Baker. Considers hammers, forging rolls and presses. General discussion. 8000 w. Pro Engrs Club of W Penn—Dec., 1904.

Improved Forging Machinery (Neuere Schmiedemaschinen). P. Möller. Describing small screw forging presses, bolt machines, screw-thread rolling machines, etc., built by Hasenclever, of Düsseldorf. 2500 w. Zeitschr d Ver Deutscher Ing—Jan. 7, 1905.

See also **HAMMER; HYDRAULIC PRESS; STEEL FORGING.**

Oil vs. Coal Fuel.—Economy and Advantage of Oil Fuel for Forging. S. Uren. Read before the Nat. R. R. Master Blacksmiths' Assn. Claims that oil at 6 cents per gallon and coal at $5 per ton about balance as far as cost is concerned, but that the improvement in the quality of the iron is incalculable. 1200 w. Am Mach—Vol. 27, No. 37.

Economy and Advantage of Oil Fuel for Forging. Extract from a paper by S. Uren, to the Nat. R. R. Master Blacksmiths' Assn. Gives a comparison of the cost of coal and oil in the smith shop. 1500 w. Ry & Engng Rev—Oct. 1, 1904.

See also **LIQUID FUEL—Furnace.**

Paris Exposition.—See **METALLURGY.**

Steel.—See **STEEL FORGING.**

Steel Ingot.—See **HYDRAULIC PRESS; STEEL FORGING; STEEL METALLURGY.**

Wheel.—Car Wheel Forging. James H. Baker. Illustrates and describes improvements in forging, consisting of a peculiar distribution of the metal, of quick changing, registering and securing dies in position by power, while securing clean welded and forged metal in the tire. 1300 w. Ir Age—Sept. 7, 1905.

FORGING MACHINE.

See also **FORGING; HYDRAULIC MACHINERY.**

Die.—See DIE—Forging; FORGING—Die.

FORGING PRESS.

See **FORGING—Machinery; HYDRAULIC MACHINERY.**

FORMING TOOL.

New Hartford.—See SCREW MACHINE.

FORMULAE.

See **EDUCATION—Self; MATHEMATICS;** and under specific subjects.

FORNEY.

See **LOCOMOTIVE—History.**

FORTIFICATION.

See **COAST DEFENCE; GIBRALTAR.**

FOUCAULT CURRENT.

See **EDDY CURRENT.**

FOUNDATION.

See also **BRIDGE FOUNDATION; BRIDGE PIER; BUILDING CONSTRUCTION; CAISSON; PILE; UNDERPINNING.**

Air versus Water. John F. O'Rourke. Discusses difficult work in building foundations, the methods used, etc. Ill. 4700 w. Trans Assn of Civ Engrs of Cornell Univ—1901.

Notes on Foundations. Gerald E. Flanagan. Discusses the application of engineering principles to foundation construction. 1000 w. Am Mach—Nov. 28, 1901.

The Construction of Foundations for Buildings. Gerald E. Flanagan. Some points in the construction of foundations for heavy loads. 1200 w. Am Mach—March 27, 1902.

Foundations. Abstract of a paper read by Baron Siccama at a recent meeting of the Civ. & Mech. Engrs.' Soc. Considers raft and sand foundations, the use of piles, the well method, etc. 2300 w. Gas Wld—Jan. 16, 1904.

Foundations. George B. Francis. Considers the need of obtaining all possible information, discussing borings, piles, grillage, riprap, footings, concrete, etc. General discussion. 2200 w. Jour Assn of Engng Socs—June, 1903.

Alluvial Soil.—Foundations. Baron H. T. H. Siccama. Read before the Civ. & Mech. Engrs.' Soc. and printed in the "Building News." An interesting review of systems used in alluvial soils. 3800 w. Am Archt—Dec. 19, 1903.

Antheni-Prache.—See Machinery.

Boston.—Boston Foundations. Joseph R. Worcester. A discussion confined to ordinary structures not requiring excessively large foundations, considering the best way to pile, what loads it is safe to place on piles, what grade piles should be cut, how foundation piles should be capped. Map, and general discussion. Ill. 22,000 w. Jour Assn of Engng Socs—June, 1903.

Experience with Foundations in Boston. Abstract of a paper by J. R. Worcester, read before the Boston Soc. of Civ. Engrs. Outlines the geologic formation and discusses principally the pile foundations and their problems. 1600 w. Eng News—Feb. 5, 1903.

Boston Harbor.—See PILE—Worm Eaten.

Caisson.—See CAISSON.

Campanile, Venice.—Rebuilding the Campanile of Venice. Notes by F. Hopkinson Smith on the progress of the reconstruction of the foundations. 1200 w. Eng Rec—Dec. 3, 1904.

Chicago.—Chicago Foundations. James N. Hatch. Describes the condition of the soil and the types of foundation which have become standard. Ills. Serial. 1st part. 3000 w. Archts & Bldrs' Mag—Sept., 1904.

The Development of Shallow and Deep Foundations for Chicago Buildings. On the foundation problem to meet the conditions in Chicago, the past and present practice. Ills. 5000 w. Eng News—Dec. 22, 1904.

Chicago Foundations. E. C. Shankland. Briefly considers the evolution from the old spread or floating foundation to the present use of concrete caissons. 3300 w. Technograph—No. 19, 1904-1905.

Chicago Foundations. E. C. Shankland, in the "Technograph." Explains the character of the soil and the troubles causing the great settlement of buildings, describing the kind of foundation now used. 2700 w. Eng Rec—July 29, 1905.

Foundations for Chicago Buildings. John M. Ewen. A short history of the foundations of Chicago buildings since the great fire, calling attention to the improvements made from time to time. Discussion. Ills. 4500 w. Jour W Soc of Engrs—Dec., 1905.

Chic., Mil. & St. Paul Ry.—See BRIDGE PIER.

Coaling Tower, St. Louis.—Coaling Tower Foundations of the Union Electric Light & Power Co., St. Louis. An illustrated detailed description of difficult foundation work, owing principally to the nature of the ground and depth of water encountered. 2000 w. Eng Rec—Oct. 21, 1905.

Coal Pocket, Boston.—Foundation for Coal Pocket at Lincoln Wharf, Boston Elevated Railway Co. Robert B. Davis. An illustrated description of the foundation or wharf under an up-to-date coal pocket. 5 plates. 3000 w. Jour Assn of Engng Socs—March, 1903.

Concrete.—Concrete Foundations. R. P. King. Practical hints for builders of machinery foundations. Ill. 3000 w. Mach, N Y—Aug., 1903.

Concrete Pile.—See Hallenbeck Building; Washington Barracks; PILE—Simplex.

Concrete Reinforced. — See Lattemann Building, Brooklyn; CONCRETE REINFORCED — Pile Sheathing.

Concrete, Station.—See Railway Station, Washington.

Dam, McMechen, W. Va.—Pile Foundations for Movable Dam, at McMechen, W. Va., with Method of Calculation. Gilbert S. Walker. Briefly describes the four principal types of foundations which were considered, and gives details of the type adopted. Ills. 2400 w. Eng News—July 27, 1905.

Dry-Dock.—See CAISSON—Kiel; DRY DOCK.

East River Bridge.—See BRIDGE FOUNDATION; BRIDGE PIER; CAISSON.

Electric Station, N. Y.—Foundations of the Power House of the New York Rapid Transit R. R. Information concerning the massive foundations required to support a steel superstructure 125 feet high, containing a great amount of very heavy machinery. 1500 w. Eng Rec—Aug. 27, 1904.

Electric Station, Yonkers.—The Foundations for the Yonkers Power House of the New York Central & Hudson River R. R. Illustrates and describes the present stage of one of the two stations to furnish electricity for handling the N. Y. Central's train service near New York. 2700 w. Eng Rec—Dec. 10, 1904.

Construction of Foundations for the Yonkers Power House of the New York Central R. R. Information concerning foundations involving important cofferdam and concreting work and special plant. Ills. 1800 w. Eng Rec—Feb. 11, 1905.

See also **ELECTRIC STATION—Port Morris.**

Elevated Ry., Boston.—Foundations for the Elevated Structure of the Boston Elevated Railway. George A. Kimball. Illustrated detailed description. 1800 w. Jour Assn of Engng Socs—June, 1903.

Engine.—See Machinery.

Failure and Reconstruction.—A Foundation Failure and its Reconstruction. Illustrated description of interesting work accomplished under difficulties. 1700 w. Eng News—May 1, 1902.

Ferry Depot, Hoboken.—Unusual Foundations at the Hoboken Terminal of the Lackawanna R. R. Outlines conditions and gives an illustrated detailed description of the foundation work. 2000 w Eng Rec—Nov. 11, 1905.

Ferry Depot, San Francisco.—The Stability of the Foundations of the Union Ferry Depot in San Francisco. Frank Soule. Abstract of expert's report after careful examination and tests made. Ills. 1500 w. Cal Jour of Tech—Oct., 1904.

Footings.—See BRIDGE FOUNDATION.

Freezing Process.—The Utilization of Artificial Cold (Étude sur l'Emploi du Froid Artificiel). E. Maynard. A discussion of the use of the freezing process for sinking foundations, with especial reference to the construction of canal locks in wet ground. 4500 w. Revue Technique—Jan. 25, 1905.

See also EXCAVATION; SHAFT SINKING; TUNNEL.

Girder.—Lowering a Heavy Foundation Girder. Illustrated description of the method used in constructing the foundations of a large steel-cage, twenty-story office building in New York. 1100 w. Eng Rec—Aug. 30, 1902.

Grain Elevator.—The Foundation of the Port Richmond Grain Elevator. Illustrated description of crib and foundation work near Philadelphia. 1100 w. Eng Rec—Jan. 18, 1902.

See also CONCRETE—Zero Weather.

Grillage vs. Concrete.—Grillage vs. Concrete Foundations. From a paper by J. C. Hain, read before the Iowa Ry. Club. The relative merits of grillage on a pile foundation and the method of surrounding the heads of piles with concrete several feet below the cut-off. 1700 w. Ry & Engng Rev—May 23, 1903.

Hallenbeck Building, N. Y.—Concrete Pile Foundations of the Hallenbeck Building, New York. An llustrated description of the system adopted for the addition to this building. 1200 w. Eng Rec—April 11, 1903.

Hoisting Engine.—Hoisting Engine Foundations. R. V. Norris. On the importance of suitable construction even for temporary purposes, discussing methods of building and comparative costs. 2000 w. Mines & Min—July, 1904.

Hotel, Brookline, Mass.—The Reconstruction of Foundations for the Hotel Wollaton, Brookline, Mass. Dana M. Pratt. Describes the conditions prevailing and the repairs made to render the building safe. Ills. 6800 w. Jour Assn of Engng Socs—March, 1904.

Reconstructing the Defective Foundations of the Hotel Wollaton, Brookline, Mass. A description of the defective foundation and its probable cause, and of the proposed method of repairing it. 1300 w. Eng News—Nov. 15, 1900.

Hotel, N. Y.—Foundations of the Sturtevant Hotel, New York City. Brief description of deep foundation work where surrounding buildings had shallow foundations, in a congested business district. Ill. 700 w. Eng Rec—May 14, 1904.

The Foundations for the Hotel Albert, New York. Describes difficult foundation work, because of quicksands encountered in building an extension to this hotel. Ills. 2000 w. Eng Rec—March 11, 1905.

Ice Machine.—See REFRIGERATION—Foundation.

Lattemann Building, Brooklyn. — Corrugated Concrete Foundation Piles. Describes briefly the method adopted for foundations of the Lattemann Building, Brooklyn, intended for use as a shoe factory. 1000 w. Eng Rec—Nov. 11, 1905.

Reinforced Concrete Pile Foundations for the Lattemann Building, Brooklyn, N. Y. Illustrates and describes the largest foundation work with reinforced concrete piles yet carried out in the United States. 1200 w. Eng News—Dec. 7, 1905.

Load Distribution.—A Few Remarks on Foundations. L. L. Buck. Some remarks on the question of the distribution of the load. 1000 w. Pro Am Soc of Civ Engrs—April, 1905.

Machinery.—Steam Engine Foundations. Some points on foundations of brick, stone, and concrete. Ill. 1500 w. Power—March, 1903.

Foundations and Foundation Drawings. A. D. Williams. Directions for preparing foundations for heavy machinery. 1200 w. Am Mach—Vol. 27, No. 51.

Cement Mortar Blocks and Engine Foundations. Paul J. Johnson. Gives some practical results with suggestions. 2000 w. Min Rept—Sept. 21, 1905.

The Anthoni-Prache Foundation System for the Prevention of Noise and Vibrations (Fondations Isolantes Anthoni-Prache). Describing a system for absorbing vibrations by the interposition of sheets of rubber between machines and foundations. 4000 w. Mem Soc Ing Civ de France—Sept., 1905.

New Orleans.—See BUILDING CONSTRUCTION.

Office Building, N. Y.—The Foundations of the New Mutual Life Insurance Building, New York City. T. Kennard Thompson. Illustrated detailed description of one of the most notable tall building foundations ever constructed. 8500 w. Eng News—March 28, 1901.

The Additions to the Mutual Life Building, New York. Illustrated description of the complicated cantilever foundation girders and wall columns in a high office building. Serial. 1st part. 2500 w. Eng Rec—April 6, 1901.

The Substructure Work for the Mutual Life Building, New York. Illustrated description of the method of sinking small pneumatic cylinders and of underpinning heavy walls with girders on cylinder piers. Serial. 1st part. 4800 w. Eng Rec—April 19, 1902.

Foundations of the Rogers Building, New York. Describes difficult foundation work for a ten-story steel-cage department store at the southeast corner of 14th street and 6th avenue, New York. 1800 w. Eng Rec—March 19, 1904.

See also Tribune Building; Trinity Building; BUILDING CONSTRUCTION; CAISSON.

Philae Temples, Egypt.—Underpinning the Philae Temples. A detailed account of the work of underpinning these ancient temples in the Nile. Ill. 2400 w. Builder—Jan. 17, 1903.

The Temple of Philae. An account of the examination of the foundations to make sure that the stability of the structures would not be endangered by submerging the island. Ill. 1800 w. Engng—Jan. 23, 1903.

The Restoration of the Foundations of the Philae Temples. An illustrated account of the underpinning made necessary to preserve the buildings against the head of water when the new reservoir is full. 1800 w. Sci Am—March 14, 1903.

Pile, Boston.—See Boston; PILE—Worm Eaten.

Pressure.—Analysis of Pressure on Foundations of Buildings. Letters from John H. Gregory and F. E. Robertson. Gives solutions for determining the intensities of pressures on the footing course of a building wall. Ill. 1500 w. Eng News—March 14, 1901.

Quicksand. — Sinking Machinery Foundations in Quicksand Without Excavation. Describes an ingenious and novel method of constructing foundations for a 60-ft. boring mill at the General Electric Co.'s plant, at Schenectady. 1000 w. Eng Rec—Nov. 4, 1905.

Sinking a Foundation Caisson with Post-Hole Augers. Illustrated description of unusual construction at the General Electric Co.'s works at Schenectady, to build engine foundations in quicksand. 600 w. Eng Rec—Nov. 18, 1905.

See also Freezing Process; Hotel Albert; GAS-HOLDER—Meriden, Conn.

Railway Station, Washington. — Concrete Foundations of the New Passenger Station, Washington, D. C. Day Allen Willey. A brief description of this interesting edifice, giving details of the elaborate substructure. Ills. 1200 w. Sci Am—May 20, 1905.

Saigon, Indo-China.—Foundations on Muddy Ground (La Fondation des Ouvrages en Terrains Vaseux). Lt. Col. G. Espitallier. Abstract of article by Col. Petitbon in the "Revue de Génie," on difficult foundation work at Saigon, French Indo-China. 2200 w. Génie Civ—Sept. 16, 1905.

St. Paul's Cathedral.—See CATHEDRAL.

Sea-Worm Action.—See PILE—Worm Eaten.

Steam Engine.—See also Machinery; Quicksand; STEAM ENGINE—Foundation Bolts.

Steel Sheet Piling.—See Tribune Building, N. Y.; COFFERDAM; PILE.

Stock Exchange, N. Y.—Pneumatic Caisson Foundations of the New York Stock Exchange Building. An illustrated detailed description of very interesting and rapid work, showing new methods of excavation. 4000 w. Eng Rec—Sept. 28, 1901.

The Foundation for the New York Stock Exchange. C. F. Maurice. Illustrated description showing the latest designs and improvements in caisson foundation building. 2100 w. R R Gaz—Sept. 27, 1901.

The Foundation for the New York Stock Exchange. Illustrates and describes the method of sinking the foundation walls and piers, which show many novel features. 1400 w. Ir Age—Sept. 26, 1901.

See also **BUILDING CONSTRUCTION—Cellar Bracing; Stock Exchange; STOCK EXCHANGE.**

Store, Chicago.—Sub-Structure at the New Schlesinger & Mayer Store Building, Chicago. Illustrates and describes the construction of foundations under peculiar and unusual conditions. 3200 w. Eng Rec—Feb. 21, 1903.

Submarine Concrete.—See **CANAL LOCK—Nussdorf.**

Temple, Philae.—See **Philae.**

Timber Crib.—Timber Crib Foundations. George B. Francis. Illustrated article describing the construction of timber cribs for different purposes in various parts of the United States. Plates. 4000 w. Jour Ass'n of Engng Socs—Feb., 1904.

See also **BRIDGE FOUNDATION; CRIBWORK.**

Times Building, N. Y.—See **BUILDING CONSTRUCTION; UNDERPINNING.**

Tribune Building, N. Y.—Steel Sheet Piling to Secure an Old Foundation. Describes methods adopted in building an extension to the Tribune Building, New York City, where the foundations were to be carried 7 1-2 feet below the the footings of the present building. Ills. 800 w. Eng Rec—July 15, 1905.

Trinity Building, N. Y.—Constructing the Foundations of the Trinity Building, New York. Illustrated description of difficult foundation work in the City of New York, adjacent to Trinity Church grounds, and to the elevated railway. 4000 w. Eng Rec—Sept. 3, 1904.

Derricks and Sheet Pile Drivers for Foundation Work. Illustrates and describes the foundation work of the new Trinity Building in New York, and the machinery for meeting the difficulties. 2000 w. Eng Rec—Aug. 27, 1904.

Trinity Church, N. Y.—Safeguarding the Foundations of Trinity Church Spire, New York City. Illustrates and describes methods of protecting these foundations, which are in dry, sandy soil, from undermining during the construction of the rapid transit subway. 700 w. Eng Rec—April 9, 1904.

Underground Railway.—See **UNDERGROUND RAILWAY—Paris Metropolitan.**

Unstable.—See **Chicago; Saigon.**

Washington Barracks, D. C.—Concrete Pile Foundations at Washington Barracks, D. C. Capt. John Stephen Sewell. Describes the foundation difficulties encountered and the means adopted for overcoming them. Ills. 2800 w. Eng Rec—Sept. 24, 1904.

Water Jet.—A New System of Foundations (Nouveau Système de Fondations). A. Casse. Describing a method of sinking metallic caissons by the aid of water jets; especially adapted for wet and sandy ground. 2000 w. Mem Soc Ing Civ de France—Sept., 1901.

FOUNDRY.

See also **CASTING; IRON; MOLDING; PATTERN; PIG IRON; TESTING.**

A Survey of Modern Foundry Practice. Percy Longmuir. Showing the defects of many of the older foundries and the remarkable cheapening in castings effected by the introduction of modern methods and machines. 5000 w. Engineering Magazine—Jan., 1901.

The Relation of the Foundry to Engineering Works. Walter J. May. Considers it an important factor in the economical arrangement of work. 1200 w. Prac Engr—Nov. 1, 1901.

What the Engineer Has Done for the Foundry. Dr. R. Moldenke. Reviews the improvements introduced in foundry work, giving brief sketches of well known workers in this industry. 2200 w. Ir Trd Rev—Nov. 14, 1901.

Some Notes on English and Continental Foundry Practice. G. E. Pickup. An account of experiences, mostly in Great Britain, in a study of methods used for light castings. 1400 w. Foundry—Dec., 1902.

The Future of the Foundry Industry. Dr. Richard Moldenke. A discussion of the outlook and the labor questions involved. 2800 w. Jour Am Found Assn—March, 1903.

Foundry Practice. Dr. Richard Moldenke. Abstract from a lecture delivered at the Case School of Applied Science, Cleveland. Discusses the work of the technical man in the foundry. 3500 w. Ir Trd Rev. Aug. 17, 1905.

Cast-Iron in the Foundry. Percy Longmuir. Presents some aspects of foundry practice in the mixing, melting and molding of castings. Ills. 5000 w. Jour of W of Scotland Ir & St Inst—Dec., 1905.

Tendencies in the Foundry Industry. Dr. Richard Moldenke. Read before the New England Foundrymen's Assn. Considers the tendency toward multiple operations, sand treatment, standardizing, steel scrap, ferro alloys, the electric furnace, and the direct metal process. 3800 w. Ir Age—Dec. 21, 1905.

Accounting.—**COST-KEEPING—Foundries.**

Air Furnace.—Melting with the Air Furnace. Dr. R. Moldenke. States the advantage to be derived from the use of the air furnace, describing typical designs in use in Europe and in America. Ills. 1800 w. Am Mach—Vol. 28, No. 1.

Types of Air Furnaces. L. G. Blunt. Brief illustrated descriptions of the three principal types in use in the United States, with remarks on the difference in fuel consumption. 600 w. Foundry—Oct., 1905.

Operation of Air Furnaces. L. G. Blunt. Discusses the method of making up the bottom, of calculating the charge, of placing the metal in furnace, flame regulation, and taking of the fracture tests. Ills. 1200 w. Foundry—Nov., 1905.

Allis-Chalmers.—See **Scranton.**

Altoona, Pa.—The New Wheel Foundry of the Pennsylvania at Altoona. Illustrated detailed description of new works and their equipment. 3800 w. R R Gaz—Vol. XXXVIII., No. 11.

The New Car-Wheel Foundry of the Pennsylvania R. R. Illustrated detailed description of this new shop at Altoona, Pa., and its equipment. 3000 w. Eng Rec—April 8, 1905.

Foundries of the Pennsylvania R. R. at Altoona. Illustrated detailed description of one of the largest and best equipped foundry plants in the United States. 4000 w. Ry & Engng Rev—June 10, 1905.

American.—Iron Foundries and Foundry Practice in the United States. The first of a series of articles giving an illustrated description of the most modern practice in the United States. Serial. 1st part. 2800 w. Engr, Lond—Sept. 27, 1901.

Some Types of Modern Foundries. Illustrates and describes three modern foundries recently visited in the United States. 2000 w. Ir & Coal Trades Rev—June 17, 1904.

American Loco. Works.—Foundry of the American Locomotive Works, Schenectady, N. Y. An illustrated detailed description of an interesting plant. 1500 w. Foundry—May, 1904.

American vs. German.—See **German vs. American.**

Anthracite Coal.—Anthracite Coal as a Cupola Fuel. Edward Kirk. Reviews the history of its use, the manner of charging, the use mixed with coke, etc. 2400 w. Foundry—May, 1901.

Apprentice.—See **APPRENTICE—Foundry.**

Biddeford, Me.—See **Saco & Pettee.**

Blackings.—Foundry Blackings. N. W. Shed. Information in regard to the various kinds of blackings used and the work for which they are suited, method of testing, &c. 1200 w. Foundry—March, 1905.

Bopp & Reuther, Mannheim.—The Iron Foundry of Bopp & Reuther at Waldhof, near Mannheim (Die Eisengiesserei der Firma Bopp & Reuther in Waldhof bei Mannheim). Illustrated description of a recent German foundry, arranged for electric driving and machine molding. 2500 w. 1 plate. Stahl u Eisen—June 15, 1904.

Borings.—The Use of Cast-Iron Borings. A. E. Outerbridge, Jr. Facts from the writer's experience concerning the smelting of cast-iron borings. 1300 w. Foundry—June, 1904.

Brass.—See **BRASS FOUNDRY.**

British Westinghouse.—See **Westinghouse British.**

Brown & Sharpe.—The New Foundry of the Brown & Sharpe Mfg. Co. An illustrated detailed description of the recent addition to the plant at Providence, R. I. Serial. 1st part. 2800 w. Mach, N Y—July, 1903.

Buckeye.—An Up-to-Date Foundry and Electrical Plant. William D. Ranney and Robert N. Hemming. Brief illustrated description of the plant of the Buckeye Steel Casting Co. 1600 w. Engr, U S A—Nov. 1, 1904.

Buffalo.—A Modern Jobbing Foundry. An illustrated detailed description of the plant of the Buffalo Foundry Co. 2200 w. Foundry—Feb., 1904.

Cast-Iron.—See CASTING; IRON; PIG IRON.

Chemistry.—Chemical Analysis as an Aid to Foundry Work. Robert Buchanan. Treats of experiences in regular daily work, showing what chemical analysis can do to help the iron founder. 2000 w. Engng—April 26, 1901.

Applied Chemistry in Foundry Work (Angewandte Chemie im Giessereibetriebe). Oskar Leyde. A discussion of the value of chemical analysis of foundry irons, and the economy to be effected by the general application of chemistry to the regular work of the foundry. Serial. Part I. 3500 w. Stahl u Eisen—July 15, 1904.

Chemistry in the Foundry. Dr. R. Moldenke. Read before the New England Found. Assn. A discussion of this subject and the benefits derived, urging a careful study of the standard specifications for foundry pig iron. 2800 w. Ir Trd Rev—Nov. 17, 1904.

Chemistry in Foundry Practice. N. W. Shed. Read before the Buffalo Found. Assn. On the change in methods brought about by the chemist, and his value, especially in the making of special irons. 1700 w. Foundry—April, 1905.

Science in the Iron Foundry. J. E. Stead. Calls attention to certain necessary conditions for carrying out foundry practice in the present, suggesting lines metallurgical chemists should follow. 5000 w. Ir & Steel Mag—April, 1905.

Chemistry in Foundry Operation (Die Chemie im Giessereibetriebe). C. Henning. An address showing the value of applied chemistry in connection with daily foundry work. Serial. Part I. Stahl u Eisen—Nov. 1, 1905.

See also Cupola; IRON.

Cleveland, O.—See Wellman—Seaver—Morgan.

Coke.—See COKE—Foundry.

Compressed Air Appliances.—See Driving; COMPRESSED AIR—Foundry Appliances.

Continuous Operation.—The Continuous Operation of the Iron Foundry. John C. Knoeppel. Views from the standpoint of a practical molder and foundryman, discussing features that should be considered. 1600 w. Jour Am Found Assn—June, 1903.

The Continuous Operation of the Iron Foundry. John C. Knoeppel. Read at meeting of the Am. Found. Assn. Considers features that should be considered before deciding upon continuous operation. 2000 w. Foundry—Sept., 1903.

Converter.—See Gruson; BESSEMER PROCESS; STEEL METALLURGY.

Cooling.—See Melting.

Copper.—See Westinghouse; BRASS FOUNDRY.

Core.—See MOLDING.

Core Oven.—See MOLDING.

Core Rooms.—See COST-KEEPING.

Cost-Keeping.—See Costs; COST-KEEPING — Core Room; Foundry.

Costs.—Foundry Costs. R. C. Cunningham. Calls attention to points affecting the economy, and offers suggestions. 1800 w. Jour Am Found Assn—June, 1901.

Foundry Costs. R. C. Cunningham. Suggestions for improving the output and diminishing the costs, by supplying needed tools, careful oversight, etc. 1700 w. Jour Am Found Assn—June 1902.

Foundry Costs: Their Analysis and Reduction. Henry Hess. Outlines a successfully used method of cost analysis. Discussion. 4000 w. Pro Engrs' Club of Phila—Jan., 1904.

See also COST-KEEPING—Foundry; Patternmaking.

Country.—The Advantages of Having a Foundry Attached to an Existing Engineering Works in the Country. J. A. Coombs. Shows the effect in cost of castings and considers the subject generally. 1800 w. Prac Engr—April 3, 1903.

Crucible.—See CRUCIBLE—Foundry.

Cupola.—The Foundry Cupola, and How to Manage It. Robert Buchanan. Abstract of a paper read at Dudley meeting of the Staffordshire Iron & Steel Inst. Discusses the designs in use, the blast pressure, and scaffolding, in the present number. Serial. 1st part. 3000 w. Ir & Coal Trds Rev —Nov. 8, 1901.

The Foundry Cupola and How to Manage It. Robert Buchanan. Read before the Staffordshire Iron & Steel Inst. Describes the various forms, and discusses their management; also considers blast pressure, scaffolding and how to avoid it, scrap iron, charging, &c., &c. Discussion follows. 13000 w. Foundry—April, 1902.

Melting Loss in the Cupola Process. Tabulated information reported to the American Foundrymen's Association. 1000 w. Jour Am Found Assn —Dec., 1901.

Improvements in Cupolas. Edward Kirk. Describes the first cupola furnaces used in the United States, and their working; and the improvements made are traced and discussed. 4500 w. Foundry—Feb., 1902.

The Effect of Melting Steel with Iron in the Cupola. H. E. Diller. Tabulated results of tests made to determine the best proportion of steel to use, and to trace the connection between the percentage of total carbon and the tensile strength. 800 w. Jour Am Found Assn—June, 1902.

The Metallurgy of the Cupola. H. E. Field. A study of the effects of melting upon iron, and upon the metalloids therein contained. 4000 w. Jour Am Found Assn—June, 1902.

Chemistry and Cupola Practice. Edward Kirk. On the importance of properly understanding melting, and the troubles due to improper melting. 900 w. Foundry—Oct., 1902.

Modern Cupola Practice. F. W. Stickle. Notes the modification in the designs, and the advantages gained, and gives suggestions for rapid and economical melting. 1200 w. Foundry—Feb., 1903.

Melting Steel with Cast Iron. R. P. Cunningham. Read before the New England Found. Assn. Describes the method of charging the cupola, and the proper management to give castings of a required strength. 1200 w. Foundry—May, 1903.

Melting Steel with Cast Iron. R. P. Cunningham. Read before the Am. Found. Assn. Points on the selection of pig iron and scrap, and the care in charging the cupola to secure strong castings that will machine easily. 1800 w. Ir Age—June 8, 1905.

Some Cupola Practice. R. H. Palmer. Illustrates and describes prevailing practice in the management of cupolas. 1700 w. Foundry—Dec., 1903.

Notes on Cupolas and Cast Iron. C. Morehead. Read before the Rugby Engng. Soc. Discusses things bearing on the melting and mixing of iron, temperatures, blast pressures, etc. 4500 w. Prac Engr—Jan. 29, 1904.

The Effect of Limestone Additions on the Product in Cupola Practice, According to the Researches of A. Sulzer-Grossman, Winterthur. Edited by F. Wust. Translated by J. E. Johnson, Jr. An account of investigations. Serial. 1st part. 2000 w. Am Mach—May 12, 1904.

Slagging a Cupola. David Rogers. Explains how the quantity of limestone required to form a slag in the cupola can be reduced to a system. 900 w. Foundry—Sept., 1905.

See also Melting; Mixing.

Cupola Blowing.—Blowing Small Cupolas from Stand Pipes. Walter J. May. Directions, with illustrations. 1100 w. Prac Engr—Aug. 26, 1904.

See also Cupola Tuyeres; FAN—Centrifugal; Cupola.

Cupola, Instruction.—See Instruction.

Cupola Linings.—Cupola Linings. Walter J. May, in the "Mechanical World." An illustrated article referring to British cupola practice. 1800 w. Foundry—Aug., 1903.

See also BRICK—Fire; REFRACTORY MATERIAL.

Cupola, Michigan Store Co.—The Cupola System of the Michigan Store Company. W. J. Keep. Read before the Am. Found. Assn. Describes this plant and the performance of the cupolas and blower. 1400 w. Ir Age—June 8, 1905.

Cupola, New Zealand.—Cupola Practice. Harry Willis. Describes practice in one of the best foundries in New Zealand. 1200 w. Foundry—Oct., 1904.

Cupola Tuyeres.—The Area of Cupola Tuyeres (Düsenquerschnitte der Kupelöfen). H. Wedemeyer. Giving applications of working formulas, and discussing the influence of tuyere area on performance. 1800 w. Stahl u Eisen—April 1, 1904.

Dayton, O.—Foundry of Stillwell-Bierce & Smith-Vaile Co., Dayton, Ohio. Illustrated detailed description of a foundry manufacturing principally pumps and water wheels. 1500 w. Foundry—Sept., 1904.

Direct Casting.—Direct-Metal and Cupola-Metal Iron Castings. Thomas D. West. Remarks on observations while handling direct metal for foundry purposes. 400 w. Trans Am Inst of Min Engrs—Feb., 1904.
See also CASTING.

Driving.—The Driving of Machinery and Tools in the Modern Foundry (Einiges über den Antrieb von Maschinen und Werkzeugen in der Modernen Giesserei). J. Groneman. With especial reference to the introduction of electric driving and to the pneumatic operation of moulding machines. 2000 w. Stahl u Eisen—March 15, 1904.

See also Equipment; Labor Saving; COMPRESSED AIR; ELECTRIC EQUIPMENT.

Drying Molds.—See MOLDING.

Duisburg, Germany.—The Foundry of Scholten Bros. at Duisburg (Die Giesserei der Firma Gebr. Scholten in Duisburg). F. Wüst. Plans and description of a new foundry plant representing recent German practice. 3500 w. 1 plate. Stahl u Eisen—May 15, 1905.

Economy.—Foundry Economy. Percy Longmuir. Briefly considers the requirements of economical castings, economical organization, and economical management. 2600 w. Ir Trd Rev—March 28, 1901.

Opportunities for Bettering the Work of the Foundry. Percy Longmuir. States conditions as they often exist, showing that poor installations are costly, and discussing points leading to satisfactory and economical results. 3800 w. The Engineering Magazine—Oct., 1901.

Foundry Economy. Dr. Richard Moldenke. How the foundryman is to economise by the application of scientific methods is discussed, and other suggestions given. 2800 w. Jour Am Found Assn—April, 1902.

Economy in Buying, Mixing and Melting Iron. Herbert E. Field. Read at meeting of Pittsburg Found. Assn. Discusses points of importance in methods the writer considers most economical. 5500 w. Ir Trd Rev—Nov. 12, 1903.

See also Management.

Electric Driven.—See Buckeye; Driving; Newark, N. J.; ELECTRIC EQUIPMENT—Foundry.

Emery Wheel Practice.—See EMERY WHEEL—Foundries; GRINDING—Foundries.

Empress, Manchester.—The Empress Foundry, Manchester. Illustrated description of new English works. 1500 w. Engr, Lond—Dec. 7, 1900.

Engineering.—The Engineer in the Foundry. Dr. R. Moldenke. Calls attention to facts about cast-iron that engineers would find it well to know. 2400 w. Am Mach—June 30, 1904.

See also Laboratory; Metallurgical Engineer.

Equipment.—The Equipment of the Foundry. Joseph Horner. An illustrated article discussing especially the general shop, with departments for special work. 5500 w. Cassier's Mag—Oct., 1903.

Equipment and Management.—The Foundry, Its Equipment and Management. Edwin B. Gilmour. Discusses what a modern foundry should be when quantity and quick delivery are of greatest importance. Ill. 3000 w. Jour Am Found Assn—June, 1901.

Facings.—Foundry Facings. W. G. Scott. Read before the A. F. A. Convention. Describes the different grades of material, and gives a suitable method for testing the quality. 4500 w. Foundry—Dec., 1905.

See also MOLDING.

Fan Blowers.—See FAN—Cupola.

Ferro-Silicon.—See Manganese.

Fuel. — See Anthracite; COKE, Melting Ratios; FUEL—Foundry.

Gelsenkirchen.—The Largest Malleable Casting Plant in Europe. Bernhard Osann in "Stahl und Eisen." An illustrated description of the Gelsenkirch Casting Works, which claim to be the largest in the world. Their principal product is car wheels, particularly for small mine cars, and axle boxes for the same. 2500 w. Ir Age—Feb. 26, 1903.

General Electric Co.—The Foundry of the General Electric Company at Schenectady, N. Y. C. L. Prince. An illustrated detailed description of a large foundry. 3000 w. Jour Am Found Assn—Vol. 14, Part I.

German.—The Manufacture of Foundry Pig Iron and Foundry Practice in General (Herstellung von Giessereiroheisen und der Giessereibetrieb im Allgemeinen). Hr. Grau. An historical review of blast furnace practice in Germany and an account of foundry practice. Paper before the "Eisenhütte Oberschlesien," with discussion and illustrations. 6000 w. Stahl u Eisen—Jan. 1, 1902.

German vs. American.—Important Questions in Connection with Foundry Operation (Wichtige Frage im Giessereibetriebe). A comparison of German and American practice, showing the advantages of mechanical transport. Serial. Part I. 3000 w. Stahl und Eisen—Sept. 1, 1902.

Grading Iron.—See Specifications; PIG IRON; TESTING.

Gruson, Magdeburg. — A Combined Baby Bessemer and Open Hearth Steel Foundry. Prof. Hermann Wedding. From a paper in "Verhandlungen des V. zur Befoerderung des Gewerbfleisses." Explains the three lines along which the baby Bessemer process may be developed, and the details of operation, and gives illustrated description of the new plant of Otto Gruson, near Magdeburg. 2800 w. Ir Age—July 27, 1905.

Hadfield, Sheffield.—Hadfield's Steel Foundry, Sheffield. A brief description of the largest steel foundry in the world, covering 6 acres. 1600 w. Col Guard—April 22, 1904.

Harrison, N. J.—A Steel Frame Foundry Building. Illustrated description of a fire-proof structure at Harrison, N. J. 1800 w. Eng Rec—Jan. 4, 1902.

Heating and Ventilation.—See HEATING AND VENTILATION—Shops.

Hilles & Jones, Wilmington.—The New Foundry of the Hilles & Jones Company. Illustrated description of a new foundry at Wilmington, Del. The walls are of concrete to a height of 14 ft., and are of glass set in iron framework the remainder of the distance to the roof. 3000 w. Ir Age—Oct. 13, 1904.

History.—Foundry Progress. Harris Tabor. Reviews the progress made in the casting of metals during the last 25 years. Ill. 1600 w. Am Mach—Nov. 6, 1902.

Foundry. R. H. Palmer. A review of the many improvements introduced during the last quarter of a century. 3700 w. Am Mach—Dec. 4, 1902.

Hyde Park, Mass.—See Sturtevant.

Hydraulic Power.—See HYDRAULIC MACHINERY.

Illinois University.—Instruction in Foundry Practice at the University of Illinois. D. T. Randall. Illustrated description of the shops, appliances and instruction given. 1000 w. Jour Am Found's Assn—April, 1901.

Instruction.—Instruction in Molding and Cupola Work. Thomas D. West. Part first is introductory, considering the branches of iron founding. Serial. 1st part. 1000 w. Jour Am Found Assn—Oct., 1903.

See also Illinois University; School; APPRENTICE.

Iron.—See Specifications; CASTING; IRON; PIG IRON; SCRAP; TESTING.

Jobbing.—Some Difficulties Met With in Small Jobbing Foundries. Walter J. May. Suggestions for overcoming such difficulties. 1700 w. Prac Engr—June 16, 1905.

Labor.—See LABOR—Founders' Agreement; Foundry.

Laboratory.—The Relation of the Laboratory to the Foundry. Percy Longmuir. Discusses the advantages of the laboratory in connection with foundry work. 2200 w. Jour Am Found Assn—June, 1901.

The Value of the Chemist and Metallurgist to a Manufacturing Plant. H. O. Loudenbeck. On the value of a chemical laboratory with hints in regard to its practical application to the work. 1400 w. Am Found Assn—June, 1904.

Labor Saving.—Labor Saving Machinery in Foundry Operations. Dr. R. Moldenke. A fully illustrated account of the latest improvements in cranes, ladles, molding machines, conveyors, core machines, and other appliances. 3500 w. Engineering Magazine—March, 1904.

Some Labor-Saving Suggestions for the Foundry. H. F. Frohman. Calls attention to devices found useful in the foundry. 1000 w. Am Found Assn—June, 1904.

Labor-Saving Suggestions for the Foundry. H. F. Frohman. Read before the Am. Found. Assn. Describes minor articles generally overlooked. 1200 w. Ir Trd Rev—June 9, 1904.

Landis Tool Co.—Foundry Methods of the Landis Tool Company. F. A. Halsey. Illustrates and describes various methods of work of particular interest. Molding, chilling process, &c. 1700 w. Am Mach—Vol 28, No. 9.

Lang, Scotland.—The Foundry of John Lang & Sons, Johnstone, Scotland. C. C. Macmillan. Illustrated detailed description of a fine modern foundry. 2500 w. Foundry—April, 1902.

See also MACHINE WORKS.

Long Heats.—Long Heats in Small Cupolas. C. K. Weller. Considers some of the things that cause cupolas to bung up and shorten the time it can be kept in blast and gives suggestions for the proper management. 1400 w. Foundry—Jan., 1903.

Running Cupolas for Long Periods. Walter J. May. Suggestions for continuous working. Ills. 900 w. Prac Engr—Aug. 25, 1905.

Loewe & Co., Berlin.—A Modern Iron Foundry (Eine Moderne Eisengiesserei). Oscar Leyde. A well illustrated description of the construction, equipment and operation of the foundry of Ludw. Loewe & Co., Berlin. 4000 w. Stahl u Eisen—June 1, 1903.

Machine Cast Iron.—See CASTING MACHINE.

Maher & Flockhart.—See Newark, N. J.

Malleable.—Foundry Tests and Malleable Iron Castings in the United States. Information in response to inquiries as to matters of detail, brought out by a series of articles recently published in this paper. 2400 w. Engr, Lond—May 23, 1902.

Loss in Malleable Foundry. R. F. Flinterman. Read at the A. F. A. convention. Gives in detail the methods employed for determining the character of the loss due to the chemical changes of various kinds. 1200 w. Foundry—Dec., 1904.

See also Gelsenkirchen; CASTING—Gating; IRON.

Management.—Control of the Foundry. Percy Longmuir. On the relation of laboratory and foundry and the education needed by the manager. 1600 w. Jour Am Found Assn—June, 1901.

Some Methods of Increasing Foundry Production. David Reid. Describes methods tried and proved successful. 1500 w. Jour Am Found Assn—June, 1902.

Foundry Management in the New Century. Robert Buchanan. The first of a series reviewing the best modern foundry practice in Europe and America. The present paper deals with the economical production of castings. 3500 w. Engineering Magazine—Dec., 1902.

Foundry Management in the New Century. Robert Buchanan. Mr. Buchanan's second paper discusses crane service and transport appliances for the foundry floor, with numerous characteristic illustrations. 4500 w. Engineering Magazine—January, 1903.

Foundry Management in the New Century. Robert Buchanan. Mr. Buchanan's third paper discusses in detail the operations of molding both by hand and by machine, with numerous illustrations. 4500 w. Engineering Magazine—February, 1903.

Foundry Management in the New Century. Robert Buchanan. Mr. Buchanan's fourth paper discusses the subject of materials of consumption including the purchase of coke, iron, sand, etc. 5000 w. Engineering Magazine—March, 1903.

Foundry Management in the New Century. Robert Buchanan. Mr. Buchanan's fifth paper discusses especially the cupola, and the conditions involved in its successful and economical use. 4500 w. Engineering Magazine—April, 1903.

Foundry Management in the New Century. VI. The Dressing of Castings. Robert Buchanan. Reviews the methods and apparatus used in cleaning castings by tumbling, sand blast, abrasive wheels, and pneumatic tools, with the comparative merits, cost, and effectiveness of each. Illustrated. 3500 w. Engineering Magazine—May, 1903.

Foundry Management in the New Century. VII. The Qualities and Training of the Foundry Manager. Robert Buchanan. Concluding a series by a very sound and interesting statement of existing labor conditions and tendencies which the foundry manager must meet and control, and the policy which will prove successful. 2500 w. The Engineering Magazine—June, 1903.

Foundry Management. Edward Kirk. Describes conditions representing the management of fully half the foundries, and discusses improvements. 5200 w. Foundry—June, 1903.

System in the Foundry. P. R. Ramp. Suggestions for daily reports useful in the successful management of the foundry. 1800 w. Foundry—Dec., 1904.

See also Costs; Economy; Equipment; Order System; Rigs; COST-KEEPING; MOLDING MACHINE; WORKS MANAGEMENT.

Manganese.—Use of Manganese in the Cupola or the Ladle. N. W. Shed. An account of experiments made to determine whether it makes any difference in the castings whether the manganese is added to the cupola or to the ladle. Gives results. 1100 w. Foundry—Oct., 1904.

Use of Ferro-Manganese and Ferro-Silicon in the Ladle. A report of tests made and the conclusions. 900 w. Foundry—Sept., 1905.

See also IRON ALLOY; MANGANESE.

Melting.—Economy in Melting. J. P. Pero. A brief consideration of present practice, with suggestions for securing economy. 1500 w. Foundry—Sept., 1904.

The Melting and Cooling of Foundry Iron. Abstract of an address delivered by R. Buchanan before the Coventry (England) Engineering Society. 1200 w. Am Mach—Vol. 28, No. 13.

See also Cupola; Mixing.

Melting Ratios.—Some Retort Coke Melting Ratios. C. M. Schwerin. A report of some tests made by the writer. 2200 w. Ir Age—June 15, 1905.

Metallography.—See METALLOGRAPHY.

Metallurgical Engineer.—The Metallurgical Engineer in the Foundry. Henry Souther. Showing that there is wisdom and economy in employing a good metallurgical engineer. 2500 w. Jour Am Found Assn—June, 1903.

The Metallurgical Engineer in the Foundry. Henry Souther. Read at meeting of the Am. Found. Assn. Considers his value and discusses some objections made to such service. 1800 w. Foundry—Sept., 1903.

See also Engineering; Laboratory; Metallurgy.

Metallurgy.—Foundry Metallurgy. Herbert E. Field. Discusses the results that may be expected and how they are best accomplished, with questions related to the mixing of irons. 5000 w. Jour Am Found Assn—June, 1901.

Foundry Metallurgy. Herbert E. Field. A consideration of the conditions necessary to its success. 3000 w. Mach, N Y—April, 1901.

Milwaukee.—A Modern Foundry. Illustrated description of a finely equipped structure at Milwaukee, Wis. 1700 w. Foundry—June, 1901.

Mixing.—Mixing Iron by Analysis. W. G. Scott. Describes the methods used in several large foundries making gray iron, malleable and steel castings, also brass and bronze work. Serial. 1st part. 4800 w. Foundry—Nov., 1900.

Mixing Iron by Analysis. W. G. Scott. Gives a mixing card showing the number of pounds of coke, flux, scrap and pig iron in each charge, and describes the method of calculating the cupola mixture. 2700 w. Foundry—April, 1901.

The Value of Mixing by Analysis. Jas. A. Murphy. Suggestions for foundry work, with the writer's method of recording pig iron shipments. 1100 w. Jour Am Found Assn—June, 1901.

Notes on Foundry Practice. Edward B. Gilmour. Discusses each of the important elements other than the iron, and its effect. 1400 w. Jour Am Found Assn—May, 1901.

Some Hints on Foundry Mixtures. Frank L. Crobaugh. Suggestions relating to the analysis of iron, scrap, coke, etc. 1400 w. Ir Trd Rev—May 2, 1901.

Economy of Mixing Iron by Chemical Process and Removal of Barriers to Its Adoption. Thomas D. West. Discusses the benefits of mixing by chemical analysis and movement to decrease the cost. 1400 w. Foundry—May, 1902.

Mixing Iron for Small to Medium Large Size Machinery Castings. P. Burke. Some suggestions from the writer's experience based on the percentage of combined carbon, free carbon and silicon. 1000 w. Foundry—Nov., 1902.

See also Cupola; PIPE MANUFACTURE.

Molding.—See MOLDING; MOLDING MACHINE.

Name Plates.—See NAME PLATE.

Newark, N. J.—An interesting Study of Foundry Development. Illustrated description of a foundry in Newark, N. J., where electric motors tend to economy in the handling of raw materials and castings. 2500 w. Elec Rev, N Y—Oct. 31, 1903.

Foundry Plant of Maher & Flockhart at Newark, N. J. Illustrated description of works which have been gradually enlarged to meet the requirements. 2500 w. Foundry, Nov., 1903.

Newton-le-Willows.—The Vulcan Foundry, Newton-le-Willows. General history of these important works with illustrations, the improvements and developments, and some of the locomotives built. 3000 w. Engr, Lond—Jan. 31, 1902.

Niles Tool Works.—Ladles and Floor Molding. William Pilton. Illustrated description of appliances and methods used in the foundry of the Niles Tool Works Co. 800 w. Am Mach—Feb. 7, 1901.

Oil City, Pa.—Foundry Department of the Imperial Works of the Oil Well Supply Company, Oil City, Pa. Illustrated description of the gray iron and malleable foundries. 1800 w. Foundry—June, 1905.

Foundry Department of the National Transit Co., Oil City, Pa. Illustrates and describes an interesting plant which manufactures in large quantities grey iron castings, steel castings, and brass and bronze castings, all of high quality. 1400 w. Foundry—Aug., 1905.

Order System.—An Order System for Foundries. J. Byron Henry. Outlines methods for keeping record of foundry orders in shops with a large output that make a specialty of jobbing orders. 1200 w. Foundry—May, 1903.

See also Costs; Management; COST-KEEPING.

Patterns.—See PATTERN; PATTERNMAKING.

Pencoyd Iron Works.—See MACHINE SHOP.

Pennsylvania R. R.—See Altoona.

Pennsylvania Steel Co.—See Steelton.

Pipe.—See PIPE MANUFACTURE.

Plaster of Paris.—Plaster of Paris in the Foundry. Edward B. Gilmour. Read before the Am. Found. Assn. Describes the method of using this material with success. Ills. 700 w. Ir Trd Rev—June 8, 1905.

See also BRASS FOUNDRY—Flux; PLASTER OF PARIS.

Port Huron, Mich.—Foundry Department of the Port Huron Engine and Thresher Co., Port Huron, Mich. Illustrated detailed descriptions of the three foundry plants and their work. 2200 w. Foundry—Oct., 1905.

See also ENGINE WORKS.

Pouring.—See CASTING.

Providence, R. I.—See Brown & Sharpe.

Retort Coke Fuel.—See Coke; Melting Ratios; FUEL.

Rigs.—Rigs as a Factor in Foundry Management. Edward Kirk. An article discussing the advantage of proper rigging. 1600 w. Foundry—April, 1903.

Saco & Pettee.—The Foundry of the Saco & Pettee Machine Shops, Biddeford, Maine. An illustrated detailed description of this plant and its methods. 3500 w. Foundry—Dec., 1902.

Sand.—See MOLDING.

Sandycroft.—The Sandycroft Foundry. Begins a detailed description, giving many illustrations. Serial. 1st part. 2300 w. Engr, Lond—May 5, 1905.

Sargent, Chicago Heights.—The New Steel and Iron Foundries of the Sargent Company. Illustrated description of a fine plant recently erected at Chicago Heights. Ill. 1800 w. Foundry—Feb., 1901.

Schenectady.—See American Loco. Works; General Electric Co.

Scholten, Duisburg.—See Duisburg.

School.—A Founders' Trade School. Thomas D. West. Shows need of such a school because of the advancement in the art of founding; outlines the kind of school required and suggests the means of obtaining it. 1500 w. Ir Trd Rev—July 25, 1901.

See also Illinois University; Instruction.

Scranton, Pa.—Foundry of the Allis-Chalmers Co., Scranton, Pa. An illustrated description of changes made in remodeling an old plant, showing the improvements. 1000 w. Foundry—Feb., 1905.

Scrap Iron.—See Specifications; SCRAP.

Sheffield Car Co., Mich.—The New Foundry of the Sheffield Car Co., Three Rivers, Mich. Brief description, sectional and outline drawings. 500 w. Foundry—July, 1903.

Sheffield, Eng.—See Hadfield.

Shot Iron.—Recovery and Use of Shot Iron. E. H. Putnam. Prepared for the Dec. meeting of the Foundrymen's Assn. Explains how success was attained in using this class of iron, and the value of the magnetic separator. 1500 w. Ir Trd Rev—Dec. 6, 1900.

Shrinkage.—See CASTING.

Specifications.—Specifications for Foundry Supplies. Gives specifications for foundry materials received from Mr. W. G. Scott of the Case Threshing Machine Co. 6700 w. Eng News—Sept. 11, 1902.

Specifications for Foundry Materials. Gives specifications used by the J. I. Case Threshing Machine Company of Racine, Wis. 5500 w. Ir Age—Nov. 1, 1900.

Specifications for Molding Sand. Specifications under which the purchases for the J. I. Case Threshing Machine Co. are made. 2000 w. Ir & Coal Trds Rev—Nov. 16, 1900.

Specifications for Cast Iron (Vorschriften für die Lieferung von Gusseisen). A. Martens. A review of the specifications of the German Society of Foundrymen by the director of the Charlottenburg testing laboratory. 4000 w. Zeitschr d Ver Deutscher Ing—March 11, 1905.

Specifications—And What They Mean to the Foundryman. David Reid. Read before the A. F. A. convention. Remarks on specifications in the foundry industry. 800 w. Foundry—Sept., 1904.

See also CASTING; PIG IRON; SCRAP; TESTING.

Stamford, Conn.—See Yale & Towne.

Standards.—Foundry and Pattern Shop Standards. William H. Parry. Read before the A. F. A. Convention. Discussion of practices that could be improved by standardizing, with suggestions. 1400 w. Foundry—Sept., 1905.

Steel.—See Gruson; Harfield; Steelton; Wellman-Seaver-Morgan.

Steel Casting.—See STEEL CASTING.

Steelton, Pa.—New Steel Foundry of the Pennsylvania Steel Company. An illustrated description of a recently completed foundry at Steelton, Penn. It is operated by electricity and all details are strictly up-to-date. 1500 w. Ir Age—Jan. 30, 1902.

Stillwell-Bierce.—See Dayton, O.

Stripping Plates.—See MOLDING.

Sturtevant.—The Sturtevant Foundry. Illustrated description of the new foundry and pattern shop at Hyde Park, Mass. 2800 w. Ir Age—Oct. 29, 1903.

See also WORKS.

Test Bar Shape.—See TESTING—Bars.

Testing.—See Specifications; IRON; PIG IRON; TESTING.

Three Rivers, Mich.—See Sheffield Car Co.

Trafford City, Pa.—See Westinghouse.

Trafford Park, Eng.—See Westinghouse, British.

Tripping Devices.—Trip Hooks and Drop Balls. Ulrich Peters. Illustrated description of tripping devices used in connection with drop weights for breaking up foundry iron, or cracking the skulls from slag ladles,. and similar work. 1500 w. Am Mach—Dec. 17, 1903.

Wellman-Seaver-Morgan. — Steel Foundry of the Wellman-Seaver-Morgan Engineering Company, Cleveland, O. Illustrates and describes the equipment of this foundry, which is modern in every respect. 1500 w. Foundry—Jan., 1905.

Westinghouse.—The Westinghouse Machine Company. An illustrated detailed description of the foundry of this company, located at East Pittsburg, Pa., and the castings made there. 3000 w. Foundry—Dec., 1900.

The Engineer in the Foundry: A New Departure. An illustrated article prepared from the lecture of Samuel Groves, at the Buffalo convention of the Am. Found. Assn. showing the methods pursued in providing foundry appliances and equipment for the works of the Westinghouse Machine Co. 2800 w. Foundry—Dec., 1901.

The New Westinghouse Foundry at Trafford City, Pa. Illustrated description of an industrial town near Pittsburg, and of the buildings erected for a large foundry. 1500 w. Eng Rec—Oct. 4, 1902.

The Foundry and Town of Trafford City, Pa. An illustrated article giving information concerning this extensive Westinghouse plant. 3500 w. Eng Rec—Oct. 31, 1903.

Foundry Practice with Copper and Its Alloys. W. J. Reardon. Read before the Electric Club. Describes the requirements, and the practice of making such castings at the Westinghouse foundry. 1200 w. Mech Engr—Oct. 29, 1904.

Westinghouse, British.—A Large Modern Iron Foundry. Samuel Groves. A brief description of the plant at Trafford Park, England, of the British-Westinghouse Electric & Manufacturing Co. Ills. 1800 w. Can Engr—Oct., 1905.

West Point.—The West Point Foundry. An illustrated account of the modernizing of the oldest foundry in the United States. Also describes some of the old appliances. 2000 w. Ir Age—Jan. 1, 1903.

Wilmington, Del.—See Hilles & Jones.

Yale & Towne.—Iron Foundry of the Yale & Towne Mfg. Co., Stamford, Conn. Illustrated article describing a foundry where the entire output is high grade small work. 1000 w. Foundry—April, 1905.

FOUNDRY IRON.

See CASTING; FOUNDRY; IRON; PIG IRON; TESTING.

FOUNTAIN.

Artificial Springs.—See GROUND WATER.

Electric.—See ELECTRIC FOUNTAIN.

FRAMEWORK.

See also BRIDGE DESIGN; BUILDING CONSTRUCTION; FERRIS WHEEL; ROOF TRUSS; STEEL CONSTRUCTION; TRUSS.

Metallic Construction (Constructions Métalliques). An examination of the stresses in framed structures with especial reference to roof trusses. 1500 w. Revue Technique—Oct. 10, 1901.

The Determination of the Axes of the Internal Members of a Plane Framework (Bestimmung der Achsenlagen der Füllungsglieder ebener Fachwerke). A. Umlauf. An examination of the true axial position of the verticals and diagonals of a truss under deflection. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 30, 1901.

The Stresses in Compression Members of Simple Framed Beams (Die Berechnung der Spannungen in den Pfosten einfacher Fachwerkbalken). A. Ostenfeld. An analytical examination for various conditions of loading. 1000 w. Zeitschr d Ver Deutscher Ing—Oct. 5, 1901.

Ferris Wheel.—See FERRIS WHEEL.

Graphics.—The Theory of Simple Frameworks (Beitrag zur Theorie des Einfachen Fachwerkbalkens). Prof. Ramisch. A graphical examination of simple truss forms. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 16, 1900.

Framed Structures Examined by Graphical Statics (Beweis Einiger Konstruktionen mit Hülfe der Graphischen Statik). M. Kinkel. Giving the application of graphical statics to certain forms of curved trusses. 1200 w. Schweizerische Bauzeitung—Jan. 12, 1901.

Contribution to the Theory of Framework Structures (Beitrag zur Theorie des Räumlichen Fachwerks). Prof. Th. Landsberg. A graphical and mathematical discussion of the stresses in frameworks in three dimensions. Serial. 1st part. 2000 w. Zentralblatt d Bauverwaltung—May 6, 1903.

A Graphical Examination of the Stresses in Framework Struts (Graphische Ermittlung der Einflusslinien für die Stabspannungen in Ständerfachwerk). S. K. Drach. A special graphical method for members subjected to thrust. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 30, 1904.

The Graphical Determination of the Lines of Pressure in Framed Structures (Graphische Ermittlung der Einflusslinien für die Spannungen im Fachwerk). S. K. Drach. Discussing especially the case of a three-hinged framed arch. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 29, 1905.

See also BRIDGE DESIGN; GRAPHICS.

Hinged Arched Ribs.—Calculating the Stresses in Hinged Arched Ribs. Charles Lean. Describes a method requiring only the ordinary rules of arithmetic, and providing co-efficients applicable to other ribs of any span, depth or proportion, and amount of live to dead loads. Ill. 2000 w. Engr, Lond—Sept. 27, 1901.

Horizontal Stresses.—The Influence of Horizontal Forces upon Framed Structures (Einflusslinien für die Beanspruchung Gerader Fachwerkträger durch Horizontale Kräfte). Wenzel St. Ritter v. Balicki. A graphical investigation of the action of horizontal forces upon various forms of roof and bridge trusses. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 16, 1904.

Joint, Spliced.—Spliced Joints in the Columns of Steel-Frame Buildings. John Stephen Sewell. A discussion of careless work on steel-framed buildings, and improvements needed. 2400 w. Eng News—Dec. 25, 1902.

Kinematic Theory.—Kinematic Theory of Framed Arches (Kinematische Theorie des Fachwerkbogens). H. Ramisch. An application of kinematic analysis to forms which are statically indeterminate. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 6, 1901.

Models.—See EDUCATION—Laboratory Work.

Music Hall, Pan-American.—See PAN-AMERICAN EXPOSITION—Music Hall.

Rectangular Panels.—The Theory of Framework with Rectangular Panels, and Its Application to Buildings which Have to Resist Wind. Ernst F. Jonson. Develops the exact theory of frameworks with rectangular panels, and suggests methods that may be of use in actual designing. Mathematical. 1800 w. Pro Am Soc of Civ Engrs—Sept., 1905.

Reichstags Dome, Berlin.—See DOME.

Stresses.—See Graphics; Hinged Arch Ribs; Horizontal Stresses; BRIDGE DESIGN.

FRANCHISE.

See also MUNICIPAL OWNERSHIP.

Franchises. H. S. Cooper. An explanation of the meaning of the term, and a discussion of their value and application, as introductory to a series of articles from an equitable and business standpoint. Serial. 1st part. 3000 w. St Ry Rev—May 15, 1901.

Electric Station.—See ELECTRIC STATION MANAGEMENT.

Street Railway.—See also ELECTRIC RAILWAY; STREET RAILWAY; STREET RAILWAY MANAGEMENT.

Telephone and Telegraph.—The Franchises of Telephone and Telegraph Companies, Legislative, Municipal and Congressional. G. C. Hamilton. Discusses questions relating to the granting of franchises, legislation, etc. 3000 w. Telephony—Sept., 1901.

The Franchises of Telephone and Telegraph Companies, Legislative, Municipal and Congressional. G. C. Hamilton. From the "American Law Register." Considers questions bearing on the granting of franchises. 2800 w. Elec Rev, N Y—July 20, 1901.

FREEBOARD.

See NAVAL ARCHITECTURE—Freeboard.

FREE TRADE.

See COMMERCE; INDUSTRY; SHIPPING; TARIFF.

FREEZING.

See also REFRIGERATION; THAWING.

Heating Systems.—See HEATING—Freezing.

FREEZING PROCESS.

See EXCAVATION; FOUNDATION; SHAFT SINKING; TUNNELING.

FRICTION.

See also BEARING; CAR BEARING; HOT BOX; LUBRICATION.

Friction. Discusses the important laws to be remembered by those having charge of machinery. 1800 w. Engr, U S A—May 1, 1901.

Investigations of Adhesion and Sliding Friction (Untersuchungen über Adhäsion und Gleitende Reibung). Dr. Johann Basta. A mathematical discussion of the laws of friction in the light of recent experiments. 5,000 w. Oesterr Wochenschr f d Oeffent Baudienst—July 5, 1902.

Air.—See AIR—Friction.

Automobile Journal.—See AUTOMOBILE—Journal Friction.

Bearing Metals.—See BEARING—Microstructure.

Bearings.—See BEARING; ROLLER BEARINGS.

Brakes.—See Test.

Car Tests.—See CAR—Friction Tests.

Engine.—See LUBRICATION.

Engine and Shafting.—The Distribution of Friction in an Engine and Shafting. Thomas L. Wilkinson. A discussion of friction loss, lubrication, and general practice. 3000 w. Min Rept—Sept. 24, 1903.

The Coefficient of Journal Friction (Zapfenreibung, Zapfenkraft und Koeffizient der Zapfenreibung). Dr. Camerer. A mathematical investigation of the action of the forces in a journal bearing, and their influence upon the friction. 1000 w. Zeitschr d Ver Deutscher Ing—Oct. 19, 1901.

Some Notes on Journal Friction. J. S. V. Bickford. Gives results of experimental investigations. 3800 w. Horseless Age—Sept. 3, 1902.

Investigations into Journal Friction according to the Method of Dettmar (Versuche über Lagerreibung nach dem Verfahren von Dettmar). H. Heimann. With description of apparatus and diagrams showing the influence of temperature, pressure and lubricants. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—July 15, 29, 1905.

Losses, Separation.—Separation of the Bearing and Air Frictional Losses of Rotating Machinery by Means of the Shape of the Retardation Curve (Trennung der Lager- und Luftreibungsverluste Umlaufender Maschinenteile aus der Form der Auslaufslinie). Fritz Roehle. Graphical and mathematical analysis of curves representing the observed decreasing speeds of rotating parts acted upon by friction. 1500 w. Elektrotech Zeitschr—Aug. 24, 1905.

Lubricated Surfaces.—Friction on Lubricated Surfaces. F. A. McKay. Prize essay. Studies the effect of pressure, velocity, and temperature on friction; also lubricants and methods of testing them. 3800 w. Can Engr—June, 1903.

Machinery.—See Engine and Shafting; Losses; Test.

Power Transmission.—See POWER TRANSMISSION—Losses.

Roller Bearing.—See ROLLER BEARING.

Sheave.—The Friction of Ropes and Chains over Sheaves (Ueber Reibung von Seilen und Ketten auf den Triebscheiben). H. Herrmann. Deducing formulas for the computation of the sheave friction of winding cables, with especial reference to the Koepe system of mine hoists. 1000 w. Glückauf—June 30, 1905.

Sliding.—The Laws of Sliding Friction (Sur les Lois du Frottement de Glissement). Paul Painlevé. An examination of the laws of Coulomb, showing the influence of the distribution of the pressure upon the friction of two surfaces. 2000 w. Comptes Rendus—March 13, 1905.

The Laws of Sliding Friction (Sur les Lois du Frottement de Glissement). Paul Painlevé. A discussion of some of the ambiguous features in the accepted laws of the friction of rest and of sliding motion. 2000 w. Comptes Rendus—Aug. 21, 1905.

The Laws of Sliding Friction (Sur les Lois du Frottement de Glissement). Paul Painlevé. A further examination of the laws of Coulomb, showing their entire inadmissibility in certain cases. 2500 w. Comptes Rendus—Oct. 2, 1905.

Sliding Friction (Sur le Frottement de Glissement). M. de Sparre. An examination of Painlevé's review of the theory of Coulomb, showing that the indeterminate nature of the result is only apparent. 1200 w. Comptes Rendus—July 31, 1905.

A Note on Sliding Friction (Sur le Frottement de Glissement). L. LeCornu. A paper before the French Academy, showing that the consideration of the elasticity of the material explains the apparent inconsistencies in Coulomb's law. 1000 w. Comptes Rendus—March 6, 1905.

The Experimental Laws of Sliding Friction (Sur les Lois Experimentales du Frottement de Glissement). H. Chaumat. A mathematical discussion of the results of experiments upon the friction of polished discs, sliding without lubrication. 1200 w. Comptes Rendus—June 29, 1903.

Test.—Coefficients of Friction between Wood and Iron (Reibungs-Koeffizienten zwischen Holz und Eisen). Prof. L. Klein. An account of friction tests made with iron and various kinds of wood, with particular reference to brakes for mine hoisting apparatus. 2 plates. 2500 w. Glückauf—April 25, 1903.

Friction in Machinery and Lubrication. D. B. Dixon. Describes tests, showing where the greatest amount of friction is to be found, and how to reduce it. 3000 w. Am Mfr—Feb. 5, 1903.

Testing Apparatus.—Testing Apparatus for Lubricants and Bearing Metals (Ueber einen Apparat zur Untersuchung von Lagerölen und Lagermetallen). G. Dettmar. An electrically driven apparatus, enabling the friction of journals to be determined for high rotative speeds, for various lubricants and bearing metals. 4000 w. Elektrotech Zeitschr—Aug. 21, 1902.

Wood and Iron.—See Test.

FRICTION CLUTCH.

See AUTOMOBILE GEAR; CLUTCH.

FRITZ MEDAL.

The Foundation of the John Fritz Medal. An Editorial comment on the significance of this important foundation, with illustrations of the medal and portrait of Mr. Fritz. 1000 w. Engineering Magazine—Dec., 1902.

FROG.

See RAILWAY SWITCH; TRACK—Blocking; Crossing.

FUEL.

See also CALORIFIC VALUE; COAL; COKE; COMBUSTION; FIRING; LIQUID FUEL; POWDERED COAL.

Fuel: What We Don't Know About It. Edward Atkinson. A discussion of the use of peat, turf, briquettes from culm, and various kinds of fuel other than coal, with information relating to their formation. General discussion follows. 8400 w. Jour N E Water Wks Assn—June, 1903.

Alcohol.—See ALCOHOL—Fuel.

Automobile.—See Coal Tar and Spirits; AUTOMOBILE; AUTOMOBILE, GASOLINE; AUTOMOBILE, STEAM; LIQUID FUEL.

Bagasse.—Bagasse as a Fuel and the Furnaces Used to Burn It. Samuel Vickers. Explains the term, and gives brief illustrated descriptions of furnaces for burning it, and information regarding its calorific value. 3200 w. Engr, U S A—April 1, 1903.

Benzol.—See BENZOL; GAS MANUFACTURE; LIQUID FUEL.

Briquette.—BRIQUETTING—Fuel.

Brown Coal.—See BROWN COAL.

Burning.—See COMBUSTION; FIRING; LOCOMOTIVE OPERATION; SMOKE PREVENTION.

California.—Fuel Conditions in California. J. L. Howard. Read at meeting of the Pacific Coast Gas Assn. Reviews the past history of the fuel trade in this state and discusses the present conditions. 4000 w. Am Gas Lgt Jour—Aug. 25, 1902.

Fuel Conditions in California. John L. Howard. Read before the Pacific Coast Gas Assn. Reviews the history of the coal deposits of California and their development, the imported coal, the use of gas as fuel, oil, etc. 3600 w. Jour of Elec—Nov., 1902.

See also FUEL TEST; LIQUID FUEL; PETROLEUM.

China.—See COAL INDUSTRY.

Coal Tar and Spirits.—Coal Tar and Spirits as Motor Fuels. Account of experiments made on the road with a Napier-Parsons parcels-delivery car, and comparison of coal-tar spirits with benzol for internal-combustion motors. 1000 w. Autocar—Aug. 6, 1904.

Coal vs. Gas.—See STEAM ENGINEERING—Heating Surface.

Coke.—See COKE.

Coke Breeze.—See COKE BREEZE.

Comparison.—See CALORIFIC VALUE—Flame.

Cupola.—See Foundry; COKE—Foundry; FOUNDRY.

Economy.—The Possibilities of New Fuel. George Ethelbert Walsh. Concerning the study of available fuels brought about by the recent strike, and the indications of more economical use, and preparations for future power. 2500 w. Power—Dec., 1902.

Recent Developments in the Economy and Variety of Fuel. E. H. S. Bailey. Remarks on recent investigations for producing greater saving in combustion, and the development of new fuels. 1800 w. Pro Age—Dec. 15, 1902.

Boiler Fuel Economy in a Water-Gas Works. J. A. Perry. Considers in detail the steps necessary to insure the best economy and indicates where certain mistakes in installation should be avoided. Serial. 1st part. 4400 w. Pro Age—Dec. 15, 1904.

See also STEAM PLANT—Fuel Economy.

Electric Station.—See ELECTRIC STATION MANAGEMENT.

Expert.—The Province of the Fuel Expert. G. A. Hutchinson. Considers some of the problems likely to present themselves in connection with a steam plant. 3800 w. Eng & Min Jour—May 25, 1905.

Foundry.—Cupola Fuels. Edward Kirk. An account of experiments made with gas and liquid fuels, and charcoal fuel. 2200 w. Foundry—Nov., 1900.

Coal and Coke for Foundry Use. Prof. Bradley Stoughton. Read before the N. Y. Found. Foremen's Assn. An explanation of the origin and manufacture of these fuels. 1200 w. Foundry—Dec., 1904.

See also COKE; FOUNDRY.

Furnace.—Fuel and Furnaces. Abstracted from "Steam: Its Generation and Use," published by Babcock and Wilcox, Ltd. Deals from a theoretical point of view, with the utilization of the various kinds of fuel and the form of furnace best suited for their combustion. Serial. 1st part. 1700 w. Col Guard (Sup)—March 31, 1905.

Garbage.—See REFUSE DISPOSAL.

Gas.—See GAS FUEL; GAS POWER; GAS POWER PLANT; GAS PRODUCER.

Gas Calorimetry.—See CALORIMETRY—Gaseous Fuels.

Gas, Heating Furnace.—See also FURNACE—Gas.

Germany.—Lignite, Peat and Coal-Dust Fuel in Germany. A supplementary report relating more especially to the utilization of these deposits. 3300 w. U S Cons Repts, No. 1615—April 8, 1903.

Liquid.—See LIQUID FUEL.

Locomotive.—See LOCOMOTIVE OPERATION; LOCOMOTIVE TEST—Fuel Value.

Losses, Steam Plants.—See STEAM PLANT—Fuel Losses.

Low Grade.—The Utilization of Low Grade Fuels for Steam Generation. W. Francis Goodrich. A comparison of the theoretical value of high grade and low grade fuels on the basis of economy in money. 3500 w. Engineering Magazine—Dec., 1905.

See also COAL—Small Size.

Metallurgical.—Present Day Metallurgical Fuels. Percy Longmuir. Deals with fuels of industrial interests both natural and artificial. 2500 w. Ir Trd Rev—Aug. 22, 1901.

Molasses.—Molasses as Fuel. R. Terry, S. Arnold, and H. Fisher. Gives report of investigation carried out in the Mechanical Engineering Laboratories of Columbia University to determine its efficiency when atomized in conjunction with fuel oil. Ills. 3500 w. Sch of Mines Qr—April, 1905.

Open Hearth Furnace.—See also OPEN HEARTH PROCESS—Gas and Tar Fuel.

Petroleum Refuse.—The Applications of Petroleum Refuse as Fuel (Masut-Feuerungen und ihre Anwendung). Ferd. Heck. An account of the methods of burning petroleum residues as a fuel for open-hearth metallurgical furnaces. 2500 w. Stahl u Eisen—Dec. 15, 1904.

Possibilities.—See Economy.

Powdered.—See POWDERED COAL.

Pulverized Coal.—See POWDERED COAL.

Sawmill Refuse.—The Value of Saw-Mill Refuse as a Fuel. O. B. Coldwell. Gives information concerning the lumber industry at Portland, Ore., and its by-products, describing the method of using the mixture of sawdust and cut-fuel as a steam producer, especially as related to the manufacture of electrical energy. 3000 w. Jour of Elec—Oct. 1905.

Substitutes.—Substitutes for Coal in Heating and Cooking. An illustrated discussion of the relative merits of other fuels, and the appliances used in burning them. 2200 w. Sci Am—Oct. 25, 1902.

Fuel Substitutes. Prof. Arthur Lakes. Some of the different materials utilized for burning in regions where ordinary fuels are unattainable are discussed. Ills. 1400 w. Mines & Min—Dec., 1905.

Tar.—The Value of Tar as Fuel. Charles F. Prichard. Gives facts relating to methods of burning, calorific power, and value. 1500 w. Engr, U S A—April 1, 1903.
See also TAR.

Value.—See CALORIFIC VALUE; THERMODYNAMICS—Fuel Utilization.

Waste.—Loss of Fuel by Presence of Combustible in Refuse. Hartley Le Huray Smith. Gives a method of calculating the fuel wasted and the graphical representation of it by a curve sheet covering ordinary practice. 500 w. Power—March, 1905.

FUEL ANALYSIS.

See also BOILER TEST; CALORIMETRY; COAL ANALYSIS; FUEL TEST.

Coke.—See SELENIUM.

FUEL ECONOMIZER.

See also ECONOMIZER.

FUEL GAS.

See **GAS FUEL; GAS POWER; GAS POWER PLANT; GAS PRODUCER.**

FUEL OIL.

See **LIQUID FUEL; PETROLEUM.**

FUEL TEST.

See also **CALORIFIC VALUE; CALORIMETRY; COAL ANALYSIS.**

Bituminous Ashes.—Some Experiments on the Fuel Value of Bituminous Coal Ashes. Henry Fay and F. W. Snow. An account of experiments made to determine the exact amount of unburned coal being thrown away in ordinary soft coal ashes. The expense of recovery would exceed the profit. 1500 w. Tech Qr—Dec., 1905.

Briquettes.—See **BRIQUETTING—Tests.**

California.—Relative Values of Fuels Used on the Pacific Coast. Irving C. Allen. A report of determinations made by the writer. Extract from a thesis prepared by the author. 1500 w. Min & Sci Pr—Dec. 8, 1900.

Incomplete Combustion. — Investigation of the Heat Losses and the Heat Distribution with Incomplete Combustion (Beiträge zur Untersuchung des Wärmeverlustes und der Wärmeverteilung bei Unvollkommener Verbrennung). Paul Fuchs. Record of experiments with a fire-tube boiler and coal fuel. 2000 w. Zeitschr d Ver Deutscher Ing —Sept. 16, 1905.

Indian Coal.—See **COAL.**

St. Louis Exposition.—The Coal Testing Plant of the Survey. E. W. Parker. Illustrated description of the plant at Louisiana Purchase Exposition. 8500 w. Eng & Min Jour—Sept. 15, 1904.

Coal-Testing Plant of the U. S. Geological Survey at St. Louis. Kurt Toensfeldt. An illustrated description of this plant and the methods of testing. 1800 w. Engr, U S A—Oct. 15, 1904.

Fuel Testing. An illustrated description of the plant of the United States Geological Survey at the Louisiana Purchase Exposition. 6600 w. Mines & Min—Jan., 1905.

The Fuel-Testing Plant at St. Louis. From a recent report of the U. S. Geol. Survey. A description of this exhibit, describing the plant and tests made, and giving related information. 5400 w. Ir Trd Rev—Feb. 16, 1905.

Testing Coals and Lignites at the St. Louis World's Fair. Edward W. Parker. The first portion of a complete review of the equipment and work of the coal-testing plant of the United States Geological Survey at St. Louis. 4000 w. Engineering Magazine—April, 1905.

Testing Coals and Lignites at the St. Louis World's Fair. E. W. Parker. Mr. Parker's second paper discusses the tests upon lignites, and the gas-producer and briquetting tests, with numerous important tables. 4500 w. Engineering Magazine—May, 1905.

Steam and Producer-Gas Tests of Coal. From the report on the tests of fuel made at St. Louis by the U. S. Geol. Survey, giving table showing the comparative results of burning the various coals under the boiler and in the gas producer, and discussing the results. 1000 w. Eng & Min Jour—July 6, 1905.

Results of the Preliminary Producer Gas Tests of the United States Geological Survey Coal Testing Plant at St. Louis. R. H. Fernald. An account of the preliminary work. Ills. 2500 w. Trans Am Soc of Mech Engrs (No. 080)—Dec., 1905.

Williams.—See **CALORIMETRY.**

FULTON.

Robert Fulton. Address of Admiral George W. Melville at the unveiling of the memorial erected by the American Society of Mechanical Engineers. 3800 w. Ir Age—Dec. 12, 1901.

FUNICULAR RAILWAY.

See **CABLE RAILWAY; MOUNTAIN RAILWAY.**

FURNACE.

See also **BLAST FURNACE; BOILER; COMBUSTION; ELECTRIC FURNACE; FIRING; IRON METALLURGY; IRON WORKS; MECHANICAL STOKING; METALLURGY; OPEN HEARTH; SMELTING; SMOKE PREVENTION; STEEL METALLURGY; STEEL WORKS.**

Adobe.—An Adobe Reverberatory Furnace. John Gross. Describes briefly the construction of a furnace which is giving good results and can be quickly erected. Ill. 900 w. Trans Am Inst of Min Engrs—Nov., 1901.

On Adobe and Other Makeshift Furnaces. Henry F. Collins. Abstracted from the Proceedings of the Institute of Mining and Metallurgy, London. Describes primitive appliances used for temporary work, often useful to meet special conditions. Ill. Serial. 1st part. 3500 w. Eng & Min Jour—July 11, 1903.

Air.—See **FOUNDRY.**

American Construction.—American Furnace Construction (Amerikanische Ofenkonstruktion). Bernhard Osann. Discussing especially the masonry work and refractory lining of blast and open-hearth furnaces in American practice. 3000 w. Stahl u Eisen—May 1, 1905.

Annealing.—A Handy Heating and Annealing Oven. Walter J. May. Illustrates and describes an arrangement which can be used for an oven from 4 ft. to 20 ft. in length, in which it is possible to heat regularly from end to end either tubes, bars, or other forms of wrought material. 1800 w. Prac Engr—July 11, 1902.
See also **POWDERED COAL—Annealing Furnace.**

Arch Bar.—Furnace Arch Bar. Discusses the arrangement of the rear arch in settings for horizontal tubular boilers. Ill. 1000 w. Locomotive—Dec., 1901.
See also **BOILER.**

Assay.—A Portable Assay Furnace. J. J. Gillis. Gives results of a trial extending over several months of fairly frequent work, and under all sorts of conditions, in which kerosene was used in a modified gasoline furnace. 1800 w. Aust Min Stand—May 19, 1904.

See also **ASSAYING.**

Bagasse.—See **FUEL.**

Boiler.—See **Arch Bar; BOILER.**

Bower-Barff.—The Inoxidising Furnace (Der Inoxydationsofen). G. Weigelin. Describing the form of regenerative gas furnace used for producing the so-called Bower-Barff coating of rustless magnetic oxide upon articles of iron. 1800 w. Stahl u Eisen—Dec. 15, 1904.

Brass.—See **BRASS FURNACE.**

Brayshaw.—See **HARDENING—Salt Bath Furnace.**

Brown.—See **BOILER—Corrugated Furnace.**

Buckstays.—See **BUCKSTAY.**

Corrugated.—See **BOILER.**

Dennis Ore Roasting.—Latest Achievement in Roasting Furnaces for Quicksilver and Other Ores. Illustrates and describes the Dennis roasting furnace, giving information concerning it, and discussing its valuable features. 1500 w. Min Rept—Aug. 17, 1905.

Door, Large.—Doors for Heating Pits. T. H. Lauder. Read before the West of Scotland Ir. and Steel Inst. Illustrates and describes a new type of door and appliances for handling doors of large dimensions. 1500 w. Ir & Coal Trds Rev—March 4, 1904.

British, Earliest.—Britain's Earliest Iron Furnaces and Moulding Floors. Thomas May. An illustrated article describing remains of smelting, refining, moulding and other furnaces investigated during recent excavations, and showing the Roman methods of iron manufacture. 7500 w. Ir & Coal Trds Rev—Aug. 11, 1905.

Edwards' Ore Roasting.—Edwards' Mechanical Ore-Roasting Furnace. F. Danvers Power. Illustrates and describes the three types of Edwards furnaces. 2500 w. Eng & Min Jour—Feb. 11, 1904.

Efficiencies.—See **BOILER.**

Enamel Hot Blast.—A Hot Blast Furnace. L. O. Danse. Illustrates and describes a flue system used to heat an enameling furnace with hot blast. 800 w. Am Mach—May 9, 1901.

Firing.—See **FIRING—Regenerator Furnace.**
Flintshire.—See **LEAD-METALLURGY—Desloge, Mo.**
Fuel.—See **FUEL—Furnace.**

Garbage.—See **REFUSE DISPOSAL.**

Garrett Reheating.—The Garrett Reheating Furnaces. J. S. Trinham. Read before the Staffordshire Ir. & Steel Inst. An illustrated description of this furnace, describing also other types, and explaining its working and advantages. 3800 w. Ir & Coal Trds Rev—Dec. 30, 1904.

Gas.—Gas Furnaces for Melting and Heating (Einiges über Gas Schweiss- und Wärmöfen). T. Stapf. An examination of the conditions of combustion in gas furnaces, showing their adaptability to metallurgical operations. 6000 w. Stahl u Eisen—Dec. 15, 1903.

Progress in the Construction of Gas Furnaces for Use in Iron Works (Fortschritte im Bau von Gasöfen für Eisenhüttenwerke). A. Desgras. A discussion of the application of gas-fired furnaces for reheating, and other metallurgical operations. Serial. Part I. 3000 w. Stahl u Eisen—July 1, 1905.

See also Oil Gas; **GAS FUEL; GAS HEATING.**

Gas Reverberatory.—Laboratory Work Under Smelting Conditions. K. Friedrich. A short description of the reconstruction of a small gas-heated reverberatory furnace, giving a report of its efficiency and application. Ills. 1800 w. Eng & Min Jour—March 24, 1904.

Hardening.—See **HARDENING—Furnace.**

Holthoff Roasting.—The Holthoff Revolving Hearth Roasting Furnace. Illustrated description. 1200 w. Min Rept—Jan. 12, 1905.

Ingot Heating.—An Improved Type of Ingot Heating Furnace. F. H. Daniels. An illustrated description of the vertical heating furnace and its method of operation, with remarks on earlier types. 1800 w. Trans Am Soc of Mech Engrs, No. 911—May, 1901.

Jewelers' Work.—Furnaces Suitable for Jewelers' Work, Enameling, Art Casting and Other Similar Industries. H. H. Cunynghame. Describes briefly furnaces at present in use and their fuels, especially some furnaces recently invented by the writer. Discussion. 6500 w. Jour Soc of Arts—Dec. 11, 1903.

Linings.—See **BRICK—Fire; FOUNDRY—Cupola Linings; REFRACTORY MATERIAL.**

Liquid Fuel.—See Oil.

McDougall.—Some Notes on Roasting with McDougall Furnace. S. S. Sorensen. A report of the working of a set of eight McDougall calcining furnaces at the Highland Boy smelter, Utah, commending their simplicity, economy and efficiency. Ill. 2500 w. Can Min Rev—April 30, 1903.

See also **ZINC METALLURGY.**

McDougall Incrustation.—Examination of Incrustation Formed on Rabble Plate of a McDougall Furnace. William P. Headden. Read before the Colorado Sci. Soc. Describes the appearance and gives the analyses made. 1500 w. Min Rept—Aug. 3, 1905.

Merton.—The Merton Furnace (Der Mertonofen). Gustav Kroupa. Describing the Merton roasting furnace as used by the Great Boulder Co. at Kalgoorlie. The ore is kept moving continually through the furnace by the action of revolving arms. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 9, 1904.

Makeshift.—See Adobe.

Metallurgical.—A Furnace for Metallurgical Research. Woolsey McA. Johnson. Describes a furnace designed for use in a metallurgical laboratory; the fuel used was natural gas. Ills. 1500 w. Elec-Chem & Met Ind—Sept., 1905.

Muffle, Wood-Burning.—A Wood-Burning Muffle Furnace. Louis Janin, Jr. Illustrated description of a large superimposed double-muffle furnace for assaying, erected in Ely, Nevada. 600 w. Eng & Min Jour—Dec. 20, 1902.

Oil.—A Convenient Petroleum Furnace. An illustrated description of an economical apparatus for ordinary forge work used by Russians. 1400 w. Am Mfr—Dec. 6, 1900.

Liquid Fuel for Furnace Equipment. W. N. Best. On the increasing use of liquid fuel and its success in forges and furnaces. 1600 w. Sci Am—April 8, 1905.

Notes on Oil Furnaces for Assaying and Melting. Charles Brent. Illustrated description of furnaces used in the assay office and melting room, which may be constructed at small cost, and are in many ways more convenient than furnaces of the older type burning solid fuel. 2000 w. Can Min Rev—June 30, 1902.

Oil-Fired Furnaces. A. M. Bell. Considers some of the applications for which oil fuel is especially adapted, and gives illustrated descriptions of types of furnaces used. 2500 w. Cassier's Mag—Nov., 1903.

Oil Furnaces. John McMally. Read before the Ry. Mas. Blacksmiths' Assn. Presents some of the advantages, and the economy made possible by the low pressure system now used. Discussion. 2000 w. Ir Trd Rev—Sept. 14, 1905.

Care, Use and Design of Oil Furnaces. Stephen Uren. Discusses questions of the economy of oil as compared with coal, the effect on the material, and the latest improvements in furnace doors, fire brick, burners, etc. Ills. 2800 w. Pro Pacific C Ry Club—July 15, 1905.

See also **LIQUID FUEL.**

Oil Gas.—The Economic Use of Petroleum Oil Gas Furnaces as Applied to Smelting, Laboratory Work and Drill Heating. David Laird. On the adaptability of these furnaces for metallurgical work, treating them purely from a mechanical point of view and showing their advantages in certain kinds of work. 5800 w. Jour Chem Met Soc of S Africa—Oct. 1, 1902.

Open Hearth. — See **OPEN HEARTH PROCESS; STEEL WORKS—Guérigny, France.**

Ore Roasting.—See Dennis; Edwards; MacDougall; Merton; **ORE TREATMENT.**

Petroleum.—See Oil; **LIQUID FUEL.**

Regenerative Gas.—Proportions of Regenerative Gas Furnaces, with Special Reference to Open-Hearth Furnaces. H. D. Hess. An illustrated article presenting the advantages of these furnaces, and discussing their management and construction. Short discussion. 5000 w. Pro Engrs' Club of Phila—Jan., 1904.

See also **VALVE—Foster, Gas; Regenerative Furnace.**

Reverberatory.—An Experimental Reverberatory Furnace. Woolsey McA. Johnson. An illustrated detailed description of two small furnaces for the study of ordinary metallurgical processes. 1400 w. Eng & Min Jour—July 18, 1903.

Coal-Fired Reverberatory Furnaces for Heating Iron and Steel. R. T. Cooke. Explains the principles of these furnaces and the methods of working and repairing. Ill. 1600 w. Prac Engr—Jan. 22, 1904.

See also Gas Reverberatory; **COPPER METALLURGY; LEAD METALLURGY—Desloge, Mo.**

Reversing Apparatus.—Reversing Apparatus for Siemens-Martin Furnaces (Umsteuerungsvorrichtung für Siemens-Martinöfen). Josef Czekalla. An illustrated description of apparatus for reversing the flow of gases and air in regenerative furnaces, without losing any gas. 1600 w. Stahl u Eisen—June 15, 1903.

Rotary.—See **CEMENT KILN; HEATING—Rotary Furnace.**

Rotary Roasting.—The Rotary Furnace for Roasting Quicksilver Ores. John W. Geary. An illustrated article giving some of the leading features of the process of roasting quicksilver ores as carried out at the Socrates Quicksilver Mine, of California. 1200 w. Cal Jour of Tech—Nov., 1904.

Sulphide Ores.—Furnaces for Blende and Pyrites Roasting. Walter Renton Ingalls. Describes furnaces used by the American zinc smelters, and especially the McDougall type of furnaces for roasting pyrites, pyrrhotite and chalcopyrite. 3800 w. Min Wld—March 4, 1905.

Thomson.—See **KILN.**

Truck Support.—Truck Support for Furnace Bottoms. Henry A. Mather. Illustrates and describes this device, stating its advantages. 600 w. Trans Am Inst of Min Engrs—Feb. and May, 1902.

Water-Cooled Parts.—See **BLAST FURNACE; OPEN-HEARTH PROCESS.**

Wellman Open-Hearth.—See **OPEN-HEARTH PROCESS—Wellman Furnace.**

Zinc Roasting.—See ZINC METALLURGY—Roasting.

FURNACE GAS.

See also BLAST FURNACE GAS; BOILER TEST; GAS ANALYSIS.

Boilers.—See BOILER—Waste Heat.

FURNACE HOIST.

Blast Furnace.—See BLAST FURNACE—Charging Apparatus.

FURNACE LINING.

See BRICK—Fire; FOUNDRY—Cupola Linings; FURNACE; REFRACTORY MATERIAL.

FUSE.

See BLASTING; ELECTRIC PROTECTIVE APPARATUS.

G

GALENA.

Electrolytic Reduction.—See LEAD METALLURGY.

GALVANIZING.

See also ELECTRO-GALVANIZING; METAL PROTECTION—Sherardizing.

The Inspection of Galvanised Iron Articles (Ueber die Beurteilung Verzinkter Eisenwaren). Carl Richter. A comparison of the results of electro-galvanising with the hot dipping process of zincing, describing methods of test. Serial. Part I. 1800 w. Elektrochem Zeitschr—Nov., 1902.

Investigation of the Properties of Zinc Coatings. Charles F. Burgess. A report of investigations undertaken at the University of Wisconsin to determine, if possible, the relative value of zinc deposited by the electrolytic or "cold" processes and the metal as applied by the "hot" or dipping methods. 5000 w. Elec-Chem & Met Ind—Jan., 1905.

Comparative Tests of Iron and Steel Articles Galvanised by the Hot and Cold Processes (Vergleichsversuche mit Eisen und Stahlwaren auf Heissem und Elektrolytischem Wege Verzinkt). Dr. Ignaz Szirmay. Results of tests upon sheet metal, wires and pipe, showing the superiority of the electrical process. 1500 w. Zeitschr f Elektrochemie—June 2, 1905.

The Galvanising of Iron and Steel Surfaces. Sherard Cowper-Coles. Illustrates and describes the hot galvanising process, and the electro or cold galvanising process, giving related information. 4800 w. Ir & Coal Trds Rev—Nov. 10, 1905.

Electro.—See ELECTRO-GALVANIZING.

Porter Process.—The Porter Galvanising Process. Illustrated description of apparatus for removing the excess metal from galvanized articles. 1200 w. Ir Age—Aug. 18, 1904.

GALVANOMETER.

See ELECTRIC INSTRUMENT; ELECTRIC METER.

GALVANOPLASTY.

See ELECTRO-PLATING.

GARAGE.

See also AUTOMOBILE GARAGE.

Boston.—Reinforced Concrete Building, for the Park Square Motor Mart, Boston. G. H. Brager. Illustrated description of a building under construction for the storage of motor vehicles. 1800 w. Eng Rec—Nov. 18, 1905.

Concrete Reinforced.—See Boston.

GARBAGE DISPOSAL.

See REFUSE DISPOSAL.

GARNET.

Copper Ore.—The Garnet Formations of the Chillagoe Copper Field, North Queensland, Australia. George Smith. Describes this field and the deposits, particularly the secondary deposits connected with the garnet. Ill. 3000 w. Trans Am Inst of Min Engrs—Oct., 1903.

Copper Ore and Garnet in Association. William P. Blake. Shows the wide distribution of garnet as an associate of copper ore, discussing briefly the origin of these formations. 1500 w. Trans Am Inst of Min Engrs—Oct., 1903.

Pennsylvania.—See GRAPHITE.

GAS.

See also GAS INDUSTRY; GAS MANUFACTURE; and under other gas headings.

Air.—See CARBURETTED AIR.

Blast Furnace.—See BLAST-FURNACE GAS.

Calorimetry.—See CALORIMETRY—Gaseous Fuels.

Carburetted Air.—See CARBURETTED AIR.

Comparison.—Coal Gas and Its Various Competitors. Franz Schaeffer. Report presented to the International Gas Congress in Paris. A review of the production and consumption of coal gas, electricity, acetylene, water gas, etc. 8900 w. Jour Gas Lgt—April 9, 1901.

Comparison of Different Heating and Lighting Gases. Abstract of article, by Joh. Körting, published in the "Jour für Gasbeleuchtung," giving comparison and conclusions. 2700 w. Gas Wld—July 6, 1901.

New Comparisons in Favor of Coal Gas. T. E. Pye. Concerning the relative hygienic values of coal gas and electricity respectively as illuminating and heating agents. 2000 w. Jour Gas Lgt—March 11, 1902.

Coal Gas and Water Gas. Alton D. Adams. Discusses the relative advantages of each and the cost of manufacture as shown in plants of various capacities in Massachusetts. 1700 w. Mines and Min—June, 1904.

Compressed.—See OXYGEN.

Compression.—Critical Points and their Importance in the Compression of Gases (Die Kritischen Daten und ihre Bedetung für die Kondensation der Gase). Dr. Clemens Schaefer. A discussion of the influence of critical temperatures upon the behavior of gases under pressure. 3000 w. Zeitschr d Ver Deutscher Ing—Dec. 13, 1902.

Condensation.—The Condensation of Coal Gas. Harold G. Colman. Views of the writer derived from a study of the literature of the question and his own experiments. 3000 w. Jour Gas Lgt—June 3, 1902.

Diagram.—A New Work Diagram for Gases. Frank Foster. Describes a diagram devised to illustrate the actions of and simplify the calculations for gas turbines, turbo compressors, gas engines, air compressors and hot air engines. 2000 w. Engr, Lond—Dec. 1, 1905.

Electric Conductivity.—See ELECTRIC CONDUCTIVITY—Gases.

Enrichment.—See Heating Power; GAS MANUFACTURE.

Explosion.—See GAS ENGINE; GAS EXPLOSION.

Explosive Limits.—Explosive Limits of Combustible Gases. Dr. P. Eitner. Abstract translation of a series of five articles in recent numbers of the "Journal für Gasbeleuchtung." A review of researches and results. Serial. 1st part. 3000 w. Jour Gas Lgt—March 11, 1902.

Explosive Mixtures.—Explosive Gas Mixtures. Dr. H. Bunte. Abstract translation of a paper read before the German Assn. of Gas & Water Engrs. Gives tabulated results of explosion investigations and explains the behavior of gases under various conditions. Serial. 1st part. 2800 w. Jour Gas Lgt—Dec. 24, 1901.

Explosive Gas Mixtures. A review of paper by Dr. H. Bunte, read before the German Soc. of Gas and Water Engrs. and containing much information regarding the theoretical facts involved in the construction of atmospheric gas burners and of gas engines. 1500 w. Engr, Lond—March 28, 1902.

Explosive Mixtures of Air and Hydro-Carbon Vapors (Sur les Mélanges Explosifs Formés par l'Air et par les Vapeurs des Hydrocabures). J. Meunièur. An investigation of the best mixture of air and vapor for perfect combustion. 1000 w. Comptes Rendus—Oct. 15, 1900.

Mixtures of Combustible Gases and Air. Gives results of experiments, published recetly in German technical papers, to determine the range of proportions in which gases and air can be mixed so as to remain explosive. 800 w. Eng Rec—April 19, 1902.

See also GAS ENGINE—Explosion; GASOLINE; MOTOR.

Explosive Wave.—Movements of the Flame in the Explosion of Gases. Harold B. Dixon. Abstract of a paper read before the Royal Society. An account of experimental study in the field. 6000 w. Am Gas Lgt Jour—Oct. 13, 1902.

Movements of the Flame in the Explosion of Gases. Harold B. Dixon. Abstract of a paper read at meeting of the Royal Society, on the extensive researches made by the writer. 6000 w. Jour Gas Lgt—July 1, 1902.

See also GAS ENGINE.

Flame Velocity.—See Explosive Wave.

Flow.—See COMPRESSED AIR—Transmission; GAS DISTRIBUTION; GAS FLOW; STEAM FLOW.

Flue.—See GAS ANALYSIS.

Fuel.—See CALORIMETRY; GAS FUEL; GAS POWER; GAS POWER PLANT; GAS PRODUCER.

Heating Power.—Heating Power and Welsbach Value of Enriched Gas. M. Verdier. Data from tests made; the heating values were ascertained with Mahler's bomb and Junker's calorimeter, which gave concordant results. 1400 w. Gas Wld—July 20, 1901.

The Influence of Enrichment on the Heating Power of Coal Gas. M. Verdier. Read at annual meeting of the Société Technique. An account of tests with interesting conclusions concerning the heating and illuminating value of coal gas. 2200 w. Jour Gas Lgt—Aug. 27, 1901.

See also Thermal Emissivity; CALORIMETRY.

High Pressure.—See Thermal Emissivity; GAS DISTRIBUTION.

History.—A Brief History of Street Gas. Reviews the early history of gas as an illuminant. 900 w. Sci Am—April 5, 1902.

Hygienic Values.—See Comparison.

Invention.—The Trend of Gas Invention. Reviews the patents in the gas field for the last year, comparing it with the year previous. 2700 w. Jour Gas Lgt—Jan. 27, 1903.

See also GAS INDUSTRY.

Low Candle-Power.—Low Candle-Power Gas. William Henry White. Read before the Western Gas Assn. Urging a cheaper gas of good heat value, good burners and good men for the advancement of the gas industry. General discussion. 7000 w. Pro Age—July 1, 1904.

Mine.—See COAL MINE EXPLOSION; FIREDAMP; MINE GAS.

Naphthaline.—See GAS MANUFACTURE.

Natural.—See GAS, NATURAL.

Oil.—See GAS, OIL.

Pumping.—See GAS, NATURAL.

Smoke.—Production of Lighting Gas from Smoke. A description of the process of Tobiansky d' Altox, by which smoke and chimney gases are carburetted, and the product used for heating and lighting. 1400 w. Jour Gas Lgt—July 9, 1901.

A New Method of Smoke Prevention (Ein Neues Verfahren zur Vollständigen Beseitigung und Unterdrückung des Schornstein-Rauches). Dr. Böhm-Raffay. A description of the Tobiansky d'Altoff process, in which the products of combustion of an ordinary furnace are carburetted to make so-called "pyrogas." 3000 w. Zeitschr d Oesterr Ing u Arch Vereines—June 13, 1902.

The Suppression of Smoke and the Utilisation of its Constituents (La Suppression Radicale de la Fumée et la Récupération de ses Eléments). E. Guarini. An illustrated description of M. Tobiansky d'Altoff's system, in which he enriches the products of combustion, including smoke, with hydrocarbons, and uses the resulting gas for lighting, heating and power. 3500 w. Rev Technique—May 10, 1903.

Street.—See History; GAS LIGHTING; STREET LIGHTING.

Sulphur.—The Relation of Sulphur in Lighting Gas to Air Vitiation. J. S. Haldane. Reprinted from the "Jour. of Hygiene." Concludes that unpleasantness of air vitiated by lighting gas is due to sulphur, and that gas purified from carbon bisulphide is greatly superior from the hygienic standpoint to gas which is only purified from sulphuretted hydrogen. 2700 w. Jour Gas Lgt—Sept. 1, 1903.

Thermal Emissivity.—Thermal Emissivity in High-Pressure Gases. Discusses researches of Mr. J. E. Petavel, which are of high interest to the engineer. An important contribution to thermodynamics. 3800 w. Engng—Jan. 3, 1902.

See also Heating Power.

Tobiansky d'Altoff.—See Smoke.

Water.—See GAS, WATER.

Wood.—See GAS, WOOD.

GAS ANALYSIS.

See also GAS MANUFACTURE—Analytical Tests.

Benzine.—The Determination of Benzine in Illuminating Gas. L. M. Dennis and J. G. O'Neill, in "Jour. Am. Chem. Soc." Describes a series of experiments, discussing the results. 3200 w. Am Gas Lgt Jour—May 18, 1903.

Determination of Benzine in Gas. L. M. Dennis and J. G. O'Neill. From the "Jour. Am. Chem. Soc." An account of experimental investigations showing that alcohol does not completely remove either benzine or ethylene, and that an ammoniacal solution of nickel nitrate furnishes a rapid and exact method for the determination. 3000 w. Jour Gas Lgt—Aug. 11, 1903.

Broockman-Schondorff.—See FIREDAMP.

Calorific Value.—See CALORIMETRY—Gas; GAS—Heating Value.

Carbonic Oxide.—The Determination of Carbonic Oxide in Gas. Translated account of a new method recently described in German papers. 1300 w. Jour Gas Lgt—Dec. 11, 1900.

Carbon Monoxide.—On Some Details of the Estimation of Carbon Monoxide. Charles R. C. Tichbourne. Lecture before the Irish Assn. of Gas Mgrs. Describes the making of the solution and the method of working. 2000 w. Gas Wld—Aug. 22, 1903.

Firedamp.—See FIREDAMP; MINE GAS.

Flue Gases.—Errors in Analyses of Furnace Gases Shown by Computation. William Kent. Mathematical demonstration. 1000 w. Stevens Ind—Oct., 1903.

Flue Gas Testing. W. H. Whysall. Illustrates and describes methods of testing, explaining the value of the information obtained. 2700 w. St Ry Rev—Oct. 20, 1904.

Improved Methods of Flue-Gas Analysis (Neuanordnung einer Vorritchtung zur Rauchgasuntersuchung). M. Moller. Describing improvements in apparatus of the Orsat type for the analysis of the waste gases discharged by boiler and other furnaces. 1500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—July 8, 1905.

Flue-Gas Analysis. F. H. Corson. Illustrates and describes apparatus for the analysis of the products of combustion, and its action. 1800 w. Elec Rev, Lond—July 14, 1905.

See also Portable Apparatus; BOILER TEST.

Heat and Light Relations.—Candles and Calories. Prof. Vivian B. Lewes. Read before the Inst. of Gas Engrs. A discussion of the methods of calculating the illuminating and the calorific values, and of determining their average relations. 7200 w. Gas Wld—June 13, 1903.

Hempel Apparatus.—The Analysis of Furnace Gases. A. W. Watson. Illustrates and describes the use of Hempel's apparatus in the analysis of chimney gases. 1700 w. B C Min Rec—May, 1901.

Orsat Apparatus.—See Flue Gas.

Phosphorus and Sulphur.—Estimation of Phosphorus and Sulphur in Acetylene and Other Combustible Gases. Describes a combustion method, with the use of oxygen. 2500 w. Jour Gas Lgt—Aug. 27, 1901.

Portable Apparatus.—A Portable Apparatus for the Analysis of Flue-Gases. Charles Joseph Wilson. Illustrates and describes an apparatus employed in all the trials carried out by the recent Admiralty Committee on Naval Boilers, with good results. 1700 w. Inst of Civ Engrs. (No. 3580.)

Quick.—See **GAS METER.**

Sulphuretted Hydrogen.—The Quantitative Estimation of Hydrogen Sulphide in Illuminating Gas. C. C. Tutwiler. Illustrated description of apparatus devised for the rapid analysis of gases. Its action depends upon the reaction between hydrogen sulphide and iodine. 1500 w. Am Gas Lgt Jour—April 29, 1901.

The Action of Ferrous Thiosulphate on Sulphuretted Hydrogen. An account of experiments carried out by Mr. Linder and given in report of R. Forbes Carpenter. 2000 w. Jour Gas Lgt—Sept. 2, 1902.

Estimation of Sulphuretted Hydrogen in Minute Quantities in Coal Gas. W. J. Dibdin. Read before the Soc. of Public Analysts. Describes methods used and results obtained. Also discussion. 1800 w. Jour Gas Lgt—Sept. 9, 1902.

GAS BENCH.

See **GAS MANUFACTURE; GAS RETORT; GAS WORKS.**

GAS BURNER.

See **GAS MANUFACTURE; GAS RETORT; GAS WORKS.**

Lighting Gas, and How Best to Burn It. Walter Grafton. Discusses the use of burners that will secure economy and efficiency. 1500 w. Plumb & Dec—Oct. 1, 1902.

Air Supply.—Regulating the Air Supply to Burners Consuming Mixed Coal and Water Gas. H. Leicester Greville. Remarks on the suitable regulation, and the faults due to the appliances rather than to the gas. 2000 w. Jour Gas Lgt—Jan. 22, 1901.

Bunsen.—Professor Smithells on the Bunsen Burner. Sketch of an interesting lecture, recording the results of important experimental work. 3500 w. Jour Gas Lgt—Nov. 3, 1903.

Canioni's.—See Self-Lighting.

Electric Ignition.—New Electrical Gas Ignition and Extinguishing Device. Illustrates and describes a device being introduced in England. 1500 w. Jour Gas Lgt—Oct. 21, 1902.

Governor.—See **GAS GOVERNOR.**

Incandescent Lighting.—See **INCANDESCENT GAS LIGHTING—Burner; Burner Maintenance.**

Lecomte.—See Regulator; **INCANDESCENT GAS LIGHTING.**

Lucas.—See **INCANDESCENT GAS LIGHTING—Lucas Lamp.**

Regulator.—The Luchaire-Lecomte Gas Regulator. A. Lecomte. Read before the Soc. Tech. du Gaz en France. Illustrates and describes a new device for regulating the consumption of gas in a Bunsen burner. 1200 w. Jour Gas Lgt—July 12, 1904.

Self-Lighting.—Automatic Ignition of Gas. W. G. Hicks. Illustrates a new device and discusses the faults of those generally used. 1300 w. Jour Gas Lgt—March 5, 1901.

Canioni's Self-Lighting Burners. M. Auguste Lecomte. Read before the Soc. Tech. du Gaz en France. Introductory remarks with description of these burners and their action. 1800 w. Jour Gas Lgt—May 26, 1903.

Westenholz's Patent Automatic Gas Lighter and Extinguisher. An account of a new invention from Denmark, stating its merits and advantages. Ills. 1400 w. Jour Gas Lgt—June 7, 1904.

See also Electric Ignition; **INCANDESCENT GAS LIGHTING.**

Slit vs. Welsbach.—Observations on Gases Burned in Slit and Welsbach Burners. Dr. H. Bunte. Abstract. Experimental results are given and discussed. 1500 w. Gas Wld—May 11, 1901.

Standard.—The Law and Practice Relating to Test Gas Burners. States how the case of the standard test-burner stands in England, both in law and by usage. 3500 w. Jour Gas Lgt—May 19, 1903.
See also **PHOTOMETRY.**

GAS CONGRESS.

See also **GAS ENGINEER; GAS EXHIBITION.**

Glasgow.—Inaugural Address of the President of the Gas Section of the International Engineering Congress in Glasgow. George Livesey. 3000 w. Jour Gas Lgt—Sept. 3, 1901.

Paris, 1900.—Report on the International Congress of the Gas Industry (Paris, France, September, 1900), to the Pacific Coast Gas Association. J. B. Grimwood. 5400 w. Am Gas Lgt Jour—Aug. 12, 1901.

GAS COOKING.

See **GAS HEATING; GAS STOVE.**

GAS DISTRIBUTION.

See also **GAS FLOW; GAS HOLDER; GAS INDUSTRY; GAS MANUFACTURE; GAS PIPE.**

Modern Methods of Distributing Gas. Norton H. Humphreys. An explanation of the methods and motive power for distributing systems. 3400 w. Jour Gas Lgt—Aug. 13, 1901.

Distribution—Developments to Meet Rapidly Increasing Consumption. A. B. Walker. Read before the North of England Gas Mgrs. Assn. A record of developments carried out in the last six years. Also discussion. 5000 w. Jour Gas Lgt—April 29, 1902.

Algiers, La.—See **GAS PIPE—Subaqueous.**

America.—Distribution Practice in the United States. Describes as well as possible what is considered good distribution practice in the gas industry. Ill. 6000 w. Jour Gas Lgt—Nov. 25, 1902.

Electric Compared.—See **POWER TRANSMISSION—Gas vs. Electric.**

Flow.—See **GAS FLOW.**

Governors.—See **GAS GOVERNOR.**

High Pressure.—Distributing Artificial Gas at High Pressure in a Suburban Locality. George F. Goodnow. Read before the New England Assn. of Gas Engrs. Also discussion. Describes the methods used by the North Shore Gas Company of Illinois. Ill. 6000 w. Am Gas Lgt Jour—March 3, 1902.

Distributing Artificial Gas at High Pressure in a Suburban Locality. George F. Goodnow. Read before the Boston meeting of the New England Assn. of Gas Engrs. Describes the methods used by the North Shore Gas Co. in the suburban district near Chicago. Ill. 3800 w. Pro Age—April 1, 1902.

The Distribution of Artificial Gas Under High Pressure. Describes the methods adopted in Chicago suburbs to save the expense of large pipe lines. 1800 w. Eng Rec—April 12, 1902.

Distribution of Gas Under High Pressure. F. H. Shelton. Paper and discussion presented at meeting of the Ohio Gas Lgt. Assn. Ways in which it enables saving in expenses, or improvement in service, or extension. 5500 w. Am Gas Lgt Jour—April 28, 1902.

Distributing Gas at High Pressure. Extracts from the discussion on F. H. Shelton's paper at meeting of the Ohio Gas Lgt. Assn., in which Dr. Pole's formula was questioned. 3500 w. Gas Wld—May 24, 1902.

Distributing Gas at High Pressure. George F. Goodnow. Read at meeting of Western Gas Assn. Gives a comparison showing the uses to which a high-pressure system may be put. General discussion. 2500 w. Am Gas Lgt Jour—June 23, 1902.

Distributing Artificial Gas Under High Pressure. George F. Goodnow. Read before the Wisconsin Gas Assn. Notes relating to observations and experience during the past year, difficulties overcome, and methods used. 2200 w. Pro Age—March 16, 1903.

Notes on High Pressure Distribution. W. A. Learned. Read at meeting of the New England Assn. of Gas Engrs. States the problem, and describes the system adopted. Ill. Also discussion. 7000 w. Am Gas Lgt Jour—April 6, 1903.

Distributing Illuminating Gas at High Pressure. F. H. Shelton. Describes examples of high-pressure practice in America, showing the conditions for which it is particularly applicable and convenient. 1700 w. Cassier's Mag—May, 1903.

High-Pressure Gas Distribution. John A. Britton. Read before the Pacific Coast Gas Assn. Shows how high-pressure gas may be utilized. 4000 w. Am Gas Lgt Jour—Aug. 17, 1903.

Gas Distribution at High Pressures. Reviews the paper by John A. Britton, read before the Pacific Coast Gas Assn., with critical remarks. 2000 w. Jour Gas Lgt—Oct. 27, 1903.

Distributing Gas at 25 lbs. Pressure per Square Inch. George Helps. Reviews what has been done in America and in England with high-pressure gas, discussing the advantages and disadvantages, and describing the Nuneaton installation. 4500 w. Gas Wld—May 28, 1904.

The Flow of Gas in Mains, and Distribution at High Pressure. Read before the Inst. of Gas Engrs. by W. C. Unwin. A discussion of this subject, the difficulties, and American practice in high-pressure distribution. General discussion. Diagrams. 11,000 w. Gas Wld—June 11, 1904.

See also **Pumping Station; St. Margrethen; GAS FLOW; GAS LIGHTING; GAS PIPE—Capacity; Subaqueous; INCANDESCENT GAS LIGHTING.**

Leakage.—In What Manner Can the Normal Loss of Gas in Distribution Be Most Largely Diminished? M. P. H. Gibbons. Read before the Paris Gas Congress. Mentions places where leaks are most likely to occur, and the precautions that should be taken. 3500 w. Gas Engs' Mag—Dec. 10, 1900.

Gas Leakage in American Cities. James C. Bayles. Considers the economic and hygienic aspects, and how to remedy the evil. Ill. 5000 w. Munic Jour & Engr—Sept., 1902.

Leakage or Preventable Waste. C. E. Jones. A discussion of the losses charged to unaccounted-for gas, giving a table showing the percentage in 438 undertakings in the United Kingdom. 1000 w. Jour Gas Lgt—Dec. 9, 1902.

Gas Leakage and the Public Health. James C. Bayles. Read before the Med. Soc. of the Co. of N. Y. Considers the amount of leakage; what becomes of the gas; the risks of fires and explosions, asphyxiation, blood poisoning and anaemia, etc. 3500 w. Dom Engng—Jan. 25, 1903.

Excavations for Sewerage Purposes, and Unaccounted for Gas: An Experience. E. G. Smithard. Read before the East. Co.'s Gas Mgrs. Assn. An account of the damage done in King's Lynn, causing explosions, and of the legal settlement. General discussion. 5500 w. Gas Wld—April 25, 1903.

Unacounted-for Gas. Jno. Paterson. Read before the Irish Assn. of Gas Mgrs. Gives the writer's methods by which he brought the leakage down from 17 to 3½ per cent. General discussion. 4200 w. Gas Wld—Aug. 22, 1903.

Leeds, Eng.—Gas Distribution at Leeds. Illustrated description of a system of extension and enlargement of mains. 1700 w. Gas Wld—Jan. 18, 1902.

Efficiency and Economy in Gas Distribution. Walter Hole. Read before the Gas Inst. (England). Gives a brief description of remodelling and enlarging of mains in Leeds, and discusses matters affecting the distribution. Discussion. Ill. 7000 w. Gas Wld—June 14, 1902.

Maps.—Street Maps. Read before the Michigan Gas Assn. Illustrates and describes maps prepared for a gas company and found very satisfactory. 4600 w. Pro Age—March 15, 1901.

Nuneaton.—See **High-Pressure.**

Pressure Regulation.—Gas Distribution as Viewed by an Electrical Man. Hubert S. Wynkoop. A discussion of pressure regulation, with diagrams. 1800 w. Am Gas Lgt Jour—May 6, 1901.
See also **GAS GOVERNOR.**

Pumping Station.—A Gas Power Pumping Station for High-Pressure Gas Distribution. Illustrated detailed description of the system of the Laclede Gas Light Co., St. Louis, Mo., explaining the principles embodied. 2200 w. Engr, U S A—Jan. 1, 1905. (Special.)

Revere, Mass.—The Development of the Gas Distributing System of the Suburban Gas and Electric Company in Revere and Winthrop, Mass. A. B. Tenney. Read before the N. England Assn. of Gas Engrs. An account of the work, its cost, etc., with discussion. 4500 w. Am Gas Lgt Jour—March 30, 1903.

St. Margrethen, Switzerland.—High-Pressure Distribution at St. Margrethen. A. Rothenbach. Summary of a paper read before the German Gas Assn. Briefly describes the high-pressure gas distribution supplying the region at the southern end of Lake Constance. Ills. 1200 w. Gas Wld—March 19, 1904.

Waste.—See **Leakage.**

Winthrop, Mass.—See **Revere.**

GAS ENGINE.

See also **BLAST-FURNACE GAS; ELECTRIC ENGINEERING—Europe; GAS, FUEL; GASOLINE ENGINE; GAS POWER; GAS POWER PLANT; GAS PRODUCER; GAS TURBINE; HEAT ENGINE; MOTOR; OIL ENGINE.**

250-Horse-Power Gas Engine. Illustrated description. 900 w. Engr, Lond—Nov. 16, 1900.

The Gas Engine at the Beginning of the Twentieth Century. J. D. Lyon. A consideration of the present and future of the gas engine. 2000 w. Am Mfr—Jan. 3, 1901.

Gas and Oil Engines. Discusses the fundamental principles, the cycle, gas engine performance, valve gear and governors, igniters, two-cycle engines, oil engine operation, etc., giving illustrated descriptions of numerous types. 25000 w. Power Quar—Oct. 15, 1900.

Lecture to Columbia Students on the Gas Engine. William P. Flint. Presents the advantages of gas engines, discusses the problem of governing, ignition, etc., and briefly reviews the history. 5500 w. Am Mfr—May 2, 1901.

Types of Gas Engines in Most Common Use. Frits W. Lürmann. Condensed translation from "Stahl und Eisen." States the fundamental principles upon which gas motors are constructed, and points out their differences. Ill. 1200 w. Ir & Coal Trds Rev—June 7, 1901.

Gas Engines. George F. Macmun, Jr. Read before the New England Assn. of Gas Engrs. A narration of experiences and observations, difficulties encountered and methods of overcoming them. 2500 w. Am Gas Lgt Jour—March 31, 1902.

Recent Developments in the Gas Engine. T. Hudson Beare. Lecture to the Graduates' Assn. of the Inst. of Mech. Engrs. Considers the improvements since 1889 in detail, and their effects. Serial. 1st part. 4500 w. Engng—May 23, 1902.

The Internal Combustion Engine. Ed. C. de Segundo. On the future outlook for this class of engines. 1200 w. Elec Rev, Lond—Aug. 29, 1902.

Gas and Gasoline Engines. Edward Brenton Boggs. Describes these engines and their cycle of operations, testifying as to their economy and efficiency. 2500 w. Can Engr—March, 1903.

Some Notes on Gas Engines. H. Diederichs. Discusses interesting tests and treatises that have appeared in recent German literature, giving also facts from the writer's own observations. 3000 w. Sib Jour of Engng—Feb., 1904.

Modern Gas and Oil Engine Practice. Horace Allen. States the necessary conditions of internal combustion motors, which have so successfully been fulfilled; reviews the history, and describes the practice followed in different types. Ills. Serial. 1st part. 2500 w. Mech Engr—July 15, 1905.

Air Compressor, Starting.—See **AIR COMPRESSOR—Gas Engine Starting.**

American.—American Internal Combustion Engines. An illustrated review of American gas and oil engine design. 12500 w. Am Elect'n—Jan., 1904.

Bibbins' Paper.—The Internal Combustion Engine.

J. R. Bibbins. Abstract of a paper read before the Modern Science Club, Brooklyn, N. Y. Discusses its principles and uses, new fields, performance, &c. Ills. 2200 w. Elec Rev, N Y—Feb. 4, 1905.

Blaisdell Tandem.—The Blaisdell Tandem Gas Engine. Illustrates and describes a new heavy duty tandem type recently brought out. 1200 w. Ir Age—April 14, 1904.

Blast-Furnace Gas.—Engines for the Utilization of Blast Furnace Gases. Considers the different types of gas motors, von Oechelhaeuser's system, and compares the different systems. Ill. 4300 w. Ir & Coal Trds Rev—Dec. 21, 1900.

Gas Engines for Furnace Gas (Les Moteurs à Gas des Hauts Fourneaux). J. Deschamps. With illustrations of large gas engines used with furnace gases for driving blowing engines and for the production of power. Serial. 5000 w. Revue de Mécanique—July 31, 1901.

Utilization of Blast Furnace Gas in Gas Engines at the Ilseder Works (Verwerthung der Hochofengase in Gasmaschinen auf der Ilseder Hütte). F. W. Lürmann. Describing a plant in which two engines of 1000 H. P. each driving dynamos and one blowing engine of 600 H. P. are operated by furnace gas, at Ilsenburg, in the Harz. 1200 w. Stahl & Eisen—Aug. 15, 1902.

Engines for Blast Furnace Gas (Moteurs à Gas de Haut-Fourneau). H. Hubert. A review of the development of large gas engines for use with blast furnace gases, with especial reference to the Delamare-Deboutteville-Cockerill engines. 12,000 w. 2 plates. Rev Univ des Mines—Sept., 1902.

Recent Developments in the Gas Engine. Prof. T. Hudson Beare. Extracts from a lecture delivered to the Graduates' Sec. of the Inst. of Mech. Engrs., England. On the use of blast-furnace waste gases, their heating value, etc. 3500 w. Ir Trd Rev—Sept. 18, 1902.

Progress in Internal-Combustion Engines. W. H. Booth. A review of recent advances in economy, reliability and range of adaptation, showing the advantages of high compression and the progress in the utilization of waste furnace gases. 3000 w. Engineering Magazine—November, 1902.

The Construction of Large Gas Engines (Verschiedene Constructionen von Grossgasmotoren und ihr Verhalten im Betriebe). H. Reinhardt. Describing many large engines, with especial reference to the use of blast furnace gases. 10,000 w. 2 plates. Stahl u Eisen—Nov. 1, 1902.

Application of Blast-Furnace and Producer Gas to Power Development. C. A. Dawley. A general review of the subject, with two illustrations of gas engines. 2400 w. Sibley Jour Mech Engng—Dec., 1902.

Blast-Furnace Gas Engines and Their Work. Extracts from a critical and descriptive paper by Director Reinhardt of Dortmund, Germany, presented at meeting of the Verein Deutscher Eisenhuettenleute, giving much new information. Serial, 1st part. 2800 w. Ir Age—Dec. 4, 1902.

The Use of Blast Furnace Gas in Gas Engines. Cecil Cochrane. Abstract of a paper read at meeting of Cleveland Inst. of Engrs. at Middlesbrough, Eng. Describes an engine in operation at the Ormesby ironworks, and the results of official trials of a gas-blowing engine, and methods employed. 1900 w. Col Guard—Dec. 19, 1902.

The Blast Furnace as a Power Plant. Edward A. Uehling. Shows the importance of the blast furnace as a source of power and the efficiency of the gas engine as a prime mover. 3300 w. Stevens Ind—Jan., 1903.

The Direct Utilization of Furnace Gas for Power Generation (Die Direkte Verwertung der Gichtgase zur Energieerzeugung). H. Thimm. A general discussion of the use of furnace gas in large gas engines, with plate showing variations in speed and power. 3000 w. 1 plate. Glückauf—Feb. 7, 1903.

The Blast-Furnace Gas Engine Plant of the Kladno Iron Works (Hochofengas Maschinen-Anlange im Eisenwerke Kladno). Karl Machacek. Describing the installation and operation of two 500 H. P. engines, with indicator diagrams and data of tests. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 20, 1903.

Blast Furnace Gas Engines at the Lackawanna Steel Company's Plant. An illustrated detailed description of the plant at Buffalo, N. Y., which is the largest gas engine plant yet installed. 2400 w. Power—Dec., 1903.

A Compact Gas Engine: Beam Type. C. H. Morgan. Illustrates and describes an engine designed with special reference to the use of blast furnace and producer gases. 2000 w. Trans Am Soc of Mech Engrs, No. 016—Dec., 1903.

The Use of Waste Gases in Large Gas Engines. Max Rotter. Read before the Illinois Steel Works Scientific Club. Considers the direct use of waste gases from coke ovens and blast furnaces in large gas engines. 3500 w. Ir Age—March 16, 1905.

The Use of Waste Gases in Gas Engines. Max Rotter. Abstract of an address before the Steel Works Club of Joliet, Ill. Considers briefly coke oven gas, blast furnace gas, governing, &c. 2000 w. Engr, U S A—April 15, 1905.

Power From Waste Furnace Gases. Brief illustrated descriptions of some of the largest installations of gas engines for utilizing the waste gases from blast furnaces. 1400 w. Power—June, 1905.

Electric Power from Blast Furnaces. P. Eyermann. Discusses the advantages of engines, driven by blast furnace gas, and the details of operation of such a plant. 2200 w. Ir Age—July 20, 1905.

See also Cockerill; Düsseldorf Exposition; Large; Nuremberg; Oechselhäuser; Seraing; BLAST-FURNACE GAS.

Blowing Engine.—See Blast-Furnace Gas; BLAST-FURNACE GAS; BLOWING ENGINE—Gas-Driven.

Boat.—See BOAT, GAS-POWER.

Bollinckx.—The Bollinckx Gas Engine and Producer. A. H. Allen. Illustrates and describes particulars of a modern design of this engine. 1200 w. Engr, U S A—July 1, 1904.

Breakdowns.—Gas Engines and Their Breakdowns. Extract from an article in the "Vulcan," giving details of gas-engine crank shaft failures, with comments. 1500 w. Mech Engr—June 3, 1905. See also MOTOR; STEAM ENGINE.

British.—The Large Gas Engine in Great Britain. William H. Booth. An illustrated study of its development and the influence of blast furnace gas, present practice, various types, etc. 4000 w. Cassier's Mag—Sept., 1903.

Some Modern Gas Engines. Illustrates and describes engines manufactured in Great Britain. 7500 w. Engr, Lond—June 23, 1905.

Buffalo Tandem.—The Buffalo Tandem Gas Engine. Illustrated description, noting the distinctive features. 1500 w. Ir Age—Sept. 5, 1901.

Butler.—See Combined Oil; Compound; Rotary Valve.

Calorimetry.—See CALORIMETRY—Exhaust Gases.

Capacity.—See Efficiency.

Carburetter.—See CARBURETTER.

Charon.—Test of a Charon Gas Engine. R. Mathot. An account of tests made of an engine and producer gas power-plant installed at Winterthur (Switzerland). 900 w. Power—Feb., 1903.

Cockerill.—The Use of Blast Furnace Gas in Gas Engines. Cecil A. Cochrane. A paper before the Cleveland Institution of Engineers, giving a description of a 600-horse-power Cockerill gas engine, installed at the Ormesby Iron Works, Middlesbrough, Eng., and the experience in operating it with blast-furnace gas. Also editorial review. Serial. Part I. 4000 w. Engng—Dec. 12, 1902.

Large Gas Engine Practice at Cockerill's Works, Seraing. E. Kilburn Scott. Information concerning large gas engine practice, and observations during a recent visit at these works. 1500 w. Elec Rev, Lond—March 29, 1901.

500 B. H. P. Gas Driven Dynamo Engine. Illustrated description of a double-acting two-cylinder gas engine of the Cockerill type, recently built for the electric station of Middlesbrough works. 800 w. Engr, Lond—April 7, 1905.

The Cockerill Gas-Engines at the Liége Exhibition. Two illustrations and brief descriptions of the three engines exhibited. 600 w. Engng—June 2, 1905.
See also VALVE GEAR.

Coke-Oven Gas.—See Blast-Furnace Gas; Test; COKE-OVEN GAS.

Combined Oil and Gas.—Brake Horse-Power Combined Gas and Oil Engine (Butler's Patents). Illustrated description of an engine instantly interchangeable from town gas to kerosene oil, while running, without even having to switch off the electric lights for a moment. 500 w. Engng—Dec. 26, 1902.

Combustion.—See Explosion.

Combustion Chamber.—Experiments with a Chamber for the Production of a Hot Working Fluid to be Used in the Generation of Power. J. F. Wentworth. Describes investigations extending through six months on a working fluid for internal combustion engines. 3000 w. Power—Nov., 1904.

Compound.—I. Should a Gas Engine Be Compounded? E. W. Roberts. II. Successful Compounding Improbable. C. V. Kerr. III. Why It Is Unnecessary to Compound a Gas Engine. C. E. Sargent. A series of articles discussing the subject of compounding, both in theory and practice, with editorial. 4000 w. Mod Mach—Nov., 1900.

Why Compounding Gas Engines Failed. H. J. Podlesak. Reviews the attempts made to compound gas and gasoline engines. 1500 w. Mod Mach—Dec., 1900.

Three-Cylinder Compound Gas Engine. An illustrated description of a 100-horse-power compound gas engine constructed by Clarke, Chapman & Co., under Mr. Butler's patents, with a set of indicator cards. 600 w. Engr, Lond—Dec. 12, 1902.

Butler's Three-Cylinder Compound Gas Engine. Illustrated description of an engine of vertical type having novel features. 1000 w. Mech Engr—Jan. 31, 1903.

Some Remarks on the Compound Explosion Engine. E. Butler. Gives an illustrated description of an engine designed by the writer, demonstrating the behavior of the explosive gases. 1600 w. Feilden's Mag—May, 1903.

Butler's 5,000 H. P. 3-Cylinder Double-Acting Compound Gas Engine. Illustrations and particulars of a vertical engine designed by Edward Butler. 800 w. Mech Engr—June 20, 1903.

Compression.—Compression in the Gas Engine. W. H. Booth. Information on the degree of compression to which gas engines can safely be worked, with diagrams. 700 w. Elec Rev, Lond—Aug. 21, 1903.

The Effect of Hydrogen on Gas Engine Compression. George M. S. Tait. Discusses the advantages gained by high compression in gas engines, and the necessity of putting the compression much lower to prevent pre-ignitions when hydrogen is present, and refers to a new system in which steam is replaced by cooled exhaust gases. 1200 w. Sci Am—Sept. 23, 1905.

Compressor Plant.—See Gas Compressor Plant.

Control, Exhaust Valve.—A New Method of Control. Illustrated description of the Hopkins device for the regulation of the time of the exhaust valve of internal-combustion motors. 700 w. Autocar—Aug. 6, 1904.

Cooling.—See Temperature; AUTOMOBILE, GASOLINE; GASOLINE ENGINE.

Crossley.—See Test; GAS POWER PLANT—Elderslie, Clyde.

Current Practice.—See Development.

Cylinder.—See Explosion.

Cylinder Casting.—See CASTING—Gas-Engine Cylinders.

Cylinder Temperature.—See Temperature.

Cylinder Walls.—See Temperature.

Davey—Paxman.—See GAS PRODUCER.

Delamare-Deboutteville. — See Blast-Furnace Gas; Königshof, Bohemia.

Design.—A Note on the Computations for Gas Engines (Beitaag zur Berechnung der Gasmaschine). R. Barkow. A mathematical investigation of the forces acting in a gas engine as deduced from the indicator diagram. 1800 w. Zeitschr d Ver Deutscher Ing—Nov. 16, 1901.

Design for a One-H. P. Gas Engine. J. C. Brocksmith. Description and working drawings of a gas engine to develop continuously one brake horse-power at the moderate speed of 500 r. p. m. Especially designed for electrical work. 3700 w. Am Elect'n—Dec., 1901.

The Design of Gas Engines (Beitrage zur Berechnung der Gasmaschine). Rudolf Barkow. A mathematical discussion of the action of two-cycle gas engines and the amount of compression. 1200 w. Zeitschr d Ver Deutscher Ing—Jan. 18, 1902.

The Calculation of the Principal Dimensions of the Internal Combustion Engines (Berechnung der Hauptmasse der Verbrennungsmotoren). Hugo Güldner. An article on the design of these engines, with formulae for the stroke, piston diameter, and number of revolutions, and also table of fuel data. 3000 w. Zeitschr d Ver Deutscher Ing—April 26, 1902.

Design of Gas Engines. James Dunlop. The first of a series of articles on the operation of gas engines, and the design of the various parts. Serial. 1st part. 1400 w. Mech Engr—Oct. 4, 1902.

Current Practice in Gas Engine Design. H. Lee Koenig and G. W. Rice. Investigations based on data of some eighty engines. 3800 w. Sib Jour of Engng—June, 1903.

Contributions to the Design of Gas Engines (Beiträge zur Berechnung der Gasmaschine). Rudolf Barkow. A discussion, with formulae and diagrams, of some points in the theory and design of gas engines. 1500 w. Zeitschr d Ver Deutscher Ing—June 27, 1903.

Air and Gas Mixtures, Explosion Pressures, and Cylinder Proportions of Gas Engines. James Dunlop. Gives method of determining the above points, devised by the writer, and agreeing closely with practice. 1600 w. Mech Engr—July 18, 1903.

Gas Engine Design Constants and Formulas. Sandford A. Moss. Gives tabulated data, the result of an investigation of gas-engine properties begun by the Dept. of Mach. Design, Cornell Univ., with explanations of formulas derived. 2500 w. Am Mach—April 14, 1904.

Recent Developments in Gas Engines. An illustrated article referring particularly to the large German and other European designs. 2400 w. Ir & Steel Mag—Dec., 1904.

European Gas Engine Practice. A. H. Allen. Considers the main features of the more recent designs of engines, and also the producer plants. 3000 w. Engr, U S A—Jan. 1, 1905. (Special.)

Notes on the Design of Large Gas Engines with Special Reference to Railway Work. Arthur West. Read before the Am. Ry., Mech. & Elec. Assn. Discusses important considerations in the design of large gas engines, and some of the differences in European and American designs. Ills. 2000 w. St Ry Jour—Sept. 30, 1905.
See also Part Sizes; STEAM ENGINE.

Deutz.—See BOAT, GAS POWER.

Development.—Recent Improvements in Gas Engines. Abstract of a paper by James Atkinson, read at meeting of the Manchester Assn. of Engrs. (England), and of the discussion. Calls attention to recent improvements and the rapid development of gas engines. 6000 w. Jour Gas Lgt—March 3, 1903.

Recent Developments in Gas Engines. A. V. Coster. Considers the great changes due to the manufacture of cheap gas, and changes in the design of gas engines. Particularly considering large gas engines of 500 brake H. P. and upwards. Ill. Serial. 1st part. 1500 w. Prac Engr—April 24, 1903.

Recent Developments in the Construction and Working of Gas Engines. Prof. D. S. Capper. Honorary member's paper read before the Junior Inst. of Engrs. Reviews the important points in the early history, and shows how recent improvements in construction have in some respects placed it in advance of the steam engine. General discussion. 10000 w. Jour Gas Lgt—Dec. 8, 1903.

Internal Combustion Motors. Dugald Clerk. Abstract of a lecture before the Inst. of Civ. Engrs. Notes briefly what has been accomplished and discusses what remains to be done in the development of internal combustion motors. Serial. 1st part. 2000 w. Engr, Lond—April 22, 1904.

The Development of the Gas Engine. Albert Stritmatter. Reviews the history of the development. 2000 w. Engr, U S A—Jan. 1, 1905.

Current Practice in Combustion Engines. Brief illustrated descriptions of the more important features of various engines. 12800 w. Engr, U S A—Jan. 1, 1905. (Special.)

The Present Position of the Gas Engine. Horace Allen. Outlines the combination, fully proved to be satisfactory, which, in the writer's opinion, explains the present position. Also considers points bearing on this subject. 1200 w. Elec Rev, Lond—May 26, 1905.

The Growth of Large Gas Engines on the Continent. Rodolphe E. Mathot. An illustrated review of the development, especially the improvements introduced during the past five or six years. 13500 w. Inst of Mech Engrs—June, 1905.

Internal Combustion Engines. Dugald Clerk. The first of a series of articles explaining the fundamental principles of these engines, and reviewing the history of their development. Serial. 1st part. 5000 w. Jour Soc of Arts—July 7, 1905.

See also **BLAST-FURNACE GAS; GAS FUEL; GAS POWER; GAS-POWER PLANT.**

Double-Acting Tandem.—See **Nuremberg.**

Doué.—A New Two-Cycle Gas Engine (Un Nouveau Moteur à Deux Temps). H. André. A description of the Doué motor with single oscillating cylinder, the compression being effected on the front side of the piston. 1200 w. Revue Technique—Sept. 25, 1903.

Dry-Dock Plant.—See **GAS POWER PLANT—Elderslie.**

Dunlop.—Dunlop's Reversible Self-Starting Internal-Combustion Engines. The illustrations show a launch engine. The arrangement and operation are fully described. 2500 w. Mech Engr—May 9, 1903.

Düsseldorf Exposition.—Gas Engines at the Düsseldorf Exposition (Die Industrie und Gewerbeausstellung in Düsseldorf 1902. Die Gasmaschinen). R. Schöttler. A general review. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—June 14, 1902.

Gas Engines at the Düsseldorf Exposition (Düsseldorfer Ausstellung 1902. Grosse Gasmotoren). C. Volk. Illustrated descriptions of large gas engines, particularly those for using blast-furnace gas. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 28, 1902.

Furnace-Gas Motors at the Düsseldorf Exposition 1902 (Die Gichtgasmotoren auf der Austellung Düsseldorf, 1902). W. Hübbe. With numerous illustrations of the various large engines exhibited for use with waste gases of blast furnaces. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 19, 1902.

Economy.—The Economy of Small Gas Engines Using Montreal Illuminating Gas. Horner M. Jaquays. Information based on tests made under conditions as nearly similar to those which occur in practice as it is possible to make them. Ill. 3000 w. Can Soc of Civ Engrs, Adv Proof—March, 1903.

The Gas Engine from the Manager's Standpoint. H. W. True. Read before the New England Assn. of Gas Engrs. Discusses the fuels and their cost for gas engines, their most profitable uses, reliability, and the methods that should be pursued by gas companies to have manufactured gas used, etc. General discussion. 9000 w. Am Gas Lgt Jour—April 11, 1904.

The Economy of Large Gas Engines. Remarks made by Dr. Edward Hopkinson, as a witness before the Royal Commission on coal supplies, dealing with the economy of fuel which may be anticipated from the use of large gas engines in the place of steam engines for driving dynamos. 2800 w. Mech Engr—Oct. 1, 1904.

Gas Engine Economy. Charles Edward Lucke. The present article is introductory; remarks on the importance of economy. Serial. 1st part. 1200 w. Engr, U S A—Jan. 1, 1905. (Special.)

Gas Engine Economy. George Miller. Remarks on the effect on economy due to the position of the igniter. 1700 w. Mach, N Y—Feb., 1905.

See also **Efficiency; Fuel.**

Efficiency.—The Computation of the Efficiency and Capacity of Gas Engines (Die Berechnung des Mechanischen Wirkungsgrades und der Leistung von Gasmaschinen). A. Riedler. A discussion of the correct method of computing the mechanical efficiency of a gas engine. 3500 w. Zeitschr d Ver Deutscher Ing—Feb. 25, 1905.

The Mechanical Efficiency and Indicated Capacity of the Gas Engine (Der Mechanische Wirkungsgrad und die Indizierte Leistung der Gasmaschine). An exhaustive symposium, to which contributions are made by Stodola, Riedler, Schöttler, Meyer, Ehrhardt, and Wagener. 10000 w. Zeitschr d Ver Deutscher Ing—April 1, 1905.

The Mechanical Efficiency of the Gas Engine. W. H. Booth. An explanation of the losses that occur and their cause, and a comparison with steam engine efficiency. 1500 w. Power—May, 1905.

The Mechanical Efficiency and Indicated Capacity of the Gas Engine. (Der Mechanische Wirkungsgrad und die Indizierte Leistung der Gasmaschine). Rudolf Diesel. An examination of the various conditions under which the efficiency of an internal-combustion motor may be stated, with especial reference to the tests of the Diesel motor. 3000 w. Zeitschr d Ver Deutscher Ing—May 20, 1905.

The Mechanical Efficiency and Indicated Power of Gas Engines (Der Mechanische Wirkungsgrad und die Indizierte Leistung der Gas Maschine). Hugo Güldner. A discussion of the basis on which the mechanical efficiency should be computed, taking the compression resistance into consideration. 1500 w. Zeitschr d Ver Deutscher Ing—June 24, 1905.

"Mechanical Efficiency" in the Gas Engine. Editorial review of an interesting discussion that has been recently published in Germany concerning the meaning of the term "mechanical efficiency" in the case of gas engines. 4000 w. Eng News—Aug. 3, 1905.

See also **Economy; Ignition Point; Test.**

Elba.—See **BLAST FURNACE GAS.**

Electric Generation.—Gas Engines and Electric Power Plants. Reviews the series of articles published in "Engineering" by Philip Dawson, relating to the use of gas engines in connection with electric power plants. Serial. 1st part. 1100 w. Jour Gas Lgt—Dec. 11, 1900.

Power-Gas and Large Gas-Engines for Central Stations. Herbert A. Humphrey. Discusses gas engines, their economy as compared with steam engines, their reliability, etc., and gives appendices containing information of interest. Ill. 9800 w. Inst of Mech Engs—Dec. 14, 1900.

A Test of a Gas Engine Electric Lighting Plant. H. N. Cheney. Read before the New England Assn of Gas Engs. Describes a test made at the Mechanics' Building, Boston, of a plant used for exhibition purposes at a fair. Ill. and discussion. 8,000 w. Am Gas Lgt Jour—March 11, 1901.

Electric Light and Power Station at Halle (Elektrische Kraft und Licht Centrale der Werschen-Weissenfelser Braunkohlen Aktien Gesellschaft in Halle a. S.). O. Gähring. Showing the advantages of using the gas produced in the dry distillation of lignite as fuel for internal combustion motors. 2500 w. Glückauf—May 11, 1901.

A Gas-Engine-Driven Electric-Power Plant at Saltley, England. Illustrated description of an electric power installation being placed in works for the manufacture of railway carriages and wagons of all types, street cars and all kinds of vehicles for heavy and light railways. 2000 w. Engr, U S A—Jan. 15, 1902.

Large Gas Engines for Driving Electric Generators. A. R. Bellamy. Abstract of a paper read before the Manchester Section of the Inst. of Elec. Engrs. Summarizes the complaints that have been brought against the gas engine, explaining what has been done to obviate them. 3800 w. Mech Engr—April 12, 1902.

Gas Engines for Electric Stations. G. H. Baillie. A general discussion of the operation of electric stations by gas engines and a comparison with steam engines. 2000 w. Engr, Lond (Elec Engng Sup)—Dec. 12, 1902.

Gas Engines for Electric Lighting. H. B. Graham. Abstract of a paper read before the Birmingham Local Sec. of the Inst. of Elec. Engrs. and of the discussion. Discusses results obtained, the flywheel problem, balancing, bearings, etc. 3300 w. Elect'n, Lond—Jan. 30, 1903.

An Application of Gas-Engines to Isolated Plant Work. An illustrated description of the power equipment of the Keystone Bank Building, Pittsburg. 1000 w. Am Elect'n—April, 1903.

Internal-Combustion Engines for Driving Dynamos. Herbert A. Humphrey. Read at the Engng. Con. of the Inst. of Civ. Engrs. Considers the types of gas-engines now made for driving dynamos, giving figures showing the number of impulses per revolution and the horse-power up to which each type is constructed. 2800 w. Engng—June 19, 1903.

The Gas Engine for Central Station Service. Ralph D. Mershon. Read before the N. Y. Elec. Soc. Considers methods of operating, governing, etc.; also cost. 4500 w. Engr, U S A—April 1, 1904.

The Present Possibilities of the Gas Producer and Gas Engine for Central Station Purposes. Discusses the subject from the viewpoint of conditions in England. 1400 w. Elec Rev, Lond—April 29, 1904.

A Gas Engine Harbor Electric Plant. Illustrated description of interesting features in the plant of the Midland Railway Company at the new harbor in Morecambe Bay for the Isle of Man and Irish traffic. 3300 w. Elec Wld & Engr—Oct. 8, 1904.

Gas Engines in Power Plants. William T. Magruder. Read before the Mech. Elec. & Steam Engrs. at the Canton, O., meeting. Discusses the advantages of the use of gas engines in power plants, and why they are not more frequently used. 2500 w. Ir Trd Rev—Dec. 8, 1904.

Gas Engines in Power Plants. William T. Magruder. Abstract of a paper read before the Ohio Soc. of Mech., Elec., and Steam Engrs. Arguments for the use of gas engines. 2500 w. Engr, U S A—Jan. 1, 1905. (Special.)

Gas Engines for Central Stations. Hugh Campbell. Read before the Leeds Local Sec. of the Inst. of Elec. Engrs. Describes some recent plants where gas engines have been installed, showing the great improvement in economy since the first installation, and giving information of value. 3500 w. Engng—Dec. 16, 1904.

The Development of the Gas Engine and Its Application to Electric Central Station Service. R. T. MacKeen. Gives a comparative idea of the relative efficiency of steam engines and gas engines, and considers in detail the principle of the gas engine and the gas producer. 3200 w. Can Elec News—Jan., 1905.

Some Continental Central Stations Operating with Gas Engines. Franz Koester. An illustrated article describing a few of these stations. 3500 w. Elec Rev, N Y—Jan. 14, 1905.

Explosion Motors (Die Explosionsmaschine). L. Dölling. A general review of the development of the internal-combustion motor and its applications to power generating stations. Three articles. 7500 w. Zeitschr f Elektrotechnik—June 4, 11, 18, 1905.

Utilization of Gas Engines in Connection with Long Distance Electric Transmission. Jno. Martin. Read before the Pacific Coast Gas Assn. Brief account of the use of gas engines by the California Gas & Electric Corporation, describing the engines now being built. 2000 w. Jour of Elec—Aug., 1905.

Utilization of Gas Engines in Connection with Long-Distance Electric Transmission. John Martin. Read before the Pacific Coast Gas Assn. Information concerning the application of gas engines in California, in which the gas used is derived from crude oil. 2000 w. Elec Wld & Engr—Aug. 5, 1905.

Utilisation of Gas Engines in Connection with Long Distance Electric Transmission. J. Martin. Read before the Pacific Coast Gas Assn. Describes large gas engines to be used in California, for the generation of electricity in times of emergency on long distance transmission lines. Discussion. 5500 w. Am Gas Lgt Jour—Sept. 18, 1905.

See also Test, Crossley; ELECTRIC GENERATOR—Girard Regulation; ELECTRIC RAILWAY—Mödling-Hinterbrühl; ELECTRIC STATION—Gas Power; Gas Works Combined; Tunis; Walthamstow; ELECTRIC SUB-STATION — Comparison; GAS POWER; GAS POWER PLANT; HYDRO-ELECTRIC PLANT—Gas Engine Combined.

Electric Generation, Madison.—Central Station Gas Engines. C. H. Williams. Read before the Wisconsin Gas Assn. An account of the plant at Madison, Wis., where gas engines have been installed to furnish the motive power of a central station generating plant, with a general discussion of gas engines. 5000 w. Pro Age—Feb. 16, 1903.

Electric Generation, Norway.—Electric Plant Operated by Gas. Einar Rasmussen. Describes the generators and engines used to run an electric station in Norway. 800 w. Am Mfr & Ir Wld—Nov. 1, 1900.

Electric Motor Compared.—See ELECTRIC MOTOR.

Electric Plant.—See Electric Generation.

Electric Station.—See Electric Generation.

Electric Transmission.—See Electric Generation.

Europe.—Design, Construction and Application of Large Gas Engines in Europe. Franz Erich Junge. The first of a series of articles dealing with types of engines which have been built and shown results. Considers the two-cycle problem. Serial. 1st part. 3300 w. Power—Nov., 1905.

See also British; Design; Electric Generation; France; Germany.

Exhaust Temperature.—See Temperature Exhaust.

Exhibition, London.—Recent Gas and Oil Engine Developments. Thomas Holgate, in "Technics." Reports the development as shown by engines exhibited at Earl's Court, giving illustrations. 3300 w. Sci Am Sup—May 13, 1905.

Experimental Construction.—Experimental Gas Engine Construction. Don McNaughton. On points of importance in the construction. 1800 w. Horseless Age—March 26, 1902.

Mr. Dugald Clerk on Gas Engines. Extracts from a lecture delivered at the meeting of the Inst. of Engrs. in Scotland. Considers the nature of a gaseous explosion, and describes the mechanical features of a gas engine. 3800 w. Jour Gas Lgt—Jan. 28, 1902.

Explosion.—Generation and Distribution of Hot Gases in Internal Combustion Engines. Charles E. Lucke. Discusses points in hot gas generation and some of the principles to be considered in designing these engines. Serial. 1st part. 2500 w. Horseless Age—Jan. 15, 1902.

The Explosive Wave in Engine Cylinders. Charles E. Lucke. An account of investigations of the causes of abnormally high pressures, which are often dangerous. Ill. 2000 w. Horseless Age—Nov. 19, 1902.

A Preliminary Note on Gas-Engine Explosions. H. E. Wimperis. Read before the British Assn. An application of the variable specific heat hypothesis to the classical experiments made by Mr. Dugald Clerk. An important contribution to the thermodynamics of heat engines, and of interest to designers of gas engines. 1100 w. Engng—Oct. 10, 1902.

A Further Note on Gas-Engine Explosions. H. E. Wimperis. Read before the British Assn. The writer in a former paper considered the experiments of Mr. Dugald Clerk on the thermodynamics of the gas engine; and in the present paper considers the experiments of Mr. Grover, comparing the two and endeavoring to reconcile the previously inconsistent results. 2500 w. Engng—Sept. 18, 1903.

Experiments on Gas Explosions in a Closed Vessel. L. Bairstow and E. C. Horsley. An account of experimental investigations with results. 900 w. Engng—Nov. 28, 1902.

Experiments in Gas Explosions. L. Bairstow. Read before the British Ass'n. An account of experimental investigations. 1600 w. Mech Engr—Nov. 21, 1903.

Gas Explosions. L. Bairstow and A. D. Alexander. Deals with results obtained by Mr. Grover when determining the effects of the products of combustion on the next explosion. Serial. 1st part. 1300 w. Engng—March 11, 1904.

Physico-Chemical Aspects of the Process of Combustion in Gas Engines (Physikalisch-Chemische Betrachtungen über den Verbrennungsprozess in den Gasmotoren). Prof. W. Nernst. Paper before the Verein Deutscher Ingenieure, discussing thermodynamics and other theoretical aspects of internal-combustion motors. 6000 w. Zeitschr d Ver Deutscher Ing—Sept. 2, 1905.
See also GAS—Explosive Mixtures.

Explosive Wave.—See Explosion; GAS; GAS EXPLOSION.

Fencing.—See SAFETY APPLIANCE.

Fire Service.—See WATERWORKS.

Flame Temperature.—See Explosion; Temperature, Flame.

Flywheel.—See FLYWHEEL—Internal Combustion Motors.

Four-Cylinder.—Four-Cylinder Gas Engine. Illustrates and describes an engine designed to develop 150 horse-power, at a speed of 250 revolutions per minute using producer gas. 1000 w. Engr, Lond—Aug. 28, 1903.

France.—The Gas Engines of the Société Française de Constructions Mécaniqnes (Moteurs à Gas Construits par la Société Française de Constructions Mécaniques). Ch. Dantin. With drawings of engines, and a photograph of a 1,200 H. P. engine in course of erection. 2000 w. 1 plate. Génie Civil—Oct. 8, 1904.

1,200 Horse-Power Gas Engine. Illustrated detailed description of a blowing engine recently built in France. 800 w. Engr, Lond—March 17, 1905.

Friedenthal.—See STEAM ENGINE.

Fuel.—The Gas Engine and Its Fuel. Abstracts of two lectures recently delivered in England; one by Prof. T. Hudson Beare on Recent Developments of the Gas Engine; the other by Mr. Frederick Grover, on Gas Engines. 2800 w. Gas Wld—Feb. 15, 1902.

Large Gas Engines and the Gases Used by Them. Dugald Clerk. Read before the Gas Inst. (England). Describes the construction and working of some large gas engines on the continent using blast furnace and other gases. Discussion follows. 10400 w. Gas Wld—June 14, 1902.

Power and Economy of the Gas Engine as Influenced by the Fuel. William P. Flint. A short paper discussing the commercial gases, followed by general discussion. 2500 w. Pro Engrs Soc of W Penn—May, 1903.

Different Gases in Gas Engines. Prof. Alfred H. White. Lecture delivered at the Detroit meeting of the Am. Gas Lgt. Assn. Considers the influence of the kind of gas used, explaining the phenomena which take place in the engine cylinder. 5500 w. Am Gas Lgt Jour—Nov. 16, 1903.
See also Test; GAS FUEL.

Fuel Consumption.—Observations on Internal Combustion Motors (Beobachtungen an Explosionsmotoren). A. Weber-Sahli. With curves showing the gas consumption of various motors. 1200 w. Zeitschr d Ver Deutscher Ing—Nov. 2, 1901.

The Determination of Fuel Consumption in Gas Engines (Evaluation de la Consommation dans les Moteurs à Gaz). J. Deschamps. A discussion of the varying methods of recording the performance of gas engines, with suggestions as to the unifying of methods in order to render results comparable. 5000 w. Mem Soc Ing Civ de France—Aug., 1902.

Cause of Increased Consumption in Gas and Gasoline Engines. Albert Stritmatter. Attributes the trouble to the lack of proper care. 1800 w. Am Mfr—Dec. 25, 1902.

Furnace Gas.—See Blast-Furnace Gas; Producer Gas.

Gas Compressor Plant.—A 1,000 Horse-Power Gas Engine and Compressor. E. E. Eysenbach. Read before the Ohio Gas Lgt. Assn. Describes a gas-engine near Lancaster, Ohio, having four 25x48-in. engine cylinders, and two 16x24 in. gas compressing cylinders. The pump is rated at 12,000,000 cu. ft. of natural gas at 315 lbs. in 24 hours, the inlet pressure being 100 lbs. 1200 w. Eng Rec—May 4, 1901.

Gases Used.—See Fuel; Fuel Consumption.

Gas Generation.—See Explosion.

Gas Pumping Station.—See GAS DISTRIBUTION—Pumping Station.

Germany.—The Gas Engine Situation in Europe. G. L. Carden. Brief description of some of the high-power gas engines being made in Germany. Ill. 1500 w. Am Elect'n—Jan., 1904.

Recent German Gas Engines. Prof. E. Meyer. Read before the Verein Deutscher Eisenhüttenleute. Describes some of the recent large gas engines of German makers. Ills. 1200 w. Am Mfr & Ir Wld—April 6, 1905.

Large German Gas Engines. Abstract of an address delivered before the Soc. of German Engrs. by Prof. Riedler, who describes and criticises the principal makes of large gas engines built in Germany, and gives a short history of internal combustion engines in general. Ills. Serial. 1st part. 3500 w. Ir Age—June 22, 1905.

Governing.—Governing Gas and Gasoline Engines. Dugald Clerk. Read before the Auto Club of Great Britain and Ireland. A review of methods used in the past and present. 3300 w. Mech Engr—Feb. 6, 1904.

Governing Gas and Petrol Engines. Dugald Clerk. Excerpts from a paper read at meeting of the Automobile Club, London. Briefly considers methods that have been and are in use. 1500 w. Auto Jour—Oct. 31, 1903.

The Regulation of Gas Engines. Dr. Charles E. Lucke. Concludes that regulation of angular velocity can be adjusted in gas engines to as small limits as in steam engines; also considers regulation of steam. General discussion. 8700 w. Pro N Y R R Club—Nov. 18, 1904.

Governing Large Gas Engines. Charles S. Sage. Discusses the requirements of a controlling device that will give the best possible efficiency. 4500 w. Power—Jan., 1905.

Governing of Gas and Oil Engines. Brief discussion of the merits of the several systems. 1000 w. Prac Engr—Sept. 8, 1905.

The Various Methods of Governing Four-Cycle Gas Engines. Rodolphe Mathot. A comparison of the hit-or-miss method with those employing regulation of the charge. 3000 w. Engineering Magazine—Dec., 1905.

Guaranties.—Gas Engine Guaranties Technically Considered. William T. Magruder. Presented at meeting of the Nat. Assn. of Gas & Gasoline Eng. Mfrs. Outlines the history of these engines, and considers power rating, regulation, cost of running and fuel consumption. 4500 w. Power—Feb., 1901.

Heat Balance.—The Heat Balance of Gas Engines (Beitrag zur Wärmebilanz des Gasmotors). A. Staus. A discussion of the balance of the energy input and output of gas engines, with an illustrated description of a calorimeter for measuring the energy in the exhaust gas due to its heat and velocity of efflux. 1000 w. Zeitschr d Ver Deutscher Ing—May 3, 1902.

High Power.—High Power Gas Engines: Conditions Necessary for Their Successful Working. A. Rollason. Read before the Glasgow and West of Scotland Technical College Scientific Society. Reports in the present article, tests made of two types of engines to determine their respective capabilities, giving indicator cards. 1300 w. Prac Engr—Jan. 10, 1902.

High-Speed.—The Construction of High Speed Explosion Motors (Construction des Moteurs à Explosions et à Grande Vitesse). Louis Berger. Discussing especially the form of the cams for the operation of the valves. 2000 w. Revue Technique—Aug. 10, 1902.
See also Speed Limit.

History.—The Gas Engine. Illustrated historical review. 2800 w. Engr, U S A—Jan. 15, 1901.

The Commercial Development of the Gas Engine.

Reviews the work of the early inventors and progress to the present, beginning an illustrated description of the Westinghouse engine. Serial. 1st part. 4000 w. Mech Engr—Oct. 11, 1902.

The Gas Engine and Its Future. Briefly reviews the history of gas engines, considering the details of the large-unit class and its applications, in order to determine its suitability for power stations and its present position. Serial. 1st part. 1700 w. Elec Rev, Lond—Aug. 7 ,1903.

The Modern Gas Engine. F. E. Matthews. Reviews some of the early efforts to build gas engines, discussing the essentials to efficiency, the operation of multiple-cycle engines, and other subjects of interest. Ills. Serial. 1st part. 2200 w. Ice & Refrig—Aug., 1905.

See also **Development.**

Holland.—The Development of Large Gas Engines (De Opkomst der Groote Gasmotoren). Chr. Muller. A discussion of the advantages of the large gas engine, supplied with producer gas, as adapted to the industries of Holland. 3000 w. De Ingenieur—May 3, 1902.

Horse Power.—See **Power.**

Ignition.—See **IGNITION.**

Ignition Advance.—See **IGNITION—Advance.**

Ignition, Compression.—A Compression Combustion Motor (Moteur à Combustion par Compression). M. Cannevel. Describing a design for a gas or petroleum engine with compression ignition. 800 w. Comptes Rendus—Dec. 14, 1903.

Ignition Point.—Heat Efficiency of a Gas Engine as Modified by Point of Ignition. C. V. Kerr. An account of tests made in the gas engine laboratory of the Armour Inst. of Technology, with conclusions reached. 1600 w. Trans Am Soc of Mech Engs, No. 880—Dec., 1900.

Point of Ignition and I. H. P. in Gas Engines. Charles E. Lucke. An account of tests made to find some of the relations between the varying point of ignition and the resulting work area or indicated horse-power. 2000 w. Horseless Age—Dec. 4, 1901.

Indicator Diagrams.—Gas Engine Diagrams. W. H. Booth. An illustrated discussion of gas-engine indicator diagrams, and a comparison with steam engine diagrams. 1600 w. Elec Rev, Lond—Dec. 12, 1902.

See also **MANOGRAPH.**

Inertia.—See **INERTIA.**

Iron Works.—Power Generation with Large Gas Engines (Betriebserfahrungen mit Grossgasmotoren). H. Strack. Discussing especially the use of gas power in iron works, with illustrations of large gas-blowing engines. 6000 w. 3 plates. Stahl u Eisen—Nov. 15, 1904.

The Gas Engine in Iron and Steel Works. J. H. Hamilton. Read at meeting of the Staffordshire Iron and Steel Inst. Considers the advantages of the internal combustion engine, discussing its efficiency, economy, etc. 3700 w. Ir & Steel Trds Jour—Dec. 3, 1904.

High Power Gas Engines in Electric Power Plants of German Ironworks. Frank C. Perkins. Brief illustrated descriptions of a 1,200-H. P., double-acting, tandem gas-engine, driving generator at the Dillingen iron works, and a 650-H. P. gas engine at the Holberger iron-works. 1200 w. Elec Rev, N Y—July 1, 1905.

See also **Blast-Furnace Gas; Producer Gas; GAS POWER; GAS POWER PLANT; IRON WORKS.**

Junge.—See **MOTOR.**

Kladno Iron Works.—See **Blast-Furnace Gas.**

Königshof, Bohemia.—Three Hundred Horse Power Tandem Gas Engine (Dreihundertpferdiger Tandem-Gasmotor). V. Schönbach. Description of the Delamare-Deboutteville engine at the Königshof iron works in Bohemia, using blast-furnace gas. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 30, 1901.

Körting.—The Körting Two-Cycle 350 Brake Horse-Power Gas Engine. Illustrated description. The test gave interesting results. 1400 w. Engr, Lond—Jan. 4, 1901.

700 Horse-Power Blast-Furnace-Gas Engine. Illustrated description of a double acting two-cycle gas engine of the Körting type, exhibited at the Düsseldorf Exhibition. 1100 w. Engng—June 27, 1902.

500 H.-P. Double-Acting Körting Gas Engine and Blowing Cylinder. Illustrated description of an engine exhibited at Düsseldorf. 850 w. Plate. Engng—Sept. 26, 1902.

The Körting Gas Engine. Illustration with description of this large gas engine and its operation. 1200 w. R R Gaz—Dec. 5, 1902.

Important Gas Engine Installation. Gives an illustrated description of the Körting gas engine of 1000 H. P., built for the Lackawanna Steel Co., Buffalo. There will be 8 engines of this size and 16 of 2000 H. P. each, all operated by blast furnace gas. 2800 w. Mach, N Y—Jan., 1903.

700-Horse-Power Double-Acting Gas Engine: Körting System. An illustrated detailed description of the engine and its working. 1600 w. Engng—Oct. 30, 1903.

The Körting Four-Cycle Gas Engine. F. E. Matthews. Illustrated description of this engine with report of tests. 1600 w. Cent Sta—April, 1905.

Lackawanna Steel Co.—See **Blast-Furnace Gas; Körting.**

Large.—New Types of Gas Engines (Les Types Nouveaux de Moteurs à Gaz). J. Deschamps. With especial reference to engines of large power, used with furnace or producer gas. 2500 w. Génie Civil—Jan. 12, 1901.

Recent Progress in Large Gas Engines. Herbert A. Humphrey. Read at Belfast meeting of the British Assn. Remarks on the progress with illustrated descriptions of various types. Serial. 1st part. 3000 w. Engng—Sept. 19, 1902.

Varieties in the Design of Large Gas Engines (Verschiedene Constructionen von Grossgasmotoren). A communication from Herr Joh. Körting discussing the construction and action of large gas engines, with especial reference to the mixture of the charge. 1800 w. 4 plates. Stahl u Eisen—Dec. 15, 1902.

Development of Gas Engines of Large Units. Fred B. Wheeler. Considers the subject in regard to natural gas, producer gas, illuminating gas, and blast furnace gas; also pumping engines for natural gas and for water, central station use, and general power purposes. Ill. 2000 w. Ir Age—Jan. 1, 1903.

Gas Fuels for Modern Engines. George E. Walsh. Considers briefly the advance in engines of large units, those operated by natural gas; those adapted to use poor gas; and furnace gas engines. 2700 w. Ir Age—Jan. 29, 1903.

Large Gas Engines (Ueber Gross-Gasmaschinen). Dr. Eugen Meyer. An address reviewing the development of the gas engine on the Continent, with illustrations of a number of engines of 1,000 H. P. and over. Two articles. 8000 w. 4 plates. Stahl u Eisen—Jan. 15, Feb. 1, 1905.

Experience with Large Gas Engines. Abstract of an address by Herr Strack, translated from ‘Stahl und Eisen.” Describes the gas engines used, and gives an account of their working. 2800 w. Ir Age—Jan. 19, 1905.

Large Gas Engines (Gross-Gasmaschinen). A. Riedler. An exhaustive review of the development of the large gas engine, with details of construction of leading types, and a review of performance and efficiency; an important paper. 20,000 w. Zeitschr d Ver Deutscher Ing—Feb. 25, 1905.

See also **Blast-Furnace Gas; Cockerill; Holland; Mond Gas; Oechselhäuser; Producer Gas; BLAST FURNACE GAS.**

Lean Gas.—Engines for Use with Lean Gas (Les Moteurs à Gaz Pauvre). A. Abraham. An exhaustive examination of the thermal and mechanical conditions involved in the direct production of power from gases of low calorific value. Serial. Part I. Revue Technique—Jan. 10, 1904.
See also **Producer Gas; GAS-POWER PLANT—Embrach, Switz.**

Letombe.—The Letombe Gas Engine. An illustrated description of the interesting features of an engine designed to give economy in working and efficiency on the lower loads. Also editorial on its possibilities. 3400 w. Auto Jour—April, 1901.

The Letombe Mono-Triplex Gas Engine (Moteur Letombe Mono-Triplex). Illustrated description of the improved two-cycle gas engine of the Letombe pattern for use with furnace gas. 2000 w. Revue Industrielle—Feb. 21, 1903.

The Letombe Gas Engine System. Emile Guarini. Illustrates and describes the Letombe pressure gas producer and the system of regulation. 1500 w. Engr, U S A—Feb. 15, 1905.
See also Temperature.

Liége Exposition.—Prime Movers at the International Exposition at Liége, 1905 (Bemerkenswerte Kraftmaschinen auf der Weltausstellung zu Lüttich 1905). H. Dubbel. Well illustrated descriptions of gas engines, with some account of steam turbines and reciprocating steam engines. Serial. Part I. 3 plates. 2000 w. Zeitschr d Ver Deutscher Ing—Sept. 2, 1905.

See also Union, Liége.

Locomotive and Steamship.—Application of the Gas Engine to the Locomotive and Steamship. A brief digest of a study of this problem by Peter Eyermann. 1000 w. Sci Am Sup—Feb. 4, 1905.

Longridge's Lecture.—See MOTOR.

Lubrication.—See LUBRICATION—Gas Engine; Gasoline Engine.

Maintenance.—The Insistent Operative Conditions of the Gas Engine. W. Osborne. On the importance of having an intelligent engineer to so regulate the engine as to bring the best conditions for efficiency. 1400 w. Am Mach—Feb. 28, 1901.

Operating Gas and Gasoline Engines. Harry J. Perkins. The first of a series of articles giving information and advice of service to sellers, buyers and users. Serial. 1st part. 1100 w. Am Mach—March 28, 1901.

What to Do When the Gas Engine Stops. Albert Stritmatter. Discusses the proper method to pursue to locate a trouble when the cause is unknown. 2000 w. Am Mfr—Jan. 9, 1902.

Avoiding Trouble with a Gas Engine. H. H. Kelley. On the care and attention needed. 1600 w. Engr, U S A—Oct. 1, 1902 .

Management of the Gas Engine. A. Stritmatter. Hints on the proper oiling, need of cleanliness, etc. 1800 w. Gas Engrs' Mag—July 10, 1903.

See also Principles.

Marine.—Producer Gas Engines on Shipboard. A. Sinn. An illustrated article discussing the best gas engine practice and its adaptability for use on ships. 3000 w. Marine Engng—Jan., 1905.

Marine Gas Engine. Illustrates and describes the construction proposed by Herr Capitaine, which has worked successfully in an experimental model. 1500 w. Engr, Lond—April 21, 1905.

The Future of Marine Gas Engines. Peter Eyermann. Reviews the development of the gas engine and producer, and states the advantages. Ills. 4000 w. Jour Am Soc of Nav Engrs—May, 1905.

Gas Producer and Gas Engine for Marine Use. George E. Walsh. Describes a modern marine producer gas plant, presenting some of its advantages. 1800 w. Marine Rev—May 11, 1905.

Gas Engine with Producer for Marine Use. Illustrated description of a new type of mechanically-propelled vessel, constructed by John I. Thornycroft & Co., Ltd., and the machinery. 1500 w. Engng—Aug. 4, 1905.

See also Locomotive and Steamship; BOAT, GAS POWER; GASOLINE ENGINE; OIL ENGINE.

Maynard.—The New Maynard Internal Combustion Motor (Nouveau Moteur à Explosions ou Combustion Interieure dit Moteur Maynard). E. Maynard. A description of an improved internal-combustion motor in which no water jacket or other cylinder-cooling device is used. 2000 w. Rev Technique—Feb. 25, 1905.

Maywood.—The Maywood Gas Engine. Illustrations with brief description. 500 w. Am Mach—Feb. 20, 1902.

Mees.—The Mees Gas Engine (Die Gasmaschine, Bauart Mees). Fr. Freytag. Describing an improved gas engine in which the speed regulation is effected by a combination of the methods of varying the mixture and the volume of the charge. 3000 w. Zeitschr d Ver Deutscher Ing—June 17, 1905.

Metallurgy.—See ELECTRIC EXHIBITION—Düsseldorf.

Mond Gas. — Five-Hundred Horse-Power Gas Engine. An illustrated description of a recent type of gas engine, built for using with Mond producer gas. 900 w. Engr, Lond—Aug. 1, 1902.

See also GAS FUEL.

Nash.—The Nash Gas Engines. Illustrates and describes the large engines installed in the Power Court at the Pan-American Exposition, and their operation. 1400 w. Ir Age—Oct. 31, 1901.

Niel.—The Niel Gas Engine (Nouveau Moteur à Explosion de la Compagnie des Moteurs Niel). The improved Niel engine has the regulation effected by the use of a variable compression. A thermal efficiency of 25 per cent. is attained. 1200 w. 1 plate. Génie Civil—March 29, 1902.

The New Niel Motor (Le Nouveau Moteur Niel). A. Moreau. A fully detailed description of the improved gas engine of the Niel Company, with data and results of tests showing more than 25 per cent. thermal efficiency. 3000 w. 2 plates. Mem Soc Ing Civ de France—Aug., 1902.

Nuremberg.—The Nuremberg Double-Acting Tandem Gas Engines. Reviews the different methods adopted by the various makers to obtain great mechanical power from one single engine, and gives drawings showing the construction of the new type of engine named. 2400 w. Ir & Coal Trds Rev—June 12, 1903.

The Nurnberg Gas Engine. Illustrated description of an American-built engine of foreign design. 2000 w. Power—April, 1904.

The Nuremberg Gas-Engine. Illustrates and describes the principal features of this gas-engine which has recently been built in very large sizes, and extensively adopted for running with blast-furnace gas, and other cheap gases. 900 w. Engng—Nov. 3, 1905.

See also Rolling Mill.

Oechelhäuser.—The Oechelhäuser Blast Furnace Gas Engine. Abstract of address by A. Wagenen, describing the principal features of this engine. Ill. 1500 w. Ir Age—Dec. 6, 1900.

The Oechelhäuser Gas Motor. A. Borsig. An illustrated detailed description of W. von Oechelhäuser's two-stroke cycle motor. 1100 w. Am Elect'n—Jan., 1904.

See also Blast-Furnace Gas; BLAST-FURNACE GAS.

Oil Combined.—See Combined Oil and Gas.

Oil Gas.—See GAS, OIL—Gas-Engine Test.

Operation.—See Maintenance.

Orleans Electric Railway.—See ELECTRIC RAILWAY.

Otto.—See Test; GAS PRODUCER—Pintsch.

Otto Cycle.—See ENTROPY.

Pan-American Exposition.—Gas Engines at the Pan-American Exposition. An illustrated description of the internal combustion engines in the pumping plant, in the court of the Machinery and Transportation Building and on exhibition. 4500 w. Engr, U S A—Sept. 15, 1901.

Gas Engines at the Pan-American Exposition. Illustrates and describes the engines taking part in the power supply for the exposition. 4800 w. Power—Sept., 1901.

See also POWER PLANT.

Paris Exposition.—The Gas Engines at the Paris Exhibition. An illustrated review of the exhibits in this field. 6500 w. Power Quar—Oct. 15, 1900.

Motors Other Than Steam Engines at the Paris Exposition (Les Moteurs autres que ceux à Vapeur à l'Exposition de 1900). G. Leroux. A general review of the gas, petroleum, hot air and similar motors exhibited at Paris. 5000 w. Soc Ing Civ de France—Dec., 1900.

Gas, Gasoline and Alcohol Motors at the Exposition of 1900 (Les Moteurs à Gaz, à Pétrole, et à Alcool à l'Exposition de 1900). G. Lavergne. The first instalment of a general description of the motors shown at the Paris Exposition. Serial. Part I. 1800 w. Génie Civil—Aug. 17, 1901.

Parts Sizes.—Sizes of Parts of Gas Engines. H. H. Kelley. Gives simple formulas for finding the sizes of parts based on the diameter of the cylinder within stated limits. Ill. 2200 w. Engr, U S A—Feb. 2, 1903.

Piston Manufacture.—See PISTON—Gas Engine.

Piston Rings.—See PISTON RING.

Power.—The Horse Power of Gas Engines. Discusses the need of a more definite and uniform basis of comparison. 1800 w. Prac Engr—Aug. 16, 1901.

Horse Power in Gas Engines. Albert Stritmatter. Discusses the things that affect the power of an engine. 1700 w. Am Mfr—April 10, 1902.

Power Calculations for Gas Engines. Herbert L. Towle. Discusses engine design and the development and use of formulas. 2900 w. Am Mach—April 11, 1901.

Power Plant.—See Electric Generation; GAS POWER; GAS-POWER PLANT.

Principles.—Gas Engine Principles and Management. E. W. Roberts. Illustrates and describes the principles of the two types in general use, and of accessory devices for using liquid fuels, discussing the management, troubles, and related matters of interest. 6500 w. Eng News—Sept. 17, 1903.

Producer Gas.—Internal Combustion Motors and their Operation with Producer Gas, Blast-Furnace Gases, etc. (Verbrennungs Kraftmaschinen und deren Betrieb mit Kraftgas, Hochofengas, etc.). Joh. Körting. An extensive review of large power gas installations, with details of engines and producer plants. 6000 w. Glasers Annalen—Dec. 1, 1902.

Gas Engines Using Producer Gas (Gasmaschinen für Generatorgas). R. W. Hilgenstock. A paper before the Technischer Verein of Philadelphia, giving a general illustrated account of gas engines and their development. 3000 w. Technologist—April, 1903.

See also Blast-Furnace Gas; Rowden; GAS POWER; GAS POWER PLANT; GAS PRODUCER; PUMPING STATION.

Pumping.—The Gas Engine as a Pumping Medium. D. Hastings Irwin. Presented at meeting of British Assn. of Water Works Engrs. Considers the internal combustion engine as a means of effecting economy in pumping. 3800 w. Jour Gas Lgt—Aug. 4, 1903.

See also PUMPING STATION.

Pumping Station, Philadelphia.—See WATER-WORKS—Fire Service.

Railway.—Gas Engines in Railway Work. William T. Magruder. Reviews the different classes of engines now on the market, aiming to give a general view of the entire field, and considers the purposes for which they are used in railway work, giving some results, and discussing other uses to which they may be applied. 10800 w. Pro Cent Ry Club—Jan. 8, 1904.

See also Westinghouse; CAR, MOTOR-DRIVEN.

Regulation.—See Governing.

Reid.—The Reid Gas Engine. Illustrations and particulars of an engine used for pumping at the oil wells in Pennsylvania. 1700 w. Am Mach—April 17, 1902.

The Shops of the Joseph Reid Gas Engine Co., Oil City, Pa. Illustrates and describes the Reid gas engine, and the plant where it is manufactured. 2200 w. Ir Tr Rev—Aug. 3, 1905.

Research.—Studies on Gas Motors (Untersuchungen am Gasmotor). E. Meyer. A full account of investigations made with varying degrees of compression and other working conditions, upon the engine in the mechanical laboratory at Göttingen. The calibration and comparison of indicators is especially discussed. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—Sept. 14, 21, 1901.

Research Committee.—Second Report to the Gas-Engine Research Committee. Frederic W. Burstall. An account of the tests made, with tabulated results. Ill. 11500 w. Inst of Mech Engrs—Oct. 18, 1901.

Rolling Mill.—Gas Engines for Rolling Mill (Zur Frage der Gas-Walzenzugmaschine). An illustrated description of a 700-H. P. gas engine built by the United Augsburg-Nürnberg Cos., using blast-furnace gases, for driving a train of rolls. 1500 w. Stahl u Eisen—July 15, 1902.

See also Blast-Furnace Gas; ROLLING MILL.

Romanshorn.—See ELECTRIC STATION.

Rotary Valve.—A Rotary Induction and Exhaust Valve for Explosion Engines. Illustrates and describes a balanced rotary valve, introduced by Edward Butler, London, which controls both the functions of induction and exhaust of the gases to and from the motor. 1000 w. Sci Am Sup—June 18, 1904.

Rowden.—300-Brake-Horse-Power Rowden Producer Gas Engine. Illustrates and describes the arrangement and details of a new type of engine for producer-gas. It is of the two-crank vertical type with four cylinders, two working in tandem on each crank. 2800 w. Engng—Sept. 15, 1905.

Saltley, Eng.—See Electric Generation.

Sargent.—A New Principle in Gas-Engine Design. C. E. Sargent. Discusses the disadvantages of modern gas engines, and the writer's efforts to overcome these disadvantages, giving an illustrated description of the engine designed. 6800 w. Trans Am Soc of Mech Engs, No. 870—Dec., 1900.

Selection.—The Selection of Gas Engines. J. D. Lyon. Briefly considers points that should be taken into account in the selection. 1500 w. Eng Rec—Sept. 6, 1902.

Seraing.—See Cockerill.

Small.—One-Horse-Power Gas Engine. George H. Johnston. Design and drawings for the construction of a small gas or gasoline engine, with explanatory notes. 1700 w. Horseless Age—Nov. 28, 1900.

See also Design; ELECTRIC MOTOR.

Soest.—Engine for Blast Furnace Gases (Hochofengasmotor). Illustrated description of the improved double-cylinder gas engine of 350 H. P. made by Soest, of Reisholz, near Düsseldorf, for use with furnace gas. 1800 w. 1 plate. Stahl u Eisen—April 15, 1902.

Speed Limit.—The Ultimate Limit of Speed in Gas Engines. Herbert L. Towle. Discusses the limit imposed by engineering conditions for steady and continuous running of automobile motors, and gasoline marine engines. 3000 w. Am Mach—Vol. 28, No. 10, 1905.

See also High-Speed.

Speed-Variations.—Speed-Variations Occurring During the Cycles of the Otto Gas Engine and the Diesel Heat Motor. Abstract of the results of thesis work, edited by Prof. Sidney A. Reeve. 1800 w. Jour Worcester Poly Inst—May, 1901.

The Irregularity of Gas Engine Speeds (Der Ungleichförmigkeitsgrad von Gasmotoren mit Aussetzerregelung). Dr. R. Mollier. An examination into the degree of irregularity in speed of gas engines provided with hit-and-miss governors. 1200 w. Zeitschr d Ver Deutscher Ing—Nov. 21, 1903.

Starting.—The Starting of Large Gas Engines. E. W. Roberts. Reviews methods, and devices used in the starting of large gasoline marine engines. Ill. 1700 w. Marine Engng—Dec., 1903.

Methods and Suggestions for the Starting of Gas Engines. R. Mathot. Describes the various systems adopted—mechanical, explosion, etc., and advocates particularly the use of compressed air according to a plan described in detail. 1800 w. The Engineering Magazine—July, 1905.

See also AIR COMPRESSOR.

Steam Combined.—A Combined Gas and Steam Engine (Moteur à Gas et à Récupération des Calories Actuellement Perdues). Jules Garnier. An illustrated description of an internal-combustion engine, in which the cooling water is injected into the cylinder and there vaporized, the steam performing useful work on the piston. 2800 w. Mem Soc Ing Civils de France—March, 1903.

Steam Compared.—Gas vs. Steam Engines. Albert Stritmatter. Discusses information given on this subject in recently published articles. 1700 w. Am Mfr—May 29, 1902.

The Steam Engine as a Competitor with the Gas Engine (Die Dampfmaschine im Wettbewerb mit der Gasmaschine). Herr Capitaine. Showing the relative efficiencies at various loads and speeds. 3500 w. Zeitschr d Ver Deutscher Ing—May 28, 1904.

Strang.—The Strang Gas Engine. Illustrated detailed description of a double-acting engine. 1200 w. Engr, U S A—March 15, 1905.

The Strang Gas Engine. Illustrates and describes a four-cycle double acting gas engine in which a portion of the exploded charge is mingled in the mixing chamber with the new charge, and returned to the engine. The object is economy. 1200 w. Ir Age—Oct. 12, 1905.

Suction Plant.—See **GAS PRODUCER.**

Taylor.—See **GAS-POWER PLANT.**

Temperature.—The Temperature of Gas Engine Cylinders (Untersuchungen über die Wärme der Gasmotorencylinder). Ernst Körting. An illustrated account of measurements to determine the temperature at different points of the cylinder of a 400 H. P. double-acting two-cycle gas engine, with a view to the prevention of injurious expansion of the metal. 1000 w. Zeitschr d Ver Deutschr Ing—Jan. 25, 1902.

Temperatures of the Cylinder Wall of a 400 Horse-Power Double-Acting Gas Engine. E. Körting. Summarised translation from the "Zeitschrift des Vereines Deutscher Ingenieure." An account of measurements of the temperature at different points, with a view to the prevention of injurious expansion. 1200 w. Jour Gas Lgt—March 11, 1902.

The Heat in Gas-Engine Cylinder-Walls. Illustrated review of some German experiments on a 400 h. p. two-cycle engine, to determine the temperature stresses in motors of this size. 1200 w. Eng Rec—March 15, 1902.

On Gas-Engine Temperatures. H. E. Wimperis. Gives some interesting deductions made from figures given in the last report of the Gas Engine Research Committee, with an explanation of the variability of the temperature throughout the mass of the gas. 3500 w. Engng—June 27, 1902.

The Action of the Cylinder Walls of Internal-Combustion Motors (Comment s'Exerce l'Action de Paroidaus les Moteurs à Combustion Interne). L. Letombe. A study of the action of the cooling of the cylinder by water circulation, claiming that the efficiency of the engine is unaffected thereby. 4500 w. Mem Soc Ing Civ de France—Nov., 1905.

See also **Test; GASOLINE ENGINE—Test.**

Temperature Exhaust.—A Method of Determining the Temperature of Exhaust Gases in Combustion Engines. H. Fernald. Describes the forms of exhaust chamber which were tried, and a record of the experiments made is given. Ill. 3200 w. Trans Am Soc of Mech Engrs. No. 0932—May, 1902.

Temperatures, Flame.—Flame Temperatures in Internal Combustion Motors. Dugald Clerk. Read before the British Assn. A study of the possibility of reducing flame temperatures by artificial enhanced atmospheric pressures. Serial. 1st part. 1800 w. Elect'n, Lond—Aug. 26, 1904.

Test.—Efficiency Tests of a One-Hundred-and-Twenty-Five-Horse-Power Gas Engine. C. H. Robertson. Illustrated description of the plant tested and results of tests made in April and May, 1900. Table, cards, curves and full information. 6800 w. Trans Am Soc of Mech Engrs, No. 907—May, 1901.

Recent British and American Gas Engine Tests (Neuere Englische und Amerikanische Versuche on Gasmaschinen). R. Schöttler. A very well illustrated discussion of gas engine experiments, partly a review of papers before the Institution of Mechanical Engineers and the American Society of Mechanical Engineers. Serial. Part I. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 18, 1902.

Working Details of a Gas Engine Test. R. H. Fernald. A complete system for testing gas engines is given, with the details of taking observations, making records and working up results, together with a blank for the recording of data and the complete log of two tests made. 14,500 w. Trans Am Soc of Mech Mgrs, No. 0933—May, 1902.

Brake Test of a Gas Engine. Alfred E. Lüders. Hints upon determining the horse-power of an engine by what is commonly known as the brake method. 1200 w. Marine Engng—Feb., 1903.

Commercial Gas Engine Testing and Proposed Standard of Comparison. William P. Flint. Explains the value of the friction brake as a satisfactory means of measuring the power developed, describing the system of plotting the results of tests. Ills. 2500 w. Trans Am Soc of Mech Engrs, No. 082—June, 1904.

Gas Engine Testing. H. B. Macfarland. Suggestions for conducting tests, the preparations, running and observation, etc. Ills. 3800 w. Engr, U S A—Jan. 1, 1905. (Special.)

Test of a 500 h. p. Gas Engine Using Coke-Oven Gas (Bericht über Leistungsversuche an einer 500-pferdigen Koksofengasmaschine). Dr. Eugen Meyer. Data and results of tests of an Oechelhaeuser engine, originally designed for blast-furnace gas, and altered for coke-oven gas. 3000 w. Zeitschr d Ver Deutscher Ing—Feb. 25, 1905.

Testing High Power Modern Gas Engines. William H. Spiller. Read before the Tech. Soc. of Kansas City, Mo. An account of the severe test in the factory which the modern gas engine has to undergo. 1300 w. Min Wld—Dec. 23, 1905.

See also **Ignition Point; FUEL CONSUMPTION.**

Test, Charon.—See **Charon.**

Tests, Crossley.—Tests of Gas Motors and Generators (Essais de Moteurs à Gaz et de Gasogènes). An account of tests of Crossley gas engines and Pierson generators at the tramway station at Cassel (France). 1200 w. Génie Civil—Feb. 23, 1901.

Test, Igniters.—Tests of a Gas Engine Using Electric and Hot-Tube Igniters. An account of some tests made in Boston on a 20 h. p., two-cylinder engine at various loads. 600 w. Eng Rec—March 30, 1901.

Test, Otto.—A Method of Testing Gas Engines. E. C. Oliver. An illustrated paper describing methods and apparatus in use in some tests on a 10 h. p. Otto gas-engine to determine the distribution of the heat supply by the fuel, and the temperature at various points in the cycle, giving the results of the heat tests. 3500 w. Trans Am Soc of Mech Engrs—June, 1903.

Test, Purdue.—Tests of a Twelve-Horse-Power Gas Engine to Determine the Effects of Changes in Speed, Load, Point of Ignition, Ratio of Gas to Air, and Jacket Temperature. C. H. Robertson. A record of tests at Purdue Univ. continuing over a period of six years. Full description, with conclusions. Ill. 6500 w. Trans Am Soc of Mech Engrs—June, 1903.

Test, Westinghouse.—Gas Engine Testing at the Works of the Westinghouse Machine Co. A brief explanation of the gas engine tests as made at these shops. 900 w. Eng Rec—Nov. 19, 1904.

Thermal Emissivity.—See **GAS.**

Thermodynamics.—See **Explosions.**

Thompson-Burger.—See **GAS PRODUCER.**

Thwaite-Gardner.—See **BLAST-FURNACE GAS.**

Troubles.—See **Maintenance.**

Union, Liége.—Union Gas Engine of 250 Horse Power (Moteur à Gas Union de 250 Chevaux). L. Ramakers. Illustrated description of horizontal double-acting gas engine, exhibited at Liége. 1000 w. 1 plate. Génie Civil—Dec. 30, 1905.

Valve.—The Influence of Self-Acting and Controlled Admission Valves Upon the Performance of Gas Engines (Der Einfluss Selbsttätiger und Gesteuerter Einlassventile auf Leistung und Verbrauch von Exploisionsmotoren). K. Fehrmann. Discussing especially the influence of increased speeds upon the behavior of uncontrolled valves. 2500 w. Zeitschr d Ver Deutscher Ing—July 1, 1905.

See also **Rotary Valve; GASOLINE ENGINE; VALVE.**

Valve Gear.—See **VALVE; VALVE GEAR—Gas Engine.**

Vogt.—The Vogt Gas-Engine. Herbert A. Humphrey. Illustrated description of a design of Adolf Vogt, and its working. 4200 w. Engng—Jan. 8, 1904.

Waste Gas Use.—See **Blast-Furnace Gas; Test; Waste Heat; BLAST-FURNACE GAS; COKE-OVEN GAS.**

Waste Heat.—An Enquiry Into the Waste Heat from Gas Engines, with Some Suggestions for its Useful Application. George Chasser. Read before the Inst. of Heat & Ven. Engrs. at Liverpool. An investigation of heat losses, giving diagrams showing suggested arrangements of the apparatus. 4500 w. Plumb & Dec—Aug. 1, 1904.

Weight.—Weight in Gas Engines. E. W. Roberts. Discusses why gas engines are so heavy, and points out ways and means for obtaining the lightest practical engine within keeping with strength and efficiency. 3300 w. Rudder—Feb., 1901.

Westinghouse.—Gas Engines for Railway and Power Service. Illustrates and describes the two types of engines developed by the Westinghouse Co. and their operation. 2500 w. St Ry Rev—April 15, 1905.

A New Double-Acting Tandem Gas Engine. Illustration, with description, of a 1500 horse-power internal combustion engine developed by the Westinghouse Co. 700 w. R R Gaz—Feb. 27, 1903.

GAS ENGINEER.

See also **GAS CONGRESS; GAS ENGINEERING; GAS INDUSTRY; GAS MANUFACTURE.**

The Rise and Recognition of the Engineer, with Especial Reference to Gas Engineering. L. P. Lowe. Read at meeting of the Pacific Coast Gas Assn. 3200 w. Am Gas Lgt Jour—Sept. 22, 1902.

The Rise and Recognition of the Engineer. Leon P. Lowe. Read before the Pacific Coast Gas Assn. The part of the engineer in the advancement of the world, especially referring to gas engineering. 2700 w. Jour of Elec—Nov., 1902.

British Institute.—See **GAS INDUSTRY—History.**

British Institution.—President's Address Before the Institution of Gas Engineers. W. R. Herring. The address deals with topics which the writer considers have an important bearing on future prosperity of the industry. 7000 w. Gas Wld—May 4, 1901.

President's Address before the Institution of Gas Engineers in London. Thomas Holgate. Gives a sketch of ideal gas works, discussing details, giving statements in regard to incandescent lighting, and describing the Lewes water-gas-in retort process. Ill. 8700 w. Gas Wld—May 3, 1902.

British Northern.—Inaugural Address Before the North British Association of Gas Managers. W. R. Herring. Discusses modern methods and questions of interest to the gas industry. 4700 w. Jour Gas Lgt—July 30, 1901.

British Societies.—The Question of Amalgamation. J. W. Helps. Read before the Inst. of Gas Engs. The story of the proposed amalgamation of the Institution of Gas Engineers, with the Gas Institute, with the discussion that followed. 14,500 w. Gas Wld—May 4, 1901.

Manchester, Eng.—Presidential Address before the Manchester District Institution of Gas Engineers. Charles Wood. Relates the practice and experience at Bradford, Eng., and discusses some points of interest. 7800 w. Jour Gas Lgt—March 5, 1901.

Midland Association, Eng.—Presidential Address at the Birmingham Meeting of the Midland Association of Gas Managers. Thomas Glover. A lengthy address dealing with many subjects of interest to gas engineers. Considers water gas, inclined retorts, naphthalene, distribution, coke ovens, burners, etc. Ill. 9600 w. Gas Wld—Feb. 23, 1901.

North of England.—Inaugural Address Before the North of England Gas Managers' Association. Matt. Dunn. An interesting address, discussing coal prices, coke sales, conveyors, the gas of the future, coke-ovens, and other important subjects. 7500 w. Jour Gas Lgt—Oct. 8, 1901.

Southern District, Eng.—Presidential Address before the Southern District Association of Gas Engineers and Managers. Corbet Woodall. The main theme of the address is public lighting, but other matters of interest are considered. 6500 w. Gas Wld—March 16, 1901.

Thompson.—See **THOMPSON.**

GAS ENGINEERING.

See also **GAS CONGRESS; GAS ENGINEER; GAS INDUSTRY; GAS MANUFACTURE; GAS WORKS.**

Gas Engineering. W. A. Baehr. A lecture before the students of the Univ. of Wis. Describes the engineering features of the business, the manufacture and distribution. 8000 w. Wis Engr—April, 1904.

British vs. Continental.—Some Differences Between British and Continental Gas Engineering. C. E. Brackenbury. Read before the Inst. of Gas Engrs. The comparison is more favorable in most respects to the Continental practice. Discussion. 11,000 w. Gas Wld—May 4, 1901.

Modern Practice.—Modern Practice in the Manufacture and Distribution of Gas. H. E. Jones. Abstract of a paper read before the Brit. Inst. of Civ. Engs. Briefly considers the cost, enrichments, purification, gasholders, and important advances. 2200 w. Gas Wld—April 20, 1901.

Modern Gas Practice. Abstract report of the discussion of Mr. H. E. Jones' paper, read at the recent meeting of the Inst. of Civ. Engrs. 5300 w. Jour Gas Lgt—April 30, 1901.

GAS EXHIBITION.

See also **GAS CONGRESS.**

Glasgow.—Gas at the Glasgow Exhibition. A brief illustrated account of the exhibits in this field, still incomplete. 3300 w. Gas Wld—April 27, 1901.

The Glasgow Exhibition. An account of the lights, the exhibition of domestic and other gas appliances, etc., with editorial on the excellence of the high-pressure gas lighting. 6800 w. Jour Gas Lgt—April 30, 1901.

London.—The Gas Exhibition at the Crystal Palace. A review of the exhibits. 7700 w. Jour Gas Lgt—Dec. 17, 1901.

Gas at the Crystal Palace. An account of the exhibits shown at the International Gas Exhibition. Considers it a meagre representation of the industry and not fitly named. Ill. 5500 w. Gas Wld—Dec. 21, 1901.

Paris, 1900.—Gas Lighting at the Paris Exposition. Walter S. Allen. Describes features of the exhibit of special interest to gas men. Discussion. 4500 w. Am Gas Lgt Jour—March 4, 1901.

GAS EXPLOSION.

See also **COAL MINE EXPLOSION; FIREDAMP; GAS—Explosive; GAS ENGINE—Explosion.**

Electric Conduits.—Gas Explosions in Electric Supply Conduits. This first article gives an account of a case in the English courts. Serial. 1st part. 2000 w. Elec Rev, Lond—April 25, 1902.

Flame Movement.— See **GAS—Explosive Wave.**

Kings Lynn.—See **GAS DISTRIBUTION—Leakage.**

Lyons.—A Gas Explosion Caused by Electricity. M. Ad. Bouvier. Extracts from a paper read before the Société Technique. Describes an explosion at Lyons, France, suggesting the protective measures needed. Ill. 2200 w. Jour Gas Lgt—June 23, 1903.

GAS FIRE.

See **GAS HEATING.**

GAS FITTING.

See also **GAS INDUSTRY; GAS PIPE.**

Practical Gas Fitting. Henry Vardiman, in the "Engineering Review." Suggestions regarding the places for and kind of fixtures; the sizes and lengths of pipes for different kinds of gas, etc. 1800 w. Pro Age—Feb. 15, 1901.

Notes on House Piping. Discusses the table proposed by the Research Committe. camparing it with other tables. 2000 w. Am Gas Lgt Jour—Feb. 2, 1903.

Adjustable Bracket.—Some Adjustable Gas-Brackets for Work-Shop Use. Illustrates and describes fittings manufactured in German shops. 1300 w. Jour Gas Lgt—Sept. 3, 1901.

Meter Unions.—See **GAS METER—Union.**

Screw Standardization.—See **SCREW THREAD.**

GAS FLAME.

See FLAME; GAS; GAS BURNER; GAS ENGINE; GAS EXPLOSION; GAS LIGHTING; PHOTOMETRY.

GAS FLOW.

See also COMPRESSED AIR—Power Transmission; GAS DISTRIBUTION; STEAM FLOW.

Nozzle.—See STEAM FLOW.

Parenty Law.—The Rational Character of the Experimental Law of Parenty (Rationalité d'une Loi Experimentale de M. Parenty). J. Boussinesq. A study of the agreement of experiment with theory of the flow of gases through orifices. 2500 w. Comptes Rendus—Jan. 4, 1904.

Pipes.—Flow of Gas in Long Pipes and Under High Pressures. An explanation by H. A. Humphrey for working out the formula for the calculation of the isothermal flow of gas in long pipes. 700 w. Jour of Gas Lgt—Nov. 24, 1903.

The Motion of Gases in Pipes, and the Use of Gauges to Determine the Delivery. Richard Threlfall. States the hydraulic principles involved and reports careful investigations made of the points involved. Tabulated results. Ill. 4200 w. Inst of Mech Engrs—Feb. 19, 1904.

An Examination of Threlfall's Work on the Flow of Gases in Pipes. Discusses the investigations made and their application to the construction of a meter for the measurement of "Mond" gas. 2000 w. Jour Gas Lgt—April 19, 1904.

Experiments with the Pitot Tube in Measuring the Velocities of Gases in Pipes. R. Burnham. A report of experimental investigations, describing the method used and presenting the results obtained as showing the practical accuracy of which the Pitot tube is capable. 2500 w. Eng News—Dec. 21, 1905.

See also GAS DISTRIBUTION—High-Pressure.

Poppet Valves.—See VALVE.

Threlfall.—See Pipe.

GAS FUEL.

See also BLAST FURNACE GAS; GAS ENGINE; GAS INDUSTRY—Future; GAS, NATURAL; GAS, OIL; GAS POWER; GAS POWER PLANT; GAS PRODUCER; GAS, WATER.

Producer-Gas and Its Application. F. J. Rowan. Part first is introductory to the subject. Serial. 1st part. 900 w. Ir & Coal Trds Rev—Jan. 18, 1901.

An Examination of Various Power Gases (Einiges über die zur Krafterzeugung Verwendeten Gasarten). F. Krull. An examination of the various producer and water gas processes and the relative values of the products for motive power. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 30, 1901.

Power Gas (Kraftgas). P. Meyer. A general review of the products of various gas producers, and their direct application to motive power. Serial. Part I. 3500 w. Glasers Annalen—Oct. 15, 1901.

The Use of Producer Gas in Engineering. Extracts from paper by F. J. Rowan, read at meeting of the Inst. of Engrs. in Scotland. Considers producers with water bottoms, the furnaces which are specially useful to engineering and shipbuilding, the use of producer gas in gas-engines, etc. 3500 w. Jour Gas Lgt—Feb. 25, 1902.

Fuel Gas for Domestic Use and Small Trade Purposes. Thomas Fletcher. The first of a series of articles on the application of gaseous fuel to heating purposes, with editorial. Serial. 1st part. 5800 w. Jour Gas Lgt—April 15, 1902.

The Generation of Power Gas in Producers and Blast Furnaces (Recherches sur la Production des Gaz des Gazogênes et des Haut Fourneaux). A. Lencauchez. An exhaustive examination of the production, purification and power applications of lean gas. 30,000 w. Mem Soc Ing Civ de France—June, 1902.

Gases Used Industrially as Fuels. Abstract translation of an article by Dr. Messerschmidt, in the "Zeitschrift für Angewandte Chemie." 1300 w. Jour Gas Lgt—Oct. 21, 1902.

Commercial Gases for Power Purposes. Alexander M. Gow. General information concerning the use of gas in gas engines. The constituents of commercial gases, the utilization of blast furnace gases, etc., are discussed. 10,000 w. Pro Engrs Soc of W Penn—May, 1903.

Some Remarks on Gaseous Firing. Arthur Valon. Discusses some points in connection with a paper recently read by Mr. Whyte bearing on this subject. 1400 w. Jour Gas Lgt—May 19, 1903.

Notes on the Production and Characteristics of Gaseous Fuel. B. H. Thwaite. Describes a gasifying system. Serial. 1st part. 1800 w. Engr, U S A—Sept. 15, 1903.

Notes on Gaseous Firing. J. F. Smith. Read before the Yorkshire Jr. Gas Assn. An illustrated article giving a historical summary and explaining the changes that go on in the gas producer, the principle and theory of gaseous firing, and the practical working. 7000 w. Jour Gas Lgt—Dec. 15, 1903.

Notes on Gaseous Firing. J. F. Smith. Read before the Yorkshire Jr. Gas Assn. An illustrated article reviewing the history of gaseous fuel, and the principle upon which gaseous firing is based, its practical working, etc. 7000 w. Am Gas Lgt Jour—Jan. 4, 1904.

Gaseous Fuels for Power and Heating. H. Sherwood. A digest of recent knowledge of the use and production of gaseous fuels. Serial. 1st part. 2000 w. Min & Sci Pr—Jan. 16, 1904.

Power Gas (Kraftgas). Ferd. Fischer. A comparison of the various forms of fuel gas and their monetary values for the production of power. 3000 w. Zeitschr d Ver Deutscher Ing—Oct. 29, 1904.

The Use of Gas for Power and Heating. Ernest A. Dowson. Abstract of a paper read at the Birmingham Assn. of Mech. Engrs. Considers the advantages of gas-engines and plant, describing the properties and manufacture of gases which are economical for industrial use, in the present number. Serial. 1st part. 4000 w. Sci Am Sup—Dec. 9, 1905.

Acme System.—See GAS, OIL—Isolated Plant.

American.—An American Fuel-Gas Method and Its Applications. Explains the preparation of the fuel, and its utilization. 1500 w. Jour Gas Lgt—Jan. 21, 1902.

Analysis.—See BLAST FURNACE GAS.

Availability.—The Gas Engine—Availability of Power Gas. B. H. Thwaite. Reviews the work of the writer in this field, and also of other experimenters, showing the differences between the ideal power gases and other gases in use, the progress in gas engines, and the advantages of the new power gas system. Ill. 6000 w. Engr, U S A—Jan. 1, 1903.

Blast-Furnace Gas.—See BLAST-FURNACE GAS.

Brick Manufacture.—See BRICK MANUFACTURE—Producer Gas.

Brown Coal.—Power-Gas Driving with Alpine Lignite (Kraftgasbetrieb mit Alpiner Braunkohle). F. Zeyringer. Giving analyses of the Leoben, Köflach and Fohnsdorf lignites, showing their suitability for making producer gas for gas engines. 2000 w. Stahl u Eisen—June 15, 1901.

See also GAS ENGINE—Electric Mining Plant; GAS POWER PLANT—Embrach.

Calorimetry.—See CALORIMETRY—Gaseous Fuel.

Cement Works.—See CEMENT KILN—Rotary.

Coal Gas Compared.—See GAS, NATURAL—Steam Producer.

Domestic Consumption.—Promotion of Domestic Fuel Gas Consumption. R. P. Valentine. Read before the Pacific Coast Gas Assn. Suggestions for increasing the demand for gas as a fuel. 1800 w. Am Gas Lgt Jour—Aug. 12, 1901.

See also GAS HEATING; GAS, NATURAL; GAS STOVE.

Electric Station.—See GAS ENGINE—Electric Generation.

France.—See Pierson.

Heating.—See GAS HEATING.

History.—A Consideration of the Gaseous Fuel Problem. Henry G. Morris. Reviews briefly the history of the use of gas as an illuminant and for fuel. Discussion. 4500 w. Pro Engrs' Club of Phila—Oct., 1903.

Hot-Air Heating.—Gas as a Fuel for Hot-Air Heating. R. S. Thompson. Read before the Am. Soc. of Heat. & Ven. Engrs. Considers how to use gas successfully and economically in hot-air heating. 2800 w. Can Archt—March, 1905.

Mond.—The Manufacture of "Mond" Gas in Central Stations. A. Rollason. Read before the South Staffordshire Ir. and Steel Inst. Illustrates and describes the Mond gas plant, giving much information concerning its operation, and a statement of the advantages. 2200 w. Col Guard—Feb. 15, 1901.

South Staffordshire Mond Gas Scheme. Describes the South Staffordshire coal fields, whose peculiarity is the great thickness of the seams and the numerous faults, and the present conditions, and explains a scheme for the use of Mond gas as a means of economical pumping. Serial. 1st part. 2400 w. Eng, Lond—March 22, 1901.

The Mond Gas Bill. An account of interesting facts and figures given in evidence before a select committee of the House of Commons. Serial. 1st part. 3000 w. Engr, Lond—May 24, 1901.

Mond Fuel Gas in Great Britain. Gives the distinguishing features of the Mond process, and a technical description taken from a paper by Mr. H. A. Humphrey. 1400 w. U S Cons Repts, No. 1063—June 15, 1901.

The Mond Gas Process (Mond Gas). R. Schöttler. A description of the Mond gas process, with plans of plant and a discussion of its advantages. 2500 w. Zeitschr d Ver Deutscher Ing—Nov. 9, 1901.

The Mond Gas Process (Mond-Gas). A description of the Mond gas process, in which the cost of power gas is reduced by the saving of the by-products. 3000 w. Glückauf—March 15, 1902.

Mond Gas Plant at Farnley. Illustrates and describes the plant of the Farnley Iron Co., Ltd., near Leeds, which will produce gas equivalent to 20,000 h. p., were it all to be used in engines. 2000 w. Nov. 21, 1902.

The Mond Power-Gas Process. An illustrated description, with statements in regard to the advantages claimed and cost. 3000 w. Jour Gas Lgt—April 14, 1903.

Mond Gas and Its Relation to Large Power Plants. H. G. H. Tarr. Reviews the results thus far attained in connection with power plants. 1400 w. Engr, U S A—Aug. 1, 1903.

Power Gas. Harold Medway Martin. Points out the differences between producer gas and ordinary coal gas, describes the Mond process and the uses to which it has been applied, giving illustrated descriptions of five plants in England. 6500 w. Trac & Trans—Nov., 1903.

See also **GAS ENGINE; GAS INDUSTRY**—Producer Gas; **GAS POWER; GAS POWER PLANT**—Monks, Hall & Co.

Natural Gas.—See **GAS, NATURAL.**

Oil.—See **GAS, OIL.**

Open-Hearth Furnaces.—See **OPEN-HEARTH PROCESS**—Gas Losses.

Pierson.—See **GAS ENGINE**—Test, Crossley; **GAS PRODUCER.**

Pintsch.—See **GAS PRODUCER.**

Shipbuilding.—The Economy of Gas-Fired Furnaces. F. J. Rowan. Abstract of paper read before the Inst. of Engrs. and Shipbuilders in Scotland. Considers the furnaces found especially useful in engineering and shipbuilding. Ill. 2000 w. Ir & Coal Trds Rev—March 21, 1902.

Producer Gas and Its Use in Engineering and Shipbuilding. F. J. Rowan. Read before the Inst. of Engrs. & Shipbuilders in Scotland. Explains the advantages of this method of treating fuel, giving illustrated descriptions of modern types of producers. Serial. 1st part. 2800 w. Mech Engr—March 22, 1902.

Tar and Ammonia.—See **BLAST-FURNACE GAS.**

Test.—See **FUEL TEST.**

Wood Gas.—See **GAS, WOOD.**

GAS GOVERNOR.

See also **GAS BURNER; GAS DISTRIBUTION.**

Some Sketches of Gas Governors. J. J. Humphreys, Jr. Read before the New England Assn. of Gas Engs. Reviews the history of gas governors, illustrating many types and giving brief descriptions. General discussion. 5800 w. Am Gas Lgt Jour—March 11, 1901.

Governors on Service Pipes and Burners. Summary of a report by F. Pennerts, in the "Journal für Gasbeleuchtung," of the results of a study made on the action of governors. 1200 w. Jour Gas Lgt—April 29, 1902.

GAS HEATING.

See also **GAS LIGHTING; GAS, NATURAL; GAS STOVE; GAS, WATER; HEATING; LIGHTING.**

Hints on Extending the Uses of Coal Gas. The present article is based on the experience of the writer in connection with the introduction of gas as a heating agent in trade and factory processes. 4000 w. Gas Wld—Feb. 8, 1902.

The Changing Use of Gas. Alton D. Adams. Discusses the tendency to use gas for heating purposes instead of illumination. 1100 w. Sci Am—Feb. 15, 1902.

Heating by Gas: A Study of the Gas Radiators of the Société Francaise de Chaleur et Lumiere. M. A. Lecomte. Abstract translation of paper read at meeting of the Société Technique de l'Industrie du Gas en France. Gives calorimetric experiments and calculations, examinations of the air and the mode of combustion. Ill. 2800 w. Gas Wld—June 28, 1902.

The Heating Effect of Gas. W. R. Crane. Description of an improved method and apparatus for determining heating values. Ill. 4000 w. Mines & Min—Oct., 1902.

On the Use of Gas for Warming Inclosed Space. Dr. W. H. Birchmore. Discusses how best to heat with economy and success by means of illuminating gas. 5000 w. Am Gas Lgt Jour—Oct. 27, 1902.

Domestic.—Domestic Heating by Gas. Donald McDonald. Read before the Ohio Gas Lgt. Assn. Discusses price, use, fixtures, etc. General discussion follows. 9000 w. Am Gas Lgt Jour—May 4, 1903.

See also **GAS FUEL.**

Dryness.—The Alleged Dryness of Air in Rooms Warmed by Gas Fires. Thomas Fletcher. A report of careful experiments made in such a form that they can be repeated and verified. 1500 w. Jour of Gas Lgt—Feb. 12, 1901.

Fires.—Radiant Heat from Different Varieties of Gas Fires. Thomas Fletcher. Reports measurements of asbestos fibre, ball fire, iron spray, and radiant reflectors. Shows the iron spray to be the most economical and effective. 700 w. Jour Gas Lgt—March 5, 1901.

Temperature and the Output of Gas Fires: Is It Colder Before or After Christmas? An article prepared from notes drafted by E. W. T. Richmond just before his death. Considers the effect of temperature on gas consumption, giving facts in proof that it is colder during the late winter months. 5000 w. Jour Gas Lgt—Sept. 30, 1902.

The Choice of Gas Fires. Thomas Fletcher. Defending gas fires and stating some of their advantages. 900 w. Jour Gas Lgt—Dec. 23, 1902.

Hygiene.—See **Dryness; GAS LIGHTING; GAS STOVE.**

Industrial.—Gas for Industrial Purposes. James H. Walker. Read at meeting of the Wisconsin Gas Inst. Information relating to the experience of the Milwaukee Gas Light Co. in the introduction of gas for industrial uses, and the methods which were successful. Illustrates appliances. 2000 w. Am Gas Lgt Jour—March 30, 1903.

Mechanical Processes.—Gas as Fuel in Mechanical Heating Processes—Why the Dearer Fuel is Often the Best to Use. Edward P. Reichhelm. Presents reasons why gas blast-furnaces are economical. 1200 w. Am Mach—April 28, 1904.

Paris.—Heating and Cooking by Gas. Auguste Lévy. Presented at the Paris Congress. On the investigations and tests of the Paris Gas Co., made to advance the use of gas for these purposes. 3400 w. Jour Gas Lgt—Nov. 6, 1900.

GASHOLDER.

See also **GAS DISTRIBUTION; GAS MANUFACTURE; GAS WORKS.**

A Talk on the Development of the Gas Holder. George Livesey. Sketches the gradual growth in size and construction and gives interesting information. Ill. Discussion. 7200 w. Gas Wld—May 3, 1902.

Alterations.—Experiences Encountered During the Alterations to Connections of an 80-Foot Diameter Water Gas Relief Holder and Tank. T. Randolph Murray. Read before the So. Dist. Assn. of Gas Engrs. & Mgrs. An account of a somewhat difficult piece of work. A gas holder tank was emptied while the holder was kept in work almost up to the last moment. 6000 w. Gas Wld—Nov. 16, 1901.

Amsterdam.—The Principles of Construction of a Proposed Modern Gas Holder for Amsterdam. J. Van Rossum du Chattel. Read before the Gas Section of the Glasgow Congress. An illustrated description of an annular tank above the ground, the largest of the kind ever constructed. States the conditions, difficulties and methods. Discussion. 4400 w. Gas Wld—Sept. 14, 1901.

Design of the Proposed Gas Holder for Amsterdam (De Constructie van een Outworpen Gashouder voor Amsterdam). J. Van Rossum du Chattel. With details of strain diagrams, and special construction to avoid a deep pit in water-bearing ground. 3500 w. De Ingenieur—Sept. 21, 1901.

Birmingham, Eng.—Holders at the Birmingham Gas Works. Describes the enlargement of a gas holder, and gives illustrations of the construction of a new holder, to be described. Serial. 1st part. 1800 w. Engr, Lond—Dec. 7, 1900.

Concrete.—Difficulties in the Construction of a Concrete Gas Holder Tank. F. G. Cockey. Read before the London meeting of the So. Dist. Assn. of Gas Engs. and Mgrs. A record of personal experience, the difficulties and how met. Also discussion. 4000 w. Gas Wld—Nov. 17, 1900.

Difficulties in Constructing a Concrete Gas Holder Tank. Describes the method of building a large tank on a side hill in a clay soil, which slipped badly. 2000 w. Eng Rec—June 8, 1901.

Cottincin System.—A New Method of Constructing Tanks. Arthur Vye-Parminter. An illustrated description of the Cottincin system of reinforced concrete as applied to gas holder construction. 1000 w. Jour Gas Lgt—Dec. 9, 1902.

East River Co., N. Y.—A Giant Gas Holder and Its Erection. Illustrated detailed description of the erection of a large gas holder for the East River Gas Company of New York. 2000 w. Ir Age—Aug. 22, 1901.

German Specifications.—Standard Specifications for Supplying the Structural Ironwork of Gas Holders. Drawn up in 1901, conjointly by the German Assn. of Gas and Water Engrs. and the Union of German Mfrs. of Gas Holders. 2500 w. Jour Gas Lgt—March 11, 1902.

Hull, Eng.—Description of a Gas Holder and Tank Erected at the Hull Station of the British Gaslight Company, with Some Practical Suggestions on Construction. Ill. 3600 w. Jour Gas Lgt—June 4, 1901.

Intze.—An Intze Gas Holder Tank. Extract from the specifications for an improved gas holder, by Otto Intze. Describes a new construction of annular metal gas holder tank, giving drawings. 1500 w. Gas Wld—Nov. 9, 1901.

Intze Gas Holders and Tanks. An abstract of the patent specification, with illustrations. 2000 w. Jour Gas Lgt—Nov. 12, 1901.

Marshland.—See **Middlesbrough, Eng.**

Mayer.—Mayer's Improvements in Gas Holder Tanks. Illustrations and specifications. The construction is the same as the Intze gas holder, save that the Mayer tank is not an annular one. 1200 w. Am Gas Lgt Jour—Dec. 9, 1901.

Meriden, Conn.—A Holder Foundation on Quicksand. C. A. Learned. Read at meeting of New England Gas Engrs. Describes the location, near Meriden, Conn., and the materials on which the foundation for a steel tank holder was constructed, and the methods used. 1800 w. Am Gas Lgt Jour—Feb. 24, 1902.

Middlesbrough, Eng.—Experience at Middlesbrough with Gas Holder Tanks on Marshland. David Terrace. Read before the Inst. of Gas Engrs. On the difficulties and means adopted to remedy them. Ills. 2200 w. Gas Wld—June 11, 1904.

Newcastle.—A Large Gas Holder for Newcastle. Detailed description and drawings. Serial. 1st part. 2400 w. Jour Gas Lgt—July 2, 1901.

The Construction of a Large Modern Gas Holder. Information from a paper by W. Doig Gibb on the new gas holder erected at St. Anthony's, near Newcastle, Eng. Ills. 2500 w. Jour Gas Lgt—May 10, 1904.

New York.—Construction Details of a Modern Gas Holder. Gives illustrated detailed description of the construction of one of six gas holders recently built in New York City, and fairly typical of the best American practice. 2500 w. Eng News—Oct. 26, 1905.

Parkinson Test.—See **GAS METER—Testing.**

Rodez, France.—Cable-Guided Gas Holder at the Rodez Gas Works. M. Godinet. Read before the Société Technique du Gas en France. An illustrated article describing this system and giving results of tests made. 2300 w. Jour Gas Lgt—Sept. 23, 1902.

St. Anthony's.—See **Newcastle, Eng.**

Specifications, German.—Rules for the Specification of the Ironwork of Gas Holders. The substance of two documents promulgated by a joint committee of the German Gas Assn. and the Union of German Gas Holder Makers, with a view of establishing a uniformity of practice. Also editorial. 4600 w. Gas Wld—Nov. 28, 1903.

Steel.—Steel Gas Holders. W. A. Baehr. A topical discussion pointing out some of the problems connected with the foundation, the tank, the holder and the guide framing. 1500 w. Wis Engr—Jan., 1901.

GAS INDICATOR.

See **FIREDAMP,**

GAS INDUSTRY.

See also **GAS; GAS ENGINEER; GAS ENGINEERING; GAS LIGHTING; GAS MANUFACTURE; GAS METER; GAS WORKS; LIGHT; LIGHTING.**

Public Gas Supply. Alton D. Adams. Discusses the heating power of illuminating gas and makes comparison with the heating power of coal; also discusses the growing use of gas engines as a source of power, cost, etc. 1800 w. Munic Engng—Dec., 1900.

Business Outside the Usual Channel. F. W. Stone. Read before the Ohio Gas Lgt. Assn. Enumerates some of the uses to which gas may be applied. Also general discussion. Ill. 4000 w. Pro Age—May 1, 1901.

The Progressive Age. J. D. Ashworth. Read before the Inst. of Gas Engrs. The writer takes a rather depressed view, but gives some suggestions worthy of consideration. Discussion. 4000 w. Gas Wld—May 4, 1901.

Gas and Gas Fittings. This introductory article reviews briefly the history of the gas industry. Serial. 1st part. 2100 w. Builder—July 6, 1901.

Accounting.—Bookkeeping for Gas Works. Charles Sandell. The first of a series of articles from a writer of large experience. Serial. 1st part. 3000 w. Gas Wld—Jan. 19, 1901.

Auditing Gas Works Accounts. The present article discusses the function of the auditor principally and the value of efficient auditing. Serial. 1st part. 2700 w. Jour Gas Lgt—Oct. 15, 1901.

See also **GAS METER.**

American.—Business Sketches in America. E. W. T. Richmond. The first of a series of articles on points of interest to the gas industry. Serial. 1st part. 5800 w. Jour Gas Lgt—Jan. 29, 1901.

Gas Matters in the United States. An explanation of methods of business in gas undertakings, a description of American types of gas engines, cooking and heating practice, etc. 7500 w. Jour Gas Lgt—Feb. 5, 1901.

Some Results of American Gas-Works Administration. Discussions of American methods and the present situation of the industry. 2000 w. Jour Gas Lgt—May 20, 1902.

Profits in the American Gas Field. Alton D. Adams. Gives the story of the condition of this industry in the United States, the inflation of stocks and bonds, etc. 3400 w. Munic Jour & Engr—Jan., 1903.

Ammonia Sulphate.—See **AMMONIA.**

Boston, Eng.—Boston and Its Gas Supply. J. S. Dougall, before the Eastern Counties Gas Mgrs. Assn. Details and early history of the supply to this English seaport. 1200 w. Gas Wld—April 19, 1902.

British.—Mr. Percy Griffith on Gas Supply. Address to the Society of Engineers, London. Deals with various aspects of gas supply and describes a new development of the Scott-Snell self-intensifying gas lamps. 3000 w. Gas Wld—Feb. 8, 1902.

Gas Undertakings Returns. Information from the recently issued returns for the United Kingdom. 1500 w. Jour Gas Lgt—Jan. 20, 1903.

The Future of the Gas Industry. William Upton. Read before the London & Southern Dist. Jr. Gas Assn. Considers important questions involved in the progress of the industry. Serial. 1st part. 3300 w. Gas Wld—June 6, 1903.

Presidential Address before the Midland Association of Gas Managers, Condensed. George Helps. Discusses the points of interest in the gas industry of England. 15,000 w. Gas Wld—Feb. 27, 1904.

Mr. Charles Hunt's Presidential Address before the Midland Association of Gas Managers. Interesting discussion of matters relating to the gas industry. 10,000 w. Gas Wld—March 1, 1902.

See also **GAS ENGINEER; INCANDESCENT GAS LIGHTING—Welsbach.**

Cheaper Gas.—The Need of Cheaper Gas. C. E. Jones. A review of the gas industry, the questions of present importance and the future outlook. 3500 w. Jour Gas Lgt—Sept. 1, 1903.

Coal Earnings.—See **GAS MANUFACTURE.**

Coke Disposal.—See **COKE—Disposal.**

Consumer and Manager.—The Relation of the Consumers to the Gas Manager. S. B. Langlands. Read at the meeting of the Irish Assn. of Gas Mgrs. Considers the best means of strengthening the relationship. General discussion follows. 4000 w. Gas Wld—Aug. 14, 1901.

Cork Strike.—See **STRIKE.**

Edinburgh and Leith.—See **GAS WORKS—Granton.**

Electric Compared.—See **LIGHTING—Electric vs. Gas.**

Electricity Combined.—Gas and Electricity Departments in Combination. S. Meunier. Read before the Midland Assn. of Gas Mgrs. Considers the advantages of such a combination. Also discussion. 7000 w. Jour Gas Lgt—Oct. 14, 1902.

England.—See **British.**

Franchise.—See **Rates and Franchise.**

Fuel Gas Consumption.—See **GAS FUEL—Domestic.**

Future.—The Future of the Gas Profession. Reviews the subject, indicating some directions in which to look for improvement. Serial. 1st part. 3000 w. Jour Gas Lgt—Dec. 11, 1900.

The Illuminating Power of the Gas of the Future. Harry Edward Jones. Read before the Inst. of Gas Engrs. Discusses how an illuminating gas of 10 or 12 candles may best be produced, the subject of fuel gas for power, and other matters of related interest. General discussion. 11,500 w. Gas Wld—May 3, 1902.

Germany.—See **GAS WORKS.**

Grand Rapids, Mich.—See **GAS PIPE.**

Griffith Address.—See **British.**

Helps Address.—See **British.**

Hunt Address.—See **British.**

History.—Gas Supply. Editorial review of the progress during the century and especially during the last year. 1200 w. Engr, Lond—Jan. 4, 1901.

Inaugural Address Before the Incorporated Gas Institute, England. T. Ormiston Paterson. Reviews the difficulties met and conquered by the gas industry in the early part of the 19th century, and discusses the problems of the present. 5500 w. Jour Gas Lgt—June 11, 1901.

The Development of Lighting and Heating (Neuerungen auf dem Gebiete des Beleuchtungs- und Beheizungswesens). Frans Walter. The first of a series of articles of a historical character; this installment describes early gas works in Vienna. Serial. Part I. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 5, 1902.

The Development of the Modern Gas Plant. Thomas D. Miller. Read at meeting of Southwestern Gas, Electric and Street Railway Assn. Briefly reviews the history of the discovery of gas giving properties in coal, and the development, improvements, etc. 2500 w. Am Gas Lgt Jour—May 16, 1904.

See also **GAS LIGHTING.**

India.—Gas: Its Uses in India. George Cecil. An account of conditions and the degree of progress in the use of gas, showing the country to be very slow in adopting modern improvements. 2000 w. Jour Gas Lgt—March 12, 1901.

Inspection.—See **GAS METER.**

Internal Fitting Work.—See **INCANDESCENT GAS LIGHTING—Maintenance.**

Invention.—The Trend of Gas Invention. An examination of new invention as revealed by the specifications published during the last year, with remarks on the comparison to be made between Great Britain and other countries in this industry. 2300 w. Jour Gas Lgt—Jan. 21, 1902.

See also **GAS.**

Iowa.—See **Rates and Franchise.**

Ireland.—See **GAS MANUFACTURE.**

Kentucky Law.—Text of the Decisions by the Court of Appeals, State of Kentucky, in the Matter of the Status of the Kentucky Heating Company to the Gas Supply of Louisville. 3300 w. Am Gas Lgt Jour—Jan. 7, 1901.

Legal Relations.—The Legal Relations Between Gas Supply Undertakings and Consumers. Considers enactments and judgments, in England, bearing upon points connected with the relations of gas undertakings with consumers who are in financial difficulties. Serial. 1st part. 3000 w. Jour Gas Lgt—Feb. 11, 1902.

The Legal Relations Between Gas Supply Undertakings and Consumers. The first of a series of articles summarizing the various sections of the several Acts of Parliament which bear upon the legal relations existing between a gas undertaking and a consumer. Serial. 1st part. 3000 w. Jour Gas Lgt—June 3, 1902.

Management.—What Is the Business of a Gas Company? Frank D. Moses. Read at meeting of the Am. Gas Lgt. Assn. Considers ways to increase the sale of gas. Also discussion. 4500 w. Pro Age—Nov. 15, 1901.

See also **Accounting; GAS WORKS.**

Meter Accounts.—See **GAS METER—Accounts.**

Modern Practice.—Modern Practice in the Manufacture and Distribution of Gas. Harry Edward Jones. Extracts from a paper read before the Inst. of Civ. Engrs. of London, Eng. Considers the influence of Welsbach light, the coin meter, and sliding scale legislation, labor-saving machines, residuals, etc. Serial. 1st part. 5000 w. Pro Age—Jan. 15, 1902.

Monazite.—See **MONAZITE.**

Municipal Ownership.—Municipal Ownership. Edward Webster Bemis. Testimony presented before the U. S. Industrial Commission. 6000 w. Pro Age—Jan. 15, 1901.

Municipal Ownership. Frank J. Symmes. Read before the Pacific Coast Gas Assn. A discussion of this subject not favorable to public ownership. 5700 w. Jour of Elec—Nov., 1902.

Some Features of Municipal Ownership. Henry L. Doherty. Read before the Am. Gas Lgt. Assn. A consideration of questions in regard to municipal ownership, discussing the reasons offered to justify it. 8400 w. Am Gas Lgt Jour—Nov. 2, 1903.

See also **MUNICIPAL OWNERSHIP—Gas.**

Municipal vs. Private.—Cost of Light in Municipal and Private Gas and Electric Plants. Alton D. Adams. A comparison between two groups of towns in Massachusetts as to the price of gas to private consumers, the cost of electric street lighting and the net earnings on the invested capital. In one group the plants are owned by private corporations, in the other by the municipality. 900 w. Munic Engng—Sept., 1902.

Cost of Municipal vs. Private Gas. Alton D. Adams. Claims that the methods of operating private gas plants are expensive and that municipal plants are run more economically, and can therefore furnish cheaper gas. 1500 w. Munic Jour & Engr—July, 1903.

New Orleans.—Gas. Thomas D. Miller. An illustrated historical review of the manufacture and development of the gas industry, especially describing the business in New Orleans, which was the second gas works built in the United States. 5300 w. Jour Assn of Engng Soc's—Oct., 1903.

Outputs.—Why English Gas Outputs Are Large, with Lessons to be Drawn in the United States. J. T. Westcott. Tabulated information concerning representative towns in different countries, with explanation of conditions in England. General discussion. 3300 w. Pro Age—April 15, 1904.

Overcapitalization.—Unproductive Capital and Its Relation to Renewals. Arthur Valon. Read before the Inst. of Gas Engrs. A discussion of the difficulties attendant on overcapitalised works, etc. Discussion. 5500 w. Gas Wld—June 13, 1903.

Paris.—The Gas Question in Paris (Le Nouveau Régime du Gaz à Paris). A review of the report of M. Lauriol, chief engineer for lighting in Paris, on plans for the improvement and increase of the gas supply, by private companies or the city itself. 2800 w. Génie Civil—Dec. 21, 1901.

The Gas Question in Paris. Particulars from a report by M. Lauriol, studying a scheme for new works and discussing the cost of manufacture, and other matters of interest. 2500 w. Jour Gas Lgt—Jan. 7, 1902.

Paterson Address.—See History.

Producer Gas.—Should Gas Companies and Corporations Vend "Producer" Gas? Discusses British legislation favorable to a Mond gas supply and the effect on the gas interests. Serial. 1st part. 2300 w. Jour Gas Lgt—Aug. 11, 1903.

See also **GAS FUEL; GAS POWER.**

Progress.—Progress Department Report, at Meeting of Ohio Gas Light Association. Irvin Butterworth. A résumé of the more important technical and mechanical improvements that have been made in gas manufacture, distribution and consumption during the last year. Short discussion. 9500 w. Am Gas Lgt Jour—April 25, 1904.

Opening Address before the American Gas Associations, at St. Louis, Mo. Rollin Norris. Indicates lines along which progress is possible, such as cheaper raw materials, increased efficiency, reduced waste, etc. Brief discussion. 6000 w. Pro Age—July 15, 1904.

Quality and Consumption.—Mr. Dibdin on the Effect of Quality on the Consumption of Coal Gas, with Some Remarks as to the Results of Adding Water Gas to Coal Gas. Review of a paper read before the Soc. of Chem. Ind., England. 2000 w. Jour Gas Lgt—Dec. 4, 1900.

Effect of Quality on the Consumption of Gas. W. J. Dibdin. Abstract of a paper and discussion at meeting of the London section of the Soc. of Chem. Ind. Reports the results of experiments made. 4800 w. Gas Wld—Dec. 8, 1900.

The Effect of Quality of Gas on Consumption. John T. Sheard. A criticism of Mr. Dibdin's paper on this subject. 3500 w. Gas Wld—Jan. 19, 1901.

Rates.—Differential Rates for Gas. Herr von Oechelhaeuser. Read at Vienna meeting of the German Assn. of Gas and Water Engrs. The writer's views based on extensive experience and observation, with discussion of the conditions and reasons. Diagrams. Serial. 1st part. 3300 w. Jour Gas Lgt—July 16, 1901.

A Plea for One Price. Norton H. Humphreys. Suggesting that the price be given in plain figures and all discounts and financial accommodation stated as a separate transaction. 1500 w. Jour Gas Lgt—May 3, 1904.

Rates, America.—Gas Rates in the United States. Alton D. Adams. Information concerning production, prices, etc. Munic Jour & Engr—Aug., 1902.

Rates and Franchise.—Gas Rates and Franchise Tax. George McLean. Read at meeting of the Am. Gas Lgt. Assn. An explanation of the laws of Iowa bearing on these questions. 2000 w. Am Gas Lgt Jour.—Oct. 20, 1902.

Rates, Mass.—See Municipal vs. Private; **ELECTRIC STATION MANAGEMENT.**

Referees, Eng.—The Arraignment of Gas Refereeism. C. E. Jones. Discussion of some aspects of refereeism as applied to gas affairs in England. 4000 w. Jour Gas Lgt—Oct. 27, 1903.

Selling.—Hints on Gas Selling. John Young. Read before the East. Co.'s Gas Mgrs. Assn. Suggestions of value to works managers, with discussion. 5500 w. Gas Wld—April 20, 1901.

Switzerland.—The Development of the Swiss Gas Works in the Past 20 Years (Die Entwickelung der Schweizerischen Gaswerke in den Letzten Zwanzig Jahren). With diagrams showing the relative progress of Swiss cities. 1000 w. Schfeizerische Bauzeitung—Dec. 29, 1900.

United States.—Gas Manufacture. Arthur L. Hunt. Extracts from the Bulletin No. 128, Jan. 3, 1902, of the Twelfth Census of the United States. Statistics concerning the operations of establishments engaged in the manufacture of gas for sale, including municipal plants, but not private plants. 4000 w. Pro Age—Feb. 1, 1902.

Vienna.—See History.

Winter Demand.—See **GAS HEATING—Fires.**

Works Management. — See Management; **GAS WORKS—Management.**

Zürich, Switzerland.—See **GAS WORKS.**

GAS INSPECTION.

See **GAS INDUSTRY—Inspection.**

GASKET.

Pipe Joints.—See **PIPE JOINT—Leaks.**

GAS LEAKAGE.

See also **GAS DISTRIBUTION—Leakage.**

Measurement.—See **GAS METER—Portable.**

GAS LIGHTING.

See also **GAS; GAS BURNER; GAS INDUSTRY; INCANDESCENT GAS LIGHTING; LIGHTING; PHOTOMETRY.**

Air Vitiation.—See **GAS—Sulphur.**

Automatic.—Automatically Lighting and Extinguishing Public Lamps. W. R. Mealing. Read before the Gas Inst. (England). Describes the Gunning system, with clockwork for each lamp, and its operation. Short discussion. 3200 w. Gas Wld—June 14, 1902.

See also **GAS BURNER—Self-Lighting.**

Burners.—See **GAS BURNER.**

Combustion Products.—See **LIGHTING.**

Competitors.—See **LIGHTING.**

Elland, Eng.—See **GAS MANUFACTURE.**

Factory.—The Lighting of Factories. J. H. Brearley. Read before the Manchester Dist. Assn. of Gas Engrs. Aims to show that not only can gas lighting maintain its ground in this field, but there is reason to hope that it may regain some of the ground lost. 4400 w. Jour Gas Lgt—Dec. 9, 1902.

Future.—See **GAS INDUSTRY.**

Guayquil, Ecuador.—Notes on the Public Lighting of the Town of Guayquil. Charles Guichard. Read before the Gas Congress at Paris. Description of means and apparatus adopted where defense against nocturnal insects is as necessary as protection from wind, rain and earthquakes. Ill. 3000 w. Jour Gas Lgt—Oct. 23, 1900.

Gunning System.—See Automatic.

High Pressure.—Recent Developments in High-Pressure Gas Lighting. Scott Snell. Report of a lecture before the Royal Scottish Soc. of Arts. Especially explaining the merits of the writer's system. 1600 w. Gas Wld—Feb. 28, 1903.

Engineering Works and Shop Lighting by the High-Pressure Gas System. Gives night photographs of the lighting by this system with account of its success. 1700 w. Jour Gas Lgt—Feb. 10, 1903.

See also GAS DISTRIBUTION; INCANDESCENT GAS LIGHTING.

History.—Gas Light. A brief review of the history of gas lighting, the improvements in burners, and especially of the invention of Dr. Auer von Welsbach. 4800 w. Contemporary Rev—Nov., 1900. See also GAS INDUSTRY; THOMPSON.

Hygiene.—Gas and Hygiene. James Ferrier. Read at meeting of the Western Gas Assn. A discussion of what constitutes hygienic light and heat, and what should be the policy of the gas industry. Also general discussion. 10,000 w. Am Gas Lgt Jour—June 10, 1901.

Hygienic Artificial Illumination. L. A. W. Alleman. Read before the Med. Soc. of the County of Kings, and published in the "Brooklyn Medical Journal." The present article considers the sources of light, the chandelier, light saved by the use of reflectors, etc. Serial. 1st part. 3200 w. Pro Age—Jan. 1, 1901.

Illumination Standards.—See PHOTOMETRY—Gas.

Incandescent.—See High Pressure; INCANDESCENT GAS LIGHTING.

India.—The Lighting of Some Indian Cities. A. J. Kennedy. Gives brief accounts of Madras and Jeypore. 1800 w. Gas Wld—Jan. 24, 1903.

Japan.—Lights in Japan. An account of the recent development in house and street lighting, with illustrated description of work of Japanese gasfitters. 1500 w. Am Gas Lgt Jour—May 20, 1901.

Light Distribution.—The Distribution of Gas Light in Space and the Technical Application of Milk-Glass. Dr. O. Schott and Dr. M. Herschkowitsch. Summary from the "Journal für Gasbeleuchtung." Gives curves showing how the light is distributed, and discusses the effect of diffusing glass. 1000 w. Gas Wld—Nov. 9, 1901.

Lighthouse.—See LIGHTHOUSE—Gas.

Massachusetts.—See ELECTRIC LIGHTING; GAS INDUSTRY—Municipal vs. Private.

Natural Light Compared.—See LIGHTING—Gas vs. Natural Light.

Paris Exposition.—See GAS EXHIBITION—Paris, 1900.

Railway Station.—Evolution: Old Lamps and New for Railway Station Lighting. Showing the advantages of the latest scientific methods of gas lighting. 1800 w. Jour Gas Lgt—Aug. 27, 1901.

Self Lighting and Extinguishing.—See Automatic; GAS BURNER; INCANDESCENT GAS LIGHTING.

Street.—See GAS ENGINEER—Southern District, Eng.; INCANDESCENT GAS LIGHTING; LIGHTING.

Street, New York—See LIGHTING.

Westenholz Igniter.—See GAS BURNER—Self Lighting.

GAS LIQUOR.

See AMMONIA; GAS MANUFACTURE.

GAS MAIN.

See GAS DISTRIBUTION; GAS PIPE.

GAS MANTLE.

See INCANDESCENT GAS LIGHTING.

GAS MANUFACTURE.

See also GAS; GAS ENGINEER; GAS ENGINEERING; GASHOLDER; GAS INDUSTRY; GAS PURIFICATION; GAS RETORT; GAS, WATER; GAS WORKS.

Coal Gas and Water Gas. Alton D. Adams. Describes how each is produced and compares the several processes of gas production. 2400 w. Munic Engng—Jan., 1901.

Mr. W. Foulis on the Economical Production and Utilization of Coal Gas. From the inaugural address before the Inst. of Engrs. & Shipbuilders of Scotland. Considers the question of the economical production of gas from coal, and its utilization. 6000 w. Jour Gas Lgt—Nov. 5, 1901.

Remarks Upon the Principles Involved in the Production of Gases from Coal, and Suggestions as to Their Application in Future Developments. William Young. Read at meeting of the N. British Assn. of Gas Mgrs. Also general discussion. 9000 w. Gas Wld—Aug. 1, 1903.

Ammonia.—See Tar and Ammonia; AMMONIA.

Analytical Tests.—Some Analytical Tests Made in a Gas-Works Laboratory. F. G. Barber. Read before the Manchester and Dist. Jun. Gas Assn. Considers methods of testing purified gas for impurities; analysis of the bodies which rid the gas of its impurities; coal gas; by-products, and special tests. 5000 w. Jour Gas Lgt—March 12, 1901.

See also GAS ANALYSIS.

Benches.—See GAS RETORT.

Benzol.—Enrichment of Gas by Benzol. M. A. Lecomte. Describes the apparatus of the Societe des Huiles Minerals de Colombes, giving comparisons of cannel and benzol and other information of interest. Ill. 3200 w. Gas Wld—July 20, 1901.

On the Automatic Carburation of Gas by Benzol. M. Laeaze. Brief illustrated description of method of automatically supplying the amount of benzol needed. 500 w. Gas Wld—July 20, 1901.

Enrichment of Gas by Benzol. M. A. Lecomte. Illustrates and describes apparatus used for enrichment by benzol, discussing points in this method of enrichment. 2300 w. Gas Engrs' Mag—Jan. 10, 1902.

Enrichment of Gas by Benzol. M. A. Lecomte. Read before the Société Technique du Gaz en France. Describes apparatus employed in the process, giving tests made. Ill. 1200 w. Jour Gas Lgt—July 8, 1902.

See also Enrichment; BENZOL.

Benzol Sulphur Test.—A New Test for Sulphur in Benzol for Use in Gas Works. Wilfrid Irwin. Read at the May meeting of the Manchester Section of the Soc. of Chem. Ind. Gives the usual methods employed for the determination, and also the author's method. 1100 w. Gas Wld—June 15, 1901.

Besemfelder.—See Mixed Gas.

Bradford, Eng.—See GAS ENGINEER—Manchester, Eng.

Bury, Eng.—See GAS WORKS.

By-Products.—See Residuals.

Carbonization.—The Improvement in Carbonization During Recent Years. E. W. Smith. Read before the Eastern Counties' Gas Mgrs. Assn. Also discussion. Gives results at Chelmsford, and considers needed improvements. 4500 w. Gas Wld—Oct. 5, 1901.

The Construction of Inclined Retort Carbonising Plants. Walter Ralph Herring. Read before the Gas Section of the Glasgow Congress. Considers the differences between British and Continental practice, the types, distinctive features, charging and discharging, coke conveyors, regenerative chambers, etc. Also discussion. 10000 w. Gas Wld—Sept. 14, 1901.

Improvement in Carbonization in Recent Years. E. W. Smith. Read before the Eastern Counties Gas Managers' Assn. Discusses such developments as are within the reach of small and medium sized works. 2700 w. Gas Engrs' Mag—Jan. 10, 1902.

A Suggestion for Unification in the Methods of Stating the Items Comprising the Carbonising Costs in Gasworks. W. R. Herring. Read before the Inst. of Gas Engrs. On the value of statistical research, and unformity in reporting statements. 3500 w. Gas Wld—May 3, 1902.

The Settle-Padfield Carbonising Process. Gives a description of this process as explained in the English patent specification. A vertical retort arrangement. Ill. 2000 w. Jour Gas Lgt—June 16, 1903.

The Settle-Padfield Carbonising Process. Illustrates and describes a bench of these vertical retorts under construction at Exeter, giving particulars of the apparatus and the special features of the invention. Reports test. 3000 w. Jour Gas Lgt—June 23, 1903.

The Way of Improvement in Coal Carbonization. Comment on the new systems of carbonization and new proposals for improvements of methods and appliances. 2300 w. Jour Gas Lgt—July 21, 1903.

The Settle-Padfield Carbonizing Process. Norton H. Humphreys. Notes and results of tests of interest. 900 w. Jour Gas Lgt—July 28, 1903.

See also COAL—Gas Manufacture; GAS WORKS Chester, Eng.

Carburation.—See Benzol; Enrichment; CARBURETTER.

Car Lighting.—See CAR LIGHTING—Acetylene Enrichment.

Charging Apparatus.—See GAS RETORT—Charging.

Chemistry.—See CHEMISTRY—Gas Works.

Chimney Draft.—The Control of Chimney Draught. E. H. Hudson. Read before the Manchester Dist. Inst. of Gas Engrs. Discussion of the design of chimneys in connection with retort-house work, and the difficulties due to draught. Ill. 4500 w. Jour Gas Lgt—March 4, 1902.

Claus Reaction.—Studies on the Claus Reaction. Gives results of investigations made, describing Claus plants tested in various works, and the tests made, stating results. 4000 w. Jour Gas Lgt—July 12, 1904.

Coal.—See COAL—Gas Manufacture; FUEL—Economy.

Coal and Coke Handling.—See COAL HANDLING; COKE HANDLING; MECHANICAL HANDLING.

Coal Earnings.—The Earnings of a Ton of Gas Coal. C. E. Jones. The inquiry is limited to coal subjected to destructive distillation in the usual manner in the works of gas companies in the United Kingdom. 1800 w. Jour Gas Lgt—Oct. 14, 1902.

Coal Tar.—See Tar and Ammonia; GAS, WATER; TAR.

Coal Valuation.—See COAL—Gas Manufacture.

Coke Oven.—See COKE-OVEN GAS.

Combined.—See Water Combined.

Combustion.—See COMBUSTION—Mechanism; GAS PRODUCER.

Condensation.—Coal Gas Condensation: A Theory. A. F. Browne. Discusses the question of the position of the condenser with regard to the exhauster, the effect of expansion, etc. General discussion. 11300 w. Gas Wld—May 3, 1902.

Condensation of Illuminating Gas. Dr. Harold G. Colman. Read before the Inst. of Gas Engrs. Considers chiefly what may be called the action of the condensing apparatus as a washer or scrubber for the various vapors present in the hot gases issuing from the retorts. General discussion. 9500 w. Gas Wld—June 11, 1904.

Some Experiences With Condensing Plant. William Currie. Read at meeting of the N. Brit. Assn. of Gas Mgrs. Discusses the best methods, describing the plant in use by the writer and its working. 3500 w. Gas Wld—Aug. 2, 1902.

Cost.—See Coal Earnings; Economy; GAS INDUSTRY; GAS WORKS—Bury, Eng.

Cyanide.—See Ferrocyanide; CYANIDE—Gas Manufacture.

Cyanogen.—See CYANIDE—Gas Manufacture.

Diluting Gases.—The Economical Production of Diluting Gases. C. B. Tully. Read before the Irish Assn. of Gas Mgrs. An account of interesting work at Sligo, with discussion. Ill. 2800 w. Gas Wld—Aug. 7, 1901.

Distillation.—Thermic Reactions in the Distillation of Coal. M. Euchêne. Read at Gas Congress at Paris. Gives the principal points in this lengthy communication, and the conclusions drawn from the investigations. Ill. Serial. 1st part. 5700 w. Jour Gas Lgt—Oct. 30, 1900.

Economy.—Efficiency in Gas Manufacture. S. Tagg. Read before the Manchester and District Jour. Gas Assn. A discussion of methods best adapted to secure economy in gas making and the principles that should guide gas engineers. 5600 w. Jour Gas Lgt—Dec. 2, 1902.

See also Coal Earnings.

Education, Germany.—Technical Instruction in Gas-Making in Germany. Details of an important scheme for the training of foremen, of managers, and of lighting engineers. 3000 w. Gas Wld—Feb. 2, 1901.

Elland, Eng.—Some Features of Gas Making and Gas Lighting at Elland. An illustrated article describing progress and improvements. 3400 w. Gas Wld—Dec. 19, 1903.

Enrichment.—The Enrichment of Coal Gas. R. Hooton. Read before the Manchester Dist. Inst. of Gas Engrs. Short paper introducing a general discussion of the subject. 5700 w. Jour Gas Lgt—March 5, 1901.

The Enrichment of Coal Gas. Report of the discussion at the meeting of the Manchester Dist. Inst. of Gas Engrs. 6000 w. Gas Wld—March 16, 1901.

Gas Enrichment. A. Yuill. Read before the N. Brit. Assn. of Gas Mgrs. Deals especially with enrichment by benzol. 2000 w. Jour Gas Lgt—July 30, 1901.

Gas Enrichment. Discussion of paper by A. Yuill. 5000 w. Jour Gas Lgt—Aug. 6, 1901.

The Use of Oil in Water Gas, Coal Gas and Air Gas Production. Vivian B. Lewes. A sketch of the history of water gas and air gas manufacture, showing the importance of oil in the generation of these gases. 7000 w. Jour Gas Lgt—April 1, 1902.

The Low Candle-Power Policy and Its Critic. Editorial review of a paper on "The Policy of Gas Enrichment," by A. G. Glasgow, read before the Am. Gas Lgt. Assn. 1500 w. Gas Wld—Oct. 31, 1903.

The Policy of Gas Enrichment (Illustrated by London Practice). Arthur Graham Glasgow. Read at the Detroit meeting of the Am. Gas Lgt. Assn. A discussion of the advantages of gas enrichment, explaining methods, especially the enrichment by carburetted water gas. 9000 w. Am Gas Lgt Jour—Nov. 9, 1903.

The Policy of Gas Enrichment (Illustrated by London Practice). Discussion at Detroit, Mich., of the paper of Arthur Graham Glasgow. 4000 w. Am Gas Lgt Jour—Dec. 14, 1903.

See also Benzol; Oil; GAS; GAS, WATER.

European Practice.—How They Do Things on the Other Side. F. H. Shelton. A paper read before the New England Assn. of Gas Engs. Notes on visits to 15 gas-works in Europe. 7700 w. Pro Age—March 1, 1901.

Ferrocyanide.—Ferrocyanide Manufacture at the Hague Gas-Works. Extract from a paper by Heer J. Rutten, in "Het Gas," giving an account of a process in practical operation for the production of potassimu ferrocyanide from the cyanogen in coal gas. Ill. 3800 w. Jour Gas Lgt—Sept. 30, 1902.

See also CYANIDE—Gas Manufacture.

Fuel Economy.—See FUEL—Economy.

History.—See GAS INDUSTRY.

Ireland.—Gas Affairs in the West of Ireland. T. J. Reid. Read before the Irish Assn. of Gas Mgrs. An account of the conditions prevailing, and what has been done to modernize some of the works. Discussion. 6400 w. Gas Wld—Aug. 23, 1902.

Jones Process.—A Combined Coal and Water Gas Plant. Illustrates and describes features in Walter R. Jones's patent. 2000 w. Jour Gas Lgt—Dec. 29, 1903.

Lime.—See AMMONIA—Gas Liquor.

Liquid Air.—See LIQUID AIR.

Massachusetts.—See GAS INDUSTRY—Municipal vs. Private; GAS, WATER.

Massa Separator.—See Separator.

Mixer.—A Proportional Gas Mixer (Doseur-Mélanguer de Gaz). A. Binet. A form of duplex gas meter, so arranged that air and gas, or gas and acetylene may be mixed in pre-determined proportions. 1000 w. Génie Civil—July 25, 1903.

Mixture.—A Continuous Process for Making a Mixed Gas of Uniform Composition. An abstract translation of an article by Dr. Besemfelder, in the "Journal für Gasbeleuchtung." Gives a description of his new process for making gas, and reviews the principles underlying other processes. Serial. 1st part. 1800 w. Jour Gas Lgt—Jan. 21, 1902.

Besemfelder's Mixed-Gas Process. Abstract translation of a paper by the inventor giving particulars of the advantages of this process for a continuous production of a mixed gas of uniform composition. 3000 w. Jour Gas Lgt—April 12, 1904.

See also Water Gas Combined; **GAS INDUSTRY—Quality and Consumption.**

Modern Practice.—Modern Practice in the Manufacture and Distribution of Gas. Harry Edward Jones. Begins the publication of an interesting paper presented to the Inst. of Civ. Engs., with a report of the discussion upon it. Serial. 1st part. 4000 w. Gas Wld—Nov. 9, 1901.

Naphtha.—See **NAPHTHA—Gas Machine in Fire.**

Naphthaline.—Coal Gas Treatment. A. B. Slater, Jr. Read before the New England Assn. of Gas Engrs. Discusses results of various methods, with special reference to the deposition of naphthaline. 2300 w. Pro Age—March 15, 1902.

Further Experiences with Reversible Condensers. Charles Carpenter. Read before the So. Dist. Assn. of Gas Engrs & Mgrs. Explains the writer's successful method of abolishing the naphthalene trouble. Ill. 2000 w. Gas Wld—Nov. 16, 1901.

The Solubility of Naphthaline. P. F. Smith. Read before the Inst. of Gas Engrs. Gives results of laboratory work in determining the value of various solvents when employed for clearing mains and service pipes. Discussion. 3900 w. Gas Wld—May 3, 1902.

Further Suggestions for the Elimination of Naphthalene from Coal Gas. Thomas Glover and William Young. Read before the So. Dist. Assn. of Gas Engrs. & Mgrs. (England). Presents some considerations of the problem and proposes modifications in the methods of condensation which will effectually reduce the quantity of naphthalene in the finished gas. 4900 w. Gas Wld—Nov. 8, 1902.

Naphthaline. Dr. W. H. Birchmore. Read before the Western Gas Assn. A discussion of results of investigations describing experiments made and giving a full study of the subject. Serial. 1st part. 12000 w. Am Gas Lgt Jour—June 22, 1903.

See also **GAS PURIFICATION.**

Oil.—See also Enrichment; **GAS, OIL.**

Pressure Regulation.—See **GAS RETORT.**

Prussian Blue.—The Determination of Prussian Blue in Spent Oxide. Abstract translation of a paper by Dr. Luhrig, who had made an exhaustive study of this question. 1000 w. Jour Gas Lgt—Feb. 10, 1903.

Purification.—See **GAS PURIFICATION.**

Pyrometer.—See **PYROMETER—Blue Glass.**

Regenerator.—The Working of Regenerator Furnaces. S. B. Chandley. Read before the Manchester and District Junior Gas Assn., England. Concerning the construction, general arrangement and working of regenerative settings. 5400 w. Am Gas Lgt Jour—Jan. 14, 1901.

Residuals.—Some Notes on the Working Up of Gas Works Residuals. The present paper deals with tar distillation. Serial. 1st part. 1700 w. Gas Wld—March 29, 1902.

Secondary Air Heating.—Is the Zigzag Flue Necessary for Heating Secondary Air? J. Whyte. Read before the North of England Gas Mgrs. Assn. Gives results of experiments made. General discussion follows. Ill. 3800 w. Jour Gas Lgt—April 28, 1903.

Separator.—The Mazza Separator. Translated from "Il Gas." An account of a simple machine and the successful experiments made. 1000 w. Gas Wld—April 18, 1903.

Settle-Padfield Process.—See Carbonization.

Sewage Sludge.—Illuminating Gas from Sewage Sludge. Discusses the practicability of obtaining illuminating gas from this source. 2200 w. Jour Gas Lgt—Nov. 6, 1900.

Small Coal.—The Uses of Small Coal. Remarks on the use of small coal in gas manufacture and the influence of washeries and other economies on the coal industry, with reference to a paper by Mr. Mackey, read before the Soc. of Chem. Ind. 1900 w. Jour Gas Lgt—May 24, 1904.

Steam and Air.—See **GAS RETORT—De-Scurfing.**

Steam Turbine.—See **STEAM TURBINE—Blowing and Exhausting.**

Sulphate.—Sulphate Manufacture in Great Britain. Extracts from the report of R. Forbes Carpenter to the Local Government Board, showing the production from the gas industry, and matters relating. 3000 w. Gas Wld—Aug. 30, 1902.

Sulphuretted Hydrogen.—See **GAS ANALYSIS.**

Sulphur Recovery.—The Claus Sulphur-Recovery Process at Granton. From the report of Mr. R. Forbes Carpenter, in regard to experiments made, giving results and conclusions. 1800 w. Jour Gas Lgt—June 30, 1903.

Sulphur Utilization.—Utilisation of Sulphur in Gas-Works. Discusses old and new methods. 2000 w. Gas Wld—Jan. 16, 1904.

Tar.—See Tar and Ammonia; **GAS, WATER; TAR.**

Tar and Ammonia.—Professor Lunge on Coal Tar and Ammonia. A review of the third and enlarged edition of a work by George Lunge. 1800 w. Jour Gas Lgt—Nov. 27, 1900.

See also **BLAST-FURNACE GAS; GAS PURIFICATION.**

Tar Removal.—See **GAS, WATER.**

Thermic Reaction.—See Distillation.

Water Gas.—See **GAS, WATER.**

Water Gas Combined.—The Supply of Mixtures of Coal Gas and Water Gas. H. Bunte. Abstract translation of a communication to the German Assn. of Gas and Water Engs. Discusses the production and distribution of a mixture of coal gas and water gas, or carburetted water gas. 6000 w. Jour Gas Lgt—Nov. 27, 1900.

Introduction of Water Gas into Coal-Gas Retorts. Abstract translation of an interesting paper by Herr O. Borchardt, published in the "Journal für Gasbeleuchtung." 600 w. Jour Gas Lgt—Dec. 16, 1902.

The Future of Coal Gas and Allied Illuminants. Prof. Vivian B. Lewes. The first of a series of lectures showing the changes in conditions during the last twenty years, and the direction in which they tend. Serial. 1st part. 7000 w. Jour Soc of Arts—Dec. 26, 1902.

Combined Oil-Carburetted and Blue Water-Gas Plant at Smethwick. Illustrates and describes the novel features of this recently installed plant. 2800 w. Jour Gas Lgt—March 10, 1903.

A Combination Dellwik Water-Gas and Peebles Oil-Gas Plant at Cleethorpes. An illustrated description of the plant, indicating the various methods of usefulness and giving a statement of results. 3800 w. Jour Gas Lgt—March 24, 1903.

Economic Advantages of Working a Carburetted Water-Gas Plant in Conjunction with Coal-Gas Plant. S. Carpenter. Read before the So. Dist. Assn. of Gas Engrs. & Mgrs. Considers the convenience, cost, coke factor, advantages, etc. Discussion. 8200 w. Gas Wld—Nov. 14, 1903.

Leading Water Gas Through Coal Gas Retorts. Herr Croissant. Summary of an address before the Mid-Rhine Dist. Assn. A record of experiments and conclusions. 1600 w. Gas Wld—May 14, 1904.

Introduction of Water Gas into Retorts in which Coal is Undergoing Carbonisation. Abstract translation of a paper by Albrecht and Shirk Boyer, in "Jour. für Gasbeleuchtung." Describes experiments made. Serial. 1st part. 1700 w. Jour Gas Lgt—June 28, 1904.

See also Jones Process.

Wood Gas.—See **GAS, WOOD.**

Yield.—Maximum Economical Yield of Gas per Pound of Coal Carbonized. John Somerville. Read before the Western Gas Assn. Introducing a general discussion. Gives results from personal experience. Discussion follows. 5300 w. Am Gas Lgt Jour—June 15, 1903.

GAS METER.

See also **GAS INDUSTRY.**

A New System of Gas Measurement. T. G. Marsh. Read before the Gas Inst. (England). A description of an apparatus that may serve the purpose of the station meter in a gas-works, or, within limits, of a consumer's meter. Discussion. 4800 w. Gas Wld—June 14, 1902.

Accounts.—Prepayment Meter Accounts and Records. Ernest William Bell. Gives a method which has proved successful in a department operating over 5000 meters. Discussion. 3200 w. Pro Age—July 1, 1901.

Automatic.—See Prepayment.

Care.—Care of Station Meters. Henry R. Cartwright. Gives details of the care needed. Short discussion. 2000 w. Pro Age—April 15, 1904.

Corrosion.—Premature Corrosion of Wet Gas Meters. A. Albrecht, in "Journal für Gasbeleuchtung. Summary. Considers the use of saline solutions in the meter, for sealing, for preventing freezing, or for thawing, to be the main cause, and suggests the remedy. 2000 w. Gas Wld—March 14, 1903.

Inspection.—Inspection of Gas Meters. Alton D. Adams. Reports the requirements in the state of Massachusetts, and gives the records of meters tested by the State inspector. 1000 w. Sci Am—May 31, 1902.

Gas Inspection. Ira C. Copley. Read at St. Louis meeting of Am. Gas Assn. Discusses State inspection to determine the quality and the testing of meters to assure the exact measurement, etc. 9000 w. Pro Age—July 15, 1904.

Mixer.—See GAS MANUFACTURE.

Mond Gas.—See GAS FLOW—Pipe; GAS FUEL.

Portable.—An Apparatus for Measuring Gas Leakage. Emile Guarini. Illustrated description of a portable gasometer used in Paris, and the method. 1000 w. Eng News—Nov. 26, 1903.

Positive.—The "Positive" Meter. John Greenall, before the Eastern Counties Gas Mgrs. Assn. An illustrated article explaining the fundamental principles and working, and giving report of tests. 3600 w. Gas Wld—April 19, 1902.

Prepayment.—Automatic Meters. Thomas Lighboy. Reviews the history of slot-meters and compares the price charged for gas consumed by slot and ordinary consumers. 2300 w. Gas Engs' Mag—Nov. 10, 1900.

Some Considerations Respecting the Slot Meter System and the Suggestion of a Hire-Purchase System for Fittings, &c., as an alternative. George Helps. Discusses what should be expected of the slot system, the objections, an alternative system and its advantages. 5500 w. Gas Wld—Nov. 2, 1901.

Some of the Questions Involved in the Slot-Meter System Considered. George Helps. Read before the Midland Assn. of Gas Mgrs. Considers the service at the present time and submits certain propositions which are discussed. 8500 w. Jour Gas Lgt—Oct. 14, 1902.

Prepayment Gas Apparatus. Dr. H. Aron. Abstract translation of paper before the German Assn. of Gas & Water Engrs. Shows how important a factor these meters have become and discusses features of the mechanism. 1400 w. Jour Gas Lgt—July 28, 1903.

Slot-Meter Agreements. J. Duncan. Reviews English law and practice with regard to slot-meter agreements, giving a model. 5800 w. Gas Wld—Sept. 5, 1903.

Ten Years' Experience with the Prepayment Meter. Alfred Colson. Read before the Inst. Gas Engrs. Discusses the working of the slot meter system in Leicester, Eng., giving the results obtained, the methods of collecting and inspecting, &c. Also discussion. 9000 w. Gas Wld—June 11, 1904.

Prepayment, Sligo.—The Prepayment Meter System in Sligo. C. B. Tully. Read before the Irish Assn. of Gas Mgrs. Describes the satisfactory introduction of these meters. Discussion. 2200 w. Gas Wld—Aug. 23, 1902.

Proportional Station.—The Proportional Station Meter. George W. Barnes. Read before the Ohio Gas Lgt. Assn. Describes the operation of the proportional meter, and discusses its adaptability to the duties of a station meter. General discussion. 3600 w. Pro Age—May 1, 1901.

Quick.—Quick Measurement and Analysis of Gas. Dr. Hugo Strache. Read before the German Gas Assn. Describes the author's developments, the instruments used, etc. 2200 w. Gas Wld—Nov. 23, 1901.

Slot.—See Prepayment.

Standardization.—See Union Standardization; GAS PIPE; SCREW THREAD.

Testing.—Meter Testing at the Works and Elsewhere. Part first considers methods of testing and gives an illustrated description of the Parkinson test gasholder. Serial. 1st part. 1600 w. Gas Engineers' Mag—Jan. 10, 1901.

See also Inspection.

Union Standardization.—The Standardization of Gas-Meter Unions. J. Ferguson Bell. Presidential address before the Midland Assn. of Gas Mgrs., England, with discussion. 3000 w. Jour Gas Lgt—Nov. 13, 1900.

GAS MOTOR.

See **GAS ENGINE.**

GAS, NATURAL.

See also **BORING; MINERAL REGION; PETROLEUM.**

Artificial Gas Business.—Natural Gas as a Factor in the Artificial Gas Business. F. W. Stone. Read before the Ohio Gas Lgt. Assn. Considers that it has helped to introduce gas as a fuel, and will eventually prove a help to artificial gas. Discussion. 6700 w. Pro Age—April 1, 1903.

Boiler Firing.—See Steam Producer.

California.—See PETROLEUM.

China.—Natural Gases and Observations Concerning Gas Lights in the Chinese Empire. Sketches of work in progress in the natural gas section of China, with descriptive notes. 1700 w. Am Gas Lgt Jour—April 7, 1902.

Colorado.—Natural Gas in Colorado. Arthur Lakes. An illustrated description of some of its occurrences and the conditions which point to the probability of its existence. 2200 w. Mines & Min—April, 1902.

Compressing Plant.—See GAS ENGINE—Gas Compressor Plant.

Earthquakes.—See EARTHQUAKE—Natural Gas.

England. — Natural Gas in England. Inverness Watts. An account of the discovery and development. Ill. 1400 w. Cassier's Mag—Aug., 1903. See also Heathfield.

Fuel.—Gas Still the Cheaper Fuel. A. J. Hollis. Reports recent trials at one of the largest steel plants in the Pittsburg district to determine the relative costs of natural gas and the best Pittsburg coal. 1000 w. Am Mfr—Jan. 3, 1901.

Heathfield, Eng.—Natural Gas in Sussex. A brief account of the discovery of gas at Heathfield, England, the composition and geological formation, and what has been done to test the extent of the field. 1300 w. Gas Wld—Nov. 22, 1902.

Natural Gas in England. From the "Statist." Report of a visit to Heathfield and a discussion of the possibilities of English natural gas. 2500 w. Gas Engrs' Mag—Dec. 10, 1902.

Notes on the Occurrence of Natural Gas at Heathfield, Sussex. H. B. Woodward. Abstract from the Memoirs of the Geol. Surv., giving information concerning their deposits. 1500 w. Ir & Coal Trds Rev—Aug. 28, 1903.

Heating.—See HEATING—Natural Gas.

History, U. S.—Natural Gas History. F. H. Oliphant. From pamphlet issued by the U. S. Geol. Survey. An interesting review of the history of natural gas in the United States. 4000 w. Pro Age—May 16, 1904.

Indiana.—The Indiana Natural Gas Field. A. S. Moon. Reviews the conditions and troubles at the beginning of the natural gas industry and gives an illustrated description of two recent pumping stations. 3200 w. Power—May, 1901.

Kansas.—Kansas Natural Gas, Its Control and Distribution. Prof. W. R. Crane. Illustrated description of the method employed in burning it and in measuring the pressures. 4400 w. Mines & Min—Jan., 1903.

The Gas and Oil Fields of Kansas. The first of a series of articles on these oil and gas fields, describing present conditions. Serial. 1st part. 1400 w. Min Wld—June 4, 1904.

See also Steam Producer; PETROLEUM.

Ohio.—The Central Ohio Natural Gas Fields. J. A. Bownocker. An account of their location and areas, history and development, geology and composition. Map. 4400 w. Am Geol—April, 1903.

Ottawa, Canada.—Gas and Oil Discoveries Near Ottawa. Description of the investigations, with brief history of the borings, etc. 800 w. Cons Repts, No. 1071—June 25, 1901.

Profits, U. S.—Profits in the American Gas Field. Alton D. Adams. Gives the story of the condition of this industry in the United States, the inflation of stocks and bonds, etc. 3400 w. Munic Jour & Engr—Jan., 1903.

Pumping.—Natural Gas Pumping Plant at Hundred, W. Va. An illustrated detailed description of the station and machinery of this plant. 3000 w. Eng Rec—Dec. 17, 1904.

Natural Gas Pumping Plant at Hundred, W. Va. An illustrated description of the pumping plant of the Carnegie Natural Gas Company, erected by the Rand Drill Company, delivering 30,000,000 cubic feet of gas from West Virginia to the works of the U. S. Steel Corporation in the vicinity of Pittsburgh, Pa. 2000 w. Air Power—April, 1905.

Natural Gas Pumping Plant at Hundred, West Virginia. F. C. Weber. Illustrates and describes a plant by which gas from wells is transmitted a distance of ninety miles. 3200 w. Mines & Min—July, 1905.

Steam Producer.—Natural Gas in Steam Production. W. R. Crane. Illustrates and describes methods employed in the Kansas gas fields with a comparison of the fuel value of gas with that of coal. 3500 w. Mines & Min—Nov., 1903.

Natural Gas Under Steam Boilers. Jay M. Whitham. Gives the results of the author's investigations. The tests show that the best coal efficiency cannot be equalled with gas. 2500 w. Trans Am Soc of Mech Engrs (No. 078)—Dec., 1905.

Transmission.—A Long Gas Transmission System. Illustrated description of a series of pipe lines owned and operated by the Philadelphia Co., of Pittsburg, and used for the transmission of natural gas from the gas producing district they control to various points of consumption. 700 w. Compressed Air—Sept., 1901.

The Transportation of Natural Gas. D. S. Ferry. Illustrates and describes the feeders from the largest gas well, in West Virginia, and the great gas engines at Hastings. 1200 w. Power—Dec., 1905.

United States.—Natural Gas Production. F. H. Oliphant. Reviews the gas-producing areas of the United States, giving information related. 4500 w. Am Mfr—Nov. 7, 1901.

Natural Gas in 1900. F. H. Oliphant. Information from the Mineral Resources of the United States for 1900. 2500 w. Pro Age—Jan. 15, 1902.

Natural Gas in 1901. Extracts from the Mineral Resources of the United States for 1901. 2500 w. Pro Age—Nov. 15, 1902.

West Va.—A Furnace System Using Natural Gas. Illustrated description of a heating system in residence at Wheeling, W. Virginia. 1800 w. Met Work—Aug. 10, 1901.

GAS, OIL.

See also **CAR LIGHTING; GAS MANUFACTURE—Oil; GAS PRODUCER—Lazareff.**

California.—Gas from Oil. Process as conducted on the Pacific coast. Facts relative to the producing gas oils in the state of California, and the methods of using them. Ill. 1500 w. Am Gas Lgt Jour—Jan. 13, 1902.

Gas Making with Crude Oil in California. Information as to the use of crude oil in various gas works in California, and the apparatus used. 1200 w. Jour Gas Lgt—April 28, 1903.

Gas-Engine Fuel.—The Application of Crude Oil to Gas Engines. Frank H. Bates. A study of the methods of gasification of crude oil for the gas engine. Ill. 7700 w. Jour of Elec—May, 1903.

Germany.—Manufacture and Employment of Gas from Heavy Oil in Germany. M. W. Scheihauer. From the "Jour. für Gasbeleuchtung." Describes the gas-producing apparatus and the manufacture of the gas. Includes Pintsch and other processes. 3400 w. Sci Am Sup—Aug. 15, 1903.

Incandescent Lighting.—Oil Gas and Incandescent Lighting. Third lecture by Prof. Vivian B. Lewes at the Petroleum Inst. Abstract. Discusses commercial results, processes, costs, etc. 3600 w. Gas Wld—April 19, 1902.

Oil Gas and Oil Incandescent Lighting. Slightly condensed lecture of Vivian B. Lewes, before the Petroleum Inst. Considers methods of production, cost, processes and results, mantles, lamps, etc. 7500 w. Jour Gas Lgt—April 22, 1902.

See also **INCANDESCENT GAS LIGHTING.**

Isolated Plants.—An Oil-Gas System for Isolated Plants. Shows the worthlessness of some advertised fuel processes, and describes the fuel gas system of the Acme Gas Co. 2200 w. Eng News—Jan. 29, 1903.

Oil Constitution.—The Constitution of Gas Oils. Raymond Ross and J. P. Leather. Reports investigations made of the four principal oils on the market, viz., Russian, American, Borneo and Texas. 4000 w. Gas Wld—June 7, 1902.

Beaumont Oil for Gas Making. John H. Fitzgerald. Paper and discussion before the Western Gas Assn. Favorable report of its gas making qualities, with analysis. 4800 w. Am Gas Lgt Jour—June 9, 1902.

The Valuation of Gas Oils. John P. Leather. Read before the Gas Inst. (England). Discusses the constitution of the different classes of hydrocarbons found in petroleum and their bearing on the variations of the gas-producing qualities of the different oils. Also gives an outline of a method by which an oil may be examined for the amounts of the compounds composing it. Discussion follows. 4200 w. Gas Wld—June 14, 1902.

Oil Trade.—The Prospects of the Gas Oil Trade. A statement based upon the best and latest information relating to the petroleum fields from which gas oils are drawn. 2200 w. Jour Gas Lgt—June 3, 1902.

Pintsch.—See **CAR LIGHTING; GAS PRODUCER.**

GASOLINE.

See also **NAPHTHA; AUTOMOBILE, GASOLINE; GASOLINE ENGINE.**

Alcohol Compared.—See **AUTOMOBILE.**

Explosive Mixtures.—Some Explosive Properties of Gasoline and Air Mixtures. E. C. Oliver. An account of experiments made imitating as nearly as practicable the conditions existing in the cylinder of a modern gas engine. 1200 w. Horseless Age—Oct. 23, 1901.

See also **GAS; GAS ENGINE.**

France.—How to Solve the Petrol Problem. A lesson from France. Comments on the better quality of petrol sold in France, and explains it as due mainly to the competition of alcohol. 2200 w. Autocar—June 6, 1903.

See also **ALCOHOL.**

Handling.—How to Handle Gasoline. E. W. Roberts. Gives illustrated series of experiments showing that if properly managed gasoline is not a dangerous fuel, and showing how to extinguish a gasoline fire. 2200 w. Auto Mag—Jan., 1903.

GASOLINE BOAT.

See **BOAT, GASOLINE.**

GASOLINE-BOAT RACE.

See **BOAT RACE.**

GASOLINE CAR.

See **AUTOMOBILE, GASOLINE; CAR, MOTOR-DRIVEN; GASOLINE ENGINE.**

GASOLINE ENGINE.

See also **AUTOMOBILE, GASOLINE; BOAT, GASOLINE; CARBURETTER; GAS ENGINE; IGNITION; MOTOR; NAPHTHA; OIL ENGINE.**

The Internal Combustion Engine. An illustrated elementary explanation of its working. 2500 w. Autocar—Dec. 21, 1901.

Theory of Operation of the Gasoline Engine. E. C. Oliver. Explains the principles of operation of a two-cycle engine comparing the four-cycle engine, and reports a series of tests made. 4800 w. Jour Assn of Engng Socs—Feb., 1903.

Adams-Farwell.—See **AUTOMOBILE, GASOLINE.**

Air-Cooled.—Progress of the Air-Cooled Motor. C. C. Longridge. Reviews the present disabilities of the air-cooled high-powered motor, and discusses the progress that has been made. 2000 w. Engr, Lond—Sept. 30, 1904.

See also AUTOMOBILE, GASOLINE.

Alterno-Rotative.—See Primat.

Applications.—Various Applications of the Gasoline Motor. Gives illustrations with brief descriptions of a number of applications. 1200 w. Sci Am—Sept. 13, 1902.

Automobile. — See also Balancing; Chenard & Walcker; Design; High Speed; Selbach; AUTOMOBILE—Gasoline-Electric; AUTOMOBILE, GASOLINE.

Balancing.—Balancing Double Cylinder Motors. From "La France Automobile." Explains a system devised by Panhard & Levassor to absolutely balance the rotary parts of a motor. Ill. 600 w. Horseless Age—Aug. 28, 1901.

The Balancing of Petrol Engines. J. C. Crombie. Considers the fundamental principles connected with the balancing of reciprocating engines, showing how far it is possible to balance the different types of motors now in use. Ills. 1800 w. Autocar—April 1, 1905.

The Balancing of Multi-Cylinder Petrol Engines. An investigation made to inquire into the conditions which give rise to vibration, and the possibility of considerably reducing it by arranging the mechanism of petrol engines in such a manner as to ensure complete balancing of the inertia forces. 2000 w. Engr, Lond—Nov. 17, 1905.

See also AUTOMOBILE—Vibration.

Balzar Air-Cooled.—See AUTOMOBILE, GASOLINE.

Banki.—Experiments with the Banki Motor. E. Meyer. From the "Zeitschrift des Vereines Deutscher Ingenieure." Illustrated description of the new form of the Banki motor. Also a comparison of the Diesel and Banki motors, with remarks on their application to motor vehicles. Serial. 1st part. 4200 w. Auto Jour—Nov., 1900.

Investigations upon Internal-Combustion Motors (Versuche mit Verbrennungsmotoren). Emil Schimanek. Discussing especially the improved Banki motor, in which a spray of water is injected into the charge. 4000 w. Zeitschr d Ver Deutscher Ing—Jan. 17, 1903.

The Banki Motor. C. A. Dawley. Gives results of a test of a motor of this type, made by Profs. Jonas and Taborsky on an engine rated at 20 H. P. 2000 w. Sib Jour of Engng—April, 1903.

Blake.—The Blake Petrol Engines. An illustrated description of an engine of 40 to 50 nominal H. P., designed with a view to rendering it suitable for a variety of purposes. 2500 w. Auto Jour—June 6, 1903.

Boat.—See Napier; BOAT, GASOLINE.

Boat, Detachable.—See BOAT, GASOLINE—Detachable Motor.

Boat Exhibition.—See BOAT EXHIBITION.

Buck.—See CARBURETTER.

Burchall.—The Burchall Double-Acting Petrol Engine. Illustrates and describes an ingenious construction which apparently overcomes many of the disadvantages of the double-acting engines of the ordinary type. 3000 w. Auto Jour—May 28, 1904.

Carburetter.—See CARBURETTER.

Cardiff Trials.—See OIL ENGINE.

Chenard and Walcker.—The Chenard and Walcker 10-H. P. Petrol Car. An illustrated description of the general construction of an interesting car remarkable for silence when standing with the engine running, the absence of vibration when traveling, and other improvements. Serial. 1st part. 1800 w. Auto Jour—Jan. 31, 1903.

Combustion.—See COMBUSTION—Chemistry; GASOLINE—Explosive Mixture.

Compound.—Compounding Vehicle Gasoline Engines. C. P. Malcolm. Considers the advantages and disadvantages of a compound construction, and describes the simplest form of construction for a three-cylinder compound engine. 1600 w. Horseless Age—Dec. 5, 1900.

The Construction and Working of a Compound Petrol Motor. Edward Butler. Illustrated description of a compound 3-cylinder petrol launch motor made in 1888-9 for the Petrol Cycle Syndicate. 1800 w. Mech Engr—March 25, 1905.

The Working of a Large Compound Explosive Engine on Petrol or Benzoline Spirit. E. Butler. A report of some experiments and tests made by the writer. 1000 w. Mech Engr—May 6, 1905.

See also GAS ENGINE.

Consumption.—See GAS ENGINE.

Cooling.—Cooling of the Cylinders of High Speed Internal Combustion Engines and Its Effect Upon the Power Developed. Prof. Hele-Shaw. Read before the Mech. Engrs. Sec. of the Glasgow Con. Discusses the overheating of the cylinders and its prevention. Ill. 1700 w. Autocar—Sept. 7, 1901.

Defective Water Circulation. C. Will Travis. Points out the causes of some of the deficiencies in cooling systems for gasoline engines and suggests an improvement. 1600 w. Horseless Age—Feb. 4, 1903.

See also Air Cooled; AUTOMOBILE, GASOLINE.

Craig-Dörwald.—The Craig-Dörwald 12-Cylinder Petrol Engine. Illustrated description of an engine in which compactness is the chief object aimed at. 1000 w. Auto Jour—Dec. 3, 1904.

Crossley.—The Crossley Petrol Engine. An illustrated article describing details of construction. 2000 w. Auto Jour—Feb. 13, 1904.

See also CARBURETTER; GAS PRODUCER; GAS POWER PLANT—Elderslie.

Cylinder Cooling.—See Air Cooled; Cooling.

Cylinder-Jacket Liquids.—See Cooling; AUTOMOBILE, GASOLINE.

Cylinder, Piston and Packing Rings.—Cylinder, Piston and Packing Rings. L. Berger. Considers French and American practice, and gives information relating to the packing. 1500 w. Horseless Age—June 5, 1901.

Daniel.—A Peculiar Petrol Engine—The "Daniel." Brief illustrated description of an engine in which elliptical cams replace the cranks on the main shaft, and in which no connecting rods are employed. 1100 w. Auto Jour—March 12, 1904.

Design.—Theoretical Calculations Concerning High-Speed Explosion Engines. P. Colardeau. Gives a method of calculating dimensions and powers within certain limits; the formulae have been established as the results of trials and observations. 1800 w. Auto Jour—March, 1901.

Some Details of Construction in Gasoline Motors. Hugh D. Meier. Discusses details of interest to designers of automobiles. 1300 w. Horseless Age—Nov. 12, 1902.

See also GAS ENGINE.

Diagram.—Graphical Representation of the Cycles of Petroleum Motors (Représentation Graphique du Cycle des Moteurs à Pétrole). L. Nerdeux. Showing the application of the Zeuner diagram to internal combustion motors. 1500 w. Revue de Mécanique—Oct. 31, 1901.

Electric Ignition.—See IGNITION.

Electric Plant.—See ELECTRIC PLANT—Gasoline.

Excelsior.—The Excelsior Reversing Gasoline Engine. Illustrates and describes a two-cycle engine having original features, especially the mechanism for reversing without the use of intermediate gearing. 1500 w. Ir Age—Oct. 26, 1905.

Exhaust Valve and Igniter.—See AUTOMOBILE, GASOLINE.

Explosive Mixtures.—See also GAS; GASOLINE; HYDROCARBON.

Fuel Feeding.—Feeding Fuel to Cylinder-Fired Motors. Hugh Dolnar. Illustrated information of appliances for regulating the flow, showing the superiority of these various mixing valves to the older forms of carburetters. 2200 w. Autocar—Aug. 10, 1901.

Fuel Mixing.—Fuel Mixing Devices for Gasoline Engines. E. W. Roberts. Considers various types of carburetters, vaporisers, mixing valves, and generator valves, giving illustrations. 3300 w. Rudder—May, 1905.

Gas Generation.—See GAS ENGINE.

Governing.—See GAS ENGINE.

Grades.—The Different Grades of Gasoline Engines. Albert Stritmatter. Describes the features of the different grades, indicating the work for which they are adapted. 2300 w. Am Mfr—Oct. 30, 1902.

Guarantees.—Gas and Gasoline Engine Guarantees. Albert Stritmatter. A consideration of some of the things that affect what may be successfully guaranteed. 2000 w. Am Mfr—Aug. 14, 1902.

High Speed.—Evolution of Light High-Speed Motors. Herbert L. Towle. An explanation of the principles of design entering into the manufacture of motors intended for automobiles of high first cost. Serial. 1st part. 3000 w. Automobile—Nov. 21, 1903.

Design for a Gasoline Motor. J. C. Brocksmith. Drawings and description of a high-speed enclosed crank-case type, used in automobile work and also for stationary purposes. 2000 w. Am Elect'n—Jan., 1904.

High-Speed Internal-Combustion Engines. Illustrated descriptions of various light, gasoline engines, and of methods of ignition. Serial. Part I. 3000 w. Engr, Lond—Aug. 12, 1904.

See also Design.

Horse Power.—See Power.

Howard Launch.—See BOAT, GASOLINE—Motor Howard.

Ignition.—See IGNITION; INTERRUPTER.

Indicator Diagram.—See INDICATOR DIAGRAM—Gasoline Engine.

James & Browne.—See AUTOMOBILE, GASOLINE.

Kerosene Compared.—Test of Engine Using Kerosene and Gasoline. H. F. Hailaday and G. O. Hodge. Tests made to determine the economic performance of a standard internal-combustion engine using these fuels respectively, under otherwise similar conditions. Serial. 1st part. 1700 w. Mech Engr—Aug. 22, 1903.

Kühlstein-Vollmer.—See AUTOMOBILE, GASOLINE.

Lister.—The Lister Two-Cycle Twin-Piston Engine. Illustrations, sectional views, and description of the working. 700 w. Sci Am Sup—June 17, 1905.

Lubrication.—See LUBRICATION—Gasoline Engine.

Lucke Experiments.—See GAS ENGINE—Explosion; GAS TURBINE; LIQUID FUEL—Combustion.

Loomis Carburetter.—See AUTOMOBILE, GASOLINE.

Machine Work.—See MACHINE WORK—Gasoline Engine.

Manograph.—See MANOGRAPH.

Marine.—See Fuel Mixing; Napier; Test; BOAT EXHIBITION; BOAT, GASOLINE.

Maybach Carburetter Case.—See CARBURETTER.

Napier.—The Napier Motor Car and Petrol Launch. An illustrated description of the petrol engine made to actuate motor cars and small vessels. 3700 w. Engng—April 22, 1904.

See also AUTOMOBILE, GASOLINE; BOAT, GASOLINE; CAR, MOTOR-DRIVEN.

Operation.—See AUTOMOBILE, GASOLINE; GAS ENGINE.

Orient.—See AUTOMOBILE, GASOLINE.

Packing.—See PACKING—Gasoline Engine.

Paris Exposition.—See GAS ENGINE.

Pollard.—The Pollard Compound Petrol Engine. An illustrated article explaining the principle and construction of this engine. 2000 w. Auto Jour—May 20, 1905.

Portable.—See OIL ENGINE—Gardner.

Power.—Motor Power Calculations. J. Boisselot. Gives rules for calculating the approximate horse power of gasoline motors. 500 w. Horseless Age—July 10, 1901.

The Gasoline Power Engine. E. W. Roberts. Gives a simple rule for calculating the power of gas engines. 800 w. Min & Sci Pr—Dec. 28, 1901.

Horse-Power Computation for Petrol Motors. Capt. C. C. Longridge. Three motors are taken and various formulae are stated and applied to determine which are of practical value. Piston displacement is also discussed, also horse-power charts. 1200 w. Engr, Lond—Oct. 7, 1904.

Power Loss.—Loss of Power in Gasoline Engines. Albert Stritmatter. Considers causes of decrease in power, and the remedies. 2000 w. Am Mfr—Oct. 9, 1902.

Power Measurement.—See DYNAMOMETER—Fan.

Primat.—Alterno-Rotative Gasoline Motor. Illustrated description of the new Primat motor. The movement is produced by a set of pistons working alternately in a circular chamber, and the to-and-fro action is transformed to a rotary movement by means of a crank. 900 w. Sci Am Sup—Dec. 2, 1905.

Principles.—The Internal Combustion Engine. An illustrated explanation of the principles of the petrol motor. 1600 w. Autocar—Dec. 27, 1902.

The Petrol Engine—Its Working Explained. A simple illustrated description of the working of the petrol motor. 1000 w. Autocar—Jan. 2, 1904.

Railway.—See CAR, MOTOR-DRIVEN; GASOLINE LOCOMOTIVE.

Ravel.—The Ravel "Intensive" Motor. Illustrated description of a new motor where an endeavor has been made to obtain a higher power within a definite bulk and weight. 1000 w. Motor Car Jour—Aug. 6, 1904.

Reversing.—See Excelsior.

Secor.—See CARBURETTER—Paraffin; OIL ENGINE.

Selbach.—The Selbach "Single-Valve" Petrol Motor. Brief illustrated description of an engine having a combined inlet and exhaust valve, which is operated by one cam, and is fitted into the cylinder head. 800 w. Auto Jour—Dec. 26, 1903.

Simms.—A Large Petrol Engine. Illustrates and describes a 100-H. P. petrol engine made by Simms Mfg. Co., London. 500 w. Engr, Lond—May 12, 1905.

Speed.—See High Speed; AUTOMOBILE, GASOLINE—Engine Speed.

Starting.—The Starting of Gasoline Engines (Les Moteurs à Pétrole Mise en Marche). M. Réperti. An illustrated account of starting devices for internal-combustion motors and methods of getting the latter going. 2000 w. Rev Technique—April 25, 1903.

See also AUTOMOBILE, GASOLINE; GAS ENGINE.

Submarine Boat.—Gasoline Engines for Holland Submarine Torpedo Vessels Nos. 3 to 8. John Saltar, Jr. Reviews the history of the modern gas engine briefly, and describes the engines being built for these boats. 2200 w. Jour Am Soc of Nav Engs—Feb., 1901.

Temperatures.—See Test; GAS ENGINE.

Test.—Test of an Otto Gasoline Engine. E. C. Oliver. An illustrated account of tests made to obtain as accurately as possible a heat account or heat balance for the engine, and the temperatures within the cylinder at various points in the cycle. 1800 w. Am Mach—June 26, 1902.

The Determination of the Temperatures in a Gasoline Engine Cylinder. E. C. Oliver. Gives calculations made, explaining the data on which they are based. 1200 w. Am Mach—July 10, 1902.

Some Experiments on an Uncooled Petrol Motor. L. H. Callendar. Summary of experiments made to test these motors, describing methods and apparatus used. 7000 w. Sci Am Sup—July 30, 1904.

Testing for Horse-Power and Fuel Consumption. A. E. Potter. Describes methods of testing gasoline engines. 3300 w. Rudder—May, 1905.

Study of a Gasoline Engine Test. P. F. Walker. Describes investigations made by students for graduating theses, stating the object of the tests, describing apparatus and methods used, and discussing results. Ills. 4500 w. Engr, U S A—Dec. 15, 1905.

See also Kerosene Compared; GAS ENGINE.

Turntable.—See TURNTABLE—Gasoline Engine.

Two-Cycle.—Design for a Two-Cycle Gasoline Motor.

J. O. Brocksmith. Gives working drawings of a two-cylinder two-stroke-cycle air-cooled type of gasoline motor adapted to light automobile work, with descriptive notes. 2500 w. Am Elect'n—Feb., 1904.

Tygard.—The Tygard Reciprocating Cylinder Double-Action Gasoline Motor. Illustrated description of a motor exhibited at the recent automobile show. 1000 w. Sci Am—March 12, 1904.

Valve.—Valves and Valve Mechanism of Internal-Combustion Engines. Robert E. Phillips. Excerpt from a paper read at the Auto Club. Considers only engines of the "Otto" or four-cycle type. Ills. 4000 w. Auto Jour—March 12, 1904.

Water Circulation.—See Cooling.

Wolseley.—140-Horse-Power Wolseley Petrol-Motor. Illustrated description of one of the largest petrol-motors yet constructed for industrial use. Built for the General Electric Co., U. S. A., for driving electric generators on passenger cars to supply current to the electric traction motors. 2400 w. Engng—Nov. 10, 1905.

See also **AUTOMOBILE, GASOLINE; AUTOMOBILE WORKS; CAR, MOTOR-DRIVEN**—Gasoline-Electric; **GASOLINE LOCOMOTIVE.**

Working.—See Principles.

GASOLINE LAUNCH.

See **BOAT, GASOLINE.**

GASOLINE LOCOMOTIVE.

See also **CAR, MOTOR-DRIVEN.**

Internal Combustion Engine in Railway Service. Abstract of a paper by R. P. C. Sanderson before the Mas. Mechs.' Assn. Thinks these engines will soon invade the field now occupied by steam locomotives. 1300 w. Ry & Engng Rev—June 27, 1903.

British.—English Gasoline Locomotives. Brief illustrated descriptions of a Wolseley light railway gasoline locomotive, and a Maudslay locomotive used for hauling freight cars. 1100 w. R R Gas—Vol. XXXVIII., No. 21.

See also London.

Electric Combined.—High-Power English Gasoline Motors for Driving American Locomotives. Describes two English motors being built for the General Electric Company, for a series of experiments with the gasoline-electric system of propulsion for locomotives. 1100 w. Sci Am Sup—Aug. 12, 1905.

See also **CAR, MOTOR-DRIVEN**—Gasoline-Electric; **GASOLINE ENGINE**—Wolseley.

London.—A Powerful Gasoline Locomotive. Illustrated description of a gasoline motor for hauling freight cars across London. 600 w. Sci Am Sup—May 7, 1904.

Narrow Gauge.—Petrol Locomotive for Light Railways. Illustrated description of a locomotive built for a 2 ft. 9 1-2 in. gauge. 1200 w. Engng—Jan. 13, 1905.

GASOLINE MOTOR.

See **AUTOMOBILE, GASOLINE; CAR, MOTOR-DRIVEN; GASOLINE ENGINE; GASOLINE LOCOMOTIVE; MOTOR CYCLE.**

GASOLINE VEHICLE.

See **AUTOMOBILE, GASOLINE; CAR, MOTOR-DRIVEN; GASOLINE ENGINE; GASOLINE LOCOMOTIVE; MOTOR CYCLE.**

GASOMETER.

See **GAS METER.**

GAS PIPE.

See also **GAS DISTRIBUTION; GAS FITTING; GAS FLOW; GAS INDUSTRY; GAS WORKS; PIPE; PIPE GALLERY.**

Boston.—Methods Employed in the Construction and Maintenance of the Massachusetts Pipe Line Gas Co.'s Mains in Boston and Vicinity. W. W. Cummings. Describes methods adopted to keep the cost within required limits. Ill. 2300 w. Eng News—Oct. 2, 1902.

Capacity.—What Is the Maximum Delivering Capacity of Mains? Observations on gas distribution at high pressure and the views recently advanced by various authorities. 2000 w. Jour Gas Lgt—Dec. 4, 1900.

Cast-Iron vs Wrought Iron.—The Relative Advantages of Cast-Iron and Wrought Iron Gas Mains. Godfrey L. Cabot. Gives evidence in favor of wrought iron. 1600 w. Am Gas Lgt Jour—May 12, 1902.

Cement Joint.—Experiences with Cement Joints for Street Mains. B. F. Bullock. Gives the writer's experience in the use of cement joints. Prefers the lead joints. 1000 w. Am Gas Lgt Jour—May 25, 1903.

Electrolysis.—See **STRAY CURRENTS.**

Flow.—See **GAS FLOW.**

Grand Rapids, Mich.—The Laying of Mains and Services and the Recording of the Same. John Hellen. Read before the Michigan Gas Assn. Gives a summary of the methods used in Grand Rapids, Mich. 3500 w. Am Gas Lgt Jour—Feb. 29, 1904.

House.—See Gas Fitting.

Kings Lynn, Eng.—See **GAS DISTRIBUTION.**

Liquid Deposits.—On the Liquids Deposited in the Mains and Services of a Gas Supply System. Norton H. Humphreys. Suggests the measuring of this liquid and explains the manner of doing it, and the value of the information obtained. 1200 w. Jour Gas Lgt—Aug. 5, 1902.

Manufacture.—See **PIPE MANUFACTURE.**

Naphthaline Cleaning.—See **GAS MANUFACTURE.**

Saginaw, Mich.—See Subaqueous, Saginaw.

Siphon.—Submerged Inverted Siphon of the Massachusetts Pipe Line Gas Co., at Everett, Mass. W. W. Cummings. Illustrates and describes this siphon, whose characteristics were its economy and rigidity for a rather unusual length. 600 w. Eng News—July 18, 1901.

Standards.—A Comparison of Standards for Cast-Iron Pipe and Specials. Walton Forstall. Read before the Am. Gas Lgt. Assn. Discusses the differences between the standards of the Association and those now in use by the United States Gas Improvement Company. 3500 w. Am Gas Lgt Jour—Nov. 25, 1901.

See also **GAS METER**—Union Standardization; **SCREW THREAD.**

Subaqueous.—The High Pressure Gas Main Under the Mississippi River. Thomas D. Miller. Read before the Western Gas Assn. An illustrated account of the laying of a high-pressure main on the bed of the river to supply Algiers with gas. Discussion. 5800 w. Am Gas Lgt Jour—June 8, 1903.

See also Siphon; **TUNNEL.**

Subaqueous, Saginaw.—The Laying of High and Low Pressure (River) Gas Lines. H. C. Morris. Read before the Michigan Gas Assn. Describes the laying of mains under the river, connecting gas works on both sides, at Saginaw, Mich. Ill. 3600 w. Am Gas Lgt Jour—Feb. 29, 1904.

Subway.—See **SUBWAY.**

Twin.—A Twin Pipe. R. J. Melbourne. Illustrated description of a pipe of oval shape, divided into two parts, each part having the same capacity as a single pipe. Discusses the advantages and economy secured. 1800 w. Jour Gas Lgt—March 4, 1902.

Worcester, Mass.—See **STRAY CURRENTS.**

Wrought Iron.—Wrought Pipe. Franklin Riffle. Read at meeting of Pacific Coast Gas Assn. Reviews the history and development of the pipe industry, giving tests made, and comparison of steel pipe and wrought iron pipe, etc. 8000 w. Am Gas Lgt Jour—Aug. 17, 1903.

Wrought Iron vs. Cast-Iron.—See Cast-Iron vs. Wrought Iron.

GAS POWER.

See also **BLAST-FURNACE GAS; COKE OVEN GAS; GAS ENGINE; GAS FUEL; GAS POWER PLANT; GAS PRODUCER; POWER COST.**

Cheap Gas for Motive Power. J. H. Brearley.

Discusses prices and competition, and refers to paper by A. B. Mountain, extracts being given. 2500 w. Gas Wld—April 11, 1903.

Power Production by Gas Producers and Engines. Robert W. A. Brewer. Read before the Civ. & Mech. Engrs. Soc. Considers the advantages of a producer, the best types, blast furnace gas and large gas engines in the present article. Ill. Serial. 1st part. 4800 w. Mech Engr—April 4, 1903.

Coal Gas and Its Rivals for Motive Power. Dugald Clerk. A lecture to the N. of Eng. Gas Mgrs.' Assn. Discusses fuel costs for power in England, and advocates a reduction in the price of gas for motive power. Urges the substitution of calorific power instead of illuminating power as the standard for gas manufacture. 5500 w. Jour Gas Lgt—May 2, 1905.

Recent Developments in the Use of Gas for Fuel. William H. Morse. An outline of the present status and future outlook of gas used for the development of power. 4000 w. Engr, U S A—May 15, 1903.

Power Production from Gaseous Fuel. J. R. Bibbins. Read before the Ohio Gas Lgt. Assn. Considers producer gas is to furnish the solution to the power problem, and gives much information in regard to applications. Discussion. 7500 w. Pro Age—April 15, 1905.

Coal Mine.—See **COKE-OVEN GAS**—Gas Engines.

Cost.—Gas as a Motive Power, and Its Relative Cost. W. H. Laurie. An illustrated article aiming to show that the gas engine with a suitable gas producer will generate power at less cost than any other source. 3500 w. Can Soc of Civ Engrs—March 23, 1905.

Electric Compared.—See **POWER TRANSMISSION**—Gas vs. Electric.

Fire Service.—See **WATERWORKS.**

Large Works.—The Economical Generation and Distribution of Power in Large Works. A. Rollason. Read before the W. of Scotland Iron and Steel Inst. Gives facts aiming to show that gas power is the most economical for all purposes. 3000 w. Ir & Coal Trds Rev—April 24, 1903.

Mine, Mexico.—The Power Plant of the Moctezuma Copper Company at Nacozari, Sonora, Mexico. John Langton. States the conditions to be considered in determining the kind of power, and gives an illustrated description of the power house, gas house, method of making gas, quality, quantity and records of the gas engines installed. 7400 w. Trans Am Inst of Min Engrs—Oct., 1903.

Steam Power Compared.—A Commercial Comparison between Blast Furnace Gas Engines and Steam Engines in the Minette District (Das Wirtschaftliche Verhältnis zwischen Gichtgasmotoren und Dampfmaschinen im Verhüttungagebiet der Minette). L. Ehrhardt. A detailed examination of the cost of power from gas and steam in iron works in Germany. 4000 w. Zeitschr d Ver Deutscher Ing—June 3, 1905.

See also **GAS PRODUCER**—Economy.

Transmission.—Power Transmission by Gas. Abstract of a paper by Prof. Burstall read at meeting of the Birmingham Sec. of the Inst. of Elec. Engrs. on its possibilities. Also discussion. 5200 w. Gas Wld—April 4, 1903.

Water Power Compared.—Is Gas Power More Economical Than Water Power? H. G. T. Horace. Presents an analysis of costs aiming to show that gas power can be produced more conomically. 1600 w. Power—Oct., 1905.

GAS POWER PLANT.

See also **BLAST-FURNACE GAS; COKE-OVEN GAS; GAS ENGINE; GAS FUEL; GAS POWER; GAS PRODUCER.**

Gas Engine Power Plants. Irving A. Chandler. Presents the qualifications which make the gas engine power plant particularly suitable for mining purposes. Ills. 2500 w. Min Mag—Oct., 1904.

Gas-Producer Power-Plants. Samuel S. Wyer. Gives facts relating to the design, operation and maintenace of gas-producer plants showing their advantages. 3300 w. Am Inst of Min Engrs—Feb., 1905.

Producer Gas Power. H. Williams. Discusses its application for factories, cold stores, etc., in place of steam power, pressure vs. suction gas plants, and comparative cost. 4000 w. Ice & Refrig—May, 1905.

Boat.—See **BOAT, GAS-POWER.**

Cudahy, Wis.—Power Plant at the Works of the Power and Mining Machinery Co. Illustrated description of the producer-gas power plant of manufacturing works at Cudahy, near Milwaukee, Wis. 2000 w. Engr, U S A—Dec. 15, 1904.

The Works of the Power and Mining Machinery Co. Illustrated description of shops at Cudahy, Wis., for the manufacture of gas producers, gas engines and mining machinery, with producer-gas power plant. 4000 w. Eng Rec—Dec. 3, 1904.

Elderslie, Clyde.—Gas Power Plant at Elderslie Graving Dock. Illustrated description of Crossley gas producer plant and gas engines, for operating pumps at Shearer's shipyard on the Clyde. 1000 w. Engr, Lond—Aug. 12, 1904.

Electric Generation.—See **GAS ENGINE.**

Electric Railway.—Producer Gas in Tramway Service. Illustrates and describes an electric tramway, the current for which is supplied from a generating station driven by power gas. 1500 w. Trac & Trans—Dec., 1903.

The Application of Gas Power to Electric Railway Service. J. R. Bibbins. Read before the Am. Ry., Mech. & Elec. Assn. Aims to show the adaptability of the gas engine and producer to street railway service, giving results that have already been attained in driving electrical machinery. Ills. 5000 w. St Ry Jour—Sept. 30, 1905.

Electric Sub-Station.—See **ELECTRIC SUB-STATION**—Comparison.

Embrach, Switz.—The Gas Power Plant of the Embrach Potteries (Die Kraftgasanlage der Thonwarenfabrik Embrach). Describing a complete power plant with fuel gas generators, engines of 100 H. P. and electric generators in operation at Embrach, Switzerland. Two articles, 1 plate. 4000 w. Schweiz Bauzeitung—Feb. 28, March 7, 1903.

The Economical Use of Engines Fed with Lean Gas (Emploi Economique des Moteurs à Gas Pauvre). F. Gramyr. A description of the gas producer engines, and machinery installed at the potteries at Embrach. 4000 w. Revue Technique—Nov. 10, 1903.

Etampes, France.—See Taylor.

Fire Service.—See **WATERWORKS.**

Heysham Harbor.—See **ELECTRIC EQUIPMENT.**

Hospital, Shingford.—A Fuel Gas Plant for a Model Isolated Hospital in England. Illustrated description of the plant for six hospital buildings at Shingford, Walthamstow, Eng. 1300 w. Elec Wld & Engr—June 1, 1901.

Laar, Germany.—1,600 Horse-Power Gas Engine and Three-Phase Alternator at Laar Power Plant, and Other High-Power Blast Furnace Gas Engines. Frank C. Perkins. Illustrations with brief descriptions. 900 w. Elec Rev, N Y—Nov. 7, 1903.

Madeley, Eng.—See **PUMPING STATION.**

Monks, Hall & Co.—Mond Gas-Driven Rolling Mills and Power Plant at the Works of Messrs. Monks, Hall & Co., Ltd., Warrington. Illustrated detailed description of gas plant for supplying power to large works. 3200 w. Ir & Coal Trds Rev—Nov. 27, 1903.

Morecombe Bay.—See **GAS ENGINE**—Electric Generation.

Newton, N. J.—A Successful Suction Gas Producer Central Station Plant. An illustrated description of a plant at Newton, N. J., which furnishes current for lighting and power for a town of 5,000 inhabitants. 2000 w. Power—Dec., 1905.

Oatmeal Mill.—Power—Economical and Otherwise. F. S. N. Macrory. Describes a gas engine plant installed in an Irish oatmeal mill, discussing its advantages and disadvantages, etc. 2500 w. Elec Engr, Lond—Aug. 26, 1904.

Romanshorn, Switz.—See **ELECTRIC STATION.**

Taylor.—Gas Engines and Gas Producers (Gasogène et Moteurs à Gaz). A description of the installation of Taylor gas producers and engines at the generating station at Etampes. 1000 w. Génie Civil—Dec. 5, 1903.

Tunis.—Gas-Driven Electric-Light Plant at Tunis. Illustrations with brief description of a plant in which producer gas and gas engines furnish the motive power. 500 w. Engng—Sept. 25, 1903.

The Tunis Central Station and the Pierson Gasogene. Emile Guarini. Illustrates and describes a station representing the most advanced engineering methods that have been developed in Europe for the driving of dynamos by gas engines that are in turn operated from gas generators especially designed for the purpose. 2200 w. Jour of Elec—Dec., 1904.

Warrington, Eng.—See **Monks, Hall & Co.**

Water Power Combined.—See HYDRO-ELECTRIC PLANT—Gas Engine Combined.

GAS PRODUCER.

See also **BLAST-FURNACE GAS; COKE-OVEN GAS; GAS ENGINE; GAS FUEL; GAS MANUFACTURE; GAS POWER; GAS POWER PLANT; GAS, WOOD; GAS WORKS.**

Producer Gas Plants (Sauggeneratorgasanlagen). Adolf Langen. A discussion of recent forms of producers for the generation of lean gas for use in gas engines. 3500 w. Zeitschr d Ver Deutscher Ing—Nov. 8, 1902.

Producer Gas and Gas Engines. An explanation of how a gas producer is constructed and operates, showing its economy. 3500 w. Power—April, 1903.

Some Recent Forms of Gas Producer. Prof. A. H. Sexton. Illustrates and describes some forms of producer suitable for the production of ordinary producer gas. 1800 w. Prac Engr—July 3, 1903.

Types of Gas Producers. Prof. A. Humboldt Sexton. Illustrated descriptions of various types. Serial. 1st part. 2000 w. Mech Engr—Jan. 2, 1904.

Producer Gas. Prof. A. Humboldt-Sexton. Considers the conditions a good producer must fulfill. Ills. Serial. 1st part. 4300 w. Mech Engr—Feb. 27, 1904.

Gas Producers for Power. Julius I. Wile. An illustrated article dealing with the several types of producers and their applications and advantages. 4000 w. Power—Sept., 1904.

Action.—See Open-Hearth Furnaces.

Anthracite.—Anthracite Gas Producers for Power Purposes. Reviews the development in this field, illustrating and describing a number of producers. Serial. 1st part. 3500 w. Ir & Coal Trds Rev—Oct. 30, 1903.

Austria.—Generator Gas Plant for Electric Driving (Generatorgas-Anlagen für den Betrieb von Elektricitätswerken). Fr. Ross. Describing especially the istallations at Pressburg, Erlangen, and elsewhere in Austria, using water gas in gas engines for driving dynamos. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 15, 1902.

Boat.—See BOAT, GAS POWER.

Bellinckx.—See GAS ENGINE.

By-Products. — See **BLAST-FURNACE GAS — Tar and Ammonia.**

Combustion.—Combustion in Gas Producers and Benches. Robert W. Prosser. Facts on the working of gas producers, showing the effects of various methods. Serial. 1st part. 3600 w. Am Gas Lgt Jour—Jan. 20, 1902.

Crossley.—New Gas-Producing Plants. Illustrations and descriptions of improved producer gas plants designed by Crossley Brothers, of Manchester, Eng. 2000 w. Engr, Lond—Dec. 11, 1903.
See also GAS-POWER PLANT—Elderslie, Clyde.

Davey-Paxman. — The Davey-Paxman Suction-Gas Plant and Gas Engine. Illustrated detailed description. 2200 w. Engng—Nov. 24, 1905.

Deutz.—See BOAT, GAS POWER.

Deschamps.—See Down-Draft.

Down Draft.—Improved Down-Draft Gas Producer (Nouveau Gasogène à Flamme Renversée). Jules Deschamps. Describing experiments with a reversed draft producer adapted for by-product recovery, and for use with gas engines. 4000 w. Mem Soc Ing Civ de France—Sept., 1903.

The Deschamps Down Draft Gas Producer. Translation from an article in the "Bulletin de la Société de l'Industrie Minerale," by Jules Deschamps, concerning an invention for the purpose of producing a gas of the most suitable composition for use in gas engines. Ill. 2500 w. Ir Age—Feb. 4, 1904.

Deschamp's Down-Draft Gas Producer. An illustrated description with report of tests. 3800 w. Ir & Coal Trds Rev—May 13, 1904.

Reversed-Combustion Gas Producers (Gazogènes à Combustion Renversée). J. Deschamps. A review of the work of the late M. Lenchauches, with especial reference to the reversed draft producer for generating fuel gas. 7500 w. Mem Soc Ing Civ de France—Oct., 1905.

Down-Draught Gas Producer (Gazogène à Combustion Renversée). J. Deschamps. A description of the Fangé gas producer, especially adapted for the combustion of wood. 1500 w. Génie Civil—Sept. 14, 1901.

Gas Generator with Reversed Combustion. J. Deschamps, in "Le Génie Civil." Illustrates and describes an apparatus that has been in use for several months in France for supplying gas motors. 1500 w. Sci Am Sup—Dec. 7, 1901.
See also Suction; Suction Down Draft.

Economy.—Economy of Gas-Producer Power Plants Where Heating is Necessary. J. H. Kinealy. A comparison of the fuel consumption of gas-producer plant and both non-condensing, and condensing steam plants. 2500 w. Eng News—Sept. 7, 1905.

Efficient Working.—The Efficient Working of Gas Plants for Gas Engines. Joseph Emerson Dowson. From the minutes of Pro. of the Inst. of Civ. Engrs., England. Discusses some of the theoretical and practical considerations which affect the working. 3800 w. Eng News—Dec. 5, 1901.

Electric Railway Service.—See GAS ENGINE; GAS POWER PLANT.

Embrach Potteries.—See GAS POWER PLANT.

European.—European Gas Producers. Emile Guarini. Describes poor gas and its use for fuel; gas producers that work under pressure, and those which work by suction; and poor gas motors. Ills. 8000 w. Jour of Elec—July, 1905.

Fangé.—See Down-Draft.

Heating Processes.—The Gas Producer for Heating Processes. William B. Chapman. Describes the American gas producer and gives some of the applications made of it with marked economy and advantage. 2000 w. Sci Am—Dec. 23, 1905.

Iron Works.—Gas Producers in Ironworks. Paper read by Herr Otto Wolff before the Assn. of Ironmasters in S.-W. Germany, at Saarbrucken. Explains the principle of gas producers, the requirements of a good producer, and discusses various forms that have stood the test of practical working. Ills. 8000 w. Ir & Coal Trds Rev—April 14, 1905.

Körting.—Power Gas and Producer Gas Installations Working with Pressure and with Exhaust. Summary of a paper by Herr Johann Körting, published in the "Journal für Gasbeleuchtung." Reviews the work of investigators. 1800 w. Gas Wld—Sept. 27, 1902.
See also **Suction.**

Lazareff.—Gas Producer for Use with Mineral Oil (Gasogène pour Huiles Minérales). A description of the Lazareff gas producer for the direct conversion of heavy mineral oils into illuminating and fuel gas. 1200 w. Génie Civil—Dec. 16, 1905.

Lencauchez.—See Down Draft.

Liége Exhibition.—Gas-Producer for Semi-Bituminous Fuel at the Liége Exhibition. Illustrates and describes an installation consisting of a double-combustion producer, of sufficient capacity to supply a 600-H. P. gas-engine, with a complete washing and cleaning plant, and a 60 cubic metre gasholder. 1200 w. Engng—Aug. 25, 1905.

Lignite.—Lignite and Peat Gas Producers for Power Purposes (Braunkohlen- und Torfgeneratoren für Motorische Zwecke). Arnold Zlamal. Paper before the "Oesterr. Vereinigung der Elektrisitätswerke," giving a general discussion of such producers, with illustrated description of a couple of types. 1600 w. Zeitschr f Elektrotech—Sept. 3, 1905.

Lignite Producer-Gas Plants. Dr. Alfred Gradenwitz. Illustrated description of a plant constructed by the Deutz Gas Motor Works, where the tars are decomposed in the producer. 1600 w. Sci Am Sup—Oct. 14, 1905.

Loomis.—The Loomis Gas Plant. Illustrated description of the water gas plant designed by the Loomis Pettibone Company of New York, which has been much improved over the first designs. 1800 w. Ir & Coal Trds Rev—March 21, 1902. See also GAS POWER PLANT—Cudahy, Wis.

Loomis, New Haven.—The Loomis Water-Gas and Producer-Gas Process. Illustrates and describes a plant recently installed at the works of the Winchester Repeating Arms Co., New Haven, Conn. 1700 w. Eng News—Sept. 12, 1901.

Marine.—See Suction; GAS ENGINE.

Maystre-Ledoyen.—An Interesting Producer-Gas Plant. Emile Guarini. Brief illustrated description of the Maystre-Ledoyen suction producer-gas plant in Paris. 600 w. Sci Am Sup—Jan. 28, 1905.

Morgan Continuous.—The Morgan Continuous Gas Producer. Gives tabulated results of tests made and information regarding the producer. Ill. 1500 w. Ir Age—Jan. 17, 1901.

Mond.—See GAS FUEL.

Moss Paper.—Gas Producers and Producer Gas. Dr. R. S. Moss. Describes the method of producing the gas, the composition of the coal used, &c., in the present number. Serial. 1st part. 1800 w. Min Wld—Nov. 11, 1905.

Oil.—See Lazareff.

Open-Hearth Furnaces.—The Action of Various Types of Gas Producers (Sur l'Action des Divers Types de Gazogènes). A. Lencauchez. With especial reference to the action of producer gas in open-hearth furnaces. 4000 w. Mem Soc Ing Civ de France—Sept., 1901.

Orleans Electric Railway.—See ELECTRIC RAILWAY.

Paris.—See Maystre-Ledoyen.

Peat.—See Lignite; PEAT—Gas.

Pierson.—Power Gas in France: The Pierson System. Reviews briefly the attempts made by French engineers to produce fuel gas from the poor native coal, and gives information concerning the successful process named. 2300 w. Jour Gas Lgt—April 16, 1901.

Pierson's "Suction" Gas-Producer. An illustrated detailed description of this producer and its action, with a statement of the claims made. 1500 w. Engng—Nov. 20, 1903.

Suction Gas Producer for Use with Explosive Motors Employing Low-Grade Gas Produced Direct from Coal. Illustrates and describes a gas generating installation of the Pierson system. 1500 w. Sci Am Sup—Sept. 3, 1904.

See also GAS-POWER PLANT—Tunis.

Pierson Tests.—See GAS FUEL; GAS ENGINE—Crossley Tests.

Pintsch.—Gas Power Station for an Electric Hoisting Machine (Gas-Kraft Primäranlage für eine elektrische Fördermaschine). Illustrating a combined generating set of 100 H. P. gas engine and dynamo in connection with a Pintsch gas producer for driving an electric mine hoist. 1200 w. Glückauf—Oct. 11, 1902.

The Pintsch Power Gas Plant. Illustrates and describes a gas plant supplying two 80-H. P. Otto cycle engines in which no gas-holder is employed. 1800 w. Ir & Coal Trds Rev—Oct. 17, 1902.

Improvements in Power-Gas Plants (Neuerungen an Kraftgas-Anlagen). H. Gerdes. A description of the water-gas plant of Pintsch, in which the carbonic oxide is drawn off separately for use in gas engines. The improved pressure regulator is described. Paper before the Verein Deutscher Maschinen Ing., with discussion. 2 plates. 6000 w. Glasers Ann—Jan. 15, 1902.

The Pintsch Suction Gas Producer. S. F. Seager. Abstract of a paper read before the Mich. Engng. Soc. Illustrated detailed description of the present Pintsch suction gas plant and its operation. 2000 w. Eng News—Feb. 16, 1905.

Pumping Plant.—See PUMPING STATION..

Reactions.—The Gasification of Fuels in Producers, especially for the Production of Power Gas (Die Vergasung der Brennstoffe in Generatoren, insbesondere für Kraftgasbetriebe). Karl Kutzbach. A graphical analysis of the thermochemical reactions involved in the operation of gas producers. 4500 w. Zeitschr d Ver Deutscher Ing—Feb. 18, 1905.

Reversed-Combustion.—See Down Draft.

Riché.—The Riché Gas Producer in Connection with Mining Power Plants. Dr. Alfred Gradenwitz. An illustrated article giving information relating to this type of gas producer intended for generating gas from any description of wood waste as well as from similar ligneous matter, agricultural residues, &c. 1000 w. Min Rept—March 9, 1905.

The Riché Gas Producer. Dr. A. Gradenwitz. Illustrated description of two systems of gas-producing designed for burning waste wood, shavings and sawdust as well as anthracite coal or coke. 1200 w. Power—May, 1905.
See also GAS, WOOD.

Scheveningen.—See Suction.

Series.—Apparatus for Converting Fuel into Heating or Power Gas (Ein Verfahren zur Umsetzung der Brennstoffe in Heis-oder Kraftgas). H. Jahns. Describing an arrangement of gas producers in series, with a corresponding increase in efficiency. 2000 w. Glückauf—Dec. 5, 1903.

A Process for the Conversion of Fuels into Heating and Power Gas (Ein Verfahren zur Umsetzung der Brennstoffe in Heiz- oder Kraftgas). H. Jahns. Describing a form of series gas producer at the Von der Heydt mines near Saarbruck. 2500 w. Zeitschr d Ver Deutscher Ing—Feb. 27, 1904.

Steam Admission.—See GAS, WATER.

Steubenville, O.—See ELECTRIC RAILWAY.

Suction.—Suction Gas Producer for Anthracite (Gasogène à l'Anthracite pas Aspiration). E. François. Illustrating a convenient form of gas producer with reversed draft, suitable for generating lean fuel gas for medium and small sized gas engines. 8000 w. 4 plates. Rev Univ des Mines—Nov., 1902.

Suction Producers for Gas Engines. Abstract translation of a paper by Herr J. Körting in the "Journal für Gasbeleuchtung." Gives an illustrated description of the Körting power-gas plant and discusses the suction generators for making producer gas without the aid of a boiler. 4000 w. Jour Gas Lgt—Nov. 25, 1902.

Gas Producers on Shipboard. Bernhard A. Sinn. Describes the suction gas producer, and gives an illustrated description of its installation on shipboard, with report of its operation. 2200 w. Marine Engng—Oct., 1904.

Suction Gas Producers. B. A. Sinn. An illustrated description of this type of apparatus which does away with the gasholder, explaining the principles involved and the operation and care necessary. 3400 w. Power—Dec., 1904.

A General Description of Suction-Gas Plants (Iets over Zuiggas-installatien in het Algemeen). H. A. Ravenek. With illustrations and description of suction gas apparatus, and an account of the installation at Scheveningen. 4500 w. De Ingenieur—Dec. 10, 1904.

Gas Producer Systems. Illustrated detailed descriptions of five or six suction gas producers. 7500 w. Engr, U S A—Jan. 1, 1905. (Special.)

Suction Gas Producers. The present article discusses the advantages claimed for the suction producer, the types now on the market, some applications, &c. Serial. 1st part. 2700 w. Engr, Lond—March 31, 1905.

Suction-Gas Plants. F. H. Bowman. Abstract of a paper read before the Leeds Loc. Sec. of the Inst. of Elec. Engrs. Discusses points to be considered in determining the nature of the plant to be used; the principal forms of producers, especially suction-gas producers. Discussion. 4800 w. Elect'n, Lond—April 7, 1905.

The Design and Operation of the Suction Gas Producer. Rodolphe Mathot. A practical discussion of the design and best proportions of suction gas producer plants, showing the high efficiency of the apparatus. 3000 w. Engineering Magazine—May, 1905.

Producer-Gas Power Plants. A. Frederick Collins. Illustrates and describes two forms of the suction type of apparatus, the Loomis-Pettibone system, and the Crossley system. 2000 w. Sci Am Sup—June 3, 1905.

Suction Gas Producer Plants. Dr. Oskar Nagel. Explains the working of suction gas producer plants and their advantages over the pressure gas producers. Ills. 2500 w. Cassier's Mag—Sept., 1905.

Recent Gas Producers (Neuere Kraftgaserzeuger). R. Schöttler. Illustrating and describing improved types of suction gas-producers for direct connection to gas engines. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—Nov. 11, 1905.

Suction-Gas Producers. Prof. A. Humboldt Sexton. Illustrates and describes four forms of suction gas producers, explaining the principles on which suction producers are based. 3800 w. Mech Engr—Dec. 9, 1905.

The Suction Type of Gas Producer. Abstract of a paper by C. H. Treglown, read before the S. Staffordshire and Warwickshire Inst. of Min. Engrs. Describes the Tangye suction gas plant, discussing factors affecting the working and the advantages. 3000 w. Col Guard—Dec. 15, 1905.

See also Davey-Paxman; Maystre-Ledoyen; Pierson; Pintsch; Thompson-Burger.

Suction Down Draft.—Gas Producer with Suction Down Draft (Gazogène à Combustion Renversée par Aspiration). J. Deschamps. An illustrated description of a gas generator of the Loomis type, using all kinds of fuels rich in volatile products. 1800 w. Génie Civil—April 25, 1902.

Suction Plant.—Experiments on a Suction Gas Plant (Untersuchungen an einer Sauggasanlage). Kurl Bräuer. Data and results of tests. The suction stroke of the gas engine produces the down draft in the producer. A fuel consumption of 0.32 kilogram of coal per 1 H. P. was attained. 4000 w. Zeitschr d Ver Deutscher Ing—Oct. 17, 1903.

Suction Trials.—Trials of Suction Gas-Producer Plants. Report on the trials under the auspices of the Highland and Agricultural Society of Scotland. 2500 w. Mech Engr—Nov. 11, 1905.

Tangye.—See Suction.

Taylor.—The Taylor Gas Producer. Illustrates and describes a producer that can be applied to any existing gas or oil engine. 800 w. Engng—June 5, 1903.
See also **GAS POWER PLANT.**

Test.—The Testing of Gas Producers. Samuel S. Wyer. Description of methods for conducting tests. Also Bibliography of Gas Producers. 5000 w. Am Inst of Min Engrs—Feb., 1905.
See also **GAS ENGINE**—Charon.

Thermal.—The Thermal Processes in Gas Producers (Die Thermischen Vorgänge in Gaserzeuger). Fritz Lürmann, Jr. An illustrated discussion of the reactions and processes in the manufacture of gas for power purposes. Serial. Two parts. 10,000 w. Stahl u Eisen—April 1 and 15, 1903.

Thompson-Burger.—The Thompson-Burger Gas Producer and Engine. Illustrated description of this automatic cut-off gas engine and the suction gas producer. 2000 w. Ir Age—Dec. 21, 1905.

Wendt.—A Study of the Gas Producer (Untersuchungen an Gaserzeugern). Karl Wendt. Data and results of a series for motive power, using a specially designed experimental producer. 5000 w. Zeitschr d Ver Deutscher Ing—Nov. 26, 1904.

Wood.—See Riché; GAS, WOOD.

GAS PURIFICATION.

See also **GAS MANUFACTURE; GAS WORKS.**

Further Notes on Purification of Gas. S. Carpenter. An article prepared for students and young gas managers. On the testing for ammonia and other impurities. Serial. 1st part. 1900 w. Jour Gas Lgt—April 23, 1901.

Purification, and Method of Working Purifiers. B. W. Smith. Read before the Inst. of Gas Engrs. The paper is addressed to managers of small works, and deals with points of importance in the work that have come within the writer's large experience. Discussion. 1200 w. Gas Wld—May 4, 1901.

Purification and Method of Working Purifiers. B. W. Smith. Discusses the merits of various methods. 4000 w. Gas Engs' Mag—June 10, 1901.

An Experiment on the Principles of Purification. E. C. Jones. Read before the Pacific Coast Assn. Also discussion. Describes experiments with two types of purifiers, giving results. Ill 4500 w. Am Gas Lgt Jour—Sept. 8, 1902.

Gas Purification and Gas Purifiers. Pierre Plantinga. Discusses the capacity, arrangement and construction of purifiers; purifying material, etc. Ill. 2000 w. Am Gas Lgt Jour—Jan. 19, 1903.

Notes on Gas Purification. Dr. H. Bunte. Abstract translation of a reprint in the "Jour. für Gasbeleuchtung" of a lecture delivered before the German Assn. of Gas & Water Engrs. Serial. 1st part. 1700 w. Jour Gas Lgt—Sept. 15, 1903.

Analysis.—See **GAS ANALYSIS** — Sulphuretted Hydrogen.

Blast-Furnace Gas.—See **BLAST-FURNACE GAS**—Purification.

Capacity Increase.—Quadrupling the Capacity of an Ordinary Purifier House at Very Small Cost. F. H. Shelton. Read before the Western Gas Assn. Suggests a simple and effective method of increasing the capacity at small expense. Ill. General discussion. 4000 w. Pro Age—Aug. 1, 1903.

Centrifugal Apparatus.—See Suspended Particles; Theisen Process.

Concrete-Reinforced Boxes.—See **CONCRETE REINFORCED**—Gas Purifier Boxes.

Construction.—Notes on Purifier Construction. G. P. Lewis. Read at London meeting of the Southern Dist. Assn. of Gas Engs. and Mgrs. Considers disadvantages of the water seal, proposed improvements in the "dry" system, cost, and the general problem of purification. Also discussion. Ill. 3500 w. Gas Wld—Nov. 17, 1900.

Construction of Purifiers. Ed. Jaeger. From "Journal für Gasbeleuchtung." Illustrates and describes a construction that has been found very satisfactory. 1000 w. Gas Wld—May 10, 1902.

Current Purifier Practice, and a New Form of Construction. F. H. Shelton. Paper before the Western Gas Assn. Briefly reviews purifier construction practice in the United States, and describes an easily made form that under some conditions will reduce the expense of construction about one-half. Ill. 6500 w. Am Gas Lgt Jour—June 9, 1902.

"Cyclone" Dust Separator.—See Suspended Particles.

Doesburgh vs. Milbourne.—The "Milbourne" and "Prins van Doesburgh" Systems of Purifiers. An illustrated description of the system devised by J. J. Prins van Doesburgh, with remarks of C. T. Salomons on its similarity with the Milbourne system. 1300 w. Jour Gas Lgt—Sept. 23, 1902.

Grid-Valves. R. J. Milbourne. Remarks on the similarity of the Milbourne gas-purifier valve and those invented by Prins van Doesburgh. Gives illustrations of the Milbourne grid-valve with explanation. 1600 w. Jour Gas Lgt—Oct. 21, 1902.

Evesham, Eng.—See **GAS WORKS.**

Grids.—A New Development in Purifier Grids. F. D. Marshall. Illustrates and describes the "Standard" grid, reviewing investigations that led to its development. 2000 w. Gas Wld—April 2, 1904.

Grid-Valves.—See Doesburgh vs. Milbourne.

Milbourne.—See Doesburgh vs. Milbourne.

Naphthaline.—See **GAS MANUFACTURE.**

Norfolk, Va.—See Oxide.

Oxide.—Purifying Materials and Spent Oxide. P. Parrish. Considers oxides of iron and spent oxide as purifying materials for coal gas. General discussion. 7000 w. Gas Wld—April 2, 1904.

Economy in Oxide Purification. H. L. Rice. Read before the Ohio Gas Lgt. Assn. Calls attention to results achieved under rather unusual conditions at the Norfolk (Va.) works. 5300 w. Am Gas Lgt Jour—April 11, 1904.

Economy in Oxide Purification. Henry L. Rice. Gives some results in purification at the Norfolk, Va., works. 2000 w. Gas Engrs' Mag—May 10, 1904.

Prins van Doesburgh.—See **Doesburgh.**

Revivification.—Revivification in Situ, and Stopped Ascension-Pipes. A summary of interesting observations communicated by Herr Burgemeister to the "Journal für Gasbeleuchtung." Describes a simple and economical method of supplying air for the revivification of the fouled oxide in purifiers. 1500 w. Jour Gas Lgt—May 5, 1903.

Scrubber.—A New Type of Scrubber. R. W. B. Creeke. Read at meeting of the N. Brit. Assn. Traces briefly the changes which have taken place in scrubbers, defining the difference between a scrubber and a washer, and giving an illustrated description of a new machine scrubber. Discussion. 3800 w. Jour Gas Lgt—Aug. 6, 1901.
See also **BLAST-FURNACE GAS—Purification.**

Springfield, Mass.—Remarks on Gas Purification. S. J. Fowler. Presented at meeting of the New England Assn. of Gas Engs. Describes the apparatus used at Springfield, Mass., the changes made and the reasons. Brief Discussion. 2000 w. Am Gas Lgt Jour—March 4, 1901.

Steam Saturation.—Simplified Method for Purifying Gas with a View to Complete Recovery of Tar and Ammonia. Summary of a paper read before the German Gas Assn. Describes a method of saturating the gas with steam. Ill. Gas Wld—Oct. 24, 1903.

Sulphur.—The Proportion of Sulphur Removed in Each Purifying Box. Carroll Miller. Read at meeting of the New England Assn. of Gas Engs. Describes the apparatus used and experiments made to determine the proportional amount of sulphur in the form of sulphuretted hydrogen removed from the gas by the oxide of iron in each box in a set of four. Discussion. 2500 w. Am Gas Lgt Jour—March 4, 1901.

The Purification of Gas from Sulphur. H. Leicester Greville. Discusses the purification from sulphur compounds other than sulphuretted hydrogen. 2400 w. Jour Gas Lgt—Aug. 4, 1903.

Sulphur Purification. O. W. Dougan. Abstract of a paper read before the Junior Gas Assn. Discusses the theory and practice, testing, etc. 4000 w. Gas Wld—April 2, 1904.

Sulphuretted Hydrogen.—Removal of Sulphuretted Hydrogen from Foul Gas Evolved in the Manufacture of Sulphate of Ammonia, Gas Liquors, etc. A report of this system and its advantages. The patent of H. W. Hemingway. 2000 w. Jour Gas Lgt—Dec. 29, 1903.
See also **GAS ANALYSIS.**

Suspended Particles.—The Purification of Furnace and Producer Gas (Die Gicht- und Generatorgas Reinigung). E. Theisen. A description of a form of centrifugal apparatus for removing dust and grit from furnace gases used in gas engines. 3500 w. Stahl u Eisen—March 1, 1904.

Removing Suspended Particles from Gases. Principal portions of a paper by M. Philippard read at meeting of the Société Technique. Discusses briefly the principles of purification, investigating different types of condensers, and favoring the cyclone. 3500 w. Jour Gas Lgt—June 21, 1904.

Condensation of Solid and Liquid Particles in Suspension in Gases, Particularly in Lighting Gas. M. J. Philippard. Abstract of a paper read at meeting of the Société Technique de l'Industrie du Gaz en France. Discusses the deposition of dust in a gas, and the use of the "Cyclone" dust separator. Ills. 3800 w. Gas Wld—June 25, 1904.

Tar.—Other Troubles Than Naphthaline: An Invitation for Discussion. John Terrace. Read before the So. District Assn. of Gas Engrs. & Mgrs. Considers the thick tar trouble, tar in the oxide, and other troubles. Discussion. 6000 w. Gas Wld—Nov. 14, 1903.
See also **GAS, WATER.**

Tar and Ammonia.—A Simplified Method of Gas Purification to Completely Recover Tar and Ammonia. Abstract translation of a short paper by Herr Burgemeister at the meeting of the German Assn. of Gas & Water Engrs. Ill. 1300 w. Jour of Gas Lgt—Oct. 13, 1903.

Tar Fog.—William Everitt. Read before the Manchester Dist. Inst. of Gas Engrs. A description of appartus tried by the writer, with general discussion. 5500 w. Jour Gas Lgt—March 10, 1903.

Theisen Process.—Theisen's Centrifugal Gas-Purifying Process. Translated from "Stahl und Eisen." Illustrated description of the invention and the manner of operating, with information concerning the process. 3000 w. Ir & Coal Trds Rev—Oct. 26, 1900.

The Theisen Centrifugal Gas Washer. Illustrated description of aparatus for purifying gas from blast furnaces, etc., for use in gas engines. 700 w. I Age—Aug. 18, 1904.

Unit System.—Application of the Unit System of Gas Manufacture to Its Purification. Charles Carpenter. Read before the Gas Section of the Glasgow Congress. Describes an experiment tried and the results obtained. General discussion follows. Ill. 5500 w. Jour Gas Lgt—Sept. 10, 1901.

Water Gas.—Gas Liquor as an Adjunct for the Purification of Water Gas. H. Leicester Greville. Reports results of experiments and discusses the advantages. 1200 w. Jour Gas Lgt—June 9, 1903.
See also **GAS, WATER.**

GAS RATE.

See **GAS INDUSTRY—Rates.**

GAS RETORT.

See also **GAS MANUFACTURE; GAS WORKS.**

Further Notes on Retort House Practice. E. H. Earnshaw. Read at meeting of the Am. Gas Lgt. Assn. Suggestions in regard to the operation of the new and improved methods of coal gas manufacture. 7000 w. Am Gas Lgt Jour—Oct. 21, 1901.

Modern Retort House Practice. W. B. M'Lusky. Read at meeting of the N. Brit. Assn. of Gas Mgrs. On the importance of good design and good workmanship in constructing the retort house, and favoring the doing of the heavy work by mechanical means. Ill. and discussion. 4500 w. Gas Wld—July 26, 1902.

Construction and Working of Modern Retort Settings. The first of a series of articles aiming to assist those whose opportunities have been limited. They will consider the theoretical side of the question and the practical adaptations of the principles. Ill. Serial. 1st part. 1100 w. Gas Wld—June 27, 1903.

Bench.—I. Is There Any Economy in Full Depth Benches Over Half-Depth; and Why? D. R. Russell. II. Isolated Generator Firing of Benches. W. E. Steinwedell. Two papers, discussed together, presented at meeting of the Ohio Gas Lgt. Assn. 3500 w. Am Gas Lgt Jour—April 28, 1902.

Construction and Operation of Recuperative Benches. W. A. Baehr. Read before the Ohio Gas Lgt. Assn. Considers the principal points in the operation of such benches, and discusses the proper principles of construction. Also general discussion. 9800 w. Pro Age—April 1, 1903.

Care of Benches and Results Therefrom. T. J. Whalen. Read at meeting of Michigan Gas Assn. Considers causes of poor results and some of the troubles in retort houses. 5500 w. Am Gas Lgt Jour—Feb. 22, 1904.

The Construction and Operation of Recuperative Benches No. II. W. A. Baehr. A discussion of the practical and important considerations of the materials of bench construction. Also general discussion. 15,800 w. Pro Age—May 2, 1904.

Bench Firing.—Coal for Bench Firing. R. C. Cornish. Read before the Wisconsin Gas Assn. An account of methods used at Racine, Wis. 1000 w. Pro Age—March 15, 1902.

Bench Fuels.—Experience with Bench Fuels. W. A. Baehr. Read at meeting of the Western Gas Assn. An account of a series of experiments in

Denver with the object of finding a suitable bench fuel to replace coke. Also discussion. Ill. 5800 w. Pro Age—June 2, 1902.

Berlin.—Retort-House Working in Berlin. Edward Drory. Tabulated results of actual workings with explanatory remarks, showing the advantage of inclined retorts. 1600 w. Jour Gas Lgt—Feb. 25, 1902.

Retort-Houses for Inclined Retort Settings and Their Development. Edward Drory. An account of experiments and illustrated description of the Getschiver Strasse Gas Works, and the Mariendorf Retort-House, Berlin. 2 plates. 3200 w. Jour Gas Lgt—June 3, 1902.

Bertrand Charger.—See Charging.

Bristol.—See Inclined.

Bury, Eng.—See GAS WORKS.

Centrifugal Charging.—See Charging, Centrifugal.

Charging.—A Retort-Charging Machine. A. Cabrier. Presented at meeting of the Société Technique. Illustrates and describes the machine, explaining its principle and method of working. 900 w. Jour Gas Lgt—Aug. 13, 1901.

The Rapid Charging and Drawing Apparatus. J. W. Russell Wall. Read before the Eastern Co.'s Gas Mgrs. Assn. An explanation of this apparatus for charging retorts, followed by general discussion. 5200 w. Jour Gas Lgt—Sept. 23, 1902.

A Combined Charging and Drawing Machine. An illustrated description of an improved machine, invented by John West, for economy in retort-house labor. 4800 w. Jour Gas Lgt—Dec. 16, 1902.

A Visit to M. de Brouwer at Bruges. An account of the retort-charging apparatus and its operation, with illustrations. Serial. 1st part. 5700 w. Jour Gas Lgt—March 24, 1903.

Retort Stoking by Electricity. Particulars from a description appearing in the "Bulletin Technologique" of the Sarrosin system for charging and drawing retorts. Ill. 2500 w. Jour Gas Lgt—May 12, 1903.

The New Parisian Retort Charging-Machine and Discharging-Ram. Illustrated detailed descriptions of these machines and their operation, with comments and general information. 6500 w. Jour Gas Lgt—May 19, 1903.

The New Parisian Retort Charging Machine. A correction of a few inaccuracies in a previous article, with supplemental information. Ill. 1200 w. Jour Gas Lgt—May 26, 1903.

Plant for Charging and Discharging Gas Retorts. Summary of a paper prepared for the Société Technique de l'Industrie du Gaz en France, by M. P. Sarrazin, describing the apparatus and its working. Ill. 2800 w. Gas Wld—June 6, 1903.

The Mechanical Operation of a Gas Retort House (La Manutention d'une Usine à Gaz). A. Thibeault. A very complete account of recent methods of mechanically charging and drawing gas retorts, both horizontal and inclined. Three articles. 9000 w. 3 plates. Génie Civil—April 16, 23, 30, 1904.

De Brouwer Stoking Machinery at Derby. J. Ferguson Bell. Read before the Inst. of Gas Engrs. An illustrated description of the plant, with results obtained by continuous working during the past eight months. General discussion. 11,800 w. Gas Wld—June 11, 1904.

An Elevating-Charging Machine. P. Parsy. Read at meeting of the Société Technique. Illustrates and describes a new retort charger. 1100 w. Jour Gas Lgt—June 28, 1904.

See also COKE HANDLING—Gas Works; GAS MANUFACTURE; GAS WORKS—Crefeld; Hanover.

Charging, Centrifugal.—Centrifugal Retort Chargers. F. H. Shelton. Describes various types of centrifugal coal projectors, and their advantages for charging coal-gas retorts. General discussion. Ill. 3000 w. Pro Age—July 1, 1904.

Charging, Electrical.—Charging-Machines at Villeurbanne (Lyons) Gas-Works. M. Boutan. Read at meeting of the Société Technique. Describes a plant worked electrically. The charge of coal is made into a sort of cartridge by enclosing it in a rigid tube, easily worked. 2200 w. Jour Gas Lgt—June 28, 1904.

Charging, Ipswich.—From Orwell to Coke Heap or Wagon. An illustrated description of West's combined charging and drawing machine, recently installed at Ipswich. Also the coke-conveying plant. 5000 w. Jour Gas Lgt—Dec. 1, 1903.

Charging, Lyons.—Charging Machinery at Lyons. M. Boutan. Read before the Soc. Tech. de l'Ind. du Gaz en France. Illustrated description of the charging machinery and its working. 2500 w. Gas Wld—June 18, 1904.

Charging, Oerlikon.—Oerlikon and Bertrand Chargers and Dischargers. M. J. Thellies. Read before the Soc. Tech. de l'Ind. du Gaz en France. An illustrated article explaining the charging and discharging movement, the lifting and lowering to different levels, etc. 900 w. Gas Wld—June 18, 1904.

Chesterfield.—See Inclined.

De-Scurfing.—A Method of De-scurfing Gas Retorts. Illustrates and describes apparatus whereby a steam injector is utilized to introduce a mixture of steam and air. 1000 w. Gas Wld—Feb. 20, 1904.

Discharging.—See Charging.

Drawing.—See Charging.

Electric Charging.—See Charging, Electric.

First Cost.—A Comparison Between the First Cost of Inclined and Horizontal Retorts. M. Frère. Read before the Société Technique du Gaz at Toulon. 1500 w. Jour Gas Lgt—July 14, 1903.

Heat Conductivity.—Heat Conductivity of Gas Retorts. H. A. Wheeler. Read before the Western Gas Assn. Describes methods of testing to determine if different makes of gas retorts have different rates of transmitting heat, discussing results. General discussion. 3400 w. Pro Age—Aug. 1, 1903.

Inclined.—Inclined Retorts. A. H. Barret. Read at Denver meeting of the Am. Gas Lgt. Assn. Describes the installation and operation of a plant. 3000 w. Am Gas Lgt Jour—Nov. 5, 1900.

The Construction and Method of Charging Inclined Retorts. Gilbert Little. Relating to improvements for reducing cost and improving quality of machinery. Ill. 1700 w. Jour Gas Lgt—Oct. 22, 1901.

The Economical Advantages of Inclined Retort-Settings. W. R. Herring. A discussion of this subject, referring to a former paper, and to the views of others, and considering the automatic discharging of inclined retorts. 2800 w. Jour Gas Lgt—Nov. 5, 1901.

The Economical Advantages of Inclined Retort-Settings. W. R. Herring. An examination of statistics abstracted from "Field's Analysis" and a statement of conclusions. 2500 w. Jour Gas Lgt—Dec. 3, 1901.

Inclines and Their Feeding Arrangements. The present article discusses the inclined system and its economy. Serial. 1st part. 1800 w. Jour Gas Lgt—Jan. 28, 1902.

The Early History of Inclined Retorts. A summary of the history, which does not date back more than twenty years. Serial. 1st part. 2000 w. Jour Gas Lgt—Feb. 18, 1902.

Inclined Retorts and Their Working. H. P. Maybury. Read before the Midland Assn. of Gas Mgrs. Also discussion. A paper favoring the use of inclined retorts, discussed by those who had had no experience with them. 9400 w. Jour Gas Lgt—March 4, 1902.

Inclined Retorts. E. Merz. Abstract translation of a paper read before the German Gas Assn. Deals with the objections raised against inclined retorts, showing them unfounded. 1200 w. Gas Wld—Sept. 6, 1902.

Inclined Retorts at the Vaise (Lyons) Gas-Works. M. Godinet. Read before the Société Technique du Gaz en France. An illustrated description of the inclined retort-house recently installed and its working. 6300 w. Jour Gas Lgt—Sept. 23, 1902.

A Complete New Gas Works for Slough. An

illustrated description of an inclined retort system for small works, with explanatory notes. 3500 w. Jour Gas Lgt—Nov. 18, 1902.

An Inclined Retort-House and Its Working at Bristol. An illustrated description of a recently installed plant where the working is as completely mechanical as possible, giving costs and information of interest. 4300 w. Jour Gas Lgt—Jan. 6, 1903.

An English Inclined Retort Installation in Italy. Illustrates and describes a large installation lately completed at the Milan Gas Works, with an account of the work of construction and information of interest. 3400 w. Jour Gas Lgt—Jan. 13, 1903.

The Home of the Inclined Retort in England. An illustrated article describing the past and present systems of the Brentford Gas Co. at Southall, England. 4000 w. Jour Gas Lgt—Sept. 29, 1903.

Notes on the Construction of Inclined Retort Settings. Archd. S. B. Little. On the designing of inclined retort settings, and present practice. Ill. Serial. 1st part. 3800 w. Jour Gas Lgt—Oct. 20, 1903.

Inclined Retorts at Chesterfield. An illustrated description of a new installation, with brief account of these works. 3000 w. Gas Wld—Feb. 13, 1904.

I. Inclines at New Bedford. C. H. Gifford. II. Inclines as Used at Lynn, Mass. C. F. Prichard. Ills. Two papers read before the New England Assn. of Gas Engrs. Describes the arrangement of inclined-retort plants and their management. 3800 w. Am Gas Lgt Jour—March 14, 1904.

See also Berlin; Milwaukee, Wis.; GAS MANUFACTURE—Carbonizing; GAS WORKS—Bristol; Heckmondwike; Wakefield.

Inclined, Derval. — See GAS WORKS — Nanterre, Paris.

Inclined vs. Horizontal.—Horizontal vs. Inclined Retort Installations, with Notes on Coke Conveying. J. G. Newbigging. Read at meeting of the Manchester Dist. Inst. of Gas Engrs. Also discussion. Gives the writer's experience, with information in regard to first cost and maintenance, and all related questions. Ills. 11,000 w. Gas Wld—March 12, 1904.

Horizontal vs. Inclined Retort Installations, with Notes on Coke Conveying. J. G. Newbigging. Read before the Manchester Dist. Inst. of Gas Engrs. Considers the costs of the two systems, the durability, production, etc., describing work undertaken by the writer, and giving information of interest. 4300 w. Gas Engrs' Mag—May 10, 1904.

Milan.—See Inclined.

Milwaukee, Wis.—Discussion on the Paper by R. B. Brown of Milwaukee, Wis., as to "Why Milwaukee Did Not Build Inclines." Discussion at meeting of the Am. Gas Lgt. Assn. 5400 w. Am Gas Lgt Jour—Nov. 24, 1902.

Concerning Mr. R. B. Brown's Paper, "Why Milwaukee Did Not Build Inclines." Frederick Egner. A criticism of statements made in paper read before the Am. Gas Lgt. Assn. 1200 w. Jour Gas Lgt—Nov. 11, 1902.

Why Milwaukee Did Not Build Inclines. R. B. Brown. Read before the Am. Gas Lgt. Assn. States the conditions affecting the carbonization scheme at Milwaukee and explains why the inclined retort system was not considered an economic success. 4600 w. Am Gas Lgt Jour—Nov. 17, 1902.

Oerlikon Charger.—See Charging, Oerlikon.

Ovens.—See COKE-OVEN GAS.

Pressure Regulation.—Some Thoughts on the Regulation of Pressure. Thomas Glover. Read before the E. Co.'s Gas Mgrs.' Assn. Abstract. Gives the writer's experience in exhausting gas from retorts under somewhat unusual conditions, and discusses regulation of pressure. General discussion. 3500 w. Gas Wld—April 23, 1904.

Reinforced Concrete Houses.—A Proposed New System of Building Retort-Houses. The first of a series of articles, mainly introductory, setting forth the merit and advantages of reinforced concrete construction. Serial. 1st part. 2200 w. Jour Gas Lgt—April 7, 1903.

Settings.—See GAS WORKS.

Stoking Machinery.—See Charging; GAS WORKS.

Vertical.—An American Arrangement of Vertical Retort. Illustrations and portion of patent specifications of an invention by Charles F. Dieterich, issued about twenty years ago, and having features similar to the Bueb system. 1500 w. Jour Gas Lgt—July 14, 1903.

The Woodall-Duckham Vertical Retort. Illustrations and information from the patent specifications. 1500 w. Jour Gas Lgt—July 5, 1904.

See also GAS MANUFACTURE—Carbonizing; Settle-Padfield Process.

West Charger.—See Charging.

Woodall-Duckham.—See Vertical.

GAS SCRUBBER.

See BLAST FURNACE GAS; GAS PURIFICATION.

GAS STOVE.

See also GAS HEATING.

The Fitting of Gas Stoves. From "The Ironmonger." Considers the use of gas stoves and the best methods of erecting and fitting them. 3000 w. Gas Wld—Jan. 25, 1902.

Combustion Products.—Combustion Products of Gas and Oil Stoves. Particulars of the experiments made by Dr. Thorpe designed to ascertain the effects of burning gas and oil in heating stoves. Also editorial. 3000 w. Jour of Gas Lgt—Nov. 24, 1903.

Cooking.—Gas-Cookers—Desirable to Gas Companies and Consumers. D. W. Lyme. Read before the Irish Assn. of Gas Mgrs. Concerning increasing the sale of gas through the medium of gas-cookers. Also discussion. 3000 w. Jour Gas Lgt—Aug. 26, 1902.

The Housing of the Gas Cooking Stove. Norton H. Humphreys. Suggesting the placing of these stoves in a place prepared for them, with a ventilating flue to carry off the steam and products of combustion. 2200 w. Jour Gas Lgt—Sept. 9, 1902.

Sanitary.—The Gas Stove Considered from a Chemical and Sanitary Standpoint. Francis C. Phillips. Describes types at present used, and tests made where natural gas was used; discussing the effect upon health from the products of combustion. 4000 w. Pro Engrs' Soc of W. Penn—Feb., 1904.

GAS TESTING.

See CALORIMETRY; FUEL TEST; GAS; GAS ANALYSIS; PHOTOMETRY.

GAS TURBINE.

See also GAS; GAS ENGINE—Combustion Chamber; Explosions; MOTOR.

Theory of the Gas Turbine. Sanford A. Moss. Advance portion of a thesis to be presented to the Faculty of Cornell University for the degree of Ph. D. 3500 w. Engr., U S A—April 15, 1903.

The Gas Engine and the Gas Turbine. George E. Walsh. Discusses the probability of the gas turbine becoming a success, and the future of the gas engine. 1400 w. Elec Rev, N Y—Sept. 5, 1903.

A New Petrol Turbine. Illustrates and describes a design for an internal combustion turbine motor. 1000 w. Autocar—July 16, 1904.

A Scientific Investigation into the Possibilities of Gas Turbines. R. M. Neilson. Compares the advantages and possibilities of gas turbines worked on different cycles, and the difficulties to be overcome to make these turbines a success. 12,700 w. Inst of Mech Engrs—Oct. 21, 1904.

The Coming of the Gas Turbine. E. Kilburn Scott. A discussion of the chances of the gas turbine as a prime mover, with brief reference to the recent paper by R. M. Neilson. 1200 w. Elec Rev, Lond—Nov. 25, 1904.

Practical Investigations in the Gas Turbine Problem. Dr. Charles E. Lucke. A review of experiments in the mechanical laboratory of Columbia University, showing that the kinetic energy of expanding gases is not effectively converted into work by free expansion in simple nozzles. 2500 w. Engineering Magazine—April, 1905.

The Problem of the Gas Turbine. Dugald Clerk. Inaugural address to the Jun. Inst. of Engrs. A critical review of what has been written and attempted in this field, not favorable to expectations of future success. 4500 w. Jour of Gas Lgt—Nov. 7, 1905.

The Gas Turbine (Les Turbines à Gaz). A. Berthier. A general description of the present status of the gas turbine question, with reference to the turbines of Stolze and of Armengaud and Lemale. 2500 w. Génie Civil—Dec. 2, 1905.

The Efficiency of the Gas Turbine (La Turbine à Gaz—Son Rendement). Alfred Barbezat. Describing the Armengaud and Lemale gas turbine, with computations of efficiency for various ranges of temperature. 2500 w. Schweiz Bauzeitung—Aug. 27, 1904.

Crossley and Atkinson's.—Crossley and Atkinson's Turbine for Combustible Gases. Illustrated description of a recent patent. 1300 w. Mech Engr—Sept. 9, 1905.

Economy.—See STEAM TURBINE.

History.—See STEAM TURBINE.

Hot Air.—See Stolze.

Steam Mixed.—The Question of the Gas Turbine. Sidney A. Reeve. A review of the conclusions of Dr. Lucke, with especial reference to the mixed gas and steam turbine. 3500 w. Engineering Magazine—June, 1905.

Stolze.—An Experimental Gas Turbine. Dr. Alfred Gradenwitz. An illustrated description, showing the principle of the hot-air turbine invented by Dr. F. Stolze. 1500 w. Mach, N Y—Dec., 1904.

The Stolze Gas Turbine Engine. Dr. Alfred Gradenwitz. Particulars of this turbine, with illustrations. 900 w. Autocar—Dec. 31, 1904.

GAS WASHER.

See BLAST-FURNACE GAS; GAS PURIFICATION.

GAS, WATER.

See also GAS INDUSTRY; GAS MANUFACTURE; GAS WORKS.

Water Gas and Other Combustible Gases. Joh. Körting. Abstract translation of a communication to the Assn. of German Engrs. Serial. 1st part. 2800 w. Jour Gas Lgt—April 30, 1901.

Notes on Water Gas Manufacture. Thomas Holgate. Read before the Inst. of Gas Engrs. The paper deals with the Dellwik system, and the Strache system, and gives a large amount of information obtained by experiment and analysis. Discussion follows. Ill. 13,000 w. Gas Wld—May 4, 1901.

I. Why I Adopted Water Gas. William Longford. II. British Water Gas Practice. Robert Porter. Two papers presented at meeting of the Inc. Gas Inst. and discussed together, though most of the interest was in replying to Mr. Porter's paper. Ill. 21,500 w. Gas Wld—June 15, 1901.

The Utilization of Water Gas in the Destructive Distillation of Coal. Vivian B. Lewes. Read before the Gas Section of the International Engng. Cong. at Glasgow. Describes experiments made at the Crystal Palace Dist. Gas Works, showing the great economy obtained. Discussion. 8300 w. Gas Wld—Sept. 7, 1901.

Water Gas Manufacture in Theory and Practice. Dr. J. Kramers. Abstract translation of a communication published last year in "Het Gas." Serial. 1st part. 2500 w. Jour Gas Lgt—May 20, 1902.

Some Experiences with Water Gas. Harold E. Copp. Some of the writer's experiences with report of tests made. 1200 w. Jour Gas Lgt—Jan. 20, 1903.

Utilizing Water Gas in the Production of Illuminating and Heating Gases. William Young. An account of personal experience and the results obtained; also gives extracts from a patent relating to improvements in the manufacture of illuminating gas. Ill. 5500 w. Jour Gas Lgt—May 5, 1903.

Water Gas. Prof. A. Humboldt Sexton. Describes various plants and their method of working. Ill. Serial. 1st part. 4500 w. Mech Engr—Feb. 13, 1904.

Aarts-Kramer.—See Kramer-Aarts.

Benzolized.—Benzolized Water Gas at Erfurt. Photographic views of the plant, with plan and elevations, and description of the system of working adopted. 3000 w. Jour Gas Lgt—Dec. 4, 1900.

Blue.—See Enrichment; Kramer-Aarts; Lowe.

Blue Tipton.—The Lewes Process at Tipton. Sidney O. Stephenson. Read before the Inst. of Gas Engrs. An account of the Lewes process of the utilization of blue water gas on the full working scale, giving the results. Ill. and discussion. 10,400 w. Gas Wld—June 13, 1903.

Boiler Fuel Economy.—See FUEL—Economy.

Burner Regulation.—See GAS BURNER—Air Supply.

Carburetted.—Carburetted Water Gas. Samuel Cutler, Jr. Abstract of paper read before the Inst. of Junior Engs. discussing the composition, chemical aspects, methods, etc. Ill. 4800 w. Jour Gas Lgt—March 5, 1901.

Some Notes on the Conditions Which Prevail Within a Carburetted Water Gas Plant. W. J. Atkinson Butterfield. Read before the Inst. of Gas Engrs. Gives suggestions for improving the present results of the working of their plants. Discussion. 6400 w. Gas Wld—May 4, 1901.

Experience with Carburetted Water Gas Sets. A. C. Beck. Read before the Pacific Coast Gas Assn. An illustrated account of improvements introduced at Oakland, Cal., to overcome defects in manufacture and aid in the efficiency of the machines. Also discussion. 4500 w. Am Gas Lgt Jour—Sept. 9, 1901.

Carburetted Water Gas (Le Gaz à l'Eau Carburé). J. Laverchère. A general study of the generation of water gas, beginning with the original apparatus of Gengember in 1819 and continuing to the latest devices. Serial. Part I. 3000 w. Génie Civil—Oct. 12, 1901.

Carburetted Water Gas. From "Le Génie Civil." An illustrated sketch of this industry. 3300 w. Sci Am Sup—Dec. 14, 1901.

Carburetted Water Gas in Europe. J. T. Westcott. An account of the development. 1600 w. Am Gas Lgt Jour—Jan. 27, 1902.

Carburetted Water Gas. How it affects the distributing plant, burners, cookers, etc., and the remedies. 1500 w. Gas Engrs' Mag—March 10, 1902.

On Some Points About the Properties and Testing of Carburetted Water Gas. Prof. C. R. C. Tichborne. Before the Irish Assn. of Gas Mgrs. Discusses the illuminating power, impurities, control of carbon monoxide, etc. 4000 w. Gas Wld—Aug. 16, 1902.

The Outlook for Carburetted Water Gas. The present article considers some of the recent working results, the departmental committee's recommendations, costs, etc. Serial. 1st part. 3000 w. Gas Wld—Oct. 11, 1902.

The Self-Carburetting of Water Gas in Gas Works. Abstract translation of a communication by H. Dicke, to the "Jour. für Gasbeleuchtung." Information on the working of this process at various places. 4600 w. Jour Gas Lgt—June 9, 1903.

Notes on the Operation of Large Carburetted Water Gas Sets. W. Cullen Morris. Read before the Am. Gas Lgt. Assn. Reviews the work of other investigators and gives data accumulated with the idea of determining the proper rate of flow of steam supply to the generators for producing the best working results, and the economy of new sets introduced. 3000 w. Am Gas Lgt Jour—Nov. 2, 1903.

Notes on the Operation of Large Carburetted Water Gas Sets. Discussion of a paper by W. Cullen Morris. 3000 w. Am Gas Lgt Jour—Dec. 28, 1903.

Notes on Carburetted Water Gas Workings. H. Kendrick. Read before the Manchester Dist. Inst.

of Gas Engrs. The paper is closely related to Mr. Newbigging's paper, and contrasts the cost of producing coal gas and carburetted water gas, giving details of the latter process. 3500 w. Gas Wld—March 12, 1904.

See also Benzolized; Enrichment.

Coal Compared.—See **GAS—Coal vs. Water.**

Coal Gas Combined.—See **GAS MANUFACTURE—Water Gas Combined.**

Coal Gas Works.—See **GAS WORKS—Water and Coal Gas.**

Dellwik-Fleischer. — Dellwik-Fleischer Water-Gas Plant at Nuremberg. From the "Journal für Gasbeleuchtung." Particulars concerning this plant. 2000 w. Jour Gas Lgt—Aug. 19, 1902.

The Dellwik-Fleischer Process of Carburetting Water Gas by Passing It Into Retorts. Abstract translation of a paper read by M. Lecomte before the Soc. Tech. du Gas en France. Descriptive. Serial. 1st part. 2500 w. Jour Gas Lgt—May 19, 1903.

The Principal Applications of Water Gas (Le Gas à l'Eau et ses Principales Applications). E. Demenge. With especial reference to the Dellwik-Fleischer process, and to the industrial uses of water gas, such as heating, welding, etc. 4000 w. Rev Gen des Sciences—Jan. 30, 1904.

Detroit Works.—The Building of a Water Gas Plant. C. W. Tippy. Read at meeting of the Mich. Gas Assn. Illustrates and describes a plant recently built in Detroit. 4000 w. Am Gas Lgt Jour—March 10, 1902.

Early Plant.—Early Plant for Making Water Gas. An illustrated account of an apparatus constructed in France in 1819, by Philippe Gengembre and his son, Antoine. 1200 w. Jour Gas Lgt—Nov. 12, 1901.

Enrichment.—Blue Water Gas and Its Enrichment by the Peebles Oil Gas Process. E. J. Brockway. Read before the East. Co.'s Gas Mgrs.' Assn. An account of writer's experience with a combination of a Wellwik plant for making blue water gas, with the Peebles process as an enricher. 7500 w. Gas Wld—April 25, 1903.

Water Gas Tar Used in Generators for Enrichment. Henry I. Lea. Read before the Ohio Gas Lgt. Assn. Reports plants that have used oil tar in generators and the results, discussing its value. General discussion. 3800 w. Am Gas Lgt Jour—May 30, 1904.

See also Carburetted; **GAS MANUFACTURE—Oil.**

Erfurt, Germany.—See **Benzolized.**

Generators.—Water-Gas Generators (Gasogènes pour Gas à l'Eau). J. Deschamps. An examination of the Dellwik-Fleischer and the Strache processes, with diagrams showing the output and the composition of product. 2000 w. Génie Civil—Jan. 26, 1901.

Kramer-Aarts.—Water Gas Manufacture by the Kramers and Aarts Process. Abstract of a paper by Dr. Alph. Steger at a recent meeting of the German and Swiss Assns. of Gas and Water Engrs. Considers both the continuous and intermittent methods of producing simple water gas. 4200 w. Jour Gas Lgt—July 21, 1903.

The Kramer and Aarts Water-Gas Process. Dr. Alph. Steger. Read before the German Gas Assn. Summary. Describes methods of making blue water gas. Claims efficiency under test of 85 per cent. Discussion. Ill. 3300 w. Gas Wld—Jan. 30, 1904.

Lewes Process.—See **Blue, Tipton; GAS ENGINEER—British Institution.**

Lowe.—Some Details in the Operation of a Water Gas Plant. Charles F. Leonard. Notes points that have appealed to the writer in a comparatively brief experience in gas works, using the Lowe process. Also discussion. 9500 w. Am Gas Lgt Jour—March 24, 1902.

Blue Water Gas at Ilford, and Elsewhere. A. G. Glasgow. A statement in defense of the Lowe process. 3700 w. Jour Gas Lgt—Feb. 10, 1903.

Massachusetts.—Tar and Water from Water Gas. W. E. McKay. Read before the Am. Gas Assn. Tabulated data showing the changes in the manufacture of gas and in the sales of residuals, in Massachusetts, during the past 14 years, with description of system of separation used, and other information. 11,700 w. Am Gas Lgt Jour—Nov. 4, 1901.

Methane-Hydrogen.—More About Methane-Hydrogen Water Gas. C. B. Tully. Read before the Irish Assn. of Gas Mgrs. Describes important features in the modified plant at Sligo, the method of working, and cost. Ill. 1800 w. Gas Wld—Aug. 16, 1902.

New York.—The Manufacture of Water Gas at the Forty-fourth Street Station, New York. An illustrated description of the plant and its operation. 2000 w. Sci Am—Jan. 19, 1901.

Nuremberg, Germany.—See **Dellwik-Fleischer.**

Oil.—See **GAS MANUFACTURE.**

Oldham, Eng.—New Carburetted Water Gas Plant at Oldham. Illustrated description of new plant. 1800 w. Jour Gas Lgt—Jan. 28, 1902.

Purification.—See **Tar Removal; GAS PURIFICATION.**

Pyrometer.—See **PYROMETER—Blue Glass.**

Steam Admission.—The Economic Admission of Steam to Water Gas Producers of the Lowe Type. G. W. M'Kee. Read before the Canadian Soc. of Chem. Ind. Gives an account of experiments conducted in three water-gas machines. 2000 w. Gas Wld—Jan. 9, 1904.

Strache.—Water Gas Installation on the Strache System. Details of the more important plants erected on a working scale and the results obtained. Ill. Serial. 1st part. 4600 w. Jour Gas Lgt—Aug. 20, 1901.

See also **Theory.**

Tar.—See **Enrichment; Massachusetts; TAR.**

Tar Removal.—The Removal of Tar from Water Gas. W. C. Morris. Read at meeting of Am. Gas Lgt. Assn. Considers the methods. Illustrations and general discussion. 1700 w. Am Gas Lgt Jour—Nov. 12, 1900.

See also **GAS PURIFICATION.**

Theory.—Theory of the Water-Gas Process. H. Strache and R. Jahoda. Abstract translation of articles published in the "Journal für Gasbeleuchtung." Serial. 1st part. 3000 w. Jour Gas Lgt—Jan. 1, 1901.

Tipton, Eng.—See **Blue, Tipton.**

GAS WELL.

See **GAS, NATURAL; PETROLEUM WELL.**

GAS, WOOD.

See also **GAS FUEL; GAS PRODUCER.**

Charcoal.—See **CHARCOAL—By-Products.**

Fangé.—See **GAS PRODUCER.**

Iron and Steel Manufacture.—On the Use of Wood Gas in the Manufacture of Iron and Steel. Dr. James Douglas. An illustrated article on the gasification of wood for gas engine purposes. 1800 w. Can Min Rev—April 30, 1902.

Power Plant, Mexico.—Wood Gas for Power Purposes and Gas Generators. George M. Douglas. Read before the Inst. of Min. and Met. Describes the plant of the Montezuma Copper Co., at Nacozari, Mexico, and its operation. Ills. 3500 w. Inst of Min and Met—April 13, 1905.

Wood Gas for Power Purposes and Gas Generators. George M. Douglas. Read before the Inst. of Min. & Met. Describes the power plant for the concentrating works and mine of the Montezuma Copper Company, located at Nacozari, Sonora, Mexico, giving results of making of water gas with wood for fuel. 2800 w. Ills. Engng—Sept. 1, 1905.

Riché.—The Riché Wood Gas Process. Illustrated detailed description. 1800 w. Ir & Coal Trds Rev—Nov. 22, 1901.

A New Riché Combustion Gas Generator (Nouveau Gasogène à Combustion de la Compagnie du Gas Riché). G. Briand. An illustrated description of a gas generator using either wood or coal fuel, with table of tests. 800 w. Génie Civil—April 12, 1902.

Motive Power from Wood (Les Forces Motrices dans les Régions sans Eau et sans Charbon, et en Particulier aux Colonies). A. Lombard. An illustrated description of the Riché wood distillation process, and of the use of wood gas in engines, with views of several plants in French colonies and other parts of the world. 3000 w. Rev Technique—May 25, 1903.

See also **GAS PRODUCER.**

GAS WORKS.

See also **GAS ENGINEER; GAS ENGINEERING; GAS HOLDER; GAS INDUSTRY; GAS MANUFACTURE; GAS PURIFICATION; GAS RETORT; GAS, WATER.**

Administration.—See **GAS INDUSTRY—American.**

Air Vitiation.—Vitiation of Air in Gas Works. R. Gordon Mackay. On the harmlessness of the air in gas works, and precautions taken to rid the air of dust. 1500 w. Jour Gas Lgt—Jan. 1, 1901.

American.—A Study of Some American Gas Works. A. J. Walker. Comments on things seen and heard during a recent visit to the United States and Canada. Serial. 1st part. 1600 w. Jour Gas Lgt—May 3, 1904.

Ammonia.—Ammonia Concentration at Gas Works. John S. Unger. Read at meeting of the Wisconsin Gas Assn. Illustrates and explains a suitable apparatus for ammonia concentration, and its operation. 1600 w. Am Gas Lgt Jour—March 2, 1903.

See also **AMMONIA.**

Berlin.—See **GAS RETORT.**

Birmingham, Eng.—Extensions at the Nechells and Saltley Gas Works, Birmingham, Eng. Henry Hack. Illustrated notes describing the extensions made since 1898. 3500 w. Gas Wld—Oct. 26, 1901.

The Windsor Street (Birmingham) Gas Works and the New Coke Plant. On the methods introduced at this plant with an illustrated description of the new coke conveyor. 1400 w. Jour Gas Lgt—Sept. 9, 1902.

Blackpool, Eng.—New Gas Works at Blackpool. Brief illustrated description of works erected to meet the increased demand for gas. 1200 w. Jour Gas Lgt—Dec. 23, 1902.

Boston, Eng.—See **GAS INDUSTRY.**

Brentford, Southall, Eng.—See **GAS RETORT—Inclined.**

Brentwood.—The Brentwood Gas Works: As They Were and as They Are. Illustrated detailed description. 4500 w. Jour Gas Lgt—April 12, 1904.

Bristol.—See **GAS RETORT—Inclined.**

British.—Something About Gas Works in the United Kingdom. Frederic Egner. Information in regard to the gas undertakings of England, Scotland and Ireland abstracted from parliamentary papers. Serial. 1st part. 1500 w. Am Gas Lgt Jour—July 27, 1903.

Building Construction.—See **Steel Construction.**

Bury, Eng.—From Siding to Coke-Store at the Bury Gas Works. An inquiry into the cost of labor with machine-worked horizontal retorts. Ill. 2800 w. Jour Gas Lgt—June 30, 1903.

California.—See **GAS MANUFACTURE—Oil, California.**

Charlottenburg.—See **MECHANICAL HANDLING.**

Chester, Eng.—Modernizing the Carbonizing Plant at the Chester Gas Works. An illustrated description of interesting alterations. 2000 w. Jour Gas Lgt—July 30, 1901.

Recent Improvements at the Chester Gas Works. John C. Belton. Read before the Midland Assn. of Gas Mgrs. An account of the work of modernizing the retort house, and some of the difficulties encountered. Ill. 5200 w. Jour Gas Lgt—Oct. 14, 1902.

Coal and Coke Handling.—See **COAL HANDLING; COKE HANDLING; MECHANICAL HANDLING.**

Combined Coal and Water.—See **Water and Coal Gas; GAS MANUFACTURE—Jones Process.**

Crefeld, Germany.—A German Installation of West's Retort-Stoking Machinery. Illustrates and describes the reconstruction of the Crefeld gas works, and the successful working of this machinery, as given in an address by Herr Salzenberg. 4500 w. Jour Gas Lgt—July 28, 1903.

Croydon.—The Croydon Gas Works. Their Present and Past. Plan of extensions, with description and historical notes. 3800 w. Jour Gas Lgt—Sept. 1, 1903.

Depreciation.—Depreciation in Gas Plants. R. W. Prosser. A discussion of this subject, and explanation of methods of calculating the yearly sum charged to depreciation in gas works. 2200 w. Am Gas Lgt Jour—May 26, 1902.

Design.—Design of a Small Coal Gas Plant. Alfred G. Lloyd. Read at meeting of Wis. Gas Assn. Considers plants serving 10,000 people or less. 3500 w. Pro Age—April 1, 1904.

Edinburgh.—Edinburgh's New Gas Works. An illustrated description of the first section of these fine works, recently opened. 3800 w. Gas Wld—Feb. 28, 1903.

Electric Appliance.—Electrically Operated Appliances in Gas and Electric Works. George C. Holberton. Read before the Pacific Coast Gas Assn. Illustrated description of electrical appliances found useful in gas works, with remarks on their convenience, economy, etc. 2500 w. Am Gas Lgt Jour—Sept. 22, 1902.

See also **COAL HANDLING; COKE HANDLING.**

Electric Combined.—See also **GAS INDUSTRY.**

Electric Station Combined.—See **ELECTRIC STATION.**

Evesham, Eng.—Extensions at the Evesham Gas Works. R. J. Milbourne. An illustrated description of a purifying installation; the chief novelty consisting in the fact that there are no connections or external valves in the ordinary sense of the term. 1800 w. Jour Gas Lgt—Aug. 18, 1903.

Fans.—See **FAN—Gas Works.**

Fire Brick.—See **BRICK—Fire.**

Franklin, Ind.—See **ELECTRIC STATION.**

French. — See **Nanterre; COKE-HANDLING — Gas Works.**

Galveston Storm.—A Stormy Experience. John Gimper. Read before the Western Gas Assn. An account of the gas company's experience, having four gas holders destroyed, retort house, shop and warehouse, coal shed, governor house, fence wall and superintendent's dwelling. Discussion. 3000 w. Pro Age—June 15, 1901.

Germany.—The Construction and Operation of Small Gas Works in Germany. Dr. E. Schilling. From a lecture delivered before the Bavarian Union of Gas and Water Engrs., at Munich. Gives information regarding the cost of various kinds of plants, and the progress in the consumption of illuminating gas. 3800 w. Pro Age—Feb. 1, 1904.

Granton, Scotland.—The Granton Works of the Edinburgh and Leith Gas Commissioners. Walter Ralph Herring. An illustrated description with two plates, one showing the method of surveying the site and giving several sections, the other giving a plan of the works so far as they at present exist, with future sections outlined, and the drainage system. 3800 w. Jour Gas Lgt—Jan. 6, 1903.

The Granton Gas Works of the Edinburgh and Leith Gas Commissioners. Analysis of the manufacturing costs and charges for the year ending May 15, 1904. 1600 w. Jour Gas Lgt—May 31, 1904.

Great Yarmouth, Eng.—See **COAL HANDLING.**

Haarlem, Holland.—The New Gas Works at Haarlem. An illustrated description based on the presidential address of J. Blom, before the Dutch Assn. of Gas Mgrs., and on a recent inspection of the works. 1500 w. Jour Gas Lgt—July 21, 1903.

Hanover.—The Growth of a Continental Gas Works, Hanover. Illustrated historical sketch of this gas undertaking; also particulars about the new stoking machinery under trial. Ills. 6800 w. Jour Gas Lgt—June 28, 1904.

Hanover Gas Works. An illustrated description of some of the chief features. 2800 w. Gas Wld—June 25, 1904.

Hastings and St. Leonard's.—The New Works of the

Hastings and St. Leonard's Gas Company. An illustrated account of the progress at Glyne Gap. 4800 w. Jour Gas Lgt—May 31, 1904.

Heckmondwike, Eng.—Heckmondwike Inclined Retorts and Coal and Coke Plant. Describes a very complete installation and its accompaniments. 3300 w. Jour Gas Lgt—Dec. 10, 1901.

History.—See **GAS INDUSTRY.**

Hong Kong.—Hong Kong and Its Gas Works. A. J. Kennedy. An illustrated description of the works of the Hong Kong and China Gas Co. 2300 w. Gas Wld—May 24, 1902.

Ipswich, Eng.—See **GAS RETORT—Charging.**

Management.—The Operation of a Gas Works. W. A. Baehr. Gives an outline of processes employed to-day in gas plants. 3200 w. Wis Engr—Feb., 1903.

Notes on the Management of Gas Works. George Helps. Discusses principally accounts and how to keep them, in the present article. Serial. 1st part. 4400 w. Gas Wld—July 2, 1904.

See also **GAS INDUSTRY.**

Mariendorf, Germany.—The Gas Works at Mariendorf, near Berlin (Die Gasanstalt in Mariendorf bei Berlin). E. Körtling. General description of plant, including inclined retorts, coal and coke handling machinery, and gas holders. The capacity is 800,000 tons of coal per year. 4000 w. Zeitschr d Ver Deutscher Ing—July 25, 1903.

Metal Protection.—See **METAL PROTECTION—Gas Works.**

Mulhouse.—The New Gas Works at Mulhouse. Illustrated particulars of these new gas works in a town in Germany. 2300 w. Jour Gas Lgt—April 16, 1901.

Municipal Ownership.—See **GAS INDUSTRY; MUNICIPAL OWNERSHIP—Gas.**

Municipal Ownership.—See **MUNICIPAL OWNERSHIP—Gas.**

Nanterre, Paris.—A Derval Setting of Retorts at the Nanterre Gas Works. P. Parsy. Read before the Société Technique. An illustrated description of these inclined retorts and their working, explaining the simple remedy adopted to stop slipping in the retorts during carbonisation. 2000 w. Jour Gas Lgt—June 21, 1904.

The New Gas Works at Nanterre, near Paris. An illustrated detailed description. 5000 w. Jour Gas Lgt—July 12, 1904.

New Orleans.—See **GAS INDUSTRY.**

New York.—Concentrating Gas Manufacture in New York. Notes on the mammoth works scheme being planned for New York, based on information obtained from W. H. Bradley, while on a European tour to investigate the latest practice in Europe. 2000 w. Jour Gas Lgt—June 9, 1903.

Oldham.—New Gas-Producing Plant at Oldham. An illustrated general description of extensions comprising a retort house, coal store and plant regenerative settings, and compressed-air stoking machinery. 3200 w. Jour Gas Lgt—Oct. 28, 1902.

Paris.—See **COKE HANDLING—Gas Works.**

Reichenberg, Bohemia.—See **Water and Coal Gas.**

Retort Houses.—See **GAS RETORT.**

Roof.—See **ROOF—Gas Works.**

St. Leonard's, Eng.—See **Hastings.**

Santa Barbara, Cal.—See **ELECTRIC STATION.**

Settings.—I. Gaseous Firing at Waterford Gas Works. R. Bruce Anderson. II. The Progress of Regenerative Settings Since 1880. William Dunn. Two papers read before the Irish Assn. of Gas Mgrs. and discussed together. The first gives an illustrated description of the settings. The second paper deals with regenerative furnaces as applied to heating gas retorts, showing that there has been practically no improvement in construction or results for the past twenty-three years. Ill. 11,300 w. Gas Wld—Aug. 15, 1903.
See also **GAS RETORT.**

Shrewsbury, Eng.—The Old and the New at Shrewsbury. An illustrated article describing extensive alterations and enlargements. 6300 w. Jour Gas Lgt—July 7, 1903.

New Gas Works at Shrewsbury. Illustrates and describes features of interest. 2800 w. Gas Wld—Dec. 12, 1903.

Sligo, Ireland.—See **GAS MANUFACTURE—Diluting Gases.**

Slough, Eng.—See **GAS RETORT—Inclined.**

Small.—See **Design; Germany.**

Smethwick.—See **COKE HANDLING; GAS MANUFACTURE—Water Combined.**

Stafford.—Enlargements and Improvements at the Stafford Corporation Gas Works. An illustrated account of changes during the last few years. 3800 w. Jour Gas Lgt—Nov. 3, 1903.

Steel Construction.—Steel Building Construction in Gas Works. Samuel Cutler, Jr. Refers particularly to buildings for inclined retort benches and carburetted water gas plants, discussing the use of corrugated sheeting, and giving illustrated descriptions of various buildings. Also discussion. 7000 w. Gas Wld—Sept. 19, 1903.

Steel Building Construction in Gas Works. Samuel Cutler, Jr. Read before the Eastern Co.'s Gas Mgrs.' Assn. An illustrated article considering particularly buildings for inclined retort-benches and carburetted water-gas plants, giving brief descriptions of examples. General discussion. 8000 w. Jour Gas Lgt—Sept. 22, 1903.

Switzerland.—See **Winterthur; Zürich; GAS INDUSTRY.**

Tynemouth.—Constructional Details and Costs of Recent Extensions (1900-1902), with Notes on Working Results, at the Tynemouth Gas Works, North Shields. A. Clement Hovey. Read before the North of Eng. Gas Mgrs.' Assn. Ill. 12,500 w. Jour Gas Lgt—Oct. 6, 1903.

Tynemouth Gas Works, North Shields. A. Clement Hovey. Constructional details and costs of recent extensions (1900-1902), with notes on working results. 11200 w. Gas Engrs' Mag—Nov. 10, 1903.

Recent Extensions, etc., at the Tynemouth Gas Works, North Shields. A. Clement Hovey. Read before the N. of England Gas Mgrs.' Assn. A report of recent extensions and working results, with discussion. 7000 w. Gas Wld—May 7, 1904.

Vienna.—The Central Gas Works of Vienna. Th. Herrmann. Illustrated description of works of exceptional interest, planned on an extensive scale and finely equipped. Serial. 2 parts. 8000 w. Jour Gas Lgt—March 26 and April 2, 1901.

The Vienna Municipal Gas Works. An illustrated description prepared mainly from a brochure issued at the meeting of the gas and water engineers last June. Serial. 1st part. 3600 w. Jour Gas Lgt—Nov. 12, 1901.

Wakefield, Eng.—The Wakefield Gas Works. H. Townsend. Read before the Manchester Dist. Inst. of Gas Engrs. History of the gas works, with illustrated description of the inclined retorts. Also discussion. 11,200 w. Jour Gas Lgt—Dec. 3, 1901.

Walsall.—From Old Conditions to New at the Walsall Gas Works. An illustrated description of extensive improvements in these works, which have a maximum output of 2 1-4 million cubic feet of gas per day. Serial. 1st part. 4000 w. Jour Gas Lgt—May 29, 1902.

Water and Coal Gas.—The Extension of Coal Gas Works by Use of Water Gas Plants (Die Erweiterung von Kohlengaswerken durch Wassergasanlagen). Frans Walter. A description of the extent to which existing illuminating gas plants may be increased in capacity by the addition of water gas apparatus; with a description of the plant at Reichenberg, Bohemia. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 11, 1903.
See also **GAS MANUFACTURE—Jones Process.**

Water Gas.—See **GAS, WATER.**

Widnes.—Widnes Gas Works. Isaac Carr. A detailed description by the engineer. 1600 w. Gas Wld—July 25, 1903.

Widnes Gas and Water Works. Isaac Carr. Read at a Dist. meeting of the Assn. of Munic. & Co. Engrs. Describes these two undertakings and reports results obtained. 3800 w. Jour Gas Lgt—July 28, 1903.

Winterthur.—The Enlargement of the City Gas Works of Winterthur, Switzerland (Die Erweiterung des Städtischen Gaswerkes Winterthur). A general illustrated description. 3000 w. Schweiz Bauzeitung—June 13, 1903.

Zürich.—The New Gas Works at Schlieren, Zürich. A translation, with illustrations, of Herr Weiss's description of these works, which present many interesting constructional details. 2 plates. Serial. 1st part. 5700 w. Jour Gas Lgt—Jan. 1, 1901.

Results of a Year's Working of the New Gas Works at Zürich, Switzerland. Walter S. Allen. Gives results obtained in the first year's workings of the new plant, as taken from the annual report for the year 1900. 800 w. Am Gas Lgt Jour—Sept. 30, 1901.

See also COAL HANDLING.

GAS WORKS MANAGEMENT.

See GAS ENGINEER; GAS INDUSTRY; GAS MANUFACTURE; GAS WORKS.

GATE

See also DOOR.

Canal Lock.—See CANAL LOCK GATE.

Dry Dock.—See DRY DOCK.

Grade Crossing.—See GRADE CROSSING.

GATEHOUSE.

Jerome Park Reservoir.—See RESERVOIR—Jerome Park, Gatehouse.

GAUGE.

See also FIT; INTERCHANGEABILITY; MACHINE SHOP; MEASUREMENT; STEAM GAUGE; WATER GAUGE; WORKS MANAGEMENT.

The Advantage of Working to Patterns and Gauges. Walter J. May. Calls attention to the advantages derived from the use of carefully made patterns and gauges in all cases where repetition work is likely to occur, especially in the foundry and smithy. 2000 w. Prac Engr—May 30, 1902.

Gauges in Workshops. Herbert J. Marshall. Read at the Engng. Con. of the Inst. of Civ. Engrs. A discussion of gauges and standards as affecting shop and manufactory administration. 2000 w. Engng—June 19, 1903.

Construction.—Gauges. Joseph M. Stabel. Discusses the construction of gauges, showing several styles and their uses. Ill. 1200 w. Am Mach—Jan. 14, 1904.

Gasoline Tank.—See AUTOMOBILE, GASOLINE—Tank Gauge.

Gear Tooth.—A Worm and Spiral Gear Tooth Gauge. Ernest J. Lees. Illustrates and describes the use of this thread tool gauge. 600 w. Am Mach—June 18, 1903.

Grinding.—See Thread.

Incandescent Lamp Socket.—See INCANDESCENT LAMP SOCKET—Edison.

Interchangeability. — See INTERCHANGEABILITY.

Limit.—The Limit Gauge System of Shop Work. W. H. Booth. Read before the Glasgow Scientific Society. An illustrated article explaining the system and its application. Serial. 1st part. 2500 w. Prac Engr—Dec. 27, 1901.

Shop Methods of Measurement and the Manufacture of Interchangeable Parts (Das Messen in der Werkstatt und die Herstellung Austaschbarer Teile). G. Schlesinger. A discussion of the use of limit gauges in connection with automatic machines tools for the production of interchangeable machine parts. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—Sept. 19, Oct. 3, 1903.

Variation in Size of Work Due to Type of Gauge. George Schlesinger. A summary of experiments made in connection with a limit gauge system. Ills. 1000 w. Am Mach—Vol. 27, No. 48.

Dimension Limits and Limit Gauges, Their Practical Uses and Results. Arthur A. Fuller. Showing the intelligent use of the limit gauge to lie at the foundation of standardizing and interchangeable systems, giving practical examples. 3000 w. Engineering Magazine—July, 1904.

See also FITTING.

Micrometers, Bariquand and Marre.—Measuring Instruments of High Precision (Instruments de Mesure de Haute Précision). A. Galassini. Especially describing the micrometers of Bariquand & Marre, as adapted for precise measurements in the workshop. 7000 w. Revue de Mécanique—July 31, 1903.

Micrometer Caliper.—The Use of Micrometer Calipers for Regular Machine Shop Gauges. John T. Slocomb. An illustrated article explaining the uses made of the micrometer caliper in the machine shop. 1600 w. Am Mach—May 2, 1901.

Micrometer, Monrad.—Some Micrometer Measuring Instruments. A. L. Monrad. Illustrated description of the writer's own design. 1800 w. Mach, N Y—Sept., 1904.

Micrometer Gages. A. L. Monrad. Illustrates and describes convenient tools. 1000 w. Am Mach —Oct. 29, 1903.

Micrometer Screw.—Determining the Errors in Screws. Robert A. Bruce. A screw-measuring apparatus is illustrated and described, with the method of using. 1200 w. Am Mach—April 7, 1904.

Petavel-Kingsmill.—See Pressure.

Pipe Thread, Briggs.—Gauges for Briggs Standard Pipe Threads and for Standard Oil Well Casing. F. A. Stanley. An illustrated detailed description of the method followed in making a new set of Briggs reference gauges. 3000 w. Am Mach—Vol. 28, No. 18.

Pressure.—Pressure Indicator. Illustrates and describes the interesting features of an instrument invented by J. E. Petavel, with records showing how it works. 1300 w. Engr, Lond—Oct. 10, 1902.

The Estimation of High Pressures. Illustrated description of a new form of deadweight pressure gauge for the estimation of high pressures. 700 w. Engng—Jan. 9, 1903.

The Petavel-Kingsmill Recording Pressure Gauge. Illustrated description of an instrument for measuring the pressures produced by various explosives. 2700 w. Engng—March 13, 1903.

Screw Thread.—See Pipe Thread; Thread; SCREW THREAD.

Steam.—See STEAM GAUGE.

Test and Inspection.—A Set of Accurate Test and Inspection Gauges for Small Duplicate Work. Joseph V. Woodworth. Illustrates and describes a set of four tests and inspection gauges for verifying measurements of small, accurately machined steel parts. 1400 w. Mach, N Y—Oct., 1905.

Thread.—The Grinding of Thread Gauges. J. R. Gordon. Describes the different operations the writer has used in making these tools. 1200 w. Mach, N Y—Oct., 1904.

Valve.—Inspirator Valve Gauge. L. C. Hitchcock. Description and sketch of a gauge made in the shops of the Northern Pacific Ry. Co. 900 w. Loc Engng—July, 1904.

Vernier.—See VERNIER.

Water.—See WATER GAUGE.

Westinghouse Machine Co.—Some Gauging and Measuring Methods at the Works of the Westinghouse Machine Company. Illustrates instruments and describes the method of using them. 1800 w. Am Mach—Vol. 27, No. 31.

GAUGING GEAR.

See GAUGE; RIVER DISCHARGE; WATER FLOW.

GAUGING.

See GAUGE.

GEAR.

See also AUTOMOBILE GEAR; GEAR CUTTING; MOLDING MACHINE—Gear; POWER TRANSMISSION; VARIABLE SPEED.

Gearing. C. F. Blake. The present article deals with calculations connected with the design of gear wheels, velocity ratio, sizing the blanks, &c. Ill. Serial. 1st part. 1500 w. Mach, N Y—Feb., 1902.

Gear Designs and Manufacture. Remarks on gears as a device for the transmission of power, gears, and discussing involute teeth, spokes or giving a demonstration of Reuleaux's geometrical method for "laying off" the epicycloidal teeth of arms, hubs and the manufacture. Ills. Serial. 1st part. 3000 w. Can Engr—Aug., 1905.

Anglemeter.—A Spur-Gear Anglemeter. W. M. Wilson. An illustrated description of an instrument fore the "Oesterr. Vereinigung der Elektrizitätswerke," giving a general discussion of such producers, with illustrated description of a couple of types. 1600 w. Zeitschr f Elektrotech—Sept. 8, 1905.

Lignite Producer-Gas Plants. Dr. Alfred Gradenwitz. Illustrated description of a plant constructed by the Deutz Gas Motor Works, where the tars are decomposed in the producer. 1600 w. Sci Am Sup—Oct. 14, 1905.

Loomis.—The Loomis Gas Plant. Illustrated description of the water gas plant designed by the Loomis Pettibone Company of New York, which has been much improved over the first designs. 1800 w. Ir & Coal Trds Rev—March 21, 1902. See also **GAS POWER PLANT**—Cudahy, Wis.

Loomis, New Haven.—The Loomis Water-Gas and Producer-Gas Process. Illustrates and describes a plant recently installed at the works of the Winchester Repeating Arms Co., New Haven, Conn. 1700 w. Eng News—Sept. 12, 1901.

Marine.—See **Suction**; **GAS ENGINE.**

Maystre-Ledoyen.—An Interesting Producer-Gas Plant. Emile Guarini. Brief illustrated description of the Maystre-Ledoyen suction producer-gas plant in Paris. 600 w. Sci Am Sup—Jan. 28, 1905.

Morgan Continuous.—The Morgan Continuous Gas Producer. Gives tabulated results of tests made and information regarding the producer. Ill. 1500 w. Ir Age—Jan. 17, 1901.

Mond.—See **GAS FUEL.**

Moss Paper.—Gas Producers and Producer Gas. Dr. R. S. Moss. Describes the method of producing the gas, the composition of the coal used, &c., in the present number. Serial. 1st part. 1800 w. Min Wld—Nov. 11, 1905.

Oil.—See **Lazareff.**

Open-Hearth Furnaces.—The Action of Various Types of Gas Producers (Sur l'Action des Divers Types de Gazogènes). A. Lencauchez. With especial reference to the action of producer gas in open-hearth furnaces. 4000 w. Mem Soc Ing Civ de France—Sept., 1901.

Orleans Electric Railway.—See **ELECTRIC RAILWAY.**

Paris.—See **Maystre-Ledoyen.**

Peat.—See Lignite; **PEAT—Gas.**

Pierson.—Power Gas in France: The Pierson System. Reviews briefly the attempts made by French engineers to produce fuel gas from the poor native coal, and gives information concerning the successful process named. 2300 w. Jour Gas Lgt—April 16, 1901.

Pierson's "Suction" Gas-Producer. An illustrated detailed description of this producer and its action, with a statement of the claims made. 1500 w. Engng—Nov. 20, 1903.

Suction Gas Producer for Use with Explosive Motors Employing Low-Grade Gas Produced Direct from Coal. Illustrates and describes a gas generating installation of the Pierson system. 1500 w. Sci Am Sup—Sept. 3, 1904.

See also **GAS-POWER PLANT—Tunis.**

Pierson Tests.—See **GAS FUEL; GAS ENGINE—Crossley Tests.**

Pintsch.—Gas Power Station for an Electric Hoisting Machine (Gas-Kraft Primäranlage für eine elektrische Fördermaschine). Illustrating a combined generating set of 100 H. P. gas engine and dynamo in connection with a Pintsch gas producer for driving an electric mine hoist. 1200 w. Glückauf—Oct. 11, 1902.

The Pintsch Power Gas Plant. Illustrates and describes a gas plant supplying two 80-H. P. Otto cycle engines in which no gas-holder is employed. 1800 w. Ir & Coal Trds Rev—Oct. 17, 1902.

Improvements in Power-Gas Plants (Neuerungen an Kraftgas-Anlagen). H. Gerdes. A description of the water-gas plant of Pintsch, in which the carbonic oxide is drawn off separately for use in gas engines. The improved pressure regulator is described. Paper before the Verein Deutscher Maschinen Ing., with discussion. 2 plates. 6000 w. Glasers Ann—Jan. 15, 1902.

The Pintsch Suction Gas Producer. S. F. Seager. Abstract of a paper read before the Mich. Engng. Soc. Illustrated detailed description of the present Pintsch suction gas plant and its operation. 2000 w. Eng News—Feb. 16, 1905.

Pumping Plant.—See **PUMPING STATION.**.

Reactions.—The Gasification of Fuels in Producers, especially for the Production of Power Gas (Die Vergasung der Brennstoffe in Generatoren, insbesondere für Kraftgasbetriebe). Karl Kutzbach. A graphical analysis of the thermochemical reactions involved in the operation of gas producers. 4500 w. Zeitschr d Ver Deutscher Ing—Feb. 18, 1905.

Reversed-Combustion.—See **Down Draft.**

Riché.—The Riché Gas Producer in Connection with Mining Power Plants. Dr. Alfred Gradenwitz. An illustrated article giving information relating to this type of gas producer intended for generating gas from any description of wood waste as well as from similar ligneous matter, agricultural residues, &c. 1000 w. Min Rept—March 9, 1905.

The Riché Gas Producer. Dr. A. Gradenwitz. Illustrated description of two systems of gas-producing designed for burning waste wood, shavings and sawdust as well as anthracite coal or coke. 1200 w. Power—May, 1905.
See also **GAS, WOOD.**

Scheveningen.—See **Suction.**

Series.—Apparatus for Converting Fuel into Heating or Power Gas (Ein Verfahren zur Umsetzung der Brennstoffe in Heiz-oder Kraftgas). H. Jahns. Describing an arrangement of gas producers in series, with a corresponding increase in efficiency. 2000 w. Glückauf—Dec. 5, 1903.

A Process for the Conversion of Fuels into Heating and Power Gas (Ein Verfahren zur Umsetzung der Brennstoffe in Heiz- oder Kraftgas). H. Jahns. Describing a form of series gas producer at the Von der Heydt mines near Saarbruck. 2500 w. Zeitschr d Ver Deutscher Ing—Feb. 27, 1904.

Steam Admission.—See **GAS, WATER.**

Steubenville, O.—See **ELECTRIC RAILWAY.**

Suction.—Suction Gas Producer for Anthracite (Gazogène à l'Anthracite pas Aspiration). E. François. Illustrating a convenient form of gas producer with reversed draft, suitable for generating lean fuel gas for medium and small sized gas engines. 8000 w. 4 plates. Rev Univ des Mines—Nov., 1902.

Suction Producers for Gas Engines. Abstract translation of a paper by Herr J. Körting in the "Journal für Gasbeleuchtung." Gives an illustrated description of the Körting power-gas plant and discusses the suction generators for making producer gas without the aid of a boiler. 4000 w. Jour Gas Lgt—Nov. 25, 1902.

Gas Producers on Shipboard. Bernhard A. Sinn. Describes the suction gas producer, and gives an illustrated description of its installation on shipboard, with report of its operation. 2200 w. Marine Engng—Oct., 1904.

Suction Gas Producers. B. A. Sinn. An illustrated description of this type of apparatus which does away with the gasholder, explaining the principles involved and the operation and care necessary. 3400 w. Power—Dec., 1904.

A General Description of Suction-Gas Plants (Iets over Zuiggas-installatien in het Algemeen). H. A. Ravenek. With illustrations and description of suction gas apparatus, and an account of the installation at Scheveningen. 4500 w. De Ingenieur—Dec. 10, 1904.

Gas Producer Systems. Illustrated detailed descriptions of five or six suction gas producers. 7500 w. Engr, U S A—Jan. 1, 1905. (Special.)

Suction Gas Producers. The present article discusses the advantages claimed for the suction producer, the types now on the market, some applications, &c. Serial. 1st part. 2700 w. Engr, Lond—March 31, 1905.

Suction-Gas Plants. F. H. Bowman. Abstract of a paper read before the Leeds Loc. Sec. of the Inst. of Elec. Engrs. Discusses points to be considered in determining the nature of the plant to be used; the principal forms of producers, especially suction-gas producers. Discussion. 4500 w. Elect'n, Lond—April 7, 1905.

The Design and Operation of the Suction Gas Producer. Rodolphe Mathot. A practical discussion of the design and best proportions of suction gas producer plants, showing the high efficiency of the apparatus. 3000 w. Engineering Magazine—May, 1905.

Producer-Gas Power Plants. A. Frederick Collins. Illustrates and describes two forms of the suction type of apparatus, the Loomis-Pettibone system, and the Crossley system. 2000 w. Sci Am Sup—June 3, 1905.

Suction Gas Producer Plants. Dr. Oskar Nagel. Explains the working of suction gas producer plants and their advantages over the pressure gas producers. Ills. 2500 w. Cassier's Mag—Sept., 1905.

Recent Gas Producers (Neuere Kraftgaserzeuger). R. Schöttler. Illustrating and describing improved types of suction gas-producers for direct connection to gas engines. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—Nov. 11, 1905.

Suction-Gas Producers. Prof. A. Humboldt Sexton. Illustrates and describes four forms of suction gas producers, explaining the principles on which suction producers are based. 3800 w. Mech Engr—Dec. 9, 1905.

The Suction Type of Gas Producer. Abstract of a paper by C. H. Treglown, read before the S. Staffordshire and Warwickshire Inst. of Min. Engrs. Describes the Tangye suction gas plant, discussing factors affecting the working and the advantages. 3000 w. Col Guard—Dec. 15, 1905.

See also **Davey-Paxman; Maystre-Ledoyen; Pierson; Pintsch; Thompson-Burger.**

Suction Down Draft.—Gas Producer with Suction Down Draft (Gazogène à Combustion Renversée par Aspiration). J. Deschamps. An illustrated description of a gas generator of the Loomis type, using all kinds of fuels rich in volatile products. 1800 w. Génie Civil—April 25, 1902.

Suction Plant.—Experiments on a Suction Gas Plant (Untersuchungen an einer Sauggasanlage). Kurl Bräuer. Data and results of tests. The suction stroke of the gas engine produces the down draft in the producer. A fuel consumption of 0.32 kilogram of coal per 1 H. P. was attained. 4000 w. Zeitschr d Ver Deutscher Ing—Oct. 17, 1903.

Suction Trials.—Trials of Suction Gas-Producer Plants. Report on the trials under the auspices of the Highland and Agricultural Society of Scotland. 2500 w. Mech Engr—Nov. 11, 1905.

Tangye.—See **Suction.**

Taylor.—The Taylor Gas Producer. Illustrates and describes a producer that can be applied to any existing gas or oil engine. 800 w. Engng—June 5, 1903.
See also **GAS POWER PLANT.**

Test.—The Testing of Gas Producers. Samuel S. Wyer. Description of methods for conducting tests. Also Bibliography of Gas Producers. 5000 w. Am Inst of Min Engrs—Feb., 1905.
See also **GAS ENGINE—Charon.**

Thermal.—The Thermal Processes in Gas Producers (Die Thermischen Vorgänge in Gaserzeuger). Fritz Lürmann, Jr. An illustrated discussion of the reactions and processes in the manufacture of gas for power purposes. Serial. Two parts. 10,000 w. Stahl u Eisen—April 1 and 15, 1903.

Thompson-Burger.—The Thompson-Burger Gas Producer and Engine. Illustrated description of this automatic cut-off gas engine and the suction gas producer. 2000 w. Ir Age—Dec. 21, 1905.

Wendt.—A Study of the Gas Producer (Untersuchungen an Gaserzeugern). Karl Wendt. Data and results of a series for motive power, using a specially designed experimental producer. 5000 w. Zeitschr d Ver Deutscher Ing—Nov. 26, 1904.

Wood.—See **Riché; GAS, WOOD.**

GAS PURIFICATION.

See also **GAS MANUFACTURE; GAS WORKS.**

Further Notes on Purification of Gas. S. Carpenter. An article prepared for students and young gas managers. On the testing for ammonia and other impurities. Serial. 1st part. 1900 w. Jour Gas Lgt—April 23, 1901.

Purification, and Method of Working Purifiers. B. W. Smith. Read before the Inst. of Gas Engrs. The paper is addressed to managers of small works, and deals with points of importance in the work that have come within the writer's large experience. Discussion. 1200 w. Gas Wld—May 4, 1901.

Purification and Method of Working Purifiers. B. W. Smith. Discusses the merits of various methods. 4000 w. Gas Engs' Mag—June 10, 1901.

An Experiment on the Principles of Purification. E. C. Jones. Read before the Pacific Coast Assn. Also discussion. Describes experiments with two types of purifiers, giving results. Ill 4500 w. Am Gas Lgt Jour—Sept. 8, 1902.

Gas Purification and Gas Purifiers. Pierre Plantinga. Discusses the capacity, arrangement and construction of purifiers; purifying material, etc. Ill. 2000 w. Am Gas Lgt Jour—Jan. 19, 1903.

Notes on Gas Purification. Dr. H. Bunte. Abstract translation of a reprint in the "Jour. für Gasbeleuchtung" of a lecture delivered before the German Assn. of Gas & Water Engrs. Serial. 1st part. 1700 w. Jour Gas Lgt—Sept. 15, 1903.

Analysis.—See **GAS ANALYSIS — Sulphuretted Hydrogen.**

Blast-Furnace Gas.—See **BLAST-FURNACE GAS—Purification.**

Capacity Increase.—Quadrupling the Capacity of an Ordinary Purifier House at Very Small Cost. F. H. Shelton. Read before the Western Gas Assn. Suggests a simple and effective method of increasing the capacity at small expense. Ill. General discussion. 4000 w. Pro Age—Aug. 1, 1903.

Centrifugal Apparatus.—See **Suspended Particles; Theisen Process.**

Concrete-Reinforced Boxes.—See **CONCRETE REINFORCED—Gas Purifier Boxes.**

Construction.—Notes on Purifier Construction. G. P. Lewis. Read at London meeting of the Southern Dist. Assn. of Gas Engs. and Mgrs. Considers disadvantages of the water seal, proposed improvements in the "dry" system, cost, and the general problem of purification. Also discussion. Ill. 3500 w. Gas Wld—Nov. 17, 1900.

Construction of Purifiers. Ed. Jaeger. From "Journal für Gasbeleuchtung." Illustrates and describes a construction that has been found very satisfactory. 1000 w. Gas Wld—May 10, 1902.

Current Purifier Practice, and a New Form of Construction. F. H. Shelton. Paper before the Western Gas Assn. Briefly reviews purifier construction practice in the United States, and describes an easily made form that under some conditions will reduce the expense of construction about one-half. Ill. 6500 w. Am Gas Lgt Jour—June 9, 1902.

"Cyclone" Dust Separator.—See **Suspended Particles.**

Doesburgh vs. Milbourne.—The "Milbourne" and "Prins van Doesburgh" Systems of Purifiers. An illustrated description of the system devised by J. J. Prins van Doesburgh, with remarks of C. T. Salomons on its similarity with the Milbourne system. 1800 w. Jour Gas Lgt—Sept. 23, 1902.

Grid-Valves. R. J. Milbourne. Remarks on the similarity of the Milbourne gas-purifier valve and those invented by Prins van Doesburgh. Gives illustrations of the Milbourne grid-valve with explanation. 1600 w. Jour Gas Lgt—Oct. 21, 1902.

Evesham, Eng.—See **GAS WORKS.**

Grids.—A New Development in Purifier Grids. F. D. Marshall. Illustrates and describes the "Standard" grid, reviewing investigations that led to its development. 2000 w. Gas Wld—April 2, 1904.

Grid-Valves.—See **Doesburgh vs. Milbourne.**

Milbourne.—See **Doesburgh vs. Milbourne.**

Naphthaline.—See **GAS MANUFACTURE.**

Norfolk, Va.—See **Oxide.**

Oxide.—Purifying Materials and Spent Oxide. P. Parrish. Considers oxides of iron and spent oxide as purifying materials for coal gas. General discussion. 7000 w. Gas Wld—April 2, 1904.

Economy in Oxide Purification. H. L. Rice. Read before the Ohio Gas Lgt. Assn. Calls atteninfluence the efficiency, &c. Ils. 3500 w. Mech Engr—July 16, 1904.

An Example of Worm Gearing. Oscar E. Perrigo. Illustrated description of a mechanism that has met successfully very rigid requirements. 1400 w. Mach, N Y—June, 1905.

A Method of Making a Templet for Worm-Gear Tooth Patterns. John J. Smith. Illustrates and describes the method adopted in making a cast worm and gear. 3000 w. Am Mach—Vol. 28, No. 38.

An Oblique Worm-Drive Layout. William H. Raeburn. Diagrams and explanation of the methods employed in locating the various points and lines. 2000 w. Am Mach—Vol. 28, No. 35.

The Worm Gear. John Edgar. A discussion of this form of gearing, referring to Mr. Halsey's article in the "American Machinist." 1200 w. Mach, N Y—Oct., 1905.

On the Location of the Pitch Circle in Worm Gearing. Ralph E. Flanders. Points out the limitations to the recommendations made by Mr. Perrigo and Mr. Edgar. Ils. 2700 w. Mach, N Y—Nov., 1905.

Worm Globoid.—Globoid Worm Gear (Globoid-Schnecken). Prof. Georg Lindner. A well illustrated description of the globoid (or Hindley) worm gears, as modified by Lorenz, of Ettlingen, Baden, with account of tests. 2000 w. Zeitschr d Ver Deutscher Ing—May 3, 1902.

The "Globoid" Worm Drive. Robert Grimshaw. Illustrated description of a new drive which has won success in Germany, for which is claimed 90 per cent. of useful effect. 400 w. Mach, N Y—Dec., 1905.

GEAR BOX.

See **GEAR—Lathe; MILLING MACHINE.**

GEAR CUTTING.

See also **GEAR; MILLING MACHINE.**

Cut Gearing and Some American Machinery for Its Manufacture. Oscar J. Beale. A discussion of cut gearing and the causes of its noisiness, and illustrated descriptions of many gear-cutting machines. 3000 w. Cassier's Mag—Jan., 1903.

The Art of Generating Gear Teeth. Howard A. Coombs. A review of the class of machines which "generate" the tooth curves, in contradistinction to those machines in which formed cutters or templets are used, previously shaped to the contour of the teeth. Serial. 1st part. 2700 w. Am Mach—July 9, 1903.

Automatic Whel-Cutting Machine. Illustrated description of a machine capable of cutting spur, bevel, and worm gears. 1500 w. Engr, Lond—July 10, 1903.

A Large Spur Gear Cutter. Illustrates and describes a machine for placing the teeth in spur gears up to 20 feet in diameter and 54-inch width of face. 900 w. Ir Age—March 31, 1904.

Wheel Cutting Machines. Thomas R. Shaw. Illustrates and describes wheel-cutting machines of various types, explaining their working. Serial. 1st part. 3300 w. Mech Engr—Dec. 31, 1904.

Bevel.—Bevel-Gear Cutting Machines at Paris. Fred J. Miller. Illustrated detailed descriptions of various machines for this class of work, showing the practice in different countries. 8800 w. Trans Am Soc of Mech Engrs, No. 893—May, 1901.

Automatic Bevel Gear Generating Machine. Illustrated detailed description of a novel and interesting machine for generating theoretically correct bevel gears. 1900 w. Am Mach—Jan. 29, 1903.

See also **Bilgram; Nardin; Planer; GEAR.**

Bilgram.—The Bilgram Automatic Generating Gear Cutter for Spur and Spiral Gears. Illustrates and describes the machine and its action. 1300 w. Am Mach—Jan. 31, 1901.

The Bilgram Automatic Bevel-Gear Generating Machine. Illustrated description of the machine and its operation. 1400 w. Am Mach—Jan. 23, 1902.

The Bilgram Bevel-Gear Planer. Illustrations and descriptions of its construction and method of working. 3600 w. Engng—March 21, 1902.

Brown & Sharpe.—New Brown & Sharpe Automatic Gear Cutting Machine. Illustrated detailed description. 1500 w. Ir Age—June 29, 1905.

Flather.—The Flather Gear Cutter. Illustrates and describes a new line of gear cutters, designed for the rapid production of spur gears. 900 w. Ir Age—June 30, 1904.

Gauge.—See **GAUGE—Gear Tooth.**

Gleason Planer.—See **Planer.**

Huddersfield Works.—See **MACHINE WORKS.**

Nardin.—The Nardin Bevel Gear Cutter. Georges Levy, in the "Revue Industrielle." Illustrated description of a bevel gear generating machine and its operation. 1700 w. Am Mach—Vol. 28, No. 28.

Planer.—Spur Gear Planer. Illustrated description of a machine for planing large spur gears by the use of a single-pointed tool and templets. 500 w. Mach, N Y—Nov., 1902.

Cutting Racks—Approximate Sizing of Gear Blanks. Illustrates and describes the solution of the problem as worked out by the Cincinnati Planer Company. 1200 w. Am Mach—May 7, 1903.

The Gleason 15-inch Shearing Cut Bevel Gear Planer. Illustrations, with detailed description. 800 w. Ir Age—June 23, 1904.

Practical Hints.—Practical Hints on Gear Cutters. T. S. Bentley. Discusses points in the replacing of broken or worn gears from the standpoint of practice. Gives table for the selection of cutters for bevel gears. 1200 w. Am Mach—Vol. 28. No. 25.

Racks.—See **Planer.**

Spiral.—Cutting Spiral Gears. E. H. Fish. Gives an explanation of a method of figuring these gears, which involves a minimum amount of mathematics. 2500 w. Mach, N Y—Oct., 1905.

Swedish.—A Swedish Worm Spur and Spiral Gear Cutting Machine. An illustrated description of a machine for cutting spur and worm gear wheels, and its action. 600 w. Am Mach—Oct. 30, 1902.

Worm.—See **GEAR; LATHE—Attachments.**

GEAR MOLDING.

See **MOLDING MACHINE—Gear.**

GEM.

See **DIAMOND; PRECIOUS STONE.**

GENERATING SET.

See **ELECTRIC GENERATING SET; ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC PLANT; ELECTRIC STATION; STEAM ENGINE.**

GENERATOR.

See **ELECTRIC GENERATING SET; ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING.**

GEODESY.

See **SURVEYING—Geodesy.**

GEOLOGICAL SURVEYING.

See **GEOLOGY; MINE MAP; SURVEYING.**

GEOLOGY.

See also **COAL GEOLOGY; GOLD GEOLOGY; IRON GEOLOGY; MINERAL REGION; ORE; ORE DEPOSIT;** and under specific metals and minerals.

Arizona.—The Geology and Vein-Phenomena of Arizona. Dr. Theo B. Comstock. Describes the structural geology and mineral belts, the vein structure, and disturbances, reviewing the stratigraphy and its economic relations. 24000 w. Trans Am Inst of Min Engrs—Aug., 1900.

Notes on the Geology of Southeastern Arizona. E. T. Dumble. Description based on recent investigations. 8000 w. Trans Am Inst of Min Engrs—Feb., 1901.

Origin of Orbicular and Concretionary Structure. William P. Blake. Gives views of various writers in regard to the origin, and the results of a study of the white volcanic Tufta of Tucson, Ariz. Ils. 1500 w. Am Inst of Min Engrs—July, 1905.

The Limestone-Granite Contact-Deposits of Washington Camp, Arizona. W. O. Crosby. A discussion of the general geology, the ore deposits, the metamorphism of the limestone and chert, &c. 9000 w. Am Inst of Min Engrs—Nov., 1905.

See also COPPER; GOLD; GOLD GEOLOGY; MINERAL REGION; ORE DEPOSIT.

Azores.—Geological Features of the Azores. O. H. Howarth. Gives interesting illustrations of peculiar volcanic effects both past and present. 5500 w. Mines & Min—April, 1903.

Belgium.—See COAL GEOLOGY.

Bohemia.—See SILVER.

Boston Harbor.—See DAM—Charles River; EARTH MOVEMENT.

Brazilian Diamond Region.—See DIAMOND—Brazil.

Broken Hill, N. S. W.—See SILVER.

Butte, Mont.—See ORE DEPOSIT.

Caliche.—See ORE DEPOSIT—Arizona.

Charles River, Boston.—See DAM.

Cleavage.—Cleavage. George F. Becker. Abstract from "Experiments on Schistosity and Slaty Cleavage." Bulletin No. 241, U. S. Geol. Survey. Describes phenomena found in rocks, giving theories explaining the causes. 1400 w. Eng & Min Jour—Dec. 1, 1904.

Coal.—See COAL GEOLOGY.

Colorado.—The Soils of Colorado. Prof. Arthur Lakes. Considers their nature in relation to their geological origin and surroundings, and their availability for irrigation. 3200 w. Mines & Min—Dec., 1902.

See also Hot Springs; La Plata; GOLD; GOLD GEOLOGY; ORE DEPOSIT; VOLCANO.

Crow's Nest Pass.—See COAL REGION.

Earth Movements.—See EARTH MOVEMENT.

Faults.—The Great London Fault of the Mosquito Range and the London Mine. Arthur Lakes. An illustration of the evolution of a fault. 1600 w. Mines & Min—Dec., 1900.

Faults—Displacements. J. P. Wallace. Explains the occurrence of faults, and gives rules for recovering faulted veins. 1600 w. Min Rept—Aug. 22, 1901.

A Lesson on Faults. Prof. Arthur Lakes. An illustrated sketch of the Aspen mining region, Colorado, in which the effects of faulting in the past, and still going on, are shown. 3000 w. Mines & Min—March, 1902.

Faults in Metal Mines. Prof. Arthur Lakes. Illustrated description of the different types and their various manifestations, showing their effect upon ore deposition. 1700 w. Mines & Min—July, 1902.

Some Observations Concerning Faults. Arthur Lakes. An illustrated article explaining how faults are sometimes indicated on the surface, and other peculiarities. Serial. 1st part. 700 w. Min Rept—June 2, 1904.

Simultaneous Joints. George F. Becker. Discusses the systems of joints of simultaneous origin, found distributed over rock exposures, etc. 3300 w. Eng & Min Jour—June 22, 1905.

Faults with Special Reference to Coal and Metal Mining. A. Lakes. An illustrated article explaining where faults are most likely to occur, and the indications of their presence. Serial. 1st part. 1400 w. Min Rept—July 6, 1905.

Fault Phenomena. A. Lakes. Illustrated description of examples of Colorado faults both old and recent, with a few practical suggestions for miners. 800 w. Min Rept—Aug. 17, 1905.

An Interesting Fault-System. C. G. Gunther. Brief description, with vertical section, of an unusual system opened up in the New York mine, in Siskeyou county, Cal. 400 w. Eng & Min Jour—Dec. 2, 1905.

See also GOLD GEOLOGY; ORE DEPOSIT—Butte.

Geogenesis.—Geogenesis and Some of Its Bearings on Economic Geology. Persifor Frazer. Considers the nebular theory and the new hypothesis propounded recently by Prof. Chamberlin. 400 w. Trans Am Inst of Min Engrs—Feb., 1904.

Gold.—See GOLD GEOLOGY; ORE DEPOSIT.

Hot Springs.—See GROUND WATER.

Hot Springs, Colo.—Geology of the Hot Springs of Colorado and Speculations as to Their Origin and Heat. A. Lakes. Abstract of a paper read before the Colorado Sci. Soc. An interesting review of hot springs and their geological conditions, concluding that the heat is derived more from the great depth of fissures, or from latent heat, than from any direct volcanic source. 2000 w. Min Rept—May 11, 1905.

See also GROUND WATER—Colorado.

Hot Springs, Nevada.—See GOLD GEOLOGY—Wedekind, Nev.

Hydrocarbons.—See PETROLEUM—Geology.

Idaho.—See MINERAL REGION.

Igneous Rocks.—Crystalline Structure of Igneous Rocks. Thomas Andrews. Briefly considers the primary formation of igneous rocks, reproducing typical samples showing the crystalline structure, and describing the main groups. Ill. 900 w. Engng—Sept. 5, 1902.

Igneous Rocks: How to Identify Them. Charles J. O'Brien. Describes the more common igneous rocks, giving practical hints for identifying them without microscopical examination. 1800 w. Min & Sci Pr—July 25, 1903.

Joplin District.—Structural Features of the Joplin District. C. E. Siebenthal. Reviews the work that has been done in studying this district, and states the conclusions reached. Also discussion by H. Foster Bain. 4400 w. Ec Geol—Nov., 1905.

See also LEAD; ZINC.

La Plata, Colo.—The Plata Mountains. Prof. Arthur Lakes. Observations on the combination of igneous and sedimentary formation of this district in southwestern Colorado, and the influence of the different igneous rocks upon mineralization. Ill. 2300 w. Mines & Min—Dec., 1902.

Limburgite.—See LIMBURGITE.

Limonites.—See IRON ORE.

Metasomatic Processes.—Metasomatic Processes in Fissure-Veins. Waldemar Lindgren. The object of this review is to collect data relating to the alteration of rocks near or between fissures; to indicate the principal active processes; classify the veins, and give conclusions. Ill. 37500 w. Trans Am Inst of Min Engs—Feb., 1900.

Metasomatic Changes in Veins. Frank D. Adams. Also Charles R. Keyes. Discussions of the paper of W. Lindgren, read at the Washington meeting. 2000 w. Trans Am Inst of Min Engs—April, 1901.

Mexico.—Geology of the San Pedro District, San Luis Potosi, Mexico. George Irving Finlay. An account of the geological relations of the ore bodies, intended to supplement the paper of George F. Laird in which the conditions of the San Pedro mines were outlined and the development described. Ill. 3200 w. Sch of Mines Qr—Nov., 1903.

See also COPPER; GOLD; GOLD GEOLOGY; MINERAL REGION; SILVER.

Mine Map.—See MINE MAP.

Mining.—The Geologist in Matters of Practical Mining. J. E. Spurr. A discussion of the value of this science in mining, and its practical application. 1800 w. Eng & Min Jour—April 11, 1903.

See also COAL GEOLOGY; MINING.

Minnesota.—The Geology of Minnesota. Prof. C. W. Hall. Address before the International Min. Cong. A description of the various formations in the state, and an account of their products which are of economic value. 4500 w. Mines & Min—July, 1903.

Mud Volcanoes.—See VOLCANO.

Nevada.—See GOLD.

New Mexico.—See COAL GEOLOGY; MINERAL REGION; ORE DEPOSIT.

Ore Deposit.—See ORE DEPOSIT.

Ore Formation.—See ORE DEPOSIT—Formation.

Ore Shoots.—See ORE DEPOSIT—Shoots.

Panama.—Notes on the Geology of the Isthmus of Panama. Henry W. Edwards. Brief description of the region, of special interest at the present time in view of the canal project. 1200 w. Eng & Min Jour—June 21, 1902.

Petroleum Fields.—See PETROLEUM—Geological Prospecting.

Sea Coast.—The Sea and Mining. Prof. Arthur Lakes. Illustrations shown at the sea coast of manner of making and destruction of rocks by action of shell-fish and erosion. 2400 w. Mines & Min—Aug., 1903.

Geologizing by the Seaside. Prof. Arthur Lakes. Illustrations of geological phenomena related to mining, as shown in the sea cliffs and caves at La Jolla, near San Diego, Cal. 3300 w. Mines & Min—July, 1903.

Telluride Quadrangle.—Recent Geological Phenomena in the "Telluride Quadrangle" of the U. S. Geological Survey in Colorado. H. C. Lay. A record of observations, made during eighteen years of local phenomena. 3500 w. Trans Am Inst of Min Engrs—Nov., 1901.

Transvaal.—See GOLD GEOLOGY.

U. P. R. R.—A Sketch of the Geology and Economics Along the Union Pacific Railway from Cheyenne to Ogden. A. Lakes. A brief popular account of what may be seen generally from the car windows along this route. Ills. 1500 w. Min Rept—March 10, 1904.

Veins.—See ORE DEPOSIT.

West Virginia.—Geology of West Virginia. Dr. I. C. White. History and description of the different formations and the minerals found in them. 4000 w. Mines & Min—Nov., 1901.

Yukon.—See BORNITE; GOLD; MINERAL REGION.

GEOMETRY.

Projection.—See SURVEYING—Bicircular Quartics. See also MAGNETISM.

GERMANY.

See also COMMERCE; EDUCATION; INDUSTRIAL ENGINEERING.

Commerce and Industries of Germany in 1900. A full discussion of conditions in Germany, the imports and exports, the various industries, American competition, tariff revision, &c. 5700 w. U S Cons Repts, No. 1185—Nov. 9, 1901.

The Industrial Advance of Germany. Joseph Horner. An English view of the causes and effects, facts and features. 7000 w. Cassier's Mag—April, 1904.

GEYSER.

Artificial.—See GROUND WATER.

GIBRALTAR.

See also FORTRESS.

Ceuta and Gibraltar. Major-Gen. John F. Crease. Discusses the value of these strongholds, especially considering the impregnability of Gibraltar. Maps. 1400 w. Jour Soc of Arts—April 11, 1902.

GILBERT.

See also MAGNETISM.

Ter-Centenary Commemoration.—Gilbert of Colchester, Father of Electrical Science. A reprint of part of the Chapter on Electrics from "De Magnete," Lib. II., with notes by Silvanus P. Thomson. Also an account of the Gilbert ter-centenary commemoration. 9000 w. Elect'n, Lond—Dec. 11, 1903.

GIRDER.

See also BRIDGE; BRIDGE DESIGN; CONCRETE REINFORCED—Beam.

Arch.—See BRIDGE DESIGN.

Bellevue-Stratford Hotel.—Heavy Plate Girders in the Bellevue-Stratford Hotel Extension. Gives an illustrated description of unusual construction, made in order to secure an unobstructed 60x80 ft. floor area in a ball-room. 800 w. Eng Rec—July 15, 1905.

Bending Moment Curves.—See BRIDGE DESIGN.

Cantilever.—See UNDERPINNING — Cantilever Girder.

Clairton, Pa.—See BRIDGE APPROACH.

Colonial Building, Boston.—Girders in the Colonial Building, Boston. Illustrates and describes unusual steel work details in a large theater. 1300 w. Eng Rec—Oct. 12, 1901.

Continuous.—A Diagram for Finding Pier Moments on Continuous Spans. C. E. Young. Diagram with explanation, illustrated by examples. 900 w. Eng News—Nov. 14, 1901.

A Simple Method of Calculating Continuous and Constrained Beams. Edward Godfrey. Explains rule deduced from the three-moment formula and illustrates its application. 1100 w. Eng News—April 17, 1902.

Beams with Elastic Secured Ends (Der Träger mit Elastisch Gebundenen Enden). A. Franke. A study of the resistance of continuous girders with the ends secured, subject to elastic stresses. Two articles. 4500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 7, 14, 1903.

The Computation of Continuous Girders over Three Openings (Zur Berechnung von Kontinuierlichen Trägern über Drei Oeffnungen). Joh. Thieme. A mathematical treatment, deriving equations for the deflections according to the elastic theory. 1800 w. Deutsche Bauzeitung—Feb. 23, 1903.

The Continuous Girder Upon Elastic Supports (Der Durchgehende Träger auf Elastisch Senkbaren Stützen). L. Vianello. A graphical examination of a difficult problem in statics, with applications to practical examples. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 23, 30, 1904.

Principles of an Analytical Theory of the Action of External Forces on a Continuous Girder (Grundlage für eine Analytische Theorie der Aeusseren Kräfte der Kontinuierlichen Träger). Nikolaus v. Szüts. A mathematical investigation, taking into account the resistance of the piers to bending. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—July 15, 1904.

The Continuous Girder upon Elastic Yielding Piers (Der Durchgehende Träger auf Elastisch Senkbaren Stützen). L. Geusen. A graphical examination of the distribution of forces in a continuous girder when the supports are not rigid. 1800 w. Zeitschr d Ver Deutscher Ing—July 23, 1904.

A New Geometric Method of Computing the Forces Acting upon Continuous Girders (Nouvelle Determination Géométrique des Efforts dans les Poutres Droites à Travées Continues). Farid Boulad. Deriving equations and diagrams applic-Génie Civil—Oct. 8, 1904.

Cross.—The Support of the Ends of Cross Girders. Brief illustrated descriptions of methods of carrying the ends of cross girders upon the main or longitudinal girder, with critical remarks. 1900 w. Engr, Lond—Dec. 26, 1902.

Design.—See also Parallel; BRIDGE DESIGN—Girder.

Elastic Supports.—See Continuous.

Erection.—See BRIDGE ERECTION.

Flange Stresses.—The Graphical Calculation of Flange Stresses in Girders and Trusses. Oscar Sanne. Explains a method worked out by the writer. Diagrams. 800 w. Jour W. Soc of Engrs—Feb., 1904.

Formulae.—Formulae for the Weights and Economic Depths of Plate Girders. Alfred Fyson. Gives formulae designed to include every condition of span, depth, load and unit strain which can obtain in practice, and explains the method adopted in arriving at the separate expressions which give the weights. Serial. 1st part. 2800 w. Engng—March 14, 1902.

Foundation.—See FOUNDATION—Girder; UNDERPINNING.

Hartford, Conn.—See BRIDGE—Hartford Plate Girder.

I-Beam.—I-Beam Girders with Re-enforcing Plates. C. F. Blake. Chart and tables convenient in the calculation of the strength of I-beams re-enforced with cover plates upon the flanges, with explanation. 400 w. Am Mach—May 30, 1901.

Loft Building, N. Y.—See COLUMN.

Old.—Old Girders. A report of an engineer's experiences with these girders, showing them only fit for the scrap heap, and suggesting that a most careful examination be made of all such material that it is proposed to use again. Ill. 1600 w. Engr, Lond—Oct. 26, 1900.

Parallel.—Parallel Girders. F. H. Hummel. Read before the Civil and Mech. Engrs. Soc. Illustrates and describes parallel girders, giving their history and method of calculating weights in the present article. Serial. 1st part. 3000 w. Prac Engr—April 18, 1902.

Railway Bridge.—See BRIDGE—Girder.

Richmond, Ind.—See BRIDGE ERECTION.

Riveting.—See also RIVETING—Girders.

Rivet Spacing.—A Direct Method of Spacing Rivets and Finding the Position, etc., of Stiffeners in Plate Girders. E. Schmitt. Presents a graphical method of finding the rivet spacing, etc., of plate girders which greatly lessens the labor. 4500 w. Pro Am Soc of Civ Engs—Nov., 1900.

A Direct Method of Spacing Rivets and Finding the Position, Etc., of Stiffeners in Plate Girders. Continued discussion of paper by E. Schmitt. 4500 w. Pro Am Soc of Civ Engs—Feb., 1901.

A Direct Method of Spacing Rivets and Finding the Position, etc., of Stiffeners in Plate Girders. E. Schmitt. Discussion of this paper continued from February, 1901. 5000 w. Pro Am Soc of Civ Engs—April, 1901.

Stiffeners.—Variations in Standard Plans for Railroad Plate Girders. Frank W. Skinner. Gives a summary of the conditions relating to web stiffeners on different railroads. 2000 w. Eng Rec—Oct. 7, 1905.

Tonoloway Creek, Md.—See **BRIDGE ERECTION—Assisted Cantilever.**

Union Club House.—Heavy Girders in the Union Club House. Illustrated description of the construction, especially the heavy girders. 1300 w. Eng Rec—Nov. 16, 1901.

Unit Stresses.—On Permissible Unit Stresses in Railway Girders. James R. Bell. Read before the Civil & Mech. Engrs. Soc. An examination of certain unit stress sliding scales, commending one on the score of its facility of application. Serial. 1st part. 1600 w. Prac Engr—July 4, 1902.

Vierendeel System.—See **BRIDGE.**

Webs.—Plate-Girder Webs. T. Graham Gribble. Also editorial. Calls attention to the need for a revision of current theories as to the resistance of plate-girder webs. Examines the properties and the way in which the theory of construction deals with them. Ill. 6500 w. Engng—Feb. 21, 1902.

Plate Girder Webs. A discussion of the best method of finding the right thickness for the web of any given girder. 5000 w. Engr, Lond—Sept. 9, 1904.

Plate Girder Webs. States briefly the difficulties in forming a really satisfactory formula, and gives reasons for adopting the one selected. 5300 w. Engr, Lond—March 17, 1905.

GLACIER.

Protection Works.—The Protection Works Recently Executed at the Tête Rousse Glacier (Glacier de Tête Rousse—Travaux de Protection Récemment Exécutés). P. Mougin. Describing the manner in which a tunnel was bored beneath the glacier to carry off the undermining water. 2500 w. Génie Civil—Nov. 12, 1904.

GLASGOW.

Notes on Glasgow Industries. Authoritative notes on the principal industries carried on in Glasgow and its neighborhood. Ill. 10700 w. Ir & Coal Trds Rev—June 28, 1901.

The Rise and Progress of Glasgow Industries. A review of the more important industries of the city. 5000 w. Ir & Coal Trds Rev—Sept. 6, 1901.

GLASGOW EXHIBITION.

Glasgow International Exhibition. The present articles gives an illustrated description of the machinery section, being devoted almost exclusively to the housing provided, but briefly indicating the extent and character of the provision made for power and lighting purposes. Serial. 1st part. 4800 w. Engr, Lond—Feb. 22, 1901.

Scope and Significance of the Glasgow International Exhibition. Benj. Taylor. Summarises the purposes, outlines the buildings and arrangement, and gives a synopsis of the power plant and electrical equipment. Ill. 8200 w. The Engineering Magazine—May, 1901.

The Glasgow International Exhibition. General review of the site, buildings, etc., and illustrated account of the exhibits in minerals, iron, steel and engineering, in its various branches. 23600 w. Ir and Coal Trds Rev—June 28, 1901.

Engineering at the Glasgow Exhibition. John G. Kerr. A finely illustrated article describing salient points in the steam plant and machinery section, and showing improvements of great importance. 3300 w. Engineering Magazine—Sept., 1901.

The Glasgow International Exposition (L'Exposition Internationale de Glasgow). Léon Guillet. A very fully illustrated account of the Glasgow exhibition from a French point of view. 3000 w. Génie Civil—Sept. 21, 1901.

The Buildings of the Glasgow International Exhibition, 1901. James Miller. Brief illustrated descriptions of the principal buildings. 1100 w. Jour Roy Inst of Brit Archts—Sept. 28, 1901.

GLASS.

Brick.—See **BRICK—Glass.**

Building Material.—Glass Considered as a Material of Construction (Le Verre Considéré Comme Matériau de Construction). J. Malette. Discussing the applications of wire glass, glass tiles, prisms, and other constructive applications. Serial. Part I. 2000 w. Revue Technique—Dec. 25, 1904.

Wire Netting.—Wire Glass (Conférence sur le Verre Armé). L. Appert. A well illustrated account of the manufacture and applications of glass with an internal wire network, with abstracts of the principal patents. 10000 w. Bull Soc d'Encouragement—June, 1902.

Wire Glass (Le Verre Armé). Léon Appert. A complete description of the method of manufacturing plate glass with a wire netting imbedded in the mass. The product is valuable for strength, and resistance to fire. 10,000 w. 1 plate. Mem Soc Ing Civ de France—Oct., 1902.

GLASS BEARINGS.

See **BEARINGS—Glass.**

GLASS BLOWING.

Sievert Process.—See **GLASS MANUFACTURE—Blowing.**

GLASS BOTTLES.

See **BOTTLE MACHINERY; ELECTRIC EQUIPMENT; GLASS MANUFACTURE—Bottles.**

GLASS MANUFACTURE.

See also **BOTTLE MACHINERY; ELECTRIC DRIVING; ELECTRIC EQUIPMENT.**

Bottle.—The Mechanical Manufacture of Bottles (Fabrication Mécanique des Bouteilles). L. Appert. A review of the various mechanical processes which have been proposed for making glass bottles, concluding with the Boucher machine, now in most successful operation. 6000 w. Bull Soc d'Encour—Sept., 1903.

See also **BOTTLE MACHINERY; ELECTRIC EQUIPMENT—Bottle-Making Plant.**

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Mercur.—The Geology of Mercur. George H. Dern. The history of the region with description of the gold and silver ores and their peculiar formation, discussing how they were deposited. Ills. 3800 w. Mines & Min—June, 1904.

See also **GOLD MINE.**

Mexico.—Geology of Sonora, Mexico. F. J. H. Merrill. Information concerning the geological formations. 1200 w. Eng & Min Jour—Nov. 25, 1905.

See also **GOLD; MINERAL REGION.**

Nevada.—Observations on Tonopah and Goldfield. S. C. Wiel. An illustrated article describing the free gold deposits of Goldfield and the silver deposits of Tonopah, and the methods of mining. 1700 w. Min & Sci Pr—Oct. 8, 1904.

The Walker River District, Nevada. Dwight T. Smith. Describes the ore deposits which carry copper and gold, the geology, &c. 1800 w. Min & Sci Pr—March 25, 1905.

Genetic Relations of the Western Nevada Ores. J. E. Spurr. Discusses especially the ore-deposit at Tonopah, and Silver Peak, comparing them with other regions, and giving conclusions regarding their origin. 10600 w. Am Inst of Min Engrs—Sept., 1905.

Geology of Tonopah District, Nevada. Information from the latest report of J. E. Spurr, as given in Bulletin 260 of the U S Geological Survey. 3000 w. Min & Sci Pr—June 10, 1905.

Tonopah Mining District. J. E. Spurr. An illustrated article giving an interesting description of this gold and silver mining district, and the geology of the region. Maps. 5000 w. Jour Fr Inst—July, 1905.

The Geology of Tonopah. J. E. Spurr. Outline of Professional Paper No. 42, U. S. Geol. Surv. A report of the geology of this region. 1800 w. Eng & Min Jour—Nov. 18, 1905.

See also Wedekind; GOLD.

New Mexico.—Geology of the Apache Cañon Placers. In the southern part of the Sierra de los Caballos, New Mexico. 2000 w. Eng & Min Jour—Dec. 24, 1903.

New South Wales.—See SILVER—Broken Hill.

New Zealand.—See GOLD; MINERAL REGION.

North America.—The Geological Features of the Gold Production of North America. Discussion of the paper of Waldemar Lindgren at the New Haven meeting. 2000 w. Trans Am Inst of Min Engrs—Oct., 1902.

The Geological Features of the Gold Production of North America. Waldemar Lindgren. A collection of data regarding the product of each State, the derivation of the gold, showing the relative importance of different kinds of deposits, and the future outlook. 22800 w. Trans Am Inst of Min Engrs—Oct., 1902.

Nugget.—Crystalline Structure of Nuggets. A. Liveridge. Extracts from an address describing some recently obtained nuggets from Victoria and the Klondike and New Zealand. Ill. 1000 w. Aust Min Stand—Sept. 12, 1901.

Ontario.—Origin and Relations of the Auriferous Veins of Algoma (Western Ontario). W. O. Crosby. The writer's observations in the Michipicoten District are presented, with a general summary of Dr. A. P. Coleman's observations and conclusions, and a comparison of the theories of vein formation as applied to this field. Ill. 6800 w. Tech Qr—June, 1902.

See also GOLD.

Oregon.—Quartz Veins and Mines of Southern Oregon. Dennis H. Stovall. Considers the causes of the slow development in this region, describing the gold and silver deposits. 900 w. Min & Sci Pr—Dec. 12, 1903.

Placers.—What Constitutes a Placer. Arthur Lakes. Describes how placer deposits are formed, and the causes of barrenness of one gulch and the richness of another. 1500 w. Min Wld—Sept. 23, 1905.

The Origin and Classification of Placers. H. L. Smyth. Aims to show how the distribution and concentration of the valuable particles in placers are dependent on the conditions under which erosion, transportation and deposition takes place. Serial. 1st part. 2000 w. Eng & Min Jour—June 1, 1905.

See also New Mexico; GOLD; GOLD MINING.

Quartz Reefs.—The Downward Extension of Quartz Reefs. A. W. Howitt. Read before the Victoria Chamber of Mines. A statement of the writer's opinions based on extensive study, with arguments supporting them. Ill. 3300 w. Aust Min Stand—Oct. 25, 1900.

Quebec.—The Red-Rock of the Gilbert River Goldfields, Quebec. John A. Dresser. Read before the Canadian Min. Inst. A brief study of the gold-bearing rocks of this region. 1000 w. Eng & Min Jour—March 23, 1905.

The Bed-Rock of the Gilbert River Gold Fields, Quebec. John A. Dresser. Describes the character of the rock, discussing the conclusions indicated. 1000 w. Can Min Rev—April, 1905.

Secondary Enrichment.—Secondary Enrichment. Sydney Fry. An account of researches at the Britannia gold mine in New Zealand. 1600 w. Aust Min Stand—Dec. 20, 1905.

See also ORE DEPOSIT.

Solubility.—See GOLD; ORE DEPOSIT.

South Africa.—Notes on the Occurrence of Gold in Primary Formations. E. F. Heneage and W. G. Holford. An account of experience during prospecting work in mineralised zones of the older sedimentary formations of South Africa. 3500 w. Jour S Af Assn of Engrs—Nov., 1904.

See also Transvaal; GOLD; MINERAL REGION.

Tarkwa Banket, W. Africa.—The Genesis of the Tarkwa Banket. Edward R. Schoch. An account of the theories advanced to explain these ore deposits in West Africa, with description of the gold occurrence. Also a short description of the Rhodesian conglomerate, and editorial. 3500 w. Eng & Min Jour—June 29, 1905.

Telluride.—See GEOLOGY; GOLD.

Tonopah, Nev.—See Nevada.

Transvaal.—The Geology of the Transvaal, Particularly of the Ore Beds (Die Geologie der Südafrikanischen Republik Transvaal unter Besonderer Berücksichtigung der Lagerstätten). Karl A. Redlich. Review of an article by Molengraf in "Bulletin de la Société Géol. de France," on the gold reefs and other geological features. 1400 w. Oesterr Zeitschr f Berg u Hüttenwesen. July 12, 1902.

The Witwatersrand Ore Deposits. G. A. Denny. Abstract of discussion of a paper by J. S. Curtis, read before the So. African Assn. of Engrs. 3000 w. Eng & Min Jour—Oct. 31, 1903.

The Witwatersrand Gold Deposits and Their Associated Rocks. Frederick H. Hatch. Discussion of papers by J. S. Curtis and G. A. Denny. Read before the So. African Assn. of Engrs. 2000 w. Eng & Min Jour—Nov. 7, 1903.

Petrography of Witwatersrand Conglomerates with Special Reference to the Origin of the Gold. Drs. Hatch and Corstorphine. Describes the microscopic characters of sections of banket, and examines the theories presented to explain the presence of gold, favoring the theory of subsequent infiltration. 3000 w. Min Jour—Jan. 7, 1905.

See also South Africa; GEOLOGY; GOLD; ORE DEPOSIT.

Victoria, Australia.—The Pyrenees Goldfield (V.). W. Bradford. Describes the topography and deposits. 1500 w. Aust Min Stand—Oct. 22, 1903.

Marine Tertiary Rocks of Victoria. E. J. Alexander. A lecture on the relationship of the auriferous gravels and drifts of Victoria to the marine tertiary rocks. 3000 w. Aust Min Stand—Feb. 2, 1905.

Characteristics of Gold-Quartz Veins in Victoria. Waldemar Lindgren. Describes these veins and discusses the theories advanced to explain their formation. 2500 w. Eng & Min Jour—March 9, 1905.

Occurrence of Albite in the Bendigo Veins. Waldemar Lindgren. Information concerning the discovery of albite with quartz from the gold-bearing veins of Bendigo, tending to confirm the relationship of these deposits to the gold-quartz deposits of California. 200 w. Ec Geol. Nov., 1905.

Deep Placer Deposits of Victoria. H. L. Wilkinson. Discusses the principles which have affected the value of the regularly defined "deep leads." Maps. 2500 w. Eng & Min Jour—Dec. 30, 1905.

See also Quartz Reefs; GOLD.

Wedekind, Nevada.—Hydro-Thermal Activity in the Veins at Wedekind, Nevada. Henry C. Morris. Gives a general description of the mines and the encounter with warm water heavily charged with sulphuretted hydrogen, discussing the ore occurrence. Ill. 2700 w. Eng & Min Jour—Aug. 22, 1903.

GOLD METALLURGY.

See also CYANIDE PROCESS; ELECTRO-METALLURGY; GOLD; GOLD MILLING; METALLURGY; ORE TREATMENT; SMELTING; STAMP MILL.

Amalgamation.—A Study of Amalgamation Methods, Especially the Patio Process, with the Object of Avoiding the Loss of Mercury. Miguel Bustamente, Jr. Describes the character of the ore to be treated and gives an account of the experimental investigations. 5400 w. Trans Am Inst of Min Engrs—Nov., 1901.

The Practice of Amalgamation. W. H. Kritzer.

Notes on the manipulation of mercury and care of plates. 2200 w. Pacific C Min—Oct. 10, 1903.

Raw Copper Plates. On the selection and care of these plates when used for amalgamation of gold ores; the preparation and treatment necessary to secure good results. 2500 w. Min & Sci Pr—Sept. 19, 1903.

Pan Amalgamation at the "Minas del Tajo," Rosario, Mexico. A. E. Drucker. Gives results of extensive experimenting with pan-amalgamation, and valuable points in regard to the preventing and saving of "floured" quicksilver. 4000 w. Cal Jour of Tech—May, 1904.

Pan Amalgamation at the "Minas del Tajo," Rosario, Mexico. A. E. Drucker. Description of ore treatment at these silver and gold mines, particularly with reference to the saving of mercury, with figures of forms of shoes for the settlers. 3000 w. Cal Jour of Tech—May, 1904.

Amalgamating Gold Ores. Algernon Del Mar. Gives the writer's ideas, based upon Western experience. 2000 w. Min & Sci Pr—June 10, 1905.

Amalgamating Tables. Algernon Del Mar. Gives sketches of three styles of tables, discussing the important essentials. 900 w. Min & Sci Pr—Aug. 5, 1905.

A New Device for Amalgamating Gold in Sands and Pulps. Illustrates and describes a device invented by Patrick McEntee for treating gold-bearing sands, stamp mill pulp, and other material. 1200 w. Min Rept—Aug. 24, 1905.

See also CYANIDE PROCESS; GOLD MILLING.

Arsenical Ores.—See SMELTING.

Bag House.—Results of Bag-House Experiment in Connection with Tavener's Process. H. Rusdett. Gives drawing showing the manner in which the bag-house was constructed, and experiments proving that practically no gold is carried over from the test furnace, and very little from the pan furnace, if the charging is carefully done. 1200 w. Jour Chem, Met & Min Soc of S Africa —May, 1905.

Bag-Houses for Saving Fume. Reviews briefly the practice of filtration through cloth, and the applications, giving a description of a standard bag-house, and its operation. Ills. 1200 w. Eng & Min Jour—July 15, 1905.

Black Hills, South Dakota.—The Metallurgical Practice in the Black Hills, South Dakota. Charles H. Fulton. Describes the development of the processes now used. 6800 w. Mines & Min—April, 1905.

See also CYANIDE PROCESS; GOLD—South Dakota; GOLD MILLING; SMELTING—Pyritic.

Black Process.—See **Permanganate.**

Black Sand.—Saving Gold from Black Sand. Explains the difficulty met in solving this problem, and considers the cyanide process the solution, precipitating the gold by the use of a current of electricity. 1200 w. Min & Sci Pr—June 28, 1902.

Second Preliminary Report on Investigation of Black Sand. Information from the report of Dr. David T. Day concerning the experiments in concentration by mechanical tables of gold from the sands of the Pacific Coast and the Columbia River, which have been conducted at the Lewis & Clark Centennial Exposition, with a view of ascertaining the most economical method of separation. 1500 w. Min Rept—Dec. 7, 1905.

British Columbia.—British Columbia Smelters. E. Jacobs. Shows the gradual increase in the treatment capacity, and reports the smelter betterments. 1500 w. Eng & Min Jour—July 5, 1902. See also GOLD; ORE TREATMENT.

Broken Hill, Australia.—See SILVER; SMELTING—Chloro-Electrolytic.

Bromo-Cyanogen.—See CYANIDE PROCESS.

Canada.—See **Mispickel Ores.**

Canvas Tables.—Canvas Tables. H. P. Stow. From the Trans. Cal. Min. Assn. Describes a canvas table of unusual design and explains its advantages. Serial. 1st part. 1800 w. Min & Sci Pr—March 26, 1904.

See also ORE TREATMENT.

Cassilis Ore, Treatment.—Treatment of Cassilis Ore. William Aplin. Prize paper. Describes the treatment of these very refractory gold ores. 2800 w. Aust Min Stand—Nov. 5 & 12, 1903. 2 parts.

Cement Gravels.—Successful Working of Cement Gravels. G. E. Bailey. Concerning the difficulty in extracting the gold from the "blue gravels," and the success recently attained. Ill. 1300 w. Min & Sci Pr—Oct. 27, 1900.

Centrifugal Sluicing.—See HYDRAULIC MINING.

Chlorination.—The Chlorination of Gold Ores at Mount Morgan, Queensland. Ernest Willoughby Nardin. Abstract of a paper read before the Inst of Civ Engs. in London. Describes the Hall-Richard process, which consists in subjecting the ore to the action of a solution of chlorine gas in water. 2200 w. Eng & Min Jour—Jan. 19, 1901.

Chlorination Mills at Cripple Creek, Colorado. Arthur Lakes. Illustrated description of the methods used in handling the ore and the application of the process. 2800 w. Mines & Min—March, 1901.

Volatilization of Metals as Chlorides. Stuart Croasdale. Relates to the volatilization of metals as chlorides from their ores during a chloridizing roast. 4500 w. Eng & Min Jour—Aug. 29, 1903.

The Chlorination Practice in the Cripple Creek District. G. E. Wolcott. Description of the operations carried on at the Economic Mill, Victor, Colo. 1000 w. Min Rept—Aug. 11, 1904.

The Portland Mill. F. A. Thomson and S. L. Goodale. An illustrated description of the chlorination plant of the Portland Gold Mining Co, at Colorado Springs, Colo. 4600 w. Mines & Min—Oct., 1904.

Chlorination in Colorado. William E. Greenawalt. Describes the methods employed, the machinery used and the results. Ills. 3000 w. Eng & Min Jour—Oct. 27, 1904.

See also ORE TREATMENT.

Chlorination and Bromination.—The Effect of Silver on the Chlorination and Bromination of Gold. H. O. Hofman and M. G. Magnuson. An account of a research to find the dissolving power of chlorine water and of bromine water upon gold and upon a series of alloys of gold and silver, the operations being carried out in revolving vessels. 3300 w. Am Inst of Min Engrs—March, 1905.

Chlorobromuration.—Extraction of Gold by Chlorobromuration (C. Grollet's Process). The process consists in the simultaneous employment of chlorine and bromine, with the aid of pressure in certain conditions. Serial. 1st part. 2300 w. Min & Sci Pr—July 19, 1902.

Concentration.—See also **Transvaal**; ORE TREATMENT.

Concentration, Iron Bottoms.—The Concentration of Gold and Silver in Iron Bottoms. Myrick N. Bolles. Discussing the use of iron as an absorbent in separating the precious metals from mattes low in copper. Ills. 11300 w. Trans Am Inst of Min Engrs—Feb., 1904.

Concentration Tests.—Concentrating Tests and Calculations. Otto F. Pfordte. The necessity of a finer system of testing is presented, and suggestions of tests to be applied are given. 2000 w. Trans Inst of Min Engs—Feb., 1901.

Copper Separation.—Separation of Gold from Copper. F. R. Carpenter. An account of investigations made to devise some dry method whereby the matte might be refined at the plant where it is made. 1800 w. Aust Min Stand—May 12, 1904.

The Separation of Gold from Copper, with Especial Reference to Pyritic Smelting. F. R. Carpenter. Read at the meeting of the Colorado Sci. Soc. An account of experiments, describing processes. 1600 w. Min Rept—May 7, 1903.

Cripple Creek.—The Metallurgy of Cripple Creek, Colorado, Ores. Godfrey D. Doveton. Gives short accounts of the treatment of the various classes of ore. 5400 w. Min Jour—Dec. 23, 1905.

See also **Chlorination**; **Washing**; ORE TREATMENT—Concentration.

Crushing.—See **Transvaal**; CRUSHING; CYANIDE PROCESS—Crushing; GOLD MILLING; STAMP MILL.

Cupellation.—Cupellation and Parting. Herbert R. Edmonds. Considers the shape of cupels and the material, referring to paper by Dr. Kirke Rose. 1000 w. Eng & Min Jour—Aug. 12, 1905.

Cupriferous Ores.—See CYANIDE PROCESS.

Cyanide Process.—See CYANIDE PROCESS.

Desilverizing Bullion.—Description of an Improved Apparatus or Method of Desilverising Base Bullion. Stephen Tredinnick. Illustrates and describes the writer's series apparatus and its working, comparing with other processes. 3000 w. W Min Wld—Feb. 9, 1901.

Diehl Process.—See also Kalgoorlie; Sulpho-Telluride Ores.

Distillation.—The Distillation of Gold (Sur la Distillation de l'Or). Henri Moissan. A description of the successful experiments of the author in the volatilization and distillation of gold and gold alloys in the electric furnace. 2500 w. Comptes Rendus—Dec. 11, 1905.

Dynamite By-Products.—See DYNAMITE—By-Products; EXPLOSIVE.

Ecuador.—Gold Mining and Milling in Ecuador. J. W. Mercer. Gives experience in the treatment of peculiar ores, describing mines, methods, &c. 3000 w. Eng & Min Jour—Aug. 15, 1903.

Edison Dry Process.—The Edison Dry Process for the Separation of Gold from Gravel. A description of a pneumatic and gravity process, authorized by Mr. Edison. Ill. 1200 w. Eng & Min Jour —May 9, 1903.

Electric.—Electrolytic Processes for Gold Extraction. Alfred T. Weightman. Some of the methods which have been proposed are discussed and the difficulties met in their operation. 2200 w. Mines & Min—March, 1901.

Electrolytic Gold Extraction. An illustrated description of the Reicken process, describing the apparatus. Serial. 1st part. 2500 w. Aust Min Stand—July 18, 1901.

Treatment of Auriferous Ores. C. A. Mulholland. Read at meeting Sydney Tech. Col. Min. & Met. Soc. Discusses apparatus where the electro-solution and electro-deposition of the gold are effected in one operation. Serial. 1st part. 2800 w. Aust Min Stand—April 10, 1902.

Electrolytic Refining of Gold. D. K. Tuttle. An illustrated description of the electrolytic gold refining process used in the United States Mint, in Philadelphia. Electro-Chem Ind—Jan., 1903.

The Electrolytic Refining of Silver and Gold. Titus Ulke. An illustrated description of different methods and some of the advantages of each. 4800 w. Mines & Min—March, 1903.

Electrolytic Refining of Gold. Emil Wohlwill. Notes on the writer's electrolytic method of refining gold, the advantages of the process, &c. Serial. 1st part. 2200 w. Elec-Chem Ind—June, 1904.

The Electrolytic Process of Refining Gold Alloys. Emil Wohlwill. States the conditions where the electrolytic process may be applied to part gold alloys, describing treatment, methods, &c., and the applications. 4000 w. Elec-Chem Ind—July, 1904.

An Electrochemical Process for the Treatment of Silver Sulphides and Gold Ores. M. Vaygouny. An account of experimental investigations made upon ores which carry their values chiefly as silver sulphides with certain amounts of gold. 3300 w. Elec Rev, N Y—Nov. 5, 1904.

See also Slimes; CYANIDE PROCESS; ELECTRO-METALLURGY—Gold and Silver.

Electric, South Africa.—Electrometallurgy of Gold in South Africa—1897 to 1899. Abstracts of papers bearing on this subject, aiming to give a review of the practice in South Africa. Also editorial. 18,300 w. Elec-Chem Ind—Feb., 1904.

Electrolytic vs. Sulphuric Parting.—Electrolytic Versus Sulphuric Parting of Bullion. F. D. Easterbrooks. Abstract of a paper before the Am. Elec.-Chem. Soc., pointing out some of the principal characteristics of the several parting methods. 1600 w. Eng & Min Jour—Dec. 16, 1905.

El Oro, Mexico.—Re-grinding at El Oro. Charles Butters and E. M. Hamilton. Abstract of a paper read before the Inst. of Min. & Met., London. An account of the latest practice and the results. Also notes from the discussion of the paper. 2500 w. Eng & Min Jour—Dec. 15, 1904.

Filter Press.—N. S. W. Filter-Press Practice. John W. Rock. Deals with the process of extraction of gold from auriferous slimes by means of filter presses. 1600 w. Aust Min Stand—Dec. 12, 1902.

Filter-Pressing in Western Australia. W. A. Prichard. Illustrates and describes the filter-press treatment of slimes at Kalgoorlie. 2000 w. Eng & Min Jour—April 14, 1904.

See also CYANIDE PROCESS; FILTER PRESS.

Fine Gold.—Method of Saving Fine Gold of Snake River, Idaho. William H. Washburn. Gives a brief description of some of the methods which have led to the processes now most successfully used. 2500 w. Min & Sci Pr—Aug. 3, 1901.

See also GOLD DREDGING.

Fine Grinding.—The Influence of Fine Grinding on the Metallurgy of the Precious Metals. A. W. Warwick. Read before the West. Assn. of Tech. Chem & Met. Discusses recent changes in methods of treating gold ores, the treatment of slimes, and describes machines for fine grinding. Ills. Serial. 1st part. 1200 w. Min Rept—March 2, 1905.

Fine Grinding in Metallurgy. E. E. Wann. Aims to open a discussion of the method of extraction by amalgamation and cyanide leaching of gold ores, with a view to improving the treatment of slimes, and constructing a regrinding device superior to those in use. 2000 w. Min & Sci Pr—Dec. 16, 1905.

Freid Dry Process.—The Freid Gravity Dry-Process Separator. Douglass McLean. Illustrated description of a process for separating gold ore by an air current and gravity. 800 w. Eng & Min Jour—Dec. 24, 1903.

Galice, Oregon.—Undercurrents for Saving Flour Gold and Platinum Sands. Dennis H. Stovall. Describes the system in use at the Royal Group hydraulic mines of Galice District, Oregon. Ill. 800 w. Min & Sci Pr—Oct. 24, 1903.

Grading Analysis.—See GOLD ASSAYING.

Gravity Separation.—See Edison; Freid.

Greenawalt—Chlorination.—The Greenawalt Electro-Chlorination Process. John E. Greenawalt. An illustrated detailed description. 1400 w. Min Rept—Oct. 8, 1903.

Grollet Process.—See Chlorobromuration.

Hodson, Cal.—New Plant of the Royal Consolidated Mines Co., Ltd., Hodson, Cal. Horace F. Brown. Illustrates and describes recent improvements consisting of a modern 120-stamp, wet-crushing gold mill, a new crushing and hoisting plant at the mines, and an electric tramway from mine to mill. 1500 w. Min & Sci Pr—May 23, 1903.

Honneus Process.—De-Sulphurising Auriferous Ore. Reports a trial of the Honneus process, made at the Great Boulder mine during the month of April. 800 w. Aust Min Stand—June 26, 1902.

Indo-China.—See also GOLD.

Kalgoorlie, Australia.—Roasting and Filter-Press Treatment at Kalgoorlie. J. T. Marriner. Describes the treatment of these sulpho-telluride ores, and also the filter-press used, giving costs. 2700 w. Eng & Min Jour—Sept. 5, 1903.

Ore Treatment at the Ivanhoe Mine, Kalgoorlie. H. J. Brooke. The plant embraces all the successful methods at present in vogue at Kalgoorlie. Descriptive. 1300 w. Eng & Min Jour—Oct. 20, 1904.

I. Grinding Machines Used at Kalgoorlie. II. Dry-Crushing and Roasting at Kalgoorlie. Two articles abstracted from a paper by W. Evav Simpson, describing the treatment of telluride ores. Two parts. 4000 w. Eng & Min Jour—Nov. 14 & 21, 1903.

Reduction Plant and Process at the Oroya-Brownhill Mines. Robert Allen. Abstract from "Jour. Cham. Mines," Kalgoorlie, W. A. Describes the wet crushing process used and the treatment. Serial. 1st part. 2200 w. Min & Sci Pr—Nov. 25, 1905.

Description of the Ore Reduction Plant and Process of Reduction on the Oroya-Brownhill Gold Mines. Robert Allen. Describes the character of the ores and gives a sketch plan of the plant. The Diehl process is used. 4000 w. Min Jour—Oct. 28, 1905.

Grit Mills and Pans. Gives results of a series of trials between the grit mill and grinding pans at the Ivanhoe Gold Corporation, Kalgoorlie (W. A.). 2400 w. Aust Min Stand—Oct. 18, 1905.

Metallurgical Methods at Kalgoorlie, Western Australia. E. Barton Hack. Reviews some of the different methods of extracting gold from the refractory ores. 2200 w. Eng & Min Jour—Jan. 24, 1903.

The South Kalgoorlie Company's Ore Treatment Plant. Arthur C. Claudet. Describes this new plant which treats 230 short tons per day by dry crushing, roasting, grinding and amalgamating, agitating with cyanide and filter pressing. 1300 w. Min Jour—Dec. 23, 1905.

See also **Sulpho-Telluride Ores; Western Australia; FURNACE—Merton; GOLD; GOLD MILLING.**

Leaching.—Modern Leaching Processes. J. Ohly. Describes various leaching processes due to the variety of ores to be treated. 2300 w. Min & Sci Pr—April 6, 1901.

See also **ORE TREATMENT.**

Lead Smelting.—The Lead Smelting of Zinc Gold Slimes. P. S. Tavener. A full description of the writer's method of smelting zinc gold mines with litharge, which appears to present advantages in economy and speed. Also describes the furnaces used. Ill. 11,000 w. Jour Chem & Met Soc of S Africa—Oct., 1902. Discussion in Nov., 1902.

The Lead Smelting of Zinc Gold Slimes. Continued discussion of paper by P. S. Tavener. 2000 w. Jour Chem & Met Soc of S Africa—Dec., 1902.

Mercur, Utah.—The New Moore Process as Installed at the Consolidated Mercur Gold Mines. George Moore. An illustrated description of this process for the treatment of slimes. 1300 w. Min Rept—Nov. 12, 1903.

See also **GOLD MINE.**

Mispickel.—The Treatment of Auriferous Mispickel Ores at Deloro, Ontario. Two papers read before the Canadian Min Inst. One by P. Kirkegaard, the other by Sydney B. Wright. Concerning the mining, milling and particulars of treatment. 7500 w. Can Min Rev—March 31, 1901.

Gold and Arsenic Recovery from Mispickel Ores. P. Kirkegaard. Describes the method of operation in a Canadian mill built with mortars suitable for inside amalgamation. 90 per cent. of the original gold was recovered. Also briefly describes the process of recovering the arsenic. 1000 w. Pacific C Min—Aug. 15, 1903.

Modern.—Modern Methods of Gold Extraction. Walter E. Koch. An illustrated article discussing methods, and expressing the opinion that the cyanide process and pyritic smelting give more promise for the future than any other methods. Also discussion. 5000 w. Pro Engrs Soc of W Penn—Jan., 1902.

Montana.—Electrical Precipitation in Montana. Matt. W. Alderson. An illustrated description of this method of treatment adopted to overcome difficulties in securing perfect precipitation. Serial. 1st part. 1200 w. Min & Sci Pr—Aug. 27, 1904.

Moore Process.—See **Mercur, Utah.**

New Zealand.—Milling and Treatment of Auriferous Ores in New Zealand. H. A. Gordon. Abstract from paper in Trans. of the Australasian Inst. of Mining Engrs. 5000 w. N Z Mines Rec—June 16, 1904

See also **GOLD MILLING—New Zealand; GOLD MINE.**

Nicaragua.—See **GOLD.**

Oxygen Refining.—Refining Gold Bullion and Cyanide Precipitates with Oxygen Gas. T. Kirk Rose. Discusses the action of oxygen and of nitrogen, on molten metals, and on mixtures, the treatment, methods, etc. 1500 w. Inst of Min & Met—April 13, 1905.

Panning.—How to Pan Gold from Gravel. Taken from the printed instructions, by Prof. Henry S. Monroe, for students in the ore dressing laboratory of the School of Mines, Columbia Univ., New York. 1200 w. Eng News—Feb. 12, 1903.

Paris Exposition.—The Metallurgy of Gold (La Metallurgie de l'Or). C. Grollet. A general review of the present state of the art, as shown at the Exposition of 1900. 3500 w. Revue Technique—Jan. 10, 1901.

Patio Process.—See **Amalgamation; ORE TREATMENT.**

Permanganate Process.—Prof. Black's Permanganate Process. Dr. H. Norman. A description of the important phases of this discovery, and a statement of its chief points of advantage over the chlorination process. 3000 w. Min & Sci Pr—April 6, 1901.

Practical Application of Dr. Black's Permanganate Process. D. F. Meiklejohn. Illustrates the plant at Sierra City, Cal., and gives a report of a practical trial of the process and the results. 1600 w. Min & Sci Pr—Feb. 28, 1903.

Plates.—Electro-Silvered versus Plain Copper Plates. Edward Halse. Considers that for a certain class of ore electro-silvered plates catch more gold in proportion than the plain copper plates working under similar conditions, but that such gold is of an increased fineness. 1500 w. Eng & Min Jour—Feb. 16, 1901.

Pneumatic Separation.—See **Edison; Freid; ORE TREATMENT.**

Pulp Distributor.—Pulp Distributor for Stamp Batteries. J. L. Buskett. Description and drawings of a pulp distributor which allows of the continuous dropping of the stamps while dressing the plates. 1000 w. Min Rept—Oct. 20, 1904.

Pulp Mixers.—Stirring or Mixing of Liquid Pulp. M. P. Boss. Remarks on the types of mechanical mixers. Ills. 700 w. Eng & Min Jour—Dec. 29, 1904.

Pyritic Smelting.—See **SMELTING—Pyritic.**

Pyritic Ores.—Treatment of Pyrites Containing Combined Gold. An account of a new process being used for the treatment of auriferous arsenical pyrites of Piedmont, Italy, by a Belgian company. 800 w. Sci Am Sup—Sept. 26, 1903.

Queensland.—Concentration and Smelting. W. A. Macleod. Deals with the treatment of auriferous ores in Queensland. 2300 w. Aust Min Stand—Sept. 26, 1901.

Mining in Queensland. Donald Clark. Discusses the treatment of auriferous ores in various places. The present article considers Charters Towers. Serial. 1st part. 1600 w. Aust Min Stand—Feb. 14, 1901.

Rand.—See **Transvaal.**

Refining.—Note on the Refining of Base Bullion. Walford Dowling. Describes a method employed by the writer for the refining of very base bullion. General discussion. 2200 w. Jour Chem Met & Min Soc of S Africa—March, 1905.

Refractory Ores.—Treatment of Refractory Silver and Gold Ores at the Mine. R. C. Campbell-Johnson. Describes the ores of British Columbia and discusses their treatment and economical working. 1200 w. Min & Sci Pr—Feb. 1, 1902.

Rieeken Process.—See **Electric; CYANIDE PROCESS.**

Roasting Temperature.—Temperature in Roasting Gold Ore. William E. Greenawalt. Suggestions helpful in getting the best results, reporting laboratory experiments. 1200 w. Eng & Min Jour—July 29, 1905.

Rosario, Mex.—See **Amalgamation.**

Sand.—See **Black Sand.**

Schils Process.—Extraction from Low Grade Ores. Begins a description of the Schils process for the extraction of gold. Serial. 1st part. 1500 w. Aust Min Stand—Aug. 21, 1902.

Slime Agitator.—See also **CYANIDE PROCESS—Slimes.**

Slimes.—Notes on the Treatment of Slimes by Filter Presses. Clement Dixon. Briefly describes the methods used in Australia and New Zealand. 1800 w. Jour Chem & Met Soc of S. Africa—June, 1902.

Electrical Treatment of Slimes. F. T. Mumford. Read before the Aust. Inst. of Min. Engrs. The advantages to be gained by the electrical precipitation on mercury, describing the process. 2500 w. Aust Min Stand—July 24, 1902.

The Desulphurisation of Slimes. E. J. Horwood. Read before the Aust. Inst. of Min. Engrs. On the advantages of heap roasting, and the method. 2800 w. Aust Min Stand—July 24, 1902.

The Smelting and Refining of Zinc Gold Slimes. E. H. Johnson and W. A. Caldecott. A discussion of methods and results. 3400 w. Jour of Chem & Met Soc of S. Africa—July, 1902.

Slimes Process at the Consolidated Mercur Gold Mines. George Moore: An illustrated description of the Moore process fillers in operation. 1200 w. Eng & Min Jour—Dec. 5, 1903.

A Trapezoidal Slimes Agitator. Courtenay De Kalb. An illustrated description of a device used in California, with report of results. 1300 w. Eng & Min Jour—Feb. 11, 1904.

The Slime Problem. T. Lane Carter. States the advantages of a slime plant and considers recent installations on the Rand. 2000 w. Eng & Min Jour—March 17, 1904.

A Proposed Filter-Press Slimes Plant. Francis L. Bosqui. Report on the filter-press treatment of slimes at the Liberty Bell mine. Telluride, Colo. 4000 w. Trans Am Inst of Min Engrs—Oct., 1903.

Slime Treatment in the Joplin Region. W. R. Crane. An illustrated detailed description of the latest sludge mill built in the Galena district, showing the scheme of treatment. 1600 w. Eng & Min Jour—April 28, 1904.

The Decantation Process of Slimes Treatment: Its Possibilities and Limitations. E. J. Laschinger. Discusses this process under various given conditions, showing losses incurred by carrying certain factors in treatment beyond definite limits and indicating how best economic results may be obtained. 8500 w. Jour of Chem, Met & Min Soc of S Africa—April, 1904.

The Separation of Sands from Slimes. From Bulletin No. 7, of the South Dakota School of Mines. Describes the method used. 1500 w. Min Rept—Sept. 15. 1904.

Improvements in Slimes Treatment. M. Torrente. Describes a method which refers to the settlement and separation of the slimes from their solutions, and states other advantages derived. 2200 w. Jour Chem, Met & Min Soc of S Africa—Aug., 1904.

Fluxing of Gold Slimes. Charles E. Meyer. Explains the theory and calculation of flux, giving results. 1200 w. Jour Chem, Met & Min Soc of S Africa—Jan., 1905.

The Moore Process. C. H. Fulton. Information concerning the improved Moore slime-filter and the results obtained. 1100 w. Eng & Min Jour—June 1, 1905.

The Buss Slimer. A new slime table, invented by Dr. Julius Buss, is illustrated and described. It is intended for treating any ore or tailing between 50-mesh linear and the finest powder that settles in water. 600 w. Eng & Min Jour—Dec. 16, 1905.

See also **Lead Smelting; CYANIDE PROCESS; ORE TREATMENT.**

Sludges.—Extraction of Gold From Sludges. From the "Queensland Government Mining Journal." Particulars regarding a method of successful cyanide treatment. 900 w. N. Z. Mines Rec—Dec. 17, 1901.

Recovery of Bullion from Zinc-Box Sludge. E. H. Taylor. From the Report of the Chamber of Mines, W. A. Notes on the economical uses of fluxes in the smelting of zinc-box sludges. Serial. 1st part. 2000 w. Min & Sci Pr—July 30, 1904.

Smelting.—See **SMELTING.**

Sodium Bisulphate.—The Use of Bisulphate of Sodium in the Clean-Up. Jas. E. Thomas and Gerard W. Williams. Reports a series of experiments and the results. 2500 w. Jour Chem, Met & Min Soc of S Africa—June, 1905.

Solubility.—See **GOLD.**

South Dakota.—See **Black Hills.**

Sulphides, Victoria, Aust.—The Treatment of Refractory Auriferous Sulphides at the Cassilis Mine, Victoria, Australia. Francis B. Stephens. Read before the Inst. of Min. & Met. Describes the ore and the methods of treatment, giving costs. 4000 w. Min Jour—June 3, 1905.

Sulpho-Telluride Ores.—The Treatment of Sulpho-Telluride Ores at Kalgoorlie. W. A. Pritchard and H. C. Hoover. Describes the treatment of refractory ores by the Diehl process, and by the roasting process, comparing the results. 2500 w. Eng & Min Jour—Aug. 1, 1903.

Swinburne-Ashcroft Process.—See also **SMELTING. Chloro-Electrolytic.**

Tailings.—Saving Coarse Gold from Tailings After Direct Cyaniding by Means of an Agitator. Paul J. Johnson. Detailed description of the writer's method of using an agitator and the results. Ill. 1200 w. Min Rept—July 27, 1905.

Tavener's Process.—See **Bag House; Lead Smelting.**

Telluride Ores.—See **Kalgoorlie; Sulpho-Telluride; GOLD.**

Tonopah, Nev.—See **FLUX—Nevada Mines; GOLD—Nevada; GOLD MILLING; ORE TREATMENT—Nevada.**

Transvaal.—A Modern Gold-Reduction Plant on the Witwatersrand Gold Field. Gives details of the extraction processes, with illustrations. 2000 w. N Z Mines Rec—July 16, 1903.

Observations on the Metallurgical Practice of the Witwatersrand. H. S. Denny. Discusses the more important points in the treatment of gold ores; crushing, sorting, milling, amalgamation, concentration, classification of sands and slimes, cyaniding of sands, and cyaniding of slimes. Ill. 24,000 w. Jour Chem, Met & Min Soc of S Africa—July, 1903.

Observations on the Metallurgical Practice of the Witwatersrand. Harry S. Denny. A reply to the discussion on the writer's paper. 10,000 w. Jour of Chem, Met & Min Soc of S Africa—April, 1904.

Visit to the New Goch Mines, Ltd. Explanatory remarks by H. S. Denny, on the occasion of a visit to this South African mine to inspect the new tube mill installation and the treatment of vanner concentrates. 3000 w. Jour Chem, Met & Min Soc of S Africa—Aug., 1904.

Observations on the Metallurgical Practice of the Witwatersrand. Discussion of paper by Harry S. Denny. 11,500 w. Jour Chem, Met & Min Soc of S Africa—Nov., 1903.

Present Stage of Metallurgy on the Witwatersrand. G. A. and H. S. Denny. Gives an outline of present practice, and alterative suggestions made by the writers, with reasons and causes. 7000 w. Min Mag—Sept., 1905.

The Use of Electro-Plated Copper Plates in the Battery. F. W. Cindel. Remarks on the system of plates, and the percentage of extraction, with brief discussion. 2300 w. Jour Chem, Met & Min Soc of S Africa—Oct., 1904.

The Metallurgy of Gold on the Rand Gold Fields. Clement Dixon and M. Torrente. Gives a résumé of the metallurgical practices in these fields, showing the development of the cyanide process. Also editorial. 9500 w. Elec.-Chem Ind. June, 1904.

See also **CYANIDE PROCESS; ELEVATOR—Tailings; GOLD MILLING.**

Tube Milling.—See **GOLD MILLING.**

Utah.—The New Plant of the American Smelting and Refining Company at Murray, Utah. Brief description. 1200 w. Eng & Min Jour—June 28, 1902.

Vaygouny Process.—See **ORE TREATMENT—Sulphide Ores.**

Victoria, Aust.—Ore Treatment in Victoria. Donald Clark. Illustrates and describes the South German cyanide plant at Maldon. 1800 w. Aust. Min Stand—Aug. 8, 1901.

See also **GOLD.**

Washing.—The Washing of Goldbearing Gravel in Sluices (Die Verwaschung Goldhaltiger Gerölle in Gerinne). L. St. Ranier. A discussion of the influence of the size of pebbles and the velocity of the water flow upon the separation of the gold. Two articles. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 4, 11, 1905.

Ore Washing in Cripple Creek, Colo. Illustrates and describes the practice at the different mines. 2000 w. Min & Sci Pr—Feb. 18, 1905.

Washington.—Notes on the Republic District, Washington, with Special Reference to the Metallurgy of Its Ores. J. C. Ralston. An account of this region which has produced about $1,400,000 in gold and silver, the silver being a small percentage. Ill. 4800 w. Eng & Min Jour—July 19, 1902.

Water Flow.—See **WATER FLOW—Gold Metallurgy.**

Water Recovery, Ariz.—An Experience in Water Recovery. George S. Binckley. Describes the method of recovery at Congress, Arizona, giving illustrations. Also the design of a recovery plant where there was a very limited flow of water, and the working of the system. 3000 w. Min & Sci Pr—Aug. 19, 1905.

Western Australia.—Ore Treatment in Australia. Donald Clark. An illustrated description of the filter press processes for gold slimes. 2700 w. Aust Min Stand—Dec. 5, 1901.

Metallurgical Progress in Western Australia. Alfred James. Reviews improved processes introduced for the treatment of ores, and related matters. 1500 w. Eng & Min Jour—Jan. 3, 1903.

Metallurgical Progress in Western Australia. Alfred James. Reports a reduction of 25 per cent. in treatment costs at some of the mines, giving details; the success of the combination process, and general details. 1800 w. Eng & Min Jour—Jan. 7, 1904.

See also **Kalgoorlie.**

Witwatersrand.—See **Transvaal.**

GOLD MILLING.

See also **CRUSHING; CYANIDE PROCESS; GOLD METALLURGY; METALLURGY; ORE TREATMENT; STAMP MILL.**

Gold Milling. Algernon Del Mar. Notes giving information in regard to mill work. Serial. 1st part. 2800 w. Min & Sci Pr—July 16, 1904.

Ball Mill.—See **Tube Mill.**

Bendigo.—Gold Milling Practice at Bendigo. H. C. Boydell. Gives the main features of local gold milling practice at this Victorian camp, pointing out in what respects it differs from other large mining camps. Serial. 1st part. 2500 w. Aust Min Stand—April 17, 1902.

Black Hills.—Black Hills, South Dakota. Notes on mills and mill work, with illustrations. 3800 w. Min Rept—Sept. 3, 1903.

See also **CYANIDE PROCESS; GOLD METALLURGY.**

British Columbia.—Notes on Gold Milling Practice at the Athabasca Mine, Nelson, B. C. E. Nelson Fell. Read before the Canadian Min. Inst. Of interest because of the peculiar character of the ore treated. The general features are a hard blueish quartz, containing a large proportion of sulphides of zinc, lead and iron, showing free gold only when the ore is of fair grade. 2500 w. Can Min Rev—Feb. 28, 1901.

Bryan Mill.—The Bryan Mill as a Crusher and Amalgamator Compared with the Stamp Battery. E. A. H. Tays. Continued discussion. The writer's reply to A. H. P. Wynne's criticism. 2000 w. Trans Am Inst of Min Engs—Sept., 1899.

The Bryan Mill as a Crusher and Amalgamator. Continued discussion of the paper of E. A. H. Tays. 400 w. Trans Am Inst of Min Engrs—Feb., 1901.

California Mother Lode.—See **GOLD.**

Camp Bird, Colo.—Milling Practice at the Camp Bird. Stephen L. Goodale. Describes the method of treating gold ores at this Colorado mine. Ills. 1300 w. Eng & Min Jour—May 4, 1904.

See also **GOLD MINE.**

Colorado.—Milling Practice at Idaho Springs, Colo. H. Foster Bain. Describes the treatment of pyritic ores and lead ores. Generally the values in the pyritic ores are in gold, and the lead ores in silver. 2000 w. Eng & Min Jour—Oct. 5, 1901.

The Union Gold Extraction Company's Mill at Florence, Colorado. John E. Rothwell. Illustrated detailed description of this plant. 4000 w. Eng & Min Jour—June 8, 1901.

Low Grade Gold Mining and Milling. Describes the practice of a leading mill in the San Juan region of Colorado, and how it is possible for low-grade ores to yield a profit. Ill. 1700 w. Sci Am Sup—June 15, 1901.

Costs.—Gold Milling Costs. S. Horsley. States the difficulties in the way of a proper comparison of the total cost of extraction on the various gold fields, giving information and a comparative table of gold milling and mining costs. 2000 w. Queens Gov Min Jour—May 15, 1906.

Dry Crushing.—The Dry Crushing of Ore. Abstract of an important paper by Philip Argall, read at London, before the Inst. of Min. & Met. Discusses sampling and dry crushing referring more especially to the treatment of the telluride ores of Cripple Creek, Colorado. Serial. 1st part. 4200 w. Eng & Min Jour—July 5, 1902.

El Oro, Mex.—See **GOLD METALLURGY.**

Fast Crushing.—Milling Gold Ores. Algernon Del Mar. A warning in regard to mill construction and fast crushing, unless the gold can be saved as fast as the ore is crushed. 900 w. Min & Sci Pr—May 13, 1905.

Free Ores.—Free Gold Milling. W. Muir Edwards. Read before the Applied Science Soc. of McGill Univ. Describes the process from the ore to the bar. 4300 w. Can Engr—Nov., 1900.

Stamp Milling of Free Gold Ores. Dana Harmon. A discussion of the fundamental principles to be followed. Ill. 7000 w. Jour Assn of Engng Socs—Dec., 1900.

Stamp Milling of Free Gold Ores. Dana Harmon. Read before the Tech. Soc. of the Pacific Coast. A discussion of the fundamental principles of milling. Ill. 8500 w. Min & Sci Pr—Dec. 1, 1900.

See also **Harmon Method.**

Fine Grinding.—See **GOLD METALLURGY.**

Georgia.—See **GOLD MINE; GOLD MINING.**

Harmon Method.—Stamp Milling and Amalgamation of Free Gold Ores. Dana Harmon. The first of a series of articles giving the writer's methods and conclusions on the treatment of ores. Serial. 1st part. 2500 w. Min & Sci Pr—Jan. 17, 1903.

India.—Milling in India. Robert F. J. Weeks. A brief account of metallurgical operations (milling) at the Champion Reef Gold Mining Co. of India, Ltd. 2400 w. Mines & Min—Aug., 1905.

Kalgoorlie, Aust.—Wet Ball Mills vs. Stamper Batteries. A comparison, with special reference to conditions in the Kalgoorlie gold fields. Ills. 1400 w. Aust Min Stand—Dec. 15, 1904.

Ore Milling at Kalgoorlie. Harry J. Brooke. Describes the successful treatment of these ores, giving table showing the cost of one month's milling on 3,484 tons treated. 1500 w. Eng & Min Jour—July 6, 1905.

See also **GOLD METALLURGY.**

Laboratory Work.—School Laboratory Work. A Free Milling Gold Run. Robert H. Richards and E. E. Bugbee. A report of tests made and the results. 2000 w. Trans Am Inst of Min Engrs—Feb., 1903.

Losses.—Causes of Gold Mill Losses. Discusses the ways in which losses may occur, offering suggestions for correcting the trouble. 1800 w. Min & Sci Pr—Dec. 5, 1903.

Mexico.—Note on Cheap Gold Milling in Mexico. Henry F. Collins. Describes the ore body, the mining and milling, giving cost. 1000 w. Trans of the Am Inst of Min Engs—Feb., 1901.

New Zealand.—Milling and Treatment of Auriferous Ores in New Zealand. H. A. Gordon. Abstract of a paper in Trans. of the Aust. Inst. of Min. Engrs. Describes the ores and the treatment given them. 6500 w. N Z Mines Rec—June 16, 1904.

The Rise and Fall of Dry Crushing on the Hauraki Goldfield. Percy G. Morgan. Gives a general description of the dry-crushing practice, stating its advantages and disadvantages. 5600 w. N Z Mines Rec—March 16, 1904.

Novia Scotia.—Stamp Milling Practice in Nova Scotia. Mr. R. O'Shaughnessy. Describes the practice in wet crushing stamp mills. Serial. 1st part. 1800 w. Min & Sci Pr—Oct. 15, 1904.

Quartz.—See **Transvaal; GOLD MINING.**

Republic, Washington.—The New Gold Mill at Republic, Washington. D. C. Jackling, in the "Republic Miner." Description of the mill and arrangements for treating the ores. 1700 w. Eng & Min Jour—Dec. 1, 1900.

Sorting.—Sorting at Johannesburg. T. Lane Carter. A brief account of a test being tried where no attempt is made to sort out the waste. 1200 w. Eng & Min Jour—Feb. 7, 1903.

Tonopah.—The Tonopah Milling Co.'s Mill. S. A. Worcester. Outline drawings and description of a mill to be located at Goldfield Junction. 1000 w. Eng & Min Jour—Oct. 14, 1905.

See also **GOLD—Nevada; ORE TREATMENT—Nevada.**

Transvaal.—Notes on the Common Practice of Quartz Milling on the Rand. Discussion of the paper by Fraser Alexander. 3000 w. Jour Chem & Met Soc of S Africa—Aug., 1903.

Notes on the Common Practice of Quartz Milling on the Rand. Fraser Alexander. A discussion of the methods most important in securing successful results. 3500 w. Jour Chem & Met Soc of S Africa—March, 1903.

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Stamp-Mill Practice in South Africa. F. C. Roberts. Illustrated account of gold ore-crushing methods in the Transvaal. 2400 w. Eng & Min Jour—Aug. 25, 1904.

Notes on Mill Construction, Milling and Amalgamation. I. Roskelley. Calls attention to some alterations that would improve the mills of the Witwatersrand, and points in mill construction, describing milling practice. 7400 w. Jour of Chem, Met & Min Soc of S Africa—Feb., 1904.

Notes on Mill Construction, Milling and Amalgamation. Discussion of I. Roskelley's paper on this subject. 16,500 w. Jour of Chem, Met & Min Soc of S Africa—May, 1904.

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Notes on Mill Construction, Milling and Amalgamation. I. Roskelly. Reply to the discussion of the writer's paper on this subject. 4000 w. Jour Chem, Met & Min Soc of S Africa—Aug., 1904.

The Tube Mill in the Transvaal. An account of the results of tests being made on the Rand. The experiments have been so successful that there is reasonable expectation of increasing the production, improving the extraction, and lowering the cost. 1800 w. Engr, Lond—Sept. 9, 1904.

Fine Crushing of Banket Ore. W. A. Caldecott. Abstract of a paper read before the Inst. of Min. & Met., London. On the results of recent practice in the Rand. 1000 w. Eng & Min Jour—Dec. 15, 1904.

Notes on Crushing of Metalliferous Ores in the Stamp Battery in Africa. F. O. Roberts. An account of extraction methods in Africa, and the use of the stamp mill as a crushing machine. Serial. 1st part. 1100 w. Min & Sci Pr—Dec. 24, 1904.

Mill Practice on the Rand. G. A. Denny. Illustrated description of a representative ore reduction and slimes treatment plant. 1200 w. Min Mag—May, 1905.

See also **Sorting; Tube; CYANIDE PROCESS; GOLD METALLURGY; GOLD MINING; STAMP MILL—Gravitation.**

Tube.—The Operation of a Tube Mill. Hermann Fischer. Abstract from the "Zeitschrift des Vereines Deutscher Ingenieure." Illustrated description of the operation of grinding. 2000 w. Eng & Min Jour—Nov. 17, 1904.

The Milling of Gold Ores. George P. Scholl. An illustrated article giving a general idea of the construction of tube mills and their operation, and data regarding installations. 4000 w. Min Mag—May, 1905.

First Results of Tube Mill Practice at the Treasury Gold Mine. H. Leupold. Gives the results of the first two runs. 1600 w. Jour S African Assn of Engrs—March, 1905.

Tube Mill Notes. Alfred James. Abstract from contribution to discussion, Inst. of Min. & Met. Comments on practice and results. 800 w. Eng & Min Jour—March 16, 1905.

The Theory of the Tube Mill. H. A. White. Illustrates and describes models and discusses the best rate of driving tube mills. 6000 w. Jour Chem, Met & Min Soc of S Africa—May, 1905.

See also **Transvaal; FLINT.**

Western Australia.—See **Kalgoorlie; GOLD METALLURGY; GOLD MINING.**

Wet Crushing.—See **CYANIDE PROCESS—Black Hills.**

Witwatersrand.—See **Transvaal; GOLD METALLURGY—Transvaal; GOLD MINING—Transvaal; STAMP MILL—Gravitation.**

GOLD MINE.

See also **GOLD; GOLD DREDGING; GOLD GEOLOGY; GOLD MINING; MINERAL REGION; ORE DEPOSIT; SILVER.**

The Greatest Gold-Producing Mines. J. H. Curle. Brief outlines of the best producers, with table giving an approximate estimate of 30 of the greatest gold producing mines of the present. Three are in the United States. 1400 w. Eng & Min Jour—Nov. 7, 1903.

Alaska.—The Sea Level Mine, Alaska. W. H. Washburn. An illustrated article giving information in regard to this property. The pay ore found is mostly in gold-bearing pyrites in two white quartz veins. 2000 w. Min & Sci Pr—May 9, 1903.

See also **Treadwell; GOLD.**

Arizona.—The Mammoth Gold Mine, Arizona. William P. Blake. Abstract of a lecture before the students of the School of Mines, Tucson. Upon methods of working large ore deposits without costly timbering, suggested by the caving in of a large portion of this mine. 1800 w. Min Rept—June 6, 1901.

Equipment of the Sultan Mine, Arizona. Charles E. Bunker. Begins an illustrated detailed description. Serial. 1st part. 1400 w. Min & Sci Pr—Nov. 14, 1903.

Atlin, B. C.—An Atlin Hydraulic Mine. Brief illustrated account of the mining conditions in this district of British Columbia. 800 w. Min & Sci Pr—May 11, 1901.

Barza, Transylvania.—See **MINE DRAINAGE.**

Bendigo.—See **GOLD—Victoria; GOLD GEOLOGY; TEMPERATURE—Deep Mine.**

Brazil.—The Morro Velho Gold Mine, Brazil. Illustrated detailed description of this great gold mine, opened upon the ruins of an old mine which had been worked many years. 6000 w. Eng & Min Jour—Oct. 19, 1901.

British Columbia.—The B. C. Mine. Summit Camp, Boundary District. S. F. Parrish. Illustrated description of this mine, yielding gold, silver and copper. 1100 w. Eng & Min Jour—July 20, 1901.

The Snowshoe Mine, Boundary District, B. C. E. Jacobs. An illustrated description of this mine and its development. The ores vary in character. The assay of a representative sample showed gold, silver, copper, iron, lime and silica. 2000 w. Eng & Min Jour—Nov. 23, 1901.

Notes to Accompany One Plan and Three Vertical Sections of the Athabasca Mine, on Toad Mountain, near Nelson, British Columbia. E. Nelson Fell. 1100 w. Can Min Rev—Dec. 31, 1901.

The Centre Star Mine. L. Heber Cole. Abstract of a paper read before the Min. Sec. of the Canadian Soc. of Civ. Engrs. Illustrates and describes the methods of mining, machinery used, etc., of this mine at Rossland, B. C. The mine consists of iron and copper sulphides. The principal value is in gold carried chiefly by the chalcopyrite. 5000 w. Can Min Rev—Jan., 1905.

See also **GOLD; MINERAL REGION.**

California.—The Pennsylvania M. Co. vs. Grass Valley Exploration Co., Litigation. Gives views of models used in this legal contest, showing interesting phenomena of lode occurrence, with explanation. 1000 w. Min & Sci Pr—Aug. 3, 1901.

Deep Workings at the North Star Mines, California. E. L. Oliver. Describes an interesting shaft sunk 1625 feet to tap the North Star Ledge. 1000 w. Eng & Min Jour—Dec. 17, 1903.

The North Star Mines. An illustrated article giving information of the equipment and improvements of these gold mines near Grass Valley, Cal. 1800 w. Min & Sci Pr—Aug. 20, 1904.

The Dorleska Gold Mine. H. Z. Osborne. An account of the rapid development of this mine in Trinity Co., California, with illustrations. 2000 w. Min & Sci Pr—Oct. 17, 1903.

Camp Bird, Colo.—The Camp Bird Mine, Ouray, Colorado, and the Mining and Milling of the Ore. Chester Wells Purington, Thomas H. Woods and Godfrey D. Doveton. Gives a description of this property, its history, geology and working; also a description of the mill, the method and cost of treating the ore. Ill. 16,000 w. Trans Am Inst of Min Engrs—Feb. and May, 1902.

The Camp Bird Gold Mine and Mill. H. A. Titcomb. An illustrated description of this mine and mill in the San Juan region, in Southwestern Colorado. 2500 w. School of Mines Quar—Nov., 1902.

See also **GOLD MILLING.**

Colorado.—The Liberty Bell Mine. A description of the mine, gold and silver ores, difficulties in successfully treating them, methods of transportation, etc. Ill. 2000 w. Mines & Min—April, 1901.

The Kimble Drift Mine, El Dorado County, Col. George W. Kimble. Describes the mine, mode of working, timbering, ventilation, milling, etc. 1700 w. Min & Sci Pr—July 12, 1902.

See also Cripple Creek; Leadville; Ouray; Silver Lake; **GOLD; GOLD MINING.**

Cripple Creek, Colo.—The Gold Mine. Arthur Lakes. A history of its development and a description of the mines, the surface plant and miners' clubhouse. Ill. 2000 w. Mines & Min—Feb., 1901.

Darien, Central America.—Darien Gold Mines. An illustrated description of the Espiritu Santo mine and its development under hard conditions. 1500 w. Min & Sci Pr—Sept. 30, 1905.

Deep Leads.—See **GOLD—Victoria; GOLD MINING—Alluvial.**

Electric Equipment.—See **ELECTRIC EQUIPMENT—Gold Mining.**

Farncomb, Colo.—Farncomb Hill Gold Deposits. Arthur Lakes. A description of the rich and peculiar deposits near Breckenridge, Colorado, and the methods of working them. 1400 w. Mines & Min—Dec., 1900.

Gas.—See **MINE GAS.**

Georgia.—The Crown Mountain Gold Mine and Mill, Georgia. Henry V. Maxwell. Illustrates and describes a plant combining the old and new methods in mining and saving the gold contents of low-grade ores. It combines mining, milling and sluicing, and utilizes water-power in generating and transmitting electrically the power needed. 1200 w. Eng & Min Jour—Sept. 21, 1901.

Gilpin Co., Col.—Gilpin County, Colo., Mines in 1901. Reports one of the most successful years in the history of these mines. 1000 w. Eng & Min Jour—Jan. 25, 1902.

The Mining Industry of Gilpin County. An interesting account of the discovery of gold in this region. Ill. 1300 w. Min Rept—Feb. 6, 1902.

Grass Valley.—See California.

Hodson, Cal.—See **GOLD METALLURGY.**

Independence, Col.—An Example of the Localization of Rich Ore. T. A. Rickard. Facts collected in regard to the Independence mine, in the Cripple Creek district, principally. Ill. 1800 w. Eng & Min Jour—Dec. 27, 1902.

Leadville, Col.—The "Down Town" Mines of Leadville. Arthur Lakes. An illustrated account of their development and the changing of Leadville from a silver to a gold mining camp. 4000 w. Mines & Min—Nov., 1900.

Macedonia.—The Gold Mines of Philip of Macedonia. J. E. Spurr. An illustrated account of these interesting placers. 1700 w. Eng & Min Jour—Feb. 22, 1902.

Mercur, Utah.—No Gold in Limestone an Exploded Theory. L. H. Beason. Reviews the history of the Mercur, Utah, mines and the methods used, and considers that there is no reason why they should not continue to be dividend payers. Ill. 2500 w. Pacific C Min—June 27, 1903.

Mercur Mining Methods. George H. Dern. An illustrated article describing methods of handling the ores, drilling, timbering and blasting, giving some figures regarding costs of mining. 2800 w. Mines & Min—Aug., 1904.

See also **GOLD GEOLOGY.**

Montana.—Big Indian Mine. Colin McIntosh. Illustrated description of a Montana gold mine and mill. The method of mining is by the open-cut and mill-hole system. 1800 w. Min & Sci Pr—Oct. 10, 1903.

Nagyag, Transylvania.—The Gold Mines of Nagyag (Der Goldbergbau Nagyág). Julius Steinhauss. A general account of the important mines at Nagyag, in Transylvania, with topographical map and profile. 2500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—April 2, 1904.

New Zealand.—Important Mining Development at the Great Barrier Island. From the "Auckland Star." Describes the Barrier Reefs mine, and the reduction plant. 2200 w. N Z Mines Rec—Dec. 17, 1900.

New Zealand's Premier Gold Mine. An account of the Waihi mine and its wonderful progress during the past sixteen years. Ill. 2500 w. N Z Mines Rec—Nov. 16, 1905.

North Star.—See California.

Ouray, Col.—The American Nettie. Arthur Lakes. An illustrated description of a mine furnishing an example of the peculiar cave deposits and the method of mining them, near Ouray, Colorado. 3000 w. Mines & Min—Jan., 1901.

Placer.—See **GOLD DREDGING; GOLD MINING; HYDRAULIC MINING.**

Portland Company.—See **GOLD METALLURGY—Chlorination; MECHANICAL HANDLING—Gold Ore.**

Red Point, Cal.—See **COMPRESSED AIR PLANT—Gold Mine, California.**

Shaft Misplacement.—See **MINE SHAFT—Misplacement.**

Silver Lake, Col.—The Silver Lake Mine, near Silverton, San Juan County, Col. Prof. Arthur Lakes. Successful operation of a large mine at high altitude, producing gold, silver, lead and copper. Ill. 2200 w. Mines & Min—April, 1903.

Transvaal.—The Equipment of the Bonanza Mine, Johannesburg. Edgar Smart. The first of a series of illustrated articles dealing with the gold-mining plants of the Rand. Especially noticing the points in which plants differ, and improvements in detail of plant or practice. 4000 w. Page's Mag—Feb., 1903.

The Equipment of the Robinson Mine, Johannesburg. Edgar Smart. Discusses notable features of one of the largest mines in the Rand. Ill. Serial. 1st part. 3800 w. Page's Mag—Aug., 1903.

The Equipment of the Lancaster West Mine. Edgar Smart. The present article gives an illustrated description of the chief points of interest noted during a visit to this South African mine. Serial. 1st part. 2700 w. Page's Mag—July, 1904.

See also **GOLD; GOLD MINING.**

Treadwell, Alaska.—The Treadwell Group of Mines, Douglas Island, Alaska. Robert A. Kinzie. History, geology and illustrated detailed description of mines and methods of ore that does not yield an average of more than $2 per ton. 13,800 w. Trans Am Inst of Min Engrs—Oct., 1903.

Valuation.—See **MINE VALUATION.**

Ybarra, Lower Cal.—The Ybarra Mines of Lower California. Brief illustrated description of this gold mine. 1000 w. Min & Sci Pr—Nov. 28, 1903.

GOLD MINER.

See **GOLD MINING; MINER.**

GOLD MINING.

See also **ELECTRIC EQUIPMENT; GOLD; GOLD DREDGING; GOLD METALLURGY; GOLD MINE; HYDRAULIC MINING; MINERAL REGION; MINING; MINING MACHINERY.**

The Mining and Working of Gold. Brief review of methods of securing this precious metal, its working and the production in the United States. 2500 w. Sci Am Sup—May 17, 1902.

See **Placer; Yukon.**

Alluvial. — Alluvial Gold-Mining Appliances. An illustrated description of machines and accessories which have proved to be of special importance in alluvial gold mining on the Clermont field. Serial. 1st part. 3500 w. Queensland Gov Min Jour—Aug. 15, 1902.

Deep Alluvial Mining. D. H. Browne. Practical hints. 3800 w. Aust Min Stand—Dec. 6, 1900.

Deep Alluvial Mining. D. H. Browne. An illustrated article giving practical hints and descriptions of methods which have been employed in the mines of New South Wales, Australia. 3800 w. Mines & Min—Jan., 1904.

Deep Alluvial Mining in Victoria. F. Danvers Power. Describes the deep leads and the systems of mining. Ills. 2000 w. Eng & Min Jour—Sept. 29, 1904.

Charlotte Plains Deep Leads. E. J. Dunn. Describes deep alluvial mining, showing gold wash deposits. 1200 w. Aust Min Stand—July 5, 1905.

See also **Placer; New Zealand.**

Black Hills, S. D.—Some Features of Mining Operations in the Homestake Mine, Lead, South Dakota. Illustrations, with description, of features of one of the largest and most productive gold mines in the world. Serial. 1st part. 2000 w. Min & Sci Pr—Feb. 13, 1904.

Common Sense Mining. W. H. Storms. On the management of low-grade mines, discussing especially the gold mines of South Dakota. 2200 w. Min & Sci Pr—Oct. 21, 1905.

See also **CYANIDE PROCESS; GOLD—South Dakota; GOLD METALLURGY; GOLD MILLING.**

British Columbia.—See **Low-Grade Ore; GOLD; GOLD MINE; HYDRAULIC MINING.**

Centrifugal Sluicing.—See **HYDRAULIC MINING.**

California Mother Lode.—See **GOLD.**

Colorado.—The Mining Development of Gilpin County, Colorado. Thomas Tonge. With especial reference to the gold producing districts, showing the evolution of mining methods, and the reduction of costs. 4000 w. Engineering Magazine—Nov., 1901.

Cost Accounts.—See **COST KEEPING; MINE MANAGEMENT.**

Deep Leads.—See **Alluvial; New Zealand; Transvaal.**

Dredging.—See **GOLD DREDGING.**

Drift.—An Experience in Drift Mining in Hard Cement Gravel. L. H. Carver. Describes the methods employed in the operation of a drift mine in Calaveras Co., Cal. Maps. Serial. 1st part. 1500 w. Min Sci Pr—Jan. 3, 1903.

Egypt.—Gold Mining in Egypt. An illustrated article describing the ancient methods of mining, and reviewing the history of these mines. 2200 w. Min & Sci Pr—Nov. 11, 1905.

Electric.—See **ELECTRIC EQUIPMENT—Gold Mining.**

Georgia.—Gold Mining Developments in Georgia. Wilbur Colvin. Describes and illustrates what is at present the largest gold mill of the Dahlonega gold belt. 2000 w. Eng & Min Jour—Jan. 26, 1901.

See also **GOLD MINE.**

Gravel.—Gravel Mining Costs in Alaska and Northwest Canada. Chester W. Purington. Gives facts compiled from statistics collected during a recent inspection of the placer fields in Alaska, Yukon Territory, and Northern British Columbia. 1600 w. Eng & Min Jour—Feb. 9, 1905.

Hydraulic.—See **HYDRAULIC MINING.**

Klondike.—Mining on the Klondike. A. J. Bowie. Illustrates and describes the mining methods used. 7000 w. Mines & Min—July, 1901.

Mining Methods on the Klondike. Eugene Haanel. An explanation of the methods, machinery and appliances used. Ill. 3900 w. Eng & Min Jour—April 11, 1902.

See also **GOLD.**

Korea.—Quartz Mining in Korea. Describes mines and their operation. Ill. 1300 w. Min & Sci Pr—Nov. 2, 1901.

Leasing System.—The Leasing System. Prof. Arthur Lakes. Describes a method of working mines which is operated on both large and small scales and is applicable to peculiar conditions. 2000 w. Mines & Min—Nov., 1903.

The Cripple Creek District. John Wellington Finch. Discusses present conditions, reviewing the past year, the discoveries and development, and the general adoption of the leasing system. 4500 w. Min Mag—May, 1905.

Lincoln, Cal.—See **SHAFT SINKING—Gold Mine, Cal.**

Low-Grade Ore.—A Method of Mining Low-Grade Ores in the Boundary Creek District. Frederic Keffer. Describes the methods of mining at the Mother Lode mine in Deadwood Camp, and the reasons for their adoption. The ores contain copper, gold and silver in varying degree. Ill. 1600 w. Can Min Rev—Feb. 28, 1902.

"Marauding," French Guiana.—"Marauding" in French Guiana. David Levat. The term indicates a prospector or placer miner who practices his industry on any gold-bearing territory regardless of the legal proprietor, and is not locally considered at all disgraceful. 1800 w. Eng & Min Jour—Dec. 13, 1902.

Mechanical Handling.—See also **MECHANICAL HANDLING—Gold Ore.**

Mercur, Utah.—See **GOLD MINE.**

Mexico.—See **GOLD; GOLD METALLURGY; GOLD MILLING.**

New Zealand.—Deep-Level Mining at the Thames. Abstracts from a memorandum of the government geologist of New Zealand. Describes the geology of the region, and considers points that need to be determined in connection with deep-sinking at this place, showing the possibility of workable gold at deep levels, and discussing how to reach it. 4500 w. N Z Mines Rec—July 16, 1902.

The Borehole at the Thames. F. B. Allen. Describes the material brought up from the borehole to test the deep ground of this district of New Zealand. 1100 w. N Z Mines Rec—July 16, 1902.

Hydraulic Sluicing and Alluvial Mining in New Zealand in 1901. A review of the annual reports of the Inspectors of Mines for the Otago goldfields, New Zealand. 14,000 w. N Z Mines Rec—Sept. 16, 1902.

Nicaragua.—Mining in Nicaragua. H. E. West. An illustrated account of the mining industry, which is confined to gold and silver mining. 2000 w. Min Mag—June, 1905.

Nome.—Gold Mining in the Nome District. Lewis Garrison. An account of the companies formed, and the need of water, showing that the district has passed largely into the hands of companies with large capital. 1200 w. Eng & Min Jour—Oct. 4, 1902.

See also **GOLD.**

Oregon.—See **Placer, Oregon; HYDRAULIC MINING.**

Placer.—Placer Mining Kinks. Charles P. Richardson. Illustrates and describes simple devices made where materials were scarce and hard to obtain. Serial. 1st part. 2300 w. Min & Sci Pr—March 29, 1902.

Placer Mining. Nelson Blount. Describes placers and methods of working. Ill. 2200 w. Yale Sci M—June, 1902.

The Problem of Dry-Placers. Henry A. Mather. Considers the difficulties of gold recovery and the means employed. 1200 w. Eng & Min Jour—Aug. 29, 1903.

See also **Alluvial; Gravel; Sluicing; GOLD DREDG-**

ING; HYDRAULIC MINING; PUMP—Placer Mining.

Placer, Alaska.—Placer Mining in Alaska. C. W. Purington. Abstract from the Bulletin of the U. S. Geol. Survey, describing the methods of mining. Ills. Serial. 1st part. 1800 w. Min & Sci Pr—Aug. 12, 1905.

See also **Gravel.**

Placer, Colorado.—Summit County Placers of Colorado. Prof. Arthur Lakes. An illustrated description of the great hydraulic works now nearing completion near Breckenridge. 2500 w. Mines & Min—Jan., 1903.

Placer, Oregon.—Placer Mining in Southern Oregon. Dennis M. Stavel. An account of the mining industry in this region and the working of the placers. Ill. 1600 w. Min Rept—Sept. 26, 1901.

Placer Mining in Josephine County, Oregon. A. B. Cousins. Describes the conditions and gives an account of what has been done since the discovery of gold in 1851 in this district. Ill. 1000 w. Eng & Min Jour—Nov. 1, 1902.

Quartz.—The Young Quartz Miner. Matt. W. Alderson. The present article deals with the tools needed, and how to shape, sharpen, harden and temper them. Serial. 1st part. 1600 w. Min & Sci Pr—June 25, 1904.

See also **Korea; Siberia; GOLD—Nome.**

Quartz, California.—Gold Quartz Mining in Kern County. C. S. Long. An illustrated article giving information of the industry near Kernville, Cal. 1200 w. Pacific C Min—May 23, 1903.

Ralston Divide, Cal.—Ralston Divide, Placer County, Cal. A. Bordeaux. Information regarding the work done in this gold-mining property during the last two years, principally hydraulic mining. Ill. 1600 w. Min & Sci Pr—Dec. 29, 1900.

Siberia.—Quartz Mining at Sarela, Central Siberia. An account of a visit to this locality and a favorable report of conditions of labor and mining prospects. 1300 w. U S Cons Repts, No. 893—Nov. 22, 1900.

Placer Mining in Siberia. Abstract translation from "L'Industrie Aurifere." M. D. Levat. Describes some of the difficulties, the methods of work and the prospecting. 1500 w. Min Wld—Aug. 26, 1905.

Sluicing.—Sluicing for Gold in Queensland. Describes the system of working on the Russell goldfield. Ill. 2800 w. Queensland Gov Min Jour—Nov. 15, 1902.

Sluice Building on Placer. Dennis H. Stovall. Calls attention to important features in the construction of a sluice. Ills. 900 w. Min Wld—Nov. 4, 1905.

South America.—Gold Mining in South America. J. H. Curle. From "The Economist." Information concerning this industry, the output, the drawbacks and the future development. 1200 w. Min Rept—Oct. 12, 1905.

South Dakota.—See **Black Hills.**

Transvaal.—Deep-Level Shafts on the Witwatersrand, with Remarks on a Method of Working the Greatest Number of Deep-Level Mines, with the Fewest Possible Shafts. Thomas Haight Leggett. Describes the gold deposits of this South African region and manner of working. 9600 w. Trans Am Inst of Min Engs—Aug., 1900.

Gold-Mining in the Transvaal, South Africa. John Hays Hammond. Describes in detail the Witwatersrand district and its operation, and discusses the mining plants and methods, milling, treatment, etc. Ill. 13,700 w. Trans Am Inst of Min Engrs—Feb., 1901.

Gold-Mining in the Transvaal, South Africa. John Hays Hammond. A discussion of this paper contributed by Thomas Haight Leggett, London, Eng. 4400 w. Trans Am Inst of Min Engrs—Feb., 1901.

Gold Mining in the Transvaal, South Africa. John Hays Hammond. (Revised Edition.) Discusses the mining titles, general features, history and financial conditions, etc., geological features, genesis of the auriferous banket, milling, treatment, etc. Ill. 1300 w. Trans Am Inst of Min Engrs—Feb., 1901.

The Transvaal Mines Under the New Regimé. John Hays Hammond. An estimate of the probable value of the deposits, discussing the economic and mining conditions and probable industrial life under British rule. 8000 w. Engineering Magazine—July, 1902.

Taxes and Labor in Transvaal Mines. From the London "Economist." Discusses the prospect of reducing working costs in the gold mines. 1700 w. Eng & Min Jour—March 16, 1901.

Gold Mining in the Transvaal. Thomas Haight Leggett. Abstract of a paper read at meeting of Am. Soc. of Min. Engrs. A criticism of the paper of John Hays Hammond presented at the Richmond meeting last year. 5800 w. Eng & Min Jour—May 17, 1902.

The New Deep-Level Mines in the Transvaal. Notes from the special commissioner of the London "Economist." Considers some questions involved in working the deep ground. 1200 w. Eng & Min Jour—Sept. 20, 1902.

Mining Methods at Johannesburg. T. Lane Carter. Notes on methods of handling ore in the deep-level mines, methods of managing the workmen, the working of the contract system and related matters. 1800 w. Eng & Min Jour—April 18, 1903.

Recent Improvements in Gold Mining Machinery on the Rand. Arthur E. T. Lees. Read before the Engng. Con. of the Inst. of Civ. Engrs. Describes improvements made in haulage, boiler plants, stamp mills, mill engines, winding engines, rock drilling, mine pumps, etc. 1400 w. Engng—June 19, 1903.

Mine Labor and Costs on the Witwatersrand. T. Lane Carter. Shows how reduction in cost of working these gold mines has been effected, and the conditions of native and white labor. 1000 w. Eng & Min Jour—Dec. 31, 1903.

Observations on the Metallurgical Practice of the Witwatersrand. Harry S. Denny's paper is discussed at length by Wager Bradford. 4400 w. Jour of Chem, Met & Min Soc of S Africa—Jan., 1904.

Machinery Improvements in Transvaal Mines. Explains the present conditions and shows how they have caused marked progress in minimizing the amount of manual labor. The use of rock drills and improved methods of handling the ore and waste products. 2700 w. Engng—June 17, 1904.

South African Methods. Thomas H. Leggett. Abstract of an address before the California Miners' Assn. On the methods of mining, especially the deep-level properties, labor, costs, etc. 2700 w. Eng & Min Jour—April 20, 1905.

See also **DRILL—Diamond; GOLD; GOLD METALLURGY; GOLD MILLING; GOLD MINE; MINE ACCIDENT.**

Tributing.—See **WAGES.**

Victoria.—See **Alluvial; GOLD GEOLOGY; GOLD MILLING—Bendigo; GOLD MINE.**

Water Problem.—The Water Problem in Cripple Creek and Other Colorado Camps. Arthur Lakes. A statement of the cause and the methods used in freeing the mines from water. 3000 w. Mines & Min—Feb., 1902.

Western Australia.—Gold Mining and Milling in Western Australia. A. G. Charleton. The first of a series of papers dealing with Western Australia. Treats of the history, position and general features of the districts. 4500 w. Engineering Magazine—Feb., 1901.

Gold Mining and Milling in Western Australia. A. G. Charleton. Mr. Charleton's second paper treats of the general geology of the Western Australian fields, and the process of dry-blowing made necessary by the scarcity of water. 4500 w. Engineering Magazine—March, 1901.

Gold Mining and Milling in Western Australia. A. G. Charleton. Mr. Charleton's third paper deals with the water problems of the region, and the manner in which they have been solved. 4000 w. Engineering Magazine—April, 1901.

Gold Mining and Milling in Western Australia. A. G. Charleton. This fourth paper of the series deals with mining methods, extent and rate of development, costs and special conditions encountered. Ill. 6800 w. The Engineering Magazine—May, 1901.

Gold Mining and Milling in Western Australia. A. G. Charleton. Mr. Charleton's concluding paper deals with the milling and cyaniding practice at Kalgoorlie, with data as to output and cost. 5000 w. Engineering Magazine—June, 1901.

See also GOLD; GOLD METALLURGY.

Yukon.—Mining in the Yukon. F. T. Congdon. Excerpt from a recent address sketching the evolution in mining methods since 1896. 3300 w. Can Min Rev—July, 1905.

See also GOLD; HYDRAULIC MINING.

GOLD MINING LAW.

See MINING LAW.

GOLD MINING MACHINERY.

See ELECTRIC EQUIPMENT; GOLD METALLURGY; GOLD MILLING; GOLD MINE; GOLD MINING; MINING MACHINERY.

GOLD ORE.

See GOLD; GOLD GEOLOGY; GOLD METALLURGY; ORE; ORE DEPOSIT.

GOLD PLACER.

See GOLD DREDGING; GOLD MINING—Placer; HYDRAULIC MINING.

GOLD PRODUCTION.

See GOLD.

GOLD PROSPECTING.

See GOLD; GOLD DREDGING—Prospecting; GOLD GEOLOGY; PROSPECTING.

GOLD REFINING.

See ASSAYING; GOLD ASSAYING; GOLD METALLURGY.

GOLD REGION.

See GOLD; GOLD GEOLOGY; GOLD MINE; MINERAL REGION.

GOLD VEIN.

See GEOLOGY; GOLD GEOLOGY; ORE DEPOSIT.

GOVERNMENT OWNERSHIP.

See also MUNICIPAL OWNERSHIP.

Illinois.—Governmental vs. Private Ownership of Public Utilities. Reviews the history of the State of Illinois, which records repeated failures wherever and whenever governmental ownership has been tried. 4000 w. R R Gaz—Vol. XXXIX., No. 14.

Railways.—See RAILWAY—Governmental Ownership.

GOVERNOR.

See also SPEED VARIATION; STEAM ENGINE—Governing; Speed Regulation.

Governors and Governing Mechanism. Herbert Reed Hall. Describes various forms of governors and considers the essential qualities that a governor should possess. Serial. 1st part. 1800 w. Prac Engr—Oct. 3, 1902.

Steam Engine Governors. Considers points in connection with their design. Serial. 1st part. 2700 w. Mech Engr—April 22, 1905.

Automatic.—See Marine Engine.

Centrifugal.—The Centrifugal Throttle Governor. Ernest R. Briggs. Illustrates and describes a form of governor much used in England. 1600 w. Am Mach—Dec. 17, 1903.

Centrifugal Governors (Les Régulateurs à Force Centrifuge). L. Rith. A general study of the principles involved in the design of centrifugal governors for the speed regulation of prime movers. 10,000 w. Mem Soc Ing Civ de France—Sept., 1905.

See also Nordberg; Theory.

Centrifugal Fan.—See PUMP—Centrifugal.

Centrifugal Pumps.—See PUMP—Centrifugal.

Corliss Engine.—See Drives; Failure.

Drives.—Positive Governor Drives for Corliss Engines. A. H. Eldredge. A brief illustrated article strongly advocating the use of gearing or sprocket and chain to replace belts for governor drive. 600 w. Trans Am Soc of Mech Engrs—June, 1903.

Electric Generating Set.—See ELECTRIC GENERATING SET—Speed Regulation; STEAM ENGINE—Speed Regulation.

Elevator.—See ELEVATOR—Governor; Safety Appliances.

Failure.—The Obscure Cause of Failure of a Corliss Engine Governor to Regulate. Yestric Land. Explains the conditions and the difficulty in locating the trouble, with the final success. 1600 w. Am Mach—June 9, 1904.

Gas.—See GAS GOVERNOR.

Gas Engine.—See GAS ENGINE—Governing.

Hand Regulator.—Hand Adjustment of the Governors of Steam Plants in Electric Light Stations. J. H. Dales. Explains what is meant by hand adjustment, considering only high-speed, spring-load centrifugal governors in studying the limit of possibilities. 1500 w. Elect'n, Lond—Oct. 3, 1902.

High Speed Engines.—The Governing of High-Speed Engines. J. H. Dales. Investigates the principles on which governing apparatus is constructed, discussing the several types of governor which are in general use. Serial. 1st part. 2200 w. Engng Rev—July, 1904.

Hydraulic.—See HYDRO-ELECTRIC PLANT; TURBINE; WATER WHEEL.

Impulse Wheel.—See WATER WHEEL.

Inertia.—Investigations of Inertia Governors for Steam Engines (Untersuchung der Beharrungsregler an Dampfmaschinen). O. Körner. A theoretical and mathematical study, with figures. 5000 w. Zeitschr d Ver Deutscher Ing—Dec. 28, 1901.

Lentz Shaft.—See STEAM TURBINE.

Marine Engine.—The Racing Check: A New Marine Engine Governor. Illustrated description. 1000 w. Prac Engr—Oct. 16, 1903.

Marine Engine Governors. Jasper E. Cooper. Illustrated descriptions of different governors for marine steam engines. 3500 w. Feilden's Mag—Jan., 1903.

Automatic Governing of Marine Engines. H. M. Wilson. Read before the N. E. Coast Inst. of Engrs. & Shipbuilders. States facts showing the need of marine reciprocating engines having a good automatic governor, illustrating and describing the principal governors. 4800 w. Mech Engr—April 16, 1904.

Nordberg.—The Nordberg Static Governor. Illustrated description of a governor for pumping engines and air compressors, which introduces the new principle of controlling the speed through a wide range by a centrifugal governor. 900 w. Am Mach—Vol. 28, No. 34.

Pelton Wheel.—See WATER WHEEL.

Relay.—Relays and Governors. Arthur Rigg. A discussion of the action and performance of various regulating appliances for steam engines, giving descriptions of arrangements and combinations, with critical comments. Ill. 3500 w. Engr, Lond—Oct. 17, 1902.

Risdon Hydraulic.—See HYDRO-ELECTRIC PLANT—Colgate, Cal.

Rites.—The Rites Shaft Governor. Charles Buerger. Mathematical study of the equilibrium positions, and the so-called "inertia effect." 1800 w. Stevens Ind—Jan., 1901.

Adjustment and Regulation of the Rites Governor. F. M. Rites. Directions regarding its adjustment and regulation. 3500 w. Power—July, 1902.

Shaft.—Progress in the Construction of Shaft Governors (Fortschritte im Baue von Flachreglern). F. Strnad. Illustrating improved forms of disc governors, both of the centrifugal and inertia types. 3000 w. Zeitschr d Ver Deutscher Ing—July 13, 1901.

Modern Forms of Shaft Governor. H. F. Schmidt. Illustrates and describes various forms in use. 2500 w. Am Elect'n—Nov., 1901.

Evolution of the Shaft Governor. Prof. R. C. Carpenter. Paper at meeting of the Engine Builders' Assn. Discusses the various forms of shaft governor and their method of action. General discussion. 9800 w. Engr, U S A—Dec. 16, 1901.

Shaft Governors—Some Troubles with Them. Hubert E. Collins. Gives experiences and points out, in a general way, a few rules to be observed, and how to handle some of the makes in general use. 1400 w. Engr, U S A—Jan. 15, 1902.

The Regulating of High-Speed Engines by Shaft Governors (Beitrag zur Frage der Regelung Schnellaufender Dampfmaschinen durch Achsenregler). J. Finkel. Showing the application of the shaft governor to valves of the Corliss and the piston types, with details of recent German governors. 2500 w. Zeitschr d Ver Deutscher Ing—March 15, 1902.

Robinson's Shaft Governor. An illustrated description of a spring shaft governor for steam engines. 400 w. Engng—Dec. 12, 1902.

Hints on the Design and Construction of Shaft Governors. C. B. Risley. Discusses points affecting regulation and durability. Ill. 1200 w. Power—April, 1903.

Treatment of Shaft Spring Governors. Hubert E. Collins. Considers the difficulties that may occur in the handling of a shaft-governor, with the remedies, giving rules for the regulation and speeding. Ill. 2300 w. Engr, U S A—Nov. 2, 1903.

The Development of the Shaft Governor. William O. Webber. An illustrated article briefly considering three classes of shaft governors. 1400 w. Engr, U S A—Feb. 1, 1904.

See also **Rites.**

Speed Recorder.—Apparatus for Obtaining a Continuous Record of the Position of an Engine Governor and the Speed of the Engine which It is Governing. Joseph C. Riley. Describes experiments performed at Nason College, Birmingham, England, on the action of governors when detached from their engines, and also a similar set of experiments at the Massachusetts Inst. of Technology. Ill. 4800 w. Trans Am Soc of Mech Engrs, No. 0971—Dec., 1902.

Spring.—Spring Governor (Leistungs-Federregler). J. Stumpf. An illustrated description of a steam engine governor with a wide range, which will act both as a regulator and as a safety device. 2000 w. Zeitschr d Ver Deutscher Ing—June 14, 1902.

Spring Governors (Régulateurs de Vitesse, à Ressorts). G. Aimont. Illustrated description of Janetzko and other governors for steam and gas engines. 1500 w. Alliance Industrielle—May, 1903.

Governor Springs. H. R. Hall. Gives a chart for determining the dimensions of a spring for a governor, with information in regard to its use, and illustrated by examples. 1800 w. Prac Engr—Dec. 29, 1905.

See also **Shaft; Tollie.**

Static.—See **Nordberg.**

Theory.—The Theory of Steam-Engine Governors (Note sur la Théorie des Régulateurs). V. Dwelshauvers-Dery. An examination of the conditions of isochronous regulation of steam engine speed by centrifugal governors, and the extent to which it can be attained in practice. 8000 w. Revue Mécanique—Jan. 31, 1903.

Tolli Spring.—The Tolli Spring Governor. Emile Guarini. Illustration with description of the operation of these governors. 800 w. Sci Am Sup—Dec. 2, 1905.

Turbine.—See **TURBINE; WATER WHEEL.**

Water Wheel.—See **TURBINE; WATER WHEEL.**

GRADE.

See **RAILWAY GRADE.**

GRADE CROSSING.

See also **INTERLOCKING; RAILWAY ACCIDENT; RAILWAY CONSTRUCTION; RAILWAY SIGNAL; TRACK DEPRESSION; TRACK ELEVATION.**

The Abolition of Railroad Crossings at Grade. From the report of L. M. Hastings, offering plans for solving the various problems arising and making his recommendations. Ils. 2200 w. Munic Engng—Aug., 1901.

Abolition of Grade Crossings. Charles Zueblin. An illustrated article reviewing what has been accomplished and what should be done in various cities of the United States. 3200 w. Munic Af—Dec., 1901.

Boston-Dedham.—The Abolition of Grade Crossings on the Providence Division of the New York, New Haven & Hartford Railroad between Boston and Dedham. Arthur S. Tuttle. A statement of the conditions and requirements of the decree of the court, with illustrated description of the construction. 9400 w. Jour Assn of Engng Soc's—Nov., 1901.

Cattle Guard.—See **RAILWAY PERMANENT WAY —Cattle Guard, Canada.**

Electric and Steam Railways.—Crossings of Steam and Electric Railways. Report of the Am. Ry. Engng. and Main. of Way Assn., relating to the safety of highway surface crossings of railways. 1800 w. St Ry Rev—April 15, 1901.

Steam and Electric Railway Crossings. Charles R. Barnes. Read at Syracuse meeting of the N. Y. State St. Ry. Assn. Discusses grade crossing accidents and the best protection when the crossing is at grade. 2000 w. St Ry Jour—Oct. 17, 1903.

Grade Crossing Protection Between Steam and Electric Railways. Illustrates and describes the means of protection adopted by the Public Service Corporation of New Jersey. 800 w. Ry Age—Feb. 5, 1904.

Gates.—Some Features of Crossing Gate Operation. Illustrates and describes features of the pneumatic gates of the Bogue and Mills systems. 1000 w. Ry & Engng Rev—Feb. 1, 1902.

Gates at Crossings of Railways and Roads (Wegschranken bei Eisenbahnen). Karl Stöcke. Brief, illustrated description of gates to be operated from one side of the track. 1 plate. 700 w. Oesterr Wochenschr f d Oeffent Baudienst—April 12, 1902.

Harrisburg, Pa.—A Grade Crossing Removed at Harrisburg, Pa. An illustrated description of the work of eliminating the Market street grade crossing. 500 w. Ry Age—Dec. 6, 1901.

Massachusetts.—The Abolition of Grade Crossings in Massachusetts. Edmund K. Turner. A report of what has been done in this State, legislation, and the course which has been pursued. Also general discussion. 15,000 w. Jour Assn of Engng Soc's—Nov., 1902.

St. Louis, Mo.—Grade-Crossing Problems in St. Louis. Carl Gayler. Gives a short review of the history of railroading in St. Louis, and some of the cases of grade-crossings and their treatment. General discussion. Ils. 7000 w. Jour Assn of Engng Socs—July, 1905.

Signal, Electric.—See **RAILWAY SIGNAL—Grade Crossing, Electric.**

Steam and Electric Railways.—See **Electric and Steam Railways.**

Texas.—Railway Grade Crossing Protection in Texas. Gives the Texas Railroad Commission's requirements and recommendations for interlocking systems. 2000 w. Eng News—July 17, 1902.

Time Lock.—Time Lock to Prevent Derailments at Interlocked Grade Crossings. Illustrated description of a mechanical time lock. 1000 w. Eng News—March 13, 1902.

GRADIENT RAILWAY.

Halford.—The Halford Gradient Railway. Brief illustrated description of a novel suspension railway utilizing the laws of gravity. 1200 w. Sci Am—Dec. 29, 1900.

GRADING.

Electric Railway.—See **ELECTRIC RAILWAY—Grading Work.**

GRADING MACHINE.

See also **EARTHWORK; EXCAVATION; RAILWAY CONSTRUCTION.**

Steam Excavating and Grading Machine. Illustrated description of a grading machine attached to a traction engine, and its operation. 1100 w. Eng News—Aug. 15, 1901.

Grant Park, Chicago.—The Handling of Material for Filling Grant Park, Chicago. Illustrated description of the interesting dumping equipment used for this work. 1200 w. Eng News—Aug. 24, 1905.

GRADUATION.

See **DIVIDING; INDEXING.**

GRAIN BIN.

See also **GRAIN ELEVATOR; GRAIN HANDLING.**

Concrete-Steel.—An Accident to a Concrete-Steel Grain Bin. Illustrated description of a bin which burst when filled with grain; the walls were of concrete reinforced by rings of strap-iron. 600 w. Eng Rec—June 1, 1901.

Concrete Reinforced.—Design for Reinforced Concrete Bins for Grain Elevators. Illustrated description of a rectangular bin construction with supporting columns. 1500 w. Eng News—June 23, 1904.

Eccentric Hopper.—Determining the Capacity of a Cylindrical Grain Bin with Eccentric Conical Hopper. B. F. Groat. Gives a general formula and method. 600 w. Eng News—March 9, 1905.

Pressure.—Grain Pressures in Deep Bins. J. A. Jamieson. Outlines tests, calculations and discussions on this subject previously published, and presents information gained by conducting a systematic series of tests, calculations and investigations and deductions drawn. Also shows cause of certain failures, and describes a number of designs of grain bin construction. 11,500 w. Can Soc of Civ Engrs—Adv Proof—Feb., 1904.

Tests of Grain Pressure in Deep Bins at Buenos Ayres, Argentina. Eckhardt Lufft. Gives a summary of results of tests carried out from Feb. to Nov., 1903. Ills. 3000 w. Eng News—Dec. 15, 1904.

The Problem of Grain Pressure. Wilfrid Airy. Discusses the principal points in papers of Isaac Roberts and H. A. Janssen, and gives a general explanation of the problem. 3500 w. Engng—Jan. 6, 1905.

The Strength of the Walls of Grain Bins (Calcul des Parois des Silos à Grains). Alexander Sée. Working out the method for calculating the lateral pressure of grain, and deriving formulas for practical use in constructing bins. 2000 w. Génie Civil—April 8, 1905.

GRAIN ELEVATOR.

See also **GRAIN BIN; GRAIN HANDLING.**

Grain Elevators (Getreidespeicher). M. Buhle. A fully illustrated account of modern warehouses and appliances for storing and handling grain, with examples from various parts of Europe and America. Three articles. 10,000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Feb. 13, 20, March 5, 1904.

Buffalo, N. Y.—The Power Equipment of the New Iron Elevator of the Iron Elevator and Transfer Company, Buffalo, N. Y. An illustrated description of an elevator and its equipment, in which the grain is handled by means of endless rubber belt conveyors and elevating legs, which are driven by induction motors. 1100 w. Elec Rev, N Y—Aug. 9, 1902.

Concrete Reinforced.—The Failure of a Concrete-Steel Grain Elevator at Duluth, Minn. An illustrated description of the structure and its failure, with analysis of its cause. 500 w. Eng News—Dec. 27, 1900.

A Concrete Grain Elevator. Illustrated description of a storage house at Duluth, Minn., embodying the concrete and wire mesh system with steel tie rods as an additional strengthening. It is also unique in shape and size. 1600 w. Ir Age—April 3, 1902.

See also **GRAIN BIN.**

Duluth, Minn.—See **Concrete Reinforced.**

Electric Equipment.—See **ELECTRIC EQUIPMENT—Grain Elevator.**

Fireproof.—Fireproof Grain Elevators in America. John Kennedy. A critical comparison of the chief types, with editorial. 3800 w. Eng News—July 18, 1901.

Elevator Construction. John Kennedy. Report of an inspection made of fireproof grain elevators. 2800 w. Can Engr—Aug., 1901.

Fireproof Grain Elevator Construction. James MacDonald. Describes the ordinary construction, where wood was the material most generally used, and gives an illustrated description of a system consisting of a combination of tile and reinforced steel members. Discussion. 8500 w. Jour W Soc of Engrs—Feb., 1902.

Fireproof Grain Storage Buildings. Illustrates and describes several types tracing the evolution of fireproof tank elevators. 2800 w. Br Build—Nov., 1902.

See also **Concrete Reinforced.**

Frankfort.—Recent Grain-Elevator Construction (Installations Récentes de Grande Magasins à Blé). A. Bidault des Chaumes. Describing especially the new warehouses at Frankfort, Strasburg and Genoa, with details of construction. 2000 w. 1 plate. Génie Civil—March 26, 1904.

Galveston.—The Southern Pacific Elevator, Galveston, Texas. Illustrated description of an interesting engineering work. 3500 w. Eng Rec—Dec. 5, 1903.

Genoa.—The New Grain Elevators at Genoa (I Nuovi Silos per il Grano a Genova). A general description, with illustrations, of the important new warehouses and elevators at the port of Genoa, Italy. Serial. Part I. 2000 w. 1 plate. L'Industria—Nov. 16, 1902.

See also **Frankfort.**

Grasshopper.—See **GRAIN HANDLING—London.**

Huart System.—Grain Storage in Elevators on the Huart System (La Conservation des Grains dans les Greniers du Système Huart). G. Espitallier. Review of an article by M. Adrian in the "Revue du Service de l'Intendance," giving an illustrated description of this system, in which the grain is stored in large metal bins and changed from one to another every week or two. 1400 w. Génie Civil—Jan. 4, 1902.

Leith Docks.—New Grain Elevators at Leith Docks. Describes elevators in Scotland for the rapid discharging of grain ships. 1300 w. Engr, Lond—Sept. 9, 1904.

Minneapolis.—Modern Grain Elevators. Illustrated descriptions of two of the latest elevators erected in Minneapolis. 700 w. Sci Am—Aug. 24, 1901.

New Orleans.—See **Stuyvesant.**

Operation.—The Operation of the Modern Grain Elevator. D. A. Willey. An illustrated account of the construction and operation of the modern "tank" elevators for storing and handling grain. 3000 w. Engineering Magazine—May, 1902.

Port Arthur.—The Canadian Pacific Grain Elevator at Port Arthur, Ontario. Illustrates and describes an elevator designed to meet special conditions, having a capacity of 448,000 bushels, and its construction. 2800 w. Eng Rec—April 9, 1904.

Fireproof Grain Storage Elevator for the Canadian Northern Railway, Port Arthur, Ont. R. M. Pratt. From a paper read before Can. Soc. of Civ. Engrs. Descriptive. 3500 w. Can Engr—April, 1904.

Portland, Me.—Grain Elevators of the Grand Trunk Ry. at Portland, Me. Illustrates and describes the elevators and conveying system at Portland. The most recently completed elevator has a capacity of 1,500,000 bushels. Many interesting features are described. 1700 w. Ry & Engng Rev—July 12, 1902.

Port Richmond, Pa.—See **FOUNDATION—Grain Elevator.**

Russia.—Grain Warehouses in Russia (Les Magasins à Blé en Russie). G. Espitallier. Describing especially the large warehouses at Nikolaieff, on the Black Sea, and at Windau on the Baltic. 2000 w. 1 plate. Génie Civil—Sept. 21, 1901.

Southern Pacific.—See **Galveston.**

Strasburg.—See **Frankfort.**

Stuyvesant, New Orleans.—Power Production and Transmission in the Stuyvesant Elevator, New Orleans. Describes an elevator with a capacity of 1,500,000 bushels in which the rope system of power transmission was adopted. Ils. 2500 w. Eng Rec—April 9, 1904.

Types.—Grain Elevators. An illustrated article considering the various types, new and old, and giving some loss figures from fires. 2800 w. Ins Engng—May, 1903.

Weehawken, N. J.—The Weehawken Elevator. Illustrated description of a fireproof grain elevator of 2,000,000 bushels total capacity, being built at Pier 7, West Shore R. R. terminal, on Hudson River, opposite New York. 3600 w. Eng Rec—Dec. 28, 1901.

The Weehawken Elevator of the New York Central & Hudson River R. R. J. C. Irwin. Fully illustrated description of a 2,000,000 bushel fireproof elevator. 2300 w. Eng Rec—April 8, 1905.

Large Grain Elevator at Weehawken. J. C. Irwin. Illustrated description of a 2,000,000 bushel fireproof elevator belonging to the New York Central. 2000 w. R R Gaz—Vol. XXXVIII. No. 14.

West Superior, Wis.—New Steel Elevator at West Superior. Illustrated description of a great grain-holding structure of steel at the head of the Great Lakes. 3000 w. Ir Trd Rev—April 18, 1901.

The Largest Steel Grain Elevator. Illustrated detailed description of an elevator just completed at the head of Lake Superior. 3300 w. Ir Age—April 25, 1901.

The New 3,100,000-Bushel Steel Grain Elevator for the Great Northern Ry., at West Superior, Wis. Description and illustrations of the construction and equipment. 2700 w. Eng News—Sept. 26, 1901.

GRAIN HANDLING.

See also **GRAIN BIN; GRAIN ELEVATOR; MECHANICAL HANDLING.**

British Harbors.—Grain Storage and Manipulation at the Quayside. Brysson Cunningham. Illustrates and describes modern methods, with especial reference to the practice at British ports. 3000 w. Cassier's Mag—May, 1905.

Compressed Air.—Compressed Air Grain Shoveling. J. G. Westbrook. Illustrates and describes the equipment for a large grain-house. 800 w. Compressed Air—May, 1905.

Great Lakes.—Great Lakes Grain Traffic. R. J. Donovan. An illustrated account briefly describing the elevator, the operations necessary in the handling of the grain, and the vessels engaged in the trade. 3000 w. Marine Engng—March, 1903.

Hickman, Ky.—Transferring Grain from Boats to Cars at Hickman, Ky. Abstract of an article by C. B. Wilson, contributed to the Trans. of the Engng Assn. of the South, showing one of the methods used for transporting freight from river steamers to the railways. Ill. 1000 w. Eng News—Aug. 1, 1901.

London.—A New Derrick or "Grasshopper" Elevator for Unloading Grain from Vessels. Illustrates and describes a machine in use at the London docks. 2000 w. Sci Am—Jan. 31, 1903.

GRAIN STORAGE.

See **GRAIN BIN; GRAIN ELEVATOR; GRAIN HANDLING.**

GRANDSTAND.

See also **RACE TRACK; STADIUM.**

Belmont Park, Long Island.—The Belmont Park Steel Grandstand. Illustrates and describes the engineering and architectural features of a steel grandstand at this race course on Long Island, near New York City. It is 116 feet wide, 650 feet long, and about 55 feet high, having a seating capacity of 11000. 2500 w. Eng Rec—April 22, 1905.

Concrete, St. Louis.—An All-Concrete Grand-Stand. Illustrated detailed description of the recently completed grand-stand for the athletic field at Washington University, St. Louis. 1000 w. Eng Rec—May 28, 1904.

GRANITE.

See also **BUILDING CONSTRUCTION; BUILDING MATERIAL; COLUMN; QUARRY; STONE.**

America.—The American Granites. A summary showing where the main deposits now being worked are formed, and information concerning the varieties and quality. 1600 w. Stone—May, 1901.

Arch Hinges.—Tests upon Granite Blocks for Arch Hinges (Versuche mit Granitquadern zu Brückengelenken). C. Bach. Data and results of compression tests of granite, showing the wide variations due to weathering, etc. 7000 w. 3 plates. Zeitschr d Ver Deutscher Ing—Oct. 3, 1903.

Articulations.—Articulations in Granite for Bridges. Describes methods successfully carried out in Wurtemberg and Saxony in which articulations of a metallic character are excluded and the same purpose accomplished by means of arch stones or concrete voussoirs in direct contact with one another. 1100 w. Engr, Lond—June 10, 1904.

Column.—See **COLUMN—Granite.**

Maine.—The Granite Industry of Maine. An illustrated article giving the location of some of the extensive deposits and information concerning the quality of the stone. 2000 w. Stone—April, 1903.

Sweden.—Karlshäll Granite Quarries, Carlshamn, Sweden. An illustrated detailed description of this famous granite district. 4600 w. Quarry—Aug., 1902.

Wales.—The Granite Quarries of Yr Eifl. Illustrates and describes these interesting quarries in Wales. 2600 w. Quarry—July, 1902.

GRAPHICS.

See also **BRIDGE DESIGN; FRAMEWORK; KINEMATICS; MECHANICS.**

The Theory and Application of Graphical Computations (La Theorie et Applications de la Nomographie). Rodolphe Soreau. A discussion of the methods of constructing diagrams for the rapid computation of engineering data, with numerous examples. 1200 w. Mem Soc Ing Civ de France—August, 1901.

Graphic Integration—Area, Center of Gravity, Moment of Inertia, &c. Karl G. Holst. Gives an approximate method of drawing an integral curve. 1400 w. Am Mach—April 10, 1902.

Illustrations of Graphical Analysis. J. Harrison. Read before the British Assn. A short account of applications of graphical processes to engineering computations. 1500 w. Engng—Sept. 18, 1903.

Arch.—See **ARCH—Elastic Circular.**

Beam Deflection.—See **BEAM—Flexure.**

Belt Length.—See **BELTING—Length.**

Calculator Board.—See **CALCULATOR BOARD.**

Compressed Air.—See **COMPRESSED AIR—Graphics.**

Concrete Reinforced.—See **CONCRETE REINFORCED—Test.**

Electric Instrument Graduation.—See **ELECTRIC INSTRUMENT—Graduation.**

Electric Station Location.—See **ELECTRIC STATION MANAGEMENT—Location.**

Flywheel.—See **FLYWHEEL—Weight.**

Forces.—The Decomposition of Forces (Ueber Kräftezerlegung). A. Kiefer. Giving solutions of a number of special problems in graphical statics. 1800 w. Schweiz Bauzeitung—May 21, 1904.

Framework Stresses.—See **FRAMEWORK—Stresses.**

Fuel Waste.—See **FUEL—Waste.**

Hoisting Problems.—See **HOISTING—Graphical Methods.**

Influence Lines.—On the Use of Influence Lines in Graphic Statics. Myron S. Falk. Shows its use to indicate the position of the moving load causing the maximum shears, moments, reactions, or stresses in a truss. 3800 w. Sch of Mines Quar—Jan., 1903.

Locomotive Proportion.—See **LOCOMOTIVE DESIGN—Graphical Methods.**

Mean Effective Pressure.—See **STEAM ENGINE.**

Mining Problems.—Graphical Solution of Mining Problems. Leo Gluck. Describes methods and apparatus by which the labor of calculation can be materially reduced. Ill. 1600 w. Mines & Min—Dec., 1900.

Moment of Inertia.—See **MECHANICS; MOMENT OF INERTIA—Riveted Joints.**

Prony Brake Tests.—See **DYNAMOMETER.**

Ship Stability.—See **SHIP STABILITY—Calculations.**

Statics.—See **Forces.**

Thermodynamics.—See **THERMODYNAMICS — Graphics.**

Tri-Axial Diagram.—See **SLAG.**

Valve Gears.—See **VALVE GEAR—Diagrams.**

GRAPHITE.

See also **CARBON.**

Graphite.—Graphite. Malcolm McNaughton. Briefly describes the formation, occurrence, sources and amount of supply, and the various uses. 5000 w. Stevens Ind—Jan., 1901.

The Graphite Industry. Joseph Hyde Pratt. States the many uses of graphite, its occurrence, deposits, localities developed, etc. 3500 w. Min Wld—July 22, 1905.

Anodes.—See **ELECTRO-CHEMISTRY.**

Artificial.—Adaptability of Artificial Graphite Articles. C. L. Collins. Facts concerning what has been accomplished in regular commercial work, including figures covering exact costs. Ills. 2500 w. Elec-Chem Ind—July, 1904.

See also **Manufacture.**

Electric Resistance.—See **ELECTRIC RESISTANCE.**

Lubrication.—See **LUBRICATION—Graphite.**

Manufacture.—The Artificial Production of Graphite. Clinton Paul Townsend. An account of some of the modifications undergone by carbon, and the conditions governing them, with inferences drawn. 5800 w. Elec Wld & Engr—April 6, 1901.

Pennsylvania.—Graphite and Garnet Industries in Pennsylvania. T. C. Hopkins. Tells where the minerals occur, the uses to which they are put, and their values. 1700 w. Mines & Min—March, 1901.

GRATE.

See also **BOILER; COMBUSTION; FIRING; FURNACE; LOCOMOTIVE GRATE; MECHANICAL STOKING.**

Bars, Herringbone.—Making a Lot of Herring-Bone Grate-Bar Patterns. J. L. Gard. Illustrations, with brief description. 600 w. Am Mach—March 17, 1904.

Coke Breeze.—See **COKE BREEZE—Fuel.**

Kudlics.—The Kudlics Grate. L. Brousse, in "L'Ingénieur Français." Illustrates and describes a grate intended to solve the problem of continuous mechanical feed, stoking or clearing the firebars, and removing the products of combustion. 1000 w. Col Guard—May 31, 1901.

Locomotive.—See **LOCOMOTIVE GRATE.**

Smoke Prevention.—See **SMOKE PREVENTION—Grate.**

GRAVEL.

Massachusetts.—See **SAND.**

Road, Material.—See **ROAD—Gravel.**

GRAVING DOCK.

See **DRY DOCK.**

GRAVITATION.

See **PHYSICS—Gravitation.**

GRAZING PEN.

Electric.—See **AGRICULTURAL MACHINERY—Grazing Pen.**

GREAT BRITAIN.

See also under subhead **British,** under specific main headings.

1901. A review of the year's history in Great Britain in mechanical and electrical engineering, gas supply, war material and chemistry. 20,500 w. Engr, Lond—Jan. 3, 1902.

GREENHOUSE.

Edgely, Pa.—The Largest Greenhouse in the World. Arthur C. Johnston. Illustrates and describes the construction of a greenhouse for rose culture at Edgely, Pa. 80 w. Eng News—Dec. 12, 1901.

Heating.—See **HEATING—Greenhouses.**

GRINDING.

See also **ABRASIVE; CRUSHING; EMERY WHEEL; GRINDING WHEEL; GRINDSTONE; MACHINE TOOL; TOOL.**

Grinding Machines and Processes. Joseph Horner. Describes recent developments in machines and their operation, new processes, etc. Ill. Serial. 1st part. 3500 w. Engng—July 4, 1902.

Some Points About Grinding. C. H. Norton. On the selection of wheels for various classes of work, the things to be considered, and related matters. 3300 w. Am Mach—Feb. 5, 1903.

Some More Points About Grinding. C. H. Norton. Discusses points brought up by Tecumseh Swift and F. Thornley, and gives personal experiences. 4200 w. Am Mach—May 7, 1903.

The Grinding Machine and Its Possibilities. H. Darbyshire. Based on experience gained in the workshops of Alfred Herbert, Limited, in Coventry, England. Discusses important points in grinding. 5500 w. Engr, Lond—March 20, 1903.

Points in Shop Management. Frank B. Kleinhans. Discusses the uses of the grinding machine, the lining up of work, &c. Ills. 2800 w. Ir Trd Rev—March 3, 1904.

The Grinding Machine as a Metal-Cutting Tool. C. H. Norton. An examination of the recent development of the grinding machine for sizing cylindrical parts, with illustrations of machines and products. 2500 w. Engineering Magazine—July, 1904.

Some New Cutter and Tool-Grinding Machinery. Charles S. Gingrich. Illustrated detailed descriptions of examples from American practice. 4000 w. Cassier's Mag—Oct., 1904.

Attachment.—Surface Grinding Attachment for a Universal Grinder. Illustrations, with description. 600 w. Am Mach—July 24, 1903.

Bath.—The Bath Upright Type Universal and Combination Grinder. Illustrated detailed description. 1500 w. Ir Age—Sept. 5, 1901.

Becker-Brainard.—The Becker-Brainard No. 1 14-inch Cutter and Reamer Grinder. Illustrates and describes a new machine able to handle various styles and sizes. 900 w. Ir Age—June 30, 1904.

Boys.—A Novel Tool-Grinding Attachment. Illustrates and describes a tool-grinding attachment designed by Prof. C. V. Boys for accurately grinding lathe and planing tools. 1900 w. Sci Am—May 24, 1902.

Cock.—Cock Grinding Machine. W. E. Willis. Illustrates and describes a four-spindle cock grinding machine and its operation. 1000 w. Am Mach—March 26, 1903.

Commercial.—Modern Commercial Grinding. W. Muston. Abstract of a paper read before the Birmingham Assn. of Mech. Engs. Deals with plain or taper cylindrical work, ground on its external surface. 4500 w. Mech Engr—March 11, 1905.

Cylindrical.—Modern Cylindrical Grinding. C. H. Norton. Read before the Cincinnati Metal Trds. Assn. Reviews the development of grinding, the conditions of modern ground work, preparation, &c. 4000 w. Ir Trd Rev—Oct. 15, 1903.

Recent Progress in Cylindrical Grinding. C. H. Norton. On the rapid progress in this work during the last few years. 1500 w. Ir Age—Jan. 7, 1904.

Disc.—Disc Grinder. Illustrated description of a 20-inch universal disc grinder of the "mechanical fitter" type manufactured in England. 800 w. Engr, Lond—Aug. 22, 1902.

A Talk on the Disk Grinder. F. N. Gardner. Considers the disk grinder with special reference to tool room work. 3500 w. Mach, N Y—June, 1904.

Drill.—An Improved Grinding Machine for Twist Drills (Neue Schleifmaschine für Lochbohrer). Hermann Fischer. With numerous diagrams showing the manner in which the drill is held and presented to the emery wheel. 1000 w. Zeitschr d Ver Deutscher Ing—April 29, 1905.
See also **Mayers' Twist Drill.**

Dust Collecting.—The Exhaust System of Dust Collecting as Applied to Grinding Machinery, Etc. Vernon I. Norbury Williams. An illustrated article presenting the merits of this system. 2000 w. Ir & Coal Trds Rev—Dec. 2, 1904.

See also Refuse.

Electric.—An Electric Grinder. F. C. Mason. Illustrated description of an electric grinding machine, designed and built by the writer, which has given satisfaction. 1000 w. Am Mach—Feb. 18, 1904.

A New Electrically-Driven Tool Room Grinder. Illustrated description of a machine arranged for direct connected motor driving. 1100 w. Am Mach—Vol. 28, No. 22.

See also ELECTRIC DRIVING.

English.—Some English Grinding Machinery. Illustrated descriptions of recent English types. The most distinctive features are the self-oiling-dust proof bearings, which are extra long and of a large diameter, and driving pulleys, which are extra wide and of large diameter. 900 w. Ir Age—March 9, 1905.

Evolution.—Points on Grinding. C. H. Norton. Gives a short study of the evolution of the grinding wheel and the grinding machine, and discusses the cause of chatters and troubles in rapid grinding. Serial. 1st part. 2500 w. Am Mach—Jan. 7, 1904.

Foundries.—See also EMERY WHEEL.

Gauges.—Making Spherical End Gauges. Charles W. Wright. Illustrates and describes inventions of the writer for grinding spherical end gauges, and a lapping rig for gauges. 900 w. Am Mach—Aug. 13, 1903.

Germany.—Two German Grinding Machines. Illustrates and describes a cylindrical grinding machine for internal grinding, and a link grinding machine which possess points of novelty. 700 w. Am Mach—Jan. 22, 1903.

Gold Ore.—See GOLD METALLURGY; GOLD MILLING.

Guest.—The Guest Universal and Cutter Grinder. Illustrated description of a tool designed to accurately and rapidly do the grinding required in manufactured establishments, explaining its operation. 1800 w. Engng—Dec. 6, 1901.

Hibbard.—The Hibbard Reversible Grinding Machine. Illustrates and describes a machine for circular grinding in which the work revolves. 1400 w. Ir Age—Feb. 6, 1902.

Hints.—Grinding. Hints from an operator of experience. 3200 w. Am Mach—Jan. 21, 1904.

Index.—Index Grinding a Hard Steel Ratchet. Walter Gribben. Illustrates and describes the manner of doing the work. 1200 w. Am Mach—Feb. 26, 1903.

Kalgoorlie.—See GOLD METALLURGY.

Lathe Compared.—The Grinding Machine vs. the Lathe. Gives facts and figures showing the advantages and economy of grinding machines. 3500 w. Engr, Lond—Feb. 19, 1904.

Lathes.—Removing Stock in the Grinding Lathe. Henry Hess. Gives results of some competitive trials to determine the relative efficiency of two wheels. 2500 w. Am Mach—July 30, 1903.

Machine Rest.—Grinding and Grinding-Machine Rests. Illustrates and describes rests in use, which the writer commends as the best he has seen. 1600 w. Am Mach—Vol. 28, No. 16.

Mayer's Twist Drill.—Mayer's Twist Drill Grinder. Illustrated description of a machine for automatically grinding twist drills recently devised by G. M. Mayer, of Germany. 1100 w. Mech Eng—Oct. 28, 1905.

Norton.—The Norton Grinding Machine. Illustrated description of a machine made in Worcester, Mass., with report of the work done by it, its operation, time performance, etc. 3500 w. Engng—Oct. 17, 1902.

The Norton New 14-Foot Grinding Machine. Illustrated description of this machine and its manipulation. 2800 w. Ir Age—Jan. 28, 1904.

See also Cylindrical; Evolution.

Ore.—See CRUSHING; FLINT; GOLD MILLING; ORE TREATMENT.

Power Consumption.—See MACHINE TOOL.

Protective Device.—Safety Appliances for Grinding Machines (Protection des Meules Artificielles). Henry Mamy. A well illustrated account of various ventilating and other safety appliances for the protection of persons running grinding machines. 1 plate. 4000 w. Génie Civil—Dec. 21, 1901.

Improved Protection Devices for Artificial Grinding Wheels (Nouveaux Protecteurs pour Meules Artificielles). Henri Mamy. Illustrated descriptions of the devices receiving the prizes of the Association of French Workmen against accidents. 1500 w. 1 plate. Génie Civil—March 4, 1905.

Reamer.—See Cutter.

Refuse.—Collection and Removal of Refuse from Grinding and Polishing Machines. A. W. Bayard. Discusses the reasons why such refuse should be removed and the most effective mode of accomplishing the desired end. 1500 w. Ir Trd Rev—Oct. 9, 1902.

See also Dust Collecting.

Successive Comminution.—See CRUSHING.

Surface.—The Grinding Machine and Some Tools. H. Darbyshire. The first of a series of articles discussing the work done by grinding machines, and describing experiments made with surface grinding machines. Serial. 1st part. 3500 w. Engr, Lond—March 27, 1903.

Tool.—Tool-Grinding Machines. Joseph Horner. The first of a series of articles dealing with the processes and machines employed in the work of grinding tools. Ills. Serial. 1st part. 3500 w. Engng—March 25, 1904.

Tool Grinders. T. S. Bentley. Briefly traces the history of tool grinding, and considers the cutting power of a wheel, the various substances of which wheels are made, their wear, &c. Serial. 1st part. 3800 w. Prac Engr—Feb. 24, 1905.

Universal and Tool.—Universal and Tool Grinding Machine. Illustrated detailed description of a new machine. 800 w. Am Mach—Nov. 5, 1903.

Walker.—The Walker Tool Grinder No. 2. Illustrates and describes a tool intended for cutter-grinding, but also used for grinding miscellaneous work. 2200 w. Ir Age—June 23, 1904.

Wheel.—See GRINDING WHEEL.

GRINDING WHEEL.

See also EMERY WHEEL; GRINDING.

Binding Material.—See Strength Test.

Evolution.—See GRINDING.

Manufacture.—Emery Wheel "Dressers" and Grinding Wheel "Truing." Discusses points in the making of grinding wheels, and the necessity of using the diamond to make a perfect face. 900 w. Am Mach—Vol. 29, No. 5.

Strength Test.—Experiments on the Strength of Emery and Carborundum Wheels (Versuche über die Festigkeit von Schmirgel-und Karborundumscheiben). M. Grübler. An account of experimental tests of the different binding materials used for the manufacture of grinding wheels. 5000 w. Zeitschr d Ver Deutscher Ing—Feb. 7, 1903.

GRINDSTONE.

Silverwood, Eng.—The Production of Grindstones. An illustrated article describing the methods in the Silverwood Quarry, near Sheffield, Eng. 2000 w. Quarry—Jan., 1905.

GROUND DETECTOR.

See ELECTRIC INSTRUMENT—Ground Detector.

GROUNDING.

See also SALVAGE; WRECK.

Battleship.—See BATTLESHIP—"Kaiser Friedrich III."

Electric Current.—See ELECTRIC DISTRIBUTION.

GROUND WATER.

See also IRRIGATION; WATER RIGHTS; WATER SUPPLY; WELL; WELL BORING.

Subterranean Waters. Charles Morris. Considers the conditions under which interior water exists, the service rendered by it, etc. General discussion follows. 4000 w. Jour Fr Inst—March 1901.

The Development of Sources of Ground-Water (Ueber die Erschliessung Unterirdischer Quellwasser). A. Tschebull. A study of the investigation of subterranean water sources, and their use for public water supply. 4500 w. Zeitsch d Oesterr Ing u Arch Ver—June 28, 1901.

Ground Water (Grondwater). J. v. D. Breggen. An examination of the formation of subterranean water strata, and the methods of reaching them for water supply. 3000 w. De Ingenieur—May 3, 1902.

Underground Water. George Bowers. Suggestions on how to obtain and care for it. Followed by general discussion. 5400 w. Jour N E Water Wks Assn—June, 1903.

Conservation and Increase of Subterranean Water. E. O. Mawson. Considers the means by which this source of water supply may be conserved and increased. 4300 w. Engr, Lond—Oct. 9, 1903.

Some Geological Principles of Subterranean Water Supply. F. J. H. Merrill. Discusses deep wells in soft rocks, and deep wells in hard rocks. 1100 w. Eng News—Oct. 20, 1904.

Artificial Infiltration.—The Progressive Sinking of the Ground Water Level and Artificial Ground Water Supplies. Prof. J. Gustav Richert. A discussion of the effect of wells on ground water supplies, and concluding that artificial infiltration is the best solution of the problem. Ills. 2000 w. Eng News—Nov. 24, 1904.

Artificial Springs.—Artificial Fountain and Geyser Springs. Myron L. Fuller. Describes the methods of constructing fountain springs and geyser springs, illustrating types. 1200 w. Sci Am—July 22, 1905.

Berlin.—The Supply of Berlin with Groundwater (Die Versorgung der Stadt Berlin mit Grundwasser). A review of the proposition to increase the water supply of Berlin, with an estimate of the available ground-water supply. 2500 w. Gesundheits-Ingenieur—July 31, 1904.

British Law.—See WATER RIGHTS—Ground Water; WATER SUPPLY—Protection.

California.—The Diminished Yield of Underground Waters in Southern California. Information from a report of W. C. Mendenhall, at the irrigation congress, showing a decline, and that it is time to stop increasing, indiscriminately, the number of wells. 3000 w. Eng Rec—Oct. 7, 1905.

Colorado.—The Hot and Mineral Springs of Routt County and Middle Park, Colorado. A. Lakes. An illustrated description of interesting and valuable springs, which will probably become very important in the future. 1200 w. Min Rept—Nov. 2, 1905.

Flow.—The Movement of Waters in the Earth (Wasserbewegung durch Boden). Ph. Forchheimer. A comparison of the results of various experimenters with the observed facts in nature. Two articles. 10000 w. Zeitschr d Ver Deutscher Ing—Dec. 7, 14, 1901.

A New Method of Determining the Velocity of Underground Water. Charles S. Slichter. Describes an electrical method which has given satisfactory results with rapidity. Ill. 900 w. Eng News—Feb. 20, 1902.

Measurements of the Underflow at the Narrows of the Rio Hondo and San Gabriel River, California. Charles S. Slichter. Describes measurements on the flow of underground water made by the electrical method of the writer. 1800 w. Eng Rec—Oct. 17, 1903.

The Measurement of Ground Water (Versuchsbrunnenanlagen). Hr. Prinz. A paper on the importance of ground water supplies, and methods of determining the amount available, by means of experimental wells, etc. 4500 w. Gesundheits Ing—Jan. 31, 1902.

The Rapidity of Flow of Ground Water (Sur la Vitesse d'Ecoulement des Eaux Souterraines). E. Fournier and A. Magnin. An account of experiments on the flow of subterranean waters, with particular reference to their use for drinking. 500 w. Comptes Rendus—April 6, 1903.

The Problem of the Movement of Water Through Permeable Ground (Problem sul Moto dell 'Acqua a Traverso Terreni Permeabili). Pietro Alibrandi. An elaborate mathematical treatment, deriving equations for the movement of ground water under various conditions. 12,000 w. Ann d Soc d Ing e d Arch Ital—No. 3, 1904.

The Flowage of Underground Water. John Wellington Finch. Extracts from a paper read before the Colorado Sci. Soc. Considers the ideal direction of movement, passage through the rocks, barriers to flow, the zonal disposition, &c. Serial. 1st part. 4700 w. Ores & Met—June 15, 1904.

The Underground Water Circulation. Charles Mortimer Cross. A study of the flow of the underground water, giving examples illustrating the action, and explaining vadose circulation and deep circulation. Serial. 1st part. 1200 w. Ores & Metals—Aug. 1, 1904.

The Movement of Ground Water (Over de Beweging van Grondwater). J. M. K. Pennink. Describing interesting experiments with artificial sand beds, reproducing natural conditions of subterranean water flow. 3500 w. De Ingenieur—July 29, 1905.

The Flow of Water into Wells and Excavations (Ueber den Wasserzudrang in Brunnen und Baugruben). Dr. Philipp Forchheimer. An examination of the influence of pressure due to underground currents in connection with the filling of wells. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 27, 1905.

See also WATER FLOW.

Gothenburg, Sweden.—An Artificial Underground Water Supply at Gothenburg, Sweden. Describes a unique method of developing a water supply, utilising dangerous surface waters and a limited underground supply, and securing a naturally purified underground water. Describes the works. 2500 w. Eng News—Jan. 8, 1903.

Hot Springs.—Hot Springs. Edouard Suess. A study of the phenomena of hot springs. Translated from the German. Serial. 1st part. 2800 w. Eng & Min Jour—July 4, 1903.
See also Colorado; GEOLOGY.

Law.—See WATER RIGHTS—Ground Water; WATER SUPPLY—Protection.

Moravia.—See WATER SUPPLY.

Near Surface Streams.—Underground Waters Adjacent to Surface Streams. C. G. Hubbell. Concerning subsurface waters along large water courses as a pure supply, and the methods of obtaining this water. 1000 w. Eng News—April 28, 1904.

New York Law.—See WATER RIGHTS—Ground Water.

Ore Deposits.—See Veins; ORE DEPOSIT—Water Deposited.

Oyster Industry.—Ground Water Supplies and the Oyster Industry. Text of a decision of the N. Y. Supreme Court in a suit to prevent the operation of a ground water pumping station because it diminished the fresh water at the mouth of a creek where oysters are fattened. 1100 w. Eng Rec—Feb. 22, 1902.

Paris Supply.—See WATER SUPPLY.

Penzance, Eng.—Development of an Underground Water Supply for Penzance, England. From a paper by Frank Latham, before the Soc. of Engrs., describing his experiences in this work. 2800 w. Eng Rec—April 16, 1904.

Pollution.—See WATER POLLUTION—Underground.

Scherrer Impounding.—The Scherrer Method of Impounding Mineral Springs (Die A. Scherrersche Mineralquellen-Fassungsmethode). F. Müller. A review of methods of collecting any one of several sources of underground water, showing the practicability of capping the veins of water in the rock. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 3, 1905.

Somme Valley, France.—Causes of the Diminution in the Flow of Springs (La Cause de l'Appauvrissement des Sources). M. Houllier. A review of observations made in the valley of the Somme, showing that intensive cultivation of the soil is abstracting an increasing proportion of moisture. 2500 w. Revue Technique—Nov. 25, 1905.

South Dakota.—See WATER RIGHTS—Ground Water.

South Lincolnshire, Eng.—The Geology and Underground Water Supply of South Lincolnshire. Henry Preston. Abstract of a paper read before the British Assn. of W-Wks. Engrs., with a summary of the discussion. Observations on wells and borings made and the relationship to their geological causes. 6000 w. Jour Gas Lgt—Sept. 15, 1903.

Veins.—Water in Veins.—A Theory. T. A. Rickard. Based on information collected during the past two years concerning the manner of occurrence of water in veins. Believes in the existence of a distinct water zone. 3500 w. Eng & Min Jour—March 14, 1903.

See also ORE DEPOSIT.

GROYNE.

See SHORE PROTECTION.

GUANO.

New Mexico.—A Valuable Bat Cave in New Mexico. F. W. Brady. Remarkable caves containing extensive deposits of dry guano are illustrated and described. 1000 w. Mines & Min—Oct., 1905.

Texas Bat Caves.—The Bat Guano Caves of Texas. William B. Phillips. Illustrated description of those enormous caverns containing valuable deposits of fertiliser, some of which are being worked. 3000 w. Mines & Min—May, 1901.

GUARD WIRE.

See also ELECTRIC LINE; ELECTRIC PROTECTIVE APPARATUS; ELECTRIC RAILWAY—Overhead Construction.

Lightning Arrester.—See LIGHTNING ARRESTER—Transmission Line.

GUN.

See also ARMORED CRUISER; ARMOR PLATE; BATTLESHIP; COAST DEFENSE; CRUISER; GUNBOAT; GUNNERY; GUN WORKS; NAVY; RIFLE; PROJECTILE; SHELL.

Modern Artillery. Arthur Trevor Dawson. Considers general governing principles and compares the different systems employed with a view of ascertaining the relative advantages and disadvantages. 10,000 w. Jour Soc of Arts—March 8, 1901.

Adjustment.—A Practical Method of Adjusting a Modern Gun and Determining Its Errors and the Errors of Its Telescopic Sight. Otto von Geldern. Treats the gun in the sense of a mathematical instrument only, and explains a method by which it may be oriented and adjusted, and by which any error in its horizontal or vertical motion may be detected. 4000 w. Eng News—April 13, 1905.

American.—The Manufacture of American Ordnance. Waldon Fawcett. Reviews the work of the past year at the different U. S. arsenals and machine works, illustrating many of the guns and describing the methods. 2500 w. Am Mfr—March 7, 1901.

The Development of Modern Ordnance and Armor in the United States. Charles O'Neil. A review of the prominent facts in connection with the development and manufacture showing progress made. 17,000 w. 2 plates. Trans Am Soc of Nav Archts & Marine Engrs, No. 10—Nov., 1902.

Naval Ordnance. A review of an interesting report of Admiral Charles O'Neil. 3800 w. Ir Age—Nov. 6, 1902.

Armstrong.—See ARMSTRONG; GUN WORKS.

Automatic.—The Automatic Gun and Its Military Aspects. Cecil Hamlin Taylor. Examines the general theory and practice of automatic gun construction for the purpose of indicating some of the causes of failure in the past and the probable lines of satisfactory future development. Serial. 1st part. 4200 w. Jour Fr Inst—July, 1901.

See also Machine; Rapid Fire.

Automobile.—See AUTOMOBILE—Artillery.

Belgian Trials.—Notes on Rapid-Fire Field Artillery. The present article gives an account of the Belgian competitive trials for the choice of a rapid-fire field gun, examining the questions from the point of view of the qualities required for good field material. Many illustrations. Serial. 1st part. 1500 w. Jour U S Art—Sept.-Oct., 1901.

Bethlehem, Pa.—See ARMOR PLATE.

Boer.—Boer Field Artillery. An illustrated discussion of some of the field guns used by the Boers, purchased from the best French, German and Austrian gun-making firms. 3500 w. Engr, Lond—April 26, 1901.

British-German.—Our New German Field Artillery Guns. Concerning the guns manufactured in Germany for the use of the British field artillery, describing the gun and carriage. 1500 w. Engr, Lond—March 22, 1901.

The New 15-Pounder Quick-Firing Field Artillery Gun. Full description with detail drawings and illustrations of the new German quick-firing field artillery gun of 3 in. calibre, together with its carriage. After a series of exhaustive trials this gun has been adopted for service in the British army. 3000 w. Engr, Lond—May 16, 1902.

Canet.—See Schneider-Canet.

Düsseldorf Exposition.—Artillery at the Düsseldorf Exposition 1902 (Geschütze auf der Düsseldorfer Ausstellung 1902). J. Castner. A fully illustrated review of the artillery exhibits at Düsseldorf, with especial reference to the mechanical and engineering problems involved. Two articles. 5000 w. Stahl u Eisen—Oct. 1, 15, 1902.

See also ARMOR PLATE.

Electrical Equipment.—Electrical Equipment of High Power Guns. Grahame H. Powell. Illustrates and describes the equipment of large-caliber guns. 1100 w. Elec Wld & Engr—Jan. 19, 1901.

Engineering.—Ordnance Engineering as a Great Mechanical Industry. J. V. Meigs. A fully illustrated review of the present state of the art of ordnance engineering as one of the most highly developed mechanical industries. 4000 w. Engineering Magazine—October, 1902.

See also Manufacture; GUN WORKS.

Field.—The Development of the Modern Field Guns. Wilmot E. Ellis. Traces the development of the field gun from 1890-1891 to the present time. 5900 w. Jour U S Art—Sept.-Oct., 1901.

See also British-German; French; German; Krupp; Nordenfelt; Schneider-Canet.

French.—Our Improved Artillery (Notre Nouvelle Artillerie). Léo Dex. A discussion of the great advantages obtained by the use of field artillery in which the recoil is taken up in such a manner as to leave the aim undisturbed. 1500 w. Revue Technique—Sept. 25, 1901.

See also Schneider-Canet.

Gathmann Tests.—See ARMOR PLATE—Trials.

History.—The Evolution of Fire-Arms and Ordnance and Their Relation to Advancing Civilization. General Joseph Wheeler. Historical review, with related matter of interest. 10,600 w. Jour Fr Inst—March, 1902.

A Sketch of the Origin and Development of Artillery. W. J. Peirce. Considers those engines employing gunpowder, or a similar explosive agent, as a propelling force; also the carriage, the powder and projectiles. 6000 w. Yale Sci M—Jan., 1903.

See also ARMOR PLATE.

Ignition History.—The Development of the Mode of Ignition in Small Arms and Artillery. A review of the progress of invention in this field, with illustrations. Serial. 1st part. 2700 w. Engr, Lond—May 10, 1901.

Krupp Field.—The Development of the Krupp Field Artillery Material. Illustrated notes on the material and construction of ordnance. Serial. 1st part. 5800 w. Jour U S Art—Nov.-Dec., 1900.

Liége Exposition.—Ordnance at the Liége Exposition, 1905 (Das Waffenwesen auf der Weltausstellung in Lüttich 1905). J. Castner. Illustrated description, principally of field artillery. 3000 w. Stahl u Eisen—Sept. 1, 1905.

Machine.—Machine Guns Up to Date. Lieut.-Colonel E. Rogers. Gives an account of the use of these guns in various battles. General discussion follows. 10,000 w. Jour Roy United Service Inst—Sept., 1904.

See also Automatic.

Manufacture.—Deep Hole Drilling in Gun Construction. J. M. B. Scheele. Describes the general features, giving sketches and engravings of the boring, turning and reaming operations on a 16-inch breech loading rifle built in the shops of the Government Army Gun Factory at Watervliet Arsenal, N. Y. 2200 w. Mach, N Y—May, 1902.

Making Big Guns. Lieut. Com. Albert Gleaves. Comments on the great advances in naval equipment, describing the making of modern large guns, and giving information concerning the results obtained with them. Ill. 4400 w. World's Work—Sept., 1903.

See also Engineering; **ARMOR PLATE—Bethlehem; GUN WORKS.**

Naval.—Late Developments in Ordnance and Armor. J. F. Meigs. Reviews the advances made during the last ten years. 6000 w. Soc Nav Archts & Marine Engrs, No. 9—Nov., 1901.

Naval Ordnance. A. Trevor Dawson. Considers the structure of guns, the breech mechanism, the motive power for working large guns within turrets, mountings, guns to repel torpedo and submarine boat attack, projectiles, &c. 33 plates. 18,300 w. Inst Mech Engrs—Aug., 1901.

Seven-Inch vs. Six-Inch Guns for Our New Armored Cruisers. Paul D. Emmons. A reply to objections made to the proposed change. 1700 w. Sci Am Sup—April 20, 1901.

The Gun Power of Warships. Editorial discussion of the increase in gun power and the placement of the guns. Compares British and American practice. 1800 w. Engng—Nov. 22, 1901.

I. Latest Types of Naval Guns. II. Gun Mounts and Breech Mechanisms. Illustrated detailed descriptions of the guns and their action. 2000 w. Sci Am—Dec. 14, 1901.

See also American; **BATTLESHIP; GUNNERY.**

Nordenfelt.—Nordenfelt's Quick-Firing Field Artillery. An illustrated description of field guns fitted with breech mechanism of the eccentric screw type, and carriages without hydraulic brake, in which the force of the recoil is taken up by a special wheel-brake. 3200 w. Engng—March 1, 1901.

Pan-American Exposition.—Modern Guns at the Pan-American Exposition. Grahame H. Powell. Illustrated description of the exhibit of guns used in the coast defense of the United States. 1800 w. Am Mach—Aug. 1, 1901.

Rapid-Fire.—Rapid-Fire Guns, Ancient and Modern. E. G. Parkhurst. Illustrated description of ancient and modern guns of this class. 3500 w. Am Mach—March 7, 1901.

The Manufacture of Rapid-Fire Guns. E. G. Parkhurst. The present article deals with the material, the physical tests, the leading operations and tools used. Serial. 1st part. 2000 w. Ill. Am Mach—March 14, 1901.

See also Automatic; Machine; Nordenfelt; Schneider-Canet.

Repairing.—Repairing Worn-Out Guns on Service. E. Bannatine-Allason. Short illustrated description of a somewhat novel operation of re-lining a damaged 12-pounder 6 cwt. gun. 1000 w. Engr, Lond—Jan. 10, 1902.

Schneider-Canet.—Schneider-Canet Quick-Firing Guns and Howitzers for Field Service. Illustrated description of these guns and their latest improvements. Serial. 1st part. 2500 w. Engng—July 19, 1901.

See **STEEL WORKS.**

Segmental Wire-Wound.—New 5-inch Segmental Wire-Wound Gun for the United States Army. Illustrates and describes the process of manufacture, and gives information of interest. Also editorial. 3200 w. Sci Am—Sept. 7, 1901.

Sight.—See **GUN SIGHT.**

16-Inch.—The New American 16-inch Gun (A Propos du Nouveau Canon Américain de 16 Pouces). A discussion of the probable range of the new gun, computing its maximum to be only about 14 miles, instead of nearly 24 miles, as computed by Major Ingalls. 2000 w. Revue Technique—Nov. 25, 1900.

The 16-Inch Breech-Loading Rifle. Waldon Fawcett. Illustrated account of this gun and its construction. 1700 w. Am Mfr—Aug. 1, 1901.

The 16-Inch Breech-Loading Rifle Type, Model 1895. J. P. Farley. Report containing description of gun and its construction, with many plates. Serial. 1st part. 8500 w. Jour U S Art—May-June, 1901.

16-Inch Test.—Test of the New 16-Inch Gun. An account of the test of the new United States army 16-inch gun at the Sandy Hook proving ground. Ill. 1100 w. Sci Am—Jan. 31, 1903.

Storage Battery.—See **STORAGE BATTERY—Fortification, U. S.**

Straightening.—How Gun-Barrels Are Straightened. William H. Avis. An explanation of the method of straightening, with illustrations. 1400 w. Am Mach—Vol. 28, No. 28.

Tactics.—See **GUNNERY—Naval.**

Test.—See 16-Inch Test; **ARMOR PLATE.**

United States.—See **American.**

Vicker's.—The Latest 12-Inch Breech-Loading Wire-Wound Guns. Drawings and description of the breech mechanism for the 12-in. Vicker's gun. 1200 w. Engr, Lond—Sept. 8, 1905.

Wire-Bound.—Wire-Bound Ordnance. Charles Berthon. Illustrates and describes the details of construction of wire-wound guns, giving a brief review of the system. 3500 w. Feilden's Mag—June, 1903.

GUNBOAT.

See also **NAVY.**

"Bennington."—See **BOILER EXPLOSION.**

"Dubuque."—U. S. Gunboats Dubuque and Paducah. W. N. Little. Illustration with description of the vessels, their equipment, and armament, and report of trials. 10,500 w. Jour Am Soc of Nav Engrs—Aug., 1905.

Mexican.—The New American-Built Mexican Gunboats. Illustrated description. 900 w. Naut Gaz—Sept. 25, 1902.

"Paducah."—Contract Trials of the U. S. Gunboat Paducah. A report of the standardisation trials, and the performance on the preliminary trial. 1000 w. Jour Am Soc of Nav Engrs—Nov., 1905.

"Romblou."—Our New Japanese Built Gunboats. An account of the launching of the "Romblou," at Uraga, the first of five gunboats ordered for the Philippine Islands. 1800 w. Naut Gaz—Jan. 22, 1903.

"Teal."—The Shallow-Draught Gunboat "Teal." Illustration, description and report of trials of this British vessel. 900 w. Engng—June 28, 1901.

"Widgeon."—H. M. Gunboat Widgeon. Illustrated description of a twin-screw shallow-draught vessel, fitted with Yarrow's patent movable flap. 900 w. Engr, Lond—May 27, 1904.

GUN CARRIAGE.

See **AUTOMOBILE—Military; GUN.**

GUN EXPLOSION.

Gun Explosions. Discusses briefly the cause of gun accidents. 1900 w. Engr, Lond—Nov. 22, 1901.

GUNNERY.

See also **GUN; SHELL.**

Naval.—Naval Gunnery. S. Eardley-Wilmot. Discusses the lack of attention in the British Navy to securing gun efficiency and the importance of drill and constant training. 2000 w. Engr, Lond—Nov. 1, 1901.

The Tactics of the Gun. A. P. Niblack. A discussion of modern gunnery on battleships, the positions of guns, and the object of tactical maneuvres, etc. 3 plates. 3000 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 12—Nov., 1902.

The Tactical Employment of Naval Artillery. Discusses the principles of naval gunnery and the relative bearing and importance of the various artillery questions in the navy. 15,000 w. Trac & Trans—Feb., 1903.

Pressures.—The Law of Pressures in Guns (Sur la Loi des Pressions dans les Bouches à Feu). E. Vallier. An extension of the author's previous researches upon the relations of pressure and projectile velocity. 1200 w. Comptes Rendus—July 22, 1901.

See also **GAUGE.**

Rifle Ball.—The Trajectory of a Rifle Ball (Trajectoire d'une Balle de Fusil). A mathematical study, based upon data from modern weapons. 2500 w. Revue Technique—Oct. 25, 1901.

GUNPOWDER.

See **EXPLOSIVE.**

GUN SIGHT.

Grenfell.—The Grenfell Sighting and Signaling Gear. Illustrates and describes a sighting device and signaling gear for diminishing the duty demanded of the gunner, especially adapted to naval ordnance. 1600 w. Engng—Jan. 16, 1903.

Grubb.—The "Grubb" Sight. Description, illustrations, and explanation of its application. 2800 w. Jour U S Art—March, 1904.

Telescope vs. Open.—Aiming by Telescope Sight Compared with Aiming by Open Sights. Dr. S. Orapski. A physico-physiological study of the advantages gained by the use of telescopes in aiming and laying guns. Ills. 7300 w. Pro U S Nav Inst—March, 1905.

GUN WORKS.

See also **ARSENAL; GUN; STEEL WORKS.**

Armstrong.—Lord Armstrong and the Elswick Works. Benjamin Taylor. A description of the growth and present condition of the Armstrong works at Elswick as an example of successful works management. 3500 w. Engineering Magazine—Jan., 1901.

The Armstrong Works at Elswick. E. Guarini. Views, with some points in the history of the development of these works. 1200 w. Am Mach—Vol. 27. No. 36.

Frankford Arsenal, Philadelphia.—See **ARSENAL.**

Hotchkiss.—The Hotchkiss Ordnance Company. Limited. Begins an illustrated description of recent types of rapid-fire machine guns made at these works near Paris. Serial. 1st part. 4500 w. Engng—Feb. 20, 1903.

Schneider, France.—See **ARMOR PLATE — Creusot; STEEL WORKS.**

Training Managers.—Training of Managers and Foremen at the Royal Ordnance Factories. Memorandum with regard to the report by the Foremen's Qualifications Committee on matters relating to the Royal Ordnance Factories. 1400 w. Mech Engr—April 8, 1905.

United States.—United States Ordnance Factories. Waldon Fawcett. Brief illustrated descriptions of some of the government plants for the manufacture of naval and coast defense ordnance. 1500 w. Mod Mach—April, 1902.

Vickers'.—Vickers' Gun-Mounting Works at Barrow-in-Furness. Illustrated detailed description of the various departments of these extensive works. 5000 w. Engng—July 26, 1901.

Virginia.—Some Mechanical Relics of the Civil War. Illustrated description of a confederate gun factory and its equipment, in Virginia. 2000 w. Am Mach—Vol. 28, No. 23.

Watervliet, N. Y.—United States Army Gun Factory, Watervliet Arsenal, N. Y. John M. B. Scheele. General description, with a brief account of the shops, calling attention to interesting details. 1200 w. Trans Am Soc of Mech Engrs—June, 1903.

Woolwich Arsenal.—See **ELECTRIC DRIVING.**

GUTTA PERCHA.

See also **ELECTRIC CABLE; INSULATION; SUBMARINE CABLE.**

Seeking Gutta-Percha. George E. Walsh. On the sources of supply, the prospect of forests of the trees in the Philippines, the advisability of cultivating the trees in suitable climates, &c. 1800 w. Elec Rev, N Y—March 1, 1902.

Philippines.—Gutta Percha in the Philippines. J. Orton Kerbey. Information from advance sheets of the Philippine Commission's reports. 1800 w. Elec Wld & Engr—Feb. 1, 1902.

GUTTER.

See **CEMENT PAVEMENT—Curb and Gutter; PAVEMENT; STREET.**

GYMNASIUM.

New York, Public.—A New York Public Bath and Gymnasium. Illustrated description of a recreation building in a tenement house district in New York. 600 w. Eng Rec—Nov. 10, 1900.

GYPSUM.

See also **PLASTER OF PARIS.**

American.—Present and Future of the American Gypsum Industry. Frank A. Wilder. An illustrated article stating the localities in the United States where it is found, the causes of the deposits, the uses, etc. 3000 w. Eng & Min Jour—Aug. 30, 1902.

California.—The Gypsum and Cement Plaster Industry in California. G. P. Grimsby. Reviews briefly the different gypsum industries in California. 800 w. Eng & Min Jour—June 8, 1901.

Eden Valley, England.—The Gypsum of the Eden Valley. David Burns. Read before the Inst. of Min. Engrs. at Keswick. An account of these mines, describing the deposits and discussing their origin. Brief general discussion. 5660 w. Quarry—Sept., 1903.

Kansas.—The Mining and Milling of Gypsum in Kansas. W. R. Crane. Describes the gypsum bearing localities and methods of working and treatment. Ill. 1800 w. Eng & Min Jour—Nov. 9, 1901.

Michigan.—A Theory of Origin for the Michigan Gypsum Deposits. G. P. Grimsby. Reviews the geology of this district, explaining the generally accepted theory of origin, and outlining the theory for these deposits. 3000 w. Am Geol—Dec., 1904.

Montana.—Montana Gypsum Deposits. Jesse Perry Rowe. An illustrated description of these extensive deposits and their geological formations. 2700 w. Am Geol—Feb., 1905.

New York.—Recent Developments in the Gypsum Industry in New York State. From report of the N. Y. State Geologist, Arthur L. Parsons. Describes the quarries at Fayetteville and their working. 2500 w. Stone—July, 1902.

Sand.—See **SAND—New Mexico.**

GYROSCOPE.

Anschütz.—Anschütz Gyroscope. Describes the invention of Dr. H. Anschütz-Kämpfe and its working. Also reports tests made by the Imperial German navy department, and states cases in which its use is of advantage. Ills. 2400 w. U S Cons Repts—June, 1905.

Electric.—Electrical Gyroscopes. Howard B. Dailey. Illustrated description of continuously-acting gyroscopes, using static electricity as a motive agent. 2000 w. Sci Am—April 20, 1901.

Fleuriais.—Admiral Fleuriais's Gyroscopic Horizon. An illustrated description of an improved instrument likely to render important service at sea. 1100 w. Engng—March 17, 1905.

GYROSTATIC ACTION.

Gyrostatic Action and Its Bearing on Certain Points of Engineering Design. W. R. Kelsey. An investigation of the nature and magnitude of the forces called into action when the plane of rotation of a revolving mass is turned through any angle. Ill. 1200 w. Elec Engr, Lond—July 18, 1902.

H

HACK SAW.

See **SAW—Hack.**

HAMMER.

See also **FORGING; STEAM HAMMER; STEEL FORGING; STEEL METALLURGY.**

Die Forging.—Hammers Used in Die Forging. Illustrates and describes types of hammers used largely in the work of die forging. A supplementary article to a recently published series. Serial., 1st part. 1600 w. Engng—Nov. 6, 1903.

Drop; Ambler.—The Ambler Drop Hammer. Illustrated description. 600 w. Am. Mach—April 14, 1904.

Drop, Brett.—Notes on the Evolution of the Drop Hammer for Die Forging. E. W. Merrill, Jr. An illustrated review of the development of this tool which is extensively used, especially describing the Brett drop-hammer. 1800 w. Eng News—Jan. 1, 1903.

Drop, Test.—Tests of Drop Hammers by the Compression of Copper Cylinders. Report of a test by Dr. R. H. Thurston to determine the efficiency of roll and crank lift drop hammers. 1500 w. Am Mach—Dec. 24, 1903.

Pneumatic Power.—Pneumatic Power Hammers. Illustrations, with descriptions of a new type motor-driven with a swing motor. Also other special arrangements. 1200 w. Engng—Feb. 19, 1904.

Power.—Recent Developments in Power Hammers. H. F. Massey. Read before the Manchester (England) Ass'n of Engrs. (Abstract.) An illustrated article describing early forms and the efforts at improvement in both spring and pneumatic hammers, with information concerning them. 4500 w. Mech Engr—March 19, 1904.

HARBOR.

See also **BREAKWATER; BULKHEAD; CANAL; CRANE; DOCK; DREDGE; ELECTRIC EQUIPMENT; NAVIGATION CONGRESS; PIER; RIVER REGULATION; SHORE PROTECTION; WATERWAY; WHARF.**

Accessibility.—The Accessibility of Ports. Brysson Cunningham. Discusses the location, environment, approach channel, and climatic conditions in relation to their influence on the accessibility. 3500 w. Engng—Oct. 13, 1905.

Ahnapee, Wis.—See **RIVER REGULATION.**

Alexandria.—The Harbor of Alexandria (Le Port d'Alexandrie). G. Birault. An account of the development of the modern port since 1832, and of the present and projected harbor improvements at Alexandria, Egypt. 3000 w. Génie Civil—Dec. 10, 1904.

Alicante, Spain.—See **BREAKWATER.**

Altona.—The Enlargement of the Harbor of Altona (Erweiterung des Altonaer Hafens). H. v. Horn. With details of the new dyke by which the new harbor is enclosed and protected from storms and ice. 2000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Sept. 13, 1902.

Amsterdam.—The North-Sea Canal, the Ymuiden Locks, and the Port of Amsterdam. Illustrated description of the engineering work that has made the city of Amsterdam a sea-port. Serial. 1st part. 3200 w. Engng—Jan. 10, 1902.

Antwerp.—The Port of Antwerp. Reviews briefly the development of this port to keep pace with the increase of commerce, and the scheme for the construction of new docks. Plans. 2000 w. Builder—Sept. 2, 1905.

Enlargement of the Port of Antwerp. Information concerning the plan adopted for the vast extension which will triple the area of the port, giving it 60 kilometers (37.3 miles) of running quays. 1600 w. U S Cons Repts—June, 1905.

The Port of Antwerp Extensions. Considers the present accommodations of this port and the enlargements proposed. Ills. 2800 w. Engng—Sept. 22, 1905.

Barrow, Eng.—See **DOCK.**

Belfast, Eng.—Belfast Harbor and Its Development. G. F. L. Giles. Read before the Inst. of Nav. Archts. Maps and description, with information concerning each of the important docks. 2900 w. Engng—July 17, 1903.

Bilbao, Spain.—Works for Improving the Bilbao River and Making an Outer Harbor, also the Application of Large Caissons as a Breakwater Foundation. Señor Don Evaristo de Churruca. Abstract of a paper read before the Glasgow Congress. Outlines the work and reports the satisfactory results. 1100 w. Ir & Coal Trds Rev—Sept. 6, 1901.

See also **BREAKWATER.**

Biserta, Tunis.—The Harbor Works at Biserta and the Arsenal of Sidi-Abdallah (Rapport et Mémoire sur les Travaux du Port de Biserte et de l'Arsenal de Sidi-Abdallah). Voisin Bey and Jean Hersant. An illustrated description of important harbor works in Tunis, particularly the making of huge concrete blocks, of 5000 tons, in caissons. 7000 w. Bull Soc d'Encouragement—March 31, 1903.

The Port of Biserta (Le Port de Biserte). Col. G. Espitalier. A description of the harbor of Bizerta in Tunis, showing the important improvements which have taken place between 1881 and 1900. Three articles. 7500 w. 1 plate. Génie Civil—Nov. 15, 22, 29, 1902.

See also **Tunis.**

Bombay.—The Development of Bombay Harbor. Map, with information as to what is proposed at this place. 1000 w. Engr, Lond—Feb. 19, 1904.

Boston.—See **Tidal Basins; DAM—Charles River.**

Bremerhaven.—See **DOCK.**

Brest.—The Commercial Port of Brest and its Immediate Future (Le Port Marchand de Brest et son Avenir Prochain). E. Duchesne. Showing the superiority of Brest over other French ports, and predicting its growth. 6000 w. Mem Soc Ing Civ de France—April, 1902.

Bristol, Eng.—See **DOCK.**

British.—Harbors and Waterways in the Nineteenth Century. Reviews the progress in Great Britain, and the great improvements made. 6000 w. Engr, Lond—Jan. 4, 1901.

Harbors and Waterways in 1901. A review of works completed, in progress and proposed. 4300 w. Engr, Lond—Jan. 3, 1902.

Harbors and Waterways in 1904. A review of the important developments, especially in Great Britain. 3400 w. Engr, Lond—Jan. 6, 1905.

Harbors and Waterways in 1902. A review of works under construction, and of matters relating to the harbors and waterways. 5500 w. Engr, Lond—Jan. 2, 1903.

Bruges.—The Harbors and Maritime Canal of Bruges (Les Ports et le Canal Maritime de Bruges). L. Coiseau. A very full account of the ship canal connecting Bruges with the North Sea; together with other harbor improvements. 16,000 w. 9 plates. Mem Soc Ing Civ de France—Dec., 1904.

The Bruges Harbor Works. An illustrated description of the works at Zeebrugge, the outer harbor of the maritime canal connecting Bruges with the North Sea. Serial. 1st part. 3300 w. Engng—May 26, 1905.

Brunswick, Ga.—See **BLASTING—Sand Bar.**

Buenos Aires.—The Harbor of Buenos Aires and the La Plata River (Der Hafen von Buenos Aires und seine Zukunft im Zusammenhang mit dem La Plata). C. Offermann. A description of the La Plata River and the improvement of the harbor of Buenos Aires, Argentina. Map. Serial. 2 parts. 7000 w. Zentralblatt d Bauverwaltung—April 15 and 18, 1903.

The Port of Buenos Ayres (Le Port de Buenos Aires). Auguste Moreau. A review of the Huergo project for the improvement of the harbor at Madero. 5000 w. 1 plate. Mem Soc Ing Civ de France—April, 1905.

Buffalo.—The Development of Buffalo Harbor. Emile Low. From a paper before the R. R. Branch of the Y. M. C. A. Briefly reviews previous work and gives an illustrated account of the breakwater system in process of construction which will make this one of the finest harbors. 2500 w. R R Gaz—March 13, 1903.

See also **BREAKWATER; DOCK; EXCAVATION.**

Canada.—Harbor and River Works in Canada. Extracts from the report of A. Gobeil giving a general review of the works now under construction by the Government. 4400 w. Can Engr—March, 1905.

See also **TIDE LEVELS.**

Cape Town.—Cape Town Harbor Works. R. H. Hammersley-Heenan. An introductory review of the early history of this southern point of the African Continent, and early engineering work there, with illustrated description of recent work. 7400 w. Public Works—Sept. 15, 1904.

The Ports of South Africa—Cape Town and Durban. Reviews the history of harbor construction on the coast of South Africa, and describes the recent improvements. Map. 3000 w. Engng —Dec. 8, 1905.

Chicago.—An Internal Harbor System for Chicago. Albert H. Scherzer. Suggests a plan for maintaining and extending the railroad and water transportation interests, showing its advantages, and giving outline maps. Also editorial. 2500 w. Ry Age—Jan. 11, 1901.

Chicago Harbor. Robert B. Wilcox. A statement of the conditions, discussing the past and future improvements. 4000 w. Trans Assn of Civ Engrs of Cornell Univ—1901.

See also **RIVER REGULATION.**

Clyde.—See **CLYDESIDE DOCK; GLASGOW.**

Constantinople.—The New Harbor Works at Haidar-Pasha, opposite Stamboul (Die Neuen Hafenwerke von Haidar-Pascha gegenüber Stambul). With illustrations showing the arrangement of the harbor and the construction of the breakwater at Haidar-Pasha, opposite Constantinople. 2000 w. Zeitschr d Ver Deutscher Ing—Jan. 9, 1904.

Coos Bay, Ore.—Description of Coos Bay, Oregon, and the Improvement of Its Entrance by the Government. William W. Harts. Description of the north jetty and the conditions prior to the commencement of operations, methods used, etc. Ill. 8000 w. Pro Am Soc of Civ Engrs—April, 1901.

Description of Coos Bay, Oregon, and the Improvement of Its Entrance by the Government. Discussion of paper by William W. Harts. 10,000 w. Pro Am Soc of Civ Engrs—Aug., 1901.

Description of Coos Bay, Oregon, and the Improvement of Its Entrance by the Government. Continued discussion of paper by William W. Harts. 6700 w. Pro Am Soc of Civ Engrs—Oct., 1901.

Description of Coos Bay, Oregon, and the Improvement of Its Entrance by the Government. L. M. Haupt. Continued discussion of paper by William W. Harts. 1800 w. Pro Am Soc of Civ Engrs—Sept., 1901.

Cosel on Oder.—The Harbor of Cosel on the Oder, Silesia (Ueber den Oderhafen bei Cosel). Josef Riedel. An illustrated description of this harbor and docks with statistics of costs and traffic. 1 plate. 1500 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 7, 1901.

Cranes.—See **CRANE; CRANE, ELECTRIC; ELECTRIC EQUIPMENT; HYDRAULIC MACHINERY; MECHANICAL HANDLING.**

Cumberland Sound, Fla.—The Improvement of the Entrance to Cumberland Sound, Georgia and Florida. James H. Bacon. Gives description of the work, with maps, and editorial on the striking contrast of the cost of the work, with that done under the Carter conspiracy. 4000 w. Eng News—March 12, 1903.

Dalny.—Dalny, the Russian Commercial Seaport in North China. A full account of this commercial seaport, established by the Russian government, its location, harbor, piers, etc., with maps and illustrations. 3500 w. U S Cons Repts, No. 1291—March 17, 1902.

The Building of Dalny. Information of interest concerning this Manchurian commercial seaport, its population, industries, railway and steamship service, etc. 3000 w. U S Cons Repts, No. 1708—July 28, 1903.

Dover, Eng.—The New Harbor Works at Dover. Describes the works under construction, giving plan and chart and explaining their importance and the advantages to be secured. 3400 w. Nineteenth Cent—Nov., 1901.

The Dover Harbor Works. Reviews the history of this project, and gives an illustrated description of the works, and methods used in their construction. 6400 w. Engng—June 12, 1903.

Dover as a Port of Call. A brief illustrated account of the construction of a portion of the new harbor works. 2200 w. Transport—July 8, 1904.

Dover Harbor Works. A. T. Walmisley. Reviews what is known of the early history of the harbor, and gives an illustrated description of the recent improvements, the appliances used, the construction work, etc. 10,000 w. Public Works —April, 1905.

The National Harbor at Dover. Archibald S. Hurd. An illustrated description of the construction of the greatest artificial harbor in the world. 3800 w. Cassier's Mag—Aug., 1903.

The New Harbor Works at Dover. Harold J. Shepstone. An illustrated description of this important engineering work on the south coast of England. 1800 w. Sci Am Sup—June 27, 1903.

Durban.—See Cape Town.

Electric Equipment.—See **CRANE, ELECTRIC; ELECTRIC EQUIPMENT; ELECTRIC PLANT; MECHANICAL HANDLING.**

England, 1903.—See **WATERWAY.**

English Channel.—The Principal Ports on the Channel (Les Principaux Ports de la Manche). R. Bonnin. Describing the improvements completed and in progress at the ports used in connection with the traffic between France and England. Serial. Part I. 2000 w. Revue Technique—Oct. 25, 1904.

Europe.—See **DOCK.**

Fishguard, Wales.—Fishguard Harbor Works. H. G. Archer. Illustrated description of the harbor works for the Irish service of the Great Western Railway. This new route will shorten the distance 100 miles in many cases between places in England and Ireland. 2000 w. Engng—Aug. 11, 1905.

Folkestone, Eng.—Folkestone Harbor Extension Works. Percy C. Tempest. Brief illustrated description of the work. 1000 w. Public Works—Jan., 1905.

See also **PIER.**

Galveston.—See **SHORE PROTECTION.**

Genoa.—The Development of the Harbor Works of Genoa (Die Bauliche Entwicklung des Hafens von Genua). E. Bavier. General historical account. Serial. Part 1. 2000 w. Schweiz Bauzeitung—Aug. 19, 1905.

See also **BREAKWATER.**

Genoa and Marseilles.—Genoa and Marseilles. An explanation of the relative position of these two shipping centers. Engr, Lond—April 19, 1901.

Glasgow.—The River Clyde and Harbor of Glasgow. W. M. Alston. Extract from paper read before the Glasgow Congress. Describes the "docks," and their equipment, giving information concerning the traffic, revenue, etc. 1600 w. Ir & Coal Trds Rev—Sept. 6, 1901.

See also **DOCK—Clyde Tust; GLASGOW.**

Heysham, Eng.—Progress of Heysham Harbor Works. An illustrated description of the harbor works being constructed for the Midland Railway. 3000 w. Transport—Nov. 14, 1902.

The Heysham Harbour Scheme. Armisted Cay. An illustrated description of the new Midland Railway port, which is nearly completed. 3800 w. Page's Mag—April, 1904.

The Completion of Heysham Harbor. An illustrated article describing the final completion of this new port of the Midland Railway. 2500 w. Transport—July 8, 1904.

Midland Railway Company's Steamship Service. Begins an illustrated detailed description of the construction of Heysham Harbor, with remarks on the promotion of the scheme and matters related. Serial. 1st part. 2700 w. Engng—July 29, 1904.

See also **ELECTRIC EQUIPMENT.**

India.—Notes on the Ports and Harbors of Peninsular India. Horace Bell. Showing the need for more ports in India, and discussing the difficulties. 3200 w. Jour Soc of Arts—July 17, 1903.

Kiao-Chau, China.—The Development of the Kiatschou District (Das Kiatschougebiet und seine Entwickelung). A description of the harbor of this German-Chinese treaty port. 5000 w. 1 plate. Glaser's Annalen—Feb. 1, 1901.

See also **KIAO CHAU.**

Koenigsberg.—The Königsberg Canal (Der Königsberger Seekanal). F. Jerosch. An illustrated description of a ship canal made through the shallow waters of the "Frische Haff" from Königsberg to the Baltic Sea. 2000 w. Deutsche Bauzeitung—Feb. 1, 1902.

Lemmer, Friesland.—See **STEAM TRAMWAY.**

Liverpool.—Mersey Bar and Channels of Approach to Liverpool. Reviews the report of the Conservator of the Mersey to the Commissioners. 1200 w. Engr, Lond—July 11, 1902.

The Improvement of the Port of Liverpool (Les Améliorations du Port de Liverpool). Bryson Cunningham. With plans of the docks and a review of the development of the port. 1800 w. Génie Civil—April 1, 1905.

See also **DOCK; DREDGING.**

Loch Linnhe, Scotland.—Proposed Home Shipping Port for Canada. Map and information concerning a scheme to utilize Loch Linnhe, on the west coast of Scotland, stating the advantages. 1300 w. Engr, Lond—March 25, 1904.

London.—The Port of London. W. H. Wheeler. Discusses the unsatisfactory conditions of this port and the causes. 4000 w. Engr, Lond—March 1, 1901.

The Port of London. Earl Egerton of Tatton. Reviews the Report of the Royal Commission on the Port of London, discussing facts given, the trade of the port, improvements needed, etc. Map. 8800 w. Nineteenth Cent—July, 1902.

The Port of London and the Thames. Reviews the report of the Commission appointed by the Board of Trade to inquire into the condition of this port and its navigable disadvantages, and discusses the subject generally. Serial. 1st part. 3000 w. Engr, Lond—Aug. 8, 1902.

The Port of London and Projects for Its Improvement (Eetude de l'Administration Actuelle du Port de Londres et du Projet de Transformation). M. Aron. A review and an analysis of the report of a Royal Commission on the improvement of the Thames and the London docks, from both commercial and engineering standpoints. 13000 w. Ann des Ponts et Chaussées—4 Trimestre, 1902.

The Port of London. Benedict W. Ginsburg. Gives a résuméé of the position and prospects of this seaport; considering improvements needed for the handling of supplies, dock management, the river, etc. Discussion. 10,000 w. Jour Soc of Arts—Feb. 13, 1903.

See also **RIVER REGULATION—Thames.**

Machinery.—Notes on Harbor Works and Harbor Plant. Discusses the principal types of machines and plant used in harbor, pier and breakwater work at the present time. Serial. 1st part. 3200 w. Builder—Dec. 19, 1903.

See also **DREDGING; ELECTRIC EQUIPMENT; HYDRAULIC MACHINERY; MECHANICAL HANDLING.**

Madero, Argentine.—See **Buenos Aires.**

Manila.—The U. S. Government Harbor Improvements and Naval Coal Storage Plant at Manila. An illustrated description of extensive work to aggregate some $2,800,000, representing the best modern practice. 3200 w. Eng News—Aug. 7, 1902.

Improvement of the Harbor of Manila. An illustrated description of a public work nearing completion. 2800 w. Far East Rev—March, 1905.

The Manila Harbor Improvements. Brief illustrated account of the dredging work and breakwater construction. 1000 w. Eng Rec—May 27, 1905.

Manzanillo, Mexico.—The Improvement of the Port of Manzanillo, Mexico. An illustrated account of a work involving an expenditure of some seven million dollars, on the Pacific coast of Mexico. The work involves the construction of a breakwater, a stone sea-wall with ten piers, and a canal. 3000 w. Eng News—Feb. 16, 1905.

Marseilles and Genoa.—See **Genoa and Marseilles.**

Midland Railway.—See **Heysham, Eng.**

Nagasaki.—Trade and Shipbuilding at Nagasaki. Notes on the present position of a port rapidly becoming one of the most important in the Far East. 2300 w. Engng—March 22, 1901.

Naples.—The Harbor of Naples (Le Port de Naples). C. de Cordemoy. With plan of the harbor and elevations and sections of the moles. 1800 w. Revue Technique—Feb. 25, 1901.

Narvik, Norway.—The Railway Terminus and Port at Narvik, Norway (Le Chemin de Fer el le Port de Narvik). Charles Delgobe. An account of the important harbor works at the Atlantic terminal of the Luleo-Narvik railway, communicating with the iron ore deposits of Lapland. 3000 w. 1 plate. Génie Civil—Nov. 5, 1904.

New York.—The New York Harbor Entrance. Lewis M. Haupt. A review of dredging operations intended to improve the channel, showing the inadequacy of this method under the conditions of littoral drift, and advocating the use of suitably located training walls to cause the opening and maintaining of the channel by natural forces. 1500 w. Sci Am—Jan. 7, 1905.

See also **DREDGING—New York Harbor.**

Palermo, Italy.—See **BREAKWATER.**

Paris.—The Usefulness of a Deep-Water Harbor at Paris (De l'Utilité d'un Port en Eau Profonde à Paris). A discussion of the project for making Paris a seaport by deepening the Seine, with favorable comment. 1200 w. Moniteur Industriel—Jan. 11, 1902.

The Port of Paris (Le Port de Paris). Pierre Jolibois. A detailed account of the growth of the port and its successive improvements since the beginning of the nineteenth century. 10,000 w. Revue Technique—Oct. 25, 1905.

Philadelphia.—The Improvement of the Delaware River and Harbor and the Landing Facilities of the Port of Philadelphia. George S. Webster. A description of the work done by the city of Philadelphia in conjunction with the United States Government in the improvement of the channels of the Delaware and Schuylkill Rivers, and the landing facilities of the port by the widening of Delaware avenue, and the construction of more commodious piers. Maps and illustrations. 3800 w. Jour Fr Inst—Sept., 1905.

See also **BULKHEAD.**

Port Arthur.—The Manchurian Southern Railway and the Russian Harbor of Port Arthur (Die Süd-Mandschurische Eisenbahn und der Russische Kriegshafen Port Arthur). F. Thiess. With map and views of the harbor, showing its military advantages. 1800 w. Glasers Annalen—Nov. 15, 1900.

Port Colborne, Canada.—Port Colborne Water Works. J. M. Hogan. Student's prize paper read before the Canadian Soc. of Civ. Engrs. Illustrated description of harbor improvements at the Lake Erie end of the Welland canal. Serial. 1st part. 1000 w. Can Engr—April, 1905.

Port Colborne Harbor Works. J. M. Hogan. Illustrates and describes important works comprising new docks, excavation of channels and two large breakwaters to the east and west of this port, situated at the Lake Erie end of the Welland Canal. 3500 w. Can Soc of Civ Engrs—Feb., 1905.

Prague, Bohemia.—The Construction of the Docks on the Moldau, near Prague (Baufortschritt bei dem Flosshafen auf der Kaiserweise an der Moldau bei Prag). M. Machulka. Describing and illustrating the work on the new basins, of 34 acres in extent, now under construction near Prague. 2500 w. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1900.

Progress in the Raft Harbor Works near Prague (Baufortschritt beim Flosshafenbaue auf der Kaiserwiese oberhalb Prag im Jahre 1901). M. Machulka. A brief illustrated account of harbor works, including a bridge, on the Moldau above Prague, Bohemia. 600 w. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 11, 1902.

The Raft Harbor at Prague-Smichov (Le Port de Flottage de Prague-Smichov). M. Hromas. Describing the harbor for the timber rafts brought down the Moldau from the forests of Bohemia. 3000 w. Ann des Ponts et Chaussées—2 Trimestre, 1901.

Preston, Eng.—See **RIVER REGULATION—Ribble, Eng.**

Prussia.—The Harbors of Rosenberg, Brandenburg and Fischhausen on the Frisches Haff, Baltic Sea (Die Häfen von Rosenberg, Brandenburg und Fischhausen am Frischen Haff). A. Thomas. An illustrated description of harbor improvement works at three small towns on a sound opening into the Baltic Sea, on the northeast coast of Prussia. 1200 w. Serial. 2 parts. Zentralblatt d Bauverwaltung—May 30 and June 6, 1903.

Rinteln.—The Harbor at Rinteln on the Weser and the Foundations of the Quay Wall (Der Weserhafen in Rinteln und die Brunnengründung der Kaimauer). Hr. Ottmann. An illustrated description of this river harbor in western Germany, and details of rectangular open box foundations for the bulkheads. 1500 w. Zentralblatt d Bauverwaltung—Jan. 8, 1902.

Rosario, Argentine.—The New Port of Rosario in the Argentine Republic (Le Nouveau Port du Rosario dans la République Argentine). Georges Hersent. A very full account of the new harbor works at Rosario, on the Parana, above Buenos Ayres. 7500 w. 2 plates. Mem Soc Ing Civ de France—Jan., 1905.

Rotterdam.—See **COAL HANDLING—Electric, Rotterdam.**

San Nicolas, Argentine.—Deep-Water Port at San Nicolas de los Arroyos (Puerto de Aguas Hondas en San Nicolas de los Arryos). Details of proposed improvements of the port of San Nicolas, on the Parana river, below Rosario. 3500 w. La Ingenieria—Aug. 30, 1905.

Savannah.—Savannah Harbor. A. S. Cooper. Describes the natural harbor and the improvements made. Ill. 3200 w. Wis Engr—Dec., 1901.

Scheveningen.—The Harbor of Scheveningen (De Binnenhaven te Scheveningen). P. J. Van Voorst. Data concerning the dredging of the harbor, breakwater construction and general improvements. 7000 w. De Ingenieur—Sept. 27, 1902.

Scotland.—New Dock and Harbor Works in the East of Scotland. An account of improvements at Grangemouth, Leith and Burntisland. Ill. 3000 w. Engr, Lond—March 8, 1901.

See also **Glasgow; GRAIN ELEVATOR—Leith.**

Seaham, Eng.—The Seaham Harbor Extension Works. Reviews the history of this coal port and describes the extensions to meet the requirements of trade. 1200 w. Engr, Lond—March 28, 1902.

Seaham Harbor New Works. Illustrates and describes the important engineering works, recently completed, for the improvement of this harbor and docks. 1600 w. Engr, Lond—Nov. 10, 1905.

Sfax.—See **Tunis.**

Shanghai.—See **RIVER REGULATION—Whampou.**

Stamboul.—See **Constantinople.**

Suez Canal.—The Improvement of the Terminal Harbors of the Suez Canal (Die Seehafen des Suez-Kanales und deren Verbesserungen). Illustrating and describing the new works at Port Said and Suez. 3000 w. Glasers Annalen—Feb. 15, 1904.

See also **CANAL.**

Surabaya Strait.—See **STRAIT—Surabaya.**

Tampico, Mex.—The Harbor Works at Tampico, Mexico. Report of a lecture by E. L. Corthell, describing the twin jetties at Tampico and the improvements they have effected. 1400 w. Eng Rec—July 27, 1901.

Tidal Basins.—Tidal Scour in Harbors, or the Function of Tidal Basins with Special Reference to the Harbor of Boston. Joseph P. Frizell. Also discussion. 5800 w. Jour Assn of Engng Socs—Feb., 1902.

Trieste, Austria.—The Harbor of Trieste (Der Hafen von Triest). Eduard Michl. A general account of the development of the port, with description and plan of the proposed improvements of the harbor and railway terminals. 4000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Nov. 11, 1904.

The Improvement of the Harbor of Trieste according to the Projects of 1903 (Ueber die Ausgestaltung des Hafens von Triest nach dem Projekte 1903). Nandor Nadory. A critical discussion of the various plans proposed, pointing out their defects. Serial. Part I. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 13, 1905.

Tunis.—The Ports of Tunis (Les Ports Tunisiens). An account of the present condition of the harbors of Sfax and Tunis, and suggestions as to their improvement. 2000 w. Revue Technique—Oct. 25, 1900.

The Ports of Tunis (Les Ports Tunisiens). G. Leugny. Especially describing the harbor of Bizerta, and the recent improvements. 3000 w. Revue Technique—Jan. 10, 1901.
See also **Bizerta.**

United States.—See **RIVER REGULATION.**

U. S. Government Work.—See **RIVER REGULATION.**

U. S. Legislation.—The River and Harbor Bill. A review of the recently published appropriations, with extracts from the Act. 2200 w. R R Gaz—July 11, 1902.

Valparaiso.—The Harbor of Valparaiso (Le Port de Valparaiso). Ch. Dantin. An illustrated review, showing the present condition of the port, and the plans for its expensive improvement. 3500 w. 1 plate. Génie Civil—July 16, 1904.

Venice.—The Port of Venice (Per il Porto di Venezia). A comparative study of the various plans now under consideration for the improvement of the harbor facilities of Venice. 4000 w. Monitore Tecnico—Sept. 20, 1905.

Vicksburg.—See **RIVER REGULATION—Yazoo.**

Vienna.—See **RIVER REGULATION—Danube.**

Zaandam.—See **DOCK.**

Zeebrugge.—Zeebrugge Harbor Works. M. J. Nyssens Hart and M. L. Van Gansberghe. Read before the Glasgow Congress. Illustrates and describes the breakwater construction at this port on the Belgian coast. 2400 w. Engng—Jan. 10, 1902.

The Harbor Works at Zeebrugge (De Havenwerken te Zeebrugge). W. Meijer Timmerman Thijssen. Showing the new curved breakwater, and channel through the bar at the port of Zeebrugge, Holland. 2000 w. De Ingenieur—Aug. 13, 1904.

See also **BREAKWATER—Bilbao.**

HARBOR IMPROVEMENT.

See **HARBOR.**

HARBOR LIGHTERAGE.

See **STEAM LIGHTER; TRANSPORTATION—Harbor Lighterage.**

HARDENING.

See also **IRON METALLURGY; STEEL METALLURGY.**

A Few Points in Hardening. E. R. Markham. Suggestions for treatment. 700 w. Am Mach—Sept. 24, 1908.

Brayshaw Salt Bath.—A New Hardening Furnace. Illustrates and describes a furnace invented by S. N. Brayshaw, which makes use of a salt bath for heating the work. 800 w. Am Mach—Vol. 28, No. 11.

The Brayshaw Salt Bath Hardening Furnace. Emile Guarini. Illustrated description of a furnace designed to effect the hardening of steel articles with a degree of precision hitherto unattained. 1000 w. Ir Age—April 20, 1905.

A Salt Bath Furnace for Steel Hardening. Illustrates and describes an apparatus in which a fusible salt liquid is utilized for heating purposes; known as the Brayshaw furnace. 1800 w. Sci Am Sup—May 20, 1905.

Case.—Case Hardening for Fine Grain. E. R. Markham. Explains how machine steel may be hardened so as to produce a fine grain. 1500 w. Am Mach—Jan. 2, 1902.

Case Hardening Wrought Iron and Machine Steel. E. R. Markham. Gives directions for the work. 2000 w. Am Mach—Jan. 23, 1902.

Points to be Observed in Case Hardening. E. R. Markham. Discusses some points concerning the composition and peculiarities of the stock and materials used. 800 w. Am Mach—Jan. 16, 1902.

A Job of Case Hardening. E. R. Markham. Describes a method adopted to remedy troubles met in hardening small pieces. 1000 w. Am Mach—Oct. 30, 1902.

Case Hardening. A. W. McCaslin. Read before the Nat. R. R. Blacksmith's Assn. Explains the meaning of the term and the methods used, best material, etc. 1700 w. Am Mach—Sept. 10, 1903.

Notes on Cementation. Georges Charpy. A report of experimental investigations and the results obtained. 2200 w. Ir & St Mag—Oct., 1904.

Case Hardening. David Flather. Read before the Cycle Engineers' Inst., Birmingham, Eng. An illustrated article describing the process and the equipment and materials needed. 6000 w. Ir & Steel Mag—April, 1905.

Casehardening. David Flather. Read before the Cycle Engrs.' Inst., Birmingham, Eng. States the advantages sought in this process, and reviews the methods. 7500 w. Mech Engr—June 24, 1905.

Cutters.—Hardening Thin Cutters. E. R. Markham. Hints as to methods of heating and arrangement of plates for cooling the work. Ill. 1200 w. Am Mach—June 26, 1902.

Drop Dies.—See **DIE—Drop, Hardening.**

Lead Heating.—Heating in Red Hot Lead for Hardening. E. R. Markham. Notes from experience on heating steel in the lead crucible. 900 w. Am Mach—March 6, 1902.

Le Chatelier.—See **PYROMETRY.**

Machine Tool Parts.—Hardening Machine Tool Parts. John Randal. Illustrates and describes the methods used in the Sloan & Chace shops, Newark, N. J. 1000 w. Am Mach—Feb. 25, 1904.

Punches.—See **PUNCH—Treatment.**

Reamers.—Hardening Long Reamers. E. R. Markham. An explanation of the method used by the writer with good results. 1800 w. Am Mach—May 29, 1902.

Ring.—Hardening Rings. E. R. Markham. Describes treatment given large tool-steel rings. Ill. 800 w. Am Mach—Feb. 6, 1902.

Salt Bath.—See **Brayshaw Salt Bath.**

Special Tools.—Hardening Special Tools. E. R. Markham. Brief description of some methods found to give good results. 1200 w. Am Mach—Dec. 3, 1903.

Springs.—See **SPRING—Hardening and Tempering.**

Steel.—Success in Hardening Steel. E. R. Markham. Practical suggestions about the fire, the steel, and the method of treatment. 3000 w. Mach, N Y—Feb., 1902.

Hardening and Tempering Steel. Abstract of a paper by Prof. A. Stansfield, of McGill University, read before the Canadian Ry. Club. Ills. 1400 w. R R Gaz—March 18, 1904.

See also **Brayshaw Salt Bath; METAL—Steel Hardening; STEEL—Hardening; STEEL METALLURGY—Hardening.**

Taps.—Hardening Extra Long Stay-Bolt Taps. E. R. Markham. Directions for this work. 1600 w. Mach, N Y—March, 1902.

Hardening Taps. E. R. Markham. Gives a description of the method known as pack hardening, as applied to the hardening of taps. 1700 w. Am Mach—Dec. 17, 1903.

Tools.—Combined Oil and Water Hardening of Taps, Milling Cutters, etc. John L. Bacon. Describes a method that seems not only to save time, but to give more satisfactory results than the ordinary method used. 1400 w. Am Mach—March 6, 1902.

Experiences and observations in Hardening Tools. From the "Zeitschrift fuer Werkzeugmaschinen und Werkzeuge." Gives results obtained from a series of experiments to find the best hardening temperature for different kinds of steel. 2000 w. Am Mach—Sept. 29, 1904.

Williams, Brooklyn.—The Hardening and Tempering Plant of J. H. Williams & Co. Illustrated detailed description of the hardening and tempering equipment of a shop in Brooklyn, N. Y., and the methods employed. 2000 w. Ir Age—Feb. 7, 1901.

HARDNESS.

See **TESTING—Hardness.**

HARVESTER WORKS.

Hamilton, Ont.—See **AGRICULTURAL MACHINERY WORKS.**

HAULAGE.

Canal.—See **CANAL HAULAGE.**

Chain Towing.—See **CANAL HAULAGE; FERRY; STEAMBOAT.**

Compressed Air.—See **COMPRESSED AIR—Haulage.**

Machinery in Streets.—See **MACHINERY—Hauling.**

Mines.—See **MINE HAULAGE.**

HAVANA.

See **MUNICIPAL ENGINEERING; PAVEMENT; QUARRY; SANITATION; SEWERAGE.**

HAWAIIAN ISLANDS.

Some Interesting Engineering Feats. John Ericson. Brief outline of the important works constructed in the Hawaiian Islands since their annexation to the United States. 1000 w. Mod Mach—Jan., 1902.

HEAD FRAME.

See also **COAL MINE; COAL TIPPLE; HOISTING; MINE; MINE SHAFT.**

Head-Works Framing—Primary Notions. Charles H. Fitch. Explanations of the stresses in tower frames. 1200 w. Min & Sci Pr—May 23, 1903.

Head-Works Framing. Charles H. Fitch. Outlines of framing used, discussing stresses. 1500 w. Min & Sci Pr—June 13, 1903.

Simple Head Frame Construction. Shows a substantial frame constructed at the collar of a shaft, and explains the conditions. 1200 w. Min & Sci Pr—Feb. 6, 1904.

Some Mine Head Frames and Hoists. Walter W. Bradley. Illustrated descriptions of examples noted by the writer. 1400 w. Min & Sci Pr—April 16, 1904.

The Rational Design of Head Frames for Mines. George S. Binckley. An illustrated article which the writer offers for consideration. 1200 w. Min & Sci Pr—June 10, 1905.

Airtight Casings.—See **MINE SHAFT.**

California.—An Eldorado County, Cal., Head Frame. C. H. Wildman. An illustrated description of a new head frame recently erected on the Flagstaff shaft of the Mt. Hope mine. 700 w. Min & Sci Pr—Nov. 29, 1902.

Cripple Creek.—The Head Frames of Shafts at Cripple Creek. Alexander Forsyth. A discussion of the problem of erecting frames for vertical shafts, stating the requirements and considering them seriatim. Ill. 2400 w. Eng & Min Jour—March 7, 1903.

Joplin, Mo.—See **HOISTING.**

Manners Colliery.—The Erection of the New Headstocks at the Manners Colliery. Illustrates and describes the headstocks and the work of erection, which was accomplished expeditiously without interfering with the work of the colliery. 1700 w. Ir & Coal Trds Rev—Aug. 8, 1902.

HEADLIGHT.

See also **REFLECTOR.**

Acetylene.—Acetylene Gas Generator for Locomotive Lighting. Illustrated description of a new apparatus in trial on the Chicago & Northwestern. 700 w. R R Gaz—Oct. 11, 1901.

Acetylene Headlights on Locomotives. From a paper by George Landis Wilson, presented at the convention of the Traveling Engrs.' Assn., giving considerable information about the use of acetylene for headlights. 1500 w. Ry Age—Oct. 11, 1901.

Acetylene Searchlights for Automobiles. From "La Nature." Considers some of the French searchlights. Ill. 1500 w. Sci Am—Nov. 15, 1902.

Principle of Acetylene Lamps. S. W. Rushmore. Discusses the principles involved in the operation of an acetylene headlight for automobiles. 1500 w. Automobile—Jan. 2, 1904.

Automobile.—Lamps for Fast Night Travel. Illustrated description of searchlights adapted to the needs of motorists. 1500 w. Automobile—Feb. 28, 1903.

Automobile Lamps. Illustrations of 20 styles, with brief descriptions. 3000 w. Automobile—Sept. 26, 1906.

Headlights and Night Driving. Joseph Tracy. Suggestions and cautions. 1000 w. Automobile—Oct. 1, 1904.

New Ideas in French Lamps. Illustrates and describes the Besnard lamp and projector, and the Bleriot lamp, burning gasoline and oxygen. 1000 w. Automobile—Nov. 30, 1905.

See also **Acetylene.**

Electric.—Electric Headlights. An explanation of the care and management of these lights. 1500 w. Loc Engng—Aug., 1901.

Headlight with a Vertical Beam. Illustrates and describes a new type of electric headlight, which, in addition to sending a powerful ray along the tracks, also projects a vertical beam. 1200 w. Sci Am—Sept. 13, 1902.

The Electric Headlight as a Safety Appliance. Considers briefly their advantages and deficiencies. General discussion. 5400 w. Pro W Ry Club—May 17, 1904.

Electric Headlight for Locomotives. Illustrated description of the Edwards electric headlight, which is in use in America, India, and South Africa. 600 w. Engr, Lond—Aug. 25, 1905.

Vertical Beam.—See **Electric.**

HEAT.

See also **COMBUSTION; HEATING; PYROMETRY; STEAM ENGINEERING; THERMODYNAMICS;** and under various compound headings, such as **HEAT TRANSMISSION,** etc.

Earth's Interior.—Power from the Interior Heat of the Earth. William Hallock. Considers the amount of energy brought to the surface in the form of hot water from hot springs, and the temperatures of deep mines, etc., and discusses the utilising the heat below the surface of the earth. Ill. 2200 w. Cassier's Mag—Feb., 1903.

See also **EARTH MOVEMENT; EARTHQUAKE; GAS, NATURAL; GROUND WATER — Hot Springs; VOLCANO.**

Effect on Materials.—See **MATERIALS' STRENGTH —Heat Effect; PLATE—Heat Effect.**

Loss.—See **HEAT RADIATION; HEAT TRANSMISSION; STEAM-PIPE COVERING.**

Morse Gauge.—See **PYROMETRY—Morse Heat Gauge.**

Standard Unit.—See **HEAT RESISTANCE.**

Wasted.—See **COMBUSTION—Wasted Heat.**

Waste Utilization.—See **COKE OVEN GAS; STEAM ENGINEERING—Exhaust Utilization.**

HEAT CONDUCTIVITY.

See also **HEAT RESISTANCE; HEAT TRANSMISSION; STEAM ENGINEERING.**

Cables.—See **ELECTRIC CABLE.**

HEAT ENGINE.

See **BINARY ENGINE; GAS ENGINE; GASOLINE ENGINE; GAS TURBINE; MOTOR; OIL ENGINE; STEAM ENGINE; STEAM TURBINE; THERMODYNAMICS.**

HEATING.

See also **CAR HEATING; ELECTRIC HEATING; ELECTRIC PLANT; FURNACE; GAS HEATING; HEATING AND VENTILATION; LIGHTING; MECHANICAL PLANT; PLUMBING; POWER PLANT; RADIATION.**

Ada, O.—See **ELECTRIC STATION.**

Air Radiators.—The Scientific Basis and Commercial Feasibility of Heat Radiators, Using Air Instead of Water or Steam. George M. Aylesworth. Read at meeting of Am. Soc. of Heat & Ven. Engrs. Describes the system as adopted by the writer and its successful application to house warming. Ill. 2300 w. Met Work—July 25, 1903.

Alcohol.—See **ALCOHOL.**

Apartment House, Boston.—Heating of the Westminster Chambers, Boston. Illustrated description of a hot-water heating plant in an 8-story, 104 x 145 ft. apartment house. 1000 w. Eng Rec—Jan. 5, 1901.

Armory, Brooklyn.—Heating System of the Squadron C Armory, Brooklyn, N. Y. J. Byers Holbrook. Describes the building, which has a large riding hall, as well as the usual administration section and usual armory conveniences. The heating is on the two-pipe, up-feed, low pressure, direct radiation system. 1400 w. Eng Rec—Oct. 14, 1905.

Baltimore.—See **REFRIGERATION.**

Baltimore Plant.—See **MECHANICAL PLANT—Combination.**

Basement.—Methods of Heating the Basement. H. H. Kelley. Illustrates and describes arrangement for heating by hot water, and also by steam. 1500 w. Engr, U S A—Oct. 15, 1902.

Boston Navy Yard.—See **Hot Water.**

Brückner System.—See **Hot Water.**

Car.—See **CAR HEATING.**

Car Shops, Baltimore.—Heating in a Large Group of Car Shops, Baltimore. Illustrated description of a plant for heating, by the fan system, buildings of the United Railways and Electric Co., covering 8.7 acres. The plant embraces 4 fan-heater units, a special application of the Holly system of gravity return, and a water-tube boiler plant of 750 H. P. 1800 w. Eng Rec—Nov. 9, 1901.

Central Station.—Central Station Heating. Illustrated abstract of paper by William H. Bryan, presented at meeting of Am. Soc. of Heat. & Ven. Engs., on the financial features of public steam and hot-water heating service by electric companies, with curves of temperature and heat demand. 3300 w. Eng Rec—Jan. 26, 1901.

Heating from Central Stations. Alton D. Adams. Urging the distribution of steam and hot-water for heating purposes, giving figures relating to efficiency, cost, etc., and reasons for advocating a combined electric and heating plant. 1200 w. Munic Engng—Feb., 1901.

Heating from Central Stations—A Comparison with Private Heating Plants. Alton D. Adams. A statement of the advantages of distributing steam heat from electric stations. 1700 w. Munic Engng—March, 1901.

Hot Water Heating from Central Stations. Alton D. Adams. Discusses the advantages of such a system, and its efficiency. 2800 w. Elec Wld & Engr—March 23, 1901.

Design of Pipes for Hot-Water Heating from Central Stations. Alton D. Adams. Discusses the various problems to be met and their solution. Serial. 1st part. 2500 w. Elec Rev, N Y—May 18, 1901.

Hot-Water Central Heating in Red Oak, Ia. Illustrated description of a plant with 5,500 ft. of steel mains and 29,000 sq. ft. of radiation, operated to utilize the exhaust steam of an electric station. 1500 w. Eng Rec—March 30, 1901.

Central Heating Plants in the United States. Concerning the recent growth of commercial central heating stations. 1500 w. Eng News—March 20, 1902.

Central Station Heating. D. F. McGee. Read before the Iowa State Elec. Lgt. Assn. A description of the plant at Red Oak, Iowa, with discussion of points of importance to obtain success. 3000 w. Am Gas Lgt Jour—May 12, 1902.

Central Station Heating. W. H. Schott. Read before the Northwestern Elec. Assn. Discusses things necessary if heating from central stations is to prove successful and profitable. 3200 w. Elec Rev, N Y—Feb. 13, 1904.

Central Station Heating. W. H. Schott. Read before the Northeastern Elec. Assn. Discusses when hot-water systems may be used, and when steam would serve better, and the requirements and how to meet them. Shows the importance of automatic regulations. 3000 w. Dom Engng—Feb. 25, 1904.

Heating from a Central Station. W. H. Pearce. An illustrated article showing that with proper appliances and experience, heating from a central station is a success, and pointing out the cause of loss in the various methods. Also discussion. 14,400 w. Jour W Soc of Engrs—Feb., 1904.

A Study, for a Central Power and Heating Plant at Washington. Extracts from the interesting report of Bernard R. Green, assisted by Prof. S. Homer Woodbridge, in regard to the investigations made to determine the advisability of erecting a station for the group of Federal executive buildings in the vicinity of the Mall. 5400 w. Eng Rec—Feb. 11, 1905.

Notes on the Design of Central-Station Hot-Water-Heating Systems. J. D. Hoffman. Discusses the details of a typical design. 5000 w. Am Soc of Heat & Ven Engrs—July, 1905.

Steam Heating for Central Stations. R. S. Wallace. Discusses some of the engineering questions which require study when it is proposed to attach a steam-heating system to an existing steam power control station supplying the public with electricity for light and power. 3500 w. Technograph—No. 19, 1904-1905.

See also **District; Dresden; Hot Water; Indianapolis; Randall's Island; Vienna; ELECTRIC STATION—Detroit; Evanston, Ill.; Springfield, O.; MECHANICAL PLANT; STEAM ENGINEERING—Exhaust Utilization.**

Chapter House.—Warming a Chapter House. Illustrated description of interesting features in the system used for the Beta Theta Pi Chapter House in Syracuse. 1700 w. Met Wk—Nov. 9, 1901.

Closed Rooms.—See **COOLING.**

Columbus, O.—See **ELECTRIC STATION.**

Combination System.—Proportioning Hot-Water Radiation in Combination Systems of Hot Air and Hot Water Heating. R. C. Carpenter. Read at meeting of Am. Soc. of Heat. & Ven. Engs. Gives results of some experiments in proportioning heating surface in a hot air furnace to hot water radiation and an accurate test of the efficiency of the different parts of a furnace combined with a hot water heater. 2500 w. Met Work—Jan. 26, 1901.

Combined System.—Combined Steam and Hot Water Radiation. Describes a system installed in a twelve-story office structure in Providence. 1400 w. Eng Rec—April 9, 1904.

Condensing Engines.—Steam Heat with Condensing Engines. Alton D. Adams. Discusses the use of the vacuum system of heating with steam from condensing engines and the work which may be done by exhaust steam. 1300 w. Sci Am—Aug. 24, 1901.

See also **Exhaust Steam.**

Copenhagen, Denmark.—See **Hot Water.**

Costs.—Heating Costs of Various Systems. J. Byers Holbrook. Gives brief descriptions of the different systems, and a table of approximate costs. 3700 w. Eng Rec—Dec. 26, 1903.

Court House.—Heating in the Marion County Court House, Fairmont, W. Va. Illustrated description of a plant for warming a building by means of a fan forcing heated air through underground ducts to the various flues leading to the rooms. 1800 w. Eng Rec—May 25, 1901.

Detroit.—See **ELECTRIC STATION.**

District.—District Heating. Gives some important data reported to the Nat. Elec. Lgt. Assn. in regard to heating in connection with electric lighting, and discusses the service generally. 2200 w. Eng Rec—July 15, 1905.

See also **Central Station.**

Dresden Central Station.—The Electrical and Heating Station in Dresden (Das Fernheiz und Elektrizitätswerk in Dresden). General description of steam power plant and electric generating station, including long-distance distribution of steam for heating purposes. 2000 w. Schweizerische Bauzeitung—July 18, 1903.

Central Station Heating (Fernheizungen). Prof. Rietschel. Paper before the Berlin Section of the Ver. Deutsch. Ing. on long distance steam heating in general, with a particular description of the great Dresden plant. 6000 w. Zeitschr d Ver Deutscher Ing—June 28, 1902.

Central Station Heating (Fernheizwerke). An account of a large steam plant for heating various public buildings in Dresden, Saxony. 1500 w. Zeitschr d Ver Deutscher Ing—Jan. 1, 1902.

The Central Heating and Electric Lighting Station at Dresden. An illustrated account of a central heating station where the results obtained have been exceptionally good. Serial. 1st part. 2200 w. Engr, Lond—Oct. 6, 1905.

Heat and Electric Light Distribution in Dresden. C. Arldt. Illustrates and describes the installation of the Dresden heating and electric light generating station, which supplies heat and light to royal, municipal and other buildings. 2200 w. Trac & Trans—June, 1903.

The Royal Central Heating and Electric Station at Dresden (Königliches Fernheizund Elektrizitätswerk zu Dresden). R. Trautmann. An illustrated description of a large central steam heating plant, in an ornamental building, for heating the principal public buildings in Dresden, Germany. 1 plate. 5000 w. Glasers Annalen—July 15, 1903.

Combined Lighting and Heating Plant at Dresden. Illustrated description of an interesting installation having a common boiler plant for electricity supply and artificial heating by steam with long distance distribution. 2000 w. Elec Engr, Lond—Aug. 28, 1903.

See also **ELECTRIC STATION—Dresden.**

Dynamite Storage.—Heating a Dynamite Storage House. Illustrated description of the type of dynamite storehouse adopted by the Fire Commissioners of New York. 700 w. Metal Work—Jan. 9, 1904.

See also **EXPLOSIVE.**

Economy.—See **Steam Economy; STEAM PLANT.**

Electric.—See **ELECTRIC HEATING.**

Ellis Island, N. Y.—Central Heating Plant, Ellis Island, New York. Illustrated description of the power plant and heating system in the large immigrant landing station in New York Harbor. The present article describes the main features of the plant. Serial. 1st part. 3200 w. Eng Rec—July 27, 1901.

Europe.—European Heating Apparatus. Charles F. Hauss. Brief illustrated descriptions of systems in use. 3800 w. Met Work—June 13, 1903.

Exhaust Steam.—Condensing vs. Exhaust Steam Heating. Charles L. Hubbard. Discusses practical examples, assuming conditions, showing the advantages of the condenser and the obstacles. 1600 w. Am Elect'n—Aug., 1902.

Two Suggestions for Exhaust Steam Heating. William E. Wood. Suggestions intended for engineers in charge of power houses of moderate size, who are called upon to heat certain spaces in the most economical manner. 1000 w. Eng News—April 7, 1904.

Performance of a Plant with Heating from the Exhaust of Condensing Steam Turbines. Illustrates and describes a very interesting plant installed in the Wing Building, New York City. This is a seven-story structure devoted to manufacturing. 2800 w. Eng Rec—Sept. 3, 1904.

Steam Heating in Connection with Condensing Engines. Reginald Pelham Bolton. Read before the Am. Soc. of Heat & Ven. Engrs. A discussion of the use of exhaust steam from condensing engines, and reporting a series of tests. 2700 w. Met. Work—March 25, 1905.

Waste Products of a Central Station. J. A. Bendure. Abstract of paper before Ohio Electric Light Assoc., giving experiences with exhaust steam for heating. 1000 w. Elec Rev, N Y—Sept. 2, 1905.

See also Central Station; Condensing Engines; CAR HEATING—Air Pump Exhaust; HOISTING ENGINE; STEAM ENGINE.

Fan and Furnace.—A Fan and Furnace School-Heating System. Illustrated description of a plant in an Oshkosh schoolhouse, where air is forced by a fan into a chamber containing hot-air furnaces, from which it passes through flues to the rooms. 900 w. Eng Rec—May 18, 1901.

Fan-Engine Test.—See FAN—Test.

Feed Water.—See FEED WATER HEATING.

France.—Low-Pressure Steam Heating in France. Gustave Debesson. Illustrated extracts from a paper presented to the Am. Soc. of Heat. & Ven. Engs., describing the typical French gravity systems, with special radiator valves and copper pipe joints. 1200 w. Eng Rec—Jan. 26, 1901.

Freezing.—The Danger of Freezing in Hot-Water and Low-Pressure Heating Systems (Die Einfriergefahr bei Niederdruckdampfund Warmwasserheizung). W. Schweer. Describing precautions to be taken to prevent injury to pipes and radiators in cold weather. 2500 w. Gesundheits-Ingenieur—Oct. 31, 1904.

Furnace.—Modern Furnace Heating. A combination of hot air and hot water heating and ventilating system is illustrated and described. 3000 w. Met Work—April 5, 1902.

A Furnace System of Heating in a Country Store. Description and calculation of the performance of a warm air furnace heating system in a store building in Montgomery, N. Y., where for 17½ days in "zero weather" one ton of anthracite sufficed for satisfactory heating. Ills. 1800 w. Met Work—Sept. 16, 1905.
See also Hot Air.

Gas.—Gas Heating Plant. Ernest A. Dowson. Abstract of a paper read before the Birmingham Assn. of Mech. Engrs. Illustrates and describes some applications of gaseous fuel to heating, discussing methods. 1800 w. Ir & Coal Trds Rev—Oct. 6, 1905.

See also Mint, Philadelphia; GAS, FUEL; GAS HEATING; GAS STOVE.

Gas—Hot Water.—See Hot Water—Gas.

Gas Plant.—See POWER PLANT—Gas.

Germany.—See TEMPERATURE.

Greenhouses.—A New Method of Steam Heating for Greenhouses. T. Eckhardt, in the "Florists' Exchange." Illustrated description of a new method of heating greenhouses for tropical plants, with a comment by L. R. Taft. 3000 w. Met Wor—Dec. 1, 1900.

Radiation or Pipe Surface Required for Greenhouses and for Ordinary Buildings Having Considerable Variations in Construction, Size and Temperature. Walter Jones. Read at London meeting of the Inst. of Heat. & Ven. Engrs. Condensed paper containing technical information. 1400 w. Dom Engng—Jan. 25, 1904.

See also Hot Water Gas; GREENHOUSE.

Heat Unit Loss.—The Heat Unit and Its Application to the Heating of Buildings. George G. Bennett. Read before the Ohio Soc. of Mech., Elec., and Steam Engrs. Gives method of finding the loss of heat units, illustrating by example. 800 w. Engr, U S A—Dec. 1, 1905.

Hospital, Dresden.—The Heating System of the Johannstadt Hospital, Dresden-Altstadt (Die Heizanlagen im Krankenhaus Johannstadt, Dresden-Altstadt). Erwin Nicolaus. Describing a central heating plant using hot water for a large hospital in Dresden. 4000 w. 2 plates. Gesundheits-Ingenieur—Oct. 10, 1904.

Hot Air.—A Residence Heated by a Furnace. Illustrates and describes a hot-air furnace which satisfactorily heats 18 rooms. 1900 w. Met Work—Nov. 10, 1900.

A Hot-Blast Furnace Heating Installation. Illustrated description of apparatus for heating a public hall by blowing air through hot-air furnaces. 600 w. Eng Rec—April 20, 1901.

European Warm Air Furnaces. Charles F. Hauss. Brief illustrated descriptions of designs, with general remarks. 2500 w. Met Work—Nov. 2, 1901.

The Science of Warm Air Heating. C. E. Oldacre. A treatise on theory and practice, with formulas and tables. Serial. 1st part. 2500 w. Met Work—Jan. 3, 1903.

Wood Furnace Heating in Nova Scotia. An illustrated description of arrangements for heating a building with a wood hot air furnace. 1800 w. Metal Work—Nov. 29, 1902.

Possibilities in Heating with Hot Air. R. S. Thompson. Presents arguments in proof of the economy of this system of heating. 2500 w. Am Soc of Heat & Ven Engrs—July, 1905.

A Notable Departure in Furnace Heating. Illustrated description of a system introducing round risers. 2200 w. Met Wor—Nov. 4, 1905.

The Science of Warm Air Heating. C. E. Oldacre. A treatise on theory and practice, with formulas and tables. Serial. 1st part. 2500 w. Met Work—Jan. 3, 1903.

The Battery System of Warm Air Heating. C. E. Oldacre. Read at N. Y. meeting of Am. Soc. of Heat. and Ven. Engrs. Illustrated description of an installation in a suburban house. 2500 w. Met Work—Jan. 23, 1904.

Advanced Methods of Warm Air Heating. A. C. Jones. Read before the Am. Soc. of Heat. & Ven. Engrs. Illustrates and describes a system, giving a plan of a residence which is heated with a warm air furnace, where seven supply pipes are used for heating thirteen rooms. 1800 w. Met Work—July 16, 1904.

The Warming of Public Buildings by the Warm-Air System Considered from a Hygienic Point of View. H. H. Grundy. Read before the British Inst. of Heating & Ven. Engrs. Discusses the necessity of introducing an ample supply of fresh air, and shows how an apparatus can be installed to introduce air from the outside of the building, the arrangement, operation, etc. 4000 w. Dom Engng—Dec. 24, 1904.

Heating a Residence in Van Wert, Ohio. D. A. Clark. Illustrates and describes a warm air furnace system in which twelve rooms are supplied by six hot air pipes. 1000 w. Met Work—Sept. 23, 1905.

Modern Methods of Heating Residences with Warm Air Furnaces and Special Side Wall Registers. E. E. Dunning. Gives illustrations and descriptions of two methods of heating with a Warm Air Furnace and the cost of installation under each plan. 2200 w. Met Work—Sept. 2, 1905.

See also Furnace System; Rotary Furnace; GAS FUEL; HEATING AND VENTILATION—Kobe, Japan.

Hot Blast.—See HEATING AND VENTILATION.

Hot Water.—A Low Pressure Hot Water Heating

System Receiving Heat from a Steam Boiler. John Gormly. Read at meeting of Am. Soc. of Heat. & Ven. Engrs. Illustrates and describes a device containing features of interest. 1000 w. Met Work—Jan. 26, 1901.

Volume of Water in Hot-Water Heating Apparatus. Abstract of paper by W. M. Mackay, describing tests made to determine the amount of water required per square foot of radiating and heating surface. 1100 w. Eng Rec—July 13, 1901.

Volume of Water in Hot Water Heating Apparatus. W. M. Mackay. Read before the Am. Soc. of Heat. & Ven. Engrs. Discusses the great difference of opinion, and states the volume that has given best results in the practice of the writer. 1500 w. Dom Engng—Oct. 15, 1901.

Distribution of Hot Water. Alton D. Adams. Discussion of the supply of heat by hot water; how to calculate for the degree of heat desired; differences in temperature, etc. Serial. 1st part. 2000 w. Archts & Builds Mag—Oct., 1901.

Hot-Water Heating in a Coal Country. Alton D. Adams. Illustrated description of the extensive system installed by the Miami Light, Heat and Power Co., of Piqua, O., for hot-water heating from an electric lighting station. 3300 w. Eng Rec—Sept. 19, 1903.

Hot Water Heating in a Chicago Residence. Illustrated description of an open gravity installation with direct and indirect radiation. 1600 w. Eng Rec—Oct. 19, 1901.

The High-Pressure System of Heating by Hot Water. Frederick Dye. An illustrated description of the system, with a statement of the advantages and disadvantages. 3800 w. Plumb & Dec—Oct. 1, 1901.

Hot Water Indirect Heating in a Rochester School. Describes the interesting features of the installation. Ill. 2000 w. Eng Rec—Jan. 4, 1902.

Hot Water Heating. P. Trowern. Read before the Canadian Assn. of Stationary Engrs. Briefly reviews the history of heating appliances, especially heating with hot water. Serial. 1st part. 1400 w. Dom Engng—March 15, 1902.

Hot-Water Heating from a Central Steam Plant. Illustrated description of a system employed to utilize old hot-water heating installations by warming the water in special heaters connecting with a central plant. 1000 w. Eng Rec—May 10, 1902.

Hot-Water Heating in a Hartford Residence. Illustrated description of the low-pressure gravity hot-water system in a 3-story, 72 x 48 ft. house, explaining some methods of calculating the sizes of different parts of the plant. 1200 w. Eng Rec—May 24, 1902.

Pipe Sizes for Hot-Water Heating. Charles L. Hubbard. An illustrated article considering the conditions that determine the size, and the method of computing the effect of each. 2800 w. Engr, U S A—July 1, 1902.

The Reck System of Hot Water Heating (Die Warmwasserheizung System Reck). Ernst Schiele. The circulation is maintained by a form of jet pump operated from the heating boiler. Details of the system and its connections are given. Two articles. 4000 w. Gesundheits—Ingenieur—Nov. 15, 30, 1902.

Hot-Water Heating Systems (Die Einrichtungen zum Erwärmen von Wasser). Otto Marr. Describing various hot water systems, with formulas for use in computation of dimensions. 3000 w. Gesundheits-Ingenieur—Feb. 20, 1903.

The Brückner System of Rapid Circulation Heating (Neue Schnellumlaufheizung, System Brückner). J. Einbeck. Describing a system of hot-water heating in which the circulation is accelerated by the use of a steam jet. 2500 w. Gesundheits Ingenieur—July 20, 1903.

Low Pressure Hot Water Heating on the Reck Circulator System. C. I. Haden. Read in London, at meeting of the Inst. of Heat. and Ven. Engrs. An illustrated description of the apparatus of a system largely used on the Continent. 5400 w. Dom Engng—Dec. 25, 1903.

A New System of Hot-Water Heating. Illustrates and describes a quick circulating hot-water heating system having new and interesting features; developed by a firm in Vienna, Austria. 2300 w. Met Work—Jan. 2, 1904.

Description of the Hot-Water Heating Apparatus in the Schioldann Institution, Copenhagen, Denmark. A. B. Reck. Read at N. Y. meeting of the Am. Soc. of Heat. & Ven. Engrs. Explains the climate and conditions in Denmark and describes the method of heating employed. Short discussion. 5500 w. Met Work—Jan. 30, 1904.

Description of Hot Water Heating Apparatus in the Schioldann Institution, Copenhagen, Denmark. A. B. Reck. Read before the Am. Soc. of Heat. & Ven. Engrs. Ills. 4500 w. Dom Engng—May 25, 1904.

A Graphical Method of Proportioning Pipes for Hot-Water Heating (Graphische Methode der Rohrbestimmung für Wasserheizung). W. Scheer. An examination of the proportions of hot-water heating pipes, with complete charts applicable to any case, together with practical examples of their application. 7000 w. 2 plates. Gesundheits-Ingenieur—March 20, 1904.

A Central Hot-Water Heating Plant in the Boston Navy Yard. Describes an installation of the Evans exhaust hot-water heating system with forced circulation, and its working. Ills. 4500 w. Eng Rec—July 16, 1904.

Heating by Hot Water (Chauffage à Eau Chaude). A. Monteilhet. With especial reference to the Rouquaud system of assisted circulation. 2000 w. Génie Civil—Sept. 24, 1904.

The Circulation of Hot Water. John S. Brennan. Read before the Am. Soc. of Heat. & Ven. Engrs. An illustrated explanation of the circulation in radiators of usual and of an improved connection, giving figures of tests of the two styles. 1000 w. Met Work—Jan. 21, 1905.

Charts for the Steam Fitter. Piping for Hot Water Heating. William G. Snow. The first of a series of charts on piping erection for hot-water and steam systems, with explanatory notes. Serial 1st part. 300 w. Met Work—April 29, 1905.

An Improvised Hot-Water Shop Heating System. Describes briefly an interesting adaptation of a waste steam boiler feed-water heating system to the heating of shops and offices, as outlined by A. A. Maver before the Canadian Ry. Club. 1500 w. Eng Rec—May 13, 1905.

Residence Heating by Direct and Indirect Hot Water. E. F. Capron. Describes a heating apparatus installed in a three-story and basement brick residence, having exposure on all sides, with no protection from surrounding buildings. Ills. 500 w. Am Soc of Heat & Ven Engrs—July, 1905.

Hot-Water Heating by Single-Pipe System with Secondary Circulation (Warmwasserheizung, Einrohrsystem mit Sekundärer Zirkulation). O. Krell. A single large main is used, the radiators being placed in shunt circuits. The system is worked out in detail. Serial. Part I. 9000 w. Gesundheits-Ingenieure—Sept. 20, 1905.

Overhead versus Underfeed in Hot Water Heating. Konrad Meier. Discusses five examples intended to represent different conditions occurring in practice. Diagrams. 1800 w. Heat & Vent Mag—Oct., 1905.

The Principles of Hot Water Circulation. F. C. Cook. The systems in common use for heating and distributing hot water in an ordinary dwelling-house are discussed, with sketches of the appliances used. 1400 w. Plumb & Dec—Oct. 2, 1905.

Hot Water Heating and House Drainage in a Residence in Ellenville, N. Y. Floor plans and sectional elevation, with description of heating and plumbing systems. 2500 w. Met Work—Oct. 7, 1905.

See also Central Station; Plant Design; Reck; BOILER—Heating; ELECTRIC STATION—Heating Combined; HOSPITAL—Germany; HOT WATER.

Hot Water, Ada, O.—See ELECTRIC STATION—Ada, O.

Hot Water—Gas.—Heating Experiments with Oils and Manufactured Gas. B. T. Galloway. Notes from the "Florists' Exchange," respecting experiments with some new devices for heating water for use in radiators, with gas and oil as fuels. Ill. 2200 w. Am Gas Lgt Jour—Oct. 26, 1903.

Hot Water Incrustation.—See HOT WATER—Incrustation.

Indianapolis.—Central Heating and Lighting Plant for the County Buildings, Indianapolis, Ind. Illustrated description of a power house containing 600 H. P. in water-tube boilers and 345 H. P. in engines. with notes on the way the various buildings are heated. 1600 w. Eng Rec—Feb. 22, 1902.

Central Heating Plants at Indianapolis, Ind. W. K. Eldridge. Abstract of a paper read at meeting of the Am. Soc. of Munic. Imp. A report of plants operating in conjunction with electric lighting stations. 1200 w. Eng News—Nov. 5, 1903.

Steam Heating from a Central Station. F. B. Hofft. Read before the Indiana Engng. Soc. Particularly describing the plant of the Merchants' Heat and Light Company of Indianapolis, and its operation. Considers the system nearly ideal. 2000 w. Munic Engng—Feb., 1904.

Indirect.—Some Features of Indirect Heating. Konrad Meier. Explains the three systems of indirect heating, and the way of determining the best requirements or capacity of the apparatus. 5000 w. Eng Rec—May 27, 1905.

Indirect Steam Heating in a Residence. Illustrates and describes a system recently installed in the house of Charles Scribner, New York. 1400 w. Eng Rec—Dec. 14, 1901.

Indirect Coil Test.—Test of an Indirect Heater Coil. S. C. Root. The object of the test was to determine exactly the amount of steam condensed in an indirect coil, under varying conditions. Ills. 2000 w. Jour Assn of Engng Socs—Feb., 1905.

Liesing Hall, Vienna.—See HEATING AND VENTILATION.

Losses.—To Figure Heating Work Accurately. With a Table Showing the Losses in British Thermal Units for Various Surfaces. Charles F. Hauss. Read at N. Y. meeting of the Am. Soc. of Heat. & Ven. Engrs. Explains the use of the table given. 1000 w. Dom Engng—Feb. 25, 1904.

Loss from Buildings.—See COOLING; HEAT TRANSMISSION—Building Materials.

Low Pressure.—See Hot Water; Steam, Low Pressure.

Machine Shop.—The Heating of Workshops (Ueber Fabrikheizungen). Otto Marr. An examination of the prevailing conditions, and a discussion of the use of exhaust, mixed, and high pressure steam, as well as hot air and gas. The preference is given to exhaust steam, aided by reduced pressure steam from the boilers. Two articles. 5000 w. Gesundheits-Ingenieur—April 30, May 15, 1901.

See also Hot Water; HEATING AND VENTILATION.

Mint, Philadelphia.—The Mechanical Heating Processes in the New United States Mint at Philadelphia. States the advantages derived from the use of gas as a fuel in the principal departments, and gives illustrated descriptions of the plant, machines, processes, etc. 3000 w. Am Mach—Jan. 22, 1903.

Moistener.—See HUMIDITY.

Moisture.—The Necessity of Moisture in Heated Houses. R. C. Carpenter. Read at N. Y. meeting of Am. Soc. of Heat. and Ven. Engrs. On the effects of dry air and means of maintaining a constant degree of humidity. 2500 w. Met Work—Jan. 23, 1904.

Natural Gas vs. Coal.—Natural Gas and Other Fuels. A comparison. Abstract of results obtained by Mr. Samuel T. Murdock in an elaborate series of tests concerning the relative value of fuels used in stoves such as are used in heating living rooms of dwellings. 2500 w. R R Gaz—Feb. 7, 1902.

Oil—Hot Water.—See Hot Water—Gas.

Paris Exposition.—Heating Apparatus at the Exposition of 1900 (Les Appareils de Chauffage à l'Exposition de 1900). F. Dommer. The first of a series of articles reviewing the warming apparatus shown, including steam, hot water, hot air, and isolated heating. Serial. Part I. 1500 w. Génie Civil—Dec. 15, 1900.

Piping Computation.—See Steam, Low Pressure.

Plant Design.—Steam Tube Heater for Hot Water Heating Plant. A problem requiring the calculations for the size of a heater for warming the water of a hot water heating plant by means of steam, with the method of solving it. 2500 w. Met Work—Oct. 7, 1905.

Public Buildings.—See Warm Air.

Radiators.—Surface of Radiators in Room Heating. Ernest T. Child. A comparison of the methods of determining the proper amount of steam radiating surface. 2700 w. Gas Engs' Mag—Dec. 10, 1900.

Radiators and Heating. H. H. Kelley. Illustrates and describes many styles of cast-iron radiators, with suggestions for determining the heating surface and other requirements. 2000 w. Engr, U S A—Nov. 1, 1902.

See also Air Radiators; Ribbed Radiators; Steam; Superheated Steam.

Radiators, European.—European Radiators. Charles F. Hauss. Illustrated descriptions of types. 800 w. Met Work—March 15, 1902.

Railway Repair Shops.—The Economical Heating of Railway Repair Shops. W. H. Carrier. Explains the difficulties to be overcome in the heating of shop buildings, and offers suggestions as to general methods of air distribution. Ill. 2700 w. Ry Age—June 30, 1903. (Daily Ed.)

See also Car Shop; Hot Water; RAILWAY SHOP.

Randall's Island, N. Y.—Central Steam Heating Plant on Randall's Island, New York City. Illustrated description of the system installed for 16 asylum buildings; the condensation water in buildings too low to return to the boiler house by gravity is handled by a vacuum system. 1000 w. Eng Rec—March 22, 1902.

Reck.—The Reck System of Heating by Hot Water (Die Warmwasserheizung von Reck). H. Fischer. Describing a combination of a hot water heater with a steam boiler for house heating. 1200 w. Zeitschr d Ver Deutscher Ing—Sept. 6, 1902.

See also Hot Water.

Recreation Pier.—See Steam, Recreation Pier.

Red Oak, Iowa.—See Central Station.

Regulators.—See Steam; Steam Low Pressure.

Reptile House, Bronx Park.—Heating the Reptile House at Bronx Park, New York. Illustrated description of a low-pressure hot-water apparatus designed to maintain a temperature of 80 degrees in zero weather. 1400 w. Eng Rec—June 22, 1901.

Ribbed Radiators.—The Theory of Ribbed Heating Surface (Zur Theorie der Rippenheizkörper. G. Rothgiesser. An examination of the advantages of using extended or ribbed surface for radiators, showing the necessity of providing sufficient thickness of rib to conduct the heat. 1200 w. Gesundheits-Ingenieur—Feb. 28, 1901.

Rotary Furnace.—Heating a Church at Martin's Ferry, Ohio. An analysis of a rotary warm air furnace heating system. Ills. 2700 w. Met Work—July 22, 1905.

Roundhouse.—See ROUNDHOUSE—Clinton, Iowa.

School.—See HEATING AND VENTILATION.

School, St. Louis.—Heating Apparatus in St. Louis Schools. Illustrates some of the details of heater coils, especially the construction of the steam heater. 600 w. Eng Rec—Nov. 16, 1901.

Ship.—See HEATING AND VENTILATION.

Shop.—See Hot Water; Machine Shop.

Simmons College, Boston.—See MECHANICAL PLANT.

Standardization.—Report of Committee on Standards. Code for Testing Direct Radiation Heating Plants. Report presented at N. Y. meeting of the Am. Soc. of Heat. & Ven. Engs. 3400 w. Met Work—Jan. 26, 1901.

Steam.—Systems of Heating by Steam. H. H. Kelley. Illustrated description of the various systems of steam heating employed in buildings and residences. Serial. 1st part. 2500 w. Engr, U S A—Sept. 1, 1901.

Heating a New York Residence. Illustrated description of the steam heating plant, mainly indirect, in a large house. 1700 w. Eng Rec—June 14, 1902.

Steam Heating. George Bennett. A review of the methods of heating buildings by steam, describing each briefly and discussing the production and distribution of heat. 3000 w. Engr, U S A—Dec. 1, 1902.

Steam Heating Principles. Prof. William J. Baldwin. The second lecture of the course of eight on Heating and Ventilating at the Brooklyn Polytechnic Inst.'s College of Arts and Engng. Considers a closed or gravity system of steam heating in the present article. 5500 w. Sci Am Sup—March 11, 1905.

Steam Heating Principles. Prof. William J. Baldwin. A lecture before the Brooklyn Polytechnic Institute's College of Arts and Engineering. Discusses the history and practice of steam heating and defines the underlying principles. Serial. 1st part. 2500 w. Dom Engng—July 1, 1905.

See also Central Station; Condensing Engines; Exhaust Steam; Indirect Steam; Superheated Steam; Testing; Washington Heights Library; Williames; BOILER—Cast-Iron Sectional; CAR HEATING; HEATING AND VENTILATION.

Steam Circulation.—See WATER-TUBE BOILER—Circulation.

Steam Economy.—Some Observations on Steam Economy in Connection with the Heating Trade. O. M. Row. Read before the Inst. of Heat. & Ven. Engrs. Remarks on economy in the initial raising of the steam, and a discussion of the economical utilisation. 6000 w. Plumb & Dec—July 1, 1905.

Steam, Hot Water.—See Plant Design.

Steam, Low Pressure.—Low-Pressure Steam Heating with Open Air Pipes. S. Naylor. Read before the Inst. of Heat. & Ven. Engrs. (England). States the advantages of this system and gives an illustrated description. Also discussion. 4200 w. Plumb & Dec—Oct. 1, 1902.

A Closed, Low-Pressure Steam Heating System, with Air and Return Valves (Geschlossenes System einer Niederdruck-Dampfheizung mit Luft-und Rückschlagventilen). G. Fromme. A description of a steam-heating system designed by the author, with diagram. 1500 w. Gesundheits Ing—Dec. 15, 1901.

Low-Pressure Steam and Warm Water Heating from the Same Boiler (Niederdruckdampf und Warmwasserheizung von einem und demselben Kessel aus). H. Heider. With diagram showing the connections to radiators and returns to boiler. 1000 w. 1 plate. Gesundheits-Ingenieur—May 31, 1902.

The Heating of Buildings with Very Low Pressure Steam (Le Chauffage des Batiments au Moyen de la Vapeur à Très Basse Pression). H. Heyninx. With details of the apparatus, showing the advantages of low over high pressure steam for heating. 3000 w. Revue Technique—Nov. 10, 1902.

General Rules for Low-Pressure Steam Heating (Zur Erzielung der Generellen Regelung der Niederdruckdampfheizungen). H. Rietschel. A development of working formulas with examples of their practical application. 6000 w. Gesundheits-Ingenieur—Jan. 31, 1903.

Regulators for Low Pressure Steam-Heating (Die Regulatoren für Niederdruck Dampfheizungen). E. Ritt. Illustrating a variety of automatic devices for controlling the steam pressure by regulating combustion. 2000 w. Gesundheits-Ingenieur—July 31, 1903.

The Regulation of Low Pressure Steam-Heating Systems (Die Erzielung der Generellen Regelung der Niederdruckdampfheizungen). Prof. Rietschel. A mathematical and experimental discussion of the proper diameter of pipes and of the general regulation of pressure and heating in steam heating systems. 4000 w. Gesundheits-Ing—June 20, 1903.

Description of a Low-Pressure Steam Heating System which Proved Defective in Operation. John Gormly. Read at meeting of Am. Soc. of Heat. and Ven. Engrs. Description of the plant which was installed. 1600 w. Met Work—July 25, 1903.

The Regulation of Low Pressure Steam Heating (Die Generelle Regelung der Niederdruckdampfheizung). F. Gremmels. A description of the use of throttling tubes for reducing steam pressure. 3000 w. Gesundheits-Ingenieur—April 20, 1904.

Regulators for Low Pressure Steam Heating. Charles F. Hauss. Brief illustrated descriptions of some German constructions. 1400 w. Met Work—March 4, 1905.

The Computation of Piping for Low-Pressure Steam Heating (Beitrag zur Berechnung der Dampfleitung von Niederdruckdampfheizungen). F. Gremmels. With especial reference to the loss of pressure for pipes of given diameter and length. Tables and a graphical chart are given. 3000 w. 1 plate. Gesundheits Ingenieur—Jan. 10, 1905.

Steam, Recreation Pier.—Steam Heating of Classrooms on a Recreation Pier in New York City. Illustrated description of an unusual installation made necessary by the need of temporary school accommodation. 2500 w. Met Work—Nov. 4, 1905.

Steam Return System.—The Return System of Steam Heating (Dampfanlagen nach den Kreislaufsystem). Bruno Müller. A general account of the arrangement of steam heating systems in which the condensed steam is returned direct to the boiler. 2500 w. Gesundheits Ingenieur—Dec. 20, 1904.

Steam Sketch Details.—Sketch Details of Heating Installations. Frank G. McCann. Gives special sketch details prepared for use of New York City Board of Education. 1200 w. Heat & Vent Mag—Nov., 1905.

Steam, Thermograde.—The Thermograde System of Steam Heating. Walter E. Barnes. An illustrated description. 2400 w. Harvard Engng Jour—May, 1903.

Superheated Steam.—Test of Radiators with Superheated Steam. Extracts from paper by R. C. Carpenter, giving results of tests, showing that superheated steam is not so useful as saturated steam for heating. 1300 w. Eng Rec—July 13, 1901.

Tests of Radiators With Superheated Steam. R. C. Carpenter. Read at meeting of the Am. Soc. of Heat. and Ven. Engrs. A report of tests which seem to indicate that superheated steam is a poor medium to employ for heating purposes. 1200 w. Dom Engng—March 15, 1902.

Testing.—A Time Limit and Dry Walls Necessary in Testing a Heating Plant. John Gormly. Read at meeting of the Am. Soc. of Heat. & Ven. Engrs. A report of data obtained while making steam heating tests in a new building. 1100 w. Met Work—June 21, 1902.

Turkish Bath.—The Heating of a New York Turkish-Russian Bath Establishment. Illustrated description of a plant, noteworthy for the filtration of the water from the swimming pool and its subsequent use in needle baths and laundry. 1500 w. Eng Rec—June 21, 1902.

Vacuum System.—Vacuum System of Heating. William Kavanagh. Detailed description of this system, with statement of its advantages. Ills. 2500 w. Engr, U S A—Feb. 1, 1905.

The Principles of Vacuum Steam Heating. George D. Hoffman. An explanation of how a heating plant may be run economically at less than atmospheric pressure. 2300 w. Dom Engng—May 6, 1905.

See also Williames.

Vienna.—Operating Results with Central Heating Plants in Public Buildings (Betriebsresultate und Erfahrungen bei Central Heizungsanlagen in

Amstgebäuden). Leopold Nowotny. Gives experiences and costs in four Vienna public buildings. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 11, 1902.

Vienna Circus.—The Heating of the Exposition Rotunda at Vienna (Die Heizungsanlage in der Weltausstellungsrotunde zu Wien). G. Kols. Illustrated description of the high-pressure steam-heating plant installed in the old rotunda of the exposition of 1873, now converted into an auditorium. 2000 w. 1 plate. Gesundheits-Ingenieur—May 31, 1901.

Vienna Palace.—The Temporary Warming of the Large Hall of the Palace Library, Vienna, Austria. Prof. Edward Meter. Read before the Am. Soc. of Heat. & Ven. Engrs. Describes an interesting piece of work to meet unusual conditions. 1100 w. Met Work—Jan. 25, 1902.

Warm Air.—See **Hot Air.**

Washington Heights Library.—Heating the Washington Heights Free Library, New York. An illustrated description of a steam-heating system, principally by indirect radiation. Plans. 1200 w. Eng Rec—Dec. 27, 1902.

Williames System.—A New System of Vacuum Return Line Exhaust Steam Circulation. James A. Donnelly. Read before the Modern Science Club, Brooklyn, N. Y. Reviews early patents, describing the Williames thermostatic or automatic system as now installed, and naming the disadvantages of these systems, suggesting remedies and describing new valves that will work well on the Williames system. Ills. 4000 w. Met Work—Oct. 8, 1904.

Wood Furnace.—See **Hot Air.**

HEATING AND VENTILATION.

See also **HEATING; MECHANICAL PLANT; POWER PLANT; VENTILATION.**

Ventilation and Heating of Buildings. G. H. Bryce. Read at the convention of the Ontario Assn. of Archts. Considers the principles that must be understood to heat economically and efficiently. 3500 w. Met Work—Oct. 19, 1901.

Heating and Ventilating During the Past Twenty-five Years. W. J. Baldwin. Reviews the early history, naming those who aided the advancement, and the methods used. Principally considering steam. 3000 w. Eng Rec—Jan. 3, 1903.

Heating and Ventilation. Charles L. Hubbard. Different classes of buildings are described and the apparatus best adapted to each discussed. Serial. 1st part. 3500 w. Am Archt—Jan. 7, 1905.

Heating and Ventilation of Buildings. R. C. Carpenter. Read before the Ohio Archts' Assn. Considers temperature required, effect of moisture, need of ventilation, various systems, etc. 3300 w. Dom Engng—April 25, 1904.

Ambridge, Pa.—See **Office Building.**

Art Galleries, Glasgow.—Heating and Ventilating the Glasgow Art Galleries. An illustrated description of the plant. The arrangement is on the plenum system. 1500 w. Engr, Lond—Sept. 20, 1901.

Ventilating and Heating the Glasgow Art Galleries. Describes a group of buildings equipped with a ventilating and heating system comprising a plenum system of air distribution and a water-tube boiler plant for steam production. 1300 w. Eng Rec—Nov. 16, 1901.

Bangor, Me.—Ventilation and Heating in the Penobscot County Court House, Bangor, Maine. Explains the requirements and the scheme adopted. Ill. 1800 w. Eng Rec—Jan. 2, 1904.

Bank, Chicago.—Ventilating and Heating the Chicago National Bank. A combination plenum and exhaust system is used for distributing heated air in the basement and the first story, and direct radiation in the rest of the building. Plans. 3300 w. Eng Rec—Nov. 23, 1901.

Bank, N. Y.—Ventilation and Heating of the American Exchange National Bank, New York. Illustrated description of a plenum system for the basement and first story of a 16-story office building, and an exhaust system for the same floors discharging through the cellar; also gives brief notes on other mechanical plant in the building. 2500 w. Eng Rec—Feb. 16, 1901.

Brewery, Vienna.—See **Liesing Hall.**

Carnegie Residence.—Heating and Ventilating in the Carnegie Residence, New York. An illustrated description of an example of fine workmanship. The heating plant is mainly an indirect one, but is supplemented by exhaust fans. 4500 w. Eng Rec—Oct 3, 1903.

Central Plant.—The Central Heating and Ventilating Plant of the Leipzig City Hall (Die Zentralheizungs und Lüftungsanlage im Rathausneubau zu Leipzig). Ludwig Dietz. With plans of the building showing arrangement of the direct and indirect heating, steam plant, etc. 5000 w. 4 plates. Gesundheits-Ingenieur—Sept. 10, 1904. See also **HEATING.**

Centrifugal Fan.—See **FAN—Centrifugal.**

Church, Baltimore.—Ventilating and Heating St. Mark's Church, Baltimore. The hot air is distributed under a plenum system assisted by aspiration near the exits. The ventilation is an upward one with air delivery through a large number of small openings in the ends of the various pews. Ill. 1800 w. Eng Rec—Sept. 14, 1901.

City Residence.—Heating and Ventilating a City Residence. Describes a type of indirect heating installed in a residence in New York City. Ills. 1400 w. Heat & Vent Mag—Oct., 1905.

Clinic, N. Y.—Ventilating and Heating St. Bartholomew's Clinic, New York City. Illustrated description of an installation with ventilating apparatus independent of the heating system and supplying 6000 cu. ft. of air per hour per capita in many rooms; heating by direct radiators supported on hangers to facilitate cleaning the floors; and fitted with special cleaning apparatus for the air filters. 2500 w. Eng Rec—March 29, 1902.

Department Store, Phila.—Ventilation and Heating in a Philadelphia Department Store. Illustrated description of methods adopted for heating a large building when each floor is practically a single room. A combined plenum and exhaust system. 3500 w. Eng Rec—Dec. 13, 1902.

Exhaust Steam.—See **Railroad Shops.**

Fan System.—See **Office Building.**

Foundries and Machine Shops.—The Heating and Ventilation of Foundries and Machine Shops. W. H. Carrier. States the difficulties to be overcome and shows the adaptation of the fan system to the solution. Ill. 2800 w. Jour Am Found Assn—June, 1903.

Forced Blast.—Heating and Ventilating by Forced Blast. Chas. L. Hubbard. A discussion of fans and blowers and their application to heating and ventilating systems. 3000 w. Am Elect'n—Jan., 1903.

Garages.—Heating and Ventilation of Garages. N. B. Pope. Suggestions for small garages and private motor-houses. 1400 w. Motor-Car Jour—Jan. 14, 1905.

See also **AUTOMOBILE GARAGE; GARAGE.**

Gas-Warmed Air.—A Scheme of Ventilation with Gas-Warmed Air. Suggests that forced ventilation be accompanied by an arrangement for warming the inflowing air by means of pipes or plates heated by gas. 1800 w. Jour Gas Lgt—Feb. 25, 1902.

German Laws.—German Heating and Ventilating Laws. Charles F. Hauss. Gives the German law covering all work in heating and ventilation. Serial. 1st part. 2000 w. Met Work—July 1, 1905.

Government Bdg., San Francisco.—Ventilation and Heating in the New Government Building at San Francisco. Describes the system used in the San Francisco post-office and court-house building. The air is heated by hot water and supplied by plenum fans; the foul air being removed by exhaust fans. 2800 w. Eng Rec—May 2, 1903.

Heating Surface.—Determination of Heating Surface. Review of a paper by J. Nelson Russell, before the Brit. Inst. of Heat. & Ven. Engrs., explaining the writer's method of determining the amount of heating surface needed in heating and ventilating work. 2200 w. Met Work—Nov. 11, 1905.

High Schools.—See School.

Hospital.—Ventilation and Heating in the Lying-In Hospital, New York. An illustrated detailed description of an extensive plant where unusual measures have been taken to make it as far as possible proof against dust and bacteria. Serial. 1st part. 3500 w. Eng Rec—Jan. 3, 1903.

See also Clinic; VENTILATION.

Hot Air.—Mechanical Ventilation and Heating by a Forced Circulation of Warm Air. Walter B. Snow. Gives an illustrated description of this combined system, stating its advantages, and showing its adaptation to various types of buildings. 4800 w. Jour Worcester Poly Inst—Jan., 1901.

Hot Blast.—Hot Blast Heating and Ventilation. W. G. Bissell. Gives results of experiments on hot blast apparatus. 1000 w. Iowa Engr—March, 1905.

The Development of the Steam Hot-Blast System of Heating and Ventilation. B. S. Harrison. A non-mechanical description of this system and its development. 1800 w. Engs' Year Bk, Univ of Minn—1901.

Jail, Akron, O. — Heating and Ventilating the Akron, O., Jail. Illustrated description of a building which is a departure from the general prison plan, and of its combined forced and inducted hot-air system of heating and ventilating. 2000 w. Eng Rec—Nov. 29, 1902.

Japan.—Ventilating and Heating in the Palace of the Crown Prince of Japan. Light, heat and power is supplied by a boiler and engine plant in a separate building. Exhaust steam is employed for heating; the fresh air supply is furnished by six fans. All the apparatus is of American make. 2200 w. Eng Rec—April 4, 1903.

Japanese Palace.—Ventilating and Heating the Palace of the Crown Prince of Japan. Illustrated description of a hot blast steam apparatus for warming the main apartments of this palace, direct-radiation for the basement and corridors and a cooling system for use in summer. 3100 w. Eng Rec—Jan. 19, 1901.

Ventilating and Heating the Palace of the Crown Prince of Japan. Illustrated detailed description of the work. 3000 w. Dom Engng—July 15, 1901.

Kobe, Japan.—A Warm Air Heating System in Kobe, Japan. Describes an installation having a large warm air cellar pipe and exhaust air ventilation passages. Ills. 2200 w. Met Work—Aug. 12, 1905.

Library, Atlanta, Ga.—Ventilation and Heating of the Atlanta, Ga., Public Library. Illustrated description of the new Carnegie library heating plant, which includes an indirect apparatus for most of the buildings and a direct apparatus, supplemented by direct-indirect radiation, for the stock-room. 1500 w. Eng Rec—Dec. 1, 1900.

Liesing Hall, Vienna.—The Steam Heating and Ventilating Plant at the Liesing Brewery (Dampfheizungs und Lüftungsanlage im Saalbau der Brauerei Liesing). J. H. Klinger. With plans and details of the steam heating of a large public hall in connection with a brewery in Vienna. 2500 w. 1 plate. Gesundheits-Ingenieure—Jan. 31, 1901.

Steam Heating and Ventilating Plant of the Liesing Brewery. J. H. Klinger. Translated from "Gesundheit's Ingenieur." Illustrated description of the building and of the steam-heating plant and the ventilating plant. 1500 w. Dom Engng—Sept. 15, 1901.

Machine Shop.—Heating in the Fore River Engine Company's Shops. Illustrated description of a hot-blast system of mechanical heating and ventilation in two large buildings having considerable exposure. 1500 w. Eng Rec—June 1, 1901.

Heating and Ventilating the Machine Shop. J. I. Lyle. On the utilization of exhaust steam for heating, considering the three systems adapted to its use. 2500 w. Can Engr—July, 1903.

Heating and Ventilating of Foundries and Machine Shops. W. H. Carrier. Abstract of a paper read before the Am. Found. Assn. On the difficulties to be overcome in the successful heating of shops and the adaptation of the fan system. 1800 w. Met Work—Dec. 26, 1903.

See also HEATING; MACHINE SHOP; WORKS-MANAGEMENT—Hygiene.

Middletown, N. Y.—Heating and Ventilating a Residence with Steam. Illustrated detailed description of the system used in a large four-story residence in Middletown, N. Y. It provides direct, semi-direct and indirect radiation, and the open fireplaces are arranged to create an outflow or exhaust current of air. 2500 w. Met Work—July 5, 1902.

Minnesota Capitol.—Heating and Ventilating the Minesota State Capitol. Illustrates and describes an interesting plant on the plenum system. 3700 w. Eng Rec—May 21, 1904.

Mint, Philadelphia.—Ventilation and Heating in the United States Mint, Philadelphia. Illustrated description of the apparatus for circulating the air through the building by means of both supply and exhaust fans. The warming is by direct steam radiation. 3000 w. Eng Rec—March 1, 1902.

Music Hall, Boston.—Ventilating and Heating the Boston Music Hall. Illustrated description of plant for a large auditorium heated by direct radiation, using steam from an electric lighting plant; ventilation is secured by a combined plenum and exhaust system, the air entering at the top of the room. 3000 w. Eng Rec—March 2, 1901.

Music Temple, Chicago.—See MECHANICAL PLANT.

N. Y. Custom House.—Heating and Ventilating New York's New Custom House. Illustrated detailed description of a notable type of the fan pressure system. 1700 w. Heat & Ven Mag—Aug., 1905.

N. Y. Stock Exchange.—Heating, Ventilating and Air Cooling at the New York Stock Exchange. Illustrated description of the interesting engineering equipment of this fine building. Serial. 1st part. 2800 w. Eng Rec—April 8, 1905.

Office Building.—Heating and Ventilating a Works Office Building. Illustrated description of the plant installed for the administration building of the American Bridge Company at Ambridge, Pa., as an example of good practice. 2800 w. Eng Rec—May 14, 1904.

Heating and Air Washing in a Works Office Building, Pittsburg. Illustrates and describes a fan system installed in the heart of the mill district of Pittsburg. 1000 w. Eng Rec—March 18, 1905.

Office Building, Chicago.—Ventilation and Heating in the Merchants' Loan and Trust Building, Chicago. Describes the plant of a 12-story office building. It is warmed by steam, distributed by means of the downward system of piping with gravity return; a vacuum system of circulation and automatic temperature regulation, and ventilated in the lower stories by a plenum and exhaust system. Ill. 2700 w. Eng Rec—Sept. 21, 1901.

Office Building, Hartford.—Ventilation of an Office Building in Hartford. Illustrated description of one of the few plants for positively ventilating large office buildings. Direct-indirect radiation and a plenum system of ventilation are employed. 400 w. Eng Rec—Dec. 21, 1901.

Pan-American Building.—See Plenum System.

Parliament.—Ventilation and Heating of the Houses of Parliament, England. A general description of the methods now employed for ventilating this structure. 1200 w. Eng Rec—Oct. 26, 1901.

Plenum System.—A Plenum Fan System of Heating in an Exposition Building. Illustrated description of the forced blast system of the New York State Building at the Pan-American Exposition. The building is a permanent structure and the plant is designed to keep the temperature at 70 degrees with the outside air 10 degrees below zero, and to change the air every 10, 15 or 20 minutes, according to the nature of the occupancy. 1600 w. Eng Rec—April 13, 1901.

See also VENTILATION.

Public Buildings.—The Proper Method of Heating and Ventilating Public Buildings. Gives the views of Prof. S. Homer Woodbridge of the Massachusetts Inst. of Technology, who has recently had charge of the ventilation of the Capitol at Washington. 1600 w. Dom Engng—Jan. 15, 1902.

Warming and Ventilation as Available for Public Buildings. Read at London meeting of the Inst. of Heat. & Ven. Engrs. Discusses the motive power used and the requirements of various classes of public buildings. 3300 w. Plumb & Dec—June 2, 1902.

Public Schools.—See **School.**

Railway Shops.—Ventilation and Heating in the Denver Shops of the Colorado Road. Illustrated description of a fan system of heating in which a comparatively small number of outlets from the ducts suffices for buildings of large volume. 1600 w. Eng Rec—Oct. 12, 1901.

Heating and Ventilating Railway Shops at Elizabethport, N. J. Illustrated description of the plant installed for a number of large shops, the steam being furnished from a central station. 2200 w. Eng Rec—Feb. 22, 1902.

Heating and Ventilating of Railroad Shops. J. I. Lyle. Considers the systems adapted to the use of exhaust steam, favoring the fan system. General discussion. 9500 w. N Y R R Club—March 20, 1903.

Heating and Ventilating Railway Shops at Spencer, N. C. Describes an interesting example of a method of heating large open buildings, which involves the circulation of warmed air. Plans. 1500 w. Met Work—Sept. 16, 1905.

See also **Heating; RAILWAY SHOP.**

Restaurant, Toledo, O.—Ventilating and Heating a Restaurant. Illustrated description of a plant in which fresh air is forced through direct radiators to ventilate a restaurant in the basement of a large office building. 900 w. Eng Rec—April 27, 1901.

Rochester, N. Y.—Ventilating and Heating the Rochester Athenaeum and Mechanics' Institute. Illustrated description of a plant embracing both hot-blast warming and ventilation, and direct and indirect steam heating, the air supply being passed through moist coke as a filter. 2200 w. Eng Rec—July 19, 1902.

School.—Heating and Ventilating in a Small Schoolhouse. Illustrated description of the system in a 12-room building, using direct steam radiation. 1500 w. Eng Rec—Nov. 10, 1900.

Warming and Ventilating of Public Schools. From a paper by D. M. Nesbit, read before the Com. on Hygiene, San. Inst. Cong., Bradford, Eng. Suggestions for small, medium-sized and large schools. 1200 w. Dom Engng—Jan. 25, 1904.

The Warming and Ventilation of School Houses (Ueber die Heizung und Lüftung von Schulhäusern). P. Hase. With graphical diagrams for computing the proportions of apparatus. 5000 w. Gesundheits-Ingenieur—June 20, 1905.

Heating and Ventilating a Medium-Sized School Building. Gives an illustrated description of the heating and ventilating system used in Public School 132, in the Bronx, New York City. 1000 w. Heat & Vent Mag—Nov., 1905.

The Progress of American Schools in Regard to Health Laws. J. D. Sutcliffe. Read at meeting of the Inst. of Heat. & Vent. Engrs., London. Discusses the heating, ventilation, sanitation and fire appliances from an English engineer's point of view. 3000 w. Heat & Vent Mag—Nov., 1905. See also **VENTILATION.**

School, Chicago.—A Typical Chicago School Heating and Ventilating Plant. Illustrated detailed description of the system used. 2800 w. Eng Rec—Nov. 24, 1900.

School, Detroit.—Ventilating and Heating the Eastern High School, Detroit, Mich. Illustrated description of a 224x220-ft. building having an independent electric plant and a forced circulation of heated air for warming the main rooms. 1500 w. Eng Rec—April 26, 1902.

School, Paterson.—Ventilation and Heating in a Paterson, N. J., Schoolhouse. Illustrated description of the method of ventilating and heating a 24-room school by apparatus occupying a notably small portion of the building's area and contents. 1900 w. Eng Rec—March 9, 1901.

School, Pittsburg.—Ventilation and Heating of Friendship School, Pittsburg. Illustrated description of an unusually costly plant taking air from an inlet 60 ft. from the building and avoiding the use of galvanized ducts in the basement by employing underground flues. 1500 w. Eng Rec—Sept. 7, 1901.

School, Rochester.—Ventilating and Heating No. 28 School, Rochester, N. Y. Illustrated description of a 22-room school with a fan system of ventilation and direct steam radiation. 2200 w. Eng Rec—Sept. 20, 1902.

Ventilation and Heating in the East High School, Rochester, N. Y. Illustrated detailed description of arrangements for heating and ventilating a school-building having three stories and basement and attic. Mainly a plenum system. Serial. 1st part. 4000 w. Eng Rec—Feb. 28, 1903.

School, St. Louis.—The Heating and Ventilation of the Edward Wyman School, St. Louis, Mo. Alvin D. Reed. Read before the Am. Soc. of Heat. & Ven. Engrs. Illustrated detailed description. 1400 w. Met Work—March 29, 1902.

School, Worcester.—Ventilating and Heating the Worcester, Mass., High School. Illustrated description of a system using hot water under forced circulation for warming, with air supply for ventilation only. 2000 w. Eng Rec—Aug. 23, 1902.

Ship.—The Ventilation and Heating of Ships by a Forced Circulation of Warm Air. F. W. Jennings. Abstract of a paper read before the N. E. Coast Inst. of Engrs. and Shipbuilders. An illustrated description of the plenum system. 2500 w. Engs' Gaz—Jan., 1901.

Mr. F. W. Jennings' Reply to the Discussion of His Paper on "The Ventilation and Heating of Ships." 2300 w. Trans of N-E Coast Inst of Engrs & Shipbuilders—May, 1901.

See also **Warship; VENTILATION.**

Steam Hot Blast.—See **Hot Blast.**

Swiss Parliament Bdg.—The Heating and Ventilating Plant of the New Swiss Parliament Buildings in Bern (Die Heizungs und Lüftungsanlagen des Neuen Schweizerischen Bundeshauses in Bern). A description, with plans and figures, of an extensive heating and ventilating system installed by Sulser Brothers, of Winterthur, Switzerland. Serial. 2 parts. 4000 w. Schweiz Bauzeitung—March 21 and 28, 1903.

Telephone Exchange.—Ventilating and Heating the Twin City Telephone Exchange, St. Paul, Minn. Illustrated description of an installation where considerable attention was given to the problem of removing dust from the fresh air supply. 800 w. Eng Rec—May 31, 1902.

Temperature Regulation.—Temperature Regulation. J. H. Kinealy. Read at meeting of Am. Soc. of Heat. & Ven. Engrs. A discussion of the systems and methods in use. 5500 w. Dom Engng—March 25, 1903.

Test, Milwaukee School.—Some Results of a Test of Heating and Ventilating Apparatus. O. B. Zimmerman. A statement of the conditions and a test where 96 observers were used after having special drill, and the results. 2300 w. Wis Engr—May, 1901.

Theatre, Boston.—Heating and Ventilating System of the Majestic Theatre, Boston, Mass. Plans and description of the interesting features of this plant. 1300 w. Eng Rec—June 17, 1905.

Theatre, Cologne.—See **COOLING.**

Theatre, Worcester, Mass.—Ventilating and Heating the Franklin Square Theatre, Worcester, Mass. Gives plan and description of an interesting plant, having features that are somewhat unusual. 1200 w. Eng Rec—March 26, 1904.

Vassar College.—Ventilation and Heating of Rockefeller Hall, Vassar College. Describes the system adopted in this two-story and basement building, which covers a ground area of 11,540 sq. ft. 2000 w. Eng Rec—April 25, 1903.

Warships.—The Warming and Ventilation of War Ships (Verwarming en Ventilatie van Oorlogsschepen). L. N. Alta. Showing arrangements of heating coils and electrically driven fans. 1500 w. De Ingenieur—April 13, 1901.

See also **VENTILATION.**

HEATING POWER.

See **CALORIFIC VALUE.**

HEAT INSULATION.

See **HEAT TRANSMISSION; REFRACTORY MATERIAL; STEAM PIPE COVERING.**

HEAT RADIATION.

See also **HEATING; HEATING AND VENTILATION; MECHANICS; PHYSICS; RADIATION.**

Laws of Heat Radiation. J. Blacklock Henderson. Read before the Glasgow Univ. Phys. Soc. An experimental study. 3700 w. Elect'n, Lond—Aug. 28, 1903.

Iron Pipes.—Some Experiments on Loss of Heat from Iron Pipes. R. W. Leonard. Gives results of experimental investigations. 1000 w. Can Soc of Civ Engrs, Adv. Proof—Oct., 1904.

Sheet Metal.—Sheet Metal Radiation. H. W. Nowell. Brief article, presenting the merits of sheet metal radiation. 700 w. Am Soc of Heat & Ven Engrs—July, 1905.

Steam Pressure.—See **STEAM—Heat Emission.**

HEAT RESISTANCE.

See also **BOILER; HEAT TRANSMISSION; STEAM ENGINEERING.**

Heat Resistance, the Reciprocal of Heat Conductivity. William Kent. Advocates the use of figures representing resistance instead of conductivity, giving reasons for the change and suggestions for a standard to be adopted. 1800 w. Trans Am Soc of Mech Engrs, No. 0955—Dec., 1902.

HEAT TRANSMISSION.

See also **BOILER; EVAPORATION; HEAT RADIATION; HEAT RESISTANCE; STEAM ENGINEERING.**

The Transfer of Heat from Steam to Water Through a Partition. H. L. Hepburn. A report of experimental investigations. 3300 w. Power—Dec., 1901.

Boiler Plates.—The Transmission of Heat Through Heating Surfaces (Ueber den Wärmedurchgang durch Dittenberger. An account of researches conducted at the Reichsanstalt, with especial reference to boiler heating surface. 2500 w. Zeitschr d Ver Deutscher Ing—Dec. 15, 1900.

Heat Transference Through Boiler-Plates. From "Zeitschrift des Vereins Deutscher Ingenieure." An account of researches, giving diagrams. 2000 w. Engng—Jan. 1, 1904.

The Transmission of Heat in Various Parts of Boiler Heating Surface (Der Wärmeübergang und seine Verschiedenheiten innerhalb einer Dampfkesselheizfläche). Paul Fuchs. With diagrams showing the results of experiments upon a water-tube boiler, showing the influence of circulation. 4000 w. Zeitschr d Ver Deutscher Ing—March, 12, 1904.

Boiler Scale.—The Transmission of Heat Through Scale-Covered Boiler Tubes. Edward C. Schmidt. Gives tabulated results of tests made at the Univ. of Illinois, for the purpose of measuring the number of heat units transmitted per hour through the different tubes; describes methods used. 1000 w. R R Gas—June 14, 1901.

Boiler Scale and the Transmission of Heat. Showing that scale of ordinary thickness is objectionable because it raises the temperature of the boiler plate, rather than because it cuts down the efficiency of the boiler. 3000 w. Locomotive —Sept., 1902.

Boiler Scale and the Transmission of Heat. A. D. Risteen. Shows that many statements made in regard to the efficiency of boilers being seriously impaired by scale are not true, but that scale is objectionable because it raises the temperature of the boiler plate. 3500 w. Am Mgr & Ir Wld —Sept. 15, 1904.

Building Materials.—Loss of Heat from Buildings. R. Gordon Mackay. Information collected by the writer concerning the transmission of heat through the various materials commonly used by engineers. Serial. 1st part. 1600 w. Prac Engr—March 8, 1901.

See also COOLING.

Cables.—See **ELECTRIC CABLE—Heat Conductivity.**

Cooler Surface.—The Transmission of Heat from Air to Water through Corrugated Copper Tubes. Harry F. Benson. Gives formula for finding the proper amount of surface in a cooler, and mathematical solutions bearing upon this subject. 1600 w. Am Mach—Vol. 28. No. 35.

Evaporation.—See **EVAPORATION—Multiple Effect.**

Steam Pressure.—The Relation of Heat Emission to Steam Pressure (Zur Generellen Regelung der Wärmeabgabe der Heizkörper bei Niederdruck durch die Höhe der Dampfspannung). O. Hunaeus. A discussion of the author's formulas in view of their use by Prof. Rietschel; with response by the latter. 3000 w. Gesundheits-Ingenieur—Dec. 31, 1902.

Tests.—The Transmission of Heat Through Heating Surfaces (Ueber den Wärmedurchgang durch Heizflächen). L. Austin. Data and results of tests made at the Reichsanstalt, with description of the apparatus. 3000 w. Zeitschr d Ver Deutscher Ing—Dec. 13, 1902.

HEAT UTILIZATION.

See **COKE-OVEN GAS; HEATING; STEAM ENGINE; STEAM ENGINEERING—Exhaust Utilization.**

HEMATITE.

Alabama.—See **IRON ORE.**

HERATOL.

Acetylene Purification.—See **ACETYLENE—Purification.**

HEWITT.

Biographical Notice of Abram S. Hewitt. R. W. Raymond. A brief sketch from memoranda personally approved by Mr. Hewitt. Portrait. 7500 w. Trans Am Inst of Min Engrs—Feb., 1903. No. 56759C.

HIGH BUILDING.

See **BUILDING CONSTRUCTION; FOUNDATION; STEEL CONSTRUCTION.**

HIGH TEMPERATURE.

See **ELECTRIC FURNACE; PYROMETRY; TEMPERATURE.**

HIGHWAY.

See **ROAD.**

HIGHWAY BRIDGE.

See **BRIDGE.**

HIGHWAY ENGINEERING.

See **ROAD—Engineering.**

HIGHWAY LAW.

See **AUTOMOBILE—Legislation; Public Relation.**

HINGE.

Arch.—See **ARCH; BRIDGE DESIGN; GRANITE.**

Die.—See **DIE—Hinges.**

HIPPODROME.

New York.—See **ELECTRIC EQUIPMENT; STEEL CONSTRUCTION; THEATRE.**

HOIST.

See **HOISTING; HOISTING ENGINE.**

HOISTING.

See also **CRANE; ELEVATOR; HEAD FRAME; HOISTING DRUM; HOISTING ENGINE; HOISTING TACKLE; LIFT; MINE HAULAGE; MINE SHAFT; MINING; MINING MACHINERY; ROPE; WIRE ROPE.**

The Hoisting Problem. James R. Thompson. Read before the Lake Superior Min. Inst. Discusses the relation of the underground requirements, the engineering mechanical and financial considerations. 5000 w. Mines & Min—Nov., 1904.

Hoists and Hoisting. Dennis H. Stovall. Illustrates four types of hoists, and explains the work for which they are united. 800 w. Min Rept—Feb. 2, 1905.

A Study of Hoisting Machinery (Etude sur les Appareils de Levage). L. Rousselet. A general study of cranes and other mechanical hoisting devices; the first instalment discusses electric traveling cranes. Serial. Part I. 2000 w. Revue Technique—Nov. 10, 1905.

Aloe Fibre Cables.—See **ROPE.**

Arenberg, France.—Hoisting Equipment of a French Colliery. L. Saclier. Abstract from "Revue Universelle des Mines." Illustrated description of the arrangements at the Arenberg mine. 1800 w. Eng & Min Jour—Aug. 4, 1904.

Balanced and Unbalanced.—Balanced and Unbalanced Hoists. E. T. Sederholm. A comparison of the different types and relative economies of various methods. Ills. 6500 w. Mines & Min—July, 1901.

Balance Platform.—Notes on a Briart Balance Platform Installed at Shaft No. 6 at Gorlooka, South Russia. A. Lebrun. Illustrated description of the apparatus with a statement of its advantages. 1200 w. Ir & Coal Trds Rev—Aug. 16, 1901.

Balance Rope.—See **Poore System; Problem.**

Belgian Coal Mines.—See **ROPE.**

Bentrop System.—See **MINE SHAFT—Air-tight Head Casings.**

Blast Furnace.—See **BLAST FURNACE—Charging Apparatus, Electric.**

Boryslaw.—Hoisting Apparatus at the Erdwachs Mine at Boryslaw (Förderschachtanlage auf den Erdwachsgruben in Boryslaw). A. Lukaszewski. Describing the electric hoisting plant used at the mines at Boryslaw in Galicia, in connection with the deepening of the shaft. 2500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—June 7, 1902.

Brakes.—See **Safety Appliance; HOISTING ENGINE.**

Cage.—See **MINE SHAFT.**

Cage Chains.—German Types of Cage Chains. Illustrates both favorable and unfavorable types, with a discussion of causes of accidents. 900 w. Col Guard—June 16, 1905.

Camp Bird, Colo.—An Underground Skip-Hoisting Plant. S. A. Worcester. Brief illustrated description of plant for the Camp Bird gold mine for hoisting ore and waste from a depth of 900 ft. 500 w. Eng & Min Jour—March 2, 1905.

See also **GOLD MINE.**

Carthage, Mo.—A Bucket Elevator Installation for a 155-Ft. Zinc Mine Shaft. Illustrated description of a continuous bucket elevator installed at Carthage, Mo., to raise zinc ore from an inclined shaft. 600 w. Eng News—Dec. 7, 1905.

Compressed Air.—Compressed Air in Hoisting. J. S. Lane. The kinds of hoists and methods of applying for different purposes, reheating, adapting steam apparatus for the use of air, &c. Ills. 4000 w. Mines & Min—July, 1904.

Compressed Air in Hoisting. J. S. Lane. Illustrated descriptions of machinery used in applying compressed air to hoisting and similar work, discussing its advantages and giving general information. 4400 w. Compressed Air—Sept., 1904.

Conveyor.—See **CONVEYOR—Mine Hoist.**

Deep, Lake Superior.—Deep Hoisting in the Lake Superior District. O. P. Hood. Describes some of the engines used to hoist from a depth of over 4,900 feet. Ills. 4200 w. Mines & Min—July, 1901.

Deep Mines.—Headgear and Winding Engines for Deep Shafts. Léon Poussigue. From a paper read at the Paris Congress. Illustrated discussion of the winding engine, headgear, detaching hooks, etc. 3500 w. Col Guard—Nov. 2, 1900.

Winding from Great Depths. An illustrated detailed description of the Whiting system is given in the present article. 2000 w. Serial. 1st part. Ir & Coal Trds Rev—Feb. 28, 1902.

Winding Plants for Great Depths. Hans C. Behr. Read before the Inst. of Min. & Met. (England). Outlines the various systems that have been tried or suggested, explaining the mechanics of the problems, etc. The present paper considers only vertical winding. An important paper on this subject. Ill. Serial. 1st part. 10,500 w. Ir & Coal Trds Rev—May 16, 1902.

Winding Plants for Great Depths. Hans C. Behr. Read before the Inst. of Min. & Met., London. Full paper with illustrations. An investigation of the various systems proposed. Vertical winding only is considered. 26,000 w. Col Guard—May 23, 1902.

Hoisting from Great Depths. Hans C. Behr. Abstract from the Johannesburg "Star." An abstract of Mr. Behr's reply to the discussion of his paper read before the South African Assn. of Engrs. 2800 w. Eng & Min Jour—April 25, 1903.

Hoisting from Great Depths. Robert Peele. A discussion of conclusions reached by H. C. Behr in his paper on "Winding Plants for Great Depths," giving also the writer's views. 4800 w. Eng & Min Jour—April 4, 1903.

Traversing Winding Engine for Deep Shafts. H. M. Morgans. Illustrates and describes a plant which avoids many of the difficulties of deep winding. 4000 w. Mines & Min—Sept., 1903.

See also **Electric; CONVEYOR—Mine Hoist.**

Deep, South Africa.—Deep Hoisting in South Africa. J. S. Lane. Explains the conditions which necessitate deep shafts, describing some of the devices recommended and plants which have been installed. Ills. 3600 w. Mines & Min—July, 1904.

Hoisting from Great Depths. Hennen Jennings. Abstracted from paper read before the So. African Assn. of Engrs. Describes the Witwatersrand gold-fields and the conditions to be met by winding plants, discussing the most advantageous method. 3000 w. Eng & Min Jour—Nov. 29, 1902.

The Deep Level Problem of the Witwatersrand. Briefly discusses the best type of winding engines for this work, giving an illustrated description of the Whiting double-sheave winding engine, and discussing its advantages and disadvantages. 1600 w. Engr, Lond—April 24, 1903.

Present Practice of Deep Hoisting on the Mines of the Rand. J. B. Carper. Description, with illustration, of the Whiting system and its application to these mines, the cost, etc. 1800 w. Min Jour—Nov. 12, 1904.

Design.—Determining the Size of Hoisting Plants. Edward B. Durham. Discusses methods of calculating. Ill. 5500 w. Trans Am Inst of Min Engrs—Sept., 1902.

Diagrams.—Speed Curves of Hoisting Engines and their Use in Designing Safety Appliances (Die Graphische Darstellung des Ganges der Fördermaschinen und die Benutzung derselben zum Bau eines Sicherheitsapparates). Hr. Witte. An account of experiments with a Karlik mercury tachograph and electrically-operated safety brakes for hoisting engines for mines. Diagrams. 2 plates. 2400 w. Glückauf—Jan. 11, 1902.

See also **Graphical Methods.**

Drum.—See **HOISTING DRUM.**

Düsseldorf Exposition.—Hoisting Machinery (Die Hebezeuge). Ad. Ernst. A description of the cranes and other hoisting machinery shown at the Düsseldorf Exposition. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—May 24, 1902.

Hoisting Apparatus at the Düsseldorf Exposition (Die Hebezeuge auf der Düsseldorfer Ausstellung). S. Fraenkel. A paper before the Verein Deutscher Maschinen-Ingenieure, giving an illustrated account of large traveling cranes and other kinds of hoisting mechinery. Serial. Part I. Tables. 2500 w. Glasers Annalen—July 1, 1903.

Efficiency.—The Efficiency of Mechanism. C. F. Blake. The first of two articles dealing especially with hoisting machinery, discussing the general principles. Serial. 1st part. 2400 w. Mach, N Y—March, 1903.

Electric.—Some Recent Tests on Electrically-Driven Hoists. Reports a series of tests made upon two hoists, considering the faults observed to be due, not to the use of electricity, but to the application. Ill. 3000 w. Elec Rev, Lond—Dec. 28, 1900.

Electric Hoists on the Comstock. Leon M. Hall. Describes the system installed at this mining plant. A continuous rope electric hoist, driven by means of a variable speed, three phase induction motor. 1200 w. Sci Am—July 27, 1901.

Electric Hoists on the Comstock. Leon M. Hall. Illustrates and describes a continuous rope electric hoist, driven by means of a variable speed, three-phase induction motor. 1200 w. Eng & Min Jour—Aug. 3, 1901.

Electric Hoists and Cranes (Elektrische Ausrüstungen für Hebezeuge). F. Winawer. A short illustrated description of electrical apparatus for cranes and hoists. 700 w. Elektrotech Rundschau—Jan. 1, 1902.

The Hoisting of Cars by an Electric Winch (Hochnehmen Vierachsiger Abtheilwagen durch Elektrisch Angetriebene Hebeböcke). F. Bergemann. A description of the inclined plane and electrically operated winding machinery used at Eberswalde, Prussia. 2500 w. Glasers Annalen—July 15, 1902.

The Influence of Electricity upon the Development of Hoisting Machinery (Die Lastenförderung unter dem Einfluss der Elektrotechnik). H. Kammerer. A general discussion of the adaptability of the electric motor to hoisting machinery, and the modifications which have resulted from its use. 3500 w. Zeitschr d Ver Deutscher Ing—Sept. 13, 1902.

Electrically Driven Mine Hoist (Elektrisch Betriebene Fördermaschinen). Illustrating and describing the Ilgner-Siemens-Halske system as exhibited at Düsseldorf. 4000 w. Elektrotech Zeitschr—Oct. 30, 1902.

Electric Winding Machine for Colliery Work. From "Glückauf." Illustrated description of an electric winding engine designed by Tr. Buschmann. 900 w. Col Guard—Oct. 24, 1902.

Electric Winding Engines. E. Kilburn Scott. The present article considers the general aspects of the problem, giving details of the methods of arranging the pulleys or drums, the different types of motors, &c. Ill. Serial. 1st part. 2500 w. Ir & Coal Trds Rev—April 3, 1903.

Some Notes on Electrically-Driven Winding Engines. An illustrated description of methods employed, with remarks on the advantages of electric driving. 2000 w. Col Guard—April 17, 1903.

The Electrical Driving of Winding Gears. F. Hird. Abstract of paper read before the Inst. of Min. Engrs. Describes the controlling apparatus used by different designers, and other features of interest. 3800 w. Elect'n, Lond—Aug. 14, 1903.

Electric Winding. Gerald Hooghwinkel. Enumerates the most striking advantages of electric wire steam winding, describing the different systems employed on the Continent and in the United States, and giving details of a modern plant. 7500 w. Ir & Coal Trds Rev—May 13, 1904.

Electric Hoists. On the advantages of the electric type, the development, and their use for deep hoisting in America, Germany, and South Africa. 2200 w. Mines & Min—July, 1904.

The Siemens-Ilgner System for Electric Mine Hoists. Illustrated description of a hoist now in use at the Zollern II. colliery, at Merklinde, Germany, using electric power. 1500 w. Eng & Min Jour—June 30, 1904.

Computations for Electrically Driven Winding Machinery (Berechnung Elektrisch Betriebener Fördermaschinen). H. Koch & H. Schmiede. Developing formulas and diagrams showing the conditions involved in mine hoisting work, together with methods of regulating and controlling electric motors for winding service. 7000 w. Electrotech Zeitschr—Sept. 22, 1904.

The Electric Winding Plant at the Ligny-les-Aire Mines (Elektrische Fördermaschine für die Compagnie des Mines de Ligny-les-Aire). Details and general arrangement of winding plant for a depth of 400 metres, installed in Northern France. 2000 w. Zeitschr d Ver Deutscher Ing—Oct. 22, 1904.

Electric Winding Machines. Prof. Paul Habets. Read before the Inst. of Mech. Engrs. Gives a dynamic investigation of electric winding for collieries. Serial. 1st part. 6500 w. Engng—June 30, 1905.

A Large Electrical Winding Plant. Lee Murray. Illustrates and describes the plant installed in a mine at Thiede, near Brunswick (Germany). 3900 w. Aust Min Stand—Jan. 9, 1902.

A New System of Electric Hoisting for Mine Shafts (Ueber ein Neues System Elektrischer Schacht-Fördermaschinen). Hans Bansen. A description of a system in which the hoisting motor is in circuit with a dynamo driven by an auxiliary motor, by which means the speed is regulated. 800 w. Glückauf—Feb. 22, 1902.

Electrically Driven Mine Hoists (Elektrisch Betriebene Hauptschacht-Fördermaschinen). C. Köttgen. Data and results of experience with electrically operated mine hoists at Karwin, in Silesia and at Thiede, in Brunswick. Serial. Part I. 5000 w. Zeitschr d Ver Deutscher Ing—May 17, 1902.

The Starting of Electric Hoisting Machines (Das Anlassen von Elektrischen Fördermaschinen). C. Köttgen. A paper before the Verband Deutscher Elektrotechniker, discussing various systems of electric hoisting for mine shafts, and especially the starting of the motor, with many diagrams. 4500 w. Elektrotech Zeitschr—July 10, 1902.

Electrically-Driven Winding Engines. Illustrated description of an engine for a Dortmund mining company which will haul from a depth of 2,296 feet 100 tons of coal per hour. Also of another type to be used in Saxony, which hauls in a ten hours' shift, from 600 to 700 tons of coal from a depth of 722 feet. 1500 w. Engng—Aug. 1, 1902.

Electrically Operated Hoisting Plants (Förderanlagen mit Elektrischen Antrieb). O. Lasche. With detailed illustrations of several hoists, showing the wiring, and method of control. 2500 w. 1 plate. Glückauf—July 19, 1902.

Improvements in the Application of Electricity to Mine Hoisting Machinery (Neuerungen in der Verwendung der Elektrizität beim Fördermaschinenbetriebe). R. Schmidt. Describing the electric winding plant in operation at the Germania Mine near Marten, in the Dortmund district; the shaft is 450 metres deep. 3500 w. Glückauf—Jan. 31, 1903.

Winding Machines with Direct-Connected Motors (Die Fördermaschinensysteme mit Direkt Gekuppelten Motoren). H. Baum. A discussion of the application of electric driving to heavy mine hoisting. Serial. Part I. 3000 w. Glückauf—Feb. 7, 1903.

An Electric Winding Engine with Safety Appliances (Ein Elektrisch Anbetriebener und mit Allen Sicherheitsvorrichtungen Ausgerüsteter Förderhaspel). H. Koch. Illustrating an electric winding engine for a depth of 160 metres and a speed 5 metres per second; using a polyphase motor. 1000 w. 1 plate. Oesterr Zeitschr Berg u Hüttenwesen—Aug. 20, 1904.

Comparison Between Direct Current and Polyphase Systems for Electric Winding Plant. John G. Hooghwinkel. Deals principally with a case where there is a separate power station for the winding plant, considering the first cost of a direct current and a polyphase equipment, and pointing out the advantages and disadvantages of each. 1800 w. Elec Engr, Lond—Sept. 16, 1904.

Computations for Electrically Driven Winding Engines (Die Berechnung der Elektrisch Betriebenen Hauptschacht-Fördermaschine). V. Graubner. Discussing the power required and the proportions for electric motors of various types. Serial. Part I. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 10, 1904.

Electrical Winding Engines. Dr. R. Herzfeld. Refers to several systems and gives particulars of the "Koepe Wheel," and the advantages of electrical transmission of power. Ill. 3000 w. Engng—Feb. 12, 1904.

Electric Winding Machines. Maurice Georgi. Abstract of a paper read before the Glasgow Local Sec. of the Inst. of Elec. Engrs. Discusses the advantages and disadvantages of electric winding, and gives an illustrated description of Mr. Ilgner's system of compensation. 2200 w. Elect'n, Lond—March 18, 1904.

Recent German High Power Electric Mining

Hoists. Frank C. Perkins. Illustration and description of a direct-current mining hoist and a motor generator with a 40-ton flywheel for operation and connection with the same installed at Merklinde, I. W., Germany. 1300 w. Min Rept—April 21, 1904.

Electric Winding Engines. Aims to show that electrical winding eliminates a large source of loss. Serial. 1st part. 3300 w. Prac Engr—March 17, 1905.

Electrically-Driven Winding Engines. Remarks on the selection of a system and type of motor, with brief descriptions of some installations erected by the Allgemeine Elektricitäts-Gesellschaft, Berlin. Ills. 4500 w. Elec Engr, Lond—June 2, 1905.

Electric Winding Engines (Les Machines d'Extraction Electriques). H. Schmerber. With illustrations and details of a number of electrically operated hoisting engines for mines in France and Germany. Two articles. 2 plates. 6000 w. Génie Civil—May 27, June 3, 1905.

See also **CRANE, ELECTRIC; ELECTRIC DRIVING**—Mine Hoist; Coal Hoist; Wüst System; **ELECTRIC EQUIPMENT; GAS PRODUCER**—Pintsch; **HOISTING ENGINE.**

Electric, France.—Electric Winding Engine at Tiremande Colliery. Illustrates and describes an engine recently erected in France designed to raise 105 tons of coal per hour from a depth of 1412 ft. at a velocity of 26 ft. per second. 1600 w. Ir & Coal Trds Rev—Dec. 30, 1904.

Electric Winding Engine of the Tiremande Mine. Dr. A. Gradenwitz. Illustrates and describes an engine designed for winding 105 tons of coal per hour, from a depth of 400 m., at a speed of 8 m. per second. 1400 w. Elec Rev, Lond—April 14, 1905.

Electric Hoist at the Tiremande Colliery. Emile Guarini. Illustrates and describes a novel arrangement in which the hoist is placed at top of head-frame. 1200 w. Mines & Min—Oct., 1905.

Electric, Frankfurt, Germany. — Electric Furnace Hoist. L. Ramakers. An illustrated description of an electrically-operated furnace hoist, which was recently constructed at Frankfurt, Germany. 1200 w. Elec Wld & Engr—Dec. 9, 1905.

Electric, German Mines.—Electricity in Continental Mines. O. Smith. Illustrated description of some German hoisting plants having interesting features. 3500 w. Mines & Min—Dec., 1905.

Electric, Leoben, Austria.—The Electric Mine Hoist at the Tolling Shaft at Leoben (Die Elektrische Schachtfördermaschine System Ilgner in Tollinggraben bei Leoben). J. von Lidl. Describing the application of electric power to mine hoisting, handling loads of 800 kilogrammes to a depth of 80 metres at a speed of 2.4 metres per second. 3000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 3, 1904.

Electric, Rand.—Some Notes on Certain Underground Hoisting Problems on the Witwatersrand. A. W. K. Peirce. A general statement of the conditions, concluding that the best method is the combination of polyphase transmission, conversion to direct currents for each hoist unit, and the "voltage control" on the Ward Leonard system. 2200 w. Trans Am Inst of Elec Engrs—July, 1903.

Electric Regulation.—Improvements in Electric Power for Mining Plants (Neuerungen bei Elektrischen Anlagen im Bergwerks-und Hüttenbetrieb). Hr. Philippi. Comparing the Leonard and the Ilgner systems of regulation as applied to electric hoisting engines. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 18, 1905.

Electric Test.—Test of Steam Consumption of the Electric Hoisting Machine at the Preussen Mine (Versuche zur Bestimmung des Dampfverbrauches an der Elektrischen Fördermaschine der Zeche Preussen II.). H. Schulte. Giving diagrams showing result of tests including efficiency of engine and dynamo. 1800 w. Glückauf—March 26, 1904.

Electric Traveling.—Electric Traveling Hoists. Illustrates and describes a system of overhead traveling electric hoists, giving four views of the traveling transfer trolley service of the Ramapo Iron Company's Works at Niagara Falls. 1600 w. Am Mach—Vol. 28, No. 32.

Electric vs. Mechanical.—The Practical Installation of Electrical Hoisting Machinery (Die Zweckmässige Ausgestaltung Elektrisch Betriebener Hauptschachtfördermaschinen). Karl Ilgner. A comparison of electrical with mechanical winding, showing the advantages of electric motors. Two articles. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—June 17, 24, 1904.

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Coal Winding Machinery. Horace D. B. How. Abstract of essay awarded the Lewis first prize, 1903. Pro. South Wales Inst. of Engrs. Describes two novel forms of electrical winding gears, comparing with a steam-winding engine from a mechanical and financial point of view. Ills. 5000 w. Ir & Coal Trds Rev—July 8, 1904.

On the Electric Drive of Large Reversing Engines Working Intermittently. Maurice Georgi. A comparison of the advantages of electric power over steam for mine hoisting engines. Serial. Part I. 2400 w. Col Guard—April 14, 1905.

Electric, Water.—A Novel Water Hoist. Illustrates and describes the electric automatic arrangement for hoisting water at the Hampton-Central water shaft of the D. L. & W. R. R. Co. 1400 w. Mines & Min—Dec., 1905.

See also **ELECTRIC EQUIPMENT; MINE DRAINAGE.**

Ely, Minn.—Hoisting Plant and Steel Shaft House for the Oliver Iron Mining Co., at Ely, Minn. An illustrated detailed description of an interesting plant and its equipment. 3500 w. Eng News—Nov. 19, 1903.

Endless Chain.—Endless Chain Winding and Vertical Shafts. Illustrated description of method devised by Prof. O. C. von Verbo of replacing rope and cage winding, by an endless chain of links, on to which the pit tubs are hooked at certain intervals. 700 w. Col Guard—March 11, 1904.

Engineer.—Qualifications and Duties of a Hoisting Engineer. J. T. Beard. A consideration of some of the personal and educational requirements. 2300 w. Mines & Min—Aug., 1904.

Flat Rope.—The Treatment of Flat Hoisting Cables. A. E. Johnson. Points that must receive attention to get good service from a flat rope in mine work. 1100 w. Min & Sci Pr—Jan. 12, 1901.

An Electrically Operated Flat Rope Hoist. Dr. Alfred Gradenwitz. Illustrated description of a hoist constructed for the Lens Mining Co., France. 1200 w. Mines & Min—Sept., 1905.
See also **HOISTING ENGINE**—**Nordberg.**

Graphical Methods.—Graphical Methods in the Study of the Equilibrium of Hoisting Cables (Application de la Méthode Graphique à l'Etude de l'Equilibre des Cables d'Extraction). Henri Deschamps. A discussion of graphical methods for determining the varying weights of cable and power required in hoisting from deep shafts. Diagrams. 4 plates. 7000 w. Rev Univ d Mines—April, 1902.

See also **Diagrams.**

Great Depths.—See **Deep.**

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Shaft Guides. Bergassessor Ackermann, in

"Zeit, Berg-, Hütten- und Salinenwesen." Gives experience gained with various kinds of shaft guides in the Breslau Mining District. Ills. 9000 w. Col Guard—Dec. 15, 1905.

Hooks.—See HOOK—Hoisting.

Hoppe Brake.—See Safety Catch.

Hydraulic, Glasgow.—See COAL HANDLING.

Interior Coal Mines.—Hoists and Hoisting in the Interior Coal Fields. George S. Rice. Describes the arrangements where the conditions to be met are shallow shafts, rapid hoisting, and small labor costs. Ills. 2200 w. Min Mag—Oct., 1904.

Joplin, Mo.—Head-Frames and Hoists in the Joplin District. W. R. Crane. Illustrates and describes the construction of head-frames and the methods of hoisting employed in the lead and zinc mines, which differ greatly from those used in other districts. 4000 w. Min Mag—Oct., 1904.

The Aerial Rail Hoist and Haulage System. W. R. Crane. Illustrated description of apparatus recently installed for raising and transporting ore in the Joplin region. 2000 w. Mines & Min—Dec., 1905.

Kinetic Shock.—An Investigation Regarding the Effect of Kinetic Shocks on Winding Ropes in Vertical Shafts. J. A. Vaughan. Gives an inquiry as to the case of a rope which is suddenly stopped while lowering a load with uniform velocity, studying the effects. Diagrams. 10,600 w. Jour of Pro of So African Assn of Engrs—March, 1904.

Koepe.—The Koepe Mine Hoist (Ueber Koepe Förderungen). W. Müller. A description of an improved wire-rope hoisting system for deep mine shafts. 2000 w. 1 plate. Glückauf—March 23, 1901.

The Installation of a Cable for a Koepe Hoisting Plant (Das Auflegen der Seile bei Koepe Fördermaschinen). K. I. Müller. Describing the method of drawing a new cable through the sheaves and drums of a double mine hoist by means of a temporary auxiliary cable and winding drum. 1000 w. Glückauf—Jan. 17, 1903.

Mine Hoisting with Driving Sheaves (Die Förderung mit Treibscheibe). H. Baumann. A review of the Koepe system of winding, using driving sheaves instead of drums, showing its application to deep shafts. 2000 w. Glückauf—Nov. 25, 1905.

See also Electric.

Liége Exposition.—See CRANE.

Linares, Spain.—A Veteran Hoisting Engine. E. R. Woakes. Illustrated description of a large hoisting engine installed at the Pozo Ancho mine of the Linares Lead Co., Ltd., Linares, Spain, in 1851. 350 w. Eng & Min Jour—Aug. 11, 1904.

Liquid Fuel Engine.—See Hoisting Engine—Gas.

Malacate.—The Mexican Malacate. J. Nelson Nevins. Illustrated description of a hoisting apparatus used in Mexico for purposes of sinking, prospecting or ventilating shafts, or for development work. 900 w. Eng & Min Jour—Sept. 27, 1902.

"Man-Engine Principle.—A Proposed New Method to Raise Coal, etc., in Shafts. W. S. Gresley. From the Trans. of the S. Wales Inst. of Engs. Describes a scheme for slow-speed hoisting, doing away with winding, and hoisting the coal in trams, or other receptacles, without the employment of drum or rope. 1800 w. Col Guard—Dec. 28, 1900.

Mines, Pennsylvania.—Hoisting Practice in the Pennsylvania Anthracite Region. R. V. Norris. With numerous illustrations of winding engines, cages, head works and details of the best modern practice of the Pennsylvania anthracite district. 3500 w. Engineering Magazine—September, 1905.

Mine Water.—See also Electric Water; MINE DRAINAGE.

Neumühl, Germany.—See MINE VENTLIATION.

Pneumatic.—The Pneumatic Hoist. M. Ehle, Jr. Discusses the value of the pneumatic system in hoisting from great depths. 1200 w. Min Rept—Feb. 11, 1904.

Poore System.—Tail- or Balance-Rope Hoists in Shafts in the Anthracite Regions of Pennsylvania. Arthur H. Storrs. A description of the Poore system. 1400 w. Mines & Min—July, 1904.

Problem.—A Winding Engine Problem. Working out an example to show how simple methods may be used to solve fairly difficult problems of a practical kind when they are properly applied. 2700 w. Engr, Lond—Dec. 11, 1903.

The Hoisting Problem. James R. Thompson. Discusses the problem in regard to the underground requirements, its engineering and mechanical features, and the financial side; especially considering the Lake Superior region. 5500 w. Min Wld—Sept. 10, 1904.

The Problem of Dynamic Balance. E. H. Roberton. An investigation of single, double and quadruple stake winding from a depth of 4000 feet. Ills. 3800 w. Ir & Coal Trds Rev—Sept. 16, 1904.

See also MINE HAULAGE.

Reserve Gear.—Reserve Winding Gear at German Collieries. From "Zeitschrift für Berg. Hutten und Salinenwesen." Illustrates and describes arrangements erected to ensure continuity of coal raising in the event of accident to the main winding gear. 600 w. Col Guard—Aug. 30, 1901.

Rope.—See Flat Rope; Kinetic Shock; ROPE—Hoisting; WIRE ROPE—Hoisting.

Rope, Breakage.—See ROPE—Hoisting Breakage.

Rope, Connections.—See ROPE—Hoisting, Connections.

Rope Inspection.—Dangerous Conditions as to Length and Number of Broken Wires in Mine Hoisting Ropes (Unsichere Drahtlänge, Gefährdete Seillänge und Zulässige Anzahl der Drahtbrüche bei für Mannsfahrten noch Verwendbaren Seilen). Hermann Kroen. Discussing principles governing the inspection of hoisting cables. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 12, 1905.

Prevention of Hoisting Accidents. A. Selwyn-Brown. Discusses the need of daily inspection of hoisting ropes, the wear, strains, and devices for diminishing strains, giving advice for the care of such ropes. Ills. 1300 w. Eng & Min Jour—Aug. 26, 1905.

Rope Testing.—The Testing of Winding Ropes in the Province of Anhalt, Germany. Frank H. Probert. Notes on the method of testing and the results obtained. Ill. 2500 w. Trans Am Inst of Min Engs—Aug., 1900.

Notes from the Westphalia Rope-Testing Station (Mitteilungen aus der Seilprüfungsstation der Westfälischen Berggewerkschaftkasse). H. Speer. With data and results of tests of a number of mine hoisting ropes. 2000 w. Glückauf—July 16, 1904.

See also HOISTING TACKLE.

Rossland, B. C.—Hoisting and Haulage in Mining Operations—A Description of the Plant on the Le Roi Mine, Rossland, B. C. Bernard MacDonald. A description of this plant and the economies effected by its operation. Ill. 11,300 w. Can Min Rev—May 31, 1902.

Safety Appliances.—The Theory of Safety Catches (Theorie der Fangvorrichtungen). R. A. Henry. A discussion of the action of safety catches on mine hoists, showing their application to an improved construction in connection with a hydraulic brake. Two articles. 7500 w. Two plates. Glückauf—Aug. 3, 10, 1901.

Hydraulic Brake Safety Clutch for Mine Cages. R. A. Henry, in "Glückauf." Illustrated description of the apparatus and its operation. 1100 w. Col Guard—Aug. 23, 1901.

Prevention of Overwinding at the Saint-Etienne Collieries, France. Illustrates and describes safety appliances in use and their operation. 1500 w. Col Guard—Jan. 11, 1901.

Apparatus to Prevent Mine Cages from Stopping too Hard (Vorrichtung zur Verhütung des Harten Aufsetzens der Fördergestelle). An illustrated description of a delayed action catch, which does not stop the cage if it is going too fast, the invention of J. Römer. 500 w. Glückauf—Dec. 21, 1901.

Schlüter's Safety Appliances for Winding Engines. Illustrated description. 600 w. Col Guard—Feb. 7, 1902.

Preventing Shock to the Cage on Reaching the Pit Bottom. From "Glückauf." Illustrates and describes a device recently invented by J. Römer, explaining its action. 600 w. Col Guard—March 27, 1902.

Safety Devices for Mine Hoists (Sicherung des Förderbetriebes durch Besondere Apparate). A. Schlüter. Describing improved forms of safety brakes and position indicators for deep mine hoists. 3000 w. 3 plates. Glückauf—May 17, 1902.

Safety Pit Cages. Are They Desirable. An inquiry aroused by the accident at Tirpentwys Colliery as to a remedy for accidents due to rope breakage. 1400 w. Ir & Coal Trds Rev—Oct. 24, 1902.

Safety Apparatus for Underlie Shafts. Report on a fatal accident at Ravenswood (Queensland), with illustrated description of two simple appliances to prevent trucks from running away. 1800 w. Queens Gov Min Jour—June 15, 1903.

Safety Catches for Mine Haulage Apparatus (Sicherheitsvorrichtungen an Bremsbergen). Gustav Ryba. Describing a number of forms of safety brakes and catches for checking the fall of cars and cages on mining inclines and hoists. Two articles. 1 plate. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 3, 10, 1903.

The Karlik-Witte Safety Device for Mine Hoisting Machinery (Der Sicherheitsapparat für Fördermaschinen Patent Karlik-Witte). The apparatus includes indicators showing the position of the cages in the shaft and an automatic brake to prevent overwinding. 2500 w. Glückauf—Sept. 19, 1903.

The Karlik-Witte Safety Stop Apparatus for Hoisting Engines. Alfred Gradenwitz. Illustrated detailed description of the apparatus and its working. 2000 w. Min Rept—Oct. 13, 1904.

Safety Appliances for the Prevention of Overwinding. Illustrated description of various types. Serial. 1st part. 2800 w. Col Guard—Dec. 4, 1903.

Biosfeld's Safety Brake for Winding Engines. Illustrated detailed description of the "Hercules" safety brake. 1500 w. Ir & Coal Trds Rev—Dec. 18, 1903.

Safety Devices for Inclined Planes (Appareils de Sécurité pour Plans Inclinés). H. Schmerber. Describing various forms of locks, brakes and automatic safety catches used in the mines of Austria. Two articles. 3500 w. Génie Civil—Dec. 26, 1903; Jan. 2, 1904.

Improved Controlling Appliances for Winding Engines (Nouveaux Evite-Molettes). H. Schmerber. Describing especially the electric and other systems, shown at the exposition at Arras, for controlling and regulating winding engines for mines, together with brakes and safety appliances. Two articles. 3000 w. Génie Civil—Oct. 22, 29, 1904.

Improved Safety Device for Cages and Skips. J. J. Jordan. Outline description, with illustrations, of a device aiming to provide a stronger means of securing the cage in case of breakage of the hoisting rope. 450 w. Min Rept—July 14, 1904.

Construction and Fencing of Hoists and Teagles. W. Sydney Smith. A report recently presented to the Home Office by H. M. Inspector of Factories, on the cause and prevention of accidents with hoisting machinery. Ills. Serial. 1st part. 2300 w. Mech Engr—Aug. 20, 1904.

The Hoppe Safety Brake (Die Neue Hoppesche Fallbremse). W. Gentsch. Describing an improved safety catch for the cages of mine hoists. 1000 w. Zeitschr d Ver Deutscher Ing—Sept. 24, 1904.

Improved Safety Devices Against Overwinding (Neue Sicherheitsvorrichtungen gegen das Uebertreiben). H. Jicinsky. Illustrating devices for automatically stopping the engine when the cage reaches the upper safe limit. 3000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 10, 1904.

Safety Catches for Mine Cages. E. Mackay Heriot. Points out the risks from the cable breaking while hoisting, and illustrates some of the methods adopted for safety. 2000 w. Eng & Min Jour—July 22, 1905.

See also **ELEVATOR; SAFETY APPLIANCE.**

Screw.—Notes on Cranes—A Screw Hoist. A. D. Williams. Describes screw hoists, giving sketch of screw and driving connections for a 60-ton hoist. 600 w. Am Mach—Vol. 28, No. 1.

Shaft-Closing Device.—New Automatic Shaft-Closing Device. A. Padour and V. Sperling. From "Oesterreichische Zeitschrift für Berg und Hüttenwesen." An illustrated description of the device and its operation. 600 w. Col Guard—Oct. 4, 1901.

Siemens-Ilgner.—See **Electric.**

Silesian Mines.—See **WIRE ROPE.**

Steel Works.—See **CRANE; STEEL WORKS—Antwerp.**

Tackle Tests.—See **HOISTING TACKLE.**

Tail Rope.—See **Poore System.**

Test, American Bridge Co.—Tests of the Efficiency of Hoisting Tackle. S. L. Wonson. An account of tests recently carried out by the American Bridge Co. of New York, using its standard types of blocks, with various combinations of manila and wire rope. Tabulated results are given. 800 w. Eng News—June 11, 1903.

Tomson.—See **SHAFT SINKING—Tomson Hoisting.**

Towers.—Some Recent Designs for Steel Coal-Hoisting Towers. H. G. Tyrrell. Illustrated description of recent designs. 500 w. Eng News—May 30, 1901.

Transvaal.—See **Deep, South Africa; Electric.**

Water, Electric.—See **Electric, Water; ELECTRIC EQUIPMENT; MINE DRAINAGE.**

Wilczek, Austria.—The Power Plant of the Wilczek Mines (Ueber einige Betriebseinrichtungen beim Gräflich Wilczekschen Bergbau). J. Manerhofer. Describing the hauling and winding machinery, also the automatic operation of the doors controlling the ventilation, etc. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 9, 1904.

See also **COAL MINING.**

Wire Rope.—See **WIRE ROPE—Hoisting.**

Witwatersrand.—See **Electric, Rand.**

Workshops.—See **CRANE; LIFT; MECHANICAL HANDLING.**

HOISTING CAGE.

See **HOISTING; MINE SHAFT.**

HOISTING DRUM.

See also **CRANE—Drum; HOISTING; HOISTING ENGINE; WIRE ROPE—Sheaves and Drums.**

Notes on Hoisting Drums. C. F. Blake. Illustrated suggestions concerning the design of hoisting drums. 500 w. Am Mach—Dec. 13, 1900.

Cylindrical vs. Conical Drums. F. Moeller. Considers the advantages and disadvantages of the different types, giving details of methods of construction of drums for various purposes. Ills. 1800 w. Mines & Min—July, 1904.

Hoisting Drums. H. L. Auchmuty. Discusses methods of construction and the good and bad points of both metal-grooved and wood-logged drums. Ills. 1700 w. Mines & Min—Aug., 1904.

Reels Compared.—Drums vs. Reels for Hoisting. F. F. Coleman. Discusses different types of drums and some points in regard to reel hoists and flat ropes. 2000 w. Mines & Min—July, 1904.

Weight.—Weight of Winding-Drums for Deep Shafts. Daniel Burns. Discusses the mechanics of the question so far as it applies to the weight of the winding-drum. Ill. 1200 w. Trans Min Inst of Scotland—Vol. XXII., Part I.

HOISTING ENGINE.

See also **HOISTING.**

Notes on Mine Hoisting Engines. Robert Peele. Considers the hoisting engine from a mechanical engineering point of view, discussing the type form of ordinary intermittent-running engine. 8500 w. Sch of Mines Qr—Jan., 1902.

Winding and Winding Appliances. Daniel Davies. Considers the varieties of winding engines, and their control, winding ropes, etc. 2200 w. Ir & Coal Trds Rev—Dec. 5, 1902.

Types of Hoisting Engines and the Adaptability of Each. S. T. Nicholson. Descriptions, with drawings, showing some of the standard methods of construction. 2000 w. Mines & Min—July, 1904.

Belgium.—New Winding Engine at the Sacré Madame Mines, Belgium (Nouvelle Machine d'Extraction à Vapeur des Charbonnages de Sacre-Madame, Belgique). L. Ramakers. Illustrating a double horizontal winding engine shown at the Liége exposition. 1500 w. 1 plate. Génie Civil—Nov. 11, 1905.

Brakes.—The Blosfeld Safety Brake for Winding Engines. Hr. Ansorge, in "Zeitschrift für Berg-, Hütten- und Salinenwesen." Illustrates and describes a brake intended to supplement the ordinary brake in an emergency. 1200 w. Col Guard—Sept. 19, 1902.

Hoisting-Engine Brakes. J. S. Lane. Illustrates and describes the different kinds, the methods of operating them and the principles governing their construction and action. 2700 w. Mines & Min—July, 1904.

Calculations.—Hoisting Engine Calculations. Gives methods of calculating sizes and power of engines required to do a given work. 2400 w. Mines & Min—July, 1904.

Care.—Care and Handling of Hoisting Engines. J. H. Pennington. Suggestions for keeping it in proper order. 1600 w. Mines & Min—July, 1904.

Compound vs. Simple.—Compounding in Hoisting Engines. A comparison of the relative economy of hoisting with compound, condensing and simple engines. 2800 w. Mines & Min—July, 1904.

Conical Drum.—Conical-Drum Winding Engine. An illustrated description of a large vertical cross-compound winding engine exhibited at Düsseldorf. 1300 w. Engng—Nov. 7, 1902.

Deep Mine.—Winding Engines. W. F. Dam. Considers winding engines generally, and particularly for depths exceeding 1000 feet, with parallel drums. 8000 w. Mines & Min—April, 1905.

See also HOISTING.

Design.—Modern Steam Hoisting Machinery. A. M. Levin. Illustrates and describes some features in the design of hoisting engines and auxiliaries. 3800 w. Mach, N Y—May, 1905.

Diagram.—See HOISTING.

Double Tandem.—Double Tandem Winding Engine (Zwillings-Tandem-Fördermaschine). A. Deeg. A detailed description of the new winding engine with double spiral drums recently built for the coal mines at Rouchamp, France, by the Humboldt Machine Works at Kalk. 4000 w. 1 plate. Zeitschr d Ver Deutscher Ing—July 19, 1902.

Düsseldorf Exposition.—Horizontal Twin-Tandem Winding Engine. Illustrated detailed description of a powerful engine exhibited at the Düsseldorf Exhibition. 1000 w. Engng—June 20, 1902.

Electric.—See Hohenlohe; HOISTING.

Electric vs. Steam.—See HOISTING.

Exhaust Steam.—Utilizing the Waste Steam from Winding Engines. Translated from "Glückauf." Illustrated description of an interesting device recently installed in a colliery at Bruay (Pas-de-Calais). 800 w. Col Guard—June 26, 1903.

Friedrichsthal.—New Hoisting Engine Plants at Friedrichsthal, Rhenish-Prussia (Neue Fördermaschinen-Anlagen der Königlichen Berginspektion IX., Friedrichsthal). H. Deichmann. A description of a powerful hoisting plant at mines in the Saar district, with illustrations and indicator diagrams. 2000 w. Glückauf—April 19, 1902.

Foundation.—See FOUNDATION—Hoisting Engine.

Gas.—Gas or Liquid-Fuel Hoisting Engines. E. W. Roberts. Discusses their economy as compared with steam engines, and some of the materials which may be used as fuels. Ills. Mines & Min—July, 1904.

Gold Mine, Western Australia.—Non-Condensing Double-Drum Winding Engine. Illustration and brief description of engine made for the Associated Gold Mines of Western Australia, Limited. 600 w. Engng—April 18, 1902.

Hohenlohe Mine.—The Winding Engines of the Arnim Alexander Mine and the Prince Hohenlohe Max Mine (Die Fördermaschinen auf dem v. Arnimschen Alexander Schacht und der Fürstlich Hohenlohe Maxgrube). W. Gentsch. Illustrating an electrically driven mine hoist and a double steam winding engine. 1500 w. Zeitschr d Ver Deutscher Ing—Oct. 1, 1904.

Indicator Cards.—Some Indicator Cards from Winding Engines. W. A. Macleod. Illustrations of different degrees of economy obtained by different methods of running. 2400 w. Mines & Min—July, 1904.

Kalgoorlie.—Coupled Winding-Engine. Illustrated description of Corliss winding engines constructed for the gold mines at Kalgoorlie, Western Australia. 800 w. Engng—Dec. 23, 1904.

Liege Exhibition.—1500 Horse-Power Winding Engine at the Liege Exhibition. Illustrated description of an engine with two horizontal twin cylinders, driving a shaft on which are keyed two winding drums for flat fibre cables. 900 w. Engng—June 16, 1905.

Nordberg.—The Winding Engine for the Boston and Montana Consolidated Copper and Silver Mining Co. (Fördermaschine für die Boston and Montana Consolidated Copper and Silver Mining Co.) Fr. Frölich. Detailed description of the Nordberg engines for use with flat ropes. 3000 w. Zeitschr d Ver Deutscher Ing—June 25, 1904.

Reversing Gear.—See GEAR—Reversing.

Safety Brake.—See Brake; HOISTING.

Sherwood, Eng.—Winding Engine at Sherwood Colliery. Illustrated description of a direct-acting Corliss winding engine at Mansfield, near Nottingham, England. 1000 w. Ir & Coal Trds Rev—June 6, 1902.

Compound Winding Engine at Sherwood Colliery. Charles H. Heathcote. Illustrated detailed description. 1600 w. Ir & Coal Trds Rev—Jan. 29, 1904.

Size.—Choice of a Hoisting Engine from the Standpoint of the Purchaser. How to determine the size of the engine required. 800 w. Mines & Min—July, 1904.

Specifications.—Hoisting Engine Specifications. F. W. Gerecke. Gives sample specifications for a pair of heavy hoisting engines for use at a coal mine. 2800 w. Mines & Min—July, 1904.

Tamarack, Mich.—The Tamarack Hoisting Engine. Illustrates and describes an engine having interesting features and a capacity of 5000 h. p. at this Michigan copper mine. 2000 w. Power—Nov., 1904.

Test.—The Steam Consumption of a Hoisting Engine at the Emscher Mine, in the Cologne District, Germany (Bestimmung des Dampfverbrauchs an der Fördermaschine auf Schacht Emscher des Kölner Bergwerks-Vereins). An account of a test made by the Boiler Inspection Association of the Mines in the Dortmund District, Germany, with diagrams. 1000 w. Glückauf—April 18, 1903.

Tests of Steam Winding Engines (Untersuchungen an Dampffördermaschinen). Dr. H. Hoffmann. An investigation of the varying loads upon mine hoisting engines, and the corresponding effects upon the steam machinery, with numerous load and indicator diagrams. Two articles. 8000 w. Zeitschr d Ver Deutscher Ing—Jan. 30, Feb. 6, 1904.

The Steam Consumption of a Winding Engine (Versuche über den Dampfverbrauch einer Dampffördermaschine). A. Czermak. With indicator and load diagrams showing the irregular work, and the economy effected by the use of cut-off. 2500 k. Oesterr Zeitschr f Berg u Hüttenwesen—June 24, 1905.

Valve Gear.—See VALVE GEAR—Hoisting Engine.

HOISTING HOOK.

See CRANE HOOK; HOOK.

HOISTING TACKLE.

See also **HOISTING.**

Tests.—Tests of the Efficiency of Hoisting Tackle. S. P. Mitchell. A report of an extended series of tests made recently at the Pencoyd plant of the Am. Bridge Co. with standard types of blocks and various combinations of manila and wire rope. 800 w. Pro Am Soc of Civ Engrs—Aug., 1903.

Tests of the Efficiency of Hoisting Tackle. S. L. Wonson. A report of tests recently carried out by the erecting department of the American Bridge Co. of New York. 1000 w. Eng Rec—Sept. 12, 1903.

See also **HOISTING—Rope Testing.**

HOLLOW TILE.

See **BUILDING CONSTRUCTION; BUILDING MATERIAL; CONCRETE; FIREPROOF CONSTRUCTION.**

HOOK.

See also **CRANE HOOK.**

Hoisting.—Some Data on Hoisting Hooks. John L. Bacon. Gives results of some tests made on the strength of hooks bent out of round stock, and compares them with tests on those shaped according to Towne's Formula, giving also the effect of case hardening. Ill. 700 w. Trans Am Soc of Mech Engrs—June, 1903.

Theory.—The Theory of Hooks. Walter Rautenstrauch. Gives the theory recently developed by Mr. E. S. Andrews and Prof. Karl Pearson, and extracts from experiments conducted to prove it. Ills. 1500 w. Sib Jour of Engng—Oct., 1905.

HOPPER.

See also **CAR; COAL BIN; GRAIN BIN.**

Cone Intersection.—A Trough Hopper Intersecting a Truncated Cone. Illustrates and describes the method used. 700 w. Boiler Maker—March, 1905.

HORSE POWER.

See also **POWER**; and under specific machines and engines.

Boiler.—See **BOILER—Horse Power.**

Chart.—A Horse-Power Chart. A. G. Holman. Gives chart and explanation of its use. 1000 w. Power—May, 1902.

HORSESHOE.

Horseshoe Making by Machine (Fabrication Mécanique des Fers à Cheval). Illustrated description of the Chelet and Simon machines and process. 700 w. Métallurgie—April 29, 1903.

The Pedersen Process and Machine for Making Horseshoes (Procédé et Machine pour la Fabrication des Fers à Cheval par M. Pedersen). Illustrated description. Serial. 2 parts. 1000 w. Métallurgie—June 10 and 17, 1903.

Brazing Calks.—See **BRAZING.**

HOSE.

Air Brake.—See **AIR BRAKE—Hose.**

Manufacture.—Manufacture of Rubber Hose. Charles Dunn. Describes one method of manufacturing air and steam hose. 1100 w. Loc Engng—Sept., 1902.

HOSPITAL.

See also **BUILDING; BUILDING CONSTRUCTION; ELECTRIC EQUIPMENT; HEATING; HEATING AND VENTILATION; VENTILATION.**

Dining Hall, Middletown.—See **BUILDING CONSTRUCTION—Middletown Hospital.**

Filtration, Poughkeepsie, N. Y.—See **FILTRATION—Hospital.**

Guy's, London.—Engineering at Guy's Hospital. Begins a description of a hospital plant that has recently been remodeled. Serial. 1st part. 1500 w. Engr, Lond—Oct. 14, 1904.

Medical Standpoint.—Hospital Construction from a Medical Standpoint. Henry M. Hurd. Considers the arrangement of buildings, heating and ventilation, precautions against fire, floors, walls, etc. 4000 w. Br Build—Dec., 1900.

Paris Children's.—The New Children's Hospitals in Paris (Les Nouveaux Hôpitaux d'Enfants à Paris). M. Seurat. Fully illustrated descriptions of the Hospital Bretonneau and the Hospital Trousseau at Paris, with details of the technical and mechanical equipment. 5000 w. 2 plates. Génie Civil—July 27, Aug. 3, 1901.

Sunlight.—See **BUILDING.**

HOSPITAL SHIP.

A Design for a Floating Sanitarium (Entwurf zu einem Schiffssanatorium). Oswald Flamm. Complete designs for a ship intended to serve as a sanitarium at sea for such patients as would be benefitted by sea air. 2000 w. 3 plates. Schiffbau—Oct. 12, 1904.

HOT-AIR ENGINE.

See also **MOTOR.**

Paris Exposition.—See **GAS ENGINE.**

HOT BLAST.

See **BLAST FURNACE; BLAST-FURNACE GAS; BLAST STOVE; BLOWING ENGINE; COPPER METALLURGY; FOUNDRY—Cupola; HEATING AND VENTILATION.**

HOT BOX.

See **CAR BEARING; LUBRICATION.**

HOTEL.

See also **BUILDING CONSTRUCTION; ELECTRIC EQUIPMENT; HEATING; HEATING AND VENTILATION; MECHANICAL PLANT; VENTILATION.**

Ansonia, N. Y.—The Apartment Hotel in New York. Reginald Pelham Bolton. An illustrated description of the "Ansonia," which contains 340 suites, comprising 1600 rooms and 345 bath-rooms. 2800 w. Cassier's Mag—Nov., 1903.

Buffalo.—See **STEEL CONSTRUCTION.**

Engineering.—See **ENGINEERING—Hotel.**

Mechanical Plant.—See **MECHANICAL PLANT; POWER PLANT.**

Power Plant.—See **MECHANICAL PLANT; POWER PLANT.**

Ventilation.—See **VENTILATION—Hotel Astor, New York.**

Water Supply and Drainage.—See **PLUMBING.**

HOT SPRINGS.

See also **GEOLOGY; GROUND WATER.**

Simplon Tunnel.—See **TUNNEL—Simplon.**

HOT WATER.

See also **BOILER—Heating; HEATING; HEATING AND VENTILATION; PLUMBING.**

Hot Water Heating for Domestic Service. H. C. Lincoln. An illustrated outline of the different systems in common use, with a few rules for the design of such systems. 2500 w. Steam Engng—Sept. 10, 1902.

Hot Water Supply. Illustrated description of two sketches of kitchen boiler and hot-water supply arrangement where one boiler is above the other. 1500 w. Met Wor—July 18, 1903.

Circulation.—See **HEATING—Hot Water.**

Discharge.—The Discharge of Hot Water from Tanks (Das Ausströmen Heissen Wassers aus Gefässmündungen). Dr. A. Fliegner. Deriving formulas for the flow of hot water, analagous to those for saturated steam. Two articles. 3000 w. Schweiz Bauzeitung—June 10, 24, 1905.

Electric Station.—See **ELECTRIC STATION—Ada; Columbus.**

Flow.—Note on the Flow of Hot Water Through and From Pipes (Note sur l'Ecoulement de l'Eau Chaude par les Tuyères). A. Rateau. An explanation, by means of the entropy diagram, of some hot-water and steam flow prenomena observed by MM. Savage and Pulin in 1892. Diagrams. 2400 w. Revue de Mecanique—Dec. 31, 1901.

Incrustation.—Hot Water Supply by Indirect Heating—A Remedy for Incrustation Difficulties. George Chasser. Read before the Brit. Inst. of Heat. & Vent. Engrs. Discusses difficulties due to hard water, and the remedy. Diagrams. 5000 w. Plumb & Dec—Nov., 1905.

Office Building.—Supplying Hot Water to an Office Building. A brief description of how the water is heated and supplied. 1000 w. Met Work—Feb. 13, 1904.

HOT WATER BOILER.

See **BOILER—Heating; HEATING—Hot Water; HOT WATER.**

HOT WELL.

Oil Extractor.—See **OIL SEPARATOR—Hot Well.**

HOUSE.

See **ARCHITECTURE; BUILDING; BUILDING CONSTRUCTION.**

HOUSEBOAT.

See also **BOAT—Houseboat.**

Fortuna.—See **STEAM YACHT.**

HOUSE MOVING.

See **BUILDING MOVING.**

HUB.

See also **WHEEL.**

Cast Iron.—See **CAR WHEEL.**

Pneumatic.—See **AUTOMOBILE—Pneumatic Hub.**

HUMIDITY.

See also **DRYING; HEATING AND VENTILATION; HYGROMETER; VENTILATION.**

Factories.—See **VENTILATION.**

Heating.—See **HEATING—Moisture.**

Humidostat.—The Control of Humidity by Means of the Humidostat. W. S. Johnson. A brief illustrated explanation of a method of controlling humidity. 1400 w. Eng News—April 21, 1904.

Hygrometer.—See **HYGROMETER.**

Telephone Exchanges.—A Practical Air Moistener. An account of experiments conducted by the Bell Telephone Company to secure agreeable temperature conditions in their exchanges. 2800 w. Dom Engng—Feb. 15, 1902.

Textile.—The Humidification of Textile Establishments (L'Humidification des Locaux de l'Industrie Textile). Paul Razous. A review of the artificial methods of maintaining the proper hygrometric state of the atmosphere for spinning and weaving operations. 2000 w. Génie Civil—Sept. 17, 1904.

Humidification in Textile Mills and Factories. H. R. Carter. States the advantages of a good humidifying system and illustrates the Drosophore humidifier as typical of local distribution humidifiers. Serial. 1st part. 600 w. Prac Engr—Aug. 4, 1905.

HYDRANT.

See also **FIRE PROTECTION; WATER SUPPLY; WATERWORKS.**

Freezing.—Freezing of Fire Hydrants. Gives information concerning the delays caused by frozen hydrants, resulting in great loss of property, considering modern hydrants to be the remedy. 3000 w. Ins Engng—Oct., 1905.

Rental.—Hydrant Rental. D. H. Sawyer. A discussion of what is an equitable and just charge. 1800 w. Munic Engng—March, 1903.

HYDRAULIC CARTRIDGE.

Coal Mining.—See **COAL MINING.**

HYDRAULIC ELEVATOR.

See **ELEVATOR; HYDRAULIC MINING—Elevator.**

HYDRAULIC ENGINE.

See also **HYDRAULIC MACHINERY; HYDRAULIC POWER.**

Bradford, R. I.—Hydraulic Engines at the U. S. Naval Coaling Station, Bradford, R. I. Illustrates and describes the Bradford installation. 1200 w. Eng News—Aug. 3, 1905.

Mine Drainage.—Hydraulic Driven Pumping Plant (Hydraulisch Betriebene Wasserhaltungsanlage). H. Unger. A detailed description of direct-acting hydraulic engines driving drainage pump at the Altendorf Mine at Mahlhausen on the Ruhr. 2000 w. 2 plates. Glasers Annalen—Nov. 1, 1903.

HYDRAULIC ENGINEERING.

See **HYDRAULIC MACHINERY; HYDRAULICS; HYDRODYNAMICS; HYDRO - ELECTRIC PLANT; RIVER REGULATION; WATER FLOW; WATER POWER.**

HYDRAULIC EXCAVATION.

See also **HYDRAULIC MINING.**

Hydraulic Excavation. Latham Anderson. Discusses the processes employed and the conditions essential to economy, outlining the process of opening and working a hydraulic mine, and other work of interest. Ill. 5500 w. Jour Assn of Engng Socs—Jan., 1901.

The Cost of Hydraulic Excavation for Embankments and for Placer Mining. Abstracts of recent papers bearing upon this class of work are given with comments and tabulated information concerning cost. 2200 w. Eng News—Nov. 27, 1902.

HYDRAULIC FILLING.

Mine.—See **COAL MINING—Filling; FILLING.**

HYDRAULIC FORMING.

High Pressure Hydraulic Forming and Stamping System (Hydraulisches Hochdruck-Press-und-Präg-verfahren). A. Riedler. A description of the Huber system, using the direct pressure of the liquid upon the die and material. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—April 27, May 24, 1901.

Forming Sheet Metal Parts, Using Water as a Medium. Wartard Stark. Describing the use of water as a medium for forcing the metal into the die of a drop press. 700 w. Am Mach—June 30, 1904.

HYDRAULIC LABORATORY.

See also **LABORATORY; MODEL BASIN.**

HYDRAULIC MACHINERY.

See also **HYDRAULIC ENGINE; HYDRAULIC FORMING; HYDRAULIC RAM; PUMP; TURBINE; WATER WHEEL.**

Hydraulic Plant. An illustrated article, giving particulars of a hydraulic-power transmission plant from the laying of the foundation to the testing of the engines, calling attention to important points. 1000 w. Prac Engr—Aug. 23, 1901.

Arsenal, Osaka.—The Hydraulic Plant for Drawing Steel Shells, at the Imperial Arsenal, Osaka, Japan. Gompei Kuwada. Description of the plant and its equipment. Plan of drawing press. 2000 w. Eng Rec—Nov. 28, 1903.

Baxter Paper.—Hydraulic Power Appliances in Engineering Industries. George H. Baxter. Especially discussing hydraulic transmission, cranes, hoisting machinery, dock and harbor appliances. Serial. Part I. 5000 w. Engineering Magazine—March, 1904.

Hydraulic Power Appliances in the Engineering Industries. George H. Baxter. Mr. Baxter's second paper is devoted to the application of hydraulic power to the operation of wharf cranes, capstans, and auxiliary machinery. 2500 w. Engineering Magazine—May, 1904.

Bordeaux.—Extension of the Hydraulic Plant at the Port of Bordeaux (Agrandisement de l'Usine Hydraulique du Port de Bordeaux). A general account of the pumps, accumulators and arrangement of the plant used to operate the hydraulic cranes at the port of Bordeaux, France. 3000 w. 1 plate. Génie Civil—Feb. 21, 1903.

Bremerhaven.—See **DOCK.**

British.—British Hydraulic Machinery. A. F. Petch. An illustrated account of various special hydraulic presses used in the manufacture of munitions of war. 3000 w. Cassier's Mag—Nov., 1904.

Cartridge Case.—Cartridge Case Heading and Indenting Press. Illustrates and describes a hydraulic press for heading and indenting the cartridge cases of quick-firing ammunition. 900 w. Engng—Oct. 6, 1905.

Crane.—Hydraulic Crane at the Tower Wharf of the General Steam Navigation Company. Illustrations and brief description of an installation consisting of seven hydraulic jib-cranes. 800 w. Engng—Feb. 12, 1904.

See also **CRANE.**

Cylinder Strength.—See **CYLINDER—Hydraulic.**

Design.—Design of a 4000-Ton Hydraulic Press. W. E. Morey. Illustrates and describes the designing of a press to meet stated requirements. Serial. 1st part. 1600 w. Am Mach—Nov. 17, 1904.

Hydraulic Pressing, Stamping and Forging Machinery. F. W. Steele. Read before the Liverpool Engng. Soc. Discusses the designing and its importance, especially of the valves and piping, the velocity of the water through pipes and valves, etc., in this number. Serial. 1st part. 2200 w. Mech Engr—Sept. 30, 1905.

Diagrams.—Diagrams for Estimating Hydraulic Machinery. Frank B. Kleinhaus. Gives diagrams with explanatory notes. 500 w. Eng News—Oct. 22, 1903.

Dock.—See **Baxter Paper; Crane; DOCK; HARBOR; MECHANICAL HANDLING—Harbor.**

Dock Gates.—Gate Machinery for Mersey Docks. An illustrated description of hydraulic machinery. 3500 w. Engr, Lond—June 4, 1901.

Dock, Middlesbrough.—See **ELECTRIC EQUIPMENT.**

Dynamometer.—See **DYNAMOMETER—Hydraulic.**

Elevator Machinery.—High-Pressure Hydraulic Distribution of Power, with Special Reference to Elevator Machinery. H. D. James. Presents the advantages of water power at high pressure, its applications, etc., discussing its advantages and disadvantages as a power for elevators. General discussion. 7000 w. Pro Engrs Soc of W Penn—April, 1904.

See also **ELEVATOR.**

Forging.—The Development of the Hydraulic Forging Press (Gesichtspunkte für die Einrichtung von Schmiederpressen-Anlagen). O. Peter. A review of the application of hydraulic pressure to forging and forming operations, with numerous illustrations. Two articles. 6000 w. Glasers Annalen—Aug. 15, Sept. 1, 1904.

Hydraulic Forging Presses. Illustrates and describes a new 3000-ton hydraulic press. 2200 w. Engng—Nov. 11, 1904.

See also **Foundry; Steam Combined; Steel Ingot; Steel Manufacture.**

Foundry and Machine Shop.—Hydraulic Power in Foundry and Machine Shop. Joseph Horner. An illustrated article on the advantages of an hydraulic installation, the uses to which the power is applied, types of hydraulic machinery, etc. 6600 w. Cassier's Mag—Jan., 1904.

Intensifiers.—Hydraulic Intensifiers. Gerald E. Flanagan. Explains what an intensifier is, and its operation. Ill. 900 w. Am Mach—Aug. 22, 1901.

Notes on the Design of Hydraulic Intensifiers. G. E. Flanagan. Illustrated description of a three-phase hydraulic intensifier, explaining also the two-stage, and single-stage apparatus. 700 w. Am Mach—Oct. 20, 1904.

Iron Manufacture.—See **Steel Manufacture; IRON METALLURGY.**

Locomotive Works.—Hydraulic Machinery for an Indian Locomotive Works. Illustrations and descriptions of a locomotive wheel press and a spring-testing machine, both supplied with special electrically-driven pumps. 600 w. Engr, Lond—Jan. 2, 1903.

See also **LOCOMOTIVE SHOP; LOCOMOTIVE WORKS.**

Packings.—See **PACKING—Hydraulic Machinery.**

Philipp.—A New Principle in Hydraulic Presses. Illustrations and descriptions of applications of the principle invented by Otto Philipp, which saves the loss of power, and does away with the usual hydraulic plant of pumps, accumulator and piping. 1300 w. Am Mach—Nov. 13, 1902.

Pipes.—See **PIPE—Hydraulic Power.**

Punching and Shearing.—Combined Hydraulic Punching and Shearing Machine. Charles Herzberg. Begins an illustrated detailed description of a machine built in Austria for the Imperial sea arsenal at Pola. Serial. 1st part. 1800 w. Am Mach—Dec. 17, 1903.

Hydraulic Punching and Shearing Machinery (Lochstanze und Blechschere mit Druckwasserbetrieb). A. Heller. Illustrating tools operated by water at a pressure of 120 to 150 atmospheres, and used for punching plates up to 35 mm. thick. 1200 w. Zeitschr d Ver Deutscher Ing—Nov. 5, 1904.

Railway Service.—Hydrostatic Tools in Railway Service. George L. Gillon. An illustrated article concerning the designs and operation of hydraulic shop jacks, wrecking jacks, transfer jacks, crank pin presses, car wheel presses, punches, rail benders, etc. Also general discussion. 12,800 w. W Ry Club—Jan., 1901.

See also **RAILWAY SHOP.**

Repairing.—Patching a Large Hydraulic Press Table. A. F. Horton. An illustrated description of difficult repairing. 1100 w. Am Mach—Dec. 20, 1900.

Repairing a 400-Ton Hydraulic Press. Frank M. Davis. The broken head of a powerful forcing press was replaced by a steel disk held in place by a cross bar and loop bolts secured to the cylinder lugs. 1200 w. Mach, N Y—Aug., 1905.

Safety Devices.—Safety Devices for Hydraulic Plants. Frank B. Kleinhans. Describes devices to prevent breakages of pipes and cylinders, and other injuries. 1100 w. Eng News—March 3, 1904.

Shearing.—See **Punching.**

Sheet Metal.—See **HYDRAULIC FORMING.**

Steam Combined.—An Austrian Steam-Hydraulic Forging Press. Illustrates and describes a 1200-ton forging press, which consists of a steam-hydraulic intensifier and press proper. 600 w. Sci Am Sup—Jan. 30, 1904.

Steel Casting.—See **Steel Ingot; Steel Manufacture; STEEL CASTING—Hydraulic Press.**

Steel Ingot.—Press of 1000 Tons Capacity for Compressing Steel Ingots (Presse de 1000 Tonnes pour la Compression de Lingots d'Acier). With sectional illustrations of the powerful press used at the St. Etienne Steel Works, France. 1800 w. Génie Civil—Aug. 10, 1901.

The Compression of Steel (Dichten des Stahls). A. W. Zdanowicz. A description of the hydraulic machinery for compressing steel ingots, as used at the St. Etienne works in France. 3500 w. Stahl und Eisen—Aug. 15, 1901.

Steel Manufacture.—The Use of Hydraulic Power in the Manufacture of Iron and Steel. R. M. Daelen. Read at meeting of the Iron & Steel Inst. On the use of the intensifier and the advantages; the application of high-pressure water to forging presses and the advantages. Ill. 2200 w. Ir & Coal Trds Rev—May 10, 1901.

Hydraulic Power in Steel-Making. R. M. Daelen. Read before the Iron and Steel Inst. Discusses the growing use of high pressures and the means of obtaining them. Ill. 2400 w. Engng—June 28, 1901.

See also **STEEL METALLURGY.**

Tube Upsetting.—Tube-Upsetting Machine (Röhrenstauchmaschine). Carl Wadas. Describing a hydraulic press for upsetting or thickening the walls of wrought tubing by longitudinal pressure. 1200 w. Stahl u Eisen—Nov. 1, 1905.

Valve.—See **VALVE.**

Wharf.—See **Baxter Paper; Crane; DOCK; HARBOR; MECHANICAL HANDLING—Harbor.**

HYDRAULIC MINING.

See also **GOLD DREDGING; GOLD MINING; HYDRAULIC EXCAVATION.**

Notes on Hydraulic Mining. George H. Evans. Practical points necessary to be considered in carrying water in ditches, flumes, etc. Ill. 2200 w. Mines & Min—Dec., 1900.

Hydraulicking Low-Grade Gravel. P. Bouery.

Gives results obtained in working placers, showing that low grades can be worked with some profit. 1400 w. Min & Sci Pr—April 18, 1903.

Notes on Hydraulic Mining Practice. Richard L. Grider. Abstract of an article in the Colorado School of Mines "Bulletin," Jan., 1905. Illustrated description of methods of work in a hydraulic mine. 3500 w. Eng News—July 20, 1905.

Atlin, B. C.—See Yukon; GOLD; GOLD MINE.

Brazil.—Mining and Hydraulic Engineering in Brazil. William Maude. An illustrated account of the novel conditions under which old placers have been reopened. 4000 w. Engineering Magazine—Feb., 1905.

British Columbia.—Hydraulic Mining in Omineca District During 1901. Report for the year of this placer district, especially the operations on the Vital and Town Creek section. Ill. 1800 w. B C Min Rec—Feb., 1902.

Hydraulic Mining in Cariboo, B. C. From the annual report submitted by J. B. Hobson, showing details of large operations in progress in Cariboo. Serial. 1st part. 1200 w. Min & Sci Pr—Feb. 20, 1904.

Hydraulic Mining Conditions in the Atlin District of British Columbia. Extract from the report of the Provincial Mineralogist. Describes the present conditions, the progress and the character of the deposits. 1500 w. Min Rept—July 27, 1905.

California.—Note on Hydraulic Mining in Low-Grade Gravel. William H. Radford. A report of actual figures in working property in Northern California. 700 w. Trans Am Inst of Min Engrs—Nov., 1901.

Low-Grade Gravel Property. Illustrated description of a property in California, where the supply of water is brought 30 miles, and the expense of maintenance is rather high. Gives results showing profits. 1300 w. Min & Sci Pr—Dec. 6, 1902.

See also Debris; GOLD; GOLD DREDGING; GOLD MINING.

Centrifugal Pump.—Hydraulic Mining with Centrifugal Pumps. Enos Brown. Illustrates and describes a successful plant installed at Grant's Pass, Oregon, where there are acres of rich placers which have never been extensively worked. 1100 w. Sci Am—Aug. 19, 1905.

Centrifugal Sluicing.—Centrifugal Sluicing. A. J. Bensusan. From the "Jour. of the N. S. W. Chamber of Mines." Describes this process of mining gold from auriferous gravel, giving information concerning work done. 3300 w. Can Min Rev—Oct. 31, 1900.

See also GOLD MINING—Sluicing.

Colorado.—Hydraulic Mining on Banner Placer, Colorado. Kirby Thomas. Describes arrangements made to secure a sufficient supply of water for hydraulic mining, and the methods of working. Ills. 1700 w. Min Wld—Sept. 16, 1905.

Debris.—A Great Engineering Problem. W. A. Lawson. An account of the effort to be made to arrest the flow of mining débris in the Yuba River and to prevent its descent into the Feather River, and so on to the Sacramento, to the detriment of navigation. 2500 w. Eng & Min Jour—Oct. 13, 1904.

The Débris Problem in the Sacramento Valley. Information from the Report of the California Débris Commission, concerning the prevention of injury to navigation in the Sacramento Valley from the enormous quantity of material washed into the river beds by hydraulic mining. 2500 w. Eng Rec—Nov. 24, 1900.

Proposed Retaining Barriers for the Débris from Hydraulic Mining in the Yuba River, Cal. Brief description of the methods adopted by the California Débris Commission. Ill. 1400 w. Eng News—Jan. 15, 1903.

Impounding Mining Débris in Yuba River, California. Franklin Riffle. An account of the troubles arising from hydraulic mining and the dumping of tailings into the river, and the action taken by the Débris Commission for the storage of the detritus. 2300 w. Eng Rec—Feb. 28, 1903.

Débris-Restraining Barriers of the Yuba River. Capt. Wm. W. Harts. An illustrated article explaining the plan proposed by the California Débris Commission for the treatment of this river, which suffered from the accumulation of mining detritus. 3000 w. Sci Am Sup—Nov. 19, 1904.

Débris Barrier No. 1, Yuba River, Cal. Illustration, with brief description of structure now being built for holding and storing mine débris in the river. 1000 w. Eng News—June 15, 1905.

Control of Hydraulic Mining Débris in California by the Federal Government. Capt. Wm. W. Harts. Read before the Mining Conference. Explains the problem, the extent of the damage, discussing the duties of the commission, and the general principles of improvement. Ills. 6000 w. Cal Jour of Tech—Sept., 1905.

Control of Hydraulic Mining Débris in California by the Federal Government. Abstract of a lecture by Capt. Wm. W. Harts, at San Francisco, Cal., giving an account of what has been done and what is proposed in this great work. Ills. 4000 w. Min & Sci Pr—Sept. 2, 1905.

Elevators.—Hydraulic Gravel Elevators. Illustrated description of a complete hydraulic gravel eliminating plant at the Cariboo Goldfields, B. C. 900 w. Aust Min Stand—Nov. 22, 1900.

Working Low-Lying Gravel Deposits by the Hydraulic Elevator System. R. H. Campbell. Illustrations of the latest improved Campbell hydraulic elevator, with remarks. 800 w. Min & Sci Pr—Feb. 13, 1904.

See also ELEVATOR—Tailings; GOLD DREDGING—Tailings Elevator.

Manganese.—See MANGANESE.

New Zealand.—See GOLD MINING.

Oregon.—Hydraulic Mining in Southern Oregon. A. B. Cousin. A brief account of its history and possibilities. Ill. 2300 w. Pacific C Min—May 23, 1903.

Placer Mining in Southern Oregon. Dennis H. Stovall. An illustrated account of the hydraulic mines and their methods. 1000 w. Min & Sci Pr—Aug. 15, 1903.

Hydraulic Mining in Southern Oregon. Dennis H. Stovall. An illustrated account of placer mining, and the extensive placer field of this region. 1300 w. Min & Sci Pr—Oct. 3, 1903.

Ralston Divide, Cal.—See GOLD MINING.

Sluicing.—See Centrifugal Sluicing; GOLD MINING.

Yuba River.—See California; Débris.

Yukon.—Hydraulicking in the Yukon Region. C. R. Settlemeier. Describes the conditions of this region and the methods used. Ills. 2700 w. Min & Sci Pr—Nov. 19, 1904.

HYDRAULIC PLANT.

See HYDRAULIC MACHINERY; HYDRO-ELECTRIC PLANT; WATER POWER.

HYDRAULIC POWER.

See HYDRAULIC MACHINERY; HYDRAULICS; HYDRO-ELECTRIC PLANT; WATER POWER.

HYDRAULIC PRESS.

See HYDRAULIC MACHINERY.

HYDRAULIC PROPULSION.

See JET PROPULSION; SHIP PROPULSION.

HYDRAULIC RAM.

See also HYDRAULIC MACHINERY; WATER HAMMER.

Water Ram Utilised. G. T. Lotts. Describes the writer's method of utilising the water ram to elevate water to a barn on a large stock farm located on very high ground. 400 w. Am Water Wks Assn—June, 1901.

Note on Action of Hydraulic Rams. A. J. Wood. Gives diagrams obtained in a test, typical for the pressure shown, with explanation of the action. 500 w. Stevens Ind—Oct., 1904.

Design.—Hydraulic Rams and Pumps. Henry H. Clay. Their construction and uses, with sketches showing their working parts, and descriptive rules for finding the sizes for raising given quantities of water. 1700 w. Plumb & Dec—Oct. 2, 1905.

Efficiency.—The Determination of the Efficiency of Hydraulic Rams. A. J. Wood, with discussion. A condensed study of the subject, with discussions by William Kent, and by Prof. Theo. Woolsey Johnson. Ill. 6400 w. Stevens Ind—April, 1902.

West Dundee, Ill.—A Large Hydraulic Ram. Daniel W. Mead. Describes the water-works system at West Dundee, Ill., and gives illustrated description of the hydraulic ram used to force the water into the tower. 1000 w. Eng Rec—Aug. 24, 1901.

HYDRAULICS.

See also **HYDRAULIC MACHINERY; HYDRODYNAMICS; HYDRO-ELECTRIC PLANT; RIVER DISCHARGE; RIVER REGULATION; SHIP RESISTANCE; WATER FLOW; WATER POWER.**

Backwater.—The Maximum Absolute Height of Backwater Behind a Weir (Das Absolute Maximum des Hydraulischen Staues). Dr. B. Tolman. Deriving formulas and a diagram for computing the height to which water is backed up at any given distance behind a dam or weir. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—March 3, 1905.

Models.—See **MODEL BASIN; RIVER REGULATION.**

Paris Exposition.—Hydraulic Engineering at the Paris Exposition (Der Wasserbau auf der Pariser Weltausstellung). M. Paul. A review of the exhibits relating to canals, river regulation, and similar work, arranged by nationalities. Serial. Part I. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—April 19, 1901.

Standpipe.—See **STANDPIPE—Experiment.**

HYDRAULIC TOOL.

See **HYDRAULIC MACHINERY; MACHINE TOOL.**

HYDRAULIC WORKS.

See also **HYDRO-ELECTRIC PLANT; PUMP WORKS; WATER POWER.**

Worthington.—See **PUMP WORKS.**

HYDRO-CARBON.

See also **ASPHALT; BENZINE; GAS; GASOLINE; OZOCERITE; PETROLEUM.**

Explosive Mixture.—See **GAS ENGINE—Explosion; GASOLINE.**

HYDRODYNAMICS.

See also **HYDRAULICS; SHIP RESISTANCE; WATER FLOW.**

Experiments on the Dynamics of Fluids. Dr. George Finzi and Dr. Nicholas Soldati. A study of the variation of pressure, produced by a given movement, in every point of the body surface. Ills. Serial. 1st part. 3800 w. Engng—March 17, 1905.

Wave Propagation.—The Theory of the Propagation of a Single Wave Along a Horizontal Elastic Tube (Théorie de l'Onde Solitaire qui se Propage le Long d'un Tube Elastique Horizontal). A. Boulanger. A mathematical examination of the propagation of the impulse produced in a tube filled with liquid and suddenly compressed at one end. 1500 w. Comptes Rendus—Dec. 11, 1905.

HYDRODYNAMOMETER.

See **DYNAMOMETER—Hydraulic.**

HYDRO-ELECTRIC PLANT.

See also **ELECTRIC TRANSMISSION; TURBINE; WATER POWER.**

Water-Power in Electrical Supply. Alton D. Adams. A discussion of several hydro-electric plants in actual operation, with a record of variations in water supply and energy output, showing, on the whole, an economy in the use of water-power. Curves. 2800 w. Cassier's Mag—Dec., 1902.

Rise of Water Power in Electrical Supply. Alton D. Adams. Shows the development of water power for electrical supply to be gaining very rapidly, giving information of the transmission systems. 1000 w. Sci Am—March 28, 1903.

Electricity from Water Power. A. A. Campbell Swinton. Read before the British Assn. A review of what has been accomplished in hydro-electric engineering. 4400 w. Elec Engr, Lond—Aug. 26, 1904.

Types of Large Water-Power Installations. Dr. F. A. C. Perrine. An interesting review of the development of the transmission and distribution of the power of water-falls, the effect on industry, describing typical plants. 3800 w. Cent Sta—Sept., 1904.

Aar River, Switz.—See **Wangen.**

Adelboden, Switzerland.—The Hydro-Electric Station at Adelboden (Usine Hydro-Electrique d'Adelboden, Berne). P. Pflug. Describing a small Swiss station, using a Pelton wheel under 280 metres head, direct-connected to two Brown, Boveri dynamos. Two articles. 3000 w. Bull Tech de la Suisse Rom—June 25, July 10, 1904.

Agriculture.—The Utilisation of Hydro-Electric Power in Agricultural Work (Utilisation de l'Energie Hydro-Electrique dans les Installations Agricoles). A review of the circular of the Minister of Agriculture, calling attention to the advantages of electrical distribution of hydraulic power. 1500 w. Génie Civil—Jan. 30, 1904.

Albbruck, Baden.—The Electrical Plant of the Albbruck Paper Works in the Southern Black Forest (Elektrizitätswerk der Papierfabrik Albbruck im Südlichen Schwarzwald). F. Allemann Gisi. A well illustrated detailed description of a hydro-electric plant in Baden, near the Rhine. 4 parts. 7000 w. Schweiz Bauzeitung—July 4, 11, Aug. 1 and 8, 1903.

Alstaetten, Switzerland.—See **ELECTRIC RAILWAY.**

America.—The Location of Electric Water-Power Stations. Alton D. Adams. Illustrates and describes examples of American practice. 3500 w. Cassier's Mag—April, 1904.

Water Power in Electrical Supply. Alton D. Adams. Reviews the development of electric water power systems in America, giving information of interest. 2500 w. Elec Rev, N Y—May 9, 1903.

American River, Cal.—The American River Electric Company's Plant on the South Fork of the American River. Illustrates and describes a model plant recently completed in Central California. Power is transmitted to Stockton, eighty miles, and to Folsom, thirty miles further. 3300 w. Jour of Elec—Feb., 1904.

Amsterdam, N. Y.—The Water Power Plant of the Empire State Power Company. Illustrated description of a 3,000-H. P. plant on a 40 ft. fall, the water being carried from the dam through a long canal and short penstocks. Power is transmitted to Howes Cave and to Amsterdam, N. Y. 3400 w. Eng Rec—Aug. 10, 1901.

Androscoggin River.—The Largest Electric Water Power Station in New England. Illustrates and describes the system of the Lewiston and Auburn Co., on the Androscoggin River, Maine, and its proposed extensions. 1900 w. Elec Wld & Engr—Sept. 20, 1902.

Largest Electric Water Power in Maine. Illustrated detailed description of the plant at Deer Rips on the Androscoggin River, near Lewiston, Me. 2800 w. Elec Wld & Eng—April 8, 1905.

Apple River, Wisconsin.—Apple River Water Power Transmission. Walter S. Morton. Brief illustrated description of the plant which utilizes the power of a waterfall in Wisconsin. 600 w. Elec Wld & Engr—Dec. 8, 1900.

The Plant of the St. Croix Power Co., of Wisconsin. Henry Floy. Illustrated detailed description of a long-distance transmission plant, having both hydraulic and electrical features of more than ordinary interest. 8000 w. Trans Am Inst of Elec Engs—Nov., 1900.

The Plant of the St. Croix Power Co. of Wisconsin. Discussion of Henry Floy's paper. 5500 w. Trans Am Inst of Elec Engrs—April, 1901.

The Power Development and Transmission of the St. Croix Power Company. John Lyell Harper. Illustrated description of the hydro-electric plant at Apple River, Wis., and the 27-mile, 25,000-volt transmission of power for the lighting of St. Paul, part of the transmission line being underground. 3000 w. Engs' Year Bk, Univ of Minn—1901.

Water Power Plants on the Apple River, Wisconsin. Illustrates and describes the plant of the Apple River Power Co. comprising the water-power electric generating stations and a high-tension transmission line. The two plants are run in multiple with each other. 3000 w. Eng News—Oct. 12, 1905.

Areuse River, Switzerland.—The Power Plants of the Valley of the Areuse (Les Usines de la Vallée de l'Areuse). M. Balling. An account of visits to the various hydro-electric stations on the river Areuse, above Neuchatel, Switzerland. 10,000 w. Ann des Ponts et Chaussées—1 Trimestre, 1901.

Arve River, France.—See **Chamonix.**

Asheville, N. C.—See **French Broad.**

Avignonnet, France.—The Hydro-Electric Station at Avignonnet (Usine Hydro-Electrique d'Avignonnet). A. Dumas. An illustrated description of a station on the Drac, Department of Isère, France, where a fall of 23 metres is used to develop 5500 horse-power. Details of the dam and general construction are given. 3000 w. 1 plate. Génie Civil—Nov. 14, 1903.

Bavaria.—See **Gersthofen.**

Bear River, Utah.—Bear River Power Plant and Utah Transmission Systems. Illustrates and describes a plant which utilizes the surplus water of an irrigation system during the season of high water. Serial. 1st part. 1500 w. Elec Wld & Engr—June 18, 1904.

Besnau, Switzerland.—The Hydro-Electric Plant at Besnau. C. L. Durand. An illustrated description of an important Swiss central supply station. 1500 w. Elec Rev, N Y—Aug. 19, 1905.

Big Bend.—See **TUNNEL.**

Big Hole River, Mont.—See **ELECTRIC TRANSMISSION—Montana.**

Birchem Bend, Mass.—Water-Power Transmission for the Springfield, Mass., Lighting System. Illustrates and describes the station at Birchem Bend. 1200 w. Elec Wld & Engr—Sept. 6, 1902.

Bloomsburg, Pa.—A Composite Plant at Bloomsburg, Pa. L. S. Levy. Brief illustrated description of a plant utilizing the power of Fishing Creek Falls, and installing a 300 horse-power engine for use in times of low water. 1000 w. Elec Wld & Engr—Feb. 27, 1904.

Bogota.—The Hydro-Electric Station at Bogota. A. Steens. Illustrated description of an interesting station. 8300 ft. above the sea level. 1600 w. Eng Rec—Sept. 3, 1904.

See also **ELECTRIC STATION.**

Bourboule, France.—See **MOUNTAIN RAILWAY.**

Bournillon, France.—The Bournillon Hydro-Electric Station (Usine Hydro-Electrique du Bournillon). Ch. Dantin. Describing the plant by which 8750 horse power is developed from the Bourne, a tributary of the Isère, near Grenoble. The regulating apparatus is especially described. 2500 w. Génie Civil—Nov. 26, 1904.

The Hydraulic Plant of Bournillon, France. C. L. Durand. Illustrates and describes a recently erected large plant on the Bourne River, and its equipment. 2800 w. Elec Rev, N Y—Sept. 16, 1905.

Bozen-Meran.—See **ELECTRIC STATION—Austria.**

Brembo River, Italy.—The Hydro-Electric Power Plant of the Brembo River. Dr. Alfred Gradenwitz. Illustrates and describes this recently completed plant in northern Italy. 1200 w. Sci Am Sup—Dec. 30, 1905.

British.—Practical Notes on Water Power for Electrical Purposes. F. R. Yorke. Read before the Glasgow Sec. of the Inst. of Elec. Engs. Discusses some of the principal types of plant used in Gt. Britain, indicating the conditions for which they are suited, and dealing with practical details. 4000 w. Elect'n, Lond—Jan. 11, 1901.

British Assn. Address.—Electricity from Water Power. A. A. Campbell Swinton. Read before the British Assn. An interesting review of hydro-electric engineering, with remarks on various installations. 3500 w. Sci Am Sup—Dec. 3, 1904.

British Columbia.—The Water Powers of British Columbia. E. Jacobs. A fully illustrated description of the hydro-electric stations supplying the mines, concentrating plants and cities of British Columbia. 3500 w. Engineering Magazine—Dec., 1903.

Brixen, Tyrol.—The Electric Station of the City of Brixen, on the Riens (Rienswerke Elektrizitätswerk der Stadt Brixen). Gustav Wits. With details of the hydraulic and electric plant, turbine regulation, and building construction of the electric plant of Brixen, in Tyrol. 4000 w. 1 plate. Zeitsch d Oesterr Ing u Arch Ver—Oct. 6, 1905.

Bruck, Austria.—The Hydro-Mechanical Arrangement of Recent Electric Stations in Austria (Hydromechanische Einrichtungen von Neueren Oesterreichischen Elektrizitätswerken). Gustav Wits. Describing especially the construction of the hydro-electric plant at Bruck, on the Mur, developing about 4000 horse power. 3000 w. 3 plates. Zeitschr d Oesterr Ing u Arch Ver—June 2, 1905.

Hydro-Electric Plant of the City of Bruck, Austria. Frans Koester. Illustrated description of light and power station with capacity of 2700 horse-power. 800 w. Elec Rev, N Y—Sept. 2, 1905.

Brugg, Switzerland.—European Vertical Turbine Hydro-Electric Plants. Frank C. Perkins. Brief illustrated descriptions of the Brugg, Interlaken and Luterbach-Solothurn water-power installations. Serial. 1st part. 1000 w. Mod Mach—Sept., 1905.

Buchanan, Mich.—The 25,000-Volt Transmission Plant of the South Bend Electric Company. Illustrated description of a high-tension power-transmission installation situated at Buchanan, Mich. 4200 w. Elec Wld & Engr—May 30, 1903.

Bull's Bridge, Conn.—High-Pressure Power on the Housatonic. Illustrates and describes the Bull's Bridge power plant on the Housatonic River, which differs from usual eastern practice. 3300 w. Elec Wld & Engr—Feb. 13, 1904.

A New Water Power Development at New Milford, Connecticut. Walter Scott Morton. Begins an interesting illustrated account of the development of the Bull's Bridge plant. Serial. 1st part. 2300 w. Eng Rec—Feb. 13, 1904.

Burlington, Vt.—Water Power on the Winooski. Alton D. Adams. Illustration, with description of the station in which electric power is generated for the city of Burlington, Vt. 1200 w. Elec Wld & Engr—Jan. 24, 1903.

California.—Electric Power Plants in the Mining Districts of Northern California. G. P. Grimsley. Briefly reviews some of the plants in use and proposed. Serial. 1st part. Eng & Min Jour—Aug. 31, 1901.

Hydro-Electric Power Development and Transmission in California. Robert McF. Doble. Brief historical review of the methods of transmitting the power of California mountain streams over long distances. Ills. 9500 w. Jour Assn of Engng Socs—March, 1905.

See also **ELECTRIC TRANSMISSION**; and under names of places and rivers in California.

California Southern.—Power-Development in Southern California. L. R. Freeman. Remarks on the value of water in California, especially in the arid regions, with an account of the great power development and transmission plants, with brief description of the Edison Co. Mill Creek Plant, No. 3. Ill. 1700 w. Rev of Revs—Aug., 1903.

The Power Plants of the Edison Electric Company of Los Angeles. The first of a series of articles giving illustrated descriptions of the hydro-electric and the steam stations of this extensive system for supplying light and power in seven counties of Southern California. Serial. 1st part. 3200 w. Eng Rec—Feb. 25, 1905.

An Efficient High-Pressure Water-Power Transmission Plant. George A. Henry, Jr., and Joseph N. Le Conte. An illustrated article describing a hydro-electric plant near Redlands, Southern California, operating under a hydraulic head of

1960 feet, and used for transmitting power to Los Angeles, etc., with account of tests of needle nozzles. 3000 w. Trans Am Inst Elec Engrs—Sept., 1903.

Canon Ferry.—See **ELECTRIC TRANSMISSION—Montana.**

Catawba River, S. C.—The Catawba River Power Development Near Rock Hill, S. C. C. A. Mees. Illustrated detailed description of this recently completed plant. Serial. 1st part. 2800 w. Eng Rec—July 23, 1904.

The Hydro-Electric Power Development on the Catawba River, Near Rock Hill, S. C. Illustrates and describes one of the most interesting and complete hydro-electric developments in the South, installed to supply power within a radius of 18 miles. 2000 w. Elec Wld & Engr—July 23, 1904.

Cauvery.—See India; **ELECTRIC ENGINEERING—India; ELECTRIC TRANSMISSION.**

Cellina, Italy.—The Cellina Hydro-Electric Plant (L'Impianto Idroeléttrico del Cellina). A full description of the plant at Cellina near Pordenone, in Northern Italy, deriving 2600 horse-power from the Cellina. Two articles. 4000 w. L'Elettricita—Feb. 10, 24, 1905.

The Electric Station at Venice (Das Elektrizitätswerk Venedig). F. Niethammer. A general description of the Cellina hydro-electric station, supplying the city of Venice with current for light and power. 2000 w. 2 plates. Zeitschr f Elektrotechnik—Aug. 6, 1905.

The 36,000-Volt Hydro-Electric Installation of the Cellina (Italy). Enrico Bignami. Illustrates and describes the first installation on the Cellina River, which is to supply electrical energy in the district of Venice. 2200 w. Elec Rev, Lond—April 7, 1905.

Cenischia, Italy.—Great Electric Installations of Italy. The Hydro-Electric Station of Cenischia. Enrico Bignami. Illustrated description of the hydraulic and electric features of a characteristic Alpine station designed to use 1,400 litres per second under a head of 859 metres. Illustrated. 3000 w. The Engineering Magazine—June, 1903.

Chambly, Canada.—See **ELECTRIC TRANSMISSION.**

Chamonix, France.—The Electric Power Stations of the Fayet-Chamonix Railway (Les Usines Electriques du Chemin de Fer du Fayet à Chamonix). E. Javaux. Describing the two hydraulic stations near Chatelard in the French Alps (Haute Savoie). 2500 w. Mem Soc Ing Civ de France—Oct., 1901.

Two Recent Water-Power Plants on the Arve River, France. From "Le Génie Civil." Describes two plants recently developed to furnish power for an electric railway running from Fayet to Chamonix. 1400 w. Eng Rec—Aug. 16, 1902. See also **ELECTRIC RAILWAY.**

Champ, France.—The Generating Station at Champ (L'Usine Génératrice de Champ). A. Lépine. A fully illustrated description of the hydro-electric station situated on the river Drac near Grenoble, France, more than 4000 H. P. are developed and distributed. 6000 w. Bull Soc Int d'Electriciens—Aug., Sept., Oct., 1902.

The Hydraulic Power Station at Champ (Usine Hydro-Electrique de Champ, Isère). A. Dumas. An illustrated account of the electric station at Champ on the River Drac, near Grenoble, for the development of 7,200 horse power and its electrical distribution. 3000 w. 1 plate. Génie Civil—Nov. 22, 1902.

The Hydro-electric Station of Champ. Enrico Bignami. Illustrated description of an industrial power station in the province of Isère, erected and operated by local interests. 2500 w. Elec Rev, N Y—April 9, 1904.

The Hydro-Electric Station at Champ. A. Steens. Illustrated description of a power plant built to furnish electricity for motive power in various industrial establishments in the vicinity of the Fure and Morge valleys. Contains an important reinforced-concrete conduit. 2000 w. Eng Rec—Dec. 9, 1905.

See also Grenoble.

Charmey, Switzerland.—The Charmey Power Station (Usine de Charmey). A Hostache. An illustrated description of the hydro-electric plant at Charmey, supplying the district about Bulle, near Fribourg, Switzerland. 2000 w. Bull Tech de la Suisse Rom—Oct. 25, 1905.

Chateaugay, N. Y.—The Chateaugay Water Power in the North Country. Illustrated description of a plant recently put in operation in northern New York. 500 w. Elec Wld & Engr—Nov. 21, 1903.

Chatel St. Denis, Switzerland.—The Chatel St. Denis Station (Usine de Chatel-St.-Denis). K. A. Breuer. A fully illustrated description of one of the power houses of the Freybourg district in Switzerland. Serial. Part I. 2000 w. 1 plate. Bull Tech de la Suisse Rom—Nov. 25, 1905.

Chaudière Falls, Can.—Chaudière Falls Power Transmission Plant. R. Girouard. An illustrated account of the hydraulic development, transmission line, power house and sub-stations. 1200 w. Elec Wld & Engr—June 15, 1901.

Water-Power Development at Chaudière Falls, Que. An account of the undertaking with illustrated description of the materials used, etc. Serial. 1st part. 2500 w. Can Engr—Oct., 1901.

Canadian Electric Light Company's Water Power Development at Chaudière Falls. Describes this power and its development and transmission. 4200 w. Ill Can Elec News—June, 1902.

The Water Power Development at Chaudière Falls, P. Q. A finely illustrated descriptive account of the plant and construction work. 6000 w. Eng News—May 7, 1903.

Chèvres, Geneva.—The Chèvres Hydraulic Station Near Geneva. B. F. Hirschauer. An illustrated description of one of the largest and best equipped plants in Europe. 3000 w. Elec Rev, N Y—Jan. 23, 1904.

Chicago Drainage Canal.—Hydro-Electric Power Development at and Near Joliet, Ill., Using Chicago Drainage Canal Water. Thomas T. Johnston. A discussion of the value of the waterpower of this canal, the cost of development, etc. A criticism of this public work, with replies from Isham Randolph and G. M. Wisner. 12400 w. Jour W Soc of Engrs—June, 1904.

Christiania.—A Norwegian Hydro-Electric Plant. Brief illustrated description of a new plant at Christiania, Norway. 1800 w. Elec Wld & Engr—Feb. 11, 1905.

See also Glommen.

Colgate, Cal.—The Hydraulic Equipment of the Colgate Power House. An illustrated detailed description of the Risdon wheels and governors, by Thomas J. Barbour, with reference also to other features. 5000 w. Jour of Elec—Jan., 1902.

S. K. C. Apparatus at Colgate. Edw. Heitmann and William Currie. Illustrated description of the principal electrical features of this power house, especially the generators. 6000 w. Jour of Elec—April, 1902.

Columbia Mills, S. C.—The Water Power Plant of the Columbia Mills Company, Columbia, S. C. An illustrated article considering the interesting features of this plant. 1500 w. Eng Rec—Aug. 29, 1903.

See also **ELECTRIC PLANT—Cotton Mill, Columbia.**

Columbus, Georgia.—Plant of the Columbus Power Company, Columbus, Georgia. Illustrated description of a plant built to furnish electric power for public sale and to drive a mill. 4000 w. Eng Rec—Jan. 16, 1904.

Combe-Garot, Switzerland.—See **ELECTRIC TRANSMISSION—Direct Current.**

Concrete Reinforced Headworks.—The Concrete-Steel Headworks of the Ontario Power Company, Niagara Falls. Describes the reinforced concrete work. Ills. 2500 w. Eng Rec—Jan. 14, 1905.

Corbières, France.—20,000-Volt Three-Phase Plant in France. P. Letheule. Illustrated detailed description of a hydro-electric plant, at Corbières, near Quillan, Department of Aude. France. 3200 w. Elec Wld & Engr—Nov. 1, 1902.

Cornell University.—The New Hydro-Electric Power Plant of Cornell University. W. W. Churchill. An illustrated article giving a full account of this work and describing the design and construction. 3500 w. Eng Rec—May 20, 1905.

Cornwall, Can.—See Milleroches; **CANAL.**

Côtes de Sassenage.—The Hydro-Electric Station of Côtes de Sassenage (Usine Hydro-Electrique des Côtes de Sassenage). A. Mauduit. Describing a small station on the Isère above Grenoble, utilizing a head of 135 metres; operating in connection with the larger station at Engins. 1800 w. Génie Civil—March 7, 1903.

Cusset, France.—Hydraulic Station at Cusset, near Lyons, France. F. M. Bryan. An illustrated description of one of the largest hydraulic plants in France, which utilises the power of the Rhone for operating lamps and motors in the city of Lyons. 3000 w. Elec Wld & Engr—Dec. 9, 1905.

Dalles, Ore.—See White River.

Danville, Va.—The Dan River Power & Manufacturing Company's Plant. An illustrated account of the construction of a complete manufacturing property, including a cotton factory of 43,000 spindles, at Danville, Va. 3500 w. Eng Rec—Sept. 3, 1904.

Constructive Work for a Water Power Plant near Danville, Va. An illustrated description of an unusually interesting plant, including a structure entirely of concrete extending across the river a distance of about 1,219 ft. 1500 w. Eng Rec—May 30, 1903.

D'Au, Würtemberg.—See ELECTRIC TRANSMISSION—Allgau.

De Sabla, Cal.—Hydro-Electric Power Station, California Gas & Electric Corporation, de Sabla, Cal. Illustrated detailed description of a power station, having a generator of 5,000-K. W. capacity, run by a single water wheel operating under a static head of water of 1528 ft. 3000 w. Eng News—Aug. 10, 1905.

Design.—Design of Electric Water Power Stations. Alton D. Adams. Describes types of water-power stations in detail, with methods of driving, and features of interest. Ill. 4000 w. Elec Rev, N Y—May 23, 1903.

Des Moines, Ia.—Extension of Dam and Paving of River Bank at Des Moines, Ia. C. B. Burdick. Illustrates and describes the hydraulic plant of the Des Moines Edison Light Co., and the improvements recently made. 1500 w. Eng News—Nov. 17, 1904.

Drammen, Norway.—The Drammen Electricity Works (Elektrizitätswerk der Stadt Drammen). Fr. Thrue. A fully illustrated description of the hydraulic and electric features of the generating station at the Gravfos Falls, near Drammen, Norway. Two articles. 7000 w. Elektrotech Zeitschr—June 8, 15, 1905.

Duluth, Minn.—Duluth Hydro-Electric Development. Dwight E. Woodbridge. Illustrates and describes the project for the improvement of the water power of the St. Louis River, at the head of Lake Superior. 1800 w. Ir Age—Jan. 19, 1905.

Electric Power for Minnesota Ore Roads. An illustrated account of an important power development on the St. Louis River. It furnishes power for mines and ore roads, and for the city of Duluth. 2000 w. Ir Trd Rev—Jan. 12, 1905.

Ebro, Spain.—The Supply of Electric Energy to Burgos (Transporte de Energia Electrica á Burgos). A description of the proposed hydro-electric plant on the Ebro, 50 kilometres from Burgos, Spain, for the generation and transmission of 1,100 h. p. for power and lighting. Serial. Part I. 7000 w. Revista de Obras Publicas—April 27, 1905.

Electrochemical Works.—Power Transmission for Electrochemical Works. Louis Bell. An analysis of the cost of developing water-powers for electrochemical plants. 2000 w. Elec-Chem Ind—Aug., 1904.

See also under names of places.

Elkhart, Ind.—Water-Power Electrical Development in Northern Indiana. Illustrated account of the Twin-Branch power-house, ten miles west of Elkhart, Ind., on the St. Joseph river. The first of a number of projected plants. 1400 w. Eng Rec—Jan. 23, 1904.

Elliott's Falls, Ontario.—Water Power Transmission Plant at Elliott's Falls, Ontario. Charles L. Fitch. Illustrates and describes the plant which is to furnish power for the Raven Lake Portland Cement Company. 2000 w. Elec Wld & Engr—April 2, 1904.

Engelberg.—See Wangen, Switzerland.

Europe.—Recent European Water-Power Plants. An illustrated description of several plants given in a recent paper before the Engineers & Architects Assn. of Zurich, by Mr. Zoelly. 1600 w. Eng Rec—Nov. 15, 1902.

Some Recent Water Turbine Plants. A. Steiger. Read at meeting of the Civ & Mech. Engrs. Soc. An illustrated paper on "Recent Turbine Plants in Great Britain and Abroad." Calls attention to the change in water power installations since the advent of electricity, and describes charactertistic features of existing plants. Serial. 1st part. 3000 w. Mech Engr—March 14, 1903.

See also Brugg, Switzerland.

Floriston, Cal.—The Truckee River Electric Power Plant. Illustrated description of the hydraulic station at Floriston, Cal., where electricity is generated for use in the Comstock mines, 30 miles distant. 1500 w. Eng Rec—Dec. 14, 1901.

Flums, Switzerland.—The Carbide Works at Flums (Das Carbidwerk Flums). A description of the hydro-electric plant at Flums, Switzerland, for the manufacture of calcium carbide. Four articles. 4000 w. Schweizerische Bauzeitung—Sept. 14, 28, Oct. 5, 12, 1901.

French Alps.—Hydro-Electric Plants in the Alps (Les Installations Hydro-Electriques dans la Region des Alpes). M. de la Brosse. A well illustrated comprehensive report to the Department of Puy-de-Dome on a number of plants in the French Alps and about Geneva. 17000 w. Ann d Ponts et Chaussées—3 Trimestre, 1901.

See also Chamonix; Grenoble; WATER POWER.

French Broad River, N. C.—Hydro-Electric Development of the French Broad River, N. C. Charles E. Waddel. An illustrated description of a 2,250-k. w., 6,600-volt plant near Asheville, N. C. 1100 w. Elec Wld & Engr—June 6, 1903.

Fribourg, Switzerland.—A Review of the Hydraulic Plants in the Canton of Fribourg, Switzerland (Aperçu Historique des Installations Hydrauliques dans le Canton de Fribourg). F. de Reyff. An illustrated review of the utilisation of the mountain streams of the canton, with details of generating and distributing plans. Serial. Part I. 4000 w. Bull Tech de la Suisse Romande—Sept. 25, 1905.

Fulton, Wis.—See Janesville.

Fumay, France.—A Low-Head Water-Power Plant at Fumay, France. From "Le Génie Civil." Illustrates and describes the power plant of a factory which consist of water power, supplemented when necessary by a steam plant and all connected on an electric system of distribution. 1000 w. Eng Rec—Aug. 30, 1902.

Garvin's Falls, N. H.—The Garvin's Falls Dam and Canal. Illustrated detailed description of the plant under construction for the Manchester Traction, Light and Power Co., in New Hampshire. 3000 w. Eng Rec—May 28, 1904.

The Largest Electric Water Power Station in New Hampshire. An illustrated article giving facts of interest relating to the development at Garvin's Falls, which furnishes light and power for Manchester. Serial. 1st part. 3800 w. Elec Wld & Engr—May 28, 1904.

The Garvin's Falls Station of the Manchester Traction, Light and Power Company. W. V. Batson. Illustrated description of one of the largest hydro-electric power systems in New England. 2700 w. Eng Rec—Jan. 24, 1903.

The Largest Electric Water-Power System in New England. An illustrated description of the electric transmission system for supplying Manchester, N. H., with power and light, and particularly the hydro-electric plant at Garvin's Falls, on the Merrimac. 3500 w. Elec Wld & Engr—Jan. 17, 1903.

Hydro-Electric Development at Garvin's Falls, Bow, N. H. Edward B. Richardson. A detailed description of the station equipment. The plant will have a total capacity of 3,950 kw. 2800 w. Jour Assn of Engng Socs—Oct., 1905.

The Garvin's Falls Dam, Canal and Hydro-Electric Plant, Bow, N. H. George G. Shedd. An illustrated description of the power development at this point on the Merrimac River, about four miles below Concord, N. H. 3500 w. Jour Assn of Engng Soc's—Oct., 1905.

See also Manchester, N. H.

Gas Engine Combined.—A Swiss Combined Water-Power and Gas Engine Plant. An illustrated description of a water-power station at Goldach with auxiliary gas-engine plant at St. Gall. 2000 w. Am Elect'n—March, 1903.

Georgia.—Water Powers in the South. An illustrated article on the recent development of hydro-electric plants, with especial reference to those of northern Georgia in the neighborhood of Gainesville and Dahlonega. 2500 w. Mines & Min—Oct., 1903.

Gersthofen, Bavaria.—The Gersthofen Hydro-Electric Power Station. Notes on the extensive utilisation of water power in the neighborhood of Augsburg, Bavaria, with illustrated detailed description of the plant named. 1700 w. Engr, Lond—April 14, 1905.

The Electric Generating Station at Gerstofen on Lech (Das Elektrizitätswerk Gersthofen am Lech). Kurt Meyer. An illustrated description of the plant at Gersthofen, near Augsburg, Bavaria, where 6,000 H. P. is taken from the Lech, and delivered to Augsburg and the vicinity for lighting and electro-chemical industries. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—July 16, 1903.

Glommen, Norway.—The Glommen Hydraulic Power Works. Particulars from a detailed account by T. Kinbach, in the "Zeitschrift des Vereines deutscher Ingenieure." Illustrates and describes a plant for the distribution of electrical energy for power and other uses in Christiania and neighboring towns in Norway. 2500 w. Engr, Lond—Aug. 26, 1904.

Hydro-Electric Development in Norway. L. Ramakers. An illustrated description of the electric generating station at Glommen, near Kykkelsrud. 1500 w. Am Electr'n—Aug., 1905.

The Hydraulic Power Works on the River Glommen, Norway. An interesting account of one of the largest hydraulic power works in Europe for the generation of electrical energy. Ills. Serial. 1st part. 1800 w. Sci Am Sup—May 20, 1905.

Goldach, Switzerland.—See Gas Engine Combined.

Gravfos Falls, Norway.—See Drammen.

Great Falls, Me.—Electrical Supply from Water Power at Portland, Me. Alton D. Adams. Illustrated description of a hydro-electric plant at Great Falls, on the Presumpscot River, the outlet of Sebago Lake, Maine, and the transmission line to Portland. 2400 w. Elec Wld & Engr—Jan. 10, 1903.

Greece.—Power Transmission in Greece. Illustrates and describes a recently completed plant for the utilisation of water power and the transmission of energy—the plant of the Lake Copais Co., Ltd. 1200 w. Elec Rev, Lond—May 8, 1903.

The First Hydro-Electric Station of Greece. E. Guarini. An illustrated account of the hydro-electric pumping station for the drainage of Lake Copais. 1800 w. Engineering Magazine—Feb., 1904.

Grenoble, France.—26,000-Volt Installation at Grenoble, France. C. L. de Muralt. Illustrated description of the plant of the Société Hydro-Electrique de Fure et Morge, which supplies electricity for power purposes to a number of factories. 4000 w. Elec Wld & Engr—Jan. 31, 1903.

A Water-Power Plant Near Grenoble, France. Brief description of a plant, chiefly interesting from the fact that it uses a hooped-steel concrete conduit for conducting the water. 2500 w. Eng Rec—March 7, 1903.

See also Bouraillon; Champ; Cotes de Sassange; ELECTRIC RAILWAY—St. Georges de Commiers.

Grenoble-Chapareillan Ry.—See ELECTRIC RAILWAY.

Gromo, Italy.—The Gromo Hydro-Electric Plant. (Nuovo Impianto Idro-Elettrico di Gromo). Illustrating and describing a plant deriving 2000 horse-power from the Serio, at Gromo, in Northern Italy. 3000 w. Il Monitore Tecnico—Jan. 30, 1905.

See also ELECTRIC TRANSMISSION.

Guadalajara, Mex.—Notes on Hydro-Electric Development Recently Completed Near Guadalajara, Mexico. M. A. Viele. Brief description. 700 w. Eng & Min Jour—Dec. 14, 1901.

Guanajuato, Mexico.—A Mexican Hydro-Electric Plant and Power Transmission. Robert McF. Doble. A well-illustrated account of the Guanajuato power station and the 100-mile, 60,000-volt transmission line. 4000 w. Engineering Magazine—August, 1904.

The Guanajuato, Mexico, Power Transmission. Robert McF. Doble. Illustrated detailed description of a fine power transmission plant. 3500 w. Elec Wld & Engr—Aug. 6, 1904.

The Guanajuato Hydro-Electric Transmission. Robert McF. Doble. Read before the Pacific Coast Elec. Trans. Assn. Illustrated detailed description of a notable hydro-electric development and high potential long-distance transmission, recently completed in Mexico. 7500 w. Jour of Elec—Sept., 1904.

Hafslund, Norway.—A Norwegian Water Power Plant. Frans Köster. Brief illustrated description of an interesting water power electrical generating plant recently completed at Hafslund, about 56 miles southeast of Christiania. 1200 w. Elec Wld & Engr—April 4, 1903.

Hagneck.—The Hydro-Electric Station at Hagneck, Switzerland (Usine Hydro-Electrique de Hagneck, Suisse). Henry Martin. A well illustrated, comprehensive account of this large plant and the electric distribution system. 1 plate. 4500 w. Génie Civil—April 12, 1902.

The Hagneck Electric Station (Das Elektrizitätswerk Hagneck). Dr. H. Rupp. A description of the plant in which more than 6000 H. P. is obtained from the Hagneck drainage canal near the Bielersee, Switzerland. 3500 w. Zeitschr d Ver Deutscher Ing—July 6, 1901.

The Power Station at Hagneck, Switzerland. From the "Zeitschrift des Vereines Deutscher Ingenieure." Illustration, vertical section and plan of the power house, with detailed description. 2200 w. Eng Rec—Sept. 28, 1901.

The Hydro-Electric Station at Hagneck. Enrico Bignami. An illustrated description of an interesting Swiss water-power installation, the difficulties overcome, etc. 4800 w. Elec Rev, N Y—Sept. 13, 1902.

Hales Bar, Tenn.—The Hydraulic Plant of the Chattanooga & Tennessee River Power Co. Brief illustrated description of a plant for utilising 56,000 H. P. of the energy of the Tennessee River, at Hales Bar, Tenn. 1200 w. Eng Rec—Nov. 4, 1905.

Hamilton, Can.—See Welland Canal; ELECTRIC TRANSMISSION.

Hammeren, Norway.—A Norwegian Hydro-Electric Plant. T. Norberg Schulz. Gives calculations made with the intention of solving the economical problems raised in connection with the combined operation of an older steam station and newer water power plant. 1000 w. Elec Wld & Engr—April 29, 1905.

Hannawa Falls, N. Y.—See WATER POWER.

Harrisonburg, Va.—Hydro-Electric Lighting and Power Plant at Harrisonburg, Va. F. F. Coleman. Illustrates and describes a plant on the Shenandoah River which is an example of the possibilities in the development of numerous single waterfalls. 200 w. Elec Wld & Engr—Dec. 30, 1905.

Hartford.—Development of a Great Water Power System at Hartford, Conn. Alton D. Adams. A detailed report of the operation of the Hartford Electric Light Company during the last ten years. The plant is a combined steam and water plant. Ill. 3300 w. Elec Wld & Engr—March 8, 1902.

See also ELECTRIC STATION.

Helena, Mont.—See ELECTRIC TRANSMISSION—Montana.

High Head.—Small Water Powers with High Heads for Electric Lighting. Thorburne Reid. Suggestions for the utilisation of such streams, describing a plant in detail. 2500 w. Cassier's Mag—May, 1903.

See also California Southern; Vouvry; WATER POWER; WATER WHEEL.

Hohenfurth, Bohemia.—The Hohenfurth Electric Station of Spiro & Sons (Elektrizitätswerk Hohenfurth der Firma I. Spiro & Söhne in Krumman). Dr. J. Puluj. Fully illustrated description of a plant taking 2,300 H. P. from the Moldau and transmitting it to the Spiro paper mills, 25 kilometres distant. 3500 w. Zeitschr f Elektrotechnik—Jan. 22, 1905.

"Houille Blanche" Congress.—See **WATER POWER.**

Housatonic River.—See **Bull's Bridge.**

Hudson River.—Hudson River Power in Albany, Troy and Schenectady. An illustrated detailed account of the interesting power developments around Albany. Relates to the utilisation of the power at various points. Also editorial. 4300 w. Elec Wld & Engr—May 14, 1904.

See also **Schuylerville; Spier Falls.**

Ice Disposal.—See **ICE.**

India.—Electrical Development Schemes in India. Particulars of a scheme for utilizing the power of Cauvery Falls for working the goldfields of the Kolar district of Mysore. Ill. 2500 w. Elec Rev, Lond—Nov. 2, 1900.

Electric Power in India. The Cauvery Falls Plant. Capt. J. H. Thomson. A well illustrated account of a great hydro-electric plant in the State of Mysore, from which energy is transmitted 92 miles to the Kolar Gold Mines. 4500 w. Cassier's Mag—Jan., 1903.

Electric Power and Transmission in India. An interesting account of the large transmission plant recently completed in Mysore, and used for working the Kolar gold mines, 92 miles distant. Refers to some peculiar problems due to the region. 1800 w. U S Cons Repts, No. 1703—July 22, 1903.

The Cauvery Falls Hydro-Electric Plant (Usine Hydro-Electrique de Cauvery Falls). F. Drouin. An illustrated description of the plant at Sivasamudram, in southern India; 7,500 H. P. are taken from the falls of the Cauvery river. 2500 w. 1 plate. Génie Civil—July 25, 1903.

The Largest Hydroelectric Installation in Southern Asia. A. C. Hobbie. Illustrates and describes the interesting engineering features of the Cauvery power scheme and the industrial applications in India. Serial. 1st part. 1500 w. Elec Rev, N Y—Oct. 14, 1905.

Water-Power Plant for a Cordite Factory in India. Illustrated description of the hydraulic plant recently erected to furnish the power required for electrically driving the new Government cordite factory in the Nilghiri Hills, India. 1500 w. Engr, Lond—March 31, 1905.

See also **ELECTRIC TRANSMISSION.**

Innsbruck, Austria.—The Hydro-Mechanical Arrangement of Recent Austrian Electrical Stations (Hydromechanische Einrichtungen von Neueren Oesterreischischen Elektrisitätswerken). Gustav Witz. Illustrating and describing the pipe line, water-wheels, and general arrangement of the new plant on the Sill, supplying 15,000 H. P. to the city of Innsbruck. 3000 w. 2 plates. Zeitschr d Oesterr Ing u Arch Ver—Feb. 24, 1905.

The Sill Hydraulic Power Plant near Innsbruck. Franz Koester. Illustrated description of an interesting hydro-electric plant in the Tyrol. 1300 w. Eng Rec—July 1, 1905.

The Hydraulic Power Plant on the Sill near Innsbruck (Die Wasserkraftmaschinen der Sillwerke bei Innsbruck). Andreas Stamm. An illustrated description of the hydraulic portion of the hydro-electric station supplying the city of Innsbruck. Pelton wheels are used. 2500 w. Zeitschr d Ver Deutscher Ing—June 17, 1905.

Interlaken, Switzerland.—See **Brugg.**

Iowa River.—Maintenance and Operation of Central Stations by Water-Power. George S. Carson. Read before the Iowa Elec. Assn. Reports concerning an installation on the Iowa river and briefly discusses the subject generally. 2000 w. Engr, U S A—May 15, 1903.

Ireland.—See **WATER POWER.**

Isère, France.—See **Sassenage.**

Italy.—Hydro-Electric Plants in Upper Italy (Les Installations Hydro-Electriques de la Haute Italie). G. Semenza. Illustrated general description of stations and transmission lines in Northern Italy. 8 plates. 10,000 w. Mem Soc Ing Civils de France—Aug., 1905.

See also under names of places and rivers.

Jacques-Cartier, Quebec. — The Quebec-Jacques-Cartier Electric Company. Illustrated description of the hydro-electric plant on the Jacques Cartier River and the 20-mile transmission line to Quebec. 1000 w. Can Elec News—June, 1902.

Janesville, Wis.—The Successful Joint Utilization of Several Small Water Powers. W. B. Jackson. Remarks on recent changes with respect to sources of power, describing the system of the Janesville Electric Company in Wisconsin, which has details of interest. 2200 w. Am Gas Lgt Jour—Feb. 13, 1905.

Japan.—Hydro-Electric Power Installation in Iyo, Japan. Brief illustrated description. 900 w. Elec Wld & Engr—July 9, 1904.

The Japanese Hydro-Electric Power Plant at Kyoto and Lake Biwa Canal Development. Frank C. Perkins. Illustrations and drawings showing the present hydro-electric power development of the Lake Biwa canal, describing this and the proposed new waterway of much larger capacity. 2000 w. Sci Am Sup—March 18, 1905.

Joliet, Ill.—See **Chicago Drainage Canal.**

Jonage Canal, Lyons.—The Hydro-Electric Station of the Jonage Canal (Usine Hydro-Electrique du Canal de Jonage). H. Clement. A description of the station by which 14,666 horse power is derived, from the power of the Rhone and delivered electrically to Lyons. 2500 w. 1 plate. Revue Industrielle—Feb. 7, 1903.

Kalamazoo Valley.—See **ELECTRIC RAILWAY—Michigan.**

Kander River, Switzerland.—The Electric Station on the Kander (Das Elektrizitätswerk an der Kander). Dr. H. Rupp. A fully illustrated description of this important hydraulic electric power station in Switzerland, which supplies the Burgdorf-Thun three-phase electric railway. 5000 w. Elektrotech Zeitschr—Nov. 1, 1900.

Karawanken Tunnel.—See **Rotwein; ELECTRIC EQUIPMENT.**

Kern River, Cal.—The Kern River Company's Hydro-Electric Power Enterprise. Burr Bassell. Brief illustrated description of a large power plant in California, the power to be transmitted 120 miles to Los Angeles. 900 w. Eng News—July 21, 1904.

Kubel, Switzerland.—The Electrical Station at Kubel, near St. Gall (Das Elektrizitätswerk Kubel bei St. Gallen). L. Kürsteiner. A fully illustrated description with details of the dam, canal, and electric generating and distributing plant. Serial. Part I. 1500 w. Schweizerische Bauzeitung—April 2, 1904.

Kykkelsrud, Norway.—The Utilisation of the Water Power of the Glommen at Kykkelsrud (Die Ausnutzung der Wasserkräfte des Glommens bei Kykkelsrud). I. H. Kinbach. A fully illustrated account of the extensive hydro-electric station in Norway, where 44,000 horse-power is being developed. Two articles. 6000 w. 1 plate. Zeitschr d Ver Deutscher Ing—April 23, 30, 1904.

The Hydro-Electric Station at Kykkelsrud, Norway (Usine Hydro-Electrique de Kykkelsrud). With plan of buildings and details of turbines for the development of 12,000 horse-power. There are 44,000 H. P. available. 1800 w. 1 plate. Génie Civil—May 21, 1904.

An Unusual Water-Power Plant at Kykkelsrud, Norway. Illustrates and describes the development of an unusualy interesting hydro-electric plant, comprising dams, an open canal, and a power house, the hydraulic works, &c. 3000 w. Eng Rec—July 2, 1904.

The Electric Power-Transmission Plant at the Waterfalls of Kykkelsrud, Norway. Einar Boye. Illustrated detailed description. 2500 w. Elec Rev, N Y—Oct. 1, 1904.

Large Norwegian Power Installation. Brief description of the Kykkelsrud power installation, comprising a water-power of 45,000 effective horse-power. 1000 w. Engng—March 10, 1905.

A Norwegian Hydro-Electric Power Plant. Dr. Alfred Gradenwitz. Illustrated description of the Kykkelsrud power station, on the Glommen River. 1400 w. Elec Rev, Lond—Sept. 8, 1905.

Lachine, Montreal.—The Lachine Rapids Power

House of the Lachine Rapids Hydraulic and Land Company, Limited, of Montreal. R. S. Kelsch. The original and the present arrangement of generators, exciters, and switchboards, etc., are illustrated and described. 3300 w. Elec Rev, N Y—Nov. 21, 1903.

The Lachine Rapids Power Plant. An illustrated description of the works, construction of the dams, weirs, gates, turbines, and power houses; also the switchboard equipment. 6800 w. Can Engr—June, 1901.

The Lachine Rapids Power House of the Lachine Rapids Hydraulic and Land Company, Limited, Montreal. Illustrated description of this unique plant of low head and large capacity, and its method of operation. 7000 w. Can Soc of Civ Engrs, Adv. Proof—Dec., 1903.

Ladernier, Swiss Jura.—The Hydro-Electric Power Station at Ladernier. S. Herzog. Illustrated description of a power equipment at Lake Joux, Canton Vaud, Swiss Jura, of interest because of the large extent of the hydraulic distributing system, and the many arrangements for safety in operation. 2200 w. Elec Wld & Engr—June 10, 1905.

The Hydraulic Power of Lakes Joux and Orbe (Les Forces Motrices des Lacs de Joux et de l'Orbe). C. H. Perrin. A description of the power stations at La Dernier and Montcherand deriving 6000 to 8000 horse-power each from the mountain streams above the Lake of Geneva. Two articles. 6000 w. 1 plate. Génie Civil—Feb. 25, March 4, 1905.

La Goule, Switz.—Single-Phase Transmission Plant with Power Distribution. Illustrated detailed description of the water-power plant at La Goule, on the river Doubs, between France and Switzerland. 1200 w. Am Elect'n—Feb., 1902.

The La Goule Hydro-electric Plant at Noirmont, Switzerland. Illustrated description of an interesting power plant in the mountains of Switzerland. It furnishes power for a large number of small motors used by watch makers; also furnishes light and power for French territory. 2200 w. Elec Rev, N Y—Dec. 10, 1904.

Hydraulic Station, La Goule, Switzerland. F. M. Bryan. Illustrated description of a power transmission plant having many unusual features. It was designed to supply many small motors over quite an extensive territory. Also editorial. 2800 w. Elec Wld & Engr—May 20, 1905.

Lake Copais, Greece.—See Greece.

Lausanne, Switzerland.—See St. Maurice; ELECTRIC TRANSMISSION—Direct Current.

Les Clées-Yverdon, Switzerland.—Les Clées-Yverdon Hydraulic Plant. C. L. Durant. An illustrated description of a system furnishing power for numerous applications of electric motors and in small industries, as well as for large shops and for lighting. 3500 w. Elec Rev, N Y—Nov. 25, 1905.

Linthal, Switzerland.—The Electric Station at Linthal, Switzerland (Das Elektrizitätswerk Linthal). Description, with illustrations and maps, of a small hydro-electric plant, with a high head of water, and generating three phase current. 2000 w. Schweiz Bauzeitung—Aug. 26, 1905.

Lombardy.—See Italy; and under names of places and rivers.

Los Angeles.—See California Southern.

Ludlow, Mass.—See Red Bridge.

Luterbach-Solothurn.—See Brugg.

Lyons, France.—See Jonage Canal.

Madrid.—See Spain.

Maine.—See Androscoggin River.

Manchester, Conn.—Water-Power Electric Plant at Manchester, Conn., for the Cheney Bros.' Silk Mills. Earl E. Boardway. An illustrated detailed description of this plant. 1500 w. Eng News—March 19, 1903.

Manchester, N. H.—Manchester Traction, Light & Power Co. Illustrates and describes the electrical power generation and distribution from the water powers along the Merrimac and Piscataquog rivers. 8000 w. St Ry Rev—May 20, 1904.

See also Garvin's Falls; ELECTRIC DISTRIBUTION.

Martinsburg, W. Va.—A Recent High-Tension Installation. A. E. Buchenberg. Illustrates and describes a recent electrical high-tension plant installed at Martinsburg, W. Va. 1500 w. Engr, U S A—Feb. 15, 1905.

Massachusetts.—Electrical Supply from Water Power. Alton D. Adams. Points out the extent to which small water powers, and parts of larger ones, have been applied to systems of electrical supply in Massachusetts. 1000 w. Elec Wld & Engr—Oct. 4, 1902.

Massena, N. Y.—The St. Lawrence Power Plant at Massena. Illustrated description of works for an initial development of 37,500 H. P., and final development of 150,000 H. P. 1800 w. Eng Rec—Nov. 3, 1900.

Another Great Hydraulic Power Plant. A full illustrated account of the St. Lawrence Power Company's undertaking, at Massena, N. Y. 3500 w. Ir Age—Nov. 8, 1900.

The St. Lawrence Power Company's Plant at Massena, N. Y. Brief illustrated description of interesting features. 1900 w. Sci Am—Nov. 17, 1900.

The Water-Power Plant at Massena, N. Y.; St. Lawrence Power Co. Illustrated description of the canal, dam and power-house, electrical equipment, etc. Eng News—Feb. 21, 1901.

The Massena Power Development. Illustrated account of the progress of work on this great power plant of the St. Lawrence. 1700 w. Elec Rev, N Y—July 27, 1901.

A Notable Electric Power Station. An illustrated article describing the plant of the St. Lawrence River Power Company at Massena, New York. 1800 w. Stevens Ind—Oct., 1904.

See also COFFERDAM; DREDGE.

Mazarin, France.—The Mazarin Hydro-Electric Station (Installation Hydro--Electrique de l'Usine Mazarin). Ch. Dantin. An illustrated description of the hydraulic plant at Mézieres in the north of France, utilizing the power of the Meuse and delivering it to the Clément automobile works. 2000 w. 1 plate. Génie Civil—Dec. 16, 1905.

Mechanicsville, N. Y.—See Spier Falls, N. Y.

Mesala, France.—See ELECTRIC RAILWAY—Nice.

Mexico.—See ELECTRIC TRANSMISSION; and under names of places.

Middletown, N. Y.—Hydraulic-Electric Development of the Neversink Light and Power Company, Middletown, N. Y. Illustrated description of an interesting development which utilizes the abandoned works and canal of the Delaware & Hudson Canal Co. 1700 w. Elec Wld & Engr—Aug. 8, 1903.

Milleroches, Ont.—Water Power Development at Milleroches, Ont. Illustrated description of a 4,000 H. P. plant on the St. Lawrence, utilizing a head of only 20 to 30 ft. 2500 w. Eng Rec—May 11, 1901.

A Novel Central Station at Cornwall. An illustrated article describing this recently completed hydro-electric station at Milleroches, in Canada, of special interest because of illuminating the locks and their approaches on the Cornwall Canal, thus permitting the passage of ships day and night. 800 w. Cent Sta—April, 1902.

Missouri River Co.—See ELECTRIC TRANSMISSION—Montana.

Modern.—Water Power Development. W. F. Durand. Briefly considers the important features of hydro-electric power plants as applied to modern installations. 5800 w. Engr, U S A—Jan. 1, 1903.

Montana.—See ELECTRIC TRANSMISSION.

Montcherand, Switzerland.—See La Dernier.

Montereale-Cellina.—Hydro-Electric Development in Italy. L. Ramakers. Illustrated detailed description of the 36,000-volt transmission plant at Montereale-Cellina. 2000 w. Am Elect'n—Dec., 1905.

Monterey, Wis.—See Janesville, Wis.

Montgomery, Ala.—The Montgomery, Alabama, Water Power Plant. Illustrates and describes a plant for generating 5000 H. P. and transmitting it electrically, to be used for lighting and power purposes. 2000 w. Eng News—Dec. 5, 1901.

Montmorency Falls, Quebec.—A Modern Canadian Water-Power Plant. An illustrated description of the Montmorency Falls generating station. 1000 w. Am Elect'n—Dec., 1900.

Hydraulic Power Plant, Montmorency Falls, Canada. George W. Bowie. An illustrated detailed description of the power and generating station of the Quebec Railway, Light and Power Co. 2800 w. Engr, Lond—Jan. 11, 1901.

Quebec Railway, Light and Power Co., Montmorency Falls. An illustrated description of a hydro-electric plant near Quebec, Canada. 2100 w. Can Engr—Jan., 1902.

The Quebec Railway, Light and Power Company. Illustrated description of the hydraulic development at Montmorency Falls, generators, stations, etc. 3000 w. Can Elec News—June, 1902.

Marbegno.—See **ELECTRIC RAILWAY—Valtellina.**

Morgan Falls, Georgia.—The Atlanta Water & Electric Power Company's Plant at Morgan Falls. Illustrated description of a plant comprising a large masonry dam, a fireproof power-house equipped with horizontal turbines and large alternating current generators, and a high-voltage transmission line. 4500 w. Eng Rec—April 23, 1904.

Morgan's Falls, Ga., Transmission Plant. Lamar Lyndon. Illustrates and describes a plant costing nearly a million and a half dollars, and having a capacity of 14,000 H. P. 2500 w. Elec Wld & Engr—Dec. 31, 1904.

Mount Rainier, Wash.—Electric Power Plant Below Mount Rainier. Earl Mayo. Brief account of a plant under construction which will utilize a glacier flow on the Pacific coast, and deliver electric energy to the cities of Washington. 1300 w. Sci Am—May 23, 1903.

Electric Power from Mount Rainier. Brief illustrated description of a plant utilizing the glaciers of Mount Rainier as a source of water supply. 1000 w. Rev of Revs—Aug., 1903.

Mount Tacoma, Wash.—See **Mount Rainier.**

Necaxa, Mexico.—The Necaxa Plant of the Mexican Light & Power Co. J. L. Bothwell. Short description of a plant of unusual engineering interest. 1200 w. Eng Rec—May 20, 1905.
See also **ELECTRIC TRANSMISSION—Mexico.**

Neversink River, N. Y.—Middletown.

New England.—Central Power Station with Electric Distribution in Regions of Small Water Powers. F. A. C. Perrine. Abstract of a paper presented before the New England Cotton Mfrs.' Assn. On the wasteful and expensive development of power in New England, due to force of precedent and custom. Advocating transmission of power from a central plant. 1600 w. Eng News—Nov. 5, 1903.

See also under names of States and places.

Newfoundland.—A Hydro-Electric Power Plant in Newfoundland. Earl E. Boardway. Brief illustrated description of the plant which furnishes power for St. John's, nine miles distant. 1000 w. Elec Wld & Engr—March 7, 1903.

See also **ELECTRIC RAILWAY—St. John's.**

New Milford, Conn.—See **Bull's Bridge.**

New Richmond, Wis.—The Electric Power Station of the New Richmond Roller Mills Company. R. D. Thomas. Illustrated description of a small hydro-electric plant in Wisconsin. 1600 w. Elec Rev, N Y—April 30, 1904.

Newry, Eng.—Hydro-Electric Installation at Newry. Illustrated description of a plant built to utilize a fall in this river. The current supplies arc and incandescent light and motors geared to various machines in English manufacturing works. 2000 w. Engng—March 4, 1904.

New Zealand.—The Waipori Falls Electric Power Company's Project. Illustrations with description of the manner of carrying out this project of supplying electric current hydraulically developed in New Zealand. 1800 w. N Z Mines Rec—June 16, 1904.

See also **Rotorua.**

Niagara.—The New Wheelpit of the Niagara Falls Power Company. Illustrated description of a wheelpit 20x463 ft. in plan and 180 ft. deep, and a tunnel 618 ft. long, for the development of 55,000 H. P. 1400 w. Eng Rec—Feb. 16, 1901.

How Niagara Has Been "Harnessed." William C. Andrews. Considers the production of the electricity at the generating station and its transmission to Buffalo. 2700 w. Am Rev of Revs—June, 1901.

The Electric Transmission of Power from Niagara Falls. Lewis B. Stillwell. An illustrated history of the plant and results obtained. 29,000 w. Trans Am Inst of Elec Engrs—Aug.-Sept., 1901.

The Electric Transmission of Power from Niagara Falls. Lewis B. Stillwell. Discussion at Buffalo, Aug. 28, 1901. 5000 w. Trans Am Inst of Elec Engrs—March, 1902.

The New Generating Plants of the Niagara Falls Power Company. H. W. Buck. Illustrated description of the second plant of this company, now nearly completed, and its equipment. 3500 w. Trans Am Inst of Elec Engrs—June 18, 1902.

Recent Developments in Niagara Power. H. W. Buck. Illustrates and describes recent plants on both sides of the river. 2300 w. Cassier's Mag—Dec., 1903.

The Utilisation of Niagara Power. H. W. Buck. An outline of the present status of the Niagara Falls Power Co. system, giving illustrated descriptions of the plants, and reporting the principal applications made of the power generated. 3500 w. Jour Assn of Engng Socs—June, 1904.

Progress on Power Station No. 2 of the Niagara Falls Power Company. Photographs showing the progress of this work, which will soon be ready for operation, with explanatory notes. 800 w. Eng News—Oct. 2, 1902.

Developments at Niagara Falls for the Utilization of Its Power. An illustrated article reviewing the progress being made on both sides of the river. 2800 w. Elec Rev, N Y—Sept. 12, 1903.

The New Niagara. Waldon Fawcett. Brief illustrated account of the several power plants for the development of electrical energy. 1300 w. Am Mfr—Dec. 25, 1902.

The New Hydraulic Plant at Niagara (La Nouvelle Usine Hydro-Electrique des Chutes du Niagara). Description of the new works, with illustrations of the wheels, shaft, regulators and switchboards. 2000 w. 1 plate. Génie Civil—Jan. 3, 1903.

Six Niagara Power Installations Under Way—A Million Horse-Power to be Developed at Niagara Falls. Frank C. Perkins. An illustrated article giving information relating to the power plants in process of construction, or projected, on the American and Canadian sides of the Niagara River, and how the power is to be utilized. 5500 w. Elec Wld & Engr—April 11, 1903.

A New Power-House at Niagara Falls. Orrin E. Dunlap. Description and illustrations of this recently completed plant. 1200 w. Sci Am Sup—June 13, 1903.

Electricity at Niagara Falls. An illustrated description of power house No. 2, and its equipment. 2500 w. Engr, Lond—June 26, 1903.

Hydraulic Features of the Plant of the Niagara Falls Power Company. The present article reviews the general considerations, describing the canal and intakes. Ill. Serial. 1st part. 4000 w. Eng Rec—Nov. 21, 1903.

The Niagara Hydro-Electric Plant (Die Wasserkraft-Elektrizitätswerke am Niagara). K. Meyer. Describes especially the electrical machinery of the second power house of the Niagara Falls Power Co. 2500 w. Zeitschr d Ver Deutscher Ing—Nov. 19, 1904.

Niagara Power at Goat Island. Alton D. Adams. A discussion of present conditions at Niagara Falls, and the danger of drying up the American falls, and in that case the value of Goat Island as a power site. 1600 w. Sci Am—April 15, 1905.

Wheel-Pits and Tunnels for Niagara Power. Alton D. Adams. Illustrated description of pits on both the American and Canadian sides, with information of interest relating to them. 3500 w. Elec Rev, N Y—May 20, 1905.

See also Concrete Reinforced, Headworks; ELECTRIC TRANSMISSION; INTAKE—Ontario Power Co.; WEIR—Concrete Tower.

Niagara, Accident.—Remarkable Emergency Work at Fire of the Niagara Falls Power Plant. An illustrated account of the accident due to the plant being struck by lightning, and the rapidity with which the lines were placed in service afterward. 1000 w. Elec, N Y—Feb. 11, 1903.

Niagara, Canadian.—Canadian Niagara Power Co.'s Development. An illustrated account of the work under construction by this company which will generate 110,000 electrical horse-power. 2000 w. Can Engr—Nov., 1902.

Power Development at Niagara Falls. A. A. Bowman. Describes the Canadian power development at Niagara Falls principally. 3000 w. Can Engr—Nov., 1902.

The New Plant of the Canadian Niagara Falls Company. Orrin E. Dunlap. An illustrated report of the progress of the work of the Canadian Niagara Power Co. 1100 w. Sci Am—Dec. 6, 1902.

The Canadian Niagara Power Development. Orrin E. Dunlap. An illustrated account of construction work for the hydro-electric power plant on the Canadian side of Niagara Falls. 1800 w. Elec Rev, N Y—Jan. 3, 1903.

Canadian Electrical Development at Niagara. A brief account of the extensive work being carried out, with map. 600 w. Engr, Lond—Aug. 7. 1903.

Power Development of the Toronto & Niagara Power Company. Illustrates and describes the general features and construction methods of this engineering work. 3700 w. Eng Rec—Feb. 13, 1904.

The Toronto and Niagara Power Development. K. L. Aitken. Read before the Can. Elec. Assn. A detailed description of this power plant and its construction. 3800 w. Can Engr—July, 1904.

The Works of the Ontario Power Company of Niagara Falls. Illustrated detailed description of a plant on the Canadian side of the river, planned for at least 180,000 H. P. uptimate capacity. 2700 w. Eng Rec—Oct. 8, 1904. Serial. 1st part.

Canadian Niagara Power To-Day. An illustrated description of the fine plant of this company. 2500 w. Elec Wld & Engr—Jan. 7, 1905.

Hydro-Electric Power Plants in the Canadian Niagara District. Cecil B. Smith. A fully illustrated account of the plant recently erected on the Canadian side of the Niagara River with an ultimate capacity of 400,000 horse-power. 5000 w. Engineering Magazine—Feb., 1905.

Construction of Canadian Niagara Power Company's 100,000 H. P. Hydro-Electric Plant at Niagara Falls, Ont. Cecil B. Smith. Illustrated detailed description of the construction and equipment. 9 plates. 8500 w. Can Soc of Civ Engrs —Jan., 1905.

Construction of Canadian Niagara Power Company's 100,000-Horse-Power Hydro-electric Plant at Niagara Falls, Ontario. Cecil B. Smith. Abstract of a paper read before the Canadian Soc. of Civ. Engrs. Describes the construction work, buildings, machinery, &c. 5000 w. Elec Rev, N Y—Dec. 2, 1905.

Opening of the Niagara Canadian Power Company's Plant. An illustrated account of the starting of the initial units of this plant. Serial. 1st part. 1100 w. Sci Am—Feb. 4, 1905.

Headworks of the Plant of the Toronto & Niagara Power Co., Niagara Falls. Illustrations, showing the general features of the headworks with description of the construction. 1000 w. Eng Rec—April 8, 1905.

The Development of the Ontario Power Co. P. N. Nunn. A statement of the considerations which led to a departure from the type of construction hitherto installed at Niagara Falls, briefly describing features which may prove to be advances in the art of power-plant design. Ills. 4800 w. Am Inst of Elec Engrs—June, 1905.

The Ontario Power Company's Plant at Niagara Falls. E. A. Ekern. Illustrated detailed description. 4800 w. Wis Engr—June, 1905.

Electric Power Developments at Niagara Falls. Gives a view showing the location of the new power plants with reference to the Falls, and begins an illustrated description of the plant of the Ontario Development Company. Serial. 1st part. 2500 w. Sci Am—Aug. 12, 1905.

Hydro-Electric Developments of the Ontario Power Company. Begins an illustrated detailed description. The present number outlines the general plan and describes the intake works. Serial. 1st part. 3000 w. Elec Wld & Engr—Aug. 26, 1905.

The Niagara Power Plant of the Electrical Development Company of Ontario. Begins an illustrated detailed description of the design and structures. Serial. 1st part. 3000 w. Eng News —Nov. 9, 1905.

Niagara, Ontario, Headworks.—See Concrete Reinforced.

Niagara Rapids.—See WATER POWER.

Noirmont.—See La Goule.

North Mountain, Cal.—The Hydro-Electric Power Plant of the North Mountain Power Co. An illustrated detailed description of a twenty-five cycle installation which is to serve Humboldt Bay and Eureka, in California. 3000 w. Jour of Elec— Feb., 1905.

Olympia, Wash.—Interesting Power Plant at Olympia, Washington. Illustrated description of a new and thoroughly modern water-power plant. 1500 w. St Ry Jour—March 11, 1905.

Oregon.—Some of the Electrical Developments in Oregon. C. M. Hyckell. Illustrates and describes various projects for the utilization of water power. 2000 w. Elec Rev, N Y—Aug. 12, 1905.

Otonabee, Can.—Transmission Plant of the Otonabee Power Company. An illustrated description of a recent Canadian installation. 1900 w. Can Elec News—Dec., 1902.

Pacific Coast, U. S.—Use of Pacific Coast Water Powers in Electrical Operation of Railroads. Robert McF. Doble. Conclusion of a paper read before the Pacific Coast Ry. Club. An illustrated description of the single phase alternating-current equipment, and a review of what has been accomplished in California and other Pacific Coast States. 6000 w. Jour of Elec—April, 1905.

See also California; and under names of places.

Paderno, Italy.—The Great Electrical Installation of Italy. Enrico Bignami. A fully illustrated account of the great hydro-electric station at Paderno on the Adda Lombardy. 4000 w. Engineering Magazine—Aug., 1901.

Panuco Mines, Mexico.—Hydraulic Installation at the Panuco Mines in Mexico. Horace L. Short. Abstract of a paper read before the Inst. of Min. & Met., London. Description of the water-power system of this gold and silver mining property. 2000 w. Eng & Min Jour—Dec. 6, 1902.

Parnahyba, Brasil.—Electrical Power Development in South America. Illustrated detailed description of the results accomplished by the Sao Paulo Tramway, Light & Power Co., in Brasil. 2500 w. Can Elec News—May, 1905.

See also ELECTRIC RAILWAY—Sao Paulo.

Pied-Selle, France.—Electric Installation at the Pied-Selle Works, at Fumay, Ardennes, France (Installations Electriques des Usines du Pied-Selle à Fumay, Ardennes). C. Dufour. An illustrated description of a hydro-electric plant, transmission line and electric driving in a manufactory of heating apparatus. 1 plate. 2500 w. Génie Civil— July 12, 1902.

Pierrefitte, France.—The Electric Power Station at the Pierrefitte Mines. E. Henry Davies. From a paper read before the Inst. of Min. & Met. Brief description of hydro-electric power plant for these lead and blend mines in the French Pyrenees. 700 w. Col Guard—March 29, 1901.

Pierrefitte-Cauterets.—See also ELECTRIC RAILWAY.

Pike's Peak.—Power Transmission in the Pike's Peak Region. R. M. Jones. Illustrated detailed description of the dam and reservoir, wood and steel pipe line, power station, electrical equipment, etc. 2700 w. Elec Wld & Engr—July 26, 1902.

The Plant of the Pike's Peak Power Co. R. M. Jones. Illustrated description of a plant comprising a rock-fill dam with steel-plate face, a wood stave and steel pipe line, 26,100 ft. long, and a 1,600 k. w. power station, for which all materials had to be lowered by derrick down the face of a cliff. 3200 w. Eng Rec—July 19, 1902.

The Pike's Peak Power Plant. An illustrated description. 3000 w. Eng & Min Jour—Nov. 8, 1902.

The Water and Electric Power System of the Pike's Peak Power Co., Colorado. W. P. Hardesty. Illustrated detailed description of the development of this system, which is the first large enterprise to utilize the streams of Pike's Peak. 5000 w. Eng News—Jan. 1, 1903.

Portland, Ore.—Electric Power Development at Portland, Ore. Illustrated description of the new station of the Portland General Electric Co., at Willamette Falls. 1600 w. Elec Wld & Engr—July 29, 1905.

The System of the Portland General Electric Company. F. G. Sykes. A general review of the development of electricity in Portland, and a fully illustrated description of the plant deriving more than 30,000 H. P. from the falls of the Willamette River and transmitted electrically to Portland. 10,800 w. Jour of Elec—Aug., 1905.

Generating System of the Portland General Electric Co. F. G. Sykes. From a paper read before the Engineering Congress at the Lewis and Clark Exposition. Illustrated detailed description of the works. 3700 w. Eng Rec—Aug. 12, 1905.

Poses, France.—The Electric Plant at the Poses Dam (Installations Electriques du Barrage de Poses). E. Bret. An illustrated description of the plant at Poses on the Seine, near Amfreville, where about 13,000 H. P. is developed at mean water. Especial measures are provided for variable flow. 2500 w. 1 plate. Génie Civil—Aug. 24, 1901.

Pueblo, Colo.—The Pueblo & Suburban Traction & Lighting Company, Pueblo, Col. An illustrated description of this system. 3500 w. Elec Rev, N Y—June 13, 1903.

Puget Sound.—The Puget Sound Power Company. Describes the interesting features of these works in the State of Washington, U. S. A., to furnish power for Seattle and Tacoma. Serial. 1st part. 2500 w. Engr, Lond—Sept. 2, 1904.

The Hydraulic Plant of the Puget Sound Power Company. Edwin H. Warner. Illustrated description of this power plant in Washington, which will supply power to Seattle, Tacoma, and interurban railways. 6000 w. Pro Am Soc of Civ Engrs—May, 1905.

The Hydraulic Plant of the Puget Sound Power Company. Discussion of paper by Edwin H. Warner, printed in May "Proceedings." 2500 w. Pro Am Soc of Civ Engrs—Sept., 1905.

Puyallup River, Washington.—The Puyallup River Water Power Development Near Tacoma, Washington. Illustrated detailed description of a generating plant to supply electric power to the cities of Seattle and Tacoma, Wash. 6000 w. Eng News—Sept. 29, 1904.

The Puyallup River Water Power Development and High Tension Transmission to Seattle and Tacoma, Washington. J. F. Vaughan. An illustrated description of this system recently put in operation. 3500 w. Harvard Engng Jour—June, 1905.

Quebec.—See **Jacques Cartier; Montmorency Falls.**

Railway Work.—Hydraulics in Connection with Electric Railway Work. B. E. Morrow. A general discussion of the advantages of water power for this work, and the points needing attention in such a plant. 3000 w. St Ry Rev—Sept. 20, 1904.

Raubsville, Pa.—The Plant of the Lehigh Power Company at Raubsville, Pa. Illustrated description of a hydraulic power plant having two turbine chambers, the turbines in the first working under a 33-ft. head, and in the second under an 18-ft. head. 1100 w. Eng Rec—Oct. 5, 1901.

Red Bridge, Mass.—The Red Bridge Power Station of the Ludlow Manufacturing Company. Illustrated detailed description of recently built works at Ludlow, Mass., for developing about 5000 horse-power. 2700 w. Eng Rec—Dec. 28, 1901.

The Largest Electrical Transmission of Water Power in Massachusetts. Alton D. Adams. An illustrated description of the plant at Red Bridge on the Chicopee River which is utilized by the Ludlow Manufacturing Co., four and one-half miles distant. 1700 w. Elec Wld & Engr—Aug. 16, 1902.

Redlands, Cal.—The New Mill Creek Power Plant of the Edison Electric Co., near Redlands, Cal. E. Duryee. Illustrated detailed description. 1600 w. Eng News—Feb. 5, 1903.

See also **ELECTRIC TRANSMISSION—Los Angeles.**

Reservoir.—See **Valley Reservoir; RESERVOIR.**

Richmond, Va.—See **ELECTRIC STATION.**

Riva, Tyrol.—Water Power Electrical Generating Plant at Riva, Tyrol. Frans Koster. Illustrates and describes a hydro-electric plant serving less than 8000 people. 1500 w. Elec Wld & Engr—Jan. 2, 1904.

Rock Hill, S. C.—See **Catawba.**

Rotorua, N. Z.—Electric Power Plant, Rotorua. Oswald Haes. Describes a hydro-electric, single-phase plant in New Zealand. Serial. 1st part. 3000 w. Aust Min Stand—Dec. 12, 1901.

An Electric Power Transmission Plant in New Zealand. Oswald Haes. Abstract of a paper read before the Elec Assn. of N. S. W. Description of the system and plant. 2500 w. Elect'n, Lond—Dec. 27, 1901.

Electric-Power Transmission Plant at Rotorua. Oswald Haes. An illustrated description of a recently installed long-distance plant in New Zealand. 6300 w. N Z Mines Rec—March 18, 1902.

Rotwein.—The Rotwein Electric Plant (Das Elektrizitätswerk in der Rotweinklamm). A description of the manner in which a mountain torrent was used to develop 850 H. P. for use in cutting the Karawanken tunnel near Assling, in Carinthia. 1500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 3, 1903.

See also **ELECTRIC EQUIPMENT—Karawanken Tunnel.**

Roumania.—See **Switzerland.**

Rudder Boom.—See **RUDDER BOOM.**

Ruppoldingen, Switzerland.—The Hydraulic Accumulator Station at Ruppoldingen, Switzerland (Die Akkumulierungsanlage in Ruppoldingen, in der Schweiz). S. Herzog. Power is stored hydraulically to aid in overcoming the peak of the load on the dynamos. Two articles. 4000 w. Zeitschr f Elektrotechnik—Dec. 17, 24, 1905.

Russia.—See **ELECTRIC TRANSMISSION.**

Rutland, Vt.—The Hydraulic Works of the Chittenden Power Co., Rutland. An illustrated description of a plant which will furnish electricity for street railway, light and power purposes at Rutland, Vt. 3000 w. Eng Rec—Dec. 9, 1905.

Hydro-Electric Power Under the Highest Head in New England. Illustrated detailed description of the interesting plant of the Chittenden Power Co., near Rutland, Vt. 4000 w. Elec Wld & Engr—Dec. 2, 1905.

Electric Transmission and Distribution in Vermont. An illustrated description of the hydro-electric generating station and sub-stations of the Chittenden Power Company at Rutland. 1500 w. Am Elect'n—Dec., 1905.

St. Croix Power Co.—See **Apple River, Wis.**

St. Gall, Switzerland.—The Kubel Electric Station (Das Elektricitätswerk Kubel). F. Collischon. A fully illustrated account of the plant utilising the hydraulic power of the Urnäsch, near St. Gall, Switzerland. There is 2,000 H. P. taken from the river, and distributed electrically in the neighborhood. Two articles. 7500 w. Elektrotech Zeitschr—Feb. 25, March 3, 1904.

See also **Gas Engine Combined.**

Saint Georges, France.—A Large French Electrical

Power Distribution Scheme. An illustrated description of the plant at Saint Georges, near Narbonne, utilizing a fall of 100 meters. The power is transmitted 40 kilometers. 2500 w. Elect'n, Lond—Nov. 14, 1902.

The Distribution of Electric Energy in the Department of Aube (Distribution de l'Energie Electrique dans le Département de l'Aube). An illustrated description of the hydro-electric station at St. Georges, department of Aube, France, developing 3,200 horse power, and distributing current for a radius of 30 kilometers. Two articles. 2000 w. L'Electricien—Jan. 3, 10, 1903.

See also **ELECTRIC RAILWAY.**

St. Joseph River, Ind.—St. Joseph River Power Development. Illustrated description of a system which will furnish power to northern Indiana and southern Michigan. 1400 w. Elec Wld & Engr—Dec. 31, 1904.

See also **Elkhart.**

St. Joseph River, Mich.—The Charles A. Chapin Electric Power Plant. An illustrated detailed description of a new hydro-electric generating station on the St. Joseph River, near Buchanan, Mich. 2500 w. Steam Engng—June 10, 1903.

St. Lawrence Power Co.—See **Massena, N. Y.**

St. Maurice, Switzerland.—The Power Plant and Transmission for the City of Lausanne, Switzerland (Die Kraftübertragung für die Stadt Lausanne). Dr. Wyssling. Illustrating the plant in which 5,000 horse power is transmitted by continuous current from St. Maurice to Lausanne, a distance of 55 kilometers. Serial. Part I. Elektrotech Zeitschr—Nov. 13, 1902.

The Power Transmission from St. Maurice to Lausanne (Die Kraftübertragung von St. Maurice nach Lausanne). A description of the hydro-electric station of St. Maurice on the Rhone, Switzerland, and the transmission of 5000 H. P. to Lausanne. 56 kilometers distant. 3000 w. Zeitschr d Ver Deutschr Ing—Jan. 17, 1903.

See also **ELECTRIC TRANSMISSION—Direct Current.**

San Simonito, Mex.—A Mexican Water-Power Electric Plant. Illustrated description of a small but interesting plant at San Simonito, supplying current for lighting and power to Toluca, and other towns and villages within twenty miles. 2000 w. Eng News—Aug. 13, 1903.

Sarpsfos, Norway.—The Sarpsfos Hydro-Electric Station in Norway (La Station Hydro-Electrique de Sarpsfos, Norwège). A. B. An article from the "Zeitschrift für Bauwesen," giving an illustrated description of this plant, which will ultimately develop 24,000 H. P., and transmit part of it long distances. 1200 w. Génie Civil—March 23, 1901.

Sassenage, France.—Hydro-Electric Power System Near Sassenage, Isere, France. E. Guarini. Illustrated description. 1000 w. Engr—U S A—Jan. 15, 1904.

Sault Ste. Marie.—Clergue's Great Enterprises. Review of what Francis H. Clergue and his associates have done at Sault Ste. Marie, and what they propose to do. 4000 w. Marine Rev—March 7, 1901.

New Water Power Plant at Sault Ste. Marie, Mich. An illustrated description of the plant on the American side which is expected to be in operation this autumn. 2000 w. Engr, U S A—Aug. 15, 1902.

The Water-Power Plant of the Michigan-Lake Superior Power Co., at Sault Ste. Marie. Views and particulars relating to this recently completed plant. 2200 w. Eng News—Sept. 25, 1902.

The Sault Ste. Marie Water Power. Frank C. Perkins. Illustrations showing the power canal and power house during construction, with interesting information concerning this great work. 1700 w. Elec Wld & Engr—Sept. 27, 1902.

The Sault Ste. Marie Water Power Canal. Illustrations and brief description of one of the greatest hydraulic developments in the United States. 1000 w. Sci Am—Nov. 1, 1902.

Compensating Works at the Sault Canal. Waldon Fawcett. Illustrates and describes these interesting works, designed to equalize conditions by retarding and diverting from the rapids in the St. Mary's river a volume of water equal to the flow through the power canal. 1200 w. Am Mfr—Dec. 11, 1902.

Precedents in Hydraulic Power Development. Editorial on the recent washout under the power house at Sault Ste. Marie, its cause and the repairs needed. Also discusses the construction of hydraulic works. 1800 w. Eng Rec—Feb. 21, 1903.

The Compensating Works of the Lake Superior Power Company. G. F. Stickney. Illustrated description of regulating works including an embankment, a movable dam, a crib dam, and a submerged weir. 6000 w. Pro Am Soc of Civ Engrs—Feb., 1905.

See also **Vouvry, Switzerland; CANAL; ELECTRIC INDUSTRY; ELECTRO-CHEMISTRY; SAULT STE. MARIE; TURBINE—Jolly-McCormick.**

Saut-Mortier, France.—The Hydraulic Electric Works of Saut-Mortier (Usine Hydro-Electrique du Saut-Mortier). J. Claudet. An illustrated description of the plant by which 3,000 H. P. is derived from the river Ain, in the department of the Jura, France. 2000 w. Génie Civil—Feb. 9, 1901.

The Saut -Mortier Power Station on the River Ain. Notes from a description by J. Claudet in "Le Génie Civil." Ill. 1700 w. Eng Rec—Nov. 16, 1901.

The Recently Installed Saut-Mortier Electrical Power Transmission Plant in France. Frank C. Perkins. Illustrated description. 1500 w. Elec Rev, N Y—Aug. 22, 1903.

Electric Distribution to Small Manufactories at Saut Mortier, France. Frans Köster. An illustrated detailed description of this remarkable hydro-electric plant. Serial. 1st part. 2300 w. Elec Wld & Engr—March 12, 1904.

The Saut Mortier Transmission Plant. F. M. Bryan. Illustrated description of a 3,000 horse-power hydro-electric plant in the Jura region of France, which transmits current to a great many small towns and villages. 2500 w. Am Elect'n—Sept., 1905.

Schaffhausen, Switzerland.—The Extension of the Schaffhausen Electric Works (Die Erweiterungsbauten der Elektrizitätswerke in Schaffhausen). Illustrated description of recent additions to the plant, and an account of the electric tramway system of the city. 1800 w. Schweiz Bauzeitung—Dec. 27, 1902.

The Electric Power and Transmission System of Schaffhausen, Switzerland. Begins an illustrated description of this remarkable hydro-electric plant. Serial. 1st part. 2300 w. Elec Wld & Engr—March 12, 1904.

Schuylerville, N. Y.—Construction of the Schuylerville Concrete Dam and Power House. Illustrated detailed description of the construction of a two-story power house and pulp mill with concrete floors and walls and steel beams and columns, five steel and concrete penstocks, a hollow dam, abutments, wing walls and bulkheads. 1500 w. Eng Rec—March 4, 1905.

Shawinigan, Canada.—Construction of the Shawinigan Water and Power Company's Plant. Illustrated detailed description of an important water-power development in Canada. Serial. 1st part. 1500 w. Can Engr—April, 1901.

Shawinigan Falls Power Plant. Illustrates and describes features of an important installation in Canada. 1500 w. Sci Am—Jan. 18, 1902.

The Shawinigan Falls Electrical Development. An illustrated article giving information, particularly relating to the hydraulic portion of the plant. 2500 w. Elec Wld & Engr—Feb. 8, 1902.

Water Power Development at Shawinigan Falls. Wallace C. Johnson. Abstract of a lecture before the Canadian Soc. of Civ. Engrs. Describes the work of development. 4200 w. Can Engr—May, 1902.

Electric Power from Shawinigan Falls, Canada. Wallace C. Johnson. Gives an illustrated description of the hydraulic development. 4000 w. Cassier's Mag—June, 1904.

Electric Power from Shawinigan Falls, Canada. Ralph D. Mershon. An illustrated detailed description of the electric transmission plant. 3500 w. Cassier's Mag—June, 1904.

The Electric Power Development at Shawinigan Falls. A description, with illustrations of the plant for the longest electrical transmission line in operation in Canada, which delivers current over ninety miles. 3000 w. Can Elec News—Dec., 1904.

See also **ELECTRIC TRANSMISSION; TURBINE.**

Sheiks Island.—Sheiks Island Power Plant. F. H. Leonard, Jr. Description of hydro-electric plant and transmission line on the St. Lawrence River, Canada, for furnishing light and power to the Cornwall canal. 1800 w. Elec Rev, N Y—March 1, 1902.

Sill River.—See **Innsbruck.**

Snake River, Idaho.—Trade Dollar Consolidated Mining Company's Electric Plant, Snake River, Idaho. Illustrated description of a water-power development at Swan Falls that has proved very successful. 2000 w. Sci Am—Oct. 5, 1901.

Snoqualmie Falls.—The Snoqualmie Falls Water-Power Plant and Transmission System. An illustrated detailed description of plant for developing the power of these falls in Washington. 9700 w. Eng News—Dec. 13, 1900.

The Snoqualmie Falls Power Plant. Enos Brown. Illustrations and brief description of this remarkable plant in Washington. 1600 w. Sci Am—Aug. 30, 1902.

The Snoqualmie Falls and White River Power Developments. An illustrated account and description of the properties of this company. 4000 w. Elec Wld & Engr—May 7, 1904.

Solingen, Prussia.—The Reservoirs and Electric Service of Solingen (Barrages-Reservoirs et Services Electriques de la Ville de Solingen). A. Bidault des Chaumes. With illustrations of the dams, artificial reservoirs and hydro-electric station near Solingen, in Rhenish Prussia. 3000 w. 1 plate. Génie Civil—Dec. 3, 1904.

South Bend, Ind.—Power Plant of the Oliver Plow Co. at South Bend, Ind. Illustrated detailed description of an interesting hydro-electric plant that has been recently improved. 2500 w. Engr, U S A—June 1, 1905.

An Industrial Water-Power Plant at South Bend, Ind. Illustrated detailed description of the plant and its equipment. The governing arrangements are somewhat unusual. 1200 w. Elec Rev, N Y—Aug. 5, 1905.

See also **Buchanan, Mich.**

Spain.—Hydro-Electric Station near Madrid (Proyectos de Santillana). A comprehensive, illustrated review of a 2,000 H. P. hydro-electric plant which will transmit energy to Madrid and other places in the vicinity; projected by the Marquis de Santillana. 18,000 w. Madrid Cientificos Supplement—April, 1902.

Spier Falls, N. Y.—The Dam and Power Station of the Hudson River Water Power Co. Illustrated description of a large masonry dam and power house at Spier Falls, for developing 20,000 H. P. 1400 w. Eng Rec—March 8, 1902.

Operations of the Hudson River Water-Power Company. Charles E. Parsons. An illustrated description of the plant at Spier Falls and its construction. Power will be transmitted to surrounding cities and villages. 5500 w. Trans Am Inst of Min Engrs—Feb., 1903.

Electric Power from the Hudson. Alton D. Adams. Illustrates and describes this important development at Spier Falls, which will supply electric light, power and traction in Albany, Troy, Schenectady, and many other places. 1600 w. Elec Wld & Engr—June 27, 1903.

The Spier Falls Dam and Power Plant of the Hudson River Water Power Company. George E. Howe. A full description, with illustrations, of this great engineering work and its construction. Power will be furnished to Albany, Troy and other cities and towns. 4800 w. Eng Rec—June 27, 1903.

The Harnessed Hudson. Thomas Commerford Martin. Reviews the rapid development of water power in the United States, especially considering the recent work at Spier Falls. Ill. 1400 w. Rev of Revs—Aug., 1903.

Hudson River Water Power Co. Brief illustrated description of developments at Spier Falls, Mechanicsville and elsewhere on the Upper Hudson. 3500 w. St Ry Rev—Aug. 20, 1903.

Spier Falls Dam and Power Plant. Walter H. Main. Illustrations, with brief description. 700 w. Sci Am—Sept. 12, 1903.

Hydraulics in Connection with Street Railway Operation. C. E. Parsons. Read at the St. Ry. Con. at Syracuse. Especially discusses the plants at Spier Falls and Mechanicsville, and their economy and reliability. 1500 w. St Ry Jour—Oct. 10, 1903.

Transmission of Hudson River Power. An illustrated description of the Spier Falls power development. 3000 w. Elec Wld & Engr—Oct. 24, 1903.

Hudson River Power in the General Electric Works. Describes the power transmission from Spier Falls, 30 miles distant. Ils. 2800 w. Elec Wld & Engr—June 11, 1904.

See also **Hudson River; DAM.**

Springfield, Mass.—Water Powers of the Springfield, Mass., United Electric Light Company. Alton D. Adams. Illustrated description of the plants established by this company for utilizing the power of nearby water falls. 3500 w. Elec Wld & Engr—Sept. 28, 1901.

Spring River, Kan.—Hydro-Electric Plant on the Spring River, Kansas. Illustrated description of an interesting plant supplying electric power to the lead and zinc fields of Missouri. 3500 w. Elec Rev, N Y—Nov. 18, 1905.

The Hydro-Electric Plant of the Spring River Power Co. Illustrated description of a plant for furnishing power to the zinc mines near Joplin, Mo. The plant shows novel features of interest. 4000 w. Engr, U S A—Nov. 1, 1905.

Steam Combined.—See **Bloomsburg; Fumay; ELECTRIC RAILWAY—Sofia, Bulgaria; ELECTRIC STATION.**

Stuyvesant Falls, N. Y.—A Combination Hydraulic and Steam Power Plant, Stuyvesant Falls, N. Y. Illustrated description of a 3,500 H. P. station for operating a third rail electric line 97 miles long, and furnishing current for power and lighting. 2100 w. Eng Rec—Jan. 5, 1901.

Sublin.—See **MOUNTAIN RAILWAY—Bex-Gryon-Villars.**

Sumatra.—See **ELECTRIC TRANSMISSION.**

Swan Falls, Idaho.—A Model Electric Mining Plant. H. A. Pharo. Illustrates and describes a hydro-electric plant at Swan Falls, on the Snake River, for driving mining and milling machinery near Silver City, Idaho. The first high-tension transmission built in America by a mining company for its own use. 3000 w. Cassier's Mag—Feb., 1905.

See also **ELECTRIC TRANSMISSION.**

Switzerland.—Some Statistics of Swiss Electric Stations (Einige Zahlen betreffend die Schweizerischen Elektricitätswerke). Prof. W. Wyssling. A statistical review of Swiss electric stations of all kinds, principally driven by water power. Serial. 1st part. 1000 w. Schweiz Bauzeitung—May 10, 1902.

The Electric Plants of Switzerland (Die Elektrizitätswerke der Schweiz). Richard Lorenz. With map showing the extent to which the hydraulic resources of Switzerland are utilized; more than 160,000 H. P. are developed. 1500 w. 1 map. Zeitschr f Elektrochemie—Oct. 30, 1902.

High-Tension Hydro-Electric Plants in Roumania and Switzerland. Frank C. Perkins. Illustrates and describes interesting features of some of these plants. 1600 w. Elec Rev, N Y—Feb. 27, 1904.

See also under subhead names of places and rivers; **ELECTRIC STATION; ELECTRIC TRANSMISSION; TURBINE.**

Terni, Italy.—See **TURBINE.**

Tessin, Italy.—The Largest Hydro-Electrical Plant in Europe. From the "Illustrirte Zeitung." An illustrated description of the water power of the Tessin, in Lombardy. 1000 w. Sci Am Sup—Aug. 30, 1902.

Thalerschachen, Würtemberg. — See **ELECTRIC TRANSMISSION—Allgau.**

Thun, Switzerland.—Electric Plant of the City of Thun, Switzerland. B. F. Hirschauer. Illustrates and describes this plant which is operated by hydraulic power, obtained from the river Aar. 2500 w. Elec Rev, N Y—Dec. 23, 1905.

Tivoli, Italy.—The great Electric Installations of Italy. E. Bignami. A fully illustrated description of the power plant at Tivoli and the transmission of electrical energy to Rome. 3000 w. Engineering Magazine—Sept., 1903.

Trinity River, Cal.—The Trinity River Plant of the North Mountain Power Company. Brief illustrated description of an interesting power transmission system of the Pacific Coast, and some of the difficulties of its construction. 1200 w. R R Gaz—Vol. XXXIX., No. 26.

Truckee River, Nev.—The Washoe Power and Development Company's Plant on the Truckee River. Wyatt H. Allen. Illustrated detailed description of a plant for supplying the towns of Reno and Sparks, Nevada, with electric power and the final union of four companies, forming the "Union Light & Water Co." 4500 w. Jour of Elec—Nov., 1905.

See also **Floriston, Cal.**

Tullohama, Tenn.—See **ELECTRIC TRANSMISSION.**

Turbigo, Italy.—Hydro-Electric Power Plant at Turbigo. Illustrates and describes this recently completed plant. 1500 w. Engr, Lond—Dec. 23, 1904.

The Hydro-Electric Installation of Turbigo, Lombardy. Enrico Bignami. Illustrated description of a new plant to operate in parallel with the plant at Vizzola. 1500 w. Elec Rev, Lond—May 19, 1905.

Turin, Italy.—Hydro-Electric Stations of the Alta Italia Company. E. Bignami. A fully illustrated account of the hydro-electric stations supplying current to Turin and the surrounding country. 4000 w. Engineering Magazine—April, 1904.

Tyrol.—The Rauris-Lend Electric Power Station (Die Elektrische Kraftübertragung Rauris-Lend). H. Spyri. Describing the electric plant of the Austrian branch of the Neuhausen Aluminum Company, near Gastein, in the Tyrol. Two articles. 2500 w. Schweiz Bauzeitung—Aug. 6, 20, 1904.

The Kaiserwerke Hydro-Electric Station in the Tyrolese Oberland (Die Ueberland Zentrale Kaiserwerke). H. Manasse. A very fully illustrated account of the utilization of the discharge of Hintersteiner Lake in the Tyrol, near Kufstein. Serial. Part I. 3500 w. Elektrotech Zeitschr—Nov. 9, 1905.

See also **Innsbruck; Wiesberg; Zwolfmalgrein;** and other names of places.

U. S. Southern.—See **Georgia.**

Utah.—A Small Water Power Electric Transmission Plant for Local Lighting Service, Utah County, Utah. W. P. Hardesty. Illustrated description of a plant as an example of what can be done in the way of utilizing the natural fall of many mountain streams for the benefit of neighboring settlements. 1800 w. Eng News—April 17, 1902.

Utah Sugar Co.—The Water and Electric Power Plant of the Utah Sugar Company. W. P. Hardesty. Illustrated description of a plant built entirely for irrigation, but made available for power. 3500 w. Eng News—April 13, 1905.

Valley Reservoir.—Valley Reservoirs as Sources of Power for Electric Plants (Talsperren als Kraftanlagen für Elektricitätswerke). Dr. M. Luxenberg. A discussion of the economy of reservoirs, formed by damming valleys, as sources of power for electric plants, with particular reference to some German examples. Diagram and tables. 3000 w. Elektrotech Zeitschr—June 4, 1903.

See also **RESERVOIR.**

Vancouver.—Vancouver Transmission Plant. Wyatt H. Allen. The plant is for the purpose of furnishing light and power for operating the street and interurban railways, and will ultimately have a capacity of 24,000 H. P. The hydraulic arrangements are very unusual, and there are several features of exceptional interest. Also editorial. Ill. 3000 w. Elec Wld & Engr—April 18, 1903.

Electrical Transmission at Vancouver. An illustrated article describing the hydro-electric transmission plant of the Vancouver Power Co., which will be capable ultimately of delivering 30,000 horse-power. 2400 w. B C Min Rec—July, 1903.

Venice.—See **Cellina.**

Victor, Colo.—See **RESERVOIR—Copper Age.**

Victoria Falls.—See **ELECTRIC TRANSMISSION.**

Vizzola-Ticino, Italy.—Great Electric-Power Installations of Italy. Enrico Bignami. Signor Bignami's present paper describes and illustrates the great power plant at Vizzola-Ticino. 3000 w. Engineering Magazine—Nov., 1901.

Hydro-Electric Power Stations in Italy. This article describes and illustrates the power station of Vizzola, on the river Ticino. Brief reference is made to other interesting stations. 1800 w. Elec Rev, Lond—July 24, 1903.

Volta, Cal.—The Northern California Power Company's Systems. An illustrated detailed description of the Volta hydro-electric plant of this company. Serial. 1st part. 3500 w. Elec Wld & Engr—Sept. 10, 1904.

See also **ELECTRIC TRANSMISSION—California, Northern.**

Vouvry, Switzerland.—The Hydro-Electric Station at Vouvry, Switzerland (Usine Hydro-Electrique de Vouvry, Suisse). Describing the electric station above Villeneuve, in which the water of Lake Tanay is utilized under a head of 950 metres. 2000 w. 1 plate. Genie Civil—Oct. 18, 1902.

A Water-Power Plant with a Head of 3,116 ft. at Vouvry, Switzerland. From "Le Génie Civil." Illustrated description of a plant that will supply electricity for lighting and power to a large number of Swiss towns and villages in the valley of the Rhone. 1000 w. Eng News—Nov. 27, 1902.

The Vouvry Water-Power Development of 3,117 Foot Head. From "Le Génie Civil." An illustrated description of a plant which possesses the highest head of all water power developments yet attempted. 2000 w. Eng Rec—Nov. 29, 1902.

The Hydro-Electric Plants of Vouvry and Sault Ste. Marie (Die Elektrizitätswerke Vouvry und Sault Ste. Marie). Kurt Meyer. An illustrated description of a plant operating under a 950-meter head near the Lake of Geneva, Switzerland, and of the Sault Ste. Marie plant in Michigan. 6000 w. Zeitschr d Ver Deutscher Ing—June 27, 1903.

The Vouvry (Switzerland) Electric Power Plant. Illustrated description of a plant on the Rhone, driven by water supplied by the Tanay Lake. Single-phase current. 3000 w. Trac & Trans—Aug., 1904.

The Highest Fall in the World. Enrico Bignami. Illustrated description of the hydro-electric station at Vouvry, in the Valais Canton, Switzerland, utilizing a head of 3,116 feet. 2800 w. Elec Rev, N Y—Oct. 29, 1904.

See also **CABLEWAY.**

Waipori Falls.—See **New Zealand.**

Wangen, Switzerland.—The Water Power Development of the Hydro-Electric Plant at Wangen-on-the-Aar, Switzerland (Ueber die Wasserbauten des Elektrizitätswerkes Wangen a. d. Aar, Schweiz). R. Schmick. An illustrated description of the construction of a movable dam, a canal and other work for water power development on the Aar River. Serial. 2 parts. 3500 w. Deutsche Bauzeitung—June 20 and 27, 1903.

A Brief Account of Two Recent Swiss Water Plants. William E. Mott. Illustrates and describes the plants at Engelberg and at Wangen a Aar. The former is representative of the best Swiss practice in water power plants under high heads; the latter an example of design and construction suitable for installations of this character intended for low heads. 2800 w. Trans Assn of Civ Engrs of Cornell Univ—1905.

Warren, O.—See **WATERWORKS.**

Washoe, Nev.—See **Truckee River.**

Water Flow.—Hydraulic Developments as Related to Electric Installations. William B. Jackson. On the necessity of considering the actual conditions of flow before deciding upon the development, with illustrated description of methods. General discussion. 11,000 w. Jour W Soc of Engrs—June, 1903.

See also **RIVER DISCHARGE; WATER FLOW.**

Waterport, N. Y.—The Efficiency of the Power Station and Transmission Line of the Albion Power

Co. J. C. Smith. Abstract of thesis, giving a report of the test made on the Waterport-Albion (N. Y.) plant. 1000 w. Sib Jour of Engng—Dec., 1900.

Welland Canal.—Electrical Power from the Welland Canal. An illustrated detailed description of the development which provides power for Hamilton, Canada, and other places in the locality. Serial. 1st part. 2500 w. Elec Wld & Engr—Jan. 21, 1905.

Electric Power from Welland Canal. Alton D. Adams. Describes the plant of the Hamilton Cataract Power, Light and Traction Co., Ltd., and discusses the possibilities of power development on this canal between Lakes Erie and Ontario, with a drop of 327 feet. 2000 w. Elec Rev, N Y—Sept. 2, 1905.

See also **ELECTRIC TRANSMISSION—Hamilton, Canada.**

Wels, Austria.—The Hydraulic Plant for the Electric Station at Wels, Austria (Wasserkraftanlage für das Elektricitätswerk Wels). R. Janesch. With illustrations of the dam, canal, and turbine house. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—June 21, 1901.

White River, Ore.—The White River—The Dalles Transmission. An illustrated description of the 20,000 volt transmission plant recently completed and of the Knight water wheels with which it is equipped. 3500 w. Jour of Elec—March, 1903. See also **Snoqualmie Falls.**

Wiesberg, Tyrol.—The Wiesberg Electric Station (Das Elektricitätswerk Wiesberg). W. Stoeger. An illustrated description of a hydro-electric station in the Tyrol, for supplying the district about Landeck with current for electro-chemical and other purposes. 1600 w. Electrotech Zeitschr—May 14, 1903.

Willimantic, Conn.—The Electrical Equipment of the American Thread Company. Geo. A. Burnham. Description, with illustrations, of hydro-electric plant and distribution system at the Willimantic Mills, Conn. 1200 w. Am Elect'n—Sept., 1905.

Winooski River, Vt.—See **Burlington, Vt.**

Zambesi River.—See **ELECTRIC TRANSMISSION—Victoria Falls.**

Zanesville, O.—See **ELECTRIC STATION.**

Zogno, Italy.—An Important Italian Hydro-Electric Installation. Enrico Bignami. Brief illustrated description of a new water-power station planned by Italian engineers and equipped entirely with Italian machinery, at Zogno, Italy. 800 w. Elec Rev, N Y—March 11, 1905.

Zürich.—The Etzel Power Station (Vom Etzelwerk). An account of the proposed hydro-electric station on the Upper Sihl near Zürich, with topographical map, and estimates of cost. 1500 w. Schweiz Bauzeitung—Oct. 1, 1904.

Zwolfmalgrein, Austria.—Hydro-Electric Power Plant at Zwolfmalgreien, in Tyrol, Austria. Franz Köster. Illustrated detailed description. 3200 w. Elec Rev, N Y—April 2, 1904.

A Central Station in the Tyrol. A. Steens. Illustrates and describes a water-power electrical generating plant of unusual interest at Zwolfmalgreien. 2200 w. Cent Sta—Dec., 1904.

Modern Austrian Hydro-Electric Generating Plant. A. Steens. Illustrates and describes some interesting features of the central station in Zwolfmalgreien. A combination of an electric plant with water-works for the distribution of water for private use. 4000 w. Am Elect'n—July, 1905.
See also **Tyrol.**

HYDROGEN.

Electrolytic Production.—See **ELECTRO-CHEMISTRY—Garuti Process.**

HYDROGEN SULPHIDE.

Gas.—See **GAS ANALYSIS—Sulphuretted Hydrogen; GAS PURIFICATION—Sulphuretted Hydrogen.**

Mine Gas.—See **MINE GAS.**

Purification.—Arseniuretted Hydrogen in Hydrogen Sulphide. Dr. J. Ohly. Shows that the purification of hydrogen sulphide is attended with serious difficulties. 1400 w. Min Rept—July 7, 1904.

HYDROGRAPHIC SURVEYING.

See also **SOUNDING; SURVEYING; RIVER DISCHARGE; WATER FLOW.**

Canada.—See **SURVEYING.**

Rivers.—See **NAVIGATION; RIVER; RIVER REGULATION.**

Steamer.—See **STEAMSHIP—"Fathomer;" "Hydrographer."**

HYDROGRAPHY.

See also **HARBOR; HYDRAULICS; RIVER REGULATION; STEAMSHIP—"Fathomer;" Hydrographer;" WATER FLOW.**

Argentina.—See **RIVER REGULATION—Negro.**

Gulf of St. Lawrence.—See **WATER CURRENT.**

Meter Rating Station.—See **WATER METER.**

HYDROMETER.

Construction.—How to Make a Hydrometer. Edward F. Chandler. Remarks concerning specific gravity, and illustrated description of the construction. 1100 w. Sci Am Sup—Oct. 21, 1905.

HYDROSCOPE.

Pino.—Pino's Hydroscope and the Efforts of His Predecessors. Dr. Carlo Iberti. The present article describes an English and an American instrument of like style to Pino's hydroscope, which will be described in later numbers. Ill. Serial. 1st part. 1200 w. Elec Engr, Lond—May 29, 1903.

HYDROSTATICS.

Spirit Levels.—See **LEVEL—Spirit.**

HYGIENE.

See **SAFETY APPLIANCE; SANITATION; WORKS MANAGEMENT.**

HYGROMETER.

Use of the Hygrometer in Studies of Ventilation. A review of a paper by J. H. Kinealy. 2300 w. Jour Gas Lgt—Nov. 20, 1900.

Investigation of Accuracy of a Direct-Reading Hygrometer. R. C. Carpenter. Read before the Am. Soc. of Heat. & Ven. Engrs. Description and investigation of two hygrometers of German make which are said to be within 5 per cent. of correct. Ills. 2500 w. Met Work—Jan. 21, 1905.

HYSTERESIMETER.

Blondel-Carpentier. — See **SPACE TELEGRAPHY — Paris Automatic.**

HYSTERESIS.

See also **ELECTRIC MEASUREMENT; ELECTRO-PHYSICS; MAGNETIC TESTING; MAGNETISM—Inertia; MAGNETO-STRICTION; TRANSFORMER.**

The Influence of the Distribution of Lines of Force in an Iron Ring upon the Losses by Hysteresis and Eddy Currents (Der Einfluss der Kraftlinienverteilung in einem Eisenringe auf die Verluste durch Hysteresis und Wirbelströme). Rudo Richter. A mathematical study of a general case, developing formulas and curves capable of application to generator and motor design. 4000 w. Elektrotech Zeitschr—Sept. 3, 1903.

Experiments on the Work of the Iron in Polyphase and Alternating Fields (Versuche über die Eisenarbeit im Dreh- und Wechselfeld). J. Herrmann. Experiments to show the relative hysteresis loss in polyphase and linear alternating fields. 8500 w. Elektrotech Zeitschr—Aug. 10, 1905.

Apparent.—See MAGNETOSTRICTION—Torsional.

Ballistic Measurement.—The Ballistic Measurement of Hysteresis. G. F. C. Searle. A connected account of the principles involved in the ballistic method of hysteresis measurement, together with a description of the practical details of the method. Serial. 1st part. 3600 w. Elect'n, Lond—May 9, 1902.

Demagnetizing Effects.—See ELECTRIC CURRENT, ALTERNATING.

Dielectric.—See DIELECTRIC—Losses.

Distribution.—Distribution of Hysteresis in a Plate of Sheet Iron (Verlauf des Hysteresiskoëfficienten innerhalb einer Blechtafel). Dr. G. Stern. Detail of measurements at various places in a piece of sheet iron are given, showing the variations. 2000 w. Elektrotech Zeitschr—May 23, 1901.

High Frequencies.—Magnetic Hysteresis at High Frequencies (Sur l'Hystérésis Magnétique aux Fréquences Elevées). C. E. Guye and B. Herzfeld. An account of experiments with frequencies up to 1,200 per second, tending to show that the hysteresis energy loss per cycle is independent of the frequency. 700 w. Comptes Rendus—April 20, 1903.

The Energy Dissipated in Iron by Hysteresis at High Frequencies (Sur l'Energie Dissipé dans le Fer par Hysteresis aux Fréquences Elevees). C. E. Guye & A. Schidlof. Tabulated results of experiments, showing that the energy consumed is independent of the speed. 800 w. Comptes Rendus—Sept. 26, 1904.

Induction Motor.—See ELECTRIC MOTOR—Induction, Losses.

Iron Alloys.—See MAGNETISM.

Iron Plates.—The Determination of the Hysteresis and Eddy-Current Losses in Iron Plates by Means of Wattmeters (Ueber die Wattmetrische Bestimmung der Verlustziffer für Eisenbleche). B. Soschinski. A mathematical discussion of methods of measuring these energy losses in iron. 1000 w. Elektrotech Zeitschr—April 16, 1903.

Lead Angle.—A Graphical Determination of the Hysteretic Angle of Advance (Graphische Ermittelung des Hysteretischen Voreilwinkels). F. Jacobson. A method by which influence of hysteresis can be simply plotted for any given case. 600 w. Elektrotech Zeitschr—June 27, 1901.

Magnetic Detector.—See SPACE TELEGRAPHY.

Oscillating Field.—Magnetic Hysteresis Produced by an Oscillating Field Superposed upon a Constant Field (De l'Hysteresis Magnétique Produite par un Champ Oscillant Superposé à un Champ Constant). P. Duhem. Deriving mathematical expressions for the relations of the magnetic effect to the rate of oscillation. 1500 w. Comptes Rendus—May 8, 1905.

Rotary.—Rotary Hysteresis (Ueber Rotirende Hysteresis). A. Dina. An experimental comparison between rotary, static and alternating current hysteresis, with curves and tables. 4000 w. Elektrotech Zeitschr—Jan. 16, 1902.

Notes on Rotary Hysteresis (Beitrag zur Kenntniss des Verhaltens der Rotirenden Hysteresis). M. Schenkel. Data and results of experiments made in the electrical laboratory of the Technical High School at Dresden. 1500 w. Elektrotech Zeitschr—May 15, 1902.

Rotary and Linear.—Comparative Investigations upon Linear and Rotary Magnetic Hysteresis (Vergleichende Untersuchungen über Lineare und Drehende Magnetische Hysteresis). Dr. W. Wecken. A review of previous work, with data and results of the author's investigations on steel and on wrought and cast iron. 4500 w. Zeitschr f Elektrotechnik—Nov. 5, 1905.

Wave Form Influence.—The Dependence of Iron Losses Upon Curve Forms (Die Abhängigkeit der Eisenverluste von Kurvenform). Dr. G. Benischke. A discussion of hysteresis and eddy currents as influenced by the wave form of the alternating current. 5000 w. Elektrotech Zeitschr—Jan. 17, 1901.

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ICE.

Anchor.—Experience with Anchor Ice at the Detroit Water-Works and Elsewhere. C. W. Hubbell. From the Michigan "Technic" for 1903, Univ. of Mich. Describes anchor ice difficulties and attempted remedies. 4300 w. Eng News—Aug. 13, 1903.

Formation of Anchor Ice, and Precise Temperature Measurements. Dr. Howard T. Barnes. Investigations into the formation of slush or frazil ice in streams, and its relation to the temperature of the water. The apparatus for measuring the temperatures of the streams is very fully discussed. 7500 w. Trans Am Soc Mech Engrs—No. 070, June, 1905.

Artificial.—See REFRIGERATION.

Hydro-Electric Plants.—The Importance of Ice Disposal on Large Hydraulic Power Developments. Edwin E. Haslam. An illustrated article explaining the difficulties caused by ice, and the methods of protection and disposal. 5000 w. Trans Assn of Civ Engrs of Cornell Univ—1905.

Niagara Canal Races.—Freeing the Niagara Canal Races from Ice. Arthur B. Weeks. Illustrates and describes the methods and appliances used. 450 w. Am Elect'n—Jan., 1902.

St. Louis Intake.—See INTAKE—Ice, St. Louis.

ICE-BREAKER.

See also FERRYBOAT; SNOW.

Ice-Breakers and Their Services. Arthur Gulston. Deals with vessels that work among ice that is formed from year to year, illustrating and describing types. Discussion. 9000 w. Jour Soc of Arts—Jan. 29, 1904.

Arctic Navigation.—A Vessel for North Polar Navigation and Discovery. Charles Baillairge. Gives cross-section and brief description of a proposed construction. 1200 w. Can Engr—Feb., 1903.

Danzig.—Light-Draft River Ice Breaker. Gives an illustrated description of an ice breaker for small river service, built at Danzig, Germany. 1500 w. Marine Engng—June, 1903.

Delaware.—See Philadelphia.

"Detroit."—See FERRYBOAT—Detroit—Windsor.

"Ermack."—The Russian Ice-Breaker "Ermack." Illustrated description of the ice-breaking steamer designed by Admiral Makaroff. 1300 w. Sci Am—May 7, 1904.

Germany.—Ice Breaking in Germany. (Eisbrechweeen in Deutschland). Hr. Boost. A historical sketch of methods of breaking up ice in rivers with explosives, and a review of modern ice-breaking boats for rivers and harbors. 700 w. Zeitschr d Ver Deutscher Ing—Dec. 21, 1901.

Great Lakes.—Great Lakes Ice-Crushing Car Ferries. An illustrated article giving information concerning the interesting vessels in the service of the great railways, and the conditions they have to conquer. 1800 w. Marine Rev—Jan. 21, 1904.

Car Ferry (Les Car-Ferries). An account of ice-breaking ferryboats on the American Great Lakes. 1200 w. Revue Technique—Dec. 25, 1901.

See also FERRYBOAT.

Philadelphia.—Ice Breaker for the Delaware. Illustrated description of vessel to be built for the city of Philadelphia for use on the Delaware. 1800 w. Marine Rev—May 4, 1905.

St. Lawrence River.—Ice Breakers on Lower St. Lawrence. G. M. Fairchild, Jr. States the conditions on this river and gives information in regard to an ice-breaking service aiming to lengthen the season of navigation. Illustrated description of the ice-breaker "Montcalm." 2800 w. Marine Rev—Feb. 23, 1905.

ICE HOUSE.

Cheap Ice Houses. Suggestions for a farmer's ice house, scheme for a 50-ton ice house, various floors, a 5,000-ton house, etc. Ill. 2500 w. Ice & Refrig—Dec., 1900.

ICE MACHINE.

See **REFRIGERATION.**

ICE MAKING.

See **REFRIGERATION.**

ICE MELTING.

See **THAWING.**

ICE SHEETS.

Crystosphenes. J. B. Tyrrell, in the "Journal of Geology." An explanation of how the buried sheets of ice found in the tundra of Northern America are formed. 2000 w. Aust Min Stand—Aug. 11, 1904.

ICE YACHT.

How to Build a Champion Ice Yacht. H. Percy Ashley. Illustrated detailed description of the construction of the "Aurora." 2800 w. Rudder—Oct., 1901.

Improved Ice Yacht Construction. H. Percy Ashley. Describes what is considered the most satisfactory construction. Hollow back bones and 250-sq. ft. sail area. Ills. 1000 w. Sci Am Sup—Oct. 27, 1905.

How to Build an Ice Yacht. H. Percy Ashley. Illustrates and describes how to build for the 300-sq. ft. class, which has been found most practicable. The two types of solid backbone construction most in use are shown. 2000 w. Rudder—Nov., 1905.

ICING PLANT.

Hannibal, Mo.—New Icing Plant of the "Burlington Route" at Hannibal, Mo. Illustrated description. 450 w. R R Gaz—Nov. 23, 1900.

IGNITION.

See also **GAS ENGINE; GASOLINE ENGINE; INTERRUPTER; OIL ENGINE.**

Ignition. Ernest J. Hutton. Extracts from a paper that is to form a part of a book on motor driving, soon to be issued. 4500 w. Autocar—Jan. 11, 1902.

Gas and Gasoline Engine Ignition. Albert Strittmatter. Considers the different methods of igntion in common use in the present article. 2000 w. Am Mfr—Feb. 6, 1902.

Ignition Devices for Gas and Petrol Motors. S. R. Bottone, in the "English Mechanic." Brief notes on the more important devices in use for this purpose, with remarks on their fitness or unfitness for certain requirements. 1400 w. Sci Am Sup—March 22, 1902.

Cylinder Charge Firing. Hugh Dolnar. Considers the electric spark charge firing the best, and explains the action of the three forms—"wipe," "manner" and "jump" sparks. 3000 w. Autocar—Aug. 30, 1902.

Ignition of Gasoline Motors. R. L. Hubler. Briefly describes obsolete methods of ignition and explains electric spark ignition, the generation and application of the current, &c. Ills. 4500 w. Marine Rev—May 5, 1904.

Ignition as Applied to Internal Combustion Engines. Sir Oliver Lodge. Abstract of a lecture delivered before the members of the Automobile & Cycle Engrs.' Inst. Discusses briefly the critical point of ignition and types of ignition. 1700 w. Autocar—Dec. 10, 1904.

Advance.—Advance of Ignition and Duration of Explosion (L'Avance à l'Allumage et la Durée des Explosions). J. Petin. An examination of the causes and effects of ignition of the charge in a gas engine before the piston reaches the end of the stroke; showing the relation of advance to speed. 1800 w. Génie Civil—Nov. 14, 1903.

Alternating Current.—Alternating Current System of Ignition. Albert L. Clough. Remarks on Mr. Bramwell's proposal for this system of ignition, with brief discussion of other devices. 1000 w. Horseless Age—Oct. 22, 1902.

Batteries.—Ignition Batteries. Albert L. Clough. Describes the dry batteries, discussing their troubles, methods of testing, etc. 1600 w. Horseless Age—July 23, 1902.

Budge, Electric.—A Simplification in Electric Ignition. Illustrated description of the system of high-tension ignition designed by Mr. Budge. 800 w. Autocar—Oct. 10, 1903.

Bullock.—The Bullock Igniter. Description and diagrams showing the method of employing the electric current for the ignition of the compressed charges of carburetted air within the cylinders of explosion motors. 900 w. Autocar—Nov. 12, 1904.

Catalytic.—The Wydts Electro-Catalytic Sparking Plug. Illustrated description of a device for exploding the charges of gas in a gas or gasoline engine, without the use of electricity or heat; also editorial. 2500 w. Sci Am—Jan. 18, 1902.

Gas Engine Ignition by Contact or Catalytic Action. Dr. Paul Gans de Fabrice, in "La Locomotion." Reviews attempts made to utilise the catalytic properties of platinum for ignition in explosive motors, and describes the electro-catalytic sparking plug invented by the writer. 1500 w. Sci Am Sup—Sept. 13, 1902.

Charging Cells.—Charging Ignition Accumulator Cells. Explains methods of charging from a private plant, public supply, and when neither of these sources is available. 3000 w. Auto Jour—Oct. 18, 1902.

Eisemann and Bosch.—See **Magneto.**

Electric.—The Elements of Electric Ignition for Automotors. General information for those in need of the knowledge, dealing especially with the jump spark system. 3500 w. Auto Jour—April, 1901.

Early Electric Ignition. Douglas Leechman. Gives brief extracts from early patents showing electric ignition for internal combustion motors to be nearly fifty years old. 1000 w. Autocar—April 26, 1902.

Electric Ignition Systems. E. W. Roberts. General explanation of electric ignition systems, with brief illustrated descriptions of the several systems. 3000 w. Sci Am Sup—Aug. 19, 1905.

Electric Ignition in Gas Motors. Sir David Salomons. Considers the various modes of electric ignition and the precautions which ought to be taken to prevent accidents. Serial. 1st part. 3300 w. Elec Rev, Lond—March 27, 1903.

Electric Ignition. Donald M. Bliss. Remarks on the methods of ignition for gasoline motors and their merits, and the care needed in their use. 1200 w. Marine Engng—June, 1902.

Electric Ignition for Combustion Motors (Die Elektrische Zündung bei Explosionsmotoren). Josef Löwy. A discussion of the best method of producing and timing the igniting spark for internal-combustion motors. 3000 w. Zeitschr f Elektrotechnik—Nov. 27, 1904.

The Ignition or Induction Coil Explained. Illustrated description of the component parts and the action of the cell. 1600 w. Autocar—May 7, 1904.

Electric Igniters for Gas Engines. George M. Hopkins. An illustrated article showing the principle of the electric igniter. 1200 w. Sci Am Sup—Jan. 7, 1905.

See also **Budge; Goodson; Magneto; Spark; GAS BURNER.**

Electric Generator.—Electric Ignition Generators. Herbert L. Towle. Points involved in their construction and operation for the information of owners and drivers of gasoline cars. 2500 w. Automobile—Feb. 14, 1903.

Exhaust Valve Combined.—See **GASOLINE VEHICLE.**

Gas Burner.—See **GAS BURNER.**

Gears.—Ignition and Ignition Gears for Internal Combustion Engines. Holberry Mensforth. Lecture delivered before the Sheffield Soc. of Engrs.

and Metallurgists. A review of ignition gears up to the present, and a discussion of points showing the effects of a variation in the time and point of ignition. 5000 w. Mech Engr—May 10, 1902.

Goodson.—The Goodson Igniter. Hugh Dolnar. States the advantages of electric ignition, describes the two present methods of producing the spark, and gives illustrated description of the invention named. 2000 w. Autocar—June 27, 1903.

Guillon.—Guillon Igniter for Explosion Motors. Illustrated description of an ignition appliance invented by M. Henri Guillon. 1200 w. Prac Engr—Sept. 5, 1902.

High Tension.—An Improved High Tension Ignition. Illustrates and describes an invention, making use of a discovery by Sir Oliver Lodge, which makes the ignition much less sensitive to external or internal causes of derangement. 600 w. Autocar—March 12, 1904.

See also Electric; Magneto.

Jump Spark Coil.—See Spark Coil.

Jump Spark Plug.—Evolution in Jump Spark Plug Construction. Hugh D. Meier. Considers the requirements, principle and detail construction, material, etc. Ill. 1300 w. Horseless Age—March 12, 1902.

Magneto.—Two European Magneto-Ignition Systems. Illustrated descriptions of the Simms-Bosch igniter and the Bergmann igniter. 1600 w. Horseless Age—May 1, 1901.

The Eisemann System of Magneto Ignition. Illustrated description of a system of ignition in which the spark is produced by means of a high tension current, brought about by a rotary magneto machine working in conjunction with an induction coil without a trembler. 1600 w. Autocar—Feb. 21, 1903.

The Eisemann and Bosch Systems of Electric Ignition. Drawings showing the general arrangement and principles of both these systems, with descriptive notes. 1500 w. Auto Jour—May 9, 1903.

A New Magneto-Electric Igniter (Neuer Magnetelektrischer Zündapparat mit Ueberspringenden Funken). An illustrated description of an igniting apparatus for internal-combustion engines, in which a magneto is wound so as to give a particularly good spark. 1200 w. Elektrizität—May 2, 1903.

High Tension Magneto-Ignition. Illustrated descriptions of the construction of the best known forms of this apparatus, the Eisemann, the Simms-Bosch and the Bassie-Michel. Also discusses the ignition question in general. Serial. 1st part. 1800 w. Auto Jour—Sept. 3, 1904.

Magneto Ignition. An illustrated series of articles explaining low- and high-tension magneto ignition. Serial. 1st part. 3500 w. Autocar—Oct. 14, 1905.

Magneto-Electric Ignition. L. Baudry de Saunier. From "La Locomotive." A practical analysis of the peculiarities of such ignition, explaining how these machines operate, and the advantages. Ill. Serial. 1st part. 2000 w. Auto Topics—Dec. 20, 1902.

Point and Efficiency.—See GAS ENGINE—Ignition Point.

Pre-Ignition.—Pre-Ignitions and Miss-Fires in Oil Motors. Discusses the causes and effects. 3500 w. Prac Engr—April 26, 1901.

Spark Coil.—The Sparking Coil. E. J. Stoddard. Considers the working of ordinary coils, and gives facts obtained from experiments and actual trials. 3000 w. Horseless Age—May 21, 1902.

Constructing a Jump Spark Coil. George T. Hanchett. Discusses the troubles due to defective coils for ignition in explosion motors, and their remedy in the adoption of modern methods of construction. Ill. 4000 w. Automobile—March 14, 1903.

The Spark Coil. From "Horseless Age." Explains briefly the phenomenon of electromagnetic induction and the nature of the contact spark and the jump spark, and gives an illustrated description of the spark coil. 3800 w. Sci Am Sup—March 4, 1905.

Spark Control.—Spark Control. Albert L. Clough. A discussion of spark regulation on automobile engines. 1000 w. Horseless Age—Jan. 22, 1902.

Sparking Troubles.—Sparking Troubles. A discussion of the causes and remedies of sparking, written especially for users of gasoline automobiles or stationary gasoline engines. Ill. 3000 w. Horseless Age—March 20, 1901.

Sparking Troubles. C. H. Guest. From a paper read before the Nottingham (England) Automobile Club. Instruction for users of spark igniters, referring more particularly to jump spark ignition. 4800 w. Horseless Age—April 10, 1901.

Sparks.—Action of Different Kinds of Ignition Sparks. Rêne M. Petard. Brief explanation of the three different classes of sparks. 900 w. Automobile—Feb. 25, 1905.

Test.—See GAS ENGINE.

Timing.—Timing the Ignition in Internal Combustion Engines. Shows the importance of correct timing in regard to economy and power developed. 900 w. Prac Engr—Sept. 22, 1905.

Troubles.—Ignition Faults. Reginald Wales. Discusses the four vital features: the batteries; the transmission wires; the induction coils; and the sparking points. 1500 w. Auto Topics—March 22, 1902.

Diagnosing Gas Engine Ills. An outline of the principles which govern the action of these motors. The present article discusses the subject of ignition. Serial. 1st part. 1600 w. Automobile—May 23, 1903.

Ignition Troubles and Remedies. R. L. Hubler. Considers in detail the parts of a complete igniting outfit and the troubles that may arise, with the remedies. Especially referring to launch motors. 4800 w. Rudder—Feb., 1905.

Features and Failures of Ignition. Reginald Wales. On the troubles with batteries, sustaining rods and induction coils. Ill. 2000 w. Auto Mag—Jan., 1903.

See also Sparking Troubles.

Wiring Methods.—Ignition Wiring Methods. Dr. Henry Power. An illustrated discussion of the electric ignition problem as applied to gasoline engines. Serial. 1st part. 600 w. Horseless Age—Feb. 27, 1901.

Wydts.—See Catalytic.

ILLUMINATION.

See ARC LIGHT; ELECTRIC LIGHTING; GAS LIGHTING; INCANDESCENT GAS LIGHTING; INCANDESCENT LAMP; LIGHTING; NERNST LAMP; PHOTOMETRY.

IMMIGRANT STATION.

Ellis Island, N. Y.—The Ellis Island Immigrant Station. Illustrated description of the buildings of this United States immigrant station in New York harbor. 500 w. Archts & Bldrs Mag—July, 1901.

See also under specific headings.

INCANDESCENT GAS LIGHTING.

See also GAS LIGHTING; LIGHTING.

The Incandescent System of Gas Lighting. On the great value of the Welsbach burner to the gas industry, and to the public, with a discussion of some of its defects. 5600 w. Engr, Lond—April 12, 1901.

Some Notes on Incandescent Gas Lighting. Ernest Feardon. Read before the Manchester and Dist. Jun. Gas Assn. Introductory remarks on this means of producing light, with short descriptions of some of the lamps, and statements as to efficiency, cost, etc. 5000 w. Jour Gas Lgt—May 21, 1901.

New Apparatus for Incandescent Gas Lighting (Les Nouveaux Appareils d'Eclairage au Gaz par Incandescence). H. Guérin. Illustrated descriptions of various high pressure and medium pressure lamps. 2500 w. Génie Civil—June 27, 1903.

Alcohol.—See ALCOHOL—Lighting.

Arc Lamp.—Installation and Maintenance of Gas Arc Lamps. T. H. Hintze. A paper before the N. E. Assn. of Gas Engrs., giving experience with an incandescent burner intended to compete with the electric arc. 1000 w. Am Gas Light Jour—March 7, 1904.

Australia.—Experience in Incandescent Gas Lighting at the Antipodes. An account of incandescent gas affairs in Australasia. 3300 w. Jour Gas Lgt—April 22, 1902.

Australia, West.—Incandescent Lighting in Western Australia. W. G. Quicke. A report of the degree of success in the introduction of the Welsbach incandescent system, the difficulty in securing really good mantles, etc. 1000 w. Jour Gas Lgt—July 21, 1903.

Barracks, French.—Directions for the Lighting of French Barracks. Abstract translation of the portion relating to gas lighting, as given in a document of the Department of the French Military Administration. 2800 w. Jour Gas Lgt—Nov. 3, 1903.

Berlin.—See **STREET LIGHTING.**

Burner.—Some Speculations on Mantle Burners. Dr. W. H. Birchmore. Discusses details to which inventors must give attention to produce a perfect burner, and the value of a knowledge of the laws of gases. 2800 w. Am Gas Lgt Jour—Jan. 4, 1904.

See also **GAS BURNER.**

Burner Maintenance.—The Maintenance of Incandescent Burners in Private Houses anl Public Lamps. George Helps. Discusses two cases of private lighting maintenance, standard of efficiency in public lighting, results and particulars. Ill. 3800 w. Gas Wld—July 19, 1902.

Maintenance of Incandescent Gas Burners by Gas Companies. Norton H. Humphrys. Read before the Gas Inst. (England). Describes the methods adopted in regard to both private and public lighting. 2000 w. Gas Wld—June 14, 1902.

The Care and Maintenance of Incandescent Gas Burners. McDougald Dexter. Presented at the meeting of the Am. Gas Lgt. Assn. Suggestions as to their proper care and maintenance, the importance of inspection, renewals, etc. 2500 w. Am Gas Lgt Jour—Nov. 3, 1902.

Care and Maintenance of Incandescent Gas Burners. McDougald Dexter. Showing that these burners need expert attention, and urging the gas companies to assume their adjustment and maintenance. 2500 w. Gas Engrs' Mag—Dec. 10, 1902.

Maintenance of Incandescent Gas Burners. E. Haase. Read before the Wis. Gas Assn. Gives facts from the writer's experience, with report of cost. 1600 w. Am Gas Lgt Jour—March 7, 1904.

Car.—See **CAR LIGHTING—Incandescent Gas.**

Chandelier.—See **CHANDELIER.**

Church.—The Incandescent Burner in the Church. J. H. Troughton. Gives the writer's experience gained in successfuly lighting some of the churches of Newmarket with incandescent burners. 1100 w. Jour Gas Lgt—Sept. 23, 1902.

De Lery.—Prof. V. B. Lewes and the De Lery Light. W. H. Birchmore. A criticism of statements made by Mr. Lewes in relation to the incandescent illumination system known as that of De Lery. 4400 w. Am Gas Lgt Jour—Dec. 31, 1900.

Efficiency.—The Effect of Quality and Pressure of Gas on the Efficiency of Incandescent Gas Lighting, Having Regard to Economy. Walter Grafton. Read at Inc. Gas. Inst. meeting. Proposal to reduce the illuminating power of gas to 10 candles by admitting air to the gas. 4300 w. Gas Wld—June 15, 1901.

Enriched Gas.—See **GAS—Heating Power.**

Future.—See **LIGHTING.**

Gasoline Burner.—The Welsbach Gasoline Burner. Illustrated description of a lamp of high efficiency. 600 w. Sci Am—Jan. 25, 1902.

Greyson de Schodt.—Intensive Incandescent Lighting. M. Greyson de Schodt. Summary of a lecture to the Dutch Gas Assn. Explains the theory of incandescent lighting and gives an illustrated description of recent improvements made by the writer. 1500 w. Gas Wld—Dec. 21, 1901.

High Pressure.—High-Pressure Gas Lighting. Mr. Casmey, before the Manchester and Dist. Junior Gas Assn. Describes the Keith compressor and burner, comparing it with the incandescent and common gas-jet. Discussion. 4000 w. Jour Gas Lgt—Dec. 3, 1901.

Intensified Gas-Lighting (Eclairage Intensif par le Gaz). J. Laverchère. A description of the high economy and brilliant illumination obtained at the Paris Exposition by the use of the Bandsept and the Denayrouse burners, using gas at high pressure. 300 w. Génie Civil—Nov. 10, 1900.

High-Pressure Gas for Incandescent Lighting. A. W. Onslow. Read at London meeting of the So. Dist. Assn. of Gas Engs and Mgrs. Gives result of experiments, and discusses the strength of mantles and related subjects. General discussion. 3000 w. Gas Wld—Nov. 17, 1900.

High Pressure Gas for Incandescent Lighting. A. W. Onslow. Gives an account of tests, describing apparatus and methods used, and an estimate of cost. Ill. 2000 w. Gas Engs' Mag—Jan. 10, 1901.

Notes on High Pressure Gas Lighting. A. W. Onslow. Referring to means of securing a large amount of light from one burner. Discussion. 4200 w. Gas Wld—Nov. 16, 1901.

Later Developments in High Pressure Lighting. A. W. Onslow. Read before the Inst. of Gas Engrs. Advocating the use of high-pressure gas, and giving report of success in the lighting of workshops and large spaces. 4000 w. Gas Wld—June 13, 1903.

The Cost of High-Pressure Gas Lighting. Statement of J. G. Newbigging, giving details of expense connected with a Welsbach high-pressure installation for twelve months. 600 w. Jour Gas Lgt—April 29, 1902.

High-Pressure Gas Lighting. Joseph Nasmith. Extracts from a paper read before the Manchester Assn. of Engrs. Discusses the recent improvements in the gas industry, especially incandescent lighting, and high pressure, or intensified gas lighting. Also general discussion. 6200 w. Jour Gas Lgt—Feb. 25, 1902.

High-Power Gas Lamps and Their Cost. Reviews what has recently been accomplished by the "high pressure" system of incandescent gas lighting, discussing the cost. 1300 w. Builder—March 22, 1902.

High-Pressure Gas Incandescent Lighting. William Sugg. Read before the Inst. of Gas Engrs. Describes improvements made in this system. Ill. Discussion includes also the papers by Mr. Marshall and Mr. Onslow. 9200 w. Gas Wld—June 13, 1903.

See also **Arc; Lace Factories; Lecomte; London; Scott; Street; GAS LIGHTING.**

History.—History of the Invention of Incandescent Gas Lighting. Auer von Welsbach. An account of this valuable discovery, translated from the "Jour. für Gasbeleucht und Wasservers." 2500 w. Sci Am Sup—Aug. 2, 1902.

See also GAS LIGHTING.

Inverted Lamps.—Inverted Incandescent Gas Lamps. Illustrated description summarised from the "Journal für Gasbeleuchtung." 1100 w. Gas Wld—May 3, 1902.

I. An Incandescent Burner (for Warm Air) Which Can Be Easily Cleaned. M. Jouanne. II. An Inverted Incandescent Burner. M. Sellié. Abstract translations of two papers presented at the Congress of the Société Technique du Gaz en France, with illustrations. 500 w. Jour Gas Lgt—June 28, 1904.

Keith.—See **High Pressure.**

Lace Factories.—High-Pressure Gas Lighting in Lace Factories. Report of W. J. A. Butterfield of investigations made of the hygienic aspect of the question. Ill. 3800 w. Jour Gas Lgt—June 23, 1903.

Langhans.—Improvement in Welsbach Gaslights. An account of improvements discovered and perfected by Rudolph Langhans, an Austrian engineer, which makes the mantle stronger and maintains the constancy of the light emission, and also corrects other defects, thus making it applicable under conditions where hitherto no mantle could be used. 1800 w. U S Cons Repts, No. 1007—April 10, 1901.

Lecomte.—A New Burner with Forced Draught. A. Lecomte. Read at meeting of the Société Technique. Explains method adopted for increasing the light of the mantle, describing the new lamp, and claiming this new type effects an economy of from 35 to 50 per cent. as compared with ordinary incandescent burners. 1800 w. Jour Gas Lgt—June 21, 1904.

Lighthouse.—Use of the Incandescent Mantle in Lighthouses. Illustrates and describes the incandescent arrangements in use in France. 1000 w. Sci Am Sup—Oct. 17, 1903.

See also **ACETYLENE; LIGHTHOUSE.**

Lighting Power.—See **Photometry; PHOTOMETRY.**

London.—High-Pressure Gas Lighting in the City. An account of lighting by Sugg's high-pressure burners in London, with remarks on certain features. 2200 w. Jour Gas Lgt—Feb. 4, 1902.

Lucas Lamp.—The Lucas Lamps. Summary of a paper by Dr. H. Lux, published in the "Zeitschrift für Beleuchtungswesen." Briefly describes this lamp, which aims to get the fullest amount of light from gas, without the aid of extraneous appliances. Describes tests and gives conclusions. 1000 w. Gas Wld—Dec. 27, 1902.

Maintenance.—I. Why Corporations and Companies Should Undertake Internal Fitting Work. A. E. Mottram. II. Incandescent Lighting and Maintenance. S. Meunier. Also discussion. Two papers read before the Manchester Dist. Inst. of Gas Engrs. and discussed together. 1500 w. Jour Gas Lgt—Dec. 1, 1903.

Mantle.—Relation of Heating to Lighting Power of Gas with Special Reference to Incandescent Mantles. Herman Russell and Alfred H. White. Read at meeting of the Michigan Gas Assn. An account of experimental investigations. 3800 w. Am Gas Lgt Jour—April 1, 1901.

Relation of Heating to Lighting Power of Gas, with Special Reference to Incandescent Mantles. Herman Russell and Alfred H. White. Discusses the subject of testing incandescent mantles, and tests made, giving conclusions. 3300 w. Pro Age—March 15, 1901.

The Change Occurring in the Illuminative Value of Mantles with Lapse of Time. Dr. Emil Liebenthal. An account of investigations made to determine the duty afforded by the different varieties. 1300 w. Jour Gas Lgt—April 16, 1901.

Some Notes on Several Types of Mantles for Incandescent Gas Burners. William Lincoln Smith. An account of a series of tests made upon a number of styles of mantles to determine their characteristics. 4000 w. Tech Quar—Dec., 1902.

The Action of the Incandescent Mantle in the Flame. Epitome of a long communication by Dr. C. Killing, to a recent number of the "Journal für Gasbeleuchtung," on the theoretical basis of incandescent gas lighting. 1400 w. Jour of Gas Lgt—Oct. 13, 1903.

Microscopical Examination of Incandescent Mantles. Dr. C. Killing. Translated from the "Jour für Gasbeleuchtung." An illustrated account of investigations. 2300 w. Pro Age—Dec. 15, 1902.

See also **Plaisetty; Self-Lighting; Theory.**

Mantle Deterioration.—Cause of the Rapid Diminution in Light from Welsbach Burners. Abstract of a paper by Herr G. Wobbe, read at meeting of the Austro-Hungarian Gas Assn. Discusses how to obtain the greatest possible lighting effect. 700 w. Jour Gas Lgt—Aug. 12, 1902.

Loss of Illuminating Power of Mantles while Burning. Alfred H. White and M. E. Mueller. Prepared for meeting of the Michigan Gas Assn. A study of the causes of deterioration of mantles while burning. 5000 w. Am Gas Lgt Jour—Aug. 3, 1903.

Mantle Strength.—Testing the Strength of Mantles. Abstract of a paper by M. Syssoyeff before the Soc. Tech. du Gaz en France, describing an appliance for measuring the strength of gas mantles. 1100 w. Jour Gas Lgt—May 19, 1903.

Mantle Tests.—Testing Incandescent Mantles. Abridged rules issued by the German Gas Association. 1000 w. Gas Wld—Dec. 14, 1901.

Mantle Trade.—The Incandescent Mantle Trade. Concerning the agreements and negotiations concerning the Welsbach mantles, as settled in the British Law Courts. 2400 w. Gas Wld—April 26, 1902.

Mill Lighting.—Incandescent Gas Lighting in Mills. Presidential address of Mr. Laurence Bell, before the Waverly Assn. of Gas Mgrs. Discusses the difficulties to overcome and how they may be conquered, and related matters. 2000 w. Gas Wld—Sept. 13, 1902.

Monazite.—See **MONAZITE.**

New Zealand.—Incandescent Gas Lighting in Wellington, New Zealand. R. G. Howell. An explanation of the system adopted to meet keen competition with electric light. Ill. Jour Gas Lgt—Sept. 23, 1902.

Oil Gas.—See **GAS OIL—Incandescent Lighting.**

Petroleum.—Petroleum Incandescent Lighting. Arthur Kitson. Illustrated detailed description of a petroleum incandescent plant, and account of some of the difficulties met in perfecting the system. Describes the methods of ignition. Discussion follows. 8500 w. Jour Soc of Arts—March 27, 1903.

See also **GAS, OIL.**

Photometry.—Lighting Power with Incandescent Mantles. M. Sainte-Claire Deville, before the International Photometry Com. at Zurich. Describes the method used at the Paris gas works for finding the highest maximum illuminating power per unit of volume used per hour, and suggests a method relying upon heating values. 1500 w. Gas Wld—July 11, 1903.

Variations in the Lighting Power in the Incandescent Burner of Combustible Gases. E. Sainte-Claire Deville. Abstract translation of a paper presented to the International Photometric Committee. A discussion of the photometry of the gas and of the mantle and the subject of incandescent lighting in general. Serial. 1st part. 3700 w. Jour Gas Lgt—Aug. 25, 1903.

See also **PHOTOMETRY—Welsbach.**

Plaissetty Mantle.—The New Plaissetty Mantle—A Strong Competitor. Describes the process of manufacture of this mantle and reports tests made. Ill. 3800 w. Jour Gas Lgt—Oct. 28, 1902.

Railway Station.—See **GAS LIGHTING.**

Regulator.—See **GAS BURNER.**

Scott-Snell.—Self-Intensifying of Gas Pressure by Means of Waste Heat. C. Scott Snell. Discusses the conditions and gives an illustrated description of the author's invention—the Scott-Snell lamp. Also discussion of this paper, with the papers by Messrs. Sugg and Grafton. 14,500 w. Gas Wld—June 15, 1901.

See also **GAS INDUSTRY—British.**

Selas.—A New Method of Incandescent Gas Lighting. G. Mollberg. Read at meeting of the German Gas Assn. A description of the Selas apparatus. 1200 w. Gas Wld—April 13, 1901.

A New Method for Illuminating with Incandescent Gas Mantles. Frederic Egner. An illustrated description of the Selas light, with remarks on the recent improvements in gas-lighting appliances. 1700 w. Am Gas Lght Jour—May 13, 1901.

The "Selas" System of Intensified Lighting by Means of an Admixture of Gas and Air. F. D. Marshall. Read before the Inst. of Gas Engrs. An illustrated description of this system, stating its advantages, and giving results obtainable. 4000 w. Gas Wld—June 13, 1903.

Self-Lighting.—Self-Lighting Mantles. Abstract translation of article by M. Pierron, in the "Revue de Physique et de Chemie," on the application to mantles of the principle of automatic ignition. 1800 w. Jour Gas Lgt—Oct. 23, 1900.

Automatic Lighting and Extinguishing Apparatus. M. A. Rothenbach. Read before the Gas Section of the Glasgow Congress. Explains clock work apparatus made in Switzerland and states its advantages. Discussion. 1700 w. Gas Wld—Sept. 7, 1901.

Street.—The Lighting of City Streets. E. C. Jones. Read before the Convention of the League of California Municipalities. Principally descriptive of the Welsbach burners used in San Francisco, with comparative cost of different lights. 2400 w. Jour of Elec—Dec., 1900.

Experiences of Incandescent Street Lighting at Formby. J. H. Buckley. Read before the Manchester Dist. Inst. of Gas Engrs. An explanation of the methods adopted and the causes of the high average of renewals, with the writer's opinion of what is required to make incandescent street lighting a success. 1400 w. Jour Gas Lgt—Dec. 9, 1902.

Incandescent Street Lighting. J. F. Tyndall. Read before the South-East of Ireland Gas Assn. A short paper giving the writer's experience, with discussion. 2500 w. Gas Wld—Dec. 5, 1903.

See also **Self-Lighting and Extinguishing; GAS LIGHTING; LIGHTING.**

Street, High-Pressure.—The Use of High-Pressure Gas on Street Lighting. J. J. Knight. Read before the Ohio Gas Lgt. Assn. Comments on the best means of street lighting now available, with a report of the writer's views on high-pressure service, with incandescent gas lamps. Also general discussion. 3500 w. Am Gas Lgt Jour—April 11, 1904.

Sugg.—High and Low Pressure Gas Incandescent Lighting. William Sugg. Read before the Inc. Gas Inst. The paper emphasizes the importance of the velocity of the gas, and illustrates the author's high-pressure apparatus. 3400 w. Gas Wld—June 15, 1901.

See also **London.**

Temperature Limit.—The Limit of Temperature Usefulness in the Mantle Light. Dr. W. H. Birchmore. Deductions from experimental researches concerning high temperature flames and combustion at high temperatures. 2000 w. Am Gas Lgt Jour—Aug. 18, 1902.

Theory.—The Theory of the Incandescent Gas Light. E. G. Love. Read at Denver meeting of the Am. Gas Lgt. Assn. A discussion of the theories and such other subjects as are needed for their clear understanding. 2500 w. Am Gas Lgt Jour—Nov. 5, 1900.

The Theory of the Incandescent Mantle. A. H. White, H. Russel, A. F. Traver. Read at meeting of Mich. Gas Assn. Discusses the cause of luminosity of the mantle, quoting from other investigations, and giving results of experiments of temperature measurements, and a statement of the writers' views. 3800 w. Pro Age—March 15, 1902.

Theory of the Incandescent Mantle. A. H. White and A. F. Traver. Gives data on the temperature of the flame and the mantle, the relation existing between the temperature and illumination, and discusses whether the illumination is a pure temperature effect. 5800 w. Pro Age—Oct. 15, 1902.

Incandescent Gas Lighting (L'Incandescence par le Gaz). Ch. Féry. A study of the conditions required for successful gas lighting by incandescent mantles, with an examination of the theory. 1500 w. Génie Civil—Aug. 8, 1903.

The Theory of the Incandescent Gas Burner (Theorie des Gasglühlichtes). Franz Bössner. A discussion of the action of oxides of the metals of the earths in connection with the emission of light when heated. An important study of the incandescent mantle. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—May 31, 1901.

Thorium.—See **THORIUM.**

Variability.—The Variability of the Incandescent Gas Light (Die Launen des Gasglühlichts). A discussion of the variability of the light, and the possibility of properly regulating the burner. 1000 w. Gesundheits Ing—Jan. 31, 1902.

Welsbach.—The Welsbach Light. Report of the Franklin Inst., through its committee on Science and the Arts, on the exhibit of the Welsbach Light Co., of Gloucester City, N. J. 3000 w. Jour Fr Inst—Dec., 1900.

The Welsbach Crisis. A report of the recent meeting of the investors of capital in the Welsbach Company in England, with editorial comment. 6500 w. Jour Gas Lgt—Jan. 21, 1902.

Gas Companies, the Welsbach Company, and the Trade. Norton H. Humphreys. Discusses the present state of affairs in England and the experience of the Welsbach Company. Serial. 1st part. 2800 w. Jour Gas Lgt—Feb. 11, 1902.

The Making of Welsbach Mantles. An account of the processes through which the mantle has to pass, with an illustrated description of the new factory at Wandsworth, England, built for the sole purpose of producing these mantles. 5300 w. Jour Gas Lgt—Oct. 21, 1902.

See also **PHOTOMETRY.**

Welsbach Patent.—A Combination to Test the Welsbach Patent of '93. An account of competition in England and the steps being taken to test the validity of the Welsbach 1893 patent. 1800 w. Jour Gas Lgt—April 16, 1901.

The Welsbach "Patent" of 1893. Information of importance regarding the validity of this patent, with editorial comment. 4000 w. Jour Gas Lgt—Aug. 27, 1901.

INCANDESCENT LAMP.

See also **ELECTRIC LIGHTING; ELECTRIC STATION MANAGEMENT; LIGHTING; PHOTOMETRY.**

The Incandescent Lamp of To-Day. John W. Howell. A few facts relating to these lamps and the features that have made them popular. 700 w. Trans Am Inst of Elec Engrs—Dec., 1901.

Some Points with Regard to Electric Ligthing by Incandescent Lamps. Considers briefly some causes of troubles, and means of possibly increasing their efficiency. 1000 w. Elec Engr, Lond—June 12, 1903.

Is the Carbon Filament Lamp Doomed? E. Leavenworth Elliott. A brief review of the carbon filament lamp, discussing the merits and demerits of the lamps aiming to improve upon it. 3500 w. Cent Sta—May, 1905.

Crawford-Voelker.—The Crawford-Voelker Incandescent Electric Lamp. F. Q. Maguire. Describes a new carbide of titanium lamp which, it is said, can be made with an efficiency of 2.3 watts per candle at 100 volts and for pressures up to 500 volts. Also extracts from report of tests. 2000 w. Elec Rev, Lond—Dec. 6, 1901.

Decorative Danger.—The Danger of Fire in the Use of Incandescent Lamps for Decoration (Feuersgefahr bei Verwendung von Glühlampen zur Dekoration). C. Ankerson. An account of experiments with incandescent lamps covered with wadding, which charred or burned and caused the lamps to break. 600 w. Elektrotech Zeitschr—Jan. 9, 1902.

Defects.—Defects in Incandescent Lamps. E. Leavenworth Elliott. Gives a copy of a defect sheet of one of the large factories, all of which are supposed to be corrected before the lamp leaves the factory, and discusses defects that develop after use. 1300 w. Cent Sta—Feb., 1904.

Dimming.—A Cheap Method of Dimming Lamps (Eine billige Methode der Lampenverdunkelung). P. Stern. Two lamps are used either in parallel or in series, the latter arrangement being used when diminished illumination is desired. 1200 w. Elektrotech Zeitschr—May 30, 1901.

Economy.—Incandescent Lamp Economy. Abstract of a paper by Guy V. Williams, read at the Sheboygan Convention of the Northwestern Elec. Assn. on the importance of each company possessing a lamp-testing outfit and the value of the photometer when properly used. 1800 w. Elec Wld & Engr—July 6, 1901.

Methods of Reducing the Cost of Lighting with Incandescent Lamps (Methoden zur Herabminderung der Kosten der Beleuchtung mittels Elektrischer Glühlampen). Karl Zipernowsky. With curves, showing the life of lamps under various conditions, and their periods of greatest efficiency. 3000 w. Zeitschr f Elektrotechnik—Feb. 1, 1903.

The Conditions of Maximum Economy of Incandescent Lamps (Détermination des Conditions d'Economie Maxima pour le Fonctionnement des Lampes Electriques à Incandescence). Aymard Valéry. Deriving formulas including the first cost, life, and consumption of electric energy, for the determination of maximum economy. 1500 w. Revue Technique—July 25, 1904.

Edison.—The Beginnings of the Incandescent Lamp. Thomas A. Edison. A very interesting account of the writer's early work in this field and final success. 1300 w. Elec Wld & Engr—March 5, 1904.

The Development of the Manufacture of the Edison Incandescent Electric Lamp—1881-1905. J. T. Marshall. A detailed account of the successive steps in the development of the Edison electric incandescent lamp from the period of its appearance to the present. Also discussion. Ills. 8500 w. Jour Fr Inst—July, 1905.

Efficiency.—The Efficiency of the Incandescent Lamp. Ed. C. Segundo. A discussion of this subject, quoting from paper by Arthur J. Rowland, read before the Franklin Inst. Serial. 1st part. 1000 w. Elec Rev, Lond—Feb. 1, 1901.

See also **Economy; Test; PHOTOMETRY.**

Exhaustion.—A Resumé of Incandescent Electric Lamp Exhausting. S. E. Doane. Brief review of the history of the development of this art, especially considering the present chemical exhausting method. 4000 w. Elec Wld & Engr—May 21, 1904.

Filaments.—Treating Incandescent Lamp Filaments. Ralph McNeill. An outline of the "treating" or "flashing" of the filament. Ills. 1500 w. Elec Wld & Engr—Sept. 3, 1904.

Frequency Effect.—Effect of Frequency on the Light of an Incandescent Lamp. H. Seaman. Extract from a thesis investigating the limits of frequency that will give good service. The object was to ascertain the variation in light from a 110-volt incandescent filament, for various frequencies, and to derive curves showing what is the lower limit of frequency for good incandescent lighting. 1100 w. Wis Engr—May, 1902.

Gas Compared.—The Gas That Failed. Alton D. Adams. Review of the growth of the incandescent lamp as compared with gas. 2500 w. Elec Wld & Engr—Jan. 2, 1904.

Göthe Gymnasium, Frankfort.—The Lighting of School Rooms (Ueber die Beleuchtung von Schulräumen). Prof. Ludw. Stelz. Data and results of tests of the distribution of light from incandescent electric lamps in the rooms of the Göthe Gymnasium in Frankfort. 2500 w. Elektrotech Zeitschr—Feb. 16, 1905.

History.—The Incandescent Lamp. H. D. Burnett. Read at meeting of Peterborough Engng. Club. Reviews the history and development. 6000 w. Can Elec News—Nov., 1900.

Incandescent Lamp Development to the Year 1880. Edwin M. Hammer. Historical résumé based on records of sworn testimony in lamp litigations in the United States and abroad, and decisions of courts; and from patents, text books, published articles, etc. Ill. Serial. 1st part. 3000 w. Elec Wld & Engr—Dec. 1, 1900.

The Incandescent Lamp. Brief review of the history of its development. 900 w. Elec Rev, N Y—Feb. 20, 1904.
See also **Edison.**

Howell Filament.—A New Carbon Filament. John W. Howell. Gives a report of a carbon filament having characteristics differing from any previously known, due to the proper application of excessively high temperatures to the ordinary carbon filament. 1800 w. Am Inst of Elec Engrs—June 22, 1905.

Life.—Life of Incandescent Lamps. C. A. B. Garrett. Discusses results obtained in a series of tests under ordinary working conditions. 1200 w. Elec Engr, Lond—July 1, 1904.

See also **Test.**

Light Distribution.—On the Distribution of Light from Incandescent Lamps. Lancelot W. Wild. On the choice of lamps for various uses, and the measurement of candle-power. 900 w. Elec Rev, Lond—Jan. 1, 1904.

Manufacture.—From Cotton-Wool to Candle-Power. Describes a visit to an English glow-lamp factory. Ill. 2400 w. Lightning—May 30, 1901.

The Manufacture of Glow Lamps. An illustrated detailed description of their manufacture and testing. Serial. 1st part. 1800 w. Elec Rev, Lond—May 9, 1902.

The Incandescent Electric Lamp—How Manufactured and Tested. William A. Del Mar. An illustrated description of the processes employed by a large European manufacturer. Also gives variations of the process introduced by other makers. 2700 w. Sci Am Sup—May 24, 1902.

The Birth of a Glow Lamp. An illustrated description of the processes involved in the manufacture. 3200 w. Elec Times—April 24, 1902.

How Incandescent Lamps are Made. E. Leavenworth Elliott. An outline of the processes and operations involved in the construction. Serial. 1st part. 2500 w. Cent Sta—Nov., 1903.

The Manufacture of Incandescent Lamps (Fabrication des Lampes Electriques à Incandescence). Paul Razous. A general account of the manufacture of incandescent glow lamps, including the preparation of the filament and the exhausting of the bulbs. 2000 w. Génie Civil—Dec. 20, 1902.

See also **Filament; Maxim; St. Louis Exposition.**

Maxim.—The Manufacture of Incandescent Lamps. Describes the making of incandescent electric lamps as carried on at the works of the Sir Hiram Maxim Electrical and Engineering Company. Ill. 5700 w. Engng—May 8, 1903.

New Forms.—See **ARC LIGHT.**

New York Subway.—See **LIGHTING.**

Night.—Home-Made Electric Night Lamp. George M. Hopkins. Illustrated description of a simple device for producing a temporary light. 500 w. Sci Am—Feb. 15, 1902.

Osmium.—The Osmium Lamp. On the new incandescent lamp invented by Dr. Auer von Welsbach, possessing a filament formed of the rare metal osmium. Also editorial. 1800 w. Elec Wld & Engr—March 16, 1901.

The Osmium Incandescent Lamp (Die Osmium-Glühlampe von Freiherr Auer v. Welsbach). From a paper by Robert Gabriel before the Elektrotechnischer Verein, Vienna, giving an account of the manufacture of electric lamps with osmium filaments, made by Dr. Auer von Welsbach, and experiments showing high efficiency. 1200 w. Elektro-Techniker—Jan. 15, 1902.

The Osmium Lamp (Ueber die Osmiumlampe). L. Lombardi. Data and results of measurements of the temperature of the filament of the osmium incandescent lamp, and its relation to illuminating efficiency. 3000 w. Elektrotech Zeitsch—Jan. 21, 1904.

The Efficiency and Color of Osmium Lamps. Prof. F. G. Baily. Gives results of a recent examination of these lamps, invented by Herr Auer von Welsbach. 900 w. Elect'n, Lond—Feb. 12, 1904.

The Osmium Incandescent Electric Lamp (Die Elektrische Osmium Glühlampe). Fritz Blau. A paper before the Berlin Electrotechnical Society, giving data as to the life and illuminating power of the Welsbach osmium lamp. 4000 w. Elektrotech Zeitschr—Feb. 23, 1905.

See also **ELECTRIC ENGINEERING—Europe.**

Photometry.—See **Test; PHOTOMETRY—Incandescent Lamp.**

Rating.—The Proper Commercial Rating of Incandescent Lamps. E. Leavenworth Elliott. Points out what the writer considers the shortcomings of the present accepted method of rating, explaining the scientific principles involved. 1500 w. Cent Sta—June, 1904.

Regulation.—On a Method of Potential Regulation Based on the Different Resistance Behavior of Carbon and Tantalum Lamps. A. E. Kennelly and S. E. Whiting. Shows how the difference in the temperature resistance characteristics may be employed for regulating the electromotive force of a generator. 1500 w. Elec Wld & Engr—July 1, 1905.

St. Louis Exposition.—The Manufacture of Incandescent Lamps at the World's Fair, St. Louis. Illustrated description of this interesting exhibit. 2200 w. Elec Rev, N Y—July 23, 1904.

School, Frankfort.—See **Göthe Gymnasium.**

Selection.—Notes on the Selection of Incandescent Lamps. J. E. Dawson. Discusses schemes for the maintenance and renewal of lamps, and the difficulties. 1100 w. Elec Rev, Lond—Oct. 13, 1905.

Street Lighting.—Incandescent Street Lighting. Alton D. Adams. Information in regard to the incandescent electric lamps used for street lighting in Massachusetts, and the value of the service. 1300 w. Munic Engng—March, 1903.

Street Lighting by Incandescent Lamps. John Howatt. Describes briefly the two general systems used in operating incandescent lamps for street lighting. 1400 w. Am Elect'n—Aug., 1905.

See also **ELECTRIC LIGHTING; LIGHTING.**

Tantalum.—Tantalum and the Tantalum Lamp. Gives information of an investigation carried out by Dr. W. von Bolton, of the preparation and properties of pure tantalum, which has a very high melting point, discussing the chemical side of the subject. 800 w. Elec-Chem & Met Ind—Feb., 1905.

The Tantalum Lamp (Ueber die Tantallampe). W. Wedding. Diagrams and tables of tests, showing the superiority of the tantalum to the carbon incandescent lamp. 2500 w. Elektrotech Zeitschr—Oct. 12, 1905.

Tantalum and the Tantalum Electric Lamp (Das Tantal und die Tantallampe). Dr. Werner von Bolton. Describing the properties of metallic tantalum, with a brief description of the Siemens & Halske incandescent lamp with tantalum filament. 1500 w. Zeitschr f Elektrochemie—Oct. 27, 1905.

The Tantalum Lamp of Messrs. Siemens & Halske. Dr. W. v. Bolton and Dr. O. Feuerlein. Abstract of a paper read before the Elektrotechnische Verein at Berlin. An account of the experimental investigations, and an illustrated description of the tantalum lamp, its electric and photometric properties, and its behavior in actual use. 4000 w. Elec Rev, Lond—Jan. 27, 1905.

The New Tantalum Lamp of Siemens & Halske (Die Tantallampe, eine Neue Glühlampe der Firma Siemens & Halske A. G.). W. von Bolton & O. Feuerlein. With illustrations of the incandescent lamp using tantalum as the luminous element. Data of illumination and endurance are given. 4000 w. Elektrotech Zeitschr—Jan. 26, 1905.

The Tantalum Incandescent Lamp. A detailed account of a new lamp in which tantalum is used for the filament. Editorial comment. Ills. 4000 w. Elec Wld & Engr—Jan. 28, 1905.

The Tantalum Lamp (Die Tantallampe). E. Budde. A brief description of the Siemens & Halske tantalum incandescent lamp, with data of performance. 2000 w. Zeitschr f Elektrotechnik—Jan. 29, 1905.

Tantalum, Regulation.—See **Regulation.**

Tantalum Test.—Some Tests of Tantalum Lamps. A. E. Kennelly and S. E. Whiting. An account of some interesting tests made in the laboratory of Harvard University. 1200 w. Elec Wld & Engr—March 25, 1905.

Tests of the Tantalum Lamp. Dr. Louis Bell and Prof. W. L. Puffer. A preliminary report of tests made of the life of these lamps, and photometric determinations. Illus. 1500 w. Elec Wld & Engr—June 3, 1905.

Tests of the Tantalum Lamp. Abstract of paper by Prof. Wm. Ambler before the Ohio Electrical Association, with curves. 1500 w. Elec Wld & Engr—Sept. 2, 1905.

Tantalum vs. Carbon.—Measurements upon the Tantalum Lamp (Messungen an Tantallampen). Egon Siedek. With diagrams of comparative measurements with the carbon filament showing the superiority of the tantalum lamp. 1000 w. Zeitschr f Elektrotechnik—May 7, 1905.

The Tantalum Lamp (Die Tantallampe). Otto Ely. A comparison of the performances of the carbon filament and the tantalum wire in incandescent electric lamps, with diagrams showing the current consumption and illuminating power. 1200 w. Zeitschr d Ver. Deutscher Ing—June 17, 1905.

See also **Regulation.**

Test.—Efficiency of Incandescent Lamps. Abstract of paper by MM. Lauriol and P. Janet before the Société Internationale des Electriciens describing results of comparative tests on 110 and 220-volt lamps, with curves and tables. 1000 w. Elect'n, Lond—Sept. 1, 1905.

An Incandescent Lamp Test. J. D. Nies. A report of tests covering six makes of lamps. Diagrams. 500 w. Cent Sta—May, 1902.

See also **Efficiency; Life; Manufacture; Tantalum Test; PHOTOMETRY.**

Titanium.—See **Crawford-Voelker.**

220-Volt.—Performance of Present 220-Volt Lamps. F. W. C. Bailey. Read at the Nat. Elec. Lgt. Assn. meeting. An account of an interesting test made, the methods and results. Diagrams. 5000 w. Cent Station—Aug., 1902.

Uses.—The Uses of Incandescent Lamps. Geo. T. Hanchett. Some of the principles by which great economies may be effected. 1800 w. Cent Sta—Nov., 1903.

Variations.—A Study of the Variations in Luminous Intensity of Alternating-Current Incandescent Lamps during One Complete Alternation (Étude des Variations d'Intensité Lumineuse dans une Période, des Lampes à Incandescence Alimentées par Courants Alternatifs). C. Leonard and P. Janet. A description of experiments and results, with tables and curves. 4000 w. Bull Soc Internationale de Electriciens—Dec., 1901.

INCANDESCENT LAMP SOCKETS.

Standard Edison.—Standard Connections for Lamps with Edison Screw Contact (Verbande-Normallien und Kaliberlehren für Lampenfüsse und Fassungen mit Edison Gewindegontakt). R. Hundhausen. An abstract of the official report of the Commission for standardization of incandescent lamp connections. 3000 w. Elektrotech Zeitschr—Nov. 8, 1900.

The Testing of Gauges for Edison Lamp Sockets (Bestimmungen betreffend die Prüfung von Lehren für die Füsse und Fassungen von Edison Glühlampen). A discussion of the standard threads for lamp sockets recommended by the "Verband Deutscher Elektrotechniken," and adopted by the Reichsanstalt. 3500 w. Elektrotech Zeitschr—Aug. 15, 1901.

INCANDESCENT LIGHTING.

See also **ELECTRIC LIGHTING; INCANDESCENT LAMP.**

"Elblight."—See **ELECTRIC LIGHTING.**

Gas.—See **INCANDESCENT GAS LIGHTING.**

INCINERATOR.

See **REFUSE DISPOSAL.**

INCLINED PLANE.

Canal Lift.—See **CANAL LIFT—Inclined Plane.**

INCLINE RAILWAY.

See **CABLE RAILWAY; MINE HAULAGE; MOUNTAIN RAILWAY; RAILWAY—Uganda; SUSPENDED RAILWAY.**

INDEX.

See also **BIBLIOGRAPHY; DRAWING ROOM.**

Technical Index and File. R. H. Soule. An illustrated description of the system used is given. 1200 w. Trans Am Soc of Mech Engrs, No. 0947—May, 1902.

Bridge Tracings.—See **DRAWING ROOM.**

Card.—Engineering Periodicals and the Card Index. H. Wade Hibbard. Presented before the Cornell Soc. of Mech. Engs. On the value of trade papers and of the card index. 4700 w. Sib Jour of Engng—Dec., 1900.

Card Indexes. H. Wade Hibbard. Extracts from a paper on "Engineering Periodicals and the Card Index," describing the best method of indexing publications, books, drawings and other technical documents. 2400 w. Eng Rec—Feb. 8, 1902.

The Card Index and Its Service in Machine Works (Das Kartenverzeichnis und der Anzeiger im Dienste der Maschinenfabriken). A. S. Oesterreicher. With various illustrations of the application of the card-index system to matters of record and accounting. 1800 w. Zeitschr d Ver Deutscher Ing—Dec. 15, 1900.

Dean's Document File.—A Method of Filing and Indexing Engineering Literature, Notes, Data, etc. George H. Marr. Describes the use of Dean's Document File. Ill. 2400 w. Trans Am Soc of Mech Engrs, No. 890—May, 1901.

Drawings.—See **DRAWING; DRAWING ROOM—Decimal Index.**

Filing Clippings.—Filing System for Office Use. Henry M. Lane. Describes a system for filing and indexing clippings, etc. Ill. 1700 w. Trans Am Soc of Mech Engrs, No. 0965—Dec., 1902.

Kunze.—An Engineering Index and File. Edward J. Kunze. An explanation of a system devised by the writer and found to be flexible and quite satisfactory. 3500 w. Am Mach—Dec. 17, 1903.

Order Recording.—See **WORKS MANAGEMENT.**

Purchasing Department.—The Card Index System in the Purchasing Department. F. H. Leland. Describes a card index system adapted to the requirements of the purchasing department of a manufacturing company. 2400 w. Am Mach—Nov. 28, 1901.

Stone & Webster.—Engineering Index and Library Work. G. W. Lee. Describes the system in use in the reference library of Stone & Webster, of Boston. Also editorial. 2200 w. Eng News—June 16, 1904.

Surveying Records.—Methods of Filing Records in a City Surveyor's Office. Fred Gabelman. Describes a system of indexing developed, which enabled information desired to be quickly available. 2500 w. Eng News—July 20, 1905.

INDEXING.

See also **DIVIDING.**

Compound.—A New Method of Compound Indexing on the Universal Milling Machine. John T. Giddings. Describes a method much shorter and more saving of labor than the one in common use. 1000 w. Mach, N Y—July, 1901.

Fractional.—Fractional Indexing. C. E. De Puy. Gives an index table and an explanation of the writer's method. 1200 w. Am Mach—Oct. 23, 1902.

Grinding.—See **GRINDING.**

Milling Machine.—Spacing for Prime Numbers on the Universal Milling Machine. G. Schneider. An explanation of three methods used by the writer. Ill. 2400 w. Am Mach—Aug. 8, 1901.

Complete Index Table for the Universal Milling Machine. Theo. J. Schmitz. Gives table complete for all whole numbers up to 360 divisions, which may be used for the usual method of indexing and the De Leeuw method. 500 w. Am Mach—Sept. 5, 1901.

See also **MILLING.**

Rack Teeth.—Spacing the Teeth of a Rack. Illustrates and describes a spacing attachment that will space the teeth of any diametral pitch. 500 w. Am Mach—Aug. 15, 1901.

INDIA.

See also **HYDRO-ELECTRIC PLANT; RAILWAY;** and under other specific heads.

The Industrial Development of India. Nilkanth B. Wagle. Discusses plans proposed for future work in developing the industrial resources. Followed by general discussion. 17,700 w. Jour Soc of Arts—March 14, 1902.

The Industrial Regeneration of India. John Wallace. A statement of present industrial conditions, the methods of manufacture, machinery used, habits of the people, etc., discussing the question of technical education. 6500 w. Cassier's Mag—July, 1903.

INDIA RUBBER.

See **ELECTRIC CABLE; INSULATION; RUBBER.**

INDICATOR.

See also **ELECTRIC INSTRUMENT; INDICATOR DIAGRAM; RECORDER; RECORDING MACHINE; SHIP TELEGRAPH; STEAM ENGINE TEST.**

Some Indicator Hints. Forrest E. Cardullo. Illustrates and describes the styles of connection in general use, and various devices for reducing motion, giving diagrams showing faults in handling the indicator, and for troubles in the engine. 1800 w. Engr, U S A—Aug. 1, 1902.

Steam Engine Indicators. C. W. Obert. Illustrates and describes modern indicators, explaining the principle of Watt's, McNaught's, and Richards' instruments, and describing other forms. 2800 w. Steam Engng—March, 1902.

The Indicator as an Educator in Steam Engine Practice. S. J. Dillon. On the importance of understanding the indicator. Gives explanation of four cards. 800 w. Loc Engng—Dec., 1902.

Automatic Recording.—An Automatic Recording Machine. E. C. Oliver. Illustrated description of a machine for recording on a continuous strip of paper the momentary changes of conditions throughout a test of an engine. 1500 w. Technograph, No. 15—1900-1901.

Automobile Engines.—The M'Innes-Dobbie Indicator and Mathot Recorder. Shows the advantage of obtaining accurate indicator diagrams from automobile engines and gives illustrated descriptions of the instruments named. 3000 w. Auto Jour—Dec. 27, 1902.

Calibration.—The Determination of the Scale of Indicator Springs (Beitrag zur Bestimmung der Massstäbe von Indikatorfedern). E. Förster. Illustrating and describing an apparatus for calibrating springs by steam and by direct loading 2000 w. Zeitschr d Ver Deutscher Ing—Feb. 28, 1903.

See also **Spring Testing.**

Connections.—Indicator Connections. J. W. Parker. Explains some arrangements tried, and the results. Ills. 800 w. Power—Feb., 1905.

Cut-Off.—Cut-Off in Indicator Work. G. W. Wildin. Suggestions from the writer's experience in indicator work. 1400 w. Loc Engng—Dec., 1900.

Dreyer, Rosenkranz & Droop.—See **Rosenkranz.**

Electric.—See **ELECTRIC INSTRUMENT; SHIP TELEGRAPH.**

Gas Engines.—Extended Applications for Indicators (Vorschläge über die Weitere Ausbildung von Indikatoren). A. Wagener. Discussing especially the use of the indicator with gas and other internal-combustion engines, and the special devices for such work. 3500 w. Zeitschr d Ver Deutscher Ing—March 7, 1903.

See also **MANOGRAPH.**

History.—The Indicator. Illustrated review of the important improvements on the instrument invented by James Watt. 1500 w. Engr, U S A—Jan. 15, 1901.

Inertia.—Indicator Inertia. Deductions from engine trials made by G. S. Rose and G. Savory at Sibley College, U. S. A. 1200 w. Engng—May 12, 1905.

Locomotive.—A Simple Locomotive Engine Indicator. Illustrated description of a device for taking a succession of indicator cards without marking over the same card, invented by Eric Norden. 350 w. Sci Am—Aug. 24, 1901.

Manograph.—See **MANOGRAPH.**

Norden.—See **Locomotive.**

Outside Spring.—The Development of the Outside Spring Indicator. Robert Grimshaw. Illustrations showing the development, with explanatory notes. 400 w. Power—Dec., 1903.

See also **Spring Testing.**

Preparation. — The Preparation for Indicating. George L. Fowler. An illustrated article reviewing the work of preparation; the drilling and tapping the cylinders, piping, measuring clearance, attachment of indicator, etc. 2200 w. Steam Engng—March, 1902.

Reducing Gear.—Reducing Gears for the Steam Engine Indicator. W. H. Wakeman. An illustrated explanation of various devices for reducing crosshead motion to convenient proportions for use on the indicator drum, without destroying the peculiarities of the crosshead motion. 2400 w. Steam Engng—March, 1902.

A Differential Reducing Motion. D. L. Gallup. Illustrated description of an accurate device for obtaining correct indicator diagrams. 300 w. Engr, U S A—Aug. 1, 1905.

Rosenkranz.—The Rosenkranz Indicator with Cold Spring (Ueber einen Neuen Indikator mit Kaltfeder). An illustrated description of an indicator with an uncovered spring, which thus keeps cool and retains its accuracy. With diagrams of tests. 1 plate. 400 w. Glückauf—April 19, 1902.

Novelties in Spring Steam Gauges, Indicators and Valves (Neuerungen an Federmanometern, Indikatoren und Ventilen). P. H. Rosenkranz. Paper before the Hanover Section of the Verein deutsch. Ing., giving illustrated descriptions of instruments and apparatus made by Dreyer, Rosenkranz & Droop. 2200 w. Zeitschr d Ver Deutscher Ing—July 5, 1902.

Rotary Engines.—The Application of the Indicator to Rotary Engines. W. Pollard Digby. Describes the circumstances under which indicator cards were taken on certain rotary engines, and what they show. 2500 w. Engr, Lond—Jan. 27, 1905.

Rowing.—See **ROWING—Indicator.**

Springs.—Indicator Springs Subjected to Tension (Auf Zug Beanspruchte Indikatorfedern). R. Schwirkus. Tabulated results of tests on indicator springs made at the Reichsanstalt, showing that there is less trouble from lateral bending with the tension springs than with those under compression. 1800 w. Zeitschr d Ver Deutscher Ing—March 25, 1905.

Spring Testing.—Improved Indicators and Indicator Spring Testing (Indikator, Prüfungs-Einrichtung und Neuerungen an Indikatoren). A description of the spring-testing apparatus of the Dortmund Boiler Inspection Association, with illustrations of new outside-spring indicators. 1500 w. Glückauf—May 20, 1905.

The Testing of Indicator Springs (Die Prüfung der Indikatorfedern). E. Roser. Giving descriptions of various methods of testing indicator spring both hot and cold, including the methods and appliances in the leading mechanical laboratories of Germany. 5000 w. Zeitschr d Ver Deutscher Ing—Oct. 18, 1902.

Testing Indicator Springs. Illustrated description of new apparatus at the New York Navy Yard for this purpose, giving details of construction and methods of testing. 2200 w. Mach, N Y—Dec., 1902.

Notes on the Testing of Indicator Springs (Beiträge zur Prüfung von Indikatorfedern). H. F. Wiebe & R. Schwirkus. A discussion of the methods for testing indicators used at the Reichsanstalt and advocating the placing of the spring out of contact with the steam. 3500 w. Zeitschr d Ver Deutscher Ing—Jan. 10, 1903.

The Testing of Indicator Springs (Prüfung von Indikatorfedern). H. Staus. An account of the testing work done in the laboratory of the technical high school at Karlsruhe. 1200 w. Zeitschr d Ver Deutscher Ing—Dec. 12, 1903.

See also **Calibration.**

Spring Variations.—Correcting for Variations in Indicator Springs. A. Koob. Gives methods for computing spring measurements. 2300 w. Power—March, 1902.

Station.—See **STATION INDICATOR.**

Testing Apparatus.—Apparatus for Dynamically Testing Steam-Engine Indicators. Carleton A. Read. Illustrates and describes the apparatus and its use. 1300 w. Trans Am Soc of Mech Engs, No. 873—Dec., 1900.

Time Diagram.—The Direct Production of Time Diagrams from Ordinary Indicators (Verfahren zur unmittelbaren Entnahme von Zeitdiagrammen mit Gewöhnlichen Indikatoren). W. Schüle. Describing the making of indicator diagrams by giving the drum a uniform rotary motion independently of the motion of the engine. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—March 26, April 2, 1904.

Watts' and McNaught's.—Watt's and McNaught's Steam Engine Indicators. Gives an account, in Watt's own words, of his first indicator, showing what he intended to effect by its means. Also notes improvements made by Watt and by McNaught. Ill. 2500 w. Engr, Lond—March 7, 1902.

INDICATOR COCK.

Improved Indicator Cock for Engines. Albert K. Mansfield. Illustrated description of a four-way cock to allow of taking a card from the steam chest or exhaust pipe in order to determine whether the piping between boiler and engine, or between engine and exhaust opening has been properly installed. 700 w. Trans Am Soc of Mech Engrs, No. 0938—May, 1902.

INDICATOR DIAGRAM.

See also **INDICATOR; RECORDER; STEAM ENGINE TEST.**

Indicator Cards. Alfred Siebert. Explains how indicator cards show what is going on inside the cylinder. 3200 w. Ice & Refrig—Nov., 1900.

Calculations From Indicator Diagrams. Charles L. Hubbard. Definition of work, foot pound work diagrams, calculation of power, mean ordinate, planimeters, etc. 4000 w. Steam Engng—March, 1902.

Reading Indicator Diagrams. Illustrates characteristics of the diagrams from various engines, explaining the meaning of the different forms. 2000 w. Steam Engng—March, 1902.

Accuracy.—The Accuracy of Indicator Diagrams (Zur Genauigkeit der Indikatordiagramme). L. O. Wolff. Discussing the sources of error in indicator diagrams, and the methods of calibration and correction. 2500 w. Zeitschr d Ver Deutscher Ing—Dec. 14, 1901.

Air Cylinders.—Notes on Indicator Cards from Air Cylinders. Ward Raymond. Gives the principal uses of an indicator on the air cylinder, the characteristics of the various lines, tables of pressures, etc. 2000 w. Compressed Air—July, 1902.

Analysis.—The Analysis of Indicator Diagrams. W. H. Wakeman. Gives diagrams and explains what they indicate. 1200 w. Engr, U S A—March 1, 1902.

Defective.—Typical Examples of Defective Indicator Diagrams. Extract from a paper by A. Marshall Arter read before the Civ. & Mech. Engrs.' Soc. Valuable notes on defective indicator diagrams, with the causes that produced them. 4500 w. Mech Engr—Jan. 24, 1903.

Flow of Steam.—The Construction of Steam Diagrams (Konstruktion der Dampfdiagramme). Hr. Debye. An application of the investigations of Gütermuth upon the flow of steam through ports, to the study of the velocity of steam flow upon indicator diagrams. 2000 w. Zeitschr d Ver Deutscher Ing—Nov. 25, 1905.

See also **STEAM FLOW.**

Gas Engine.—See **GAS ENGINE—Indicator Diagram; INDICATOR.**

Gasoline Engine.—The Indicator Diagram of a High-Speed Petrol Motor. Prof. H. L. Callendar. Read before the Auto-Cycle Club, So. Kensington. Describes the method adopted for obtaining high-speed indicator diagrams, showing how the indicator may be utilized in the study of the theory of the motor, and as a guide to its practical improvement. 3000 w. Auto Jour—May 14, 1904.

See also **INDICATOR—Automobile Engine; MANOGRAPH.**

Hoisting Engine.—Diagrams from a Double Tandem Hoisting Engine (Diagramme einer Zwillings-Tandem-Fördermaschine). Otto Himmelheber. A comparison of theoretical indicator diagrams with those obtained under actual working conditions. 1000 w. Zeitschr d Ver Deutscher Ing—July 23, 1904.

See also **HOISTING ENGINE—Indicator Cards.**

Horse Power.—See **STEAM ENGINE.**

Load Record.—See **STEAM ENGINE—Load Diagram.**

Locomotive.—See also **LOCOMOTIVE TEST—Compound.**

Manograph.—See **MANOGRAPH.**

Marine Engine Design.—Theoretical Indicator and Valve Diagrams and Their Relation to Marine Engine Design. Theodore Lucas. Explains the great value of diagrams to engine designers in settling rapidly and efficiently many points to be considered. Ill. 1500 w. Marine Engng—Sept., 1901.

Mean Effective Pressure.—The Working Out of Indicator Diagrams. H. E. Hodgson. The present number discusses methods of finding the mean effective pressure. Serial. 1st part. 1700 w. Elec Engr, Lond—July 22, 1904.

Measurer.—A Diagram Measurer. Describes a cheap and useful instrument for measuring indicator diagrams, consisting of a sheet of transparent celluloid with co-ordinate lines. 1100 w. Prac Engr —July 8, 1904.

See also **PLANIMETER.**

Shop Engine.—Some Shop Engine Indicator Diagrams. C. D. King. Gives a set of diagrams taken on a cross-compound Corliss engine, with explanatory notes. 600 w. Am Mach—Sept. 5, 1901.

Steam Consumption.—Figuring the Steam Consumption from the Indicator Diagram. S. H. Bunnell. Explains the method. 1200 w. Power—Nov., 1905.

Steam Engine Test.—See **STEAM ENGINE TEST—Indicator Diagram.**

Steam Hammer.—See **STEAM HAMMER—Diagrams.**

Theory.—The Theory of Steam Engine Diagrams (Beitrag zur Theorie der Dampfmaschinendiagramme). Viktor Blaess. A discussion of the influence of the dimensions of steam passages upon indicator diagrams, based upon the experiments of Gutermuth upon the flow of steam. 2000 w. Zeitschr d Ver Deutscher Ing—April 29, 1905.

Time.—See **INDICATOR—Time Diagram.**

Vertical Compound Engine.—Steam Engine Diagrams. Gives diagrams of a tandem compound engine of vertical marine type without condensation, explaining the information obtained from them. 1700 w. Naut Gaz—Sept. 17, 1903.

INDICATOR VEIN.

See **GOLD GEOLOGY; ORE DEPOSIT.**

INDUCTANCE.

See **ELECTRIC CABLE—Concentric Inductance; ELECTRIC MEASUREMENT; ELECTRO PHYSICS; TELEPHONE CABLE; TELEPHONE LINE—Pupin Long Distance.**

INDUCTION COIL.

See also **ELECTRO-MAGNET; ELECTRO-PHYSICS; IGNITION; INTERRUPTER; RADIOGRAPHY; ROENTGEN RAYS; SPACE TELEGRAPHY.**

An Induction Coil for X-Light Tubes and Wireless Telegraphy. William Rollins. An illustrated article giving directions which will enable anyone possessing mechanical skill to construct a seventy-centimetre induction coil. 3500 w. Elec Rev, N Y—March 29, 1902.

The Induction Coil Explained. An explanation of the principles and construction. Serial. 1st part. 1700 w. Autocar—March 28, 1903.

Air Core Reluctance.—The Magnetic Reluctance of Air Cores in Short Coils. W. M. Thornton. Gives an account of experiments undertaken to determine the constants for coils of common proportions. 1100 w. Elect'n, Lond—Sept. 16, 1904.

Choking.—Design of Choking Coils for Alternating Current Circuits. Considers the elementary principles and fromulae used in this connection, and discusses the design. 2000 w. Elec Engr, Lond—March 11, 1904.

Regulating Impedance Coils: Experiments Illustrating the Importance of Some Details in Construction. C. Faraday Proctor. Read before the Newcastle Loc. Soc. of the Inst. of Elec. Engrs. Gives results of experiments in the use of choking coils for regulating currents. 1800 w. Elec Engr, Lond—March 11, 1904.

Design.—Induction Coil Design. Mortimer A. Codd. Discusses points in design which affect the efficiency. Serial. 1st part. 1500 w. Elec Rev, Lond—May 20, 1904.

Four-Inch Spark.—The Construction of a Four-Inch Spark Induction Coil. Thomas R. Hopper. Illustrated detailed description. 3000 w. Sci Am Sup—April 8, 1905.

Ignition.—See **IGNITION—Spark Coil.**

Japan.—A New Induction Coil. W. C. Peckham. Illustrates and describes a large induction coil made for the Japanese government. 1200 w. Sci Am—Jan. 5, 1901.

Solenoid.—See **ELECTROMAGNET.**

Theory.—The Induction Coil. James Edmund Ives. A mathematical study of the theory of the induction coil. 2000 w. Elec Wld & Engr—March 28, 1903.

Therapeutic. — See **ELECTRO-THERAPEUTICS—Current Curves.**

INDUCTION JET.

See **PUMP—Jet.**

INDUCTION MOTOR.

See **ELECTRIC MOTOR.**

INDUCTION REGULATOR.

Single-Phase Induction Regulator. B. G. Bergman. Describes the design and explains the operation. The field for the induction regulator is apparently limited to heavy locomotives for freight service. 2000 w. Elec Wld & Engr—July 8, 1905.

INDUSTRIAL COMMISSION.

Mosely.—The Mosely Industrial Commission Reports. Reviews the reports made by a commission representing the principal industries of Great Britain of the tour to investigate the industrial situation in the United States. 5000 w. Ir Age—April 30, 1903.

The Recent British Trades Unions Visit to the United States. Alfred Mosely. Gives details of things seen by the Mosely Commission, the reasons for the visit, and the results looked for. 4000 w. Cassier's Mag—Nov., 1903.

Mr. Mosely's Industrial Inquiry. Translated from a paper published by the Union of Metal and Mine Workers of France. Discussion of the first commission's visit to the United States. 4500 w. U S Cons Repts—Nov., 1903.

Railway.—See **RAILWAY LEGISLATION—Industrial Commission.**

United States.—The Three-Years' Work of the United States Industrial Commission. Samuel M'Cune Lindsay. This commission was established to investigate questions pertaining to immigration, labor, agriculture and business, and to suggest legislation as it deemed best on these subjects. 7000 w. Rev of Revs—Dec., 1901.

INDUSTRIAL ENGINEERING.

See also **COMMERCE; ENGINEERING ECONOMICS; WORKS MANAGEMENT.**

Experience, Theory and Practice. Robert H. Smith. Discusses the proper standards of economical outlay. 4200 w. Engr, Lond—Oct. 30, 1903.

The Commercial Side of Engineering. Walter M. McFarland. Discusses the effect of cost in engineering design, giving illustrations in various

Business (System des Geschäfts). Alexander Brauner. An address before the Vienna Elektrotechnischer Verein on modern commerce and business and their relations to engineering. 5000 w. Zeitschr f Elektrotechnik—Jan. 10, 1904.

The Commercial Side of Engineering. Charles Kirchhoff. A lecture to students showing the need of commercial training as well as mechanical, to carry to a successful issue the undertakings of engineering works. 4500 w. Sib Jour of Engng—Feb., 1902.

The Relation of the Engineer to Finance. An Address at the Univ. of Illinois by John W. Alvord. Serial. 1st part. 2800 w. Eng Rec—May 21, 1904.

The Engineer in Manufacturing Industries. Walter S. Graffam. Explains what is meant by manufacturing industries, and the position which the engineer holds in relation to manufacturing. 3000 w. Elec Rev, N Y—Dec. 9, 1905.

Efficiency.—The Conditions of Maximum Productive Efficiency. Ralph Neville. Discussing the necessity for incentive as a condition for efficient production in all departments of industry. 3500 w. Engineering Magazine, July, 1904.

Fixed Charges.—The Financial End of Industrial Engineering. A. E. Dixon. Describes a method for arriving at the fixed charges on an engineering investment, applicable to all investments. 3300 w. Ir Age—Oct. 5, 1905.

Ideals.—The Realization of Ideals in Industrial Engineering. H. F. J. Porter. A discussion of the effect of the human element upon the efficiency and working organizations in office and shop. 5500 w. Trans Am Soc of Mech Engrs (No. 082)—Dec., 1905.

Preece Address.—Sir William Henry Preece's Address before the Society of Arts. Discusses manufactures and commerce aiming to determine the causes which result in successful or disastrous financial undertakings and showing that the commercial conduct of industrial processes follow distinct laws. 7700 w. Jour Soc of Arts—Nov. 21, 1902.

The Science of Business. Editorial review of Sir William Henry Preece's address before the Society of Arts. 1800 w. Engng—Nov. 21, 1902.

Prices.—The Trend of Prices in Engineering Industries. C. L. Redfield. A discussion of the influence of the increasing output and declining value of gold upon prices in connection with engineering work. 2500 w. Engineering Magazine—Aug. 1902.

Thurston Paper.—The Engineer as Financier. Dr. Robert H. Thurston. An able review of the financial and economic problems which the engineer is called upon to solve, and of his increasing importance in the organization and advancement of civilization and his vast opportunities. 7500 w. Cassier's Mag—Dec., 1902.

Wright Address.—Modern Industrial Progress a Social Problem. Carroll D. Wright. Extracts from an address before the National Assn. of Mfrs., at New Orleans, La. 8700 w. Ir Age—April 30, 1903.

INDUSTRY.

See also **COAL INDUSTRY; COMMERCE; ELECTRIC INDUSTRY; ENGINEERING; FOOD SUPPLY; INDUSTRIAL COMMISSION; INDUSTRIAL ENGINEERING; IRON INDUSTRY; LABOR; MINING INDUSTRY; STEEL INDUSTRY; WORKS MANAGEMENT**; and under specific geographical headings.

American.—A Journey in the United States for the Purpose of Studying the Mechanical Industries (Eine Studienreise in den Vereingten Staaten von Amerika). Paul Möller. An account of American technical and industrial conditions, as seen on a trip through the United States by a representative of the Verein Deutscher Ingenieure. Serial. 2 parts. 7000 w. Zeitschr d Ver Deutscher Ing—July 4 and 11, 1903.

See also **LABOR.**

Engineering and Law.—See **ENGINEERING—Law and Industry.**

Exports.—See **COMMERCE; EXPORT.**

Merger Decision.—The Merger Decision. Discusses the decision in the case of the United States against the Northern Securities Company, arguing that the Sherman act should be repealed, and that its enforcement would disorganize industry. 1200 w. Gunton's Mag—May, 1903.

See also **INDUSTRIAL COMMISSION; LABOR.**

Puget Sound.—See **PUGET SOUND.**

Upper Rhine.—Notes on the Industries of the Upper Rhine. John Richards. Interesting account of the wine industry, the commerce of the river, the vessels used, machinery works, and various matters of interest. 8300 w. Jour Assn of Engng Socs—July, 1901.

Westinghouse Address.—See **ELECTRIC INDUSTRY.**

INERTIA.

See also **MECHANICS; PHYSICS.**

Gas and Steam Engines.—Inertia in Gas and Steam Engines. A. T. Kasley. Explains the meaning of inertia and considers some problems. General discussion. 3000 w. Pro Engrs' Soc of W Penn—July, 1904.

Moment of.—See **MOMENT OF INERTIA.**

INGOT.

See **HYDRAULIC MACHINERY—Steel Ingot; STEEL CASTING; STEEL METALLURGY.**

INJECTOR.

See also **BOILER; FEED WATER; LOCOMOTIVE OPERATION; PUMP—Feed Water; STEAM ENGINEERING.**

Injectors as They Are Met With in Every-Day Railway Practice. F. W. Edwards. Introductory to a general discussion. Considers the mounting of injectors, location on different classes of boilers, care, failures, etc. 11000 w. Pro W Ry Club—May 19, 1903.

Locomotive Practice.—Locomotive Injectors, Modern Practice. Strickland L. Kneass. Abstract of a paper read before the Traveling Engrs. Assn. Explains the principle upon which the injector operates, the importance of the location, the systems in use and the desirable features of the ideal modern locomotive injector. 2000 w. Ry Age—Dec. 29, 1905.

Repairs.—Injector Troubles and Repairs. Fred H. Colvin. Discusses repairs, with special reference to locomotive injectors. Ills. 3000 w. Mach, N Y—March, 1904.

INLAND NAVIGATION.

See **CANAL; HARBOR; NAVIGATION; RIVER REGULATION; WATERWAY.**

INSPECTION.

See also **CONTRACT; SPECIFICATION; STEEL SPECIFICATION; TESTING**; and under specific headings.

Inspection as a Factor in Cheap Production. Charles U. Carpenter. Discussing inspection as a necessary complement of standardized production, for the maintenance of accurate work. 3000 w. Engineering Magazine—July, 1904.

Bridge.—See **BRIDGE INSPECTION.**

Contract.—The Position of the Constructing Engineer, and His Duties in Relation to Inspection and the Enforcement of Contracts. Albert J. Himes. 7000 w. Pro Am Soc of Civ Engrs—Nov., 1905.

See also **CONTRACT.**

Electric Machinery.—The Inspection and Insurance of Electrical Machinery. From the report of Mr. Michael Longridge, giving interesting records of the experience of his company in connection with the working and breakdown of electrical machinery. 6500 w. Mech Engr—Sept. 10, 1904.

See also **MOTOR—Longridge Report.**

Electric Plants.—See **ELECTRIC PLANT—Inspection.**

Materials.—The Inspection of Materials. Part first considers the need and aim of inspections and whether good work is assured by the present system. Serial. 1st part. 3700 w. Engr, Lond—Sept. 4, 1903.

The Practical Inspector. E. N. Percy. Suggestions on inspection of materials. 2000 w. Mach, N Y—Oct., 1904.

Municipal Electrician.—See **MUNICIPAL ENGINEER—Electrician.**

Optical Examination. — See **MATERIALS' STRENGTH; TESTING.**

Osborn Engineering Co.—Shop and Mill Inspectors and Their Work. W. O. Henderer. The need of inspection is shown, and an account given of the methods adopted by the inspection department of the Osborn Engng Co., of Cleveland, O. 7500 w. Jour Assn of Engng Socs—Sept., 1900.

Rails.—The Inspection of Rails. C. W. Gennet, Jr. A discussion of the inspector's duties. 2000 w. R R Gaz—Aug. 28, 1903.

See also **RAIL.**

Steam Engine.—See **STEAM ENGINE—Inspection.**

Steel.—Hints on the Inspection of Steel. Albert Moritz. Hints and suggestions of what is required of inspectors of material for the government. Gives methods of making tests, methods of manufacture, etc. 10,800 w. Jour Am Soc of Nav Engrs—Aug., 1903.

INSTRUMENT.

See also **DRAWING INSTRUMENT; MEASUREMENT; SURVEYING INSTRUMENT; TOOL.**

Small Instruments of Measurement. Joseph Horner. Illustrates and describes various small instruments of precision, giving some account of the care needed in their manufacture and their uses. 3500 w. Cassier's Mag—May, 1905.

Electric.—See **ELECTRIC INSTRUMENT.**

Graduated Circles.—A Cause of Errors in Graduated Circles (Sur une Cause de Variabilité des Erreurs de Division dans Certains Cercles Gradués). C. Bigourdan. An examination of the appearance of errors subsequent to graduation, caused by the unequal expansion of the materials. Iron is inferior to brass as a support for the graduated silver circle. 1000 w. Comptes Rendus—Sept. 26, 1904.

Paris Exposition.—A Few Instruments of Precision at the Paris Exhibition of 1900. William E. Reed. Describes astronomical, physical and other instruments as well as the telegraphone. 4800 w. Trans Am Soc of Mech Engrs, No. 898—May, 1901.

Preservation.—See MACHINERY.

Vibration Recorder.—See CAR; VEHICLE.

Warner and Swasey.—See MACHINE SHOP; MEASUREMENT—Refined.

INSULATION.

See also DIELECTRIC; ELECTRIC CABLE; ELECTRIC MEASUREMENT; ELECTRIC TESTING; ELECTROSTATIC CAPACITY; GUTTA PERCHA; INSULATOR; RUBBER.

Insulating Materials; A Field for the Chemist. Max von Recklinghausen. Read at the N. Y. meeting of the Am. Elec-Chem. Soc. Considers the desirable and undesirable qualities of insulating materials now used, showing where chemical research would be of value. 2000 w. Eng News—April 23, 1903.

A Study of Insulating Compounds. This first article deals with shellac. Serial. 1st part. 1200 w. Cent Sta—April, 1902.

On Insulation. Discusses some of the conditions which have to be fulfilled by a good insulator, and the tests that should be made. 3500 w. Elec Engr, Lond—Sept. 16, 1904.

Armature.—See Coils; Electric Machinery; ARMATURE—Construction.

Armature Slot.—Considerations Relating to the Design of the Armature Slot Insulation in High Voltage Alternating Current Generators. H. M. Hobart. Investigations as regards the thickness of the slot insulation from the armature conductors to the iron core are discussed in the present article. Serial. 1st part. 900 w. Elec Rev, Lond —April 28, 1905.

Balata.—See BALATA.

Beads.—Decorative Insulating Beads for Uninsulated Electric Light Wires. Illustrates and describes a system in which beads of cut and polished glass are strung on naked wires of copper, stating the advantages. 900 w. Sci Am Sup—May 20, 1905.

Bitumen.—See BITUMEN—Electric Insulation.

Brooks Semi-Solid.—See ELECTRIC CABLE—High Tension.

Cables.—How Insulated Wires and Cables Are Made. Henry A. Morss. Illustrates and describes the manufacture of rubber insulated wires and cables. 3800 w. Cent Sta—May, 1904.

See also ELECTRIC CABLE; SUBMARINE CABLE; TELEPHONE CABLE.

Cellulose Paper.—The Use of Cellulose Paper in Electrotechnics (Ueber die Verwendung der Holzfaser in Form von Papier in der Elektrotechnik). Dr. J. Rabinowicz. Giving a comparison of the insulating value of various materials, and showing the applicability of wood-fibre paper for insulating wire. 3000 w. Elektrotech Zeitschr—Nov. 15, 1900.

Coils.—The Insulation of Armature or Other Coils for High-Tension Apparatus. J. S. Highfield. An account of an investigation made of the breakdown of insulation, proving it to be due to the formation of nitric acid by brush discharge causing ozonization of the air. 1200 w. Elect'n, Lond—Jan. 27, 1905.

Compressed Gas.—Compressed Gas as an Insulator. Report of a lecture by Harris J. Ryan. Gives results of testing the dielectric strength of gases under pressure. Ills. 2000 w. Elec Jour—July, 1905.

See also ELECTRIC CONDUCTIVITY—Air; ELECTRIC DISCHARGE—Air; ELECTRIC TRANSMISSION—Atmospheric Losses.

Decorative.—See Beads.

Dielectric Strength.—See Compressed Gas; DIELECTRIC—Strength; ELECTRIC DISCHARGE—Striking Distance.

Dynamo.—See Electric Machinery.

80,000-Volts Transmission, Cal.—See ELECTRIC TRANSMISSION—80,000-Volts, Cal.

Electric Machinery.—Defective Machine Insulation. C. E. Farrington. On the defective insulation which is found in modern dynamo and motor construction, outlining investigations made to determine a good insulating compound. 3800 w. Jour Fr Inst—Aug., 1903.

Defective Insulation in Dynamo and Motor Construction. C. E. Farrington. An outline of investigations made to determine the best insulating materials. 4000 w. Cent Station—June, 1903.

Electric Wiring.—See ELECTRIC WIRING.

Energy Losses.—See DIELECTRIC—Losses.

"Gutta Gentzsch."—"Gutta Gentzsch." Describes an insulating substance intended for use as a substitute for gutta percha in submarine cables. 2000 w. Elec Rev, Lond—Feb. 26, 1904.

Gutta Percha.—See GUTTA PERCHA.

Heat.—See HEAT TRANSMISSION; REFRACTORY MATERIAL; STEAM PIPE COVERING.

Heating Experiments.—Report on Temperature Experiments Carried Out at the National Physical Laboratory. E. H. Rayner. Deals with investigations undertaken on behalf of the Engineering Standards Committee. The first part was on the effect of heat on the properties of insulating materials usually employed in electrical machinery; the second deals with the internal temperature of field coils of continuous-current machinery. 10,400 w. Ill. Inst of Elec Engrs—March 9, 1905.

High Pressure.—Some Elements in the Design of High-Pressure Insulation. Prof. Harris J. Ryan. Presents the elements of modern electrical science upon which must rest the trained judgment of the designer of high-pressure insulation, with tests and measurements. 4500 w. Int Elec Cong of St Louis—Sept., 1904.

Leakage.—See ELECTRIC DISTRIBUTION; ELECTRIC LINE; ELECTRIC MEASUREMENT; ELECTRIC TESTING; ELECTRIC TRANSMISSION.

Liquid.—See Oils; DIELECTRIC.

Measurement.—See ELECTRIC MEASUREMENT—Insulation.

Mica.—See DIELECTRIC; MICA.

Oils.—A Method for Measuring the Insulation of Liquids (Eine Methode zur Bestimmung der Isolierfähigkeit von Flüssigkeiten). Paul Humann. Illustrated description and results of measurements of electrical resistance of oils, etc., at different temperatures. 5000 w. Elektrotech Zeitschr—Dec. 1, 1903.

Paint.—Insulating Paints. Arthur B. Weeks. Discusses some of the qualites of a good paint, means of testing, &c. 1800 w. St Ry Rev—Oct., 1905.

See also Varnish.

Porcelain.—See INSULATOR; PORCELAIN.

Resistance. — See ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE.

Rubber.—Rubber Insulation. Some points on means of determining the value of rubber compounds for insulating purposes. 1200 w. R R Gaz—March 18, 1904.

See also RUBBER.

Rubber Strip.—India-Rubber Strip for Insulation Purposes. H. L. Terry. Notes the increased use of the "spread" strip in preference to "cut," and the reasons. Outlines the processes to which the raw material is subjected, and discusses longevity and other matters of interest. 1600 w. Elect'n, Lond—Aug. 23, 1901.

Steam Pipe Covering.—See STEAM PIPE COVERING.

Tape, Inflammability.—The Inflammability of Rubber Insulating Tape (Ueber die Entflammbarkeit Biegsamer Gummibandschnüre). J. Herzog and C. Feldmann. With diagram giving the results of tests as to the extent to which the conductor may become heated without igniting the insulation. 1000 w. Elektrotech Zeitschr—March 17, 1904.

See also DIELECTRIC; ELECTRIC MEASUREMENT; ELECTRIC TESTING.

Trolley Wires.—Measurements of the Insulation of Trolley Wires (Isolationsmessungen am Fahrdraht bei Strassenbahnen). H. A. Mork. Illustrated description of methods. 500 w. Elektrotech Zeitschr—Jan. 7, 1904.

See also ELECTRIC RAILWAY—Overhead Construction; INSULATOR; TROLLEY WIRE.

Varnish.—The Application of Insulating Varnish. Arthur B. Weeks. Gives ideas and suggestions from an extended experience. Ill. 1500 w. Steam Engng—Nov. 10, 1902.

See also Paint.

Varnish, Test.—Tests to Determine the Comparative Heat Conduction and Radiation of Insulating Varnishes. John C. Dolph. Describes tests made to determine the combined heat radiation and conduction of various varnishes, giving results. 1800 w. Elec Rev, N Y—April 1, 1905.

INSULATOR.

See also **ELECTRIC LINE; ELECTRIC RAILWAY—Overhead Construction; ELECTRIC TRANSMISSION; INSULATION; TROLLEY WIRE.**

The Insulation of Overhead Lines. W. B. Esson. Discusses the materials used, the design of insulators, illustrating and describing examples of recent practice. 2200 w. Engr, Lond—Oct. 6, 1905.

European Practice.—See also **ELECTRIC LINE.**

High Voltage.—The Evolution of High-Tension Insulators. Reviews the paper of V. G. Converse read before the International Electrical Congress. Also editorial. Shows the requirements which practice has shown to be necessary for the pressures now used, and gives illustrated descriptions of types, showing developments. 4200 w. Elec Wld & Engr—Dec. 3, 1904.

High-Tension Insulators. E. H. Craffer. An illustrated article considering insulators for high-presure wires, the requirements, etc. Serial. 1st part. 2500 w. Engng—March 17, 1905.

High-Tension Insulators. Illustrated description of the manufacture and electric testing. 3000 w. Elec Rev, N Y—June 3, 1905.

Porcelain.—The Electrical Properties of Porcelain Insulators at High Voltages (Die Elektrischen Grössen von Porzellanisolatoren bei Hoher Spannung). Rob. M. Friese. Experiments determining the resistance, leakage currents, capacity, etc., of different styles of insulators, with diagrams, illustrations and tables. 1500 w. Elektrotech Zeitschr—Dec. 17, 1903.

Porcelain Insulators: Their Manufacture and Testing. H. W. Crozier. Brief description of methods of manufacture and testing. 2300 w. Cal Jour of Tech—Oct., 1904.

The Use of Porcelain in the Manufacture of High and Low Tension Switch Gears. W. E. Warrilow. On the importance of this product as an insulator. 2000 w. Elec Engr, Lond—March 13, 1903.

See also **PORCELAIN—Electric Uses.**

Testing.—The Testing of Insulators. F. O. Blackwell. Notes and suggestions on the testing of insulators. 1800 w. Trans Am Inst of Elec Engrs—March 27, 1903.

Testing Laboratory.—The High-Voltage Testing Laboratory of the Hermsdorf-Klosterlausnitz Porcelain Works (Die Hochspannungsversuchsstation der Porzellanfabrik Hermsdorf-Klosterlausnitz). G. Ritter. Describing the methods of testing porcelain insulators for high-voltage transmission lines. 3000 w. Elektrotech Zeitschr—May 29, 1902.

Trolley.—Some Recommendations Concerning Electrical and Mechanical Specifications of Trolley Insulators. Samuel Sheldon and John D. Kelley. Gives results of tests made on samples obtained in the open market and recomendations concerning specifications of certain types. Ill. 1800 w. Trans Am Inst of Elec Engrs—July, 1903.

INSURANCE.

See also **FIRE HAZARD; INSPECTION.**

Boiler Explosion.—See **BOILER EXPLOSION—Insurance.**

Fire.—See **FIRE HAZARD.**

Inspection.—See **INSPECTION.**

Marine.—Insurance of Ships at Lloyds. Lawrence Irwell. Brief account of Lloyd's coffee house and other matters bearing upon the insurance of ships. 3200 w. Marine Rev—Dec. 11, 1902.

Workmen in Germany.—See **LABOR—Insurance.**

INTAKE.

See also **HYDRO-ELECTRIC PLANT; WATER POWER; WATERWORKS.**

Chicago.—See **TUNNEL; WATERWORKS.**

Cincinnati.—See **WATERWORKS.**

Cleveland, O.—The New Water Supply Tunnel of Cleveland, Ohio. Charles Goffing. Gives a brief résumé of the history of the East Side lake tunnel and its construction. 1500 w. Eng Rec—Dec. 12, 1903.

The Cleveland Water Supply Tunnel. S. J. Pierce. Presents observations made and results shown during the construction of a tunnel under Lake Erie. Geological features. 1800 w. Am Geol—Dec., 1901.

Defective Work in the Cleveland Water-Works Intake Tunnel. Describes the condition of the tunnel under Lake Erie, recently built. Ill. 1000 w. Eng Rec—May 23, 1903.

Cleveland Accidents.—The Accidents at the East Side Water-Works Intake Tunnel, Cleveland, O. Gives a full account of the accidents of Aug. 14 and Aug. 20, resulting in the loss of life. Ill. 2300 w. Eng News—Aug. 29, 1901.

Erie Waterworks.—The New Intake of the Erie Water Works. Describes the extension to the present intake which will draw the supply from Lake Erie instead of from from Erie harbor. Ills. 3500 w. Eng Rec—Oct. 14, 1905.

Flood.—Water Supply Intakes. Herbert E. Bellamy. Discusses particularly those rivers which are liable to large floods and where pumping is necessary. Considers the site of the intake, design, tunnel, etc. Ills. 1000 w. Public Works—April, 1905.

Ice.—See also **ICE.**

Ice, St. Louis.—Ice at the Intake of the St. Louis Water Works. Edward E. Wall. Describes the arrangements for protecting the intake tower from ice, and an account of the trouble during the severe weather of the past winter. Ills. 900 w. Eng Rec—April 15, 1905.

Ontario Power Co.—The Intake of the Ontario Power Co. Illustrates and describes a structure built entirely of concrete, with reinforced concrete in a large part of the work, and the methods of construction. 1500 w. Eng Rec—Aug. 12, 1905.

Painesdale, Mich.—Intake Tunnel for the Champion Mill, at Painesdale, Mich. F. W. O'Neil. Abstract of a paper for meeting of the Lake Superior Min. Inst. An illustrated description of the work, with reasons for the method adopted. 4500 w. Eng News—Oct. 1, 1903.

Quincy, Ill.—An Old Wood Stave Water Intake at Quincy, Ill. Edward Prince. Illustrates and describes a pipe, laid in 1887, and still in perfect condition. 900 w. Eng News—Nov. 2, 1905.

Richmond, Va.—See **ELECTRIC STATION.**

INTEGRAPH.

The Uses of the Integraph in Ship Calculations. John G. Johnstone. A short description of the nature of the work of the integraph, and how it can be applied to calculations relating to a vessel's form. Also a short description of the machine and the properties of integral curves. Plate. 4000 w. Trans Inst of Engrs & Shipbuilders in Scotland—March 22, 1904.

INTEGRATOR.

See also **CALCULATING MACHINE; INDICATOR DIAGRAM; PLANIMETER.**

Amsler's.—Amsler's Mechanical Integrators. Cecil H. Peabody. An illustrated explanation of this instrument for determining moments and moments of inertia of plane figures. 4000 w. Marine Engng—June, 1905.

Dynamometer Car.—A Mechanical Integrator Used in Connection with a Spring Dynamometer. Max H. Wickhorst. Illustrated description of an integrator designed by the author for use in the dynamometer car of the C. B. & Q. R. R., for the purpose of showing the average drawbar pull. 600 w. Trans Am Soc of Mech Engs, No. 875—Dec., 1900.

INTERCHANGEABILITY.

See also **FIT; GAUGE; JIG; MACHINE SHOP; MACHINE WORK; WORKS MANAGEMENT.**

Manufacture by the System of Interchangeable Parts. E. G. Parkhurst. Describes old methods of work, and the systems in use in the United States and Germany, and gives information of interest. Ill. 4300 w. Am Mech—Jan. 3, 1901.

Jigs and Fixtures.—Jigs and Fixtures for Interchangeable Manufacturing. Joseph V. Woodworth. An illustrated article considering the important factors, the various processes, etc. 3200 w. Ir Trd Rev—July 2, 1903.

Marine Work.—Interchangeability of Units for Marine Work. W. D. Forbes. Illustrations and suggestions concerning a proposed system. 1500 w. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

A Development of Recent Machine Shop Processes. W. M. Barr. A review of methods of producing interchangeable work in the general shop, with especial reference to marine-engine work. 3000 w. Engineering Magazine—Nov., 1904.

Repetitive Processes.—Repetitive Shop Processes and

Interchangeable Machine Parts. Barton Cruikshank. A discussion of the fundamental rules governing successful repetition work, with examples in illustrations. 3000 w. Engineering Magazine—Aug., 1901.

Symboling.—Symboling a Machine for Interchangeable Manufacture. F. W. McArdle. Describes a system with which the writer has had experience, which is particularly applicable to constructions that have many details. 2500 w. Amer Mach—Vol. 28, No. 19.

Tools.—Tools for Interchangeable Manufacturing. Joseph Vincent. The first of a series of articles illustrating and describing practical points about the design and construction of jigs, tools, and fixtures used for the duplication of machine parts, aiming to show how unnecessary expense and work may be avoided. Serial. 1st part. 2000 w. Mach, N Y—May, 1901.

INTERFEROMETER.

The Interferometer. H. G. Gale. Illustrated explanation of the principle of this instrument and the method of measuring very small distances and angles in terms of the wave length of light. Serial. 2 parts. 4000 w. Am Mach—July 11 and 18, 1901.

INTERLOCKING.

See also **GRADE CROSSING; RAILWAY SIGNAL; RAILWAY SWITCH.**

Interlocking Signaling. W. H. Patton. Read before the Engrs. Club of Toronto. Describes some signals now in use, showing their importance and reviews various forms and the development of the inter-locking system. 2500 w. Can Engr—Feb., 1902.

The Cost of Stopping Trains, Compared with the Cost of Maintenance, Operation and Inspection of Interlocking Plants. J. A. Peabody. Read at the convention of the Ry. Sig. Assn. Gives statistics showing the costs as derived from experiments, and tables showing the saving to be effected by interlocking plants. 1500 w. Eng News—Oct. 12, 1905.

Railroad Signals. B. B. Adams. Illustrated description of block and interlocking signals. 2200 w. Sci Am Dec. 13, 1902.

Recent Development of Block and Interlocking Signal System. W. H. Elliott. A review of recent changes made, both from the standpoint of the trainmen, and from the standpoint of the signal engineer. 2000 w. Loc Engng—Jan., 1903.

Interlocking Construction and Specifications. C. O. Tilton. Abstract of a paper read at the Railway Signaling Club, in Chicago. A brief review of the points of importance in the construction. 1200 w. Eng News—May 15, 1902.

Albany, N. Y.—Electro-Pneumatic Interlocking at Albany. Diagrams showing the tracks and signals, with explanatory notes. 600 w. R R Gaz—Oct. 24, 1902.

All Electric.—New System of All-Electric Interlocking. Illustrates and describes an installation at Millbury Junction, Ohio. 3800 w. Ry & Engng Rev—Feb. 18, 1905.

A New Interlocking Machine; the Pneumatic Signal Co.'s All-Electric Machine. An illustrated description of a machine recently introduced. 3000 w. Eng News—Jan. 14, 1904.

See also **Electric, Philadelphia.**

Am. Main. of Way Assn. Report.—See **RAILWAY SIGNAL.**

Antwerp.—Electric Interlocking of Switches and Signals at Antwerp Central Station. L. Weissenbruch. A review of the development of mechanically operated switches, the various systems, with illustrated detailed description of this installation and much information of interest. 26,300 w. Bul Int Ry Cong—Aug., 1904.

Electric Interlocking at the New Central Station in Antwerp. L. Weissenbruch. Describes the signal practice on the Belgian State Railway, explaining why the Siemens system was selected for Antwerp, and giving an illustrated description. Serial. 1st part. 7000 w. Ry Age—April 22, 1904.

Electric Interlocking. A letter from L. Weissenbruch, of the Belgian State Rys., referring to a former article of his on the Antwerp interlocking plant, with diagrams and editorial comment. 3000 w. Ry Age—Aug. 12, 1904.

Barking Becton, Eng.—See **LIGHT RAILWAY.**

Belgium.—A Cheap Method of Interlocking Switches and Signals. P. Grade. Describes a system of interlocking without placing the levers together in one cabin, or having to carry keys about. Gives applications, trials, and statement of advantages and cost. 3400 w. Ills. Bul Int Ry Cong—Nov., 1905.

See also **Antwerp.**

Chicago.—Harrison Street Low-Pressure Pneumatic Interlocking. Brief illustrated description of a plant installed in Chicago. 600 w. R R Gaz—Sept. 19, 1902.

Electric Interlocking for the C., R. I. & P. and the B. & O., at South Englewood, Chicago. Illustrated description of important installations in Chicago. 1500 w. Ry & Engng Rev—Sept. 28, 1901.

Electric Interlocking near Sixteenth Street, Chicago. Illustrated description of one of the largest plants ever installed in the United States. 1600 w. R R Gaz—July 12, 1901.

Low-Pressure Pneumatic Interlocking, C. & W. I. R. R., 16th Street Subway, Chicago. Illustrated description of a recently installed plant. 2300 w. Ry & Engng Rev—March 16, 1901.

See also **Taylor.**

Chicago Elevated.—Interlocking Plants of the Metropolitan Elevated Railway, Chicago. Illustrated description. 800 w. Ry Age—Jan. 13, 1905.

Electric.—Electric Interlocking at Bridge Junction. Illustrates and describes a plant in Illinois having features of particular interest, one of the switches being a mile from the cabin. 1200 w. R R Gaz—Aug. 15, 1902.

Electric Interlocking for the Texas & Pacific Ry., at Texarkana. Illustrated description of an all-electric installation where there are many grade crossings. 3000 w. Ry & Engng Rev—Jan. 9, 1904.

Supplying Electric Current for Interlocking Plants. C. C. Anthony. Describes a method of supplying current to interlocking switches and signals. 1800 w. R R Gaz—Vol. XXXVIII. No. 11.

Electric Locking for Levers of Interlocking Machines. How best to use electric locking and the advantages. Ill. 2200 w. Ry Age—June 12, 1903.

Electric Interlocking at the Lake Shore-Rock Island Terminal. Diagram of the yard at Chicago, with brief description. 500 w. R R Gaz—March 13, 1903.

See also **All Electric; RAILWAY SIGNAL;** and under names of places and systems.

Electric, Antwerp.—See **Antwerp.**

Electric Gare du Nord, Paris.—A Study of Some Interlocking Switch Systems. (Etude de Quelques Appareils Destinés à ne Libérer les Enclenchements qu'apres l'Achèvement des Mouvements). MM. Cossmann & Cuny. A description of the improved electrically operated interlocking system used in the train yard of the Gare du Nord at Paris. 6000 w. 2 plates. Rev Gen des Chem de Fer—Jan., 1903.

Electric, Philadelphia.—All-Electric Interlocking at Park Junction. Illustrated detailed description of a plant at Philadelphia in which all the functions are worked by electric power. 1200 w. R R Gaz—April 22, 1904.

Electro-Pneumatic.—Electro - Pneumatic Switches. Describes the plant recently installed at Bayonne, N. J., for the Central R. R. of New Jersey, for operating interlocking switches. Ill. 1200 w. Compressed Air—Aug., 1903.

See also **Albany; RAILWAY TERMINAL—Long Island City.**

Gauntlet Track.—Proposed Interlocking for a Gauntlet Track Arrangement. W. M. Torrence. Shows an arrangement designed by the writer for use in connection with work of lining the east end of Musconetcong tunnel on the Lehigh Valley R. R. 800 w. Ry & Engng Rev—March 15, 1902.

Grateley, Eng.—Pneumatic Interlocking on the London and Southwestern. Diagram and locking sheet showing the scheme of a signaling plant lately put in service at Grateley, 72 miles from London. 700 w. R R Gaz—Aug. 16, 1901.

Lake Shore-Rock Island.—See **Electric.**

Millbury Junction, O.—See **All Electric.**

Musconetcong Tunnel.—See **Gauntlet Track.**

N. Y. & Long Branch.—See **RAILWAY SIGNAL.**

N. Y. Central Station.—Interlocking at the Grand Central Station, New York. Illustrates and describes the system of pneumatic interlocking and its working, giving a statement of the conditions to be met. 1800 w. Ry Age (Spe. No.)—March 15, 1901.

N. Y. Subway.—See **RAILWAY SIGNAL.**

Northern Ry., France.—A Low-Pressure Pneumatic Interlocking Signal Station (Description d'une Cabine d'Enclenchements à Trajecteurs Pneumatiques à Basse Pression). E. Despons. Describing experiments on pneumatic signals made by the Northern Railway of France. 7500 w. Rev Gen d Chem de Fer—Oct., 1904.

Pittsburg.—New Interlocking Plant at the Pittsburg Terminal of the P. R. R. Illustrates the general layout of the tracks and the arrangement of the switch machines and signals. 400 w. Ry & Engng—March 15, 1902.

Rowell.—The New Manual Interlocking Machine. Illustrated description of a machine designed on the usual system of preliminary locking, but with the locking mechanism connected directly to the rockers. The invention of Benton C. Rowell. 1100 w. Eng News—Jan. 31, 1901.

St. Louis.—Interlocking at St. Louis. Illustrated description of the interlocking plant controlling the entrance and departure of trains to and from the Union Station. 3-page plate. 1200 w. Ry Age—Dec. 16, 1904.

Salisbury, England.—Low Pressure Power Interlocking at Salisbury, England. Drawings showing the layout of tracks with description of the working. 900 w. R R Gaz—April 3, 1903.

Specifications.—Standard Specifications for Mechanical Interlocking Material and Construction Work. Extracts from a set of specifications submitted at the annual convention of the Railway Signal Assn. at St. Louis. 2000 w. Eng News—Oct. 20, 1904.

Standard Arrangement of Signal. — See **RAILWAY SIGNAL.**

Switch Towers.—Interlocking Switch Towers (Cabines d'Enclenchments). M. Cossmann. A discussion of the arrangement of the tower for a number of levers as illustrated by the station at Amiens, and elswhere in France. 3500 w. Rev Gen d Chemins de Fer—Aug., 1902.

Taylor Electric.—The Taylor Electric Interlocking System. An illustrated detailed description of this system and its working. 5400 w. Eng News—Oct. 2, 1902.

Taylor Electric Interlocking at West Chicago, Ill. Illustrates and describes an interesting recent installation for signaling and interlocking, all the movements being controlled by electricity. 1600 w. Ry & Engng—March 16, 1901.

The Taylor Electric Signal System at the Railway Station of Pétange, Luxemburg (Note sur les Postes Electriques, Système Taylor, de la Gare de Pétange, Grand Duché de Luxembourg). M. Collot. Illustrated description of an interlocking switch and signal system at an important railway junction. 1 plate. 1800 w. Rev Gén Chemins d Fer—June, 1903.

Automatic Block Signals. Ralph Scott. An illustrated description of the Taylor electric interlocking signal. 4500 w. Am Elect'n—May, 1905. See also **Chicago.**

Texarkana.—See **Electric.**

Texas.—See **GRADE CROSSING.**

Time Lock.—See **GRADE CROSSING.**

Toledo.—Interlocking at Maumee River Bridge, Toledo. Illustrates and describes an interesting recently completed plant on the L. S. & M. S. Ry. 1400 w. R R Gaz—Nov. 21, 1902.

Train Order.—See **RAILWAY OPERATION; RAILWAY SIGNAL.**

INTERNAL-COMBUSTION ENGINE.

See **GAS ENGINE; GASOLINE ENGINE; MOTOR; OIL ENGINE.**

INTERNATIONAL CONGRESS.

See under specific headings.

INTERRUPTER.

See also **ELECTRO-PHYSICS; IN[illegible]ON COIL; MERCURY VAPOR LAMP; RADIOACTIVITY; RADIOGRAPHY; SPACE TELEGRAPHY.**

The Development of the Current Interrupter. J. Wright. A review of this important accessory of the induction coil from its commencement to the present. Ill. Serial. 1st part. 1800 w. Elec Rev, Lond—June 12, 1903.

A Study of Interrupters (Sur les Eclateurs). R. de Valbreuze. A general review of the development of modern interrupters, with especial reference to the production of Hertzian waves for space telegraphy. 10,000 w. Bull Soc Int d Electriciens—Nov., 1905.

Liquid Interrupters. James T. Sibley. Gives illustrated description of the Caldwell and Wehnelt types, and reports their use with good results on a gas engine. 800 w. Horseless Age—May 22, 1901.

Arc.—Electric Arc Interrupter (Lichtbogenunterbrecher). Dr. Hugo Mosler. Describing an arrangement of electric arcs in series for producing interruptions of high frequency for operating induction coils. 1200 w. Elektrotech Zeitschr—Dec. 1, 1904.

Carbon Electrolytic.—A Carbon Electrolytic Interrupter. A. H. Taylor. Describes a cheap, simple, self-adjusting instrument suited for continuous service. Ill. 1500 w. Elec. N Y—March 5, 1902.

Cooper Hewitt.—See **MERCURY VAPOR LAMP; SPACE TELEGRAPHY.**

Electrolytic.—See **ELECTRIC CURRENT RECTIFIER.**

Hārdén. — A New Electrolytic Interrupter (Ein Neuer Elektrolytischer Unterbrecher). John Härdén. An illustrated description of an interrupter on the Simon principle, but with a punctured porcelain insulator instead of a punctured glass plate. 800 w. Elektrotech Zeitschr—March 21, 1901.

Lecarme-Michel.—Direct Current Interrupters (Les Interrupteurs de Courant Continu de la Maison Lecarme Frères et Michel). Henry Denis. An illustrated description of a mercury interrupter, of a vibrating-strip interrupter and of an interrupter rotating in an insulating fluid. 3 parts. 4000 w. Electricien—Dec. 7, 14, 21, 1901.

Mercury.—A Simple and Efficient Mercury Jet Interruption for Röntgen Ray Induction Coils. R. H. Cunningham. An illustrated description of a convenient revolving mercury interrupter for use in the primary circuit of a Ruhmkorff coil. 1500 w. Elec Wld & Engr—Oct. 12, 1901.

A New Mercury Interrupter (Ein Neuer Quecksilberstrahl-Unterbrecher). An illustrated description of a current interrupter to be used in connection with induction coils for Röntgen ray work, in which a stream of mercury is broken at intervals in a liquid insulating material. 1000 w. Elektrotech Zeitschr—Feb. 6, 1902.

Mercury Vapor.—See **MERCURY VAPOR LAMP; SPACE TELEGRAPHY.**

Wehnelt.—Some Experiments on the Wehnelt Interrupter. M. A. Codd. An account of experimental investigations into the working of the electrolytic interrupter. 1600 w. Elec Rev, Lond—Nov. 15, 1901.

A Modified Wehnelt Interrupter Prof. A. L. Foley and R. E. Nyswander. Illustrates and describes an interrupter used for more than two years in the Indiana University Physics Laboratory with better results and less trouble than any others of the electrolytic type. 1000 w. Elec Wld & Engr—March 1, 1902.

INVAR.

See **ALLOY—Invar.**

INVENTION.

See also **ELECTRIC INVENTION; PATENT.**

Studies in Invention. Leicester Allen. Introduction to a series of problems of educational value, calling for solutions and stating requirements. The first problem is also given. Serial. 1st part. 1200 w. Am Mach—Vol. 27, No. 48.

Some Ingenious Inventions. Howard A. Coombs. Describes some simple inventions, showing great inventive ability, giving sketches. 1500 w. Am Mach—Feb. 6, 1902.

Commercial Development.—The Commercial Development of Inventions. James Swinburne. A very entertaining account of the difficulties that beset the average inventor, and a suggestion for a the average inventor, and a suggestion for a tions on terms fair to all parties. 4800 w. Page's Mag—Dec., 1902.

Commercial Value.—The Real Want and Commercial

Value of Potential Inventions. F. C. Fraentzel. Statements bearing on inventions as an investment and the real want and commercial value of patented inventions to both the inventor and investor, based on an experience of twenty years in obtaining letters-patent. 2500 w. Stevens Ind—Oct., 1905.

Economy.—See **ENGINEERING.**

Employee.—Relation of Employer and Employee in Reference to Inventions. Grafton L. McGill. Read before the Modern Science Club of Brooklyn, N. Y. Discusses various classes of relations between employer and employee and the doctrines tending to the general welfare. 2800 w. Am Mach—Feb. 4, 1904.

The Patent Rights of Employers and Workmen. Discusses how far an inventor is entitled to claim the fruits of the workman's labor and ingenuity, stating several cases in their legal aspect. 3500 w. Engr, Lond—Sept. 30, 1904.

Title to Inventions and Patents by Employees. Gives a form of agreement being used by a large engineering establishment, with editorial comment. 1400 w. Am Mach—April 2, 1903.

Labor Saving.—See **LABOR SAVING.**

Moulton Address.—Presidential Address before the Junior Institution of Engineers. J. Fletcher Moulton. Abstract of a valuable address on invention, the equipment of the inventor, the aims, etc. 6000 w. Engr, Lond—Jan. 29; 1904.

"Invention." Editorial review of an address by J. Fletcher Moulton as President of the Junior Inst. of Engrs. 2000 w. Engng—Jan. 29, 1904.

Parsons' Address.—Address to the Engineering Section of the British Association. Hon. Charles A. Parsons. Remarks on the subject of invention and patents, including discoveries in physics, mechanics, chemistry and geology. 6000 w. Engng—Aug. 19, 1904.

Railway.—See **RAILWAY INVENTION.**

Trust's Influence.—The Inventor and the Trust. William Stanley. Reprinted from the "Springfield Republican." Thinks the present methods adopted by the trusts, if uncontrolled, will stifle invention and retard progress. 2300 w. Elec Wld & Engr—March 28, 1903.

United States.—A Century of American Invention. Leon Mead. Reviews the history of the patent system, pointing out the manner in which certain inventions have increased the world's commerce, added to the comfort of the human family, and enlarged the opportunities of labor. 3000 w. Gunton's Mag—Aug., 1901.

INVENTORY.

See **COST-KEEPING—Inventory.**

ION.

See **ELECTRO-CHEMISTRY; ELECTRO-PHYSICS.**

IRON.

See also **BLAST FURNACE; CASTING; FOUNDRY; IRON ALLOY; IRON ANALYSIS; IRON GEOLOGY; IRON INDUSTRY; IRON METALLURGY; IRON MINE; IRON ORE; IRON REGION; MATERIALS' STRENGTH; METALLOGRAPHY; PIG IRON; STEEL; TESTING.**

Cast-Iron. Percy Longmuir. Reviews the constituent elements and their effect on the quality and the purpose to which the iron is adapted. 2800 w. Jour Am Found Assn—June, 1902.

Alloy.—See **ALLOY; IRON ALLOY.**

Building Material.—Iron. Prof. Aitchison. Some remarks on architecture and what it does for a country, and an interesting dissertation on the use of iron as a building material. Ill. Serial. 2 parts. 6800 w. Jour Royal Inst of Brit Archts—June 27 and July 25, 1903.

See also **STEEL CONSTRUCTION.**

Chemistry.—Chemistry of Cast-Iron. Herbert E. Field. Read before the New England Found. Assn. Discusses the composition and characteristics which make cast-iron so valuable a product, the causes of the reactions, &c. 3000 w. Ir Trd Rev—Nov. 17, 1904.

See also **Constitution; IRON ALLOY; IRON ANALYSIS.**

Chemistry and Physics.—The Chemistry and Physics of Cast-Iron. Continued discussion of Mr. Kreuzpointner's paper, entitled "Riddles Wrought in Iron and Steel." Ill. 8500 w. Jour Fr Inst—Nov., 1900.

The Chemistry and Physics of Cast-Iron. Continued discussion of Mr. Kreuzpointner's paper entitled "Riddles Wrought in Iron and Steel." 4200 w. Jour Fr Inst—Dec., 1900.

Characteristics of the Chemical and Physical Properties of Cast-Iron. Thomas D. West. A lecture delivered before Sibley College. Shows the utility of chemical analyses, and discusses the effects of treatment and composition. Ill. Serial. 1st part. 4000 w. Sib Jour of Engng—Jan., 1901.

Foundry Iron. Captain Henning. Showing that chemical and physical investigations are of value to the foundry industry and equally necessary at the blast furnace to secure reliable results. 1200 w. Jour Am Found Assn—Feb., 1901.

The Chemistry and Physics of Cast-Iron in the Light of Recent Knowledge. J. E. Johnson, Jr. A review of the advance made during the last three years, mentioning some important articles dealing with this subject which have appeared. Serial. 1st part. 2200 w. Am Mach—Oct. 8, 1903.

Note on the Further Discussion of the Physics of Cast-Iron. William R. Webster. A list of the contributions to the "Transactions" bearing on this subject, since 1895. 600 w. Trans Am Inst of Min Engrs—Feb., 1904.

Notes on the Physics of Cast-Iron. Richard Moldenke. A review of recent work on the physics of cast-iron showing the lines along which investigations have been made. 3000 w. Trans Am Inst of Min Engrs—Feb., 1904.

Chilled Ways.—See **MACHINE TOOL—Ways.**

Classification.—The Classification of Iron and Steel. Albert Sauveur. Read before the Am. Soc. of Test. Mat. Gives some classifications proposed, with opinions and comments. 3300 w. Ir & Steel Mag—Aug., 1904.

See also **Grading; PIG IRON—Grading.**

Cleaning.—See **FOUNDRY—Management; PICKLE; SAND BLAST.**

Constitution.—The Constitution of Cast-Iron, with Remarks on Current Opinions Concerning It. H. M. Howe. An attempt to select the most probable working hypothesis, in studying the relation between the chemical composition and physical properties of cast-iron, and some steps toward testing it. 7500 w. Trans Am Inst of Min Engs—April, 1901.

The Constitution of Cast-Iron, with Remarks on Current Opinions Concerning It. Discussion of Prof. Howe's paper. 2500 w. Trans Am Inst of Min Engrs—Feb., 1901.

The Constitution of Cast-Iron, with Remarks on Current Opinions Concerning It. H. M. Howe. A discussion of this paper presented at the Richmond meeting. 2500 w. Trans Am Inst of Min Engrs—Feb., 1901.

Notes on the Chemical Constitution of Cast-Iron and Steel. A. Carnot and E. Goutal. From "Annales des Mines.' An account of investigations dealing with the elements. 8000 w. Metallographist—Oct., 1901.

On the Constitution of Cast-Iron. Henry M. Howe. Read at meeting of the Am. Soc. for Test. Materials. A study of the relation between the composition and properties of cast-iron. Ill. 9500 w. Metallographist—July, 1903.

The Chemical Equilibrium of Ferro-Carbon Systems (Sur l'Equilibre Chiminque des Systêmes Fer Carbon). Georges Charpy et Louis Grenet. Discussion and experiments on the chemistry and constitution of combustions of iron and carbon. 500 w. Comptes Rendus—Jan. 13, 1902.

On the Equilibrium of Iron-Carbon Systems. G. Charpy and L. Grenet. Translated from the "Bulletin de la Société d'Encouragement." Experimental investigations of the constitution and chemistry of metals formed of combustions of iron and carbon. 1400 w. Engng—May 9, 1902.

Equilibrium of Iron-Carbon Systems. G. Charpy and L. Grenet. An illustrated account of experimental investigations, noting in particular the results on five castings containing practically the same amount of carbon, and in which the other elements exist in small quantities, except silicon, which is in variable proportions. 1600 w. Jour Fr Inst—Aug., 1902.

The Equilibrium Diagram of the Iron-Carbon Alloys (Sur le Diagramme d'Equilibre des Alliages Fer-Carbone). Georges Charpy. A study of the cooling curves of the iron-carbon alloys, with a view to determine the law of cooling. 1800 w. Comptes Rendus—Dec. 4, 1905.

Effect of Variations in the Constituents of Cast-

Iron. W. G. Scott. Read before the International Assn. of Test. Materials. Describing the influence of metalloids on cast-iron as observed under practical conditions, without regard to theory. 7000 w. Foundry—Sept., 1902.

The Allotropic Transformations of Iron and Its Alloys (Transformations Allotropiques du Fer et de ses Alliages). O. Boudouard. Data and results of experiments with numerous diagrams, tables, and a bibliography. 10,000 w. Bull Soc d'Encour—Oct. 31, 1903.

The Range of Solidification and the Critical Ranges of Iron-Carbon Alloys. H. C. H. Carpenter and B. F. E. Keeling. Researches testing the accuracy of conclusions reached in the paper by Prof. Bakhuis-Roozeboom. 2500 w. Ir & Coal Trds Rev—May 6, 1904.

Stable and Unstable Equilibrium in Iron-Carbon Alloys (Labile und Metastabile Gleichgewichte in Eisen-Kohlenstoff-Legierungen). E. Heyn. A study of the changes which occur among the iron-carbon alloys. illustrated with microphotographs, 5000 w. 1 plate. Zeitschr f Elektrochemie—July 22, 1904.

The Constitution of Iron-Carbon Alloys. E. Heyn. Translated from "Zeitsch. f. Elektro-Chemie." The writer's views regarding the phenomena occurring on the quenching and on the solidification of iron-carbon alloys. Serial. 1st part. 2000 w. Ills. Ir & Steel Mag—May, 1904.

The Influence of Carbon, Silicon, Manganese, Sulphur, and Phosphorus Upon the Formation of Temper Carbon in Iron (Der Einfluss von Kohlenstoff, Silizium, Mangan, Schwefel, und Phosphor auf die Bildung der Temperkohle in Eisen). F. Wirst and P. Schlosser. Data and results of tests showing the influence of the various constituents. 2000 w. Stahl u Eisen—Oct. 1, 1904.

The Two Forms of Carbon in Iron, Temper-Carbon and Graphite (Beiträge zur Kenntnis der Zwei Kohlenstofformen im Eisen. Temperkohle und Graphit). F. Wüst and C. Geiger. A study of the influence of heat treatment upon the combination of carbon in iron. Serial. 2 parts. Tables. 6000 w. Stahl u Eisen—Oct. 1, 15, 1905.

See also **Molecular Mobility; Phase Theory; IRON ALLOY; METALLURGY; STEEL.**

Corrugated.—Practical Applications of Corrugated Iron (Etude sur l'Emploi Pratique des Toles Ondulées). J. E. Delluc. With especial reference to the uses of corrugated iron for roofs and sides of buildings, with details of methods used in France and data of standard French sizes. 1500 w. Revue Technique—Dec. 10, 1902.

Crystalline Sulphide.—A Crystalline Sulphide in Pig-Iron. Andrew A. Blair and Porter W. Shriner. Describes investigations to isolate a suspected insoluble sulphide. 800 w. Trans Am Inst of Min Engrs—Nov., 1901.

Crystallization.—On the Crystallography of Iron. F. Osmond and G. Cartaud. An account of extensive experimental investigations with numerous illustrations. Serial. 1st part. 6000 w. Metallographist—April 1901.

The Crystalline Structure of Metals. J. A. Ewing and Walter Rosenhain. Describes investigations dealing principally with the phenomena of annealing. Ill. 9000 w. Metallographist—April, 1902.

Some Unusual Crystals of Cast-Iron. J. E. Johnson. Jr. Illustrates some interesting crystals, giving their analysis and an account of their origin. 1700 w. Metallographist—Jan., 1903.

Crystallization of Iron and Steel. William A. Doble's contribution to a discussion at the July meeting of the Pacific Coast Ry. Club, giving an account of the results of long and careful study. 7000 w. Ry Age—Sept. 4, 1903.

The Mechanical Properties of Iron in Isolated Crystals (Les Propriétés Mécaniques du Fer en Cristaux Isolés). F. Osmond and Ch. Frémont. Tests upon crystals of iron, showing the relation of strength to crystalline axes, and of fracture to the planes of cleavage. 1200 w. Comptes Rendus—Aug. 7, 1905.

See also **Wrought; METALLOGRAPHY.**

Cuba.—Cuban Iron. Editorial on the supplies of iron and manganese that the United States obtains from Cuba. 1100 w. Engng—Feb. 14, 1902.
See also **IRON ORE.**

Defects.—See CASTING.

Diseases.—The Diseases of Iron and Copper (Krankheitserscheinungen in Eisen und Kupfer). E. Heyn. An examination of the changes in the constitution of metals which may be compared to the diseases of living beings. 3500 w. Stahl u Eisen—Nov. 15, 1902.

Dynamo Frames.—Cast-Iron for Dynamo and Motor Frames. H. E. Diller. Read at meeting of the Am. Soc. for Test. Materials. Considers the requirements for use in dynamo and motor frames, and the problems it presents to the designer, especially as to its magnetic qualities. 1800 w. Ir Trd Rev—July 9, 1903.

See also **ELECTRIC MACHINERY; MAGNETIC TESTING.**

Electro-Chemistry. — See also **ELECTRO-METALLURGY—Iron and Steel.**

Expansion.—Does Iron Expand? H. Sayers. Gives the reasons for the writer's conclusion that iron expands. 800 w. Foundry—Sept., 1904.

Foundry.—Blast Furnace Conditions Affecting the Chemical Composition of Foundry Iron. W. Walley Davis. Defines some of the blast furnace conditions that contribute to, or cause changes in the chemical composition of iron. 2800 w. Jour Am Found Assn—June, 1903.

Blast Furnace Conditions and the Composition of Foundry Iron. W. Walley Davis. Read before the Am. Found. Assn. Discusses the important points in the manufacture of foundry iron. 3000 w. Foundry—Nov., 1903.

See also **Chemistry; Chemistry and Physics; CASTING; FOUNDRY; PIG IRON.**

Galvanized.—See **ELECTRO-GALVANIZING; GALVANIZING; METAL PROTECTION—Sherardizing.**

Grading.—Features and Characteristics of Iron and Steel. R. G. Griswold. Illustrated article discussing what may be learned from the appearance of fractures, and considering the grades of cast-iron, also wrought iron and steel. 2500 w. Power—Nov., 1903.

See also **Classification; PIG IRON.**

Hard.—Hard Cast-Iron. Henry Souther. Read before the Am. Soc. for Test. Materials. A brief account of trouble with very hard iron and the remedy. 800 w. Ir Tr Rev—July 13, 1905.

Heat Treatment.—The Micro-Structure and Physical Properties of Cast-Iron, as Affected by Heat Treatment, Especially in the Manufacture of Malleable Cast-Iron. A. T. Child and W. P. Heineken. Presents results of a series of experiments made in the metallurgical laboratory of Columbia University, New York City. Ill. 5200 w. Trans Am Inst of Min Engrs—Aug., 1900.

The Temperature Limits for the Separation of Graphite from Martensite in Pure Cast-Iron. Hugh P. Tiemann. Experimental work done in the Metallurgical Laboratory of Columbia University. 3900 w. Metallographist—Oct., 1901.

The Influence of Heating and Annealing upon the Resistance of Iron and Steel (Der Einfluss des Glühens und Abschreckens auf die Zugfestigkeit von Eisen und Stahl). A collection of the researches of Brinell, edited by Axel Wahlberg, discussing experiments made at the Fagersta Works, Sweden. 2500 w. Stahl und Eisen—Aug. 15, 1902.

Strength of White Iron Castings as Influenced by Heat Treatment. A. E. Outerbridge, Jr. Read at meeting of the Am. Soc. of the International Assn. for Test. Materials. Describes an unusual change observed in the chilled or white iron forming the "treads" of a number of wheels, and the cause; discusses the converting of white castings into "steel;" the differences found in white castings; and gives a résumé of experimental work in this field. 4000 w. Foundry—March, 1903.

See also **IRON METALLURGY.**

Investigations.—Recent Investigations and Discoveries in Cast-Iron. Alexander E. Outerbridge, Jr. Calls attention to hitherto unobserved properties as determined by experiments. Tabulated results, and discussion. Ill. 6800 w. Jour Fr Inst—Feb., 1904.

Low Temperatures.—The Effect of Liquid Air Temperatures on the Mechanical and Other Properties of Iron and Its Alloys. Sir James Dewar, and Robert Asholt Hadfield. Gives the more important results of a series of tests carried out on some five-hundred specimens of standard iron and iron alloyed with other elements. 4200 w. Sci Am Sup—April 15, 1905.

Experiments Relating to the Effect on Mechanical and Other Properties of Iron and Its Alloys

Produced by Liquid Air Temperatures. R. A. Hadfield. Read before the Iron & Steel Inst. An account of early and recent research work in this field. 11,000 w. Ir & Coal Trds Rev—May 12, 1905.

See also LIQUID AIR; LOW TEMPERATURE.

Magnetic Properties.—See Dynamo Frames; MAGNETIC TESTING; MAGNETISM.

Magnetic Testing.—See MAGNETIC TESTING.

Malleable.—Physical Development of Malleable Cast-Iron. C. Powers. Discusses the elements that effect physical standards, and the conditions to overcome. 3000 w. Foundry—Sept., 1901.

The Manufacturing of Malleable Iron. Joseph V. Woodworth. An account of methods employed at Hoosick Fals, N. Y., in a large shop for the manufacture of machine parts. 1500 w. Am Mach—July 17, 1902.

Malleable Cast-Iron. H. E. Diller. Describes the processes by which malleable iron is produced and gives information related. 1000 w. Jour Am Found Assn—Dec., 1902.

Malleable Cast-Iron. Dr. Richard Moldenke. On the properties, composition and structure, with directions for making malleable castings. 3200 w. Jour Am Found Assn—June, 1903.

Malleable Cast-Iron. Dr. Richard Moldenke. Read at the Milwaukee meeting of the Am. Found. Assn. Discusses the structure, composition, etc., of good malleable iron. 3700 w. Foundry—Dec., 1903.

See also Heat Treatment; CASTING—Gating; FOUNDRY.

Manganese.—See FOUNDRY; IRON ALLOY; MANGANESE.

Mechanical Engineering.—See MATERIAL.

Melting.—A Queer Phenomenon in Melting. G. P. Blackiston. Gives evidence supporting the statement that iron and steel melt from the inside, the outside being the last to be converted to a liquid state. Ill. 700 w. Ir Age—July 24, 1902.
See also FOUNDRY.

Meteoric, Sudan.—Meteoric Iron from N'Goureyma, near Djenne, Province of Macina, Sudan. E. Cohen. Description with analysis and illustrations. 2200 w. Am Jour of Sci—April, 1903.

Microstructure.—See METALLOGRAPHY.

Molecular Mobility.—The Molecular Mobility of Cast-Iron. Describes investigations made by Mr. Alexander E. Outerbridge, Jr., on cast and wrought iron subject to repeated heating and cooling. 4000 w. Ill. Engng—Jan. 8, 1904.

The Mobility of Molecules of Cast-Iron. A. E. Outerbridge, Jr. Supplementing an earlier paper. Describes investigations made which disprove the supposed fact that cast-iron under the influence of repeated shocks becomes brittle. Ills. 5500 w. Trans Am Inst of Min Engrs—Feb., 1904.

The Mobility of Molecules of Cast-Iron. A. E. Outerbridge, Jr. Gives some further investigations on the behavior of cast-iron, and calls attention to the effects of the Baltimore fire on this material. 1500 w. Trans Am Inst of Min Engrs—Feb., 1904.

See also Constitution; STEEL—Segregation.

Nitrogen.—Nitrogen in Iron and Steel. Ernst A. Sjostedt. A résumé of two articles in "Teknisk Tidskrift," written by Hj. Braune and Olas Bolin, which should be of interest to furnace managers. 3000 w. Ir Age—May 5, 1904.

The Influence of Nitrogen on Iron and Steel (Influence de la'Azote sur le Fer et l'Acier). Hjalmar Braune. Showing that combined nitrogen, taken up in the course of manufacture, is the cause of brittleness in iron and steel, with micrographs and a note by H. Le Chatelier. 2500 w. Rev de Métallurgie—July, 1905.

Paris Exposition.—See METALLURGY.

Phase Theory.—The Phase Theory of Iron and Steel (Le Fer et l'Acier au Point de Vue de la Doctrine des Phases). H. W. Bakhuis Roozeboom. A very complete discussion, translated, with comments, by Prof. Osmond. 20,000 w. Bull de la Soc d'Encour—Nov. 30, 1900.

The Application of the Phase Rule to Mixtures of Iron and Carbon (Ueber die Anwendung der Phasenlehre auf die Gemische von Eisen und Kohlenstoff). Dr. Bakhuis Roozeboom. With diagram, showing the temperatures and carbon content corresponding to the various iron-carbon alloys. 1000 w. Zeitschr f Elektrochemie—July 22, 1904.

Iron and Steel from the Point of View of the "Phase Doctrine." F. Osmond's remarks, and a note by H. le Chatelier accompanying a full French translation of Prof. Bakhuis Roozeboom's paper. Ill. 5300 w. Metallographist—April, 1901.

Iron and Steel from the Standpoint of the Phase Teory (Eisen und Stahl vom Standpunkte der Phasenlehre). H. von Jüptner. A review of the theory of Roozeboom, with reference to the criticisms of Osmond and Le Chatelier. 2500 w. Stahl und Eisen—Aug. 1, 1901.

See also Constitution; METAL.

Phosphorus.—See IRON ANALYSIS, METALLOGRAPHY.

Physics.—See Chemistry and Physics.

Piston Rings.—See PISTON RING—Cast-Iron.

Plastic Strain.—See MATERIALS' STRENGTH.

Pyromagnetic Properties.—See MAGNETISM—Temperature Changes.

Rusting.—The Rusting of Iron and Its Passive Condition (Ueber das Rosten des Eisens und Seine Passivität). M. Mugdan. A communication from Breslau University, giving a scientific discussion of the rusting of iron and of its passive state (when it does not enter into combinations) and the results of experiments. 7000 w. Zeitschr f Elektrochemie—May 28, 1903.

See also METAL CORROSION.

Scrap.—See SCRAP.

Sheet.—See MAGNETIC TESTING; SHEET METAL; WELDING—Sheet Iron.

Shot.—See FOUNDRY.

Silicon.—See IRON ALLOY.

Solidification.—See DIAMOND—Electric Furnace.

Solutions.—See Constitution; Phase Theory; METAL.

Specifications.—See STEEL SPECIFICATION.

Specific Heat.—See MAGNETISM—Temperature Changes.

Strength.—Experiments on the Crushing Resistance of Cast-Iron (Versuche über die Druckfestigkeit Hochwertigen Gusseisens). C. Bach. Data and results of tests, with especial reference to the dependence of strength to temperature. 1500 w. Zeitschr d Ver Deutscher Ing—Feb. 2, 1901.

Cast-Iron, Strength, Composition, Specifications. W. J. Keep. Shows strengths and chemical composition graphically and gives facts based on extensive tests. 5500 w. Trans Am Soc of Mech Engrs, No.029—June, 1904.

See MATERIALS' STRENGTH; STEEL; TESTING.

Sulphide.—Sulphide of Iron (Sulfure de Fer). MM. Le Chatelier & Ziegler. A study of the state in which sulphide of iron exists in cast-iron, and the nature of its influence upon the metal. 7000 w. Bull Soc d'Encour—Sept. 30, 1902.

Sulphur.—See CASTING.

Testing.—See TESTING.

Titanium.—See IRON ALLOY.

Tungsten.—See IRON ALLOY.

Wrought.—See also IRON METALLURGY.

Wrought, Crystallization.—Note on the Crystallisation of Wrought-Iron. Prof. J. O. Arnold. Plate and description of an example of crystalline structure of iron, from a wrought-iron bolt which had been broken after 30 years' use. 1000 w. Engr, Lond—Aug. 18, 1905.

Wrought, Structural Changes.—Structural Changes in Wrought Iron. H. Stillman. Relates only to manufactured, rolled, or what is commercially known as fibrous wrought iron, giving reports of tests and results. Discussion. Ills. 10,500 w. Pro Pacific Ry Club—Nov. 21, 1903.

IRON ALLOY.

See also ALLOY; IRON; IRON ANALYSIS; STEEL ALLOY.

Alloys of Iron. Discusses various metals of importance because of the beneficial properties they impart to steel. 1200 w. Am Mfr—May 22, 1902.

Iron and Steel Alloys. R. A. Hadfield. On the effect of various elements upon iron. 5200 w. Iron and Steel Met—Jan., 1904.

Calcium and Magnesium.—Calcium and Magnesium in Iron (Ueber einen Gehalt des Eisens an Calcium und Magnesium). Prof. A. Ledebur. An account of experiments showing that calcium and magnesium can combine with iron only in the electric furnace and in the presence of silicon. 1500 w. Stahl u Eisen—July 1, 1902.

Calcium and Silicon.—The Presence of Calcium in High Grade Ferro-Silicon. G. Watson Gray. Abstract of a paper read before the Glasgow Congress. Gives analysis of ferro-silicons containing calcium, describing work. 1500 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Copper.—See **ALLOY—Copper—Iron.**

Electro-Metallurgy. — See **ELECTRO-METALLURGY—Iron and Steel.**

Low Temperatures.—See **IRON.**

Manganese.—Effects of Variations in Manganese on Different Grades of Iron. Thomas D. West. Tabulated results from a wide range of experiments, with an outline of the method of testing. Ill. 2000 w. Jour Am Found Assn—June, 1901.

Effects of Variations in Manganese on Different Grades of Iron. Thomas D. West. Outlines the Method of testing and gives results. 2000 w. Ir Trd Rev—July 11, 1901.

A Study of Ferromanganese (Zur Kenntnis des Technischen Ferromangans). Th. Naske & A. Westermann. Discussing chemical analyses of commercial specimens of ferromanganese, showing the manner in which the constituents are combined. 3000 w. Stahl u Eisen—Feb. 15, 1903.

The Effect of Manganese in Low Silicon Cast-Iron. H. C. Loudenbeck. Read before the Am. Found. Assn. A report of tests made to show the effect of manganese on the chill and fracture of cast-iron having a low percentage of silicon. 1000 w. Am Mfr & Ir Wld—June 15, 1905.

The Effect of Manganese in Low Silicon Cast-Iron. H. C. Loudenbeck. Read at A. F. A. Convention. An account of tests made to show the effect of manganese on the chill and fracture of cast-iron having a low per cent. of silicon. 1000 w. Foundry—Sept., 1905.

See also **FOUNDRY; IRON; IRON ANALYSIS; MANGANESE; STEEL ALLOY.**

Nickel.—See **NICKEL STEEL.**

Nickel and Manganese.—Alloys of Iron, Nickel and Manganese. R. A. Hadfield. Read before the Engng. Con. of the Inst. of Civ. Engrs. Describes this alloy, which has shown remarkable properties. Gives results obtained in tests. 700 w. Ir & Coal Trds Rev—June 26, 1903.

Silicon.—Ferrosilicon in France. Information concerning ferrosilicon, manufactured by the electrical process, and a statement of the advantages of high-grade ferro-silicon. 1800 w. U S Cons Repts, No. 1713—Aug. 3, 1903.

The State of Silicon in Cast-Iron and in Low Ferrosilicon (Sur l'Etat du Silicium dans les Fontes et les Ferro-Silicums à Faible Teneur). P. Lebeau. A review of chemical researches showing the true combination existing between the silicon and the iron; confirming the results of metallographical investigations. 1200 w. Comptes Rendus —Dec. 9, 1901.

The Influence of Silicon upon Red Shortness (Ueber den Einfluss des Siliciums beim Glühfrischen). A. Ledebur. With tabulated data as to the effect of iron at a red heat. 1500 w. Stahl u Eisen—Aug. 1, 1902.

The Influence of Silicon on Iron. Thomas Baker. An account of research, having for its object the preparation of a series of alloys of silicon and iron, and a study of the microstructure, mechanical and physical properties. 2700 w. Ir & Coal Trds Rev—Sept. 4, 1903.

The Influence of Silicon on Iron (Der Einfluss von Silizium auf Eisen). F. Wüst. With microphotographs, showing the nature of the various iron alloys, and tables of the physical properties. 2500 w. Stahl u Eisen—May 1, 1904.

See also **Calcium; Manganese; FOUNDRY—Manganese; IRON; IRON ANALYSIS; STEEL ALLOY.**

Silicon, Sulphur and Carbon.—The Influence of Silicon and Sulphur on the Condition of Carbon in Cast-Iron. Henry M. Howe. A study of this subject, giving the author's results, and examining the results of other investigations. 3800 w. Trans Am Inst of Min Engs—Aug., 1900.

Silicon Explosions.—Explosions Produced by Ferro-Silicon. A. Dupre, and W. B. Lloyd. Gives the circumstances of the explosions, the cause, and precautions, to avoid future risk. 1400 w. Eng News—May 26, 1904.

Titanium.—Ferro Alloys. Auguste J. Rossi. Discusses their uses in the iron industry, especially considering titanium and its ferro combination in the electric furnace. Ils. 5000 w. Cassier's Mag—Sept., 1905.

Influence of Titanium on the Properties of Cast-Iron. Auguste G. Rossi. The writer's experience in using ores containing titanium, with report of tests made to show the effect of adding various quantities of ferro-titanium to ordinary foundry mixtures. 3600 w. Jour Am Found Ann—June, 1901.

Titanium Iron (Ueber Titaneisen). E. Bahlsen. An examination of the influence of titanium upon iron and the use of ferro-titanium in the manufacture of special steels. 1800 w. Stahl u Eisen —March 15, 1902.

See also **ELECTRO-METALLURGY—Iron and Steel; STEEL ALLOY; TITANIUM.**

Tungsten.—Alloys of Iron and Tungsten. R. A. Hadfield. Read before the Iron & Steel Inst. Abstract of the first part of this important paper, with the complete second part. A report of researches. Serial. 1st part. 4000 w. Engng—Sept. 14, 1903.

See also **STEEL ALLOY; TUNGSTEN.**

Vanadium.—Manufacturing and Metallurgy of Ferro-Vanadium. J. Baxeres de Alzugaray. Information about the properties this alloy imparts to iron and steel, and the progress made by this new industry. 1600 w. Min Wld—June 4, 1905.

Ferro-Vanadium. Dr. Ohly. Discusses properties of some alloys in iron and steel, especially the remarkable qualities of chromo-vanadium steel in regard to strength and ductility. 2500 w. Mines & Min—Nov., 1905.

See also **STEEL ALLOY; VANADIUM.**

IRON ANALYSIS.

See also **IRON; IRON ALLOY; MATERIALS' STRENGTH—Chemical Analysis; STEEL ANALYSIS.**

Contributions to the Analysis of Iron (Beiträge zu der Analyse des Eisens). Felix Bischoff. A discussion of the best methods for securing uniformity in the analysis of iron and steel, with diagrams and tables. Serial. 2 parts. 1 plate. 8000 w. Stahl u Eisen—July 1, 15, 1902.

The Analyzing and Grading of Iron Ores. Edward A. Separk. Abstract of a paper prepared for the meeting of the Lake Superior Min. Inst. Describes the methods used with the ores of the Oliver Iron Mining Co. The samples are taken underground. 2500 w. Eng News—Sept. 1, 1904.

Annealing Effect.—The Effect of Annealing Shot or Chilled Iron in the Determination of Phosphorus by the Permanganate Alkali Method. Charles E. Manby. Gives the method of analysis in detail. 1200 w. Pro Engrs' Soc of W Penn—April, 1902.

Evolution.—The Evolution of the Determination of Iron in Ores. Harrison W. Craver. A review of methods used from the earliest times to those now in common use. 3000 w. Pro Engrs Soc of W. Penn—May, 1903.

Foundry.—Some Troubles with Samples of Iron and Coke. George C. Davis. Read before the Phila. Found. Assn. Considers some of the sources from which disputes may arise, and how to avoid such difficulties. 1500 w. Ir Age—Dec. 17, 1903.
See also **FOUNDRY; IRON.**

Manganese.—Manganese in Iron and Steel. A. A. Read. A comparison of some methods for the determination of manganese in iron and steel. 900 w. Engng—Oct. 27, 1905.

See also **IRON ALLOY; MANGANESE—Spiegel.**

Phosphorus.—Notes on the Ammonium Molybdate Precipitation for Phosphorus. J. William Beatty. Gives some results recently obtained in the laboratory of the Sweet Steel Co., Syracuse, N. Y. 800 w. Ir Age—May 28, 1903.

See also **Annealing.**

Pig-Iron.—Note on the Occurrence of Copper, Cobalt and Nickel in American Pig-Irons. E. D. Campbell. Read before the Ir. & Steel Inst. Gives analyses of samples, mostly from charcoal or coke blast furnaces in the United States, to determine the extent to which copper, cobalt and nickel occurs in pig-iron made from ore found in the different districts. 800 w. Ir & Coal Trds Rev—Sept. 29, 1905.

See also Sulphur Standards; PIG IRON.

Silicon.—A Simple Device for Ascertaining the Average Silicon in an Iron Mixture. Arthur W. Walker. Illustration and brief explanation of the working of a device consisting of a balanced scale. 400 w. Jour Am Found Assn—June, 1903.

A Suggestion for a Test of the Effect of Silicon in Neutralizing Sulphur in Cast-Iron. J. E. Johnson, Jr. Suggests a cheap and simple method to be carried out at the foundry. 800 w. Am Mach—Oct. 29, 1903.

Standard Methods.—Standard Methods for Analyzing Iron. Herbert E. Field. A classification of the methods used in different laboratories, as collected by the Metallurgical Section of the Foundrymen's Assn. Serial. 2 parts. 5000 w. Jour Am Found Assn—April & May, 1903.

Standard Methods for Analyzing Iron. Outlines methods for separating and estimating carbon, phosphorus, and manganese. 13,600 w. Jour Am Found Assn—May, 1903.

Sulphur.—On a Calometric Method for the Estimation of Sulphur in Pig Iron. W. G. Lindsay. Describes method and compares the results with the regular method. 800 w. Sch of Mines Qr—Nov., 1901.

An Accurate Estimation of Sulphur in Iron by the Evolution Method. Harry E. Walters and Robert Miller. An explanation of methods, with report of results. 1000 w. Pro Engrs Soc of W Penna—March, 1902.

Sulphide of Iron: Its Properties and Its Conditions in Iron. H. Le Chatelier and M. Ziegler in "Bull. Soc. d'Encour." A study of the relations of sulphur with iron and manganese. Ill. 4000 w. Metallographist—Jan., 1903.

A Radically New Method for the Determination of Sulphur in Irons and Steels. H. B. Pulsifer. Describes a new method devised by the author, much more rapid than the two methods at present recognized. 1400 w. Ir & St Mag—Oct., 1904.

The Determination of Sulphur in Iron Ores. J. Howard Graham. Work undertaken to test statements made by Williams, and to determine the influence of ammonium chloride, hydrochloric acid, and ferric chloride in solution, on the precipitation of barium sulphate. 3300 w. Jour Fr Inst—June, 1905.

See also SLAG.

Sulphur Standards.—Loss of Sulphur in Borings of Pig or Cast Iron. W. E. Dickson. An account of the writer's experience showing that borings of pig or cast iron lose very appreciable amounts of sulphur on standing, and so are unsuitable for standards in iron analysis. 600 w. Jour Am Found Assn—June, 1903.

IRON CASTING.

See CASTING; FOUNDRY; IRON; PIG IRON.

IRON CORROSION.

See IRON—Rusting; METAL CORROSION.

IRON GEOLOGY.

See GEOLOGY; IRON ORE; MINERAL REGION.

IRON INDUSTRY.

See also COAL INDUSTRY; IRON METALLURGY; IRON MINE; IRON ORE; IRON WORKS; MINING AND METALLURGY; MINING INDUSTRY; PIG IRON; STEEL INDUSTRY.

The Iron Trade of the Leading Countries of the World. Statistical and other information relating to the recent development of the iron and steel trade of the world. The present article is a general survey of the existing situation. Serial. 1st part. 1500 w. Ir & Coal Trds Rev—Nov. 16, 1900.

Influence of Raw Materials, Transport, and Labor on Iron Making Costs in Great Britain, United States, and Germany. An examination of the comparative conditions under which the principal industrial nations carry on their great industries. 7700 w. Ir & Coal Trds Rev—May 6, 1904.

Some Statistics of the World's Iron and Steel Industries. William Pollard Digby. Statistics in regard to the respective supplies of iron ore in Germany and England as compared with the United States, showing the extent of the import and export trade in the United Kingdom, and the margin of profit of the iron industries. Also discussion. 8700 w. Jour Soc of Arts—May 6, 1904.

The Iron and Steel Industry. A review of the production, comparing the principal iron producing countries. 3000 w. Engng—Nov. 10, 1905.

American.—American Iron Works and Their Appliances (Amerikanische Eisenhütten und deren Hülfsmittel). Ernest Langheinrich. A descriptive review of the American iron industry, including transport and handling of ore, and the general auxiliary appliances to the manufacture. Serial. Part I. 3000 w. Stahl und Eisen—Sept. 15, 1901.

The Development of the American Iron and Steel Industries. Extracts from a report issued by James M. Swank. 2000 w. Col Guard—Oct. 11, 1901.

The Recent Development of the American Iron Industry (Die Neuere Entwicklung der Nordamerikanischen Eisenindustrie). E. Schrödter. A comparison of the iron industries of Great Britain, Germany, France, Austria, and Russia, with the United States, showing the raipd growth of the latter. 3000 w. Stahl u Eisen—March 15, 1902.

A Bird's-Eye View of Conditions in the Iron and Steel Industry. Editorial review of the present situation as presented in the recently issued "Directory of the Iron and Steel Works of the United States," and a comparison with the situation four years ago. 1800 w. Eng News—March 27, 1902.

The Old and New Iron Industry Compared. John Birkinbine. A brief resumé of the development of the iron and steel industry in the United States. 4200 w. Can Min Rev—April 30, 1902.

Future Markets for American Iron and Steel. Axel Sahlin. From the "Report on American Industrial Condition and Competition" by the British Iron Trade Association. 2200 w. Ir Age—Aug. 21, 1902.

The Foundations of the American Iron Industry. Archer Brown. A critical review of the causes, conditions and probable duration of the present era of prosperity in the American Iron Trade. 4000 w. Engineering Magazine—October, 1902.

Some Economic Conditions Affecting the American Iron and Steel Trades. J. Stephen Jeans. Read before the Conference of the British Iron Trade Assn. Discusses the recent development of the output and capacity, the influence of the steel corporation, etc., in the present article. Serial. 1st part. 2000 w. Ir & Coal Trds Rev—April 3, 1903.

American Iron Trade Outlook. Editorial discussion of the pig-iron situation in America, and commenting on editorials in the "N. Y. Times" and the "Iron Age." 1600 w. Engng—June 12, 1903.

Report of a Visit to the United States (Bericht über eine Studienreise nach den Ver. Staaten von Nordamerika). H. Macco. An account of a visit to the Minnesota ore deposits and the iron and steel furnaces of Western Pennsylvania; being a report to the Verein Deutscher Eisenhüttenleute. Two articles. 12,000 w. Stahl u Eisen—Jan. 15, Feb. 1, 1904.

Changes in the American Iron Industry Since the Iron and Steel Institute Meeting of 1890. B. E. V. Luty. Briefly reviews the more important changes that have occurred during fourteen years. 4500 w. Ir Trd Rev—Oct. 27, 1904.

See also COAL INDUSTRY; IRON METALLURGY; IRON WORKS.

American Census.—Census Report on Iron and Steel. Report for the census year 1900, aiming to give statistics not available for the Am. Ir. & Steel Assn's annual report. 7000 w. Ir Age—Aug. 28, 1902.

The Census of the Iron Ore Industry. A review of the special report for the Twelfth Census, prepared by John Birkinbine, showing the phenomenal growth. 6400 w. Ir Age—Sept. 15, 1904.

American Competition.—The Competition of the United States (Der Wettbewerb der Vereinigten Staaten). H. Schwabe. A review of the development of the iron and steel industries of the United States, showing the influence of its competition upon German trade. 3000 w. Glasers Annalen—Sept. 1, 1902.

See also **British vs. American; Europe, 1900; COMMERCE.**

American Cost.—The Cost of Producing Pig Iron in the United States. William B. Phillips. Discusses the cost in various districts and compares the results with foreign countries. 2500 w. Eng & Min Jour—Aug. 31, 1901.

The Future of American Iron Costs. B. E. V. Luty. A study of the cost of producing iron and steel in the United States, showing that the low costs of raw material before 1900 will not return. Also editorial. 4000 w. Ir & Coal Trds Rev—March 13, 1903.

American Exports.—The Distribution of Iron and Steel Exports in 1900. Statistics relating to the principal exports of iron and steel and manufactures of the same from the government official report. 1800 w. Ir Age—May 16, 1901.

American History.—The First Discovery and Use of iron ore in North America. Historical account. 1000 w. Eng News—June 13, 1901.

American vs. British.—See British vs. American.

Australasia.—Iron Making in Australasia. Information concerning the supply in New South Wales, Victoria, New Zealand, Tasmania and South Australia. 2800 w. Ir & Coal Trds Rev—April 12, 1901.

Australia.—Australian Iron and Iron Ore. John Plummer. Reviews the industry, its development and future outlook. 1500 w. Min Wld—Nov. 4, 1905.

Bell Address.—Sir Lowthian Bell on the Progress of the Iron Industry. Address before the Institution of Junior Engineers. 5000 w. Ir & Coal Trds Rev—Dec. 7, 1900.

British.—The Iron and Steel Industries of Great Britain—Their Conditions and Outlook. J. Stephen Jeans. Abstract of a lecture before the students of Birmingham University. Considers the conditions upon which success depends, and how far these are met. 3000 w. Ir & Coal Trds Rev—Dec. 5, 1902.

The Iron-Working Districts of Great Britain. The first of a series of articles on the present conditions and immediate outlook of the principal iron-making centers of the United Kingdom. Photographs of prominent men. Serial. 1st part. 1500 w. Ir & Coal Trds Rev—May 8, 1903.

The Future of the British Iron Trade as Affected by Pending Tariff Proposals. A discussion of the present situation and future outlook. 12,800 w. Ir & Coal Trds Rev—Sept. 4, 1903.

Mining Royalties and the Iron Trades. Some Conditions of Foreign Competition. T. Good. Discusses conditions in England detrimental to the iron industry. 2800 w. Engng Rev—June, 1904.

A French View of the English Iron Industry. E. de Billy and J. Milius, on "Revue de Metallurgie." Considers the natural conditions under which the industry has developed, the features of the different districts, and British equipment and organization. 2500 w. Ir Age—Sept. 1, 1904.

Great Britain's Iron Industry. T. Good. Discusses the production, imports, exports, etc., from a British point of view. 3000 w. Cassier's Mag—Nov., 1905.

See also **TARIFF.**

British and Foreign.—The Home and Foreign Iron and Steel Industries. Concerning the imports and exports of iron, steel and machinery. 4800 w. Ir & Coal Trds Rev—July 12, 1901.
fields. 7800 w. Cassier's Mag—Jan., 1904.

British, 1900.—The English Engineering and Iron Trades. The annual review issued by Bolling & Lowe, of London. 3000 w. Ir Age—Jan. 3, 1901.

British vs. American.—Britain and Her Competitors in Iron and Steel Making. E. Phillips. A comprehensive review of contrasting physical and economic conditions in Britain and America, with summary of their net influence on the cost of steel making. Serial. 1st part. 6500 w. Engineering Magazine—May, 1901.

Britain and Her Competitors in Iron and Steel Making. E. Phillips. A discussion of the causes of the wane of British supremacy in the manufacture of iron and steel, with suggested measures for checking the decline. 5000 w. Engineering Magazine—June, 1901.

Conditions Which Surround the Iron Producer in the United States and Great Britain Compared. George H. Hull. Begins a comparison of the manner of protecting against loss. Serial. 1st part. 5000 w. Ir Age—Jan. 28, 1904.
See also **COAL INDUSTRY.**

Canada, East.—The Development of Iron and Steel Industries in Eastern Canada. J. Stiven Barrie. Read at the West of Scotland Iron & Steel Inst. An illustrated account of these industries, the ore deposits and manufacture. 5700 w. Ir & Coal Trds Rev—Jan. 18, 1901.

The Coal and Iron Industries of Eastern Canada. J. Stiven Barrie. A paper read before the West of Scotland Iron & Steel Inst. A review of the development of these industries and their present condition. 3800 w. Col Guard—Feb. 15, 1901.
See also **STEEL METALLURGY; STEEL WORKS.**

Canada, West.—Iron and Steel for Western Canada. William Blakemore. Discussing the possibility of establishing a steel-making industry in British Columbia which would serve the West with cheaper iron and steel and yet realize a profit. 1800 w. Eng & Min Jour—Oct. 13, 1904.

Cast Iron.—The Economic Value of Cast Iron. W. H. Pretty. Abstract of a paper read before the Manchester (Eng.) Assn. of Engrs. Considers the most important applications of cast iron, the things that affect the product, the cost, etc. Serial. 1st part. 2200 w. Prac Engr—Dec. 23, 1904.

Chicago, 1900.—The Chicago Iron Trade in 1900. George W. Cope. A general review of conditions, prices, trade, etc. 5000 w. Ir Age—Jan. 3, 1901.

Chicago, 1901.—The Chicago Iron Trade in 1901. George W. Cope. A review of the year, which is reported as more active than any previous year. Discusses the conditions, the strike, consolidations, trade, prices, etc. 4800 w. Ir Age—Jan. 2, 1902.

Chicago, 1902.—The Chicago Iron Trade in 1902. W. T. Partridge. A review of the year, the new enterprises developed, the outlook for the coming year, and subjects of related interest. 15,000 w. Ir Age—Jan. 1, 1903.

Chicago, 1903.—Chicago Iron and Steel Trade in 1903. R. R. Shuman. A review of the past year and the outlook for 1904. 13,500 w. Ir Age—Jan. 7, 1904.

Cleveland, Eng.—The Industrial Progress of the Cleveland District. An account of the most important iron-producing centre of the British Isles, its ironstone resources and mining, system of working mines, etc. Ill. 3600 w. Ir & Coal Trds Rev—April 19, 1901.

Continental.—See Europe; France; Germany.

Dumping.—See also **STEEL INDUSTRY.**

Düsseldorf Exposition.—The Metallurgy of Iron and Steel (La Metallurgie du Fer et de l'Acier). Alexandre Gouve. A very complete review of the exhibits at the Düsseldorf exposition relating to the manufacture of iron and steel and the allied industries. 20,000 w. 6 plates. Rev Univ des Mines—Aug., 1902.

Iron and Steel at the Düsseldorf Exhibition, 1902. Prof. Hermann Wedding. Read at meeting of the Iron & Steel Inst. A review of the extensive display of the metallurgy of iron and machine construction. 3200 w. Engng—Sept. 5, 1902.

Metallurgy at the Düsseldorf Exposition, 1902 (Der Bergbau auf der Düsseldorfer Austellung 1902). H. Beckert. A review of the iron working exhibits, products and methods shown at the Düsseldorf exposition. Two articles. 1 plate. 6000 w. Glückauf—Aug. 16, 23, 1902.

The Iron Manufacturing Industry (Das Eisenhüttenwesen). Fr. Frölich. An illustrated review of the exhibits at the Düsseldorf exposition relating to the iron and steel industries. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 20, 1902.

See also **EXPOSITION—Düsseldorf.**

1899-1900.—The Revival and Reaction in Iron. Archer Brown, in "The Forum." History of the sudden rise and fall of the past two years, and the outlook for the future. 4400 w. Am Mfr & Ir Wld—Nov. 8, 1900.

Eight-Hour Day.—See LABOR.

Elba.—The Iron Industry on the Island of Elba (Die Eisenindustrie auf der Insel Elba). Fr. Poech. An account of the iron mines and furnaces. Map and geological sections. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—July 4, 1903.

See also **BLAST FURNACE; BLAST FURNACE GAS; IRON ORE HANDLING.**

Europe.—The Recent Development of the European Iron Industry. Reviews the history of the industry in Germany, France, Sweden and Norway, Russia, Belgium, Austria-Hungary and Spain. Photographs of prominent men. 9000 w. Ir & Coal Trds Rev—May 8, 1903.

Some Features of the Continental Iron Trade. Largely a review of the German trade during 1901, with tabulated information of the iron and steel exported from Germany to other countries. 1300 w. Ir & Coal Trds Rev—Feb. 14, 1902.

Europe, 1900.—The Situation in the Iron Trade of Europe. J. Stephen Jeans. A review of the last year and a statement of the present condition of the trade, and the effect of American competition. Ir Age—Jan. 24, 1901.

France.—Influence of the Exposition on the French Iron and Steel Industry. Henri Guérin. A review of the successive developments which have followed the various expositions, and a review of the present status of the iron and steel industries of France. 3500 w. Engineering Magazine—March, 1901.

See also **COAL INDUSTRY.**

German Coal Mines.—See **COAL INDUSTRY—German Iron Companies.**

German Exports.—German Iron Exports (Die Ausfuhrbestrebungen des Deutschen Eisengewerbes). An account of the efforts of the German iron trade to increase exports, with noteworthy results, and tables showing the exports of Germany, England, Belgium and the United States. 1500 w. Glückauf—April 19, 1902.

The Export Trade of the German Iron Industry in 1902 (Der Aussenhandel der Deutschen Eisenindustrie in Jahre, 1902). Statistics, tables and graphical diagrams, covering the past ten years. 1000 w. 3 plates. Stahl u Eisen—Feb. 15, 1903.

German Syndicates.—The German Syndicates and Their Influence on the Recent Panic. Gives facts from various industries, and shows that Germany has a combination of syndicates for the protection of business interests. 2800 w. Ir & Coal Trds Rev—July 25, 1902.

See **TRUST.**

German Tariff.—The Iron Tariff in the First Reading of the Tariff Commission (Die Eisenzölle in der I Lesung der Zolltarifcommission). The full tabular changes proposed in the German tariff on iron; with editorial comments. 3000 w. Stahl u Eisen—Aug. 15, 1902.

The New Tariff Duties (Der Neue Zolltarif). The full text of the sections of the new tariff law of Germany relating to iron and steel products. 6000 w. Stahl und Eisen—Aug. 15, 1901.

The New German Tariff Law (Das Neue Zolltarif-Gesetz). The full text of the new German tariff law, with note showing its bearing upon the iron and steel trade. 2500 w. Stahl u Eisen—Jan. 1, 1903.

Germany.—The Iron Industry in Germany from a Technical Point of View. W. Brügmann. Read at the Düsseldorf meeting of the Ir. & Steel Inst. Remarks on the progress in the manufacture of coke, and discussion of details in German blast furnaces. 2800 w. Ir Trd Rev—Oct. 23, 1902.

The Development of Pig Iron Manufacture in Germany since 1880 (Die Fortschritte in der Roheisenerzeugung Deutschlands seit 1880). W. Brügmann. Giving diagrams showing the enormous progress made in the past 20 years. Two articles. 7500 w. Stahl u Eisen—Sept. 15, 1902.

Twenty Years of the German Iron and Steel Industries. J. Stephen Jeans. A review of the progress of the various branches of the iron trade of the empire since 1880. Charts. 4500 w. Ir & Coal Trds Rev—Aug. 29, 1902.

The German Coal and Coke Syndicates and the Reaction in the Iron Industry. An explanation of the changed conditions of industry. 2400 w. Col Guard—April 26, 1901.

Production of Iron and Steel in Germany and Luxemburg (Zehnjährige Uebersicht der Gesamptproduktion an Eisen im Deutschen Zollgebeit einschl. Luxemburg). Statistical tables for the years from 1890 to 1900, of the production of iron ore, iron and steel. 400 w. Glückauf—Nov. 23, 1901.

The Iron Industries of Germany. Information concerning the iron ore, the iron works, general conditions and the market. 1000 w. U S Cons Repts, No. 1270—Feb. 19, 1902.

The German Iron Industry. Editorial review of the features of special interest, especially the increase of exports, and diminution of the imports. 1600 w. Engr, Lond—Feb. 14, 1902.

German Imports and Exports of Iron Ore, Iron, Iron Manufactures, Machines and Vehicles for 1900 and 1901 (Des Deutschen Zollgebietes Einfuhr begw. Ausfuhr von Eisenerz, Eisen, Eisenwaren, Maschinen und Fahrzenengen in den Jahren 1901 und 1900). Complete statistical tables. 3 plates. Stahl u Eisen—March 1, 1902.

Twenty-five Years of German Iron Industry (25 Jahre Deutscher Eisenindustrie). E. Schroedter. Address at the convention of the Verein Deutscher Eisenhüttenleute, with diagrams showing the progress of the iron and steel industries of various countries. 4500 w. Stahl u Eisen—May 1, 1904.

The Iron and Steel Industries of Germany in 1902. Herr Emile Schrödter. Report of general conditions, prices, exports, etc. 1300 w. Ir & Coal Trds Rev—Feb. 27, 1903.

The German Iron Industry in Competition for the Markets of the World (Ueber Die Deutsche Eisenindustrie und ihren Kampf um den Weltmarkt). Dr. Alexander Tille. A review of the influence of protection and free trade upon the export iron business of Germany. 5000 w. Zeitschr d Ver Deutscher Ing—Oct. 21, 1905.

See also **American Competition; Europe; Rhenish-Westphalia.**

Germany, 1900.—The German Iron Industry in the Year 1900. Emile Schrödter. A review of the production and trade. 2300 w. Ir & Coal Trds Rev—Jan. 11, 1901.

Great Britain.—See **British.**

Great Lakes.—See also **Lake Superior; COMMERCE—United States.**

Hadfield Address.—See **IRON METALLURGY.**

History.—Address of William Whitwell before the Iron and Steel Institute. Abstract. Reviews briefly the progress of the last century and discusses some of the problems awaiting solution, and other matters of interest to this industry. 4200 w. Col Guard—May 10, 1901.

Twenty-five Years of Engineering Progress in the Iron Industry. John Birkinbine. A review of advances, with sketches and photographs of prominent men engaged in the industry. 10,000 w. Ir Trd Rev—Nov. 14, 1901.

See also **American History; Pennsylvania History; Progress.**

India.—The Iron and Steel Industries of India. C. Ritter von Schwarz. Extract from a series of articles in "Stahl und Eisen." Reviews the enterprises to establish these industries and utilize the seams of coal and iron ore, and the causes of the failures. 2200 w. Ir & Coal Trds Rev—May 31, 1901.

The Iron Ores of India. An interesting article on the mineral industries of India, their early success, and the causes of the present unimportant position of the country in the production of this metal. 4700 w. Col Guard—Nov. 16, 1900.

Italy.—The Iron Industry of Italy (Die Eisenindustrie Italiens). Carl Brisker. With tabular statements of the output of the various districts and of the exports and imports of iron ore and pig iron. 5000 w. Stahl u Eisen—Oct. 1, 1905.

Japan.—Japanese Iron Works (Ueber den Japanischen Eisenhüttenbetrieb). A Ledebur. With illustrations of mines, furnaces and primitive equipment. 2500 w. Stahl und Eisen—Aug. 15, 1901.

The Japanese Iron Industry. An illustrated description of the smaller works in Japan, producing iron and steel in the old-fashioned way, and which has furnished the famed sword steel of the Japanese. 1000 w. Col Guard—Sept. 6, 1901.

See also **IRON WORKS.**

Lake Superior.—Lake Superior Ore Output. Editorial giving information concerning the wealth of iron ore from this region. 2000 w. Engng—Feb. 7, 1902.

Lake Superior Iron Trade During 1900. Dwight E. Woodbridge. Concerning the output and growth of the industry, the ore reserves, and the conditions of ownership and transportation. 3500 w. Mines & Min—Feb., 1901.

The Lake Iron Ore Industry. Dwight E. Woodbridge. Reviews the past year, and considers the outlook for the future. 4500 w. Ir Age—Jan. 3, 1901.

The Iron Ore Trade of the Lake Superior Region for the Year 1902. Horace J. Stevens. Reports the largest output ever made in one year. 2800 w. Mines & Min—Feb., 1903.

The Lake Ore Trade in 1903. Dwight E. Woodbridge. A review of the year, causes of abatement of demand, disappointment in explorations, shipments, etc. 2000 w. Ir Age—Jan. 7, 1904.

Developments in Lake Superior Iron Mining. Kirby Thomas. A review of the past year, giving chart showing fluctuations in iron and steel prices from 1895 to 1904. 2100 w. Min Wld—Jan. 21, 1905 (Special).

The Lake Superior Iron Ranges. Dwight E. Woodbridge. A review of the progress of the Lake Superior ore trade for 1904. 2000 w. Eng & Min Jour—Jan. 5, 1905.

The Lake Superior Iron Ore Trade in 1905. Dwight E. Woodbridge. A report of the most prosperous year yet recorded, the production exceeding the previous year by more than 6,000,000 tons. 4000 w. Ir Age—Dec. 28, 1905.

See also **IRON ORE; IRON ORE HANDLING; IRON ORE TRANSPORTATION; IRON REGION.**

Lake Superior Co.—See **ELECTRIC INDUSTRY; SAULT STE. MARIE.**

Lorraine.—See **Minette District; IRON ORE; IRON WORKS.**

Luxembourg.—The Development of the Iron Industry of Luxembourg Since 1879 (Der Werdegang der Eisenindustrie Luxemburgs seit 1879). Gustav Loose. A review of the iron industry of Luxembourg and its commercial relations to the markets of France and Germany. 3500 w. Stahl u Eisen—July 15, 1905.

See also **Minette District; IRON ORE.**

Martin Address.—See **IRON METALLURGY.**

Minette District.—The Iron Industry in the Minette District (Die Eisenindustrie des Minettebezirks). A tabulated view of the iron industry in the district included in Lorraine, Luxembourg, and Eastern France, with map. 2000 w. 1 plate. Stahl u Eisen—May 1, 1905.

See also **IRON ORE—Lorraine.**

Natal.—See **COAL INDUSTRY.**

1900.—Iron and Steel in 1900. Approximate estimate. 9200 w. Eng & Min Jour—Jan. 5, 1901.

Some Controlling Features of the Iron and Steel Trade in 1900. Reviews the production, consumption, prices and other features. 2200 w. Ir & Coal Trds Rev—Dec. 28, 1900.

Iron and Steel at the Close of the Nineteenth Century. James M. Swank. Extract from Mineral Resources of the United States, 1900. An account of the development and increase of production. 2200 w. Mines & Min—Feb., 1902.

See also **COAL INDUSTRY.**

1902.—Iron and Steel in 1902. Articles by Frederick Hobart and others, reviewing the enormous production of the year and matters of related interest. 9500 w. Eng & Min Jour—Jan. 3, 1903.

1903.—Iron and Steel in 1903. Frederick Hobart. A review of production, consumption, progress, condition affecting the output, exports and imports, markets, etc. 10,500 w. Eng & Min Jour—Jan. 7, 1904.

1904.—The Iron Industry in the Year 1904 (Das Eisenhüttenwesen im Jahre 1904). Dr. B. Neumann. A review of the output of the principal iron-producing countries of the world, discussing the conditions from a German point of view. 7500 w. Glückauf—July 29, 1905.

Nova Scotia.—See **Canada, East; STEEL METALLURGY—Canada; STEEL WORKS—Cape Breton.**

Ontario.—Iron and Steel Making in Ontario, Canada. Reviews the recent development of this industry, and describes some of the plants. 3400 w. Ir & Coal Trds Rev—Aug. 23, 1901.

Pennsylvania History.—Early Iron Enterprises in Cambria, Somerset, Westmoreland and Indiana counties, Pa. James M. Swank. Historical summary, giving facts of interest. 500 w. Am Mfr & Ir Wld—Nov. 1, 1900.

Philadelphia, 1900.—The Philadelphia Iron Trade. Thomas Hobson. Annual review of new plants and enlargements. 3400 w. Ir Age—Jan. 3, 1901.

Pittsburg, 1900.—The Pittsburg Iron Trade in 1900. Robert W. Walker. Reviews the general features of the year, the labor troubles, new construction, foreign trade, etc., and the outlook. 13,500 w. Ir Age—Jan. 3, 1901.

Philadelphia, 1902.—The Philadelphia Iron Trade. Thomas Hobson. A review of the past year, discussing features of interest. 3700 w. Ir Age—Jan. 1, 1903.

Philadelphia, 1903.—The Philadelphia Iron Trade. Thomas Hobson. A review of the past year and a discussion of the prospects of ensiung year. 5000 w. Ir Age—Jan. 7, 1904.

Pittsburg, 1901.—The Pittsburg Iron Trade in 1901. Robert A. Walker. A review discussing the general features, consolidations, foreign trade, new construction, labor troubles, prices, the outlook, etc. 1200 w. Ir Age—Jan. 2, 1902.

Pittsburg, 1902.—The Pittsburg Iron Trade in 1902. Robert A. Walker. General review of conditions, new construction, finished material, prices, etc. 9700 w. Ir Age—Jan. 1, 1903.

Pittsburg, 1903.—The Pittsburg Iron Trade in 1903. Robert A. Walker. A review of the year, the general features, construction, price agreements, foreign trade, labor troubles, etc., considering also the outlook for 1904. 6500 w. Ir Age—Jan. 7, 1904.

Poland.—See **COAL INDUSTRY.**

Production.—See **IRON ORE.**

Progress.—The Progress of the Iron and Steel Industries. Leysbon D. Thomas. Extracts from a presidential address delivered before the So. Staffordshire Ir. & Steel Inst. 4500 w. Col Guard—Nov. 2, 1900.

Railway Influence.—Iron in Railway Service (Das Eisen in der Eisenbahn nach Beschaffenheit, Form und Masse). Dr. A. Haarmann. A paper before the International Congress of Applied Chemistry, giving a general review of iron and steel in their relation to railways, of iron and steel rails and of the growth of railways. 6000 w. Stahl u Eisen—June 15, 1903.

Rhenish-Westphalia.—The Iron Industry in the Rhenish Westphalian Coal Region (Die Eisenhüttenindustrie im Rheinisch-Westphälischen-Kohlenrevier). Abstract from the "Allgem. Deutscher Bergmannstag." A historical and up-to-date review of iron and steel manufacture in this part of Germany. Serial. 2 parts. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 8, 15, 1902.

The Present Condition of the Iron and Steel Industries of Westphalia (Etat Actuel des Industries du Fer et de l'Acier dans les Provinces du Rhin et de la Westphalia). A. Gowry. An exhaustive review of the metallurgical industries of Rhenish Prussia, with tables and numerous illustrations. 30,000 w. 5 plates. Mem Soc Ing Civ de France—Jan., 1903.

See also **Düsseldorf Exposition; Germany; Siegerland.**

Russia.—The Mining and Metallurgical Industries of Southern Russia. H. L. Geissel. Illustrations of the largest blast furnaces ever built in Russia, with an account of the principal iron-producing district. 800 w. Min & Met—May 1, 1901.

The Present State of the Russian Metallurgical Industry (Zur Gegenwärtigen Lage der Russischen Montanindustrie). Dr. Neumark. A review of the Russian iron and steel and allied industries, with statistical tables. 3000 w. Stahl u Eisen—March 1, 1902.

The Iron Industry of Russia (Russische Eisenindustrie). A review of the present output of iron and steel, with data as to costs and quality. Two articles. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 13, 20, 1904.

The South Russian Iron Industry. Archibald P. Head. Gives results of recent investigations of these industries, having had exceptional facilities for examining them from a metallurgical as well as a commercial standpoint. Maps, illustrations and discussion. 8000 w. Jour Soc of Arts—Dec. 19, 1902.

See also **Ural; COAL INDUSTRY; MINING AND METALLURGY; RUSSIA.**

St. Louis Exposition.—See **IRON WORKS—Marquette, Mich.**

Scotland.—Iron and Steel Industries of the West of

Scotland. I. Henry Burnby. II. William Wylie. Discusses pig and malleable iron industries, the materials, by-products, etc. 4500 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Siegerland, Prussia.—The Iron Industry of the Siegerland. An illustrated historical account of this district in regard to the iron industry. There are 21 works, with 33 blast furnaces, with an annual output of about 700,000 tons of pig iron. 2200 w. Ir & Coal Trds Rev—Dec. 12, 1902.

Small Manufacturers.—See **STEEL INDUSTRY.**

Spain.—Coal and Iron in Spain. Information relating to imports and exports. 1500 w. Col Guard—July 12, 1901.

Development of Iron Ore Mining and its Manufacture in the Central Portion of the North of Spain. John Alcock Jones. A review of the provinces of Lugo, and Leon, and the principality of Austrias. Maps. Serial. 1st part. 2400 w. Ir & Coal Trds Rev—April 5, 1901.

The Spanish Iron Ore Industry. Information concerning this industry in the province of Biscay, the geological formation, system of mining, treatment of the ore, transport, price, etc. 2000 w. Col Guard—May 24, 1901.

Notes on the Iron Ore Deposits of Bilbao, Northern Spain. Frank D. Adams. Read before the Applied Science Society of McGill Univ. Information concerning these deposits, their value, the workings, etc. 2800 w. Can Engr—Aug., 1901.

The Present State and Outlook of the Iron Trade in Spain. A report of progress, with a discussion of the industry and its possibilities. Serial. 1st part. 2800 w. Ir & Coal Trds Rev—Jan. 6, 1905.

See also **IRON ORE.**

Sweden.—Some of the Iron and Steel Industries of Sweden. Robert W. Hunt. A lecture delivered before Sibley College. Briefly reviews the history of this important industry and describes visits paid to a few of the mines and works. 6500 w. Sib Jour of Engng—March, 1901.

The Swedish Iron, Steel, Metal and Coal Industries in 1900. The report for the year is reviewed. 2000 w. Ir & Coal Trds Rev—Aug. 16, 1901.

The Swedish Iron and Steel, Metal and Coal Industries. Report for the year 1899. 2200 w. Engr, Lond—Jan. 18, 1901.

See also **IRON ORE; IRON WORKS.**

Swedish Lapland.—See **IRON ORE—Sweden.**

Tariff, Germany.—See **German Tariff.**

Texas.—The Iron Industry of Texas, Present and Prospective. Edwin C. Eckel. Gives information concerning the commercial and engineering phases of the Texas iron industry. 3000 w. Ir Age—Aug. 24, 1905.

United States.—See **American.**

U. S., Eastern, 1901.—The Eastern Iron Markets. Thomas Hobson. A review of the year, considering pig iron, billets, exports, finished material, old material, etc. 3300 w. Ir Age—Jan. 2, 1902.

United States History.—See **American History.**

U. S., Southern, 1903.—A Review of the Southern Iron Trade in 1903. James A. Green. A review by months of the record of the last year. 4400 w. Ir Age—Jan. 7, 1904.

Ural.—The Iron and Steel Industries of the Urals. G. Kamensky. A review of this industry, the output and methods. The pig-iron is smelted exclusively on charcoal fuel. 1400 w. Ir & Coal Trds Rev—Feb. 1, 1901.

The Iron Industry of the Southern Urals (La Sidérurgie dans l'Oural Méridional). M. A. Gouvy. An account of the existing furnaces and a description of the riches of the region and its need of railway communication. 15,000 w. 3 plates. Mem Soc Ing Civ de France—May, 1901.

The Manufacture of Pig Iron in the Southern Urals Die Grundlagen zur Roheisenerzeugung im Südlichen Ural). A. Gouvy. With map of the region and data concerning the present manufacture. Vast beds of ore would be made available if railways were built. 2500 w. Stahl u Eisen—July 1, 1901.

The Tagil Iron District in the Urals (Der Eisenhüttenbezirk Tagil im Ural). H. Tittler. A résumé prepared from the exhibits at the Paris Exposition of the Tagil district of Southern Russia, including description of mines, furnaces and steel works. 4000 w. Stahl und Eisen—May 15, 1901.

See also **Russia.**

Virginia, Pyrites.—Pyrites Mining and Milling in Virginia. Robert K. Painter. Gives some average costs, discussing value of deposits, size of concentrate, dressing, etc. 1000 w. Eng & Min Jour—Sept. 9, 1905.

Warrant System.—See **PIG IRON—Warrant System.**

World's Supply.—See **IRON ORE.**

IRON METALLURGY.

See also **BLAST FURNACE; CASTING; FOUNDRY; IRON INDUSTRY; IRON MINE; IRON ORE; IRON WORKS; METALLURGY; PIG IRON; STEEL METALLURGY; STEEL WORKS.**

Manufacture of Iron and Steel. R. R. Neild. Read before the Canadian Ry. Club. Gives a brief outline of this important industry. 2500 w. Can Engr—July, 1902.

A Problem in the Metallurgy of Cast Iron. Dr. Richard Moldenke. How to overcome the dissolved oxide of iron found in the pig and scrap is discussed, and other difficulties. 1200 w. Ir and Steel Met—Jan., 1904.

An Introductory Outline of the Metallurgy of Iron and Steel. Albert Sauveur. From advanced sheets of a work soon to be published. Considers the conditions which must be fulfilled to extract metallic iron from ores, and the chemical and physical principles involved. 4400 w. Ir & Steel Mag—Jan., 1905.

Descriptive Metallurgy of Iron and Steel. Samuel Groves. The present number briefly reviews the progress of the stone age, bronze age, and iron age. Ils. Serial. 1st part. 1400 w. Can Engr—July, 1905.

American.—Changes in the Manufacture of Pig Iron as Illustrated by the Development of the American Blast Furnace. John Birkinbine. Reviews the history of the manufacture of iron in the United States, showing the development and progress. Illustrations and discussion. 3800 w. Pro Engrs' Club of Phila—July, 1902.

American Costs.—See **IRON INDUSTRY.**

Australia.—Iron Smelting at Nowa Nowa (V.). Henry C. Jenkins. From the report of the government metallurgist, giving information concerning conditions and cost. Serial. 1st part. 1500 w. Aust Min Stand—July 4, 1901.

Iron in Australia. W. H. Harrison. Reviews the history of past attempts at iron manufacture in Australia, with the conclusion that the Australian ores can be reduced to fibrous or wrought iron more readily than to cast or pig iron. 1600 w. Aust Min Stand—May 29, 1902.

Blooming Mill.—Blooming Mill of the Röchling Iron and Steel Works. Translated from "Stahl und Eisen." Illustrated description. 1200 w. Engng—April 10, 1903.

British.—British Improvements in Iron and Steel Making. An address delivered before the Staffordshire Iron & Steel Inst., by Mr. Walter Macfarlane. 4700 w. Engr, Lond—Nov. 13, 1903.

See also **IRON INDUSTRY.**

British History.—Iron and Its Early Manufacture in England. A. R. Bell. A brief review of the early history of iron working in England. Ils. 2000 w. Mach, N Y—Dec., 1904.

See **Hadfield Address; FURNACE.**

Cape Breton.—See **IRON INDUSTRY—Canada, East; STEEL WORKS.**

Cort.—See **CORT.**

Desulphurization. — Experimental Desulphurization. Reginald Meeks. Describes experiments made with manganese ore, and considers the use of low sulphur materials, and the use of ferro-manganese in the ladles or in the cupola to be the only positive methods of obtaining low sulphur in castings. 2000 w. Ir Age—Nov. 9, 1905.

Direct.—The Direct Production of Iron (Unmittelbare Eisenerzeugung). C. Otto. From the "Chemische Zeitung." An addition to former articles of the author, describing a process of producing iron direct from the ore in a closed furnace under pressure. 700 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 26, 1902.

See also **ELECTRO-METALLURGY—Iron and Steel; STEEL METALLURGY.**

Dry Air Blast.—See **BLAST FURNACE.**

Duluth, Minn.—Concentration of Mesabi Iron Ores.

Dwight E. Woodbridge. An account of the experimental work being made by the Canisteo Mining Company, of Duluth, and describing the ore deposits. 1400 w. Eng & Min Jour—June 16, 1904.

See also **ELECTRIC FURNACE; ELECTRO-METALLURGY.**

Electric Power.—See **ELECTRIC DRIVING—Iron and Steel Works.**

Fine Ore.—Treatment of Finely Divided Iron Ore. Prof. Léonce Fabre, in "Revue de Chimie Industrielle." Describes the principal processes now followed. 1500 w. Sci Am Sup—Nov. 7, 1903.

Fuel Consumption.—The Fuel Consumption in Iron Making (Ueber die Brennstoffverluste im Eisenhüttenbetrieb). A. Bergstrom. A discussion of possible sources of fuel economy in iron works, especially in connection with gaseous fuel. 1800 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 30, 1901.

Germany.—See **IRON INDUSTRY.**

Hadfield Address.—Presidential Address at the Annual Meeting, in London, of the Iron & Steel Institute. R. A. Hadfield. Reviews the history of the manufacture of iron and steel. 21,000 w. Ir & Coal Trds Rev—May 12, 1905.

Presidential Address Delivered Before the Iron and Steel Institute. R. A. Hadfield. Abstract of address delivered May 11, 1905. A history of iron and steel manufacture. 8000 w. Engng—May 12, 1905.

Hardening.—See **Tempering; HARDENING; STEEL METALLURGY.**

Lancashire.—See **Swedish Lancashire.**

Magnetic Separation.—See **MAGNETIC SEPARATION.**

Magnetite.—See **IRON ORE.**

Martin Address.—Presidential Address to the Institution of Mechanical Engineers. Edward P. Martin. On some of the improvements applied to the manufacture of iron and steel, which have greatly increased the output and reduced the cost of production. 6500 w. Engr, Lond—April 21, 1905.

Mixer.—Modern Pig Iron Mixers (Neuere Roheisenmischer). J. Nockher. Illustrating and describing various forms of mixers used in Luxembourg and Westphalia. 1800 w. Zeitschr d Ver Deutscher Ing—March 22, 1902.

A 325-Ton Hot-Metal Mixer. Arthur C. Johnston. Illustrates and describes the chief features of a very successful vessel of this capacity. 900 w. Eng News—April 3, 1902.

See also **FOUNDRY.**

Nodulating.—A Process for Converting Fine Iron Ores into Nodules. Illustrates and describes the plant and process. 2000 w. Ir Age—Sept. 7, 1905.

Ore Roasting.—The Roasting of Iron Ores (Ueber das Rösten von Eisenerzen). Oscar Simmersbach. A discussion of the effect of roasting in driving off the volatile impurities in iron ore, and an examination of the ores adapted to this treatment. 3000 w. Glückauf—April 22, 1905.

See also **Pyrites Roasting; ORE TREATMENT.**

Pennsylvania.—Modern Methods of Making Iron and Steel. Brief review of the history, showing Pennsylvania's part in their introduction. 2000 w. Bul of Am Ir & St Assn—Sept. 10, 1904.

Puddling.—The Chemical Phenomena of Puddling. L. Cubillo. An account of experimental researches undertaken to ascertain whether the oxidation of the metalloids and metals which occurs in the cast-iron is caused by the oxygen of the oxidizing coating of the furnace, or by the oxygen of the gases which come from the hearth. Describes the entire operation. Ill. 3200 w. Ir & Coal Trds Rev—Nov. 30, 1900.

Puddled Iron and Mechanical Means for the Production of Same. James P. Roe. Also discussion by Joseph Hartshorne. An explanation, with illustrations, of the process developed by the writer. 3500 w. Trans Am Inst of Min Engrs—Feb. and May, 1902.

The Roe Mechanical Puddling Process. Joseph Hartshorne. Describes this process and the recent improvements introduced. 3800 w. Ir Age—June 15, 1904.

See also **Wrought Iron.**

Pyrites Roasting.—Kernel Roasting. Herman Poole. Describes the various stages of roasting of pyrites, and the explanations of the causes of the action as given by various writers. Ills. 3200 w. Am Inst of Min Engrs—Sept., 1905.

Pyrites, Virginia.—See **IRON INDUSTRY—Virginia—Pyrites.**

Roasting.—See **Ore Roasting; Pyrites Roasting; ORE TREATMENT.**

Roe Puddling Process.—See **Puddling; Wrought Iron.**

Ruthenberg Electric.—See **ELECTRO-METALLURGY—Iron and Steel.**

Sweden.—See also **IRON ORE; MAGNETIC SEPARATION.**

Swedish Lancashire.—The Swedish Lancashire Iron. Birger F. Burman. Discusses points in the manufacture of "Lancashire" iron made in Sweden, which is often called "the best iron in the world." 2700 w. Ir Age—July 16, 1903.

Tempering.—On the Tempering of Iron Hardened by Overstrain. James Muir. Abstract of a paper communicated by Prof. Ewing, read before the Royal Soc. The work described is a continuation of that described in a paper by the present author, "On the Recovery of Iron From Overstrain." 1500 w. Engng—Jan. 25, 1901.

Victoria.—See **Australia.**

Washing.—See also **IRON ORE—Washing, Alabama.**

Wicksteed Lecture.—See **MECHANICAL ENGINEERING.**

Wrought Iron.—The Manufacture and Characteristics of Wrought Iron. Taylor Allderdice. A communicated discussion of the paper by James P. Roe, read at the May meeting. 1200 w. Am Inst of Min Engrs—Sept., 1905.

The Manufacture and Characteristics of Wrought Iron. James P. Roe. Briefly outlines the history of the manufacture of wrought iron, and discusses mechanical puddling, reactions of the puddled process, the structure of puddled iron, resistance to oxidation, defects of wrought iron, and the conditions essential to successful puddling. 4500 w. Am Inst of Min Engrs—July, 1905.

The Manufacture and Characteristics of Wrought Iron. A discussion of the paper by James P. Roe, read at the Washington meeting, May, 1905. 7000 w. Am Inst of Min Engrs—Sept., 1905.

See also **Puddling; IRON.**

IRON MINE.

See also **IRON INDUSTRY; IRON ORE; MINERAL REGION.**

Alabama.—Iron Mining in the Birmingham District, Alabama. W. R. Crane. An illustrated article describing the deposits, methods of mining, ore handling, haulage, etc. 3300 w. Eng & Min Jour—Feb. 9, 1905.

Alquife, Spain.—The Alquife Iron Ore Mines, in the South of Spain. George Harley Bulmer. Describes these mines and their working. 1000 w. (No. 3496.) Inst of Civ Engrs.

Bilbao, Spain.—The Bilbao Iron Mines. C. Mackay-Heriot. Outlines the history of these Spanish mines, describing the geological conditions, ore occurrence, methods of extraction, etc. Ill. 2800 w. Eng & Min Jour—Oct. 3, 1903.

The Iron Ore Industry at Bilbao. Editorial discussion of the situation at these noted Spanish mines, the recent strike, the working, quality, etc. 1500 w. Engng—Dec. 18, 1903.

Biwabik, Minn.—The Biwabik Ore Mine. An illustrated summary of work accomplished in opening this iron mine of the Mesaba range, by the stripping process. 1600 w. Ir Age—Dec. 13, 1900.

British Columbia.—Pyrites Mine, Red Gulch Creek, Skeena Division. W. F. Best. Illustrated description of a remarkable deposit of iron pyrites. 500 w. B C Min Rec—Aug., 1902.

Durango, Mex.—See **IRON WORKS.**

Grangesberg, Sweden.—The Grangesberg Iron Mines in Sweden. J. W. H. Hamilton. Illustrated description of the methods of working, electric power being largely used, and modern appliances. 2800 w. Eng & Min Jour—May 18, 1905.

Hartville, Wyo.—The Iron Mines of Hartville, Wyoming. H. M. Chance. Gives the general characteristics, and detailed description of the openings. 7000 w. Trans Am Inst of Min Engs—Aug., 1900.

Hodbarrow, Eng.—See **SEA BARRIER.**

Iowa.—Iowa's Iron Mine. S. W. Beyer. Describes Iron Hill and its deposits, discussing the nature and origin of the ore, and the outlook for the industry. 2000 w. Eng & Min Jour—Feb. 22, 1902.

Mesaba, Minn.—Mining Methods in the Mesaba Iron District, Minnesota. Kirby Thomas. An illustrated description of mining principally by the open-cut method with steam shovels. 2500 w. Min & Sci Pr—April 16, 1904.

See also **Biwabik; IRON ORE.**

Michigan.—The Arragon Mine at Norway, Michigan. E. S. Dickenson. A description of the mine, the machinery used and manner of working. Ill. Mines & Min—June, 1901.

Mineville, N. Y.—Magnetite Deposits at Mineville, N. Y. Heinrich Reis. Describes the ore bodies, and the new electric concentrating plant. Ill. 2000 w. Mines & Min—Sept., 1903.

The Mineville Magnetite Mines. Illustrates and describes recent improvements of the mining and separating plant of Witherbee, Sherman & Co., Port Henry, N. Y. 8000 w. Ir Age—Dec. 17, 1903.

Minnesota.—See **Biwabik; Mesaba; Vermillion; COPPER; IRON ORE.**

New Jersey.—The Revival of Iron Mining in New Jersey. F. W. E. Mindermann. Reports the working of the Wharton and other mines with improved appliances, giving the yield of the mines now being worked. 1100 w. Eng & Min Jour—Jan. 25, 1902.

Philippine Island.—See also **IRON ORE.**

St. Lawrence, N. Y.—Pyrite Mining in St. Lawrence County, New York. Robert B. Brinsmade. Gives the location of these mines and describes the development of the three producing mines. 1800 w. Eng & Min Jour—Oct. 28, 1905.

Scandinavia.—See **IRON ORE.**

Spain.—See **Alquife; Bilbao; IRON ORE.**

Swedish Lapland.—See **IRON ORE—Sweden.**

Tennessee.—The Smith Mine, Tennessee. N. W. Buckhout. The location and quality of the ores, which are limonite, or brown ore, and the methods of mining, cleaning and handling them are described. 2200 w. Mines & Min—Feb., 1902.

Test Drilling.—See **DRILLING.**

Vermilion, Minn.—Methods of Mining in the Vermilion Iron District of Minnesota. Kirby Thomas. Illustrates and describes the working of these mines as examples of the best art in mining. 1600 w. Min & Sci Pr—Feb. 20, 1904.
See also **DRILLING; IRON ORE—Minnesota.**

Wyoming.—The Sunrise Iron Mines in Wyoming. John Birkinbine. Illustrations with brief description. 1600 w. Ir Age—Feb. 6, 1902.

IRON MIXER.

See **IRON METALLURGY—Mixer.**

IRON ORE.

See also **IRON; IRON INDUSTRY; IRON MINE; IRON REGION; IRON SAND; MINERAL REGION; MINING INDUSTRY.**

Africa, Northwest.—The Iron Ore Deposits of Northwest Africa (Die Eisenerzlagerstätten Nordwestafrikas). Hr. Baum. An illustrated account of iron ore deposits and mines in Morocco, Algiers and Tunis. Map. 1 plate. 7000 w. Stahl u Eisen—June 15, 1903.

Alabama.—Brown Hematite Ores. W. R. Crane. On the methods of prospecting, mining, and washing the soft iron ores of the Birmingham district, Alabama. Ills. 4500 w. Mines & Min—April, 1905.

America.—See **United States.**

Appalachian.—See **Limonite.**

Belgium.—Black Band Deposits in the Campine Coalfield. B. Schulz-Briesen. Concerning the deposits of black band iron ore in association with the coal, and the indication of a co-relation between this Belgian field and those of Dudley and Cleveland in England. Map. 1200 w. Ir & Coal Trds Rev—Jan. 27, 1905.

Brazil.—The Iron Ores of Brazil. H. Kilburn Scott. Describes the deposits which the writer considers probably the most important known iron ore deposits in the world. Gives also information concerning their manufacture. 4000 w. Ir & Coal Trds Rev—May 9, 1902.

The Iron Ores of Brazil. Herbert Kilburn Scott. Abstract of a paper read before the Inst. of Min. & Met., London. Information concerning very large deposits of fine quality. 1300 w. Eng & Min Jour—Dec. 6, 1902.

Briquetting.—See **BRIQUETTING.**

British Columbia.—British Columbia Iron and Coal. W. M. Brewer. A description of the various known deposits, their locations, qualities, and the extent of development. 4700 .w. Mines & Min—Aug., 1902.

The Iron Ores of British Columbia. H. Mortimer Lamb. A fully illustrated account of the development of a new industry on the Pacific coast of America. 3000 w. Engineering Magazine—Dec., 1900.

The Bull River Iron Mines. C. Hungerford Pollen. An illustrated detailed description of this property, with remarks on its profitable working. 1500 w. B C Min Rec—May, 1903.

Brown Hematite.—See **Limonite.**

Canada.—See **Ontario; COAL REGION.**

Chromic.—See **CHROMITE.**

Colorado.—Colorado Iron Ore Deposits. James Angus Snedaker. On the iron resources of this State, suitable for steel manufacturing. 1000 w. Eng & Min Jour—Feb. 16, 1905.

The Iron Ore Deposits of Gunnison County. Dr. J. Ohly. Describes the deposits, and gives analyses, discussing the outlook for the development of this field. 1700 w. Min Rept—Nov. 21, 1901.

Cuba.—The Iron Ores of Santiago, Cuba. Arthur C. Spencer. Observations concerning the occurrence and origin of these ores. Ill. 2200 w. Eng & Min Jour—Nov. 16, 1901.

Duddon Estuary, Eng.—The Probability of Iron Ore Lying below the Sands of the Duddon Estuary. James Leslie Shaw. Gives some undoubted facts in support of the assumption that there are deposits of good quality and quantity, describing the faulting, and suggestions for exploration work. 2700 w. Ir & Coal Trds Rev—Sept. 4, 1903.

Georgia.—Notes on the Fossil Iron Ores of Georgia. S. W. McCallie. Describes the deposits, their chemical composition and methods of mining. Ill. 1700 w. Eng & Min Jour—Dec. 29, 1900.

Georgian Bay, Canada.—Occurrence of Hematite North of Little Current, Georgian Bay. S. Dillon-Mills. Describes the geology of the region, the minerals found, and discusses the chances for making the mining a financial success. Ills. 2200 w. Can Min Rev—Nov., 1905.

Gogebic vs. Mesaba.—See **Mesaba vs. Gogebic.**

Hematite.—The Clinton Hematite. Edwin C. Eckel. Gives results of a recent investigation of these ores, with analyses. Ills. 1800 w. Eng & Min Jour—May 11, 1905.

See also **Georgian Bay; Limonite; New York; New Zealand.**

India.—See **IRON INDUSTRY.**

Lahn Valley, Germany.—The Probable Duration of Iron Mining in the Lahn and Dill Districts, Germany (Die Muthmassliche Dauer des Fortbestehens des Eisenerzbergbaues, der Lahn und Dillreviere). An abstract of a memoir on the canalization of the Lahn, describing the iron geology and iron ores of these districts in Nassau, Germany. 1600 w. Stahl u Eisen—March 1, 1902.

Lake Superior.—First Half Century of Lake Superior Ore Mining. Horace J. Stevens. Reviews the history of this region, the present condition and future outlook. 2800 w. Am Mfr—Jan. 3, 1901.

The Original Source of the Lake Superior Iron Ores. J. E. Spurr. An account of the writer's investigations and the conclusions drawn. 5400 w. Am Geol—June, 1902.

The Lake Superior Iron Ore Mines. L. Douglass Anderson. A description of the important mines of this region, methods of mining, development, discovery, etc. Ill. 6000 w. Technic—1902.

The Lake Superior Iron Region. Report of production during the past year, with general information of exploration work, systems of mining, and related matters. 3000 w. Eng & Min Jour—Jan. 14, 1904.

Investigations on the Lake Superior Iron Ore Deposits. U. S. Grant. Gives points of interest concerning the results of the survey of these iron districts. Ills. 3200 w. Min Mag—Sept., 1904.

A New, Promising Lake Superior Iron District. Kirby Thomas. Describes the Cuyuna district in Minnesota. Map. 2300 w. Min Wld—Nov. 5, 1904.

A Summary of Lake Superior Geology with Special Reference to Recent Studies of the Iron-Bearing Series. C. K. Leith. Description of the geology of the iron-bearing and copper-bearing series, their structure and distribution, etc. Ills. 19,300 w. Am Inst of Min Engrs—Sept., 1904.

Genesis of Lake Superior Iron Ores. Charles Kenneth Leith. A summary of conclusions presented in U. S. Geol. Surv. monographs, with a report of later work and a summary of the general geology of the ores and ore-bearing series. 7500 w. Ec Geol—Oct., 1905.

See also **Mesaba; Minnesota; Moisture; IRON INDUSTRY; IRON MINE; WHITE.**

Lapland.—See **Sweden.**

Limonite.—The Preparation of Brown Hematite Iron Ores. F. Lynwood Garrison. Explains the fundamental principle of log washers or trommels, and gives an illustrated description of a plant designed by the writer. 1100 w. Eng & Min Jour—June 16, 1904.

Origin of the Oriskany Limonites. J. B. Johnson, Jr. A record of facts and observations taken principally from the Virginia brown ore fields, giving an explanation of the occurrence of these ores. 3000 w. Eng & Min Jour—Aug. 15, 1903.

Chemical Charactertistics of Limonite (Brown Hematite) Iron Ores. F. Lynwood Garrison. Discussion, with analytical tables, of ores in the Paleozoic rocks of the Appalachian system. 1600 w. Eng & Min Jour—Aug. 18, 1904.

The Genesis of Limonite Ores in the Appalachians. F. Lynwood Garrison. A geological study. 2800 w. Eng & Min Jour—Sept. 22, 1904.

See also **New York; IRON GEOLOGY.**

Lookout Mountain, Ala.—The Origin of Clinton Red Fossil-Ore in Lookout Mountain, Alabama. William M. Bowron. Gives the theory advanced to explain these deposits, personal investigations, a statement of the geological conditions, conclusions, etc. Ills. 6500 w. Am Inst of Min Engrs—Nov., 1905.

Lorraine.—The Minette Deposits of Lorraine (Die Minetteablagerung des Lothringischen Jura). Dr. Kohlmann. An illustrated comprehensive geological review of the extensive oolitic iron ore deposits of Lorraine, in Southern Germany, Northern France, Luxemburg and Belgium. Serial. 1st part. 4500 w. Stahl u Eisen—May 1, 1902.

The Iron Ore Deposits of Lorraine (Das Lothringsche Eisenerzlager). Dr. O. Lang. A geological study of the important ore deposits of the district, showing the extensive developments of the last decade. Two articles. 3 plates. 7000 w. Glückauf—July 11, 18, 1903.

The Oolitic Iron-Ore Deposits of Lorraine. From an article by Mons. L. Bailly, in the "Annales des Mines." Describes the deposits and the methods of working, cost, etc. 4500 w. Ir & Coal Trds Rev—April 21, 1905.

See also **IRON INDUSTRY—Minette.**

Luxemburg.—Hydrographic and Geological Notes upon the Ore Deposits in Southern Luxemburg (Hydrologisch-Geologischer Beitrag zum Minette-Vorkommen in Süd-Luxemburg). K. Limpach. With sections of strata and a colored geological map showing iron ore deposits. 3000 w. 1 plate. Stahl und Eisen—Sept. 15, 1901.

See also **IRON INDUSTRY.**

Magnetite.—See also **IRON MINE—Mineville, N. Y.**

Magnetite, New Jersey.—Genesis of the Magnetite Deposits in Sussex Co., New Jersey. Arthur C. Spencer. Shows the geologic relation of these magnetites, and the manner in which they were formed. 2000 w. Min Mag—Dec., 1904.

Magnetite, Sweden.—See **Sweden.**

Magnetite, Utah.—See **Utah.**

Menominee, Lake Superior.—The Menominee Range. John L. Buell. Abstract of a paper read before the Lake Superior Min. Inst. Gives some reasons why the discovery of these iron ore deposits were belated, an account of the discovery, and theories of the formation. 1500 w. Ir Age—Dec. 7, 1905.

Mesaba.—The Mesaba Range. Cyril Brackenburg. An illustrated description of the ore and also of the open pit, the caving and the milling methods of mining. 3000 w. Mines & Min—Nov., 1900.

The Mesaba Range. Reviews a report prepared by Charles K. Leith for the U. S. Geol. Surv., considering the origin and development of the ore deposits of this iron-bearing district. 4000 w. Ir Age—Oct. 23, 1902.

Notes on Recent Work on the Mesaba Iron Range. Dwight E. Woodbridge. Information concerning the exploration work on this range. 1000 w. Eng & Min Jour—Aug. 8, 1903.

The Mesaba Iron Ore Range. Dwight E. Woodbridge. Begins a history of this important district. Ills. Serial. 1st part. 2000 w. Eng & Min Jour—Jan. 12, 1905.

See also **Lake Superior; IRON METALLURGY—Duluth.**

Mesaba vs. Gogebic.—A Comparison of the Origin and Development of the Iron Ores of the Mesaba and Gogebic Iron Ranges. Kenneth Leith. Abstract of a paper presented to the Lake Superior Min. Inst. Outlines and compares certain conclusions reached by the U. S. Geol. Survey. 2700 w. Ir Age—Dec. 4, 1902.

Mexico.—Some Notes on the Cerro Mercado. Oliver Cummings Farrington. Illustrations and information of this hill in Mexico, which is largely made up of solid iron ore. Considers its origin, the uses made of the ore, etc. 2000 w. Eng & Min Jour—Sept. 1, 1904.

See **COAL REGION.**

Minette.—See **Lorraine; IRON INDUSTRY.**

Minnesota.—Sketch of the Iron Ores of Minnesota. N. H. Winchell. An account of explorations, production, geological relations, origin of the ores, &c. 2200 w. Am Geol—March, 1902.

The Vermillion Iron Range in Minnesota. D. E. Woodbridge. A brief account of the exploration in progress. 900 w. Eng & Min Jour—Feb. 14, 1903.

Vermilion Iron-Bearing District of Minnesota. Kirby Thomas. A review of the fifth monograph on this region by the United States Geological Survey. Ills. 2200 w. Mines & Min—June, 1904.

See also **Lake Superior; Mesaba; IRON MINE.**

Moisture.—Moisture in Lake Superior Iron Ores. N. P. Hulst. Read before the Lake Superior Mining Inst. Discusses whether it will pay to remove partially the excessive moisture before shipping. 1500 w. Ir Age—Aug. 28, 1902.

New Jersey.—See **Magnetite.**

New Mexico.—Iron Deposits of the Chupadera Mesa. Charles R. Keyes. Describes the geological conditions under which these deposits were formed, and the conditions which have exposed them to view. 900 w. Eng & Min Jour—Oct. 20, 1904.

New York.—Geological History of the Hematite Iron Ores of the Antwerp and Fowler Belt in New York. W. O. Crosby. Ill. 2500 w. Tech Qr—Sept., 1901.

Geological History of the Hematite Iron Ores of the Antwerp and Fowler Belt in New York. W. O. Crosby. 2800 w. Am Geol—April, 1902.

Brown Hematite Deposits of Eastern New York and Western New England. Edwin C. Eckel. A study of the deposits in the counties of Dutchess and Columbia, N. Y.; Berkshire, Mass., and Litchfield, Conn. Ills. 2800 w. Eng & Min Jour—Sept. 15, 1904.

New Zealand.—Iron Ores and Sands of New Zealand. Sir James Hector. Brief description of the ores and statement of where they are found. 1000 w. N Z Mines Rec—May 16, 1902.

The Parapara Hematite Deposits. Extracts from Geological Survey reports, giving information in regard to these deposits and their probable origin and value. 3800 w. N Z Mines Rec—Dec. 16, 1902.

The Great Deposit of Iron Ore at Parapara, New Zealand. James MacIntosh Bell. An illustrated article describing extensive deposits of hematite ore. 1200 w. Ir Trd Rev—Nov. 23, 1905.

Nodulating.—See **IRON METALLURGY.**

Norway.—Norway as an Iron-Producing Country (Norwegen als Eisen Erzeugendes Land). Otto Vogel. A review of the iron production of Norway, and a discussion of its future development. Serial. Part I. 4000 w. Stahl und Eisen—Nov. 15, 1900.

See also **Sweden.**

Nova Scotia.—The Iron Ores of Nova Scotia. Abstract from summary report of Geological Survey of Canada (Ottawa, 1905). Gives information concerning the iron ores of Nictaux and Torbrook, Annapolis Co., N. S. 3500 w. Can Min Rev—Sept., 1905.

See also **IRON INDUSTRY—Canada East.**

Ontario.—The Iron Ore Fields of Ontario. Willet

G. Miller. A review of the iron ore deposits, giving illustrations and outline map, and showing the Province to have a great future as an ore-producing country. 7800 w. Can Min Rev—June 30, 1901.

Types of Iron-Bearing Rocks in Ontario. A. P. Coleman. Brief descriptions of the types of iron ore deposits found in the province. 900 w. Eng & Min Jour—Dec. 27, 1902.

An Ontario Iron Ore Deposit. Two articles giving information in regard to the deposits of the Hutton Iron Range. 2200 w. Eng & Min Jour—Jan. 31, 1903.

The Exploration of the Ontario Iron Ranges. A. B. Willmott. Read before the Can. Min. Inst. Discusses the surface indications of undiscovered iron ore deposits, and the best methods of exploration. 3000 w. Can Min Rev—Aug. 31, 1904.

Animikie, or Loon Lake, Iron-Bearing District. W. N. Smith. Information concerning recent work in this district of Ontario. Map. 3500 w. Min Wld—Feb. 18, 1905.

Oolitic.—See **Lorraine.**

Paleozoic Rock.—See **Limonite.**

Parapara.—See **New Zealand.**

Pennsylvania.—The Cornwall Ore Hills of Pennsylvania. An illustrated historical review of this valuable iron ore property. 5500 w. Ir Age—July 18, 1901.

Perm, Russia.—The Brown Iron Ore Deposits of the Kisel District in the Ural (Ueber die Brauneisensteinlagerstätten des Bergreviers von Kisel im Ural). L. Mrazec and L. Duparc. A geological account of important iron ore deposits in the vicinity of Soltkamsk, in the Government of Perm, Russia. Two articles. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 19, 26, 1903.

Philippine Islands.—The Iron Mines of Angat, Philippine Islands. H. D. McCaskey. An illustrated article referring to iron deposits of value in the province of Bulacan, Central Luzon. Serial. 1st part. 1200 w. Eng & Min Jour—Nov. 14, 1903.

See also **MINERAL REGION.**

Production.—The Production of Iron Ore in 1901. Summary of a report by John Birkinbine. All records of production exceeded. 2000 w. Ir Age—May 15, 1902.

See also **World's Supply.**

Pyrite.—See also **IRON INDUSTRY—Virginia; IRON MINE—St. Lawrence, N. Y.**

Pyrite, Deadwood, S. D.—A Noted Pyrite Deposit. W. H. Storms. An account of the occurrence of iron sulphide ore in Whizzers mine at Deadwood, S. D. 1200 w. Min & Sci Pr—Oct. 28, 1905.

Russia.—See **IRON INDUSTRY; MINING AND METALLURGY.**

Sand.—See **IRON SAND.**

Scandinavia.—See **Norway; Sweden.**

Spain.—The Iron Ore Mines of Biscay. Bennett H. Brough. An illustrated article describing the country, people, mines, &c., methods employed, transportation and output. 2700 w. Cassier's Mag—April, 1903.

The Iron Ore Deposits of Galicia (Eisenerzvorkommen in Galicien). H. Teichgräber. A brief description of the deposits in the vicinity of Vigo and Corunna, Spain. 1800 w. Stahl u Eisen—March 15, 1904.

The Iron Ore Deposits of Spain (Der Eisenerzreichtum Spaniens). Oskar Simmersbach. A review of the valuable iron ore beds of Spain, with chemical analyses, and tabulated data concerning exports. 3500 w. Glückauf—Nov. 4, 1905.

See also **IRON INDUSTRY; IRON MINE—Bilboa.**

Storage.—See **IRON ORE HANDLING.**

Sussex Co., N. J.—See also **Magnetite, New Jersey.**

Sweden.—Iron Mining in Sweden (Ueber den Schwedischen Eisenerzbergbau). Arpád Zsigmondy. An illustrated article from "Bány és Koh. lapok," giving a description of the iron ores and mines of Sweden. Serial. 2 parts. 8 plates. 6000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 23 and 30, 1903.

Iron Ores of Arctic Lapland. Chas. S. Osborn. Brief account of iron ore fields beyond the Arctic Circle. 1200 w. Aust Min Stand—Nov. 19, 1903.

Iron Ores of Arctic Lapland. Chase S. Osborn. From a paper read before the Lake Superior Min. Inst. Describes the mines, methods of mining, extent of deposits and their character, giving information about cost, transportation and related matters. 4000 w. Ir Trd Rev—Aug. 20, 1903.

Iron Ores of Arctic Lapland. Chase S. Osborn. A report of these iron-ore fields, located beyond the Arctic circle, the character of the ores, methods of mining, etc. 1800 w. Ir & Coal Trds Rev—Sept. 11, 1903.

Applications of Magnetic Iron Ores Lean in Phosphorus (Verwendung von Phosphorarmen Magneteisensteinen). A discussion of the practicability of using the magnetites of northern Sweden in connection with hematite ores. 2000 w. Stahl u Eisen—Feb. 15, 1903.

Iron Ore Mining in Scandinavia. W. Fischer Wilkinson. Read before the Inst. of Min. & Met. Information concerning the deposits, and the importance to this industry of the recently constructed railroad which gives access to the Atlantic port of Narvik. Ills. 4300 w. Ir & Coal Trds Rev—July 1, 1904.

Iron Ore Mining in Scandinavia. W. Fischer Wilkinson. Abstract of a paper read before the Inst. of Min. & Met., England. On the character and extent of the deposits, considering Dunderland, Kirunavaara, and Gellivara. Map. 3000 w. Ir Age—Sept. 1, 1904.

Tennessee.—The Iron Ores of Shady Valley, Tennessee. F. Lynwood Garrison. Describes the creation, value, etc. 3000 w. Eng & Min Jour—Oct. 13, 1904.

Texada Island.—See **Vancouver.**

Texas.—The Iron Resources of Texas. Dr. William B. Phillips. Considers the iron resources in a general way and states conclusions. 6500 w. Pro Engrs' Soc of W Penna—March, 1902.

United States.—Iron Ore Supplies. Editorial discussion of a statement made by Mr. Schwab in his evidence before the Industrial Commission in regard to the iron ore deposits of the United States. 1800 w. Engng—July 5, 1901.

See also **Production; World's Supply; IRON INDUSTRY—America.**

Utah.—Notes on Southwestern Utah and Its Iron Ores. G. C. Hewitt. Read before the Colorado Sci. Soc. Describes this interesting region, giving details and impressions obtained during recent visits. 3300 w. Min Rept—Feb. 12, 1903.

The Utah Iron Fields. An account of these deposits, and the plans for mining and manufacturing. 2800 w. Ir Age—July 16, 1903.

Origin of the Magnetic Iron-Ores of Iron County, Utah. E. P. Jennings. Describes these deposits, and gives the writer's conception of their origin. Ills. 1200 w. Trans Am Inst of Min Engrs—Feb., 1904.

The Iron Ore Deposits in Southern Utah. Fred Lerch. Information concerning the geology, the size and character of the ore bodies, quality of the ore and coal, facilities for cheap mining and the commercial prospects. Map. 2300 w. Ir Trd Rev—May 19, 1904.

The Iron Ores of the Uintah Mountains. A. W. Warwick. Description of deposits in the northeastern part of Utah. 1200 w. Min Rept—Aug. 18, 1904.

Iron Ores in Utah. Don Maguire. Concerning the location and extent of a number of deposits which may prove of great value to the State. Ills. 1800 w. Mines & Min—March, 1905.

Valuation.—The Valuation of Iron Ores (Ueber die Verwerthung von Eisenerzen). P. Lisl. Deriving a formula from which the value of an ore can be determined. The data are the price of pig iron, and the composition of the ore. 1200 w. Stahl u Eisen—Dec. 15, 1901.

The Valuation of Iron Ores and Other Raw Materials (Die Bewerthung von Eisenerzen und anderen Schmelzstoffen). Barnhard Osann. A detailed examination of the elements involved in the valuation of the ore coke, flux and other materials used in the making of iron, based on their relative uses in the furnace. Two articles. 6000 w. Stahl u Eisen—Oct. 1, 15, 1902.

The Valuation of Iron Ores (Zur Frage der Eisenerzbewertung). Oskar Simmersbach. An examination of the method of valuing iron ores according to chemical composition, taking into account the degree of fusibility and ease of reduction, together with the process for which they are intended. 3000 w. Glückauf—March 19, 1904.

Vancouver.—Iron Ore Deposits of Vancouver and

Texada Islands. W. M. Brewer. Describes these deposits, giving theories relative to the origin of these ores, discussing matters relating to the production. 2500 w. B C Min Rec—June, 1903.

Victoria.—See **IRON METALLURGY.**

Virginia.—See Limonites; **IRON INDUSTRY.**

Washing, Alabama.—Brown-Ore Washing in Alabama. Erskine Ramsay and Charles E. Bowron. An illustrated description of construction and method of operation of log washers, stating the conditions to which they are adapted. 1400 w. Mines & Min—Dec., 1904.

Western New England.—See **New York.**

Wisconsin.—The Baraboo Iron District Mining Developments. A report of recent developments in Wisconsin. 2000 w. Ir Age—Sept. 17, 1903.

The Baraboo Iron Ore. N. H. Winchell. Discusses these deposits in Wisconsin, considering their structure, formation, etc., as discussed by Samuel Weidman in a recent publication. 4500 w. Am Geol—Oct., 1904.

Iron Ores of Wisconsin with Special Reference to the Baraboo District. S. Weidman. Read before the Science Club of the Univ. of Wis. Considers briefly the three kinds of iron ores in the State, especially describing the Baraboo district, its geology, deposits, development, &c. 4500 w. Wis Engr—Dec., 1904.

Progress on the Baraboo Iron Range. D. E. Woodbridge. Remarks on Mr. Weidman's conclusions as to the genesis of this ore, with information and opinions of W. G. La Rue. Ills. 2500 w. Ir Trd Rev—Dec. 29, 1904.

See also **Lake Superior.**

World's Supply.—The World's Iron Ore Supplies. Bennett H. Brough. Abstract of lecture and discussion. 4400 w. Pamphlet—Jour of West of Scotland Iron & Steel Inst. 1904.

Iron Resources of the World. R. Anspach. Translated from the "Zeit. für angewandte Chemie." Information from the report of Prof. A. E. Törnebohm to the Swedish Parliament. 2800 w. Eng & Min Jour—Oct. 7, 1905.

The Iron Ore Supply of the World. Interesting data from reports of Prof. Törnebohm to the Swedish Parliament, and of other reports by experts. Map. 2500 w. Ir Age—Nov. 2, 1905.

The Iron Ore Deposits of the World (Die Eisenerzvorräte der Welt). A statistical review, giving brief tables of the principal deposits of iron ore in Europe and America. 2000 w. Glückauf—Dec. 9, 1905.

See also **IRON INDUSTRY.**

IRON ORE HANDLING.

See also **CABLEWAY; DOCK; IRON INDUSTRY; IRON ORE; IRON ORE TRANSPORTATION; MECHANICAL HANDLING.**

New Ore Handling Machinery. Waldon Fawcett. Illustrates and describes new devices for use on docks and in blast furnaces. 1600 w. Am Mfr—July 17, 1902.

The Handling and Storing of Iron Ore. Charles Pies. Considers how a great reduction in cost has been brought about by labor-saving appliances. General discussion. 4000 w. Pro Engrs Club of Phila—April, 1903.

Gigantic Ore-Handling Machinery. W. Frank McClure. An account of important innovations in connection with the ore-handling industry, with illustrations of ore-unloaders. 1200 w. Sci Am—June 20, 1903.

America.—Improved Handling Machinery (Neue Verladevorrichtungen). H. S. Johannsen. An illustrated description of the improved machinery used in America for excavating and handling iron ore. Serial. Part I. 3500 w. 1 plate. Stahl u Eisen—Jan. 1, 1905.

Cableways.—Cableways for Handling Iron Ore. Waldon Fawcett. Illustrates and describes some recent plants of interest. 1700 w. Am Mfr—Sept. 26, 1901.

Modern Ore Loading Plants and Wire Rope Tramways. Frank C. Perkins. Illustrates and describes modern systems of ore-handling apparatus, showing the great improvement and economy of methods now in use. 2500 w. Min Rept—April 27, 1905.

Clairton, Pa.—Ore-Handling Plant at the Clairton Works of the Crucible Steel Company. Charles H. Wright. An illustrated article describing how ore, limestone, and coke are conveyed from railroad cars to the furnace. 5500 w. Jour Assn of Engng Soc's—Aug., 1904.

Conneaut, Ohio.—Ore-Handling at Conneaut, Ohio. H. E. Scott. Brief illustrated description of the main features of this harbor and the system for rapidly and economically handling the ore. 3800 w. Jour Worcester Poly Inst—Jan., 1905.

The Electric Ore Unloaders at Conneaut, Ohio. Illustrates and describes four electric ore unloaders recently installed for transferring the ore from ships to cars, or to storage pile. 1800 w. Elec Rev, N Y—May 6, 1905.

Ore Handling Plant at Conneaut, Ohio. Illustrated description of the arrangements for transferring of ore from the lake vessels to the cars or docks. The amount handled last year exceeded 4,000,000 long tons. 3500 w. Ir Age—May 25, 1905.

Elba.—Conveyors and Ore Handling Appliances of the Iron Works at Elba (Transporteur Aerien et Grues de Déchargement de l'Usine Métallurgique d'Elba). E. Boucher. Illustrating the conveyors used on the docks at Elba for handling ore and coal. 1800 w. 1 plate. Génie Civil—Jan. 9, 1904.

Coal and Ore Handling Plant in the Island of Elba. Illustrates and describes a system of automatically-operated overhead conveyors for the blast-furnace plant at Portoferraio, to handle the ore and coal. 1600 w. Sci Am Sup—Feb. 4, 1905.

See also **BLAST FURNACE; IRON INDUSTRY.**

Electric.—Electricity in Ore Handling. Waldon Fawcett. Describes the application of electricity to this work, especially in loading and unloading. Ill. 1500 w. Am Mfr—Aug. 28, 1902.

Electrically Operated Ore Loading Plants and Wire Rope Tramways. Frank C. Perkins. Illustrates and describes some improved methods employed for ore loading, and the power utilized. 2000 w. Min & Sci Pr—Dec. 23, 1905.

See also **Great Lakes.**

Great Lakes.—Ore Handling Machinery on the Great Lakes. James N. Hatch. A fully illustrated account of the mechanical appliances which have become such an important factor in American ascendancy in steel making. 3500 w. Engineering Magazine—Aug., 1901.

Modern Handling of Iron Ore on the Great Lakes. Jas. N. Hatch. Describes modern methods of mining and transportation during the last fifty years in the territory between the Lake Superior iron mines and the Pittsburg iron district. Ill. 12,000 w. Jour W Soc of Engrs—Dec., 1902.

Extensive Ore Dock Improvements. On the wonderful developments in hoisting and conveying machinery, and the changes still in progress; the automatic unloaders. Also considers the more substantial form of dock construction. Ill. 4000 w. Marine Rev—March 6, 1902.

The Movement of Iron Ore on the Great Lakes. Arthur J. Mason. An interesting illustrated description of the mining and ore handling methods in the Lake Superior region. General discussion. 5000 w. Jour W Soc of Engrs—April, 1904.

Modern Methods of Handling Iron Ore from Minnesota Mines to Pittsburg Furnaces. Charles H. Wright. Two-page plate, illustrations, and account of the ore-handling on the Great Lakes. 3500 w. Eng News—May 5, 1904.

Ore-Handling Machinery on the Great Lakes. Illustrated description of some of the more important varieties of ore handling machinery in use, showing the method of removing the ore from vessels and placing it on cars. 4400 w. Naut Gas—Nov. 3, 1904.

Electrically Operated Ore Unloaders. Frank C. Perkins. An illustrated description of the labor-saving devices used at the docks of the steel companies on the Great Lakes. 1600 w. Min Rept—Dec. 7, 1905.

See also **Conneaut; South Chicago; IRON INDUSTRY; IRON ORE TRANSPORTATION; STEAMSHIP—Elbert H. Gary.**

Hulett.—The Handling of Iron Ore. Illustrated description of the Hulett ore unloading plant. 2200 w. Engr, Lond—Sept. 8, 1905.

See also **CONTROLLER—Ore Unloaders.**

South Chicago.—Hoover & Mason Ore Handling Plant at South Chicago, Ill. Illustrates and describes the ore-unloading plant at the South Chicago works of the Illinois Steel Company. 2500 w. Ir Trd Rev—Sept. 4, 1902.

IRON ORE TRANSPORTATION.

See also **IRON INDUSTRY; IRON ORE; IRON ORE HANDLING.**

Cost Comparison.—A Comparison of Costs in Iron Ore Handling and Transportation. Waldon Fawcett. Discusses the volume of ore shipments and the expenditure by lake and rail. 3000 w. Ir Age—March 21, 1901.

The Cost of Transportation of the Raw Materials in the Iron Industry (Die Rohstoff-Gütertarife der Eisenindustrie). E. Schrödter. A comparative review of the cost of railway transport of iron ore in the principal manufacturing countries, showing the importance of a reduction in rates in Germany. 10,000 w. Stahl u Eisen—Dec. 15, 1905.

Great Lakes.—The Steel Trust on the Great Lakes. W. Frank McClure. An illustrated discussion of the transportation problem of the Great Lakes as affected by the steel industry. 3500 w. Rev of Revs—May, 1901.

See also **DOCK—Conneaut, O.; West Superior, Wis.; IRON INDUSTRY; IRON ORE; IRON ORE HANDLING; STEAMSHIP.**

Great Lakes—Pittsburg.—See **RAILWAY—Pittsburg, Bessemer & Lake Erie.**

IRON PIPE.

Heat Loss.—See **HEAT RADIATION; STEAM-PIPE COVERING.**

IRON PROTECTION.

See **METAL PROTECTION.**

IRON REGION.

See also **COAL REGION; IRON INDUSTRY; IRON MINE; IRON ORE; MINERAL REGION.**

IRON SAND.

See also **GOLD; IRON ORE; MAGNETISM.**

New Zealand.—See **GOLD; IRON ORE.**

St. Lawrence River.—Notes on the Magnetic Iron Sand of the North Shore of the St. Lawrence. J. Obalski. Read before the Canadian Min. Inst. Historical sketch of the attempts to work these deposits profitably, and a study of their character. 2200 w. Can Min Rev—Feb. 28, 1901.

Magnetic Iron Sand of the St. Lawrence Shore. J. Obalski. Read before the Canadian Min. Inst. Concerning the deposits and the processes suggested for agglomerating the magnetic sand. 2500 w. Can Engr—June, 1901.

IRON TRADE.

See **IRON INDUSTRY.**

IRON WORKS.

See also **BLAST FURNACE; IRON INDUSTRY; IRON METALLURGY; IRON REGION; ROLLING MILL; STEEL METALLURGY; STEEL WORKS.**

American.—Iron and Steel Works of the United States. James M. Swank. Extracts from the preface to the fifteenth edition of the "Directory to the Iron and Steel Works of the United States and Canada," describing the condition at the close of 1901, as compared with 1898. 1700 w. Eng & Min Jour—March 8, 1902.

American Iron Works (Amerikanische Eisenhütten). Max Kirdorf. A general description of American works and methods as observed by the writer during a recent tour. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 21, 1905.

Some Notes on a Visit to Iron and Steel Works in the United States and Canada. P. N. Cunningham. Deals with the transportation, handling and assembling of material in iron and steel works, and the accessories connected with such plants. Ils. Discussion. 10,600 w. Jour of W of Scotland Ir & St Inst—Nov, 1905.

See also **IRON INDUSTRY.**

Antwerp.—See **STEEL WORKS.**

Auxiliary Machinery.—Mechanical Appliances in Iron Works Operation (Maschinelle Einrichtungen im Eisenhüttenwesen). Fr. Frölich. Discussing especially the various auxiliary machinery used in connection with the manufacture of iron and steel. The present instalment describes traveling ladles for hauling slag and molten metal. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—Aug. 6, 1904.

Battelle, Ala.—The Lookout Mountain Iron Company. Description of the company's property and plant at Battelle, Ala. 3500 w. Ir Age—Aug. 4, 1904.

Boonton, N. J.—See **FORGE.**

Canada.—See **America.**

Cette, France. — See **BLAST FURNACE; STEEL WORKS.**

Depreciation.—See **DEPRECIATION.**

Differdingen.—See **ROLLING MILL.**

Durango, Mex.—The Iron Mountain, and the Plant of the Mexican National Iron and Steel Company, Durango, Mexico. F. F. Witherbee. Gives view of mountain and works, with description of ore, method of working, &c. 1800 w. Trans Am Inst of Min Engrs—Nov., 1901.

Fagersta, Sweden.—See **IRON—Heat Treatment.**

Falkirk, Scotland.—Carron and Other Falkirk Iron Works Past and Present. Reviews the history and present condition of these works. 2000 w. Engr, Lond—Nov. 7, 1902.

Gas Engine.—See **GAS ENGINE—Iron Works.**

Gas Producer.—See **GAS PRODUCER—Iron Works.**

Gutehoffnungs.—The Gutehoffnungs Iron and Steel Works (Die Werke der Gutehoffnungshütte). A very well illustrated historical and descriptive account of these old and great works at Oberhausen, in the Rhineland. Serial. Part I. 2000 w. Zeitschr d Ver Deutscher Ing—July 12, 1902.

Herrang, Sweden.—The Manufacture of Pig-Iron from Briquettes at Herräng. Prof. Henry Louis. Read before the Iron & Steel Inst. Describes the mines, concentrating work, briquetting plant, blast furnace plant, and power station, giving general information. Ils. 5500 w. Ir & Coal Trds Rev—May 6, 1904.

Hoops and Bars.—Modern Plants for the Manufacture of Hoops and Merchant Bars. Theodore J. Vollkommer. Illustrates and describes plants where automatic machinery has been introduced, and improved methods. 5300 w. Ir Age—Jan. 16, 1902.

Japan.—The Kamaishi Iron Works (Die Kamaishi-Eisenwerke). E. Bahlsen. A general description of an important Japanese iron works, which has been in operation since 1828, using native ores. 2500 w. Stahl u Eisen—Nov. 15, 1901.

See also **IRON INDUSTRY.**

Jeanesville, Pa.—The Jeanesville Iron Works Company. Illustrated description of a modern plant arranged with a view to obtaining low shop cost and the greatest perfection in the product. 1400 w. Ir Age—Dec. 1, 1904.

Lorraine.—The Lothringer Iron Works at Kneuttingen (Die Werke des Lotringer Hüttenvereins in Kneuttingen). Bernhard Osann. A detailed description of the furnaces and rolling mills of a new large works near Fentsch, Lorraine. 4500 w. Three plates. Stahl u Eisen—Nov. 15, 1905.

Marquette, Mich.—The Pioneer Charcoal Furnace and Chemical Plant. A description of an interesting exhibit at St. Louis Exposition of the Pioneer Iron Company, at Marquette, Mich. 3700 w. Ir Age—June 23, 1904.

Middlesbrough.—The Works of the Skinningrove Iron Company. Illustrated detailed description of this plant at Middlesbrough, which has recently been thoroughly remodeled, and is considered one of the finest of its kind in Great Britain. 3500 w. Ir & Coal Trds Rev—Sept. 12, 1902.

Minnequa, Colo.—See **STEEL WORKS.**

Pencoyd.—See **MACHINE SHOP.**

Port Richmond, Pa.—See **MACHINE WORKS.**

Power Cost.—See **POWER COST.**

Rendsburg.—See **OPEN HEARTH PROCESS.**

Röchling. — See **IRON METALLURGY — Blooming Mill.**

Shop Appliances.—Mechanical Appliances in Iron Works (Maschinelle Einrichtungen für das Eisenhüttenwesen). Fr. Frölich. The first article discusses devices used in connection with the rolling and drawing of tubing. Serial. Part I. 2000 w. Zeitschr d Ver Deutscher Ing—March 25, 1905.

Steubenville, O.—The La Belle Iron Works. An illustrated description of the improved works at

Steubenville, Ohio. 3500 w. Ir Age—Oct. 8, 1903.

IRRIGATION.

Sydney, Cape Breton.—See **STEEL WORKS.**

See also **AGRICULTURE—Engineering; CANAL; DAM; GROUND WATER; RESERVOIR; RIVER REGULATION; RURAL ENGINEERING; WATER FLOW; WATER SUPPLY; WATER WHEEL; WELL.**

Some Features of Irrigation. William O. Webber. Considers important questions in relation to irrigation schemes. 1800 w. Eng Rec—Jan. 10, 1903.

Address by Colonel Sir C. Scott Moncrieff before the British Association. Address before the engineering section, on the science of irrigation, describing what has been accomplished in various parts of the earth. 8500 w. Nature—Sept. 7, 1905.

Administration of Streams.—Administration of Streams in Irrigation. Elwood Mead. Considers the relation of streams to the agricultural development of the West, the meaning of a water right, etc. Also discussion. 7800 w. Jour W Soc of Engrs—Feb., 1903.

America.—See **United States.**

Arizona.—Experiments on Winter Irrigation of Deciduous Orchards in Southern Arizona. Summary and conclusions of Alfred J. McClatchie, having a bearing on the design of irrigation works. 900 w. Eng News—Aug. 15, 1901.

Bagdad.—See **Chaldea; RAILWAY.**

Bakersfield, Cal.—Electric Power for Irrigation Pumping at Bakersfield, California. Illustrated description of an interesting irrigation system. 2200 w. Elec Wld & Engr—April 6, 1901.

Buford, Montana.—The Buford Irrigation Project. General remarks on the extensive irrigation works undertaken by the U. S. Government, with illustrated description of this project in Montana, which contemplates the irrigation of about 60,000 acres of land. 1500 w. Engr, Lond—Sept. 29, 1905.

Bulgaria.—See **Roumania.**

California.—The Condition of Water and Power Development in Southern California. L. K. Sherman. On the great necessity of irrigation in this region, the types of construction used in water power development, etc. 2000 w. Jour W Soc of Engs—Oct., 1900.

Noteworthy Water Storage and Irrigation Works of Southern California. Robert Fletcher. Describes several important systems and the regions watered. 4800 w. Eng News—Aug. 22, 1901.

The Irrigation Works of the Modesto and Turlock Districts, Cal. The first of a series of illustrated articles giving a descriptive account of the engineering work. Serial. 1st part. 2000 w. Eng Rec—Sept. 17, 1904.

Time Test of a Great Irrigating System. H. A. Crafts. Brief illustrated description of the Turlock and Modesta irrigating systems in California. 900 w. Sci Am—Sept. 2, 1905.

The Irrigation System of Ontario, California—Its Development and Cost. F. E. Trask. Treats of the development and present status of an irrigation plant in the "Orange Belt" of Southern California, and gives details and cost of a system designed to meet exacting demands for "high duty and maximum utility." 2200 w. Ills. Pro Am Soc of Civ Engrs—April, 1905.

See also **Bakersfield; Pumps, Electric.**

Canada, North Western.—Irrigation in the North-West Territories of Canada. Showing the importance, extent and value of the work. Serial. 1st part. 900 w. Engr, Lond—March 18, 1904.

Irrigation in Canada. An account of work accomplished and projected in the Saskatchewan valley. 1500 w. Engr, Lond—May 12, 1905.

Canadian Pacific Ry.—The Irrigation Project of the Canadian Pacific Railway. Illustrated description of the system of irrigation undertaken by this railway for the purpose of promoting the settlement of that portion of its land which requires irrigation. 2800 w. Eng News—April 27, 1905.

Canal, Col.—See **Colorado Canal.**

Cementing Canal.—See **CEMENT—Irrigation Canal.**

Chaldea.—Ancient Chaldean Irrigation. An illustrated article describing the ancient irrigation works at Chaldea, with a suggestion for their restoration. 3700 w. Builder—Sept. 19, 1903.

Colorado.—New Irrigation Works and Methods in Colorado. H. A. Crafts. Describes extensive works for the storage of flood waters and for the interchange of water between different canal owners. 2900 w. Eng Rec—June 21, 1902.

Irrigation System of the Arkansas Valley Sugar Beet and Irrigation Land Co., Colorado. W. P. Hardesty. An illustrated description of this extensive system, with its history. 6300 w. Eng News—Nov. 13, 1902.

See also **GEOLOGY.**

Colorado Canal.—Masonry and Steel Head-Gate of the Grand Valley Irrigation Canal, Colorado. Clarence T. Johnson. Illustrations, with brief description. 700 w. Eng News—Aug. 13, 1903.

Current Wheels.—See **WATER WHEEL.**

Drainage.—Drainage of Irrigated Lands. Ernest McCullough. Shows how drainage practice in the West varies from accepted practice in the East, and why. 3300 w. Eng News—Aug. 20, 1903.

See also **DRAINAGE.**

Egypt.—Improvements on the Nile. Sketch of the present state of the work on the Assouan Dam, and other work directly connected therewith, with statements of the benefits contemplated. 4000 w. U S Cons Repts, No. 1019—April 24, 1901.

The Nile Irrigation Works. An illustrated account of the work being done at a cost of $25,000,000. 1200 w. Sci Am—May 4, 1901.

Irrigation in the Nile Valley, and Its Future. W. Willcocks. Read before the Glasgow Congress. Describes the main features of basin irrigation and considers the lessons to be drawn from the wisdom of the ancient Egyptians. Ill. 6200 w. Engng—Sept. 6, 1901.

Extensive Project for Irrigating Egypt. Briefly outlines the works at present under construction and their cost, and also the projects under discussion. 1200 w. Sci Am—Oct. 12, 1901.

Irrigation in the Nile Valley (Die Bewässerung im Nillande). From reports of the Austrian consul at Cairo, giving a general account of the subject with mention of the works at Assouan and Assiout. 1000 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 7, 1901.

The Nile Dams. A review of the important works already completed, with four 2-page plates. 7500 w. Builder—Sept. 20, 1902.

Nile Irrigation Works. W. Noble Twelvetrees. The present article is devoted to the Delta and the Delta barrage. Illustrated. Serial. Part I. 3500 w. Feilden's Mag—Jan., 1903.

The Construction of the Asyut Dam; Nile Irrigation Works. Interesting views of this second great dam across the Nile, with official description from notes by Sir Benjamin Baker. Also editorial, drawing comparison between the rapidity of engineering construction of these great works, and the slow construction of the great municipal works of New York City. 4000 w. Sci Am—Feb. 28, 1903.

The New Nile Reservoir. Frederic Courtland Penfield. Reviews the history of this project, and discusses the importance of the work, some of its features and the benefits expected. 4500 w. N Am Rev—March, 1903.

The Nile Dams and Reservoir. Sir Benjamin Baker. Address before the Royal Inst. of Great Britain. An account of this great engineering work—the construction of the Nile reservoir and dam at Assouan, the barrage at Asyat, and the various supplementary works. Ill. 5000 w. Pop Sci M—April, 1903.

The Irrigation of the Nile Valley. John Ward. An illustrated account of the present condition of Egypt, the effect of the new dams, and other engineering works. 4400 w. Page's Mag—Jan., 1904.

Notes on Egyptian Irrigation. Information concerning the various engineering works carried out in different parts of Egypt. 4500 w. Builder—April 23, 1904.

Irrigation Projects in Egypt and the Soudan. Extracts from a report of Sir William Garstin to Lord Cromer, describing projects for regulating the Nile, with map of White Nile region. 2500 w. Engr, Lond—Aug. 12, 1904.

New Irrigation Projects for Egypt and the Soudan. Considers the future requirements of Egypt and the Soudan. 5400 w. Builder—Aug. 20, 1904.

Nile Irrigation. Sir Hanbury Brown. A discussion of the problem of providing for the continued development of Egypt and the reclamation of the Soudan at the same time, based on the recent report of Sir William Garstin. Map. Serial. 1st part. 6000 w. Engr, Lond—Sept. 9, 1904.

The Control of the Nile. Sir Hanbury Brown. An illustrated article dealing with the means adopted to make Egypt produce more. The irrigation question. 11,000 w. Public Works—Jan., 1905.

The Irrigation Development of Egypt—A Huge Project. Outlines the scheme formulated by Sir William Garstin for improving the channels of the White Nile and the Blue Nile, the Nile Delta, &c., and so rendering fertile thousands of acres of land now sterile. 1200 w. Sci Am Sup—Sept. 10, 1904.

The River Nile and Irrigation in Egypt. An editorial discussion of the report of Sir William Garstin. 3800 w. Engng—Oct. 7, 1904.

Some Problems of the Upper Nile. Sir William E. Garstin. An account of the schemes proposed for controlling the river, giving a brief description of the stream and its characteristics, and discussing the irrigation requirements of Egypt and the Soudan. 11,500 w. Nineteenth Cent—Sept., 1905.

The Asyut Barrage Across the Nile. Notes from a paper by George H. Stephens, presented before the Inst. of Civil Engrs., describing this work in Egypt. Ills. 2500 w. Eng Rec—April 15, 1905.

The Irrigation of Egypt. A brief review of the work already accomplished and discussion of proposed work in the valley of the Nile. 3000 w. Engng—June 16, 1905.

See also **DAM — Assuan; Nile; NAVIGATION — Nile; RIVER REGULATION—Nile; SLUICE GATE—Assuan.**

Electric Pumping.—See **Pumps, Electric; PUMP—Electric.**

Engineers.—Prospects of Employment for Young Men as Irrigation Engineers. Sir William Willcocks. On the training needed by irrigation engineers. 1400 w. Engr, Lond—Jan. 15, 1904.

Engineering.—Notes on Irrigation Engineering. Extracts from testimony by Elwood Mead before the U. S. Industrial Commission, on the losses of water by seepage from canals, the filling of canals by silt, and the filling of reservoirs by silt. 2700 w. Eng Rec—Sept. 20, 1902.

Irrigation Engineering. Sir Hanbury Brown. A discussion of the general principles on which the practice of irrigation is based. Serial. 1st part. 3000 w. Engr, Lond—Oct. 20, 1905.

Flood Prevention.—Flood Prevention and Irrigation: Twin Ideas. J. R. Burton. Urging that measures be taken to control flood waters, and that the stored waters be used for land irrigation. Considers methods involved. 4000 w. N Am Rev—Oct., 1903.

See also **FLOOD.**

Flume, Turlock, Cal.—See **FLUME—Turlock Irrigation, Cal.**

Gunnison River, Col.—See **SURVEYING.**

Hawaiian Islands.—Irrigation in the Hawaiian Islands. Wade Warren Thayer. Illustrated description of an engineering feat which brings a supply of 50,000,000 gallons of water daily, a distance of 22 miles, through a very difficult region. 700 w. Sci Am—Jan. 12, 1901.

An Hawaiian Sugar Plantation. Charles W. Goodale. Describes extensive irrigating operations. 1800 w. Jour Assn of Engng Socs—Oct., 1902.

An Irrigated Sugar Plantation in the Sandwich Islands. C. H. Kluegel. Describes the Oahu Plantation as a type. All the water is taken from wells and delivered by pumping. 7000 w. Eng News—March 17, 1904.

India.—The Reclamation and Irrigation of the Kistna Delta, India. An illustrated account of this work, abstracted from an article by George T. Walch, published as a government document at Madras. 3300 w. Eng News—Nov. 7, 1901.

Recent Developments in Punjab Irrigation. Sidney Preston. Explains the details of one of the latest schemes for the irrigation and colonization of a large area of Crown land, which promises to be one of the most productive tracts in the country, though formerly a waterless waste. Also discussion. 10,000 w. Jour Soc of Arts—May 30, 1902.

Irrigation Works of India. Brief review of the extensive irrigating works which have cost the British Government over $150,000,000. 1100 w. U S Cons Repts, No. 1554—Jan. 26, 1903.

Famines and Their Results. Reports results of some of the irrigation works, giving illustrations of reservoirs, and especially an account of Kathiawar. 1200 w. Engr, Lond—July 17, 1903.

Indian Irrigation and Famine. Reviews the report of the Commission appointed to inquire into and report in regard to the extent and benefit of the irrigation works, results as a relief from famine, &c. 2000 w. Engr, Lond—March 11, 1904.

A Great Irrigation Project in the Punjab. An illustrated account of a new project, estimated to cost about £5,200,000 for the construction of a great irrigation system. Map. 2700 w. Engr, Lond—Feb. 17, 1905.

Italy.—See **DRAINAGE.**

Java.—A General Plan for the Irrigation of Java (Een Algemeen Irrigatie-Plan voor Java). H. H. van Kol. A comparison of the conditions of Java with those of British India, and a recommendation of the adoption of a consistent irrigation system for the whole island. 3500 w. De Ingenieur—May 25, 1901.

Kansas.—Windmill Irrigation in Kansas. Philip Eastman. An illustrated article describing the transformation wrought by windmill irrigation. 1800 w. Rev of Revs—Feb., 1904.

Kistna Delta.—See **India.**

Louisiana.—Irrigation Farming in the Southwest. D. Allen Willey. Describes methods of irrigation in Louisiana, for the cultivation of rice. Ill. 1500 w. Sci Am—Jan. 26, 1901.

Modesta, Cal.—See **California.**

Neste River, France.—See **RIVER REGULATION.**

Newland Act.—See **U. S. Legislation.**

Nile.—See also **Egypt; DAM—Assuan; Nile; NAVIGATION; RIVER REGULATION.**

Periyar, India.—See **DAM.**

Pumps, Electric, Cal.—On the Cost of Irrigation by Electrically Driven Pumps from Transmission Services. W. W. Wheeler. Read before the Pacific Coast Engng. Cong. Gives the writer's experience in Northern California. 2500 w. Jour of Elec—Sept., 1905.

See also **PUMP—Electric.**

Pumps, Turbine.—Turbine Pumps in Irrigation. J. J. Brown. From an address before the Nat. Ir. Cong. at El Paso, Tex. General remarks on land developed by the pumping system, especially discussing the advantages of the centrifugal pump. 3300 w. Mfrs Rec—Nov. 24, 1904.

Punjab.—See **India.**

Rio Grande Valley.—Tests of Irrigation Pumping Plants and Wells in the Valley of the Rio Grande. Charles S. Slichter. Describes tests made in New Mexico and Texas, giving tabulated results. 2500 w. Eng News—Dec. 29, 1904.

Roumania and Bulgaria.—Irrigation in Roumania and Bulgaria (Bewässerung der Rustikalgründe in Rumänien und Bulgarien). Jan Blauth. An illustrated description of irrigating and rather primitive water-raising methods. 1 plate. 700 w. Oesterr Wochenschr f d Oeffent Baudienst—April 19, 1902.

Salt River, Arizona.—See **DAM.**

Saskatchewan.—See **Canada North-West.**

Sewage Disposal.—See **SEWAGE DISPOSAL—Irrigation; SEWAGE FARM.**

Snake River Valley, Idaho.—Irrigation Survey of the Upper Snake River Valley, Idaho. E. B. Darlington. Review of the statistics obtained from investigations on a large scale, describing the work done. 1000 w. Eng News—June 1, 1905.

Sudan.—See **Egypt.**

South Africa.—Irrigation in South Africa. Extracts from the report of W. Willcocks, who was sent to examine the irrigation possibilities of Cape Colony, the Orange River Colony and the Transvaal. 3400 w. Jour Soc of Arts—Oct. 10, 1902.

South African Irrigation. Francis Robert Johnson. An account of the use thus far made of irrigation, the methods and description of typical colonial furrows, as they are called. Also information of the geology, rainfall, water supply, crops, and related matters of interest. 8000 w. Pro Am Soc of Civ Engrs—Aug., 1903.

South African Irrigation. Augustine W. Wright. Continued discussion of paper by Francis Robert Johnson. 1600 w. Pro Am Soc of Civ Engrs—Oct., 1903.

Irrigation in South Africa. Discusses in detail the state control of rivers and other sources of supply, and the advantages gained by easily constructed devices for storing and distributing the natural flow. 5000 w. Engr, Lond—Nov. 13, 1903.

Texas.—A Private Irrigation System in Texas. Illustrated detailed description of a system furnishing water to an area of about 15,000 acres, and costing about $1,000,000. 1400 w. Eng Rec—Feb. 18, 1905.

See also **Rio Grande Valley.**

Time Test.—See **California.**

Truckee-Carson.—The Truckee-Carson Reclamation Project. Enos Brown. Illustrated description of this great irrigation project undertaken by the government. 1700 w. Sci Am Sup—Sept. 16, 1905.

The Truckee-Carson Irrigation Project. Herbert I. Bennett. An illustrated article explaining the purpose of this canal, and describing the work. 2000 w. Sci Am—Sept. 16, 1905.

See also **CANAL.**

Turlock, Cal.—See **California; FLUME.**

United States.—The Scope and Purpose of the Irrigation Investigations of the Office of Experiment Stations. Elwood Mead. From the report of the office of Experiment Stations. Relates the investigations made of the arid and subhumid portions of the United States, and its insular possessions. 6000 w. Eng Rec—Oct. 18, 1902.

U. S. Census Report.—Irrigation. From Twelfth Census. An illustrated historical review of the irrigation work in America. Serial. 1st part. 9500 w. Sci Am Sup—Jan. 10, 1903.

U. S. Government.—Irrigation Works. Informal discussion of the question whether the National Government should undertake the construction and operation of irrigation works. 9800 w. Pro Am Soc of Civ Engrs—Aug., 1902.

Government-Irrigation Work. Guy E. Mitchell. An illustrated article describing proposed work, for which $2,600,000 have been appropriate. 1200 w. Sci Am Sup—June 11, 1904.

The United States Reclamation Service. F. H. Newell. Information concerning this irrigation service and the work now under construction, including dams, tunnels, etc. 2500 w. Eng News—June 15, 1905.

United States Legislation.—National Aid to Irrigation: A Bill to Come Before the Next Congress. Also editorial. Letters from Fred. Bond and George H. Maxwell, discussing the bill. 8000 w. Eng News—Aug. 8, 1901.

Irrigation as a Factor in National Development. Editorial on the great benefit of the Newlands Irrigation Act, which has been in operation in the United States for nearly a year. 1400 w. Ir Age—June 4, 1903.

United States Western.—An Unwatered Empire. Gen. Nelson A. Miles. On the importance of irrigation and the arid regions that could by this means be made productive. 1200 w. Western Min Wld—Feb. 23, 1901.

Types of Irrigation in the West. George Ethelbert Walsh. An interesting review of irrigation projects established in various parts of the Western States, and their results. 8400 w. Gunton's Mag—Oct., 1901.

The United States Reclamation Service in the Arid West. F. H. Newell. A statement of the proposed work of reclaiming the arid lands and making possible their settlement. 1200 w. Eng News—Nov. 26, 1903.

Desert Irrigation in the Far West. L. R. Freeman. Showing the wonderful results brought about by irrigation. Ill. 2500 w. Rev of Revs—March, 1904.

The Industrial West. An illustrated article explaining how oil fuel has made irrigation possible, describing the irrigation wells, the manufacture of pumps and engines for the industry, etc. 3000 w. Am Mach—Vol. 28, No. 30.

See also **RESERVOIR—Arid Regions; WATER SUPPLY.**

Utah.—See **HYDRO-ELECTRIC PLANT—Utah Sugar Co.**

Water Measurement.—See **WATER FLOW—Irrigation.**

Water Rights.—See **WATER RIGHTS.**

Water Wheels.—See **WATER WHEEL—Irrigation.**

Windmill.—See **Kansas.**

Wyoming Development Co.—An Example of Irrigation in the Arid Regions of the United States. George Frederick Vollmer. A description of a typical irrigation scheme which has been carried out by a private company called the Wyoming Development Company. Ills. 3000 w. Inst of Civ Engrs (No. 3553).

Yuma, Cal.—See **DAM—Laguna, Colorado River.**

ISOLATED PLANT.

See **ELECTRIC PLANT.**

J

JACKET.

Steam.—See **STEAM JACKET.**

See also under specific headings.

Japan, Our Latest and Greatest Rival for Commercial Supremacy in the Far East. Alexander Hume Ford. The present article considers the recent transition in Japan, her importance as a nation, her progress in the world's trade, and matters of related interest. 2800 w. Ir Age—May 2, 1901.

Trade and Industry in Japan. Information relating to the engineering industries, their progress and development. 3000 w. Engng—June 21, 1901.

Engineering Science in Japan. Robert H. Smith. Reviews some of the interesting papers recently presented to the Society of Mechanical Engineers, Tokio, showing the remarkable progress in this field. 3300 w. Engr, Lond—Sept. 22, 1905.

JET.

See **GAS FLOW; STEAM FLOW; WATER FLOW.**

JET CONDENSER.

See **CONDENSER.**

JET PROPULSION.

See **SHIP PROPULSION—Jet.**

JETTY.

See **BREAKWATER; HARBOR; RIVER REGULATION; SEA BARRIER; SEA WALL; SHORE PROTECTION.**

JIG.

See also **GOLD METALLURGY; MACHINE TOOL; MINING MACHINERY; ORE TREATMENT; TOOL.**

Accurate.—Accurate Drill Jigs. C. L. Goodrich. An illustrated account of extremely careful work to produce jigs in which the limit of variation from specifications allowed between the centers of any two holes was 0.0001 inch. 1500 w. Ir Age—March 31, 1904.

America.—The Jig Habit in America. Oberlin Smith. Discusses the tendency to use jigs and analogous tools for the accurate and rapid development of interchangeable parts of machines. 2800 w. Jour Fr Inst—Sept., 1901.

Automobile Manufacture.—Set of Jigs for a Manufacturing Operation. L. O. Danse. Illustrated description of methods adopted in making the steering connection knuckle of the Cadillac automobile. 1800 w. Am Mach—March 3, 1904.

Boring and Facing.—A Boring and Facing Jig. Joseph V. Woodworth. Illustrates a jig made for special work. 600 w. Am Mach—Oct. 3, 1901.

Care.—Getting the Full Value Out of Jigs. J. F. Mirrielees. Suggestions for the use and care of jigs, outlining a working system. 1200 w. Mach, N Y—Feb., 1905.

Drill.—A Common Drilling Jig. D. E. MacCarthy. Illustrated description of jig for drilling odd holes in a casting. 300 w. Am Mach—Feb. 7, 1901.

Two Drill Jigs for Odd Shaped Castings. William Doran. Illustrated description of the design and construction. 1000 w. Am Mach—July 4, 1901.

A Jig for Accurately Drilling a Plate. Joseph V. Woodworth. Illustrated description. 400 w. Am Mach—July 18, 1901.

A Drill Jig and Its Excellent Work. W. H. Pike, Jr. Illustrated description of a jig which has proved of value in producing work in which great accuracy is required. 500 w. Am Mach—Nov. 21, 1901.

Drilling and Milling.—A Set of Jigs for Milling and Drilling. Joseph V. Woodworth. Illustrates and describes these tools. 1000 w. Am Mach—Oct. 8, 1903.

Jig for Drilling and Milling. C. T. Sutton. Illustrated description of a jig adapted to any ordinary high-speed lathe at slight cost. 900 w. Engr, Lond—Feb. 12, 1904.

Drilling and Tapping.—A Drilling and Tapping Jig. Joseph V. Woodworth. Illustrated description of a jig for drilling and tapping a cast-iron hood. 600 w. Am Mach—Nov. 29, 1900.

Hancock.—See **ORE TREATMENT—Jig.**

Indexing.—An Indexing Drill Jig. George F. Popplewell. Drawings and description of the construction. 800 w. Am Mach—Vol. 28, No. 33.

See also **INDEXING.**

Lathe.—Flat Turret-Lathe Jigs. Description and illustrations of jigs and fixtures used in the manufacture of the Jones & Lamson lathe. 1500 w. Am Mach—Vol. 27, No. 34.

See also **LATHE—Attachments.**

Making.—Processes of Jig Making. C. H. Rowe. Gives methods in use for the building of parts of jigs and the exact locating of holes. 1600 w. Am Mach—Feb. 7, 1901.

Jig Making. Frank E. Shailor. Discusses methods of accurately spacing the holes. Ills. 1800 w. Mach, N Y—July, 1904.

Molding Machine.—The Molding Machine. Jigs. S. H. Stupakoff. Describes in detail the preparing of pattern plates and patterns for plate molding, giving drawings. 2500 w. Jour Am Found Assn—June, 1902.

Jigs for Molding Machines. S. H. Stupakoff. From a paper prepared for the Boston meeting of the A. F. A. Explains the use of a plate in connection with a suitable jig, especially prepared for the purpose, and the advantages. Ill. 2500 w. Foundry—Nov., 1902.

Stabel.—Accuracy in Jig and Fixture Work. J. M. Stabel. Illustrates and discusses a special indicator designed by the writer, for setting the buttons in perfect alignment with the milling machine spindle, and its use. 1000 w. Am Mach—June 4, 1903.

V-Block.—Two V-Block Drill Jigs. A. B. Christman. Sketches and description of jigs for drilling holes in 1-4 inch rolled shafting are given, and the method of correctly locating the drill bushings is also described. 700 w. Am Mach—Vol. 28, No. 49.

JOINT.

See also **BRIDGE DESIGN; FRAMEWORK; RAIL JOINT; RIVETED JOINT.**

Butt Strap.—See **BOILER—Butt Strap Joints.**

Expansion.—See **PIPE JOINT—Expansion.**

Kinematics.—See **Universal; KINEMATICS.**

Pipe.—See **PIPE JOINT.**

Rail.—See **RAIL JOINT.**

Riveted.—See **MOMENT OF INERTIA—Polar; RIVETED JOINT.**

Shrinkage and Pressure.—Shrinkage and Pressure Joints. William Ledyard Cathcart. An illustrated discussion of practice in the various applications of this work. 10,600 w. Sch of Mines Qr—Jan., 1902.

See also **FIT.**

Toggle and Spring.—See **SPRING—Toggle Joint.**

Universal.—A New Variable-Angle Joint (Sur un Nouveau Joint à Angle Variable). G. Koenigs. A description of an improvement on the Cardan joint by means of which a uniform angular velocity is transmitted. 1000 w. Comptes Rendus, July 15, 1901.

The Efficiency of the Universal Joint (Sur le Rendement du Joint Universel). L. Lecornu. Deriving an equation showing the relation of the angle between the two shafts to the efficiency. 1200 w. Comptes Rendus—May 30, 1904.

Wooden Trusses.—See **TRUSS.**

JOURNAL.

See also **BEARING; CAR BEARINGS; FRICTION; LUBRICATION.**

Electric Car.—See **BALL BEARING—Chapman.**

Locomotive.—See **LUBRICATION.**

Pressures.—See **BELTING—High Speed.**

Railway.—Notes on the Wear of Journals. David Van Alstine. Notes on an investigation made by Chicago Great Western Ry. 2300 w. R R Gaz—Feb. 21, 1902.

K

KAOLIN.

See **CLAY.**

KEEL.

See **NAVAL ARCHITECTURE; SHIPBUILDING.**

KELVIN.

Lord Kelvin, His Work and Influence. F. B. Crocker. A comprehensive examination of the effect of the work of Lord Kelvin, formerly Sir William Thomson, upon the development of electrical engineering. 2000 w. Engineering Magazine—June, 1902.

KEROSENE.

See **LIQUID FUEL; OIL; PETROLEUM.**

KEROSENE ENGINE.

See **AUTOMOBILE GASOLINE; GASOLINE ENGINE; OIL ENGINE.**

KETTERING.

tion concerning the advantages of this English
Factory Sites.—Kettering. Description and informa-
town for manufacturing works. Editorial. 6500
w. Engng—Sept. 22, 1905.

KEY.

Design.—Strength and Proportion of Keys. Frank P. Kleinhans. Gives method of calculating. 900 w. Am Mach—Oct. 9, 1902.

Key Design. Robert S. Riley. Discusses methods for proportioning keys in shafts. 1700 w. Am Mach—Vol. 28, No. 8.

Locomotive and Car.—See **BOLT.**

KEYSEATING.

German Machine.—German Vertical Keyseating and Slotting Machine. Illustrated description of the machine and its operation. 900 w. Am Mach—Vol. 28, No. 21.

Glasgow Exhibition.—Key Seaters at the Glasgow Exhibition. Illustrated description of machine tools of this class; two of British manufacture and the remainder from the United States. 2300 w. Engng—May 31, 1901.

KIAO-CHAU.

See also **HARBOR; RAILWAY—China; RAILWAY CONSTRUCTION—China.**

The Development of the Kiao-Chau Territory in China, from October, 1901, to October, 1902 (Die Entwickelung des Kiautschou-Gebiets in der Zeit vom Oktober, 1901, bis Oktober, 1902). A general account of railways, harbors, buildings and other development work in the German sphere of influence in China. 2500 w. Glasers Annalen—June 1, 1903.

KILN.

See also **BRICK MANUFACTURE; CEMENT KILN; FURNACE.**

Thomson.—Thomson's Kiln. An illustrated description of a new kiln, with statement of the advantages claimed, and explanation of the method of working. 3000 w. Ir & Coal Trds Rev—Jan. 24, 1902.

KINEMATICS.

See also **GRAPHICS; JOINT; LINK MOTION; MECHANICS.**

The General Principles of Mechanism (Sur les Principes Généraux des Mécanismes). G. Koenigs. A communication to the French Academy, criticizing some details of the kinematic analysis of machines by Prof. Reuleaux. 1200 w. Comptes Rendus—Aug. 19, 1901.

Binary Systems and Elementary Kinematic Couples (Les Systemes Binaires et les Couples d'Eléments Cinématiques). G. Koenigs. An examination of complete closure, partial closure, and force closure in connection with simple kinematic systems. 1000 w. Comptes Rendus—Sept. 23, 1901.

Cam Movements.—See **VALVE GEAR—Cam Operation.**

Elliptic Gear Wheels.—See **Quick Return.**

Framed Arches.—See **FRAMEWORK—Kinematic Theory.**

Graphostatics.—Graphostatic Computations for Moving Machine Parts (Grundzüge einer Graphostatischen Berechnung Bewegter Maschinenteile). Paul Wostrowsky. With diagrams analyzing the inertia forces of moving bodies; with practical applications. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 15, 22, 1904.

Harmonic Analysis.—See **VALVE GEAR.**

Linkage.—The Construction of the Pole Paths and Normals of a Linked Quadrilateral (Konstruktion der Normalen und der Krümmungskreise der Polbahnen der Vierzylinderkette). W. Hartmann. A kinematic analysis of the movements of the joints of a quadrilateral linkage, by the method of instantaneous centres. 2000 w. Zeitschr d Ver Deutschr Ing—Sept. 6, 1902.

A New Mechanism. G. T. Bennett. Illustrated description of a skew linkwork of four pieces having the axes of rotation neither parallel nor concurrent. It offers a simple means of communicating rotation immediately between two crossing shafts by the use of a single connecting rod. 2000 w. Engng—Dec. 4, 1903.

The Generation of a Compound Curve by Three Double Linkages (Zur Erzeugung der Koppelkurve durch Drei Doppelkurbelgetriebe). Heinrich Kratsert. An examination of the kinematic theory of the three-bar linkage motion, and the curves generated by it. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—July 1, 1904.

Link Motion.—See **LINK MOTION; VALVE GEAR.**

Quick Return.—"The Slow Advance and Quick Return Motion" as Produced by Means of Elliptical Wheels. Prof. C. W. MacCord. Discusses a method depending upon the varying angular velocity of one elliptical wheel, driven by another which revolves with uniform speed. Ill. 1800 w. Stevens Ind—Oct., 1902.

The Acceleration of Quick Return Mechanisms. W. V. Dunkin. A general discussion of a device much used to produce the slow advance and quick return motion in shaping machines, and the principles involved. 2500 w. Technograph—1902-3.

Spur Gears.—See **GEAR—Spur.**

Universal Joint.—See **JOINT.**

Velocity Diagrams.—Velocity Diagrams. Dexter S. Kimball. Gives a method of finding the velocity diagram, and its value in machines design. Ill. 2500 w. Sib Jour of Engng—Nov., 1900.

KINEMATOGRAPH.

Electric Spark.—The Application of the Electric Spark to the Chronophotography of Rapid Movements (Application de l'Etincelle Electrique à la Chronophotographie des Mouvements Rapides). Lucien Bull. Describing an apparatus for enabling kinematograph photographs to be taken at very close intervals of time. 1000 w. Comptes Rendus—March 21, 1904.

KITE.

See **AERONAUTICS.**

KNIFE.

Press Button.—Making the Press Button Knife. C. Neil. Illustrated description of a knife in which all the parts, excepting the blade, are made by machinery. Also describes the tools and methods. 2000 w. Am Mach—Feb. 5, 1903.

KRUPP.

See **STEEL WORKS.**

L

LABOR.

See also **COAL MINER; FACTORY LEGISLATION; INDUSTRY; MINER; RAILWAY EMPLOYEE; STRIKE; TRADE UNION; WAGES; WORKMEN'S DWELLINGS; WORKS MANAGEMENT.**

Some Aspects of the Labor Question and Shop Ethics. Egbert P. Watson. A discussion of some of the points that cause disturbances in labor. 4800 w. Ir Age—Sept. 19, 1901.

The Relative Position of Employer and Employed. Edward B. Gilmour. Arguments showing the interests are co-equal. 1100 w. Jour Am Found Assn—May, 1902.

What Is for the Best Interests of the Workingman in His Relation to His Employer and to the Labor Union. Thomas Caldwell. A discussion of these two points in the problem of the relation of capital and labor. 4000 w. Ir Age—June 11, 1903.

A Few Questions to the Rank and File of Laboring Organizations. Discusses points bearing on the motto "Equal Rights for All." 1200 w. Dom Engng—Dec. 25, 1903.

Reconciling the Conflict Between Employers and Employees. Ralph M. Easley. Discusses the questions lying back of industrial disturbances, and the outlook. 4400 w. Bankers' Mag, N Y—Feb., 1904.

American.—Fifty Years Among American Workingmen. Egbert F. Watson. Observations from the writer's experience, describing the social and material condition of fifty years ago, the workmen, the effect of increased immigration, development, etc. 4000 w. Ir Age—Sept. 18, 1902.

Labor Conditions in America (Amerikanische Arbeitsverhältnisse). Georg Dinglinger. An interesting discussion of factory and wage systems, the character of workmen and labor conditions in general in America, by a German who worked at American shops to study conditions there. Serial. Two parts. 7500 w. Glasers Annalen—April 1 and 15, 1903.

The Industrial Army of the United States. James Dredge. The present article gives information based on the U. S. census, in regard to the population and its distribution, the extent of territory, etc. Serial. 1st part. 4000 w. Trac & Trans—April, 1904.

American vs. British.—American and British Workmen. A comparison, discussing the behavior and surroundings and their effect. Serial. 1st part. 4700 w. Engng—Aug. 14, 1903.

Anthracite Conciliation Board.—See **STRIKE.**

Arbitration.—Arbitration: Its Place in Our Professional Practice. G. Alexander Wright. Read before the Tech. Soc. of the Pacific Coast, arguing in favor of arbitration as the quickest and most inexpensive process of settling vexatious disputes. 6000 w. Jour Assn of Engng Socs—Nov., 1900.

Industrial Arbitration. Chauncey H. Castle. An address before the National Arbitration and Conciliation Convention. Reports the experience of the Stove Founders' National Defense Assn. 4000 w. Ir Age—Jan. 3, 1901.

Arbitration of Labor Questions Necessary to Industrial Supremacy. Charles B. Going. Showing that the wastefulness of labor wars is fatal to industrial supremacy, and holding arbitration to be the only remedy. 3000 w. Engineering Magazine—Feb., 1901.

Arbitration in Practice. H. W. Hoyt. An address before the Nat. Civic Fed. Conference in Chicago. On the work of the Nat. Founders' Assn. in this field. 2300 w. Ir Trd Rev—Feb. 7, 1901.

Industrial Arbitration. Chauncey H. Castle. Read before the Nat. Civil Fed. Con. Gives a plan that has worked most successfully, called a method of conciliation through conference. 3200 w. Am Mach—Aug. 8, 1901.

Strikes and the Public Welfare. John Handiboe. Advocating compulsory arbitration in troubles between capital and labor. 3000 w. N Am Rev—July, 1902.

Arbitration or Litigation. Editorial, discussing the working of the English Arbitration Act of 1889, considering some recent cases. 3500 w. Engng—Aug. 1, 1902.

The Harmonising of Organized Labor with Organised Capital. M. Cokely. An argument for the policy of conference, conciliation, and mutual fairness, even at the expense of the exercise of considerable self-restraint. Organization, both of capital and labor, is shown to be not only contributory but essential to the settlement of the problems. 3000 w. Engineering Magazine—May, 1903.

Compulsory Arbiration. F. Danvers Power. Discusses the results of the Arbitration Act in Australia, arguing against compulsory arbitration. 2000 w. Eng & Min Jour—June 15, 1905.

See also Civic Federation; Court of Appeals; New Zealand Laws; **WORKS MANAGEMENT.**

Australia.—Australian Labor Laws and Their Bearing on Trade Unionism. Stafford Ransome. Discusses the new law in Australia and its effect, but does not assume that even if it works well there it would apply to Great Britain or other countries. 2000 w. Engr, Lond—Jan. 3, 1902.

Bloomington League.—The Bloomington Law and Order League. Editorial commending the declaration of this organization and the work it has undertaken to protect all who wish to earn a living. 2000 w. Ir Age—Feb. 12, 1903.

Boycott.—The Anti-Boycott Movement. Daniel Davenport. Read before the Central Supply Assn. Describes the purpose of the Anti-Boycott Association. 1200 w. Ir Age—July 16, 1903.

British.—Emotion and Reason among British Workmen. Percy Longmuir. A discussion of the impelling motives among workmen in their conduct of labor matters, showing the unfortunate effects of appeals to emotion, and calling for a national consideration of important questions. 3000 w. Engineering Magazine—March, 1902.

See also **WAGES.**

British Legislation.—See **FACTORY LEGISLATION.**

British vs. American.—See American vs. British.

Capital Relations.—The Relations of Capital and Labor. Herman Justi. An address delivered under the auspices of the Federation of Labor on Labor Day, at Springfield, Ill. 2300 w. Mines & Min—June, 1901.

The Labor Problem. From the annual address of Pres. I. E. Knisely before the Ohio Bankers' Assn. The relations of labor and capital are briefly discussed. 10,000 w. Bankers' Mag, N Y—Nov., 1903.

Carnegie Address.—See **WORKS MANAGEMENT.**

Civic Federation.—The Conference for Industrial Peace. Oscar S. Straus. An account of the recent conference in New York, and the benefits hoped to be derived from it. 2000 w. N Am Rev—Feb., 1902.

Classification and Valuation.—The Classification and Valuation of Labor. David Carnegie. Discusses the need of classification and valuation; how it should be classified; who should value it, etc.; the advantages. 2300 w. Prac Engr—Aug. 2, 1901.

Coal Mines.—See **COAL MINER; STRIKE.**

Compensation.—See **WAGES**—Skilled Labor.

Compensation Act.—Five Years' Experience of the Effect of the Workmen's Compensation Acts. William H. Tozer. Abstract of a paper read before the Royal Statistical Soc. A review, with the inference that the Acts have been beneficial to the working classes. 5000 w. Ir & Coal Trds Rev—April 22, 1904.

Complaint.—Labor's Complaint Against Capital. Frederic Hay. A short presentation of the conditions now existing, as they appear to the employee, with the employee's view of the necessary remedies. 1800 w. Engineering Magazine—May, 1903.

Conciliation.—See Arbitration; **STRIKE.**

Contract vs. Municipal.—See Municipal vs. Contract.

Convict.—See **ROAD**—Convict Labor.

Court of Appeals.—A Permanent Labor Court of Appeals. Gives a statement of the present industrial situation and the unsatisfactory methods of adjusting difficulties, and discusses the scheme of the Building Trades Employers' Assn. in New York. 2000 w. Gunton's Mag—Aug., 1903.

Crisis.—The Labor Crisis. Discusses the seeming chaos in organised labor and the disturbance in industry due to these conditions. 1800 w. Gunton's Mag—June, 1903.

Eight-Hour Day.—The French Mine-Owners and the Eight-Hour Day. Editorial review of the recent agitation of this subject in France, and the information drawn out by questions to mine owners upon the probable results. 1700 w. Ir & Coal Trds Rev—Feb. 7, 1902.

The Eight-Hour Bill. Testimony of the iron interests before the House Committee on Labor. 8700 w. Ir Age—Feb. 20, 1902.

The Eight-Hour Bill. Testimony of A. C. Dinkey and Judge L. E. Payson before the House Committee on Labor, opposing the passage of the bill. 4500 w. Ir Age—March 6, 1902.

Eight Hours (Bank to Bank). An exhaustive statement of the employers' position in regard to the bill before the British Parliament, at a meeting of the coal-owners with representatives of the Miners' Federation of Great Britain. 3800 w. Col Guard—Dec. 12, 1902.

The Eight-Hour Day. R. W. Raymond. A discussion of the demands Mr. John Mitchell announces that he intends to present next April in behalf of the Mine Workers' Union. 1700 w. Eng & Min Jour—Sept. 9, 1905.

Electric Railways.—See Providence; **STREET RAILWAY MANAGEMENT; STRIKE.**

Employers' Association.—The Attitude of Employers Toward Labor Unions. Extracts from an address by John Kirby, Jr., before the Nat. Assn. of Mfrs., at New Orleans. Urges the thorough organisation of employers, and the protection of the wage-earner in the right to sell his labor to whom he pleases and for the price he pleases. 3200 w. Ir Age—April 23, 1903.

The Employment Department of Employers' Association Work. J. C. Hobart. Address at the special convention of representatives of local employers' associations, held in Cincinnati under the auspices of the Nat. Metal Trades Assn. Considers the unions, the course of action for this association, etc. 4000 w. Ir Age—May 28, 1903.

Is Organised Labor Right? The Only Question. David M. Parry. Discusses the "closed shop," wages, etc. Also considers attitude of employers' associations. 2500 w. Bankers' Mag, N Y—Nov., 1903.

Labor Met by Its Own Methods. Isaac F. Marcosson. On the work of the Chicago Employers' Association. 3700 w. World's Work—Jan., 1904.

New Phase of the Labor Conflict. Discusses the encouraging outlook from the recent movements of organised employers. 2500 w. Gunton's Mag—Jan., 1904.

Trade Unions and Employers' Associations. Charles W. Eliot. From an address to the Boston Central Labor Union. A review of the principles which govern the relations between employers and employees, and of the past history and present methods. 4500 w. R R Gaz—Feb. 12, 1904.

The Employers' Association of the Future. Henry M. Leland. Prepared for the Nat. Metal Trds. Assn. A discussion of the attitude of labor and capital and the future outlook, with suggestions as to the steps needed. 4500 w. Ir Trd Rev—April 7, 1904.

See also **STRIKE; TRADE UNION.**

Engineer's Viewpoint.—The Labor Problem from an Engineer's Point of View. William W. Bird. A lecture, considering the labor problem as a problem of forces, and discussing these forces in detail. 4500 w. Jour Worcester Poly Inst—July, 1905.

Factory Department.—See **WORKS MANAGEMENT—Labor Department.**

Foremen.—See **WORKS MANAGEMENT.**

Founders' Agreement.—Philadelphia Molders' and Founders' Agreement. A copy of the agreement between the National Founders' Assn. on behalf of its Philadelphia members, and the Iron Molders' Union of North America, on behalf of its Philadelphia members. 2400 w. Ir Trd Rev—March 7, 1901.

The Organization of Manufacturers. Antonio C. Pessano. Read before the Foundrymen's Assn. of Philadelphia. Claiming it a necessity to obtain the best results from organized labor, and giving the Philadelphia and New York agreements. 6600 w. Ir Age—March 14, 1901.

Foundry.—Employer and Employee. S. H. Stupakoff. Remarks on the conditions and a wise statement of the relations and rights of each. 1200 w. Jour Am Found Assn—June, 1903.

See also **Management; MOLDING MACHINE—Labor Unions.**

Gantt Address.—See **WAGES—Bonus System.**

Gas Companies.—The Labor Question. F. H. Shelton. Read at the St. Louis meeting of the Am. Gas Assns. Discusses the subject of improvement of the relations between gas companies and their employees, reviewing what has been done in the United States and offering suggestions. Discussion. 11,000 w. Pro Age—July 15, 1904.

See also **TRADE UNION.**

Germany.—The Relations between the Employer and Employed (Verhältnis Zwischen dem Arbeitgeber und dem Arbeiter). R. Krause. An examination of labor conditions in Germany, discussing especially welfare work and the maintenance of friendly relations between employer and men. 2000 w. Stahl u Eisen—Oct. 1, 1905.

High Unit Cost.—High Unit Labor Cost and Its Effect on Prosperity. Thomas D. West. A very just presentation of the labor question and some of the mistakes. 2500 w. Ir Trd Rev—March 17, 1904.

India.—Famine Works in India. E. O. Mawson. An explanation of the system generally adopted for the management of these large camps of unskilled laborers. Ill. 3500 w. Engr, Lond—Aug. 28, 1903.

Insurance.—Workmen's Insurance in Germany (Die Deutsche Arbeiter-Versicherung). Fr. Pichler. Paper before the Technischer Verein of Baltimore, giving an account of the system of workmen's insurance instituted by the German government, in which both employer and employee contribute to the fund. Diagrams. 3000 w. Technologist—July, 1903.

Insurance Against Loss of Work (Die Fürsorge für Arbeitslose). Paul Möller. An account of some of the schemes for insuring workmen against hardship from lack of work, as in force in certain establishments in Germany. 3000 w. Zeitschr d Ver Deutscher Ing—June 10, 1905.

Issues.—The Issues Between Labor and Capital. Egbert P. Watson. An impartial discussion of the faults of trade unionism and the mistakes of employers. 3000 w. Engineering Magazine—Oct., 1903.

Johannesburg.—See **GOLD MINING—Transvaal; MINER.**

Legislation.—Attitude of Courts Toward Labor Interference. Articles by James A. Miller and Arthur E. Ireland. The first article encourages resort to the courts; the second discusses present laws affecting strikes, and related matters. 4200 w. Mod Mach—March, 1902.

Machinery Opposed.—Machinery and Labor. Henry White. Address before the Am. Soc. of Pol. & Soc. Sci. Discusses the opposition of workmen to labor-saving methods, and shows the material advantages of machinery. 3200 w. Gunton's Mag—Aug., 1902.

See also **Output Restriction; MOLDING MACHINE—Labor Unions.**

Mines.—See **COAL MINER; GOLD MINING—Transvaal; MINER.**

Mosely Commission.—See **INDUSTRIAL COMMISSION.**

Municipal vs. Contract.—Municipal vs. Contract Construction. James M. Head. Claims advantages of "day labor systems" over contract work, illustrating by results. Serial. 1st part. 3800 w. Munic Jour & Engr—Nov., 1903.

Negro.—The American Negro for South America. D. H. Newland. Discusses the question of introducing negro labor from the United States. The investigations made do not recommend the negro as an efficient laborer. 2000 w. Eng & Min Jour—Aug. 29, 1903.

New Zealand Laws.—New Zealand Labor Laws. A summary of the "industrial conciliation and arbitration act of 1900," with explanatory notes. 11,500 w. U S Cons Repts. No. 1538—Jan. 7, 1903.

Open Shop.—Free Shops for Free Workingmen. W. H. Pfahler. Read before the Am. Econ. Assn. Outlines the existing conditions and considers the reasons why employers oppose the "union shop." 2000 w. Ir Trd Rev—Jan. 29, 1903.

Issues Between Employers and Employees. Summary of actions taken by various organizations, including a new movement which has for its object the maintenance of the right of the individual to work when and under what terms he pleases. 3500 w. Ir Trd Rev—March 26, 1903.

The Union vs. the Open Shop. Discusses the question of unionizing shops, and other demands made by union labor, the misuse of power, etc. 2800 w. Gunton's Mag—Aug., 1903.

The Open Shop. T. F. Woodlock. Address before the Nat. Civic Fed. in Chicago. Discusses the case of the public in favor of the open shop. 2000 w. Ry Age—Dec. 11, 1903.

The Fight for the Open Shop. Isaac F. Marcosson. An account of the victory of organized employers over labor unions, and the protection of non-union men. Ills. 5000 w. World's Work—Dec., 1905.

Organized Employers.—See **Employers' Association; Open Shop.**

Output Restriction.—The Restriction of Output. Abstract of a chapter in the report of the Bureau of Labor upon the restriction of output in the manufacturing trades, especially dealing with that regulation of output by the machinists' organizations. 4000 w. Ir Age—Aug. 31, 1905.

See also **Machinery Opposed.**

Parry Address.—Labor, Foreign Commerce and Railroad Questions. D. M. Parry. Extracts from the Presidential Address at the convention of the Nat. Assn. of Mfrs. Discusses the questions of labor, interstate commerce legislation, rates, etc. 5000 w. Ir Age—May 18, 1905.

Pension System.—The Pension System and Profit Sharing. J. B. Johnston. Discusses the growing sentiment in favor of pensions to the invalided or superannuated workmen; also the subject of profit sharing, which the writer does not think an unqualified success. 1600 w. Am Mfr—Feb. 27, 1902.

Philippines.—The Labor Question in the Philippines. Edwin Maxey. A discussion of the industrial education of the native Filipino. 2000 w. Gunton's Mag—July, 1903.

Labor Conditions in the Philippine Islands. J. W. Beardsley. Shows briefly some of the essential conditions surrounding the labor problem in the Philippines. 9500 w. Eng News—Nov. 23, 1905.

Providence Street Railway.—The Labor Question in Providence. Substance of the form of agreement presented by the employees for the acceptance of the United Traction & Electric Co., with the reply of the company. 2000 w. St Ry Rev—May 20, 1902.

See also **STRIKE.**

Sanitation.—See **SANITARY ENGINEERING—U. S. Southern; WORKS MANAGEMENT.**

Shop Clubs Act.—The Shop Clubs Act, 1902. Editorial discussion of an act recently passed which places further statutory restrictions upon the liberty of employers in dealing with their men. 1400 w. Engng—Aug. 29, 1902.

South Africa.—See **GOLD MINING—Transvaal; MINER.**

South America.—See **Negro.**

Stock Holder.—See **WAGES—Profit Sharing; WORKS MANAGEMENT—Labor Capitalist.**

"Stop-Day."—The South Wales Miners and the "Stop-Day" Decision. Gives criticisms upon this important case by a number of leading daily journals. 4200 w. Ir & Coal Trds Rev—Aug. 15, 1902.

The Stop-Day Case. Reviews an important case between capital and labor and the decision rendered by a British court. 3000 w. Engng—Aug. 15, 1902.

Storage Battery Manufacture.—See **STORAGE BATTERY—Manufacturing Regulations.**

Street Railways.—See **Providence; STREET RAILWAY MANAGEMENT; STRIKE.**

Strike.—See **STRIKE.**

Trade Union.—See **TRADE UNION.**

Trust.—See **TRADE UNION; TRUST.**

Unemployed.—Dealing with the Unemployed. J. Keir Hardie. A discussion of this problem, outlining the scope of voluntary agencies for dealing with distress and the reforms necessary. Refers especially to England. 8000 w. Nineteenth Cent—Jan., 1905.

See also **WORKMEN'S DWELLING.**

Wage-Fund Theory.—See **WAGES—Fund Theory.**

Welfare Work.—See **WORKS MANAGEMENT.**

LABORATORY.

See also **EDUCATION; ELECTRIC TESTING; TESTING**; and under specific headings.

American.—American Technical Laboratories (Amerikanische Technische Laboratorien). A. Gramberg. A description from a German viewpoint of the mechanical laboratories of the principal engineering schools in America. 4500 w. Zeitschr d Ver Deutscher Ing—April 22, 1905.

See also **U. S. National.**

Berlin.—The Mechanical Laboratory of the Royal Technical High School of Berlin. Walter Mentz. An illustrated review of the arrangement and working of this laboratory. 5800 w. Jour Am Soc of Nav Engrs—Nov., 1903.

The Royal Testing Laboratory at Gross-Lichterfelde-West (Das Königliche Materialprüfungsamt zu Gross-Lichterfelde-West). An illustrated account of the new buildings to be occupied by the Royal testing laboratory and the Chemical-Technical Research Department of the Prussian Government, near Berlin. Serial. Part I. 4000 w. Zeitschr d Ver Deutscher Ing—July 9, 1904.

The Royal Testing Laboratory at the Berlin Technical High School (Das Königliche Materialprüfungsamt der Technischen Hochschule Berlin). An editorial review of the new quarters of the Government testing bureau, with especial reference to its work upon iron and steel. 3500 w. Stahl u Eisen—July 15, 1904.

The Materialprüfungsamt Near Berlin. A description of the new testing station in one of the suburbs of Berlin, which was recently completed, and of the equipment for testing various materials. 2500 w. Engng—June 16, 1905.

The Laboratory for the Testing of Materials of the Charlottenburg Polytechnic School of Berlin. L. Ramakers. A partial description of the Gross-Lichterfelde establishment for experimental study of materials, illustrating some of the modern testing machinery and instruments installed. 2500 w. Sci Am—Sept. 9, 1905.

See also **Reichsanstalt.**

Blast Furnace.—See **BLAST FURNACE—Laboratory.**

British National.—The National Physical Laboratory. An illustrated article describing this recently opened laboratory in England, and its equipment. 5000 w. Elec Engr, Lond—March 21, 1902.

I. The National Physical Laboratory. Albert Campbell. A brief description of some of the electrical apparatus. II. Wiring for Experimental Work. W. P. Steinthal. Illustrates and describes the general scheme. 3000 w. Elec Rev, Lond—June 6, 1902.

The National Physical Laboratory and Engineering. Dr. R. T. Glazebrook. Lecture to the graduates of the Inst. of Mech. Engrs. Illustrates and describes the equipment of this laboratory, and suggests the work, useful to engineers, which may be done there. Serial. 1st part. 4200 w. Engng—March 13, 1903.

The National Physical Laboratory. A summary of the work done and of the instruments and machines thus far added to the equipment, with information concerning the needs, etc. 4800 w. Engng—March 25, 1904.

Brooklyn Waterworks.—See **Waterworks.**

Castner Experiments.—See **ELECTRO-CHEMISTRY —Castner Process.**

Carlsruhe.—See **Hydraulic.**

Case Co., Racine.—A Practical Laboratory. Illustrated description of the laboratory of the J. I. Case Threshing Machine Co., Racine, Wis. 2300 w. Ir Age—Jan. 24, 1901.

Physical and Chemical Laboratory of the J. I. Case Threshing Machine Co., Racine, Wis. Illustrated description of this laboratory and the important features of the work. 3800 w. Eng News —July 10, 1902.

Cement Testing.—See **Municipal; CEMENT TEST— Laboratory.**

Christ's Hospital School.—See **EDUCATION.**

Columbia University.—See **Road Materials.**

Copper Works, Baltimore.—Labor Saving Appliances in the Works-Laboratory. Edward Keller. Illustrates and describes appliances introduced in the laboratory of the Anaconda Copper Mining Co., in Baltimore, Md. 3500 w. Am Inst of Min Engrs—March, 1905.

Courses.—See **EDUCATION—Laboratory.**

Danzig.—The Mechanical Plant of the New Technical High School at Danzig (Die Maschinenanlagen der Neuen Technischen Hochschule zu Danzig). W. Josse. A very full account of the new plant of the mechanical laboratory, including steam, hydraulic, pneumatic and electrical equipment. 10,000 w. 2 plates. Zeitschr d Ver Deutscher Ing—Oct. 8, 1904.

Darmstadt Technical Institute.—See **Hydraulic; EDUCATION.**

Dresden.—The New Mechanical Buildings of the Dresden Technical High School (Die Neubauten der Mechanischen Abteilung der Kgl. Sächsischen Technischen Hochschule zu Dresden). A very complete and fully illustrated description of the buildings and equipment. 15,000 w. 1 plate. Zeitschr d Ver Deutscher Ing—May 27, 1905.

The New Mechanical Laboratory of the Dresden Polytechnic (Les Nouveaux Laboratoire de Mécanique de l'Ecole Technique Supérieur de Dresde). With plans and elevations of the buildings, and a general account of the equipment. 2500 w. 1 plate. Génie Civil—July 1, 1905.

Electric Cell.—See **ELECTRIC CELL.**

Electric Commercial.—The Equipment of a Commercial Testing Laboratory. Dr. Clayton H. Sharp. An outline of the equipment needed for the various kinds of work to be done, and the conditions that must be kept in view. 6000 w. Int Elec Cong of St. Louis—Sept., 1904.

The Electrical Testing Laboratories. Clayton H. Sharp. An illustrated description of the plant in New York, on the corner of 80th St. and East End Ave., and of its equipment for the work. 5200 w. Elec Wld & Engr—Jan. 7, 1905.

A Testing Laboratory in Practical Operation. Clayton H. Sharp. An account of the results attained in the establishment and maintenance of a laboratory for commercial electric testing. 2800 w. Am Inst of Elec Engrs—Dec., 1905.

Electric Furnace.—See **ELECTRIC FURNACE.**

Electric, London.—See **London Central Technical.**

Electric, Munich.—The Electrotechnical Laboratory of the Municipal Electric Works of Munich (Das Elektrotechnische Laboratorium der Städtischen Elektricitätswerke in München). F. Uppenborn. With plan of the building and views of the various rooms and apparatus. 3500 w. Elektrotech Zeitschr—Nov. 27, 1902.

Electric, Paris.—The Laboratoire Central D'Electricité at Paris. Albert Campbell. A description of some of the things seen in the main public laboratory for electrical testing work. 1200 w. Elec Rev, Lond—March 25, 1904.

Electric, Vienna.—See **EDUCATION.**

Electro-Analytical.—Suggestions for the Equipment of an Electro-Analytical Laboratory. Dr. Rudolf Gahl. Read before the W. Assn. of Tech. Chem. & Met. Discusses the electrical current and how best to produce it, and the application of this system for practical use. 2500 w. Min Rept—Aug. 10, 1905.

Electro-Chemical.—See **ELECTRO - CHEMISTRY — Laboratory.**

Engineering.—A Project for an International Bureau of Engineering Data. Leicester Allen. A discussion of the necessity for fixed electrical and mechanical standards, urging the importance of an international bureau of standardisation. 2500 w. Engineering Magazine—Dec., 1901.

Engine Testing.—See **STEAM ENGINE TEST—Test House.**

Fireproofing, Chicago.—The Underwriter's Laboratories. Day Allen Willey. Illustrates and describes a laboratory in Chicago for testing the utility of all fire resisting materials and systems, as well as apparatus used. 2000 w. Sci Am Sup—Aug. 22, 1903.

See also **FIREPROOFING—Testing Oven.**

Foundry.—See **FOUNDRY—Laboratory.**

French Posts and Telegraphs.—See **ELECTRIC UNIT—Ohm.**

Furnace.—See also **FURNACE—Gas Reverberatory.**

Gold Milling.—See **GOLD MILLING—Laboratory Work.**

Hydraulic.—See also **MODEL BASIN.**

Hydraulic, Carlsruhe.—The Stream-Flow Laboratory of the Carlsruhe Polytechnic (Le Laboratoire d'Hydraulique Fluvide de l'Institut Technique de Carlsruhe). A description of the testing tank for the study of the action of stream flow upon the beds and banks of rivers. 2000 w. 1 plate. Génie Civil—Jan. 24, 1903.

Hydraulic, Darmstadt.—The Hydraulic Laboratory of the Technical High School at Darmstadt (Das Maschinenbau-Laboratorium III der Technischen Hochschule Darmstadt). Prof. A. Pfarr. Illustrating and describing the testing flume, weirs, pumping plant and hydraulic laboratory equipment at the Darmstadt Polytechnic. 2000 w. 1 plate. Zeitschr d Ver Deutscher Ing—July 16, 1904.

Insulator Testing.—See **INSULATOR—Testing Laboratory.**

Labor Saving Appliances.—See **Copper Works, Baltimore.**

London Central Technical.—The New Electrical Laboratories of the Central Technical College. Joseph Griffin. Illustrated detailed description of a finely equipped laboratory. 1800 w. Elec Engr, Lond—Jan. 1, 1904.

London Polytechnic.—The Engineering Laboratories at the South-Western Polytechnic, London. An illustrated detailed description of laboratories and their equipment for the instruction of students. 8700 w. Mech Engr—May 7, 1904.

Manufacturing Plant.—See **FOUNDRY—Laboratory.**

Massachusetts Institute of Technology.—See **ELECTRO-CHEMISTRY—Laboratory.**

Mechanical.—The Place of the Mechanical Laboratory in the Education of the Engineer. Prof. J. Boulvin. A discussion of the great value of an intelligently conducted mechanical laboratory in the technical school. 4500 w. Engineering Magazine—April, 1902.

See also **American; Berlin; Dresden; Zurich Polytechnic.**

Metallography.—Equipment and Work of Metallographical Laboratories in Germany. E. P. Buffet. Extracts from descriptions appearing in German engineering periodicals, describing two recent plants. 1800 w. Ills. Am Mach—Vol. 28, No. 11.

See also **METALLOGRAPHY—Aix-la-Chapelle.**

Metallurgical.—The Equipment of a Laboratory for Metallurgical Chemistry in a Technical School. Charles H. White. States the principles to be observed in the equipment, and gives an illustrated description of the laboratory for metallurgical chemistry at Harvard University. 1400 w. Trans Am Inst of Min Engrs—Feb., 1904.

A Modern Metallurgical Laboratory. Robert H. Bradford. An illustrated description of a complete plant for testing ores by various processes, at the State School of Mines, University of Utah. 1700 w. Mines & Min—Dec., 1904.

Mining.—See **MINING LABORATORY.**

Municipal.—A Municipal Laboratory for Testing Asphalt and Cement. W. H. Broadhurst. Illustrated description of a plant designed for testing asphalts, paving materials, cements, etc., and the facilities for testing. 2000 w. Munic Engng—Nov., 1904.

See also **Philadelphia; Waterworks; CEMENT TEST—Laboratory.**

National Physical.—See **British National; Official; Paris Conservatoire; Reichsanstalt; U. S. National.**

N. Y. Water Department.—See **Waterworks.**

Niagara.—See **ELECTRO-CHEMISTRY—Laboratory, Niagara.**

Official.—Official Testing Laboratories (Les Laboratoires Officiels d'Essais). A comparative review of the official testing laboratories of Berlin, Munich, Dresden, Vienna, and Prague, with estimates for the establishment of a laboratory in Paris. 3000 w. Revue Technique—July 10, 1901.

Paris Conservatoire.—The Testing Laboratory of the Conservatoire des Arts et Metiers (Laboratoire des Essais lu Conservatoire des Arts et Métiers). P. Breuil. A general description of the new mechanical laboratory in Paris, with illustrations of the hydraulic machinery and testing appliances. Serial. Part I. Génie Civil—Sept. 5, 1903.

The Testing Laboratory of the Conservatoire des Arts et Metiers (Laboratoire d'Essais du Conservatoire des Arts et Metiers). A. Boyer-Guillon. Describing especially the department relating to the testing of automobiles, steam engines, and other machines. Two articles. 5000 w. 1 plate. Génie Civil—May 21, 28, 1904.

The Testing Laboratory of the Conservatoire des Arts Et Métiers (Le Laboratoire d'Essais du Conservatoire National des Arts et Métiers). E. Leduc. With views of the various departments and an outline of the system of work. Serial. Part I. 2000 w. Revue Technique—June 25, 1904.

The Testing Laboratory of the Conservatoire des Arts et Métiers (Organisation et Outillage du Laboratoire d'Essais du Conservatoire des Arts et Métiers). A. Perot. A general account of the new testing laboratory, and its relation to public and private industries. 4000 w. Mem Soc Ing Civ de France—May, 1905.

See also **TESTING MACHINE.**

Philadelphia.—The Philadelphia Municipal Testing Laboratories. W. Purves Taylor. Describes the work carried out at these laboratories. 1300 w. Eng Rec—July 2, 1904.

Photometric.—See **PHOTOMETRY—Laboratory.**

Railway.—The Relation of a Testing Laboratory to a Large Railway System. J. C. Thorpe. An account of the work of a railway laboratory, showing its relation to the railway system, and hence its value. 1600 w. Technograph—No. 16—1901-2.

See also **RAILWAY MATERIAL—Testing.**

Railway, Austria.—A Central Technical Investigation Bureau for the Austrian Railways (Ein Technisches Zentral Studienbureau für das Eisenbahnwesen in Oesterreich). Dr. W. Exner. An examination of the project to establish a scientific bureau for the investigation of railway problems. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 29, 1904.

Proposed Central Technical Research Bureau for the Austrian Railways. Dr. Wilhelm Exner. Lecture to the Austrian Soc. of Engrs. and Archts. Translated from "Zeitschrift des Oesterreichischen Ing. und Arch. Ver." A statement of the proposal and arguments favoring it. 9200 w. Bul Int Ry Cong—Oct., 1904.

Reichsanstalt.—The Work of the Reichsanstalt in the year 1901. Summary of the official report on the work of the Physikalische Technische Reichsanstalt. 5000 w. Engng—Oct. 31, 1902.

The Work of the Electric Testing Office (Bekanntmachung über Prüfungen und Beglaubigungen durch die Elektrischen Prüfämter). Detailed report of tests of meters at the Reichsanstalt. 5000 w. Elektrotech Zeitschr—April 28, 1904.

The Physical Technical Reichsanstalt (Die Physikalisch-Technische Reichsanstalt). An abstract of the work of the Reichsanstalt, to the close of 1903, with especial reference to the calibration of electrical instruments. 5000 w. Elektrotech Zeitschr—May 12, 1904.

The Work of the Physical-Technical Reichsanstalt for 1903 (Die Tätigkeit der Physikalisch-Technischen Reichsanstalt im Jahre 1903). An abstract of that portion of the report for 1903 relating to the testing and calibrating of electrical apparatus and other electrical work. 4500 w. Elektrotech Zeitschr—Sept. 8, 1904.

The Work of the Physical Technical Reichsanstalt in 1904 (Die Tätigkeit der Physikalisch-Technischen Reichsanstalt im Jahre 1904). An abstract of that portion of the report relating to the standardizing of electrical appliances and methods. 6000 w. Elektrotech Zeitschr—Sept. 21, 1905.

See also **ALLOY—Magnetic; LIGHTNING PROTECTION.**

Research Institution, France.—See Paris Conservatoire; EDUCATION.

Road Material.—The United States Road Material Laboratory. Logan Waller Page and Allerton S. Cushman. Read before the Am. Soc. for Test. Materials. Historic review of road material tests; the present article is devoted principally to the methods in use in France. Ill. Serial. 1st part. 2300 w. Engr Rec—July 25, 1908.

The Laboratory for the Testing of Road Materials at Columbia University. A. Black. Describes the methods of testing these materials in various laboratories, and the qualities required, and gives tabulated report of tests made at the laboratory of Columbia Univ., and illustrations of machines. 6600 w. Sch of Mines Qr—Jan., 1905.

See also **ROAD MATERIAL—Test.**

Rudge-Whitworth.—A Factory Research Laboratory. Illustrated description of the laboratory in the cycle works of Messrs. Rudge-Whitworth, Ltd., an exceptionally fine example. Serial. 1st part. 2200 w. Engr, Lond—June 10, 1904.

Sand Test.—See **SAND—Mortar.**

Shop Compared.—See **EDUCATION—Laboratory vs. Shop.**

Stuttgart.—The Engineering Laboratory of the Technical High School at Stuttgart (Das Ingenieur Laboratorium der Kgl. Technischen Hochschule Stuttgart). C. Bach. With views of the exterior of the building, and plans and sections of the rooms. 3000 w. 2 plates. Zeitschr d Ver —Laboratory.

Tantalum Lamp Test.—See **INCANDESCENT LAMP —Tantalum.**

Technical Colleges.—See American; Berlin; Dantzig; Dresden; London; Stuttgart; Zurich; **EDUCATION Laboratory.**

Underwriter's.—See Fireproofing; **FIREPROOFING —Testing Oven.**

U. S. National.—A New Government Laboratory and Its Work. George Steiger and E. T. Allen. Illustrated description of these new laboratories at Washington, D. C., and their equipment. 2000 w. Eng & Min Jour—May 10, 1902.

The National Bureau of Standards. Prof. S. W. Stratton. Historical review of what has been done by the U. S. Congress, and discussion favoring the compulsory use of the metric system. 8000 w. Jour W Soc of Engrs—Aug., 1902.

The National Bureau of Standards. S. W. Stratton and E. B. Rosa. Illustrated detailed description of the buildings and equipment and the methods of carrying out the work. 13000 w. Am Inst of Elec Engrs—Dec., 1905.

Utrecht University.—The Van't Hoff Laboratory at the University of Utrecht (Das Van't Hoff Laboratorium der Reichsuniversität zu Utrecht). Ernst Cohen. A general description, with plans, of the new chemical and physical laboratory, with an account of the opening ceremonies. 3500 w. Zeitschr f Elektrochemie—July 15, 1904.

Van't Hoff.—See **Utrecht University.**

Waterworks.—Municipal Water-Works Laboratories. George C. Whipple. Information concerning the laboratories already established and their work, and discussing the use of laboratories for other municipal needs. Ill. 4500 w. Pro Sci M—Dec., 1900.

Waterworks, Brooklyn.—The Mount Prospect Laboatory, Brooklyn, New York. Describes a station for chemical, bacterial and microscopical analysis of the complicated Brooklyn water supply. 3000 w. Eng Rec—April 13, 1901.

Waterworks, N. Y.—Biological and Chemical Laboratories of the Water Department of New York City. George C. Whipple. A review of the work carried on at these laboratories, the supervision, tests, analyses, and sanitary investigations. 2500 w. Eng Rec—May 9, 1903.

Wisconsin University.—See also **ELECTRIC-CURRENT RECTIFIER—Electrolytic.**

Worcester Polytechnic. — See **DYNAMOMETER—Electromagnetic Absorption.**

Zurich Polytechnic.—The Mechanical Laboratory of the Polytechnic School at Zurich (Das Machinenlaboratorium am Eidgenössischen Polytechnikum in Zürich). A very fully illustrated description of the new building and the equipment of the mechanical, hydraulic and electrical laboratories. Six articles. 8000 w. 3 plates. Schweizerische Bauzeitung—Oct. 17, 24, 31, Nov. 14, 21, Dec. 12, 1903.

LABOR SAVING.

See also **WORKS MANAGEMENT.**

The World's Great Labor Savers and Labor Servers. Robert W. Hunt. A review of the work which has been done by the great inventors and engineers of the past century, with numerous portraits. 3500 w. Engineering Magazine—March, 1904.

The Effects of Labor-Saving Machinery. Frank H. Rose. A conservative view of the effect of machinery upon the wage earner, showing the result to be beneficial to employer and employee. 4000 w. Engineering Magazine—March, 1904.

Office Equipment.—See **CALCULATING MACHINE.**

LABOR UNION.

See **LABOR; TRADE UNION.**

LACQUER.

Metal.—See **METAL PROTECTION.**

LADLE.

Slag.—Slag and Metal Ladles. Illustrates and describes various recent types. Serial. 1st part. 3000 w. Ir & Coal Trds Rev—Oct. 3, 1902.

LADLE CAR.

See also **IRON METALLURGY; STEEL METALLURGY; STEEL WORKS.**

Electric.—Electric Travelling Ladle of 20 Tons Capacity (Elektrisch Angetriebener Giesspfannenwagen für 20 t Pfanneninhalt). Illustrated description of heavy electric ladle car built by Seussenbreuner of Düsseldorf. 600 w. Stahl und Eisen—March 15, 1901.

Twenty-Ton Electric Ladle Car (Elektrisch Betriebener Giesswagen für 20 Tonnen Pfanneninhalt). With photographs showing construction and details for conveying and pouring from the ladle. 1200 w. Stahl u Eisen—Dec. 15, 1904.

An Electrically Operated Casting Wagon. Dr. Alfred Gradenwitz. Short illustrated description of a casting wagon at the Burbach Metallurgical Works, in Lorraine. 700 w. Ir Trd Rev—Sept. 7, 1905.

LAKE.

See also **RESERVOIR.**

Protection Works.—The Efficiency of the Protection Works of the Salzkammergut Lakes (Die Verwertung des Retentionsvermögens der Salzkammergut Seen). Ernst Lauda. A discussion of the regulation works of the Traun, and the lakes in the Salzkammergut district of Austria. Two articles. 1000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—April 28, May 5, 1905.

LAKE LEVEL.

Nicaragua.—See **CANAL—Nicarauga Lake.**

LAMP.

See **ARC LIGHT; HEADLIGHT; INCANDESCENT LAMP; LIGHTING; MERCURY VAPOR LAMP; NERNST LAMP; SAFETY LAMP;** and other kinds of lamps and systems of lighting.

LANDING STAGE.

See also **DOCK; HARBOR; PIER.**

Lome, Africa.—See **PIER.**

LAND RECLAMATION.

See **DRAINAGE; IRRIGATION; RIVER REGULATION; SHORE PROTECTION.**

LANDSCAPE ARCHITECTURE.

See also **MUNICIPAL IMPROVEMENT.**

Landscape Architecture. Stephen Child. Lecture before the Boston Society of Civil Engineers, giving a general account of the subject, with illustrations. 2800 w. Jour Assn of Engng Socs—July, 1904.

Railway Station Grounds.—See **RAILWAY STATION —Grounds Decoration.**

Washington, D. C.—Landscape in Connection with Public Buildings in Washington. Abstract of a paper by F. L. Olmsted, Jr., before the Am. Inst. of Archts., explaining the unfortunate results of a failure to group the public buildings of Washington in harmony with l'Enfant's project. 3300 w. Eng Rec—Dec. 29, 1900.

See also **BRIDGE; CITY PLAN; MUNICIPAL ART; RAILWAY STATION.**

LANDSLIDE.

See also **EARTH MOVEMENT.**

Austrian Railway.—See RETAINING WALL.

Cleveland, O.—The Railway Landslide at Cleveland. An illustrated article describing the destruction of railways and buildings by a slide along the lake front. 1200 w. Eng Rec—Nov. 14, 1903.

Dortmund, Germany.—See COAL MINE ACCIDENT.

Frank, Alberta.—The Frank Disaster. Several accounts, with illustrations, of the rock slide on Turtle Mountain, which buried this mining town on the C. P. Railroad, and caused great loss of life. A vertical seam of coal was being worked. 4500 w. Can Min Rev—May 30, 1903.

The Rock-Slide at Frank. Reports, with interesting illustrations of this catastrophe, describing the features of interest, and the present condition of the locality. 2000 w. Can Engr—June, 1903.

The Great Rock-Slide at Frank, Alberta. William Pearce. An illustrated account of the disaster on the morning of April 29th, which buried this town and killed 66 men, women and children, blocking the Canadian Pacific Ry. track for about a mile and a half. Also report of the official investigation. 3300 w. Eng News—June 4, 1903.

The Turtle Mountain Rock Slide. Walton E. Dowlen. An illustrated description of the conditions which give an explanation of this disaster in Alberta, Canada. 2000 w. Eng & Min Jour—July 4, 1903.

Hartford.—The Settlement of Lorraine Street, Hartford, Conn. Frederick L. Ford. Illustrated description of a landslide and the method of checking it. 1800 w. Eng Rec—Feb. 22, 1902.

New York Underground.—See UNDERGROUND RAILWAY.

Portland, Oregon.—A Phenomenal Land Slide. D. D. Clarke. Relates to the slide affecting the reservoirs of Portland, Oregon, describing the surveys and explorations which have been made during the last nine years, for the purpose of determining the dimensions of the slide and its probable cause, and to aid in devising a plan for a cure of the difficulty. Maps, illustrations, etc. 25,500 w. Pro Am Soc of Civ Engrs—March, 1904.

A Phenomenal Land Slide. Discussion of paper by D. D. Clarke on the slide affecting the reservoirs of Portland, Oregon. 5500 w. Pro Am Soc of Civ Engrs—May, 1904.

A Phenomenal Landslide. Discussion on paper by D. D. Clarke on landslide involving reservoirs near Portland, Ore. 1400 w. Pro Am Soc of Civ Engrs—Aug., 1904.

LAND SUBSIDENCE.

Boston.—See EARTH MOVEMENT.

LANTERN.

Miner's.—See SAFETY LAMP.

Projecting.—See PROJECTION APPARATUS; SEARCHLIGHT.

LATHE.

See also **BORING MILL; ELECTRIC DRIVING; MACHINE SHOP; MACHINE TOOL.**

Lathe Design and Practice. E. H. Fish. The present number discusses the cause of chattering, the main spindle bearing, the carriage, and the carriage ways. Ills. Serial. 1st part. 2500 w. Am Mach—Vol. 28, No. 41.

Amateur.—Lathes for the Amateur. From the "English Mechanic and World of Science." Considers the principal points to be settled in buying a lathe. Ills. 4000 w. Sci Am Sup—Dec. 9, 1905.

Apron.—Engine Lathe Apron. Illustrated description of the apron with which the lathes of the Draper Machine Tool Co. are fitted. 700 w. Am Mach—April 9, 1903.

Attachments.—A Multi-Spindle Drilling and Tapping Attachment and Work Fixture, for the Turret Lathe. William Doran. Illustrates and describes designs of the writer. 1600 w. Am Mach—Oct. 3, 1901.

Hobbing Worm Wheels in a Lathe. Illustrates and describes an arrangement for this work. 600 w. Am Mach—Oct. 3, 1901.

Some Lathe Attachments for the Amateur Machine Shop. Robert G. Griswold. Illustrates and describes angle plates, facing attachment and grinding attachment, explaining methods of using. 2000 w. Am Mach—Vol. 27, No. 31.

See also **Turret Lathe Fixture; JIG; MACHINE TOOL—Fixture.**

Automatic.—See Turret.

Automobile vs. Hand.—The Automobile Versus the Hand Turret Lathe. P. V. Vernon. A reply to an article by Paul Wesley, followed by an illustrated description of the operation of the automatic machine. 2000 w. Am Mach—Vol. 28, No. 16.

Backing-Off Attachment.—Backing-Off Attachment for the Lathe. William Runge. Illustrated description of an attachment intended for relieving or backing off the teeth of formed cutters, hobs, taps, etc., and is fitted to a lathe having a taper turning attachment. 700 w. Am Mach—April 23, 1903.

Bardons & Oliver.—A Large Bardons & Oliver Lathe. Illustrated description of a heavy turret lathe for operating on bar stock up to six inches in diameter. 2500 w. Mach, N Y—Sept., 1904.

Backwoods.—A Backwoods Lathe. John Randol. Illustrated description, with remarks. 1000 w. Am Mach—March 31, 1904.

Boiler Heads.—See BOILER MANUFACTURE—Turning Mill.

Boring.—Boring and Turning Mill for Electric Generators. Illustrates and describes a boring and turning lathe made for large dynamo work. 1200 w. Engng—Aug. 14, 1904.

Hydraulic-Feed 14-Inch Boring Lathe. Illustrated description of an interesting powerful machine. 1200 w. Mach, N Y—March, 1904.

14-Inch Hydraulic Boring Lathe. Illustrated description of a heavy lathe intended for boring gun forgings, marine shafting and ingots. Built at Hamilton, Ohio. 1200 w. Engng—March 4, 1904.
See also **BORING MACHINE; BORING MILL.**

Brass Finishers'.—Brass Finishers' Lathes. Illustrated description of lathes especially designed for repetition work. 1800 w. Engng—Nov. 13, 1903.

Building Methods.—Lathe Building Methods Used at the Works of the Lodge & Shipley Machine Tool Company. C. F. Pease. An illustrated article describing heavy casting, cleaning, erecting department appliances, and stock boxes. 600 w. Am Mach—June 23, 1904.

Capstan.—See Turret.

Change Gear.—See GEAR—Change.

Crank Shaft.—See German Crank Shaft.

Drives.—Analysis of Some Engine-Lathe Drives. Sketches and table giving results of work undertaken to determine which of nine lathes of various sizes and makes were best suited to certain diameters of work; also which were most suitable for the heaviest work. 2000 w. Am Mach—Vol. 28. No. 23.

Electric Driving.—Electric Drive for Large Lathes. Oscar E. Perrigo. Illustrates and describes a method of applying the electric drive to existing lathes which has been found economical, convenient and efficient. 700 w. Am Mach—Vol. 28, No. 18.

See also **Shafting; ELECTRIC DRIVING.**

Elliptical.—A New Elliptical Lathe. C. W. MacCord. Illustrates and describes a lathe for elliptical turning, possessing novel features. 1800 w. Sci Am Sup—Dec. 15, 1900.

Elliptic Lathe with Movable Tool (Tours Elliptiques à Outil Guidé). Ch. Dantin. With especial reference to the lathe of MM. Vrignault & Brosse for turning elliptical forms. 2000 w. Génie Civil—Nov. 30, 1901.

See also **BORING MACHINE.**

Feeds and Speeds.—Feeds and Speeds for Lathe Work. T. A. Sperry. Gives results of observations at the works of the Cincinnati Milling Machine Company, showing the speeds and feeds at which iron and steel are being machined to-day. 1100 w. Am Mach—Vol. 28, No. 21.

Fixtures.—See Attachments; Turret Lathe Fixture; JIG; MACHINE TOOL.

Fly Wheel Making.—See FLY WHEEL—Pit Lathe.

Gear Blanks.—Machinery Gear Blanks in the Lathe. Frank B. Kleinhans. An illustrated description of a lathe fitted with a turret drilling attachment and its use. 600 w. Am Mach—Jan. 28, 1904.

Gear Box.—See GEAR—Lathe.

German Crank Shaft.—Lathe for Double Crank Shafts (Doppelte Kurbelachsen-Drehbank). Illustrated description of heavy double ended lathe built by E. Schiess of Düsseldorf, for turning heavy multiple-crank shafts for marine engines. 1000 w. Stahl und Eisen—Aug. 1, 1901.

A Large German Crank Shaft Lathe. Half-tone and line engravings of what is believed to be the largest lathe that has been made. Description. 700 w. Am Mach—Aug. 29, 1901.

Grinding.—See GRINDING—Lathe.

Heavy Turret.—See Turret.

Heavy Work.—See Turbine Rotors.

Hendey-Norton.—The Latest Hendey-Norton Lathe. Illustrated description of a lathe designed with the object of increasing the producing capacity. 1200 w. Ir Age—Dec. 29, 1904.

High Speed.—The Inefficiency of the Ordinary Lathe for High-Speed Cutting. H. M. Norris. Read before the Cincinnati Metal Trades Assn. Discussion with an account of tests made on a new high-speed lathe. Ill. 3000 w. Ir Age—June 11, 1903.

Heavy Service Lathe. Illustrated description of a lathe for high-speed cutting, with drawings of the gearing. 800 w. Engr, Lond—Nov. 27, 1903.

An English Design of High-Speed Lathe. Illustrates a lathe for use with high-speed steel, and gives report of a recent test. 1000 w. Am Mach—March 10, 1904.

High-Speed Lathes. P. V. Vernon. An illustrated discussion of high-speed headstocks. 14,300 w. Engr, Lond—Nov. 4, 1904. Supplement.

High-Speed Lathes. Joseph Horner. Gives illustrations of lathes designed to utilise the new high-speed cutting steels, describing them and explaining their value. 7500 w. Cassier's Mag—Aug., 1905.

See also **MACHINE TOOL; TOOL STEEL.**

Hydraulic Feed.—See Boring.

Le Blond.—The Le Blond Quick-Change Feed Lathe. Illustrated description of lathe equipped with quick-change gear box for feeding and thread cutting. 1200 w. Ir Age—Aug. 25, 1904.

Light.—Light Lathes and Screw Machines. John Ashford. Considers the requirements of a present-day lathe for tool and ordinary work and how they may be fulfilled. Discusses various machine tools. Fully illustrated. 1500 w. Inst of Mech Engs—Feb. 15, 1901.

Low-Swing.—The Low-Swing Lathe. Illustrations, with description of a novel lathe design, explaining its object. 1700 w. Am Mach—Vol. 28. No. 44.

McCabe. — A New, Heavy Pattern, Two-Spindle Lathe. Illustrated description of redesigned McCabe lathe. 800 w. Am Mach—Feb. 7, 1901.

Machine Spindles.—See Taper Holes.

Manufacture.—Some Points in Connection with the Manufacture of a Turret Lathe—The Use of Compressed Air in Jigs and Fixtures. An illustrated article describing interesting appliances designed for use in the manufacture of turret lathes. 2500 w. Am Mach—June 16, 1904.

Milling.—A Milling Operation in a New York Shop. An illustrated description of work performed in a lathe instead of in a miller, showing the efficiency of the arrangement. 1000 w. Am Mach—May 5, 1904.

See also **MILLING; MILLING MACHINE.**

Pattern Maker's.—The Pattern Maker's Lathe. John M. Richardson. Illustrates and describes tools for the lathe. 1800 w. Am Mach—April 3, 1902.

See also **PATTERN MAKING.**

Pipe Flange Facing.—Facing Pipe Flanges in the Field—An Improvised But Very Efficient Lathe. E. L. Mills. Illustrates and describes the facing of the flanges of thirty-four pieces of pipe in connection with work on the N. Y. aqueduct. 1000 w. Am Mach—April 28, 1904.

Pit.—A Forty-Four-Foot Pit Lathe. John M. Barnay. Illustrated description of the construction of a heavy pit lathe for the manufacture of electrical machinery. 600 w. Trans Am Soc of Mech Engrs, No. 0968—Dec., 1902.

See also **FLYWHEEL—Pit Lathe.**

Prentice.—The New Prentice 18-Inch Lathe. Illustrated description of a lathe designed especially for use with the new tool steels. 1800 w. Ir Age—Dec. 1, 1904.

Putnam.—The Putnam 90-Inch Driving Wheel Lathe. Illustrated description of one of the most powerful locomotive driving wheel lathes ever built. 1700 w. Ir Age—Feb. 11, 1904.

Railway Wheel.—Railway Wheel Lathe. An illustrated description of an interesting machine recently brought out in England. 400 w. Engng—Nov. 7, 1902.

Rapid Reduction Work.—Rapid Reduction in the Lathe as Compared with Forgings. Frank B. Kleinhaus. Illustrated description of methods of arrangement of tools for rapid reduction work. 800 w. Eng News—Nov. 5, 1903.

Recessing.—Special Lathe for Recessing Small Shafts. H. Robinson. Line drawings with brief description. 350 w. Am Mach—Feb. 11, 1904.

Ridgway.—The Ridgway Heavy Driving Wheel Lathe. Illustrated description of a 90-In. heavy driving wheel lathe, with a report of tests of its efficiency. 1800 w. Ir Age—Oct. 26, 1905.

Ring Turret.—Ring Turret Lathe. Illustrated description of a turret lathe having a number of novel features, the most interesting one being the turret which is made in the form of a ring and encircles the bed. 1500 w. Am Mach—May 22, 1902.

Screw Cutting.—See Light; **SCREW MACHINE.**

Shafting.—Motor-Driven Shafting Lathe. Illustrations and description of a recently designed lathe having points of interest. It is driven by an 18-H. P. variable speed motor. 800 w. Am Mach—May 28, 1903.

Shaft Turning Machine. H. Robinson. An illustrated description of a new semi-automatic double-head turning machine. 600 w. Am Mach—Jan. 28, 1904.

Speed Variation.—See **PULLEY—Cone; VARIABLE SPEED.**

Spindle.—Lathe Spindle Design. John Randol. Illustrated description of the Sloan & Chace No. 5 lathe spindle. 1500 w. Am Mach—April 14, 1904.

Bench Lathe Cone Spindle and Box Fitting. Detailed Account of a Delicate Piece of Work. John Randol. An illustrated description of spindle and box grinding. 2500 w. Am Mach—May 12, 1904.

Steam Turbine Rotors.—108-In. Lathe for Turning Turbine-Rotors. Illustrated detailed description of a lathe built for heavy work, in which great care has been taken with details of design to increase its utility. 1300 w. Engng—July 28, 1905.

Lathe for Rotors of Large Steam Turbines at Clydebank. N. B. Illustrations, with brief descriptions. 450 w. Engng—March 10, 1905.

Stocks.—Boring Head and Foot-Stocks of Lathes. A. B. Christman. Illustrates and briefly describes a method of finishing head and tail stocks, which the writer considers ideal. 300 w. Am Mach—Feb. 7, 1901.

Tahar Primitive.—A Lathe Shown at the Pan-American. Illustrated account of the work of Tahar Ben Mh. of Tunis, and his primitive wood lathe. 600 w. Am Mach—Dec. 26, 1901.

Taper Holes.—Taper Holes in Machine Spindles. Frank B. Kleinhans. Illustrates and describes a lathe rigged for performing this operation. 600 w. Am Mach—Dec. 24, 1903.

Testing.—Some Lathe Shop Notes. Describes the methods of testing these machines as used by the F. E. Reed Co., of Worcester. Ill. 2000 w. Am Mach—June 4, 1903.

Testing a Lathe. Oscar E. Perrigo. Considers particularly the inspection of the ordinary screw-cutting engine lathe, giving such description and illustrations of the necessary apparatus and methods as will insure the degree of accuracy demanded. 2000 w. Am Mach—June 2, 1904.

Three-Bearing.—The Three-Bearing Lathe. A. H. Cleaves. Illustrates and describes a lathe called in the watch factory, a plate lathe. 400 w. Am Mach—Aug. 29, 1901.

Tindel-Albrecht.—See **CRANK SHAFT—Machining.**

Tools.—A Study of Lathe Tools (Note sur les Outils de Tours). A general review of the various forms of modern tools for use in the lathe with aumerous illustrations, and a bibliography. 3500 w. Revue de Mécanique—Oct. 31, 1902.

See also **TOOL.**

Turbine Rotors.—See **Steam Turbine Rotors.**

Turret.—Turret Lathe for Extra Heavy Work. Illustrated detailed description of the latest development in these machines. 1600 w. Am Mach—April 18, 1901.

The First Large Turret Lathe. Thomas Coulter. An illustrated account of the first large turret lathe built or used in the United Staes. 1600 w. Ir Age—May 23, 1901.

Turre Lathe Practice. Illustrates and describes a semi-automatic turret lathe and its work. 2200 w. Mach, N Y—May, 1901.

Capstan Lathe. Illustrates and describes a new tool exhibited at the National Cycle Show, especially adapted for high-speed work. 900 w. Engng—Dec. 13, 1901.

Heavy Turret Lathe. Half-tones and line engravings of a new heavy turret lathe, with description of its interesting features. 2000 w. Am Mach—Feb. 26, 1903.

A Large Turret Lathe. Drawings of the principal parts of an exceptionally large flat turret lathe with descriptive notes. 900 w. Engr, Lond—April 3, 1903.

Automatic Turret Lathe Development at the Works of the Potter & Johnston Machine Company. Illustrated description of the lines of development. 1500 w. Am Mach—Nov. 5, 1903.

Heavy Turret Lathe. Illustrates and describes a new design of powerful turret lathe recently manufactured in England. It is suitable for screw-cutting, chucking, boring, and general purposes. 2200 w. Engng—Dec. 4, 1903.

An English Turret Lathe. Illustrated description of a lathe for general shop purposes, especially for handling bar work and castings and forgings. 800 w. Am Mach—Jan. 14, 1904.

The Automatic versus the Hand Turret. Paul Wesley. Gives experience with automatic machines, and describes the method of handling the work on hand and in automatic machines. 1600 w. Am Mach—Vol 28, No. 4.

Combination Turret Lathe. Illustrated detailed description of a machine used in the manufacture of the various parts of the gear mechanism in motor cars. 1500 w. Engng—Dec. 30, 1904.

3x36 Turret Lathe. Illustrated description of a tool exhibited at the St. Louis Exposition. 1800 w. Am Mach—Vol. 28. No. 24.

Heavy Turret-Lathe for 6-in. Black Steel Bars. Illustrated detailed description of a very powerful turret-lathe designed to take full advantage of the cutting capacity of modern tools. Built at Cleveland, Ohio. 1200 w. Engng—March 17, 1905.

See also **Attachment; Manufacture; Ring Turret; MACHINE TOOL; TOOL.**

Turret, Conradson.—Tool Practice with the Conradson Heavy Turret Lathe. Gives illustrations and descriptions of some of the characteristic tools used on the lathe described in last week's issue. 1300 w. Am Mach—April 25, 1901.

Turret Fixture.—Turret Lathe Fixture. Joseph V. Woodworth. Illustrated description of a handy attachment for forming irregular pieces. 1200 w. Mach, N Y—Feb., 1902.

Turret, Flat.—The Flat Turret Lathe with Cross Feeding Head. An article showing something of the mechanism by which the spindle and chuck are driven, the head and carriage fed, and the unique movements in general made possible. Ills. 3400 w. Am Mach—June 30, 1904.

The Development of a Remarkable Turret Lathe. Illustrates and describes development of the "flat turret" for imparting to the spindle a range of speeds and to the turret slide a wide feed variation. Serial. 1st part. 2500 w. Am Mach—July 28, 1904.

3-In. Flat Turret Lathe with Cross-Sliding Head. Illustrated detailed description. 900 w. Engng—March 31, 1905.

Turret, Glasgow.—Turret Lathes at the Glasgow Exhibition. Illustrates and describes two of these machines on exhibition which represent the newest designs. 1500 w. Engng—July 5, 1901.

Turret, Vertical.—A Rapid Production Vertical Turret Lathe. Illustrated description of a new machine for handling heavy face-plate work of all descriptions. 800 w. Ry Mas Mech—April, 1905.

Vertical.—See **BOILER MANUFACTURE—Turning Mill; BORING MILL.**

Wheel.—See **Ridgway.**

Worm Hobbing.—See **Attachment.**

LATHE WORKS.

See **LATHE; MACHINE WORKS.**

LATIN AMERICA.

Railway Influence.—See **RAILWAY—Latin-American Stability.**

LAUNCH.

See also **BOAT.**

Electric.—See **BOAT, ELECTRIC.**

Gasoline.—See **BOAT, GASOLINE.**

Steam.—See **BOAT, STEAM.**

LAUNCHING.

See also **SHIPBUILDING;** and under various types of vessels.

"California."—Recent Launching Practice of the Pacific Coast. Everett P. Lesley. Illustrates and describes features of interest in the recent launching of the U. S. S. California, South Dakota and Milwaukee. 1700 w. Soc of Naval Archts & Marine Engrs, No. 15—Nov., 1904.

"Caronia."—See **STEAMSHIP.**

"Chattanooga."—Notes on Launching of the cruiser "Chattanooga." Mason S. Chace. An account of the method employed to check and stop the ship before she had moved more than 283 ft. Ill. 2500 w. Trans Am Soc Nav Archts & Marine Engrs, No. 14—Nov., 1903.

"Connecticut."—Recent Launching Practice of the Atlantic Coast. R. H. M. Robinson. Gives launching data, with description of special features in the methods used on the "Connecticut," recently launched. 1400 w. Soc of Naval Archts & Marine Engrs, No. 14—Nov., 1904.

See also **BATTLESHIP.**

Cruiser and Battleship.—The Launch of a Cruiser and a Battleship. James Dickie. Describes the launch of these vessels and also the slips on which they were built. Ill. 3500 w. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

"Denver."—See **STEAMSHIP.**

"James C. Wallace."—Launch of the "James C. Wallace." An account of the launch, with illustrated description of the vessel and its construction. 3000 w. Marine Rev—March 16, 1905.

"Kaiser Wilhelm II."—The Launch of the Kaiser Wilhelm II. (Le Lancement du "Kaiser Wilhelm II.") J. Bosquet. With illustrations showing the details of the launch of this large steamship, including the friction brakes by which the momentum of the hull was checked. 1800 w. Génie Civil—Nov. 8, 1902.

See also **STEAMSHIP.**

Lightship.—See **SALVAGE.**

"Milwaukee."—See **"California."**

"Roxburgh."—Launching of an Armored Cruiser. Data in connection with the launch of the first-class armored cruiser "Roxburgh." 900 w. Engng—Jan. 29, 1904.

Side.—Side Launch of Torpedo-Boats and Torpedo-Boat Destroyers. W. G. Groesbeck. Describes the launching of torpedo-boats "Shubrick," "Stockton" and "Thornton," and of torpedo-boat destroyers 'Dale" and "Decatur," launched sideways because of the limited extent of land and water available. Ill. 2500 w. Soc Nav Archts & Marine Engrs, No. 12—Nov., 1901.

Notes on Side Launchings. William G. Groesbeck. Describes the side launching of the cruiser "Galveston" and the suction dredge "Benyuard." 1500 w. Trans Am Soc Nav Archts & Marine Engrs, No. 15—Nov., 1903.

Snubbing.—See **STEAMSHIP—"Denver" Launching.**

"South Dakota."—See **"California."**

Steamship.—Launching of Large Merchant Vessels. William A. Fairburn. Considers the statics and dynamics of stern launching, giving data of merchant vessels. 6500 w. Trans Am Soc Nav Archts & Marine Engrs, No. 16—Nov., 1903.

Stresses.—The Influence of Launching Stresses upon Vessels (Einfluss der Stampfbewegungen beim Stapellauf auf die Beanspruchung des Schiffes). Alexander Dietzius. A discussion of the action of the dynamic forces at the time of launching, and the manner in which they cause stresses upon the hull. 3000 w. Schiffbau—Jan. 11, 1905.

LAUNDRY.

Machinery.—Some Present Requirements in Laundry Machinery. Henry Waring. A systematic study of the requirements of a large steam laundry. 4000 w. Engng—May 29, 1903.

Steam.—A Modern Steam Laundry. Illustrated description of a large laundry in Germany, and its mechanical appliances. 1000 w. Sci Am Sup—March 1, 1902.

LAW.

See also **CONTRACT**; and under specific headings.

Engineering and Industry.—See **ENGINEERING—Law and Industry.**

LAWN MOWER

Automobile.—A Novel Automobile Lawn Mower. Waldon Fawcett. Illustration and brief description of the automobile mower used on the lawn of the United States Capitol. 600 w. Sci Am—June 13, 1903.

LEAD.

See also **LEAD METALLURGY; MINERAL REGION; SILVER; ZINC.**

Lead: Its Ores, Compounds and Alloys. S. Barlow Bennett. The present article reviews briefly the lead mining industry in England, and discusses the important ores of this metal and their reduction. Ill. Serial. 1st part. 2200 w. Plumb & Dec—May 1, 1905.

Architecture.—Lead Architecture. J. Starkie Gardner. An illustrated article reviewing the uses made of lead from the earliest history of the metal. Especially describes lead architecture in the past, and some suggestions for its use in the present. General discussion. 10,000 w. Jour Ry Inst of British Archts—Jan. 23, 1904.

Arkansas.—See **ZINC.**

Assaying. — The Determination of Arsenic, Antimony, Tin and Bismuth in Fine Lead. M. Liebschutz. Describes method in detail. 1000 w. Eng & Min Jour—Aug. 10, 1901.

See also **ASSAYING—Lead.**

British Columbia.—See **SILVER; SILVER MINE.**

Broken Hill, Australia.—See **SILVER.**

Coeur d'Alene, Idaho.—See **SILVER.**

Electrolytic Refining.—See **LEAD METALLURGY.**

Frongach, Wales.—See **ELECTRIC EQUIPMENT. Mine, Wales.**

Galena-Joplin.—See **Missouri; ZINC.**

Homestake, Colo.—See **SILVER MINE.**

Idaho.—See **SILVER.**

Illinois.—See **ZINC.**

Joplin.—See **Missouri; GEOLOGY; LEAD METALLURGY; SMELTING; ZINC.**

Kootenay, B. C.—See **SILVER.**

Mexico.—See **SILVER; SILVER MINE.**

Mississippi Valley.—See **ZINC.**

Missouri.—The Disseminated Lead Ores of South East Missouri. Frank L. Nason. Facts in regard to the occurrences of lead ores in this section, their origin and peculiarities. 3000 w. Eng & Min Jour—April 5, 1902.

Lead Mining in Southeastern Missouri. R. D. O. Johnson. Describes the deposits and methods of mining. 2300 w. Eng & Min Jour—Sept. 16, 1905.

The Lead Ores of Southwestern Missouri. C. V. Petraeus and W. George Waring. Describes these deposits, their treatment, value, &c., reviewing the development of the industry. 1200 w. Eng & Min Jour—Oct. 21, 1905.

See also **Ozark; DRILLING—Diamond; LEAD METALLURGY; ZINC.**

Missouri-Kansas.—The Lead-Zinc Mines of Kansas and Missouri. W. R. Crane. An illustrated description of the present practice of mining and milling in the Joplin district. 4000 w. Mines & Min—Dec., 1904.

Newbury, Mass.—The Lead and Silver Mines of Newbury. Horace C. Hovey. Account of a vein recently opened by quarrymen while blasting rock for the State highway. 700 w. Sci Am Sup—June 15, 1901.

New South Wales.—See **SILVER.**

New York.—The Rossie Lead Veins. C. H. Smyth, Jr. Notes on these old mines of St. Lawrence County, New York. 3700 w. Sch of Mines Qr—July, 1903.

1903.—Lead in 1903. W. R. Ingalls. The production in the United States is reported by districts, with brief reviews of the lead markets of New York and London. 5000 w. Eng & Min Jour—Jan. 7, 1904.

1904.—Lead, Copper, and Tin in 1904. E. A. Caswell. Reviews the features of the market during the year. 3800 w. Ir Age—Jan. 5, 1905.

Ozark Region.—Lead and Zinc Deposits of the Ozark Region. Information of the ore-bearing formations and mining districts of this region in Missouri and Arkansas, giving theories of ore deposition, their origin, conditions, etc. 2700 w. Eng & Min Jour—April 5, 1902.

Poisoning.—See **LEAD POISONING.**

Santa Eulalia, Mexico.—See **SILVER.**

Sardinia.—The Lead and Zinc Mines of Monteponi. Charles Will Wright. An interesting illustrated description of these mines in Sardinia, their location, development, methods of mining, etc. 1800 w. Min Mag—July, 1905.

Lead-Smelting at Monteponi, Sardinia. Terminio Ferraris. Trans from "Oest. Zeit. f. Berg- und Hüttenwesen." Illustrated description of the smelting works and methods. 1500 w. Eng & Min Jour—Oct. 28, 1905.

See also **MINING INDUSTRY—Italy-Sardinia.**

Smelting.—See **LEAD METALLURGY; SMELTING.**

Spain.—The Linares Lead Mining Industry of Spain. E. Mackay-Heriot. Information concerning the geological features, production and working of this district. 2400 w. Eng & Min Jour—Jan. 11, 1902.

Lead Mining in the Linares District, Spain. Norman Carmichael. An illustrated article describing the conditions obtained at Linares, one of the important producing districts of Spain. 5000 w. B C Min Rec—Aug., 1905.

Tasmania.—See **SILVER MINE.**

Tellurium Alloy.—See **ALLOY—Lead—Tellurium.**

Tennessee.—See **Virginia-Tennessee.**

United States.—Sources of Lead Production in the United States. Walter Renton Ingalls. Gives statistics of value, with brief reports of important districts. 2000 w. Eng & Min Jour—Nov. 28, 1903.

Soft Lead Resources of the United States. H. Foster Bain. Map, showing the more important of the lead-producing districts, with information concerning the deposits. Ills. 2400 w. Min Mag—July 1, 1905.

Virginia-Tennessee.—Lead and Zins Deposits of the Virginia-Tennessee Region. Thomas L. Watson. Results of a careful field and laboratory study of these deposits, with many illustrations and a bibliography. 12,000 w. Trans Am Inst of Mining Eng—July, 1905.

Volumetric Determination.—See **Assaying; ASSAYING—Lead.**

Wisconsin.—See **ZINC.**

LEAD ASSAY.

See **ASSAYING—Lead; LEAD—Assaying.**

LEAD BURNING.

See **PLUMBING—Lead Burning.**

LEAD METALLURGY.

See also **LEAD; METALLLURGY; ORE TREATMENT; SILVER METALLURGY; SMELTING; ZINC METALLURGY.**

The Metallurgy of Lead. H. O. Hofman. Reprinted from an article in the new volumes of the "Encyclopedia Britannica." Describes methods in use. 4000 w. Tech Qr—Sept., 1903.

Ainsworth, B. C.—See **SILVER METALLURGY.**

British Columbia.—See **ORE TREATMENT.**

Canada.—Lead Refining in Canada. Discusses the reasons for the backwardness in smelting and the absence of lead refining plants in Canada, and gives a statement of present conditions. 2000 w. Can Min Rev—Feb. 28, 1901.

Carmichael - Bradford.—The Carmichael - Bradford Process. Illustrated description of this process, which has been put into practical use at Broken

Hill, N. S. W. 2000 w. Eng & Min Jour—Oct. 28, 1905.

Concentrating Machinery.—The Klein Jig and the Klein Classifier. Ferdinand H. Regel. Illustrated description of a jig and an ore-classifier of new design used with galena and other lead ores. 800 w. Trans Am Inst of Min Engrs. Nov., 1901.

See also **ORE TREATMENT; SILVER METALLURGY.**

Desloge, Mo.—Lead Smelting in Reverberatory Furnaces at Desloge, Mo. W. R. Ingalls. Describes the technical results of furnaces of the Flintshire type at Desloge. 2200 w. Eng & Min Jour—Dec. 16, 1905.

Electric.—The Electrolytic Separation of Metallic Lead from Solutions, and the Formation of Spongy Lead (Die Elektrolytische Ausfällung von Metallischem Blei aus Lösungen und die Bleischwammbildung). L. Glaser. A general discussion of methods, and an account of the author's experiments. Serial. Part I. 2500 w. Zeitschr f Elektrochemie—Dec. 13, 1900.

The Electrolytic Refining of Base Lead Bullion. Titus Ulke. Description of the process invented by A. G. Betts for refining lead bullion, noting its low working cost and high efficiency. 1500 w. Eng & Min Jour—Oct. 11, 1902.

Lead Refining in Trail, B. C. An illustrated description of a refinery using the Betts electrolytic process. 1300 w. Can Min Rev—Jan. 31, 1903.

The Electrolytic Treatment of Galena and Reduction of Lead. Alec. A. Beadle. Describes briefly the ways in which attempts have been made to reduce galena. 1200 w. Elec Rev, N Y—June 13, 1903.

Electrolytic Lead-Refining. Anson G. Betts. Describes a successful process using a solution of lead-fluosilicate, containing an excess of fluosilicic acid, as an electrolyte. Ill. 3000 w. Trans Am Inst of Min Engrs—Feb., 1903.

See also **ELECTRO-CHEMISTRY; ELECTRO-METALLURGY.**

Furnace Feeding.—See **SILVER METALLURGY.**

Highland Mill, B. C.—The Highland Ore Dressing Mill, British Columbia. Ernest R. Woakes. Abstract of a paper read before the Inst. of Min. & Met., London. An illustrated description of the plant. 1200 w. Eng & Min Jour—Dec. 27, 1902.

Huntington-Heberlein.—The Huntington - Heberlein Process from the Hygienic Standpoint. A. Biernbaum. Translated from the "Zeitschrift für das Berg-, Hütten und Salinenwesen." Discusses the improvement in danger from lead-poisoning. 2500 w. Eng & Min Jour—Oct. 14, 1905.

Idaho Springs, Colo.—See **ORE TREATMENT.**

Kentucky.—See **ORE TREATMENT.**

Lime Roasting.—Lime Roasting of Galena. W. Maynard Hutchings. Discusses the Huntington Heberlein treatment and other systems, and reports experimental investigations. 2700 w. Eng & Min Jour—Oct. 21, 1905.

Mexican Furnace.—A Native Lead Smelting Furnace, Mexico. A. H. Bromly. Read before the Inst. of Min. Engrs., England. Illustrates and describes a primitive smelting plant. 900 w. Min Rept—May 28, 1903.

Missouri.—Lead Smelting in Southeast Missouri. R. B. Brinsmade. A description of the different methods used, and the advantages and disadvantages of each. Ill. 1600 w. Mines & Min—Feb., 1902.

See also **LEAD; SMELTING; ZINC METALLURGY.**

Parkes' Process.—The Refining of Lead Bullion. F. L. Piddington. An account of the Parkes' process of desilverizing and refining lead bullion, as carried out at the works of the Smelting Co. of Australia. 2400 w. Jour Chem & Met Soc of S Africa—May, 1903.

Salom Electric.—See **ELECTRO-CHEMISTRY—Niagara.**

Sardinia.—See **LEAD.**

Savelsberg.—The Savelsberg Process. W. R. Ingalls. Outlines this process for the desulphurisation of galena by lime-roasting. 2200 w. Eng & Min Jour—Dec. 9, 1905.

Scotch Hearth.—Lead Smelting in the Scotch Hearth. Kenneth W. M. Middleton. Describes the present method as practiced in the North of England. 2300 w. Eng & Min Jour—July 6, 1905.

Slimes.—See **ORE TREATMENT; ZINC METALLURGY.**

Spain.—Lead Smelting in Spain. Hjalmar Eriksson. Brief description, with illustration, of a plant serving as a general type for that country. 1100 w. Eng & Min Jour—Nov. 14, 1903.

See also **LEAD.**

Trail, British Columbia.—See **GOLD METALLURGY.**

United States.—Lead, Copper and Zinc Smelting and Refining. Charles Kirchhoff. A summary for the United States of these industries, with explanatory remarks. 800 w. Min Rept—Jan. 23, 1902.

LEAD MINE.

See **LEAD; SILVER; ZINC.**

LEAD PIPE.

See **PIPE MANUFACTURE—Lead; PLUMBING.**

LEAD POISONING.

Electrolysis.—Plumbism Due to Electrolysis. Baldwin Latham. Read before the Brit. Assn. of W. Wks. Engs. Gives an account of a case of lead poisoning carefully investigated, and pronounced as entirely due to electrolysis. 2500 w. Elec Engr, Lond—Dec. 29, 1905.

LEAF ARRESTER.

See also **SCREEN.**

Turbines.—On a Leaf Arrester for the Water Supply of a Turbine. Earl of Rosse. Illustrates and describes an apparatus that has worked successfully in directing the leaves to a side channel and into the tail-race. 700 w. Engng—Jan. 10, 1902.

LEATHER.

See also **BELTING.**

Chemistry.—A Chemical Study of Leather (Etude Chimique du Cuir). Ed Nihoul. An exhaustive study of the operations of tanning leather, with especial reference to its uses in the mechanic arts. Serial. Rev Univ des Mines—Dec., 1901.

Factory.—See **BELTING.**

Paris Exposition.—The Leather Industry at the Exposition of 1900 (L'Industrie des Cuirs et Peaux à l'Exposition de 1900). H. de la Coux. With especial reference to the improved processes for rapid tanning exhibited, and the influence upon the product. Two articles. 3500 w. Génie Civil—May 4, 11, 1901.

Tests.—Tests of Leather (Essais du Cuir dans ses Applications Industrielles). Henri Boulanger. A well illustrated account of an extensive series of tensile tests of leather prepared in various ways for industrial purposes, with tables and diagrams. Serial. 1st part. 9000 w. Bull Soc d'Encouragement—April, 1902.

The Elasticity of Belts Taken from Different Parts of a Hide (Die Elastizität der an Verschiedenen Stellen einer Haut Entnommenen Treibriemen). C. Bach. An account of tests of leather belts to determine the elasticity and elongation of different parts of a hide. Tables and curves. 1500 w. Zeitschr d Ver Deutscher Ing—July 5, 1902.

LEGISLATION.

See under specific heads.

LESLEY.

Biographical Notice of J. Peter Lesley. Benjamin Smith Lyman. An account of his life and work. Photograph. 2400 w. Trans Am Inst of Min Engrs—Oct., 1903.

LETTERING.

See also **DRAWING.**

Proportions and Spacing of Roman Letters. William Welch. An analysis of a number of the best Roman alphabets and their spacing, with rules for laying off such lettering. 3000 w. Eng Rec—May 17, 1902.

LEVEE.

See **FLOOD; RIVER REGULATION.**

LEVEL.

See also **SURVEYING INSTRUMENT.**

Spirit.—Hydrostatics and Spirit Levels. R. P. King. On methods of testing levels and using them, determining the probable error, etc. Ill. 1000 w. Am Mach—June 25, 1903.

LEVELING.

See **SURVEYING—Leveling.**

LEVEL RECORDER.

See **TIDE INDICATOR; WATER GAUGE.**

LIBRARY.

British Patent Office.—See **PATENT OFFICE.**

LIEGE EXPOSITION.

See **EXPOSITION—Liége**; and under specific kinds of machines and apparatus.

LIFE-BOAT.

Carley Float.—The Carley Life Float. Illustration with description of a device for saving life at sea. 900 w. Am Shipbuilder—Sept. 11, 1902.

Cranes.—See **CRANE—Boat.**

Dickenson.—The Dickenson Improved Life-Boat. Illustrated description of a novel boat constructed of metallic sheets, self-bailing and self-righting. 700 w. Am Shipbuilder—Oct. 9, 1902.

Engelhardt's.—Engelhardt's Collapsible Life-Boat. An illustrated description of a boat which occupies but little space, and is available for instant use. 1300 w. Am Shipbuilder—Nov. 20, 1902.

Unsinkable Life-Boat. Illustrated description of the Englehardt unsinkable life-boat. 800 w. U S Cons Repts—Nov., 1904.

The Englehardt Unsinkable Life-Boat. Randolph I. Geare. Brief illustrated description of a boat invented in Copenhagen. 600 w. Sci Am—July 1, 1905.

Folding.—See **Engelhardt; James; BOAT.**

Gasoline.—Some New Types of Life-Boats. An illustrated article describing the adaptation of the gasoline motor to the requirements of life-boat work. Also describes the boat invented by M. Albert Henry. 3800 w. Sci Am—Oct. 8, 1904.

Motor Life-Boats. W. G. Windham. States some of the advantages and disadvantages of a petrol engine as fitted to a life-boat, giving some practical hints on the fitting of a motor. Ills. 2000 w. Autocar—Dec. 31, 1904.

Henry.—See **Gasoline.**

James Folding.—The "James" Folding Boat. Illustrated description of a boat which received the approval of the British Board of Trade under the Life Saving Appliances Act. 1000 w. Ind & East Engr—July, 1901.

Launching Apparatus.—The Peterson Boat-Launching Apparatus. An illustrated description of a system designed to meet severe requirements. 900 w. Sci Am Sup—June 28, 1902.

Lowering Gear.—The Welin Boat-Lowering Gear. Illustrated description. 700 w. Engng—June 21, 1901.

Norway.—New Life-Saving Boat in Norway. Brief description of a new life-boat which has just been tried with satisfactory results. 450 w. U S Cons Repts, No. 1472—Oct. 18, 1902.

Princess of Wales.—See **Steam.**

Self-Bailing.—The U. S. Life-Saving Service Self-Bailing Water Ballast Surf-Boat. C. H. M'Lellan. Describes a useful and recent improvement in appliances for this service. Ill. 4400 w. Marine Engng—March, 1901.

See also **Dickenson.**

Steam.—The Twin-Screw Steam Life-Boat "Molesey." Brief illustrated description of the fastest steam life-boat yet built, and the only one fitted with twin screws. 850 w. Engng—Sept. 22, 1905.

A Steam Life-Boat. An illustrated description of a steam life-boat, named the "Princess of Wales," recently constructed for the Government authorities of the Isle of Mauritius. 1800 w. Engng—Aug. 14, 1903.

Unsinkable.—See **Engelhardt.**

LIFE-SAVING APPLIANCE.

See also **FIRE APPARATUS; LIFE-BOAT; RESCUE APPARATUS; SAFETY APPLIANCE.**

Balloon Float.—Drouillard's Drifter Balloon Float. Describes an ingenious apparatus used to carry a rope between a vessel in distress and the land. 1800 w. U S Cons Rept—Feb., 1904.

Drouillard's Drifter Balloon Float. Describes a simple and practical apparatus designed to carry a line between a vessel in distress and the shore. 900 w. Sci Am—Sept. 16, 1905.

Donvig's Globe.—Donvig's Life-Saving Globe. An illustrated description of this life-saving device, with reports of trials. 600 w. U S Cons Repts—May, 1904.

Fire.—See **FIRE APPARATUS.—Life Saving.**

Mines.—See **RESCUE APPARATUS.**

Paris Exposition.—Life-Saving Appliances at the Paris Exhibition. Review of the exhibits in competition for the Anthony Pollok prize. Ill. 3800 w. Engr, Lond—Jan. 4, 1901.

See also **SAFETY APPLIANCES.**

LIFT.

See also **CANAL LIFT; ELEVATOR; ELEVATOR, ELECTRIC; HOISTING.**

Air.—See **Pneumatic; AIR LIFT.**

Electric.—See **CRANE, ELECTRIC; ELEVATOR, ELECTRIC; HOISTING—Electric.**

Factory.—Factory Schemes—Three Special Lifts. S. A. Worcester. Illustrates and describes three lifts designed for special work. 1200 w. Am Mach—Feb. 18, 1904.

Harvesting Machine.—A Special Lift. S. A. Worcester. Illustrated description of a lift designed to be used in connection with the binder of a harvesting machine, explaining the operation. 900 w. Am Mach—Feb. 4, 1904.

Locomotive.—Electric Lifting Gins. Illustrates and describes an inexpensive and expeditious method of lifting locomotives for repairs. 2300 w. Transport—May 13, 1904.

Pneumatic.—A Special Air Lift for Printing Press Service. A. W. Cochran. Illustrated description of a lift operated by pneumatic power for supplying paper to a newspaper press, in Portland, Ore. 1000 w. Eng News—Dec. 7, 1905.

Spring Counterbalance.—See **MACHINE TOOL—Boring and Facing.**

Water.—See **AIR LIFT; MINE DRAINAGE; SCOOP WHEEL; WATER SCOOP; WATER WHEEL.**

LIFTING MACHINERY.

See also **CRANE; CRANE, ELECTRIC; HOISTING; HOISTING ENGINE.**

LIGHT.

See also **ELECTRO-PHYSICS; LIGHTING; PHOTOMETRY; PHYSICS; RADIATION.**

Light. Prof. Ivison Macadam. Lecture delivered before the N. Brit. Assn. of Gas Mfrs. Gives information on the analysis of light, testing, different burners, and the Welsbach, or incandescent burner, with general conclusions. 3200 w. Jour Gas Lgt—July 30, 1901.

Cold.—Light Without Heat. R. A. Fessenden. Discusses methods of lighting, and concludes that in chemical methods the solution of the problem is most likely to be found. 3600 w. Elec Wld & Engr—Jan. 5, 1901.

Diffusion.—See **LIGHTING—Prismatic.**

Electricity.—See **ELECTRO-PHYSICS; RADIO-ACTIVITY.**

Fog.—The Transmission of Light Waves of Various Lengths through Fog (Untersuchungen über die Durchlässigkeit von Nebel für Lichstrahlen von Verschiedener Wellenlänge). A. Rudolph. Data and results of exhaustive experiments showing the greater penerating power of rays from the red end of the spectrum. 2500 w. Zeitschr d Ver Duetscher Ing—April 30, 1904.

Mechanical Equivalent.—Mechanical Equivalent of Light. Carl Hering. A discussion of the determinations of the energy required to produce a unit quantity of light rays made by Tumlirz and by Thomsen, reducing them to more convenient terms. 3400 w. Elec Wld & Engr—April 20, 1901.

Standards.—See **PHOTOMETRY.**

Temperature Relation.—The Relations Between Temperature and Intensity of Light (Ueber den Zusammenhang zwischen Lichtstärke und Temperatur). Hermann Eisler. A review of the experimental researches of Lummer, Kurlbaum and Langley, with curves showing the relation of increase of light with increase in temperature of incandescent bodies. 3500 w. Elektrotech Zeitschr—March 10, 1904.

LIGHTER.

See **STEAM LIGHTER; TRANSPORTATION—Harbor Lighterage.**

LIGHTHOUSE.

See also **LIGHTSHIP.**

Acetylene.—See **ACETYLENE—Lighthouse.**

American.—The New American Lighthouse System. George Ethelbert Walsh. An interesting account of the efficient lighthouse service, consisting of some 9,000 warning lights and signals. 1600 w. Sci Am—Nov. 22, 1902.

Beachy Head.—Building the New Beachy Head Lighthouse. Harold J. Shepstone. Illustrated description of a lighthouse erected on a wave-washed rock, 550 ft. from the cliffs, as the lighthouse on the promontory is frequently obscured by fogs. It will be, when completed, one of the finest lighthouses on the English coast. 1800 w. Sci Am—Nov. 9, 1901.

The New Beachy Head Lighthouse. Illustration and brief description of a recently completed lighthouse on the English Channel. 500 w. Sci Am—Nov. 29, 1902.

The New Beachy Head Lighthouse. T. Williams. Illustrates and describes the construction of the new Beachy Head lighthouse, on the English coast. 2500 w. Feilden's Mag—April, 1903.

Building the Beachy Head Lighthouse. Notes from a paper by Albert H. Case, submitted to the Inst. of Civ. Engrs., describing and illustrating the methods used in erecting this new lighthouse. 3700 w. Eng Rec—July 29, 1905.

Beachy Head New Lighthouse. Albert Havelock Case. Illustrated detailed description of this structure and its equipment. 5300 w. Ills. (No. 3461). Inst of Civ Engrs.

Construction of the Beachy Head Lighthouse, England (Construction du Phare de Beachy Head Angleterre). Illustrated description of lighthouse built 700 feet off shore, and of cableway used in its construction. 1 plate. 1500 w. Génie Civ—Aug. 26, 1905.

Bermuda.—The Gibbs' Hill Lighthouse, Bermuda. Robert A. Cummings, and C. W. Reinhardt. Illustrates and describes the modern lenses and apparatus recently installed in the Gibbs' Hill lighthouse. 1000 w. Eng News—Aug. 31, 1905.

Brebner Mechanism.—Improved Rapid Group Flashing Lights. Alan Brebner. Read before the Glasgow Congress. Mainly a description of Brebner's eclipsing mechanism for lighthouses. Ill. 2000 w. Engng—Oct. 18, 1901.

Canadian Service.—How Canadian Waterways are Lighted. Information from the annual report of Lieut.-Col. F. Gourdeau, deputy minister of marine and fisheries of the Dominion government. Ill. 1800 w. Marine Rev—May 28, 1903.

Cana Island, Wis.—Steel Casing for Brick Lighthouse Tower. Illustrates and describes a method of repair and protection of a tower on Cana Island, Wisconsin. 700 w. Eng News—July 31, 1902.

Chassiron, France.—See **ACETYLENE—Lighthouse.**

China.—Lighting of the Chinese Coast. J. R. Harding. Abstract of a paper read before the Glasgow Congress. Brief outline of what has been accomplished. 1000 w. Engng—Sept. 20, 1901.

Concrete Reinforced.—See **Nicolaief, Russia; Mile Rock.**

Electric.—The Electric Illumination of Lighthouses. Editorial discussion of English and French practice, and the suitability of electric illumination. 1200 w. Engr, Lond—May 5, 1905.

See also **Helgoland; ELECTRIC LIGHTING—Coast.**

English.—Improvements in English Lighthouses. Illustrated description of new lanterns recently placed at St. Catherine's and two other electrically illuminated English lighthouse. 2000 w. Engr, Lond—April 14, 1905.

France.—Modern Lighthouses (Les Phares Actuels). G. Leugny. A review of modern illuminating devices for lighthouses, with especial reference to those of France. 2000 w. Revue Technique—July 10, 1901.

Recent Improvements in the Lighting and Buoying of the Coasts of France. Baron Quinette de Rochemont. Read before the Glasgow Congress. Illustrates and describes recent improvements in burners, discussing means of increasing the illuminating power, the electric lights, incandescent lighting, lightships, beacon towers, etc., etc. 7000 w. Engng—Sept. 20, 1901.

Recent Improvements in the Lighting and Buoying of the Coasts of France. Baron Quinette de Rochemont. Extract from a paper read before the Glasgow Congress. Describes the "Sandettie" lightship and accessories. 1400 w. Marine Engng—Jan., 1902.

The Lighting and Buoying of Coasts. (L'Eclairage et le Balisage des Côtes). M. Ribière. A review of recent progress in lighthouse engineering with especial reference to French practice. 15,000 w. Ann d Ponts et Chaussées—4 Trimestre, 1901.

See also **L'Ile Vierge; ACETYLENE—Lighthouse.**

Gas.—Gas for Lighthouses. Editorial review of a book by Thomas Williams on "The Life of Sir Thomas Nicholas Douglass," giving additional facts in regard to the trials of gas as an illuminant. 4000 w. Jour Gas Lgt—July 9, 1901.

Gibbs Hill.—See **Bermuda.**

Grande Point au Sable, Mich.—See **Metal Casing.**

Helgoland.—The New Electric Lighthouse on Helgoland (Das Neue Elektrische Schnellblinkfeuer auf Helgoland). O. Krell, Jr. A well illustrated description of the new Helgoland lighthouse, which has a revolving light with three beams projected from high-power electric search lights placed at angles of 120 degrees, a duration of 0.1 second. 3000 w. Elektrotech Zeitschr—April 16, 1903.

Modern Searchlights. Frank C. Perkins. Illustrates and describes the new form of electric flashlight installed in the lighthouse tower at Heligoland. 600 w. Sci Am—Aug. 22, 1903.

Illumination.—Modern Lighthouse Illumination. James Shirra. Read before the Engng. Assn. of N. S. W. Discusses recent practice in this field both as regards the light and methods of securing far-reaching power. Two parts. 5200 w. Aust Min Stand—Aug. 2 and 9, 1905.

Incandescent Gas Lighting.—See **INCANDESCENT GAS LIGHTING—Lighthouses.**

L'Ile Vierge.—The Lighthouse at L'Ile Vierge. Illustrations and description of a recently completed lighthouse off the coast of Brittany, which has the distinction of being the most lofty yet erected. 2800 w. Engng—Aug. 22, 1902.

Metal Casing.—Metal Casing for a Lighthouse Tower at Grande Pointe au Sable. Illustrated description of the sheet steel casing built about a brick shaft beginning to deteriorate. 1100 w. Eng Rec—March 2, 1901.

Mile Rock, Cal.—The Mile Rock Steel and Concrete Lighthouse, California. Illustrated detailed description. 1500 w. Eng Rec—May 14, 1904.

Nicolaief, Russia.—A Lighthouse of Reinforced Concrete. Translated from "La Nature." Illustrated description of a lighthouse constructed by the Russian government at the entrance to the canal that connects the port of Nicolaief with the Black Sea. 1100 w. Sci Am Sup—Oct. 14, 1905.

Norwalk, Conn.—The Greens Ledge Lighthouse. Illustrated description of a new lighthouse being erected in Norwalk (Conn.) harbor, and the methods of construction. 1600 w. Ir Age—June 27, 1901.

Red Sea.—The Lighthouses in the Southern Part of the Red Sea (Les Phares du Sud de la Mer Rouge et Leur Installation). J. Benard. A description of four lighthouses recently built near the southern end of the Red Sea by French engineers for the Turkish government. Maps. 1 plate. 9000 w. Mem Soc Ing Civils de France—April, 1903.

Revolving Lanterns.—Revolving Lanterns for Lighthouses. Illustrates and describes three types of flashing lanterns, with remarks on the difficulty in making and properly mounting the lenses. 900 w. Sci Am—Sept. 26, 1903.

Steel Construction.—Steel Lighthouse Construction. Waldon Fawcett. Relating to changes proposed in these structures, providing the United States government decides to erect additional towers of this type. Ill. 1600 w. Am Mfr—Nov. 21, 1901.

Swinemünde, Prussia.—The Repairing of the Lighthouse at Swinemünde (Instandsetzung des Leuchtturmes in Swinemünde). H. Kohlenberg. The weather-beaten brick tower was incased in a new outer wall of hard brick, bonded to the old structure. 1200 w. Zentralblatt d Bauverwaltung—Dec. 17, 1904.

Twin.—See **Visibility.**

Visibility.—The Visibility of Twin Lighthouses (Vision des Feux Associés). M. de Joly. A comprehensive discussion of the visibility of lighthouses, particularly those grouped in pairs. 8000 w. Ann d Ponts et Chaussées—3 Trimestre, 1901.

LIGHTHOUSE TENDER.

"Larkspur."—Fine New Lighthouse Tender. An illustrated description of the "Larkspur" now building. 1600 w. Naut Gaz—Aug. 15, 1901.

"Magnolia."—United States Lighthouse Tender Magnolia. Illustrated description of a new vessel to be used in the Gulf of Mexico and lower Mississippi. A departure in design has been made to meet the conditions of that climate. 1100 w. Marine Rev—Oct. 23, 1902.

New Lighthouse Tender. Full description and plans of the Magnolia, building for gulf service. Serial. 1st part. 2000 w. Naut Gaz—Feb. 19, 1903.

LIGHTING.

See also **ARC LIGHT; ELECTRIC LIGHTING; GAS LIGHTING; INCANDESCENT GAS LIGHTING; INCANDESCENT LAMP; LIGHT; MECHANICAL PLANT; NERNST LAMP; PHOTOMETRY; RADIATION.**

Light and Illumination. E. L. Elliott. An elementary explanation of the principles of photometry and their application to the problems of illumination. Serial. 1st part. 4300 w. Cent Station—Oct., 1902.

Some Notes on Illumination. Bassett Jones, Jr. An article discussing various methods of lighting required under certain specific conditions. 1500 w. Elec Wld & Engr—Dec. 20, 1902.

Alcohol.—See **ALCOHOL; ALCOHOL LIGHTING.**

A. I. E. E. Discussion.—Light and Methods of Illumination. Discussion. 7800 w. Trans Am Inst of Elec Engrs—April, 1902.

Discussion of Papers on Photometry and Illumination. 11,800 w. Trans Am Inst of Elec Engrs—Nov., 1902.

Art Gallery, Birmingham.—Lighting of Birmingham Art Gallery. Report by Professor Percy Frankland on experiments made to ascertain whether artificial illumination by electric arc lamps, or by the incandescent gas installation was preferable from the point of view of possible damage to the pictures. 2300 w. Gas Wld—July 26, 1902.

Automatic.—An Automatic Lamp Lighting and Extinguishing Device. Dr. Alfred Gradenwitz. Illustrates and describes a device for automatically lighting and extinguishing lamps of any kind. Invention of Mr. E. Ruhmer. 800 w. Sci Am Sup—Sept. 24, 1904.

Bell.—Methods of Illumination. Louis Bell. Discusses the important qualities for a perfect illuminant, general illumination, &c., considering the practical rather than the technical side. 9300 w. Trans Am Inst of Elec Engrs—Feb., 1902.

Burnett.—The Physical Principles of Illumination, with Special Reference to Recent Methods. Douglass Burnett. Presented to the Department of Physics, of the Brooklyn Inst. A review of basic scientific principles, existing methods and future possibilities. 3500 w. Am Gas Lgt Jour—Dec. 23, 1901.

The Principles of Illumination. A study in abstract of a paper by D. Burnett, read before the Brooklyn Inst. of Arts and Sciences, indicating the directions in which further improvement in artificial light may take place. 1200 w. Engr, Lond—Jan. 31, 1902.

Distributed Lighting. Douglass Burnett. On means for measuring the illumination of surfaces. A study of the distribution and difusion of light. 2000 w. Trans Am Inst of Elec Engrs—Nov., 1902.

Car.—See **CAR LIGHTING.**

Carburetted Air.—See **CARBURETTED AIR.**

Chandelier.—See **CHANDELIER.**

Combustion Products.—The Products of Combustion of Various Lighting Apparatus (Les Produits de Combustion de Divers Appareils d'Eclairage). N. Gréhant. Especially comparing the products of combustion of the Argand and the Welsbach burners. 1000 w. Comptes Rendus—Dec. 3, 1900.

Comparison.—Some Modern Competitors with Coal Gas. A. Lecomte. Read before the recent congress of the Société Technique du Gaz en France. Brings up to date the technical details in regard to the illuminants, carburetted gas, "alcoholene," petroleum, and alcohol, devoting most attention to the last named. 2000 w. Jour Gas Lgt—July 1, 1902.

Improvements in the Technology of Illumination (Neuerungen der Beleuchtungstechnik). W. Wedding. A comparison of the illuminating value of various sources of light, on a basis of operative cost and effect. 2000 w. Zeitschr d Ver Deutscher Ing—May 7, 1904.

Progress in the Technology of Illumination (Fortschritte in der Beleuchtungstechnik). Dr. W. Wedding. An address before the Electrical Society of Cologne, reviewing the development of the latest forms of oil, gas, and electric lighting, with a comparison of their relative efficiency. 3500 w. Elektrotech Zeitschr—Jan. 19, 1905.

See also **Electric vs. Gas; Petroleum and Electric.**

Comparisons, England.—Relative Attractiveness of Different Artificial Lights. Reviews the improvements in artificial lighting, especially as affecting England. 2500 w. Jour Gas Lgt—Aug. 19, 1902.

Decorative.—See also **ELECTRIC SIGN.**

Distribution.—The Distribution of Illumination in Artificially Lighted Spaces (Ueber die Helligkeitsverteilung in Künstlich Beleuchteten Räumen). F. Meisel. Theoretical discussion, with formulae and diagrams. 2500 w. Elektrotech Zeitschr—Sept. 14, 1905.

See also **Burnett.**

Edinburgh.—See **History.**

Electric vs. Gas.—Gas versus Electricity. Alton D. Adams. Gives a comparison of the incomes of these systems, discussing their relative growth during the last ten years in Massachusetts. 2300 w. Elec Wld & Engr—Oct. 26, 1901.

Some Points that Deter the Spread of Electric Lighting. F. H. Davies. Remarks on the slow progress of electric lighting in Great Britain, in competition with the use of gas, calling attention to some things that customers find annoying. 2500 w. Elec Engr, Lond—Nov. 13, 1903.

New Lamps for Old. R. J. Milbourne. Reviews the progress of electricity, and gives a comparison of costs in favor of gas. 3300 w. Jour Gas Lgt—April 12, 1904.

Electricity vs. Gas for Public Lighting. An explanation of the substitution in London and other English cities of gas for electric lights, and some information in regard to the comparative cost. 3500 w. Elec Rev, Lond—Oct. 6, 1905.

Engineering.—The Engineering of Illumination. Van Rensselaer Lansingh. Considers the factors constituting good illumination, especially in buildings for public use. Ill. 7800 w. Jour W Soc of Engrs—April, 1903.

A Field for the Illuminating Engineer. L. B. Marks. Discusses the proper distribution of light in interiors, and the value of diffused light. 1000 w. Elec Rev, N Y—April 15, 1905.

Fallacies.—Fallacies in Illumination. E. Leavenworth Elliott. A number of curious and amusing fallacies are explained. 2200 w. Cent Sta—May, 1904.

Fire Hazard.—Fire Risks of Illuminants. E. Frank Williamson. The present article discusses oil lamps and gas. Serial. 1st part. 1600 w. Aust Min Stand—Jan. 1, 1903.

See also **FIRE HAZARD.**

Future.—The Illumination of the Future. E. Leavenworth Elliott. Reviews briefly the progress of artificial illumination as the basis of a forecast of future development. Thinks the most probable improvement will be along the line of incandescent substances heated by gas as the light radiators. 1500 w. Cent Sta—Oct., 1903.

Gas Burners.—See **GAS BURNERS.**

Gas vs. Natural Light.—Artificial Gas Illumination in Relation to Natural Light. William Sugg. Read before the Inst. of Gas Engrs. A study of natural light and the effect of artificial light of high power on the eye sight, with suggestions. Ills. 3200 w. Gas Wld—June 11, 1904.

History.—Artificial Lighting in the Nineteenth Century. Abstract of a paper by D. Macfie, read before the Edinburgh Archt. Assn. Mainly historical with special reference to Edinburgh. 3500 w. Jour Gas Lgt—March 10, 1903.

Hygienic.—See **GAS LIGHTING.**

Improvements.—Recent Improvements in the Art of Lighting and Heating (Neuerungen auf dem Gebiete des Beleuchtungs- und Beheizungswesens). Franz Walter. Discussing especially improved methods of lighting by gas, with a brief reference to heating. Two articles. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 19, 26, 1902.

Moonlight Tables.—Moonlight Tables for 1903. H. W. Frund. Tables for street lighting work, showing for each night in the year when to light and when to extinguish lamps which are not lighted when the moon shines. 2500 w. Elec Wld & Engr (Supplement)—Dec. 20, 1902.

Nernst Lamp.—See **NERNST LAMP.**

Nernst Lamp vs. Incandescent Gas.—Street Lighting. E. E. Hoadley. Read before the Incor. Munic. Elec. Assn. Deals with the question from the point of view of a central-station engineer and the problems in towns of about 50,000 people. Shows that Nernst lamps can be used at less cost than incandescent gas lamps burning 4 cu. ft. of gas per hour. Also discussion. 6500 w. Elect'n, Lond—June 30, 1905.

New York Subway.—The Illumination of the Subway Stations. E. Leavenworth Elliott. Discusses the faults of the present system of lighting the New York Subway, and the means of overcoming them. 2500 w. Elec Rev, N Y—Aug. 26, 1905.

Paris Exposition.—Lighting at the Exposition of 1900 (L'Eclairage à l'Exposition de 1900). H. Guérin. The first of a series treating of the general lighting of the exposition describes the petroleum and alcohol incandescent lamps. Serial. Part I. 2000 w. Génie Civil—Dec. 1, 1900.

Petroleum and Electric.—The Output of Various Sources of Light and a Simple Arrangement for Increasing the Amount of Light from Flames (Sur le Rendement des Foyers Lumineux et sur un Dispositif Très Simple Permettant d'Augmenter le Rendement Lumineux des Foyers à Flamme, et des Lampes à Pétrole en Particulier). Charles Henry. Efficiency and other curves of electric arc and petroleum lamps, and description of a method of preventing the cooling of the flame of the latter, by placing a copper ring about it. 1200 w. Bull Soc d'Encour—June 30, 1903.

Photometer.—See **PHOTOMETRY.**

Prismatic.—Diffusion of Light. Edward Atkinson. The present article reports experiments made and conclusions, and begins the discussion of the advantage of prisms and other reflectors in lighting factories, work shops, school rooms, etc. Serial. 1st part. 4000 w. Am Archt—Nov. 10, 1900.

Experiments on the Diffusion of Light Through Prismatic and Ribbed Glass Windows. Abstract of the conclusions of a report made by Charles L. Norton on a series of tests conducted for the Associated Factory Mutual Companies of New England. 1500 w. Eng News—Jan. 10, 1901.

A New Era in Interior Lighting. Charles L. Norton. An account of the progress made in the use of diffusing glass, the changes due to its adoption, and some of the varieties. Ill. 4000 w. Tech Quar—March, 1901.

Luxfer Prisms, and Prismatic Lighting Theory and Application. R. A. Wood. Reviews the laws of refraction and reflection of light, on which these prisms are based, and how to determine what prisms to use. 4500 w. Builder—April 6, 1901.

Radiation.—Radiation and Illumination. An outline of the modern aspect of radiation and illumination. Serial. 1st part. 4500 w. Engng—Nov. 20, 1903.

See also **RADIATION.**

Self-Lighting and Extinguishing.—See **GAS LIGHTING; INCANDESCENT GAS LIGHTING.**

Sewickley, Pa.—See **NERNST LAMP—Street Lighting.**

Street.—Common Sense in Street Lighting. Edward B. Ellicott. Read before the League of Ohio Municipalities. Gives some statistics relating to the cost of lighting with electric arcs and with gas or gasoline lamps equipped with incandescent mantles, and discusses the subject generally. 2000 w. Pro Age—June 15, 1901.

Some Common Faults in Exterior Illumination. S. Everett Doane. Urging the use of incandescent lamps for residential streets, side streets, and outside the more congested portions of a town or city. 1200 w. Trans Am Inst of Elec Engrs—June-July, 1902.

The Illumination of Streets. Paul F. Gaehr. Briefly considers the best illumination, and method of testing. 1200 w. Sib Jour of Engng—Feb., 1904.

Street Lighting. Haydn T. Harrison. Abstract of a paper read before the Manchester Sec. of the Inst. of Elec. Engrs. Considers the factors of importance in judging the degree of illumination in streets, and the means of comparing accurately, based on the measurement of the minimum illumination. Serial. 1st part. 3300 w. Elect'n, Lond—Dec. 15, 1905.

See also Nernst Lamp vs. Incandescent Gas; **ARC LIGHT; ELECTRIC LIGHTING; INCANDESCENT GAS LIGHTING; INCANDESCENT LAMP; NERNST LAMP.**

Street, Acetylene.—See **ACETYLENE—Town Lighting.**

Street, Berlin.—Street Lighting in Berlin. A Comparison Between Electric Arc Lights and High-Pressure Gas Burners. Translation of a paper read before the German Assn. of Gas and Water Engrs. Results of photometrical observations conducted by Prof. Drehschmidt. Diagrams. 2200 w. Jour Gas Lgt—Dec. 8, 1903.

Street, Detroit.—Analysis of the Seventh Annual Report of the Public Lighting Commission, Detroit, Mich. A critical analysis, with editorial comments. 7500 w. Elec Wld & Engr—Feb. 28, 1903.

Street, Electric.—See **ARC LIGHT; ELECTRIC LIGHTING—Street.**

Street, Electric, Massachusetts.—See **ELECTRIC LIGHTING—Street, Massachusetts.**

Street, Incandescent Gas.—See **INCANDESCENT GAS LIGHTING—Street.**

Street, Incandescent Lamp.—See **INCANDESCENT LAMP—Street Lighting.**

Street, New York.—Street Lighting Conditions in New York City and a Proposed Municipal Plant. Reprint of two reports submitted to the Board of Estimate and Apportionment of New York City, with account of steps being taken to secure municipal ownership of the lighting service, or marked reduction in the cost. 7500 w. Eng News—March 19, 1903.

A Defense of the High Prices of Street Lighting in New York, and a Reply Thereto. Reviews the statement made by John M. Bowers, on behalf of the Consolidated Gas Co., and the reply of Robert Grier Monroe. 1800 w. Eng News—April 23, 1903.

Street, Photometry.—See also **PHOTOMETRY—Street Lighting.**

Street, Tests.—Street Lighting. Tabulated reports by J. W. Bradley, of tests made of a great variety of systems and their cost, including both gas and electricity. 1700 w. Elec Engr, Lond—Feb. 20, 1903.

Vacuum Tube.—See **VACUUM TUBE LIGHTING.**

West Hartford, Conn.—See **NERNST LAMP—Street Lighting.**

LIGHTNING.

See also **ELECTRIC DISCHARGE; LIGHTNING PROTECTION.**

Lessons from Lightning Strokes (Blitzschläge und Lehren aus Denselben). F. Neesen. A discussion of the recorded action of lightning strokes and a consideration of possible short circuits and other sources of danger. 1800 w. Elektrotech Zeitschr—Nov. 28, 1901.

Report of the Lightning Research Committee. Sir Oliver Lodge gives a preface explaining the report, which follows. 6800 w. Jour Ry Inst of Brit Archts—May 6, 1905.

Automobiles.—Is an Autocar Safe in a Thunderstorm? Sidney F. Walker. Explains the electrical discharge during a thunderstorm, and the conditions needed for safety. 2500 w. Autocar—Aug. 17, 1901.

Duration of Flash.—Observations on the Duration of Lightning Flashes (Beobachtungen über die Leuchtdauer der Blitze). K. E. F. Schmidt. A comparison of the observation of various physicists, showing the time to be less than 1: 30,000 part of a second. 1200 w. Elektrotech Zeitschr—Sept. 28, 1905.

Germany.—The Lightning Danger in Germany (Die Blitzgefahr in Deutschland). O. Steffens. A review of reports of lightning from various parts of Germany, comparing these with the record of sunspots. 6000 w. Elektrotech Zeitschr—June 8, 1905.

Metallic Buildings.—The Effect of Lightning upon Metallic Structures (Les Constructions Métalliques et la Foudre). A review of the records of skeleton steel buildings which have been struck by lightning, discussing the possible relation between the construction and effect. 1200 w. Revue Technique—Nov. 10, 1901.

Theory.—The Theory of Thunderstorms. Concerning the remarkable experiments of Herr Schmauss, as given in the "Annalen der Physik," which explains the phenomena as due to the picking up of an excess of negative ions by the water drops. 1000 w. Elec Rev, Lond—Oct. 17, 1902.

Water.—Lightning Above and Below Water. Prof. John Trowbridge. An illustrated account of experiments believed to show that lightning never strikes the surface of the sea. 1100 w. Sci Am—April 5, 1902.

LIGHTNING ARRESTER.

See **ELECTRIC PROTECTIVE APPARATUS; ELECTRIC SWITCH; LIGHTNING PROTECTION.**

LIGHTNING PROTECTION.

See also **ELECTRIC PROTECTIVE APPARATUS; ELECTRIC SWITCH; LIGHTNING.**

The Protection of Buildings from Lightning (Ueber Gebäude-Blitzableiter). K. Strecker. The report of a committee of the Elektrotechnischer Verein, with the proposed rules for the protection of buildings against lightning. Also editorial comment. 1800 w. Elektrotech Zeitschr—April 11, 1901.

The Protection of Buildings from Lightning. Alfred Hands. Read before the Architectural Assn., England. Briefly explains the electrical action during a thunderstorm, reviews the history of protection, and discusses the prevailing practice. Also discussion. 12,600 w. Builder—May 18, 1901.

Necessary Practical Safeguards Against Fires Caused by Lightning. Alfred Hands. Abstract of a paper read before the Fire Prevention Congress, England. Explains the force of lightning and discusses points necessary to protect buildings. 2200 w. Elect'n, Lond—July 17, 1903.

Protection Against High Pressures (Schutzvorrichtungen gegen Schädliche Ueberspannungen). G. Benischke. A paper on lightning arresters and protection against high tension currents, with discussion. Presented before the Elektrotechnische Verein. 5000 w. Elektrotech Zeitschr—July 11, 1901.

The Protection of Buildings from Lightning. Killingworth Hedges. Read before the Glasgow Congress. Considers the protection usually inadequate, discusses modern practice, American practice, the protection of Westminster Abbey, etc. 6800 w. Elec Engr, Lond—Sept. 27, 1901.

Notes on Lightning and High Voltage Arresters for Electric Currents. J. Wright. Considers how to efficiently protect a building from lightning, and also electric circuits not connected to earth. Ill. 2700 w. Ind & East Engr—Nov., 1901.

Lightning and Lightning Protectors (Ueber Blitz und Blitzableiter). F. Wellisch. A review of the theory and practice of lightning protection. 4500 w. Oesterr Wochenschr f d Oeffent Biudienst—Jan. 4, 1902.

Atmospheric Electricity and Lightning Protectors. Begins a careful review of the progress made in the study of atmospheric electricity, and the various theories regarding thunderstorms. Serial. 1st part. 8800 w. Engng—May 30, 1902.

Protection from Lightning. Prof. Dr. Fr. Neesen. A lecture delivered before the Electrochemical Society of Leipsig. An illustrated review of the laws governing the construction of lightning protection. Considers protectors for buildings, arresters for low-potential circuits, and for high-potential circuits. 3800 w. Sci Am Sup—Oct. 22, 1904.

The Lightning Arrester. Newton Harrison. Shows that if lightning has a choice of paths it will choose the one having the least impedance, explains the purpose of the arrester, and gives a study of the problem of protection. Ills. 2800 w. Cent Sta—June, 1905.

Modern Lightning Conductors. Killingworth Hedges. A discussion of the best method of protection, reviewing also the opinions of other writers. Ills. Also discussion. 3000 w. Jour Soc of Arts—May 26, 1905.

Protective Apparatus. N. J. Neall. Illustrates and describes various designs of choke coils for use in connection with lightning arresters. 1400 w. Elec Jour—Oct., 1905.

Discussion on Lightning and Lightning Protective Apparatus. 6800 w. Am Inst of Elec Engrs—Dec., 1905.

Chicago Electric System.—See Electric System; **ELECTRIC DISTRIBUTION; ELECTRIC STATION; ELECTRIC SUB-STATION.**

Comparative Design.—The Arrangement of Lightning Arresters and the Influence of Choke Coils (Die Schaltung der Blitzableiter und der Einfluss von Drosselpulen). F. Neesen. An examination of various methods of connecting lightning arresters, comparing different designs. 4000 w. Elektrotech Zeitschr—March 30, 1905.

Electric Apparatus.—Protection of Electrical Apparatus From Lightning and Other Destructive High Potentials. Howard R. Sargent. Discusses the best protection from such troubles, calling attention to features of importance. 2400 w. Elec Wld & Engr—Jan. 2, 1904.

Electric Plant.—Report of a Committee of the Elektrotechnischer Verein on the Protection of Electric Plants Against Atmospheric Discharges (Bericht des Technischen Ausschusses des Elektrotechnischen Vereins über den Schutz Elektrischer Starkstromanlagen Gegen Atmosphärische Entladungen). A report giving a synopsis of answers to questions sent to electric plants in Germany and Austria. 2000 w. Elektrotech Zeitschr—May 7, 1903.

Electric System.—Protection and Control of Large High Tension Alternating-Current Distribution Systems. George N. Eastman. Examples and conditions presented refer to the system of the Chicago Edison Company and Commonwealth Electric Company, discussing the protection needed. Ills. 3500 w. Int Elec Cong of St. Louis—Sept., 1904.

Electric Transmission.—See **Transmission Lines.**

Europe.—Protective Apparatus. N. J. Neall. Illustrates and describes the principal forms of arresters used on the Continent. 1200 w. Elec Jour—Dec., 1905.

Explosive Magazines.—See **EXPLOSIVE—Lightning Protection.**

Fire and Police Telegraphs.—The Protection of Fire and Police Telegraph Systems from High-Tension Currents and Lightning. Walter M. Petty. Read at the convention of the International Assn. of Munic. Elect'ns. Describes apparatus in use and discusses what is necessary. 5000 w. Fire & Water—Oct. 19, 1901.

Gola.—Protection of Electric Plants from Atmospheric Discharges (Schutz Elektrischer Anlagen gegen Atmosphärische Entladung). A description of the Gola lightning arrester, used in Italy. 2000 w. Elektrotech Zeitschr—May 22, 1902.

The Gola Lightning Arrester (Parafoudre Système Gola). J. A. Montpellier. Describing an improved arrangement of series lightning arrester, applicable for currents up to 80,000 volts and 250 amperes. 800 w. L'Electricien—Jan. 7, 1905.

Grounded Wire.—The Grounded Wire as a Protection Against Lightning. Ralph D. Mershon. Discusses the efficacy of wires strung parallel to the power wires and grounded at intervals for the protection of transmission lines. 1800 w. Trans Am Inst of Elec Engrs—July, 1903.

See also **ELECTRIC DISTRIBUTION.**

Guard Wire.—See **Transmission Line.**

Hedges.—Lightning Protection. Killingworth Hedges. Illustrated description of special clamps designed by the writer which project from the wall, and of methods of installation adopted. 1600 w. Public Works—Jan., 1905.

Horn.—Horn-Shaped Lightning Arresters with Iron Armature (Hörnerblitzableiter mit Eisenarmirung). Eugen Klein. An illustrated description of a modification of the Elihu Thomson lightning arrester, in which iron plates are placed on the horns in order to drive the arc toward the far ends and extinguish it. 800 w. Elektrotech Zeitschr—Dec. 19, 1901.

Horn Lightning Arresters with Iron Framing. Eugen Klein. Illustrated description of lightning safety devices for electrical apparatus. 900 w. Elect'n, Lond—March 7, 1902.

Horn Lightning Arresters with Iron Framing. Eugen Klein. Translated from "Elektrotechnische Zeitschrift." Illustrates and describes these safety devices, and method of testing. 800 w. Sci Am Sup—Aug. 23, 1902.

An Experiment to Illustrate the Principle of Horn Arresters. A. E. Moore. Describes an experiment made to determine whether connection or electromagnetism plays the more important part. The result shows that connection plays only a small part. 900 w. Elec Engr, Lond—Oct. 7, 1904.

Horn, Relay.—The Siemens-Schuckert Lightning Arrester Relay (Das Blitzableiter-Relais der Siemens-Schuckertwerke). Alberto Dina. Showing the application of auxiliary discharge points to the horn lightning arrester to enable the gap to be safely increased. 4500 w. Elektrotech Zeitschr—May 25, 1905.

Multi-Path.—Protective Apparatus. N. J. Neall. An illustrated article explaining static discharges and the equivalent spark gap, and the development of the multi-path arrester. 1800 w. Elec Club Jour—April, 1905.

Railway Signal.—See **RAILWAY SIGNAL—Lightning Interruption.**

Reichsanstalt Test.—Correct Position of Lightning Arresters in the Circuit and the Effect of Choking Coils. F. Neeson, in "Elektrotechnische Zeitschrift." An account of some tests carried out at the Reichsanstalt for the purpose of determining whether a lightning arrester is most effective when connected as a shunt to the circuit, or when in series. The results point uniformly to the latter. 1200 w. Elec Engr, Lond—June 23, 1905.

Resistance Function.—The Function of Shunt and Series Resistance in Lightning Arresters. Percy H. Thomas. A description of a method of enabling an arrester to suppress the arc which tends to follow a simultaneous discharge to ground from two legs of a circuit. 5500 w. Trans Am Inst of Elec Engrs—June 18, 1902.

Schoen and Felix.—Lightning Arrester for High Tension Currents (Parafoudre pour Haute Tension). A. Bainville. An illustrated description of the Schoen & Felix arrester, made up of elements which can be assembled in any desired number. 1000 w. Electricien—Jan. 31, 1903.

Shaw.—Shaw's Lightning Arrester. Report of the Committee on Science and the Arts, on the invention of Henry M. Shaw. Ills. 900 w. Jour Fr Inst—Nov., 1905.

Shawinigan Water and Power Co.—Some Experiences with Lightning Protective Apparatus. Julien C. Smith. Deals with experiences with lightning protective apparatus which the operating department of the Shawinigan Water & Power Co. has had during the years 1903, 1904 and 1905. Ills. 2000 w. Am Inst of Elec Engrs—Oct., 1905.

See also **HYDRO-ELECTRIC PLANT.**

Static Interrupter.—Lightning Protection and the Static Interrupter. Percy H. Thomas. Considers ground and short circuits, local concentration of potential, effect of discharge of arrester, other causes of static strains, protection of apparatus and the devices used. Ill. 6200 w. Can Engr—July, 1902.

Telegraph, Austrian.—The New Earth Connections for Lightning Rods of the Austrian State Telegraph Department (Die Neuen Blitzableiter-Erdleitungen der Staatstelegraphen-Verwaltung). Robert Nowotny. An illustrated description of ground connections which consist of a network of stout wires buried in the earth, with or without coke. 3500 w. Oest Wochenschr f d Oeff Baudienst—May 23, 1903.

Telephone.—Safety Appliances for Use with Weak Currents (Beitrag zur Konstruktion Elektrischer Sicherungen für Schwachstromanlagen). Hans Carl Steidle. Describing a device to protect the user of a telephone from the action of atmospheric discharges. 1200 w. Elektrotech Zeitschr—July 20, 1905.

See also **ELECTRIC PROTECTIVE APPARATUS.**

Telephone & Telegraph.—Lightning Protection. Ralph Scott. Considers principles involved, and gives brief illustrated descriptions of devices for the protection of telephones, signals and telegraph instruments. 1700 w. Elec. N Y—March 9, 1904.

Telephone Line.—Improved Lightning Protection for Telephone Lines (Ueber Neue Blitzschutzeinrichtungen für Fernsprechleitungen). Dr. Adolf Franke. Describing an improved form of lightning arrester with carbon points in vacuum. 4000 w. Elektrotech Zeitschr—Nov. 27, 1902.

Transmission Line.—The Protection of Overhead Lines Against Lightning (La Protection des Lignes Aériennes Contre la Foudre). E. Dussaugey. An exhaustive study of the construction and operation of devices for protecting electric transmission lines from lightning. 8000 w. Bull Soc Int Electriciens—Aug., Sept., Oct., 1902.

Lightning Arresters on Transmission Lines. Alton D. Adams. Considers the dangers from atmospheric electricity, the true purpose of lightning arresters, the types in use, the most recent practice, the degree of security, etc. 4500 w. Elec Rev, N Y—Oct. 10, 1903.

Guard Wires for Transmission Lines. Alton D. Adams. Discusses systems both with and without guard wires, giving information from various sources. Also editorial. 5000 w. Elec Rev, N Y—Jan. 16, 1904.

Lightning Protection. J. V. E. Titus. Read before the Colorado Elec. Lgt., Power & Ry. Assn. Discusses points to be considered in installing lightning arresters. 1800 w. Elec Rev, N Y—Dec. 24, 1904.

Protective Apparatus. N. J. Neall. Illustrates various types of lightning arresters, discussing present American practice for high voltage transmission circuits. 3000 w. Elec Jour—Aug., 1905.

Performance of Lightning Arresters on Transmission Lines. N. J. Neall. Describes a method of obtaining, by means of test-papers, records of the operation of lightning arresters in service; gives some results obtained by the use of this method. Ills. 3500 w. Pro Am Inst of Elec Engrs—Nov., 1905.

Note on Lightning Arresters on Italian High-Tension Transmission Lines. Philip Torchio. A report of observations made by the writer and reporting the best practice of to-day for the protection of Italian transmission lines. 800 w. Am Inst of Elec Engrs—Oct., 1905.

See also **Grounded Wire.**

LIGHTNING RECORDER.

See **ELECTRIC INSTRUMENT.**

LIGHT RAILWAY.

See also **ELECTRIC RAILWAY; MOUNTAIN RAILWAY; RAILWAY.**

Austria.—The Industrial Importance of the Narrow Gauge Railway (Die Schmalspurbahnen und ihre Volkswirtschaftliche Bedeutung). Josef Ritt. v. Wenusch. A review of the history of narrow gauge railways, advocating the construction of double-track narrow-gauge roads to benefit the agricultural districts of Austria. Three articles. 10,000 w. Zeitschr d Oesterr Ing u Arch Ver—June 10, 17, 24, 1904.

Barking-Becton, Eng.—The Barking-Becton Light Railway. Illustrates and describes the interlocking devices which control the opening of the bridge which crosses the river Roding, and gives information concerning the line. 1500 w. Elect'n, Lond—Feb. 26, 1904.

Belgium.—The Light Railways of Belgium (Die Belgischen Kleinbahnen). H. Pforr. A general review of the tramway and interurban railway systems of Belgium, with comparative diagrams showing the rate of growth. 3000 w. Glaser's Annalen—Jan. 1, 1904.

Light Railways and Land Development. J. M. Hewitt and W. G. Rhodes. Describes the system of eight railways and methods adopted in Belgium and their effect on the value of land and property. Serial. 1st part. 2500 w. Elec Rev, Lond—May 16, 1902.

British.—Light Railroads in Great Britain. C. H. Grinling. States what led to the passing of the Light Railways Act of 1896, its object, and the power of the Board of Trade over this class of railways. 1300 w. R R Gaz—Feb. 7, 1902.

Railways: Co-ordinate and Sub-ordinate. R. H. Scotter. A discussion of the railways question in England, especially as related to light railways. 2500 w. Tram & Ry Wld—June 12, 1902.

See also **Promotion.**

Chatham, Eng.—Chatham and District Light Railways. An account of the opening of these lines in England on June 17, 1902, and illustrated description. 3800 w. Tram & Ry Wld—July 10, 1902.

Cheap Service.—See **TRAIN SERVICE—Branch Lines.**

Electric.—Light Electric Railways. James R. Cravath. From a paper before the Chicago Branch of the Am. Inst. of Elec. Engrs. Sets forth the demand for railways which can be built and operated cheaply for farming districts and small villages. Plans the type of road that will thrive, advocating narrow gauge. Also editorial criticism. 2500 w. Engr News—June 29, 1905.

Electric vs. Steam.—The Application of Electric Traction to Light Railways. H. Luithlen. Abstract of a report to be presented at the Vienna meeting of the Inernational Tramways and Light Railways Association. Considers the advantages of electric traction over steam for light railway service. 2000 w. St Ry Jour—Aug. 27, 1904.

See also **ELECTRIC RAILWAY—Steam Compared.**

Gasoline Car.—See **CAR, MOTOR DRIVEN—Narrow Gauge.**

Gerardmer-Honeck.—The Gerardmer-Retournemer-Honeck Tramway (Tramway de Gerardmer à Retournemer-La Schluct-Le Honeck). A. Moutier. Description of construction material, and operation of an interurban steam railway in the Vosges near Belfort. 4000 w. 2 plates. Rev Gen d Chem de Fer—Jan., 1905.

Germany.—The Limits to the Capacity of Light Railways (Ueber die Grenzen der Leistungsfahigkeit der Kleinbahnen). A. Liebmann. A comparison of the capacity of various light interurban railways in Germany, deducing their probable commercial limitations. 3000 w. Ill. Zeitschr f Klein u Strassenbahnen—Nov. 1, 1902.

Government Co-operation.—On the Question of the Direct Financial Co-operation by the State and by Localities Interested in the Development of Light Railways (Subject XVIII. for Discussion at the Seventh Session of the Railway Congress). C. Colson. Statement of the results obtained in Belgium, France, Germany and the United Kingdom. 23,400 w. Bul Int Ry Cong—Oct., 1904.

On the Question of the Direct Financial Cooperation by the State and by Localities interested in the Development of Light Railways (Subject XVIII. for Discussion at the Seventh Session of the Railway Congress). E. A. Ziffer. Report No. 2 for all countries, except Belgium, France, England and Germany. 12,600 w. 1 table. Bul Int Ry Cong—Dec., 1904.

Influence on Main Lines.—Report on the Influence of Light Railways on the Main Lines (Subject XVII. for Discussion at the Seventh Session of the Railway Congress). Mr. De Burlet. 10,900 w. 16 tables. Bul Int Ry Cong (2d Part)—Feb., 1905.

Leek and Manifold.—The Leek and Manifold Valley Light Railway. Illustrated dealled description of this recently opened road in England, which has novel features of interest. 3000 w. Tram & Ry Wld—July 14, 1904.

See also **CAR.**

Maine Com. Report.—Concerning Railways of Light Traffic. Editorial discussion of construction and operation costs, giving statistics compiled from the annual report of the Maine R. R. Commission for 1902. 4500 w. Eng News—April 30, 1903.

Mountain.—See **MOUNTAIN RAILWAY.**

Portsdown & Horndean, Eng.—See **ELECTRIC RAILWAY.**

Promotion, Eng.—Light Railway and Tramway Promotion Procedure. Arthur P. Poley. The first of a series of articles giving an account of the procedure and rules applicable to applications made by promoters in England. 3000 w. Tram & Ry Wld—June 9, 1904.

Tramway Compared.—Tramway or Light Railway. W. Valentine Ball. Considers the relative advantages and the legal aspects of the two systems. 4000 w. Trac & Trans—Nov., 1903.

Walthamstow, Eng.—ELECTRIC RAILWAY.

LIGHTSHIP.

See also **LIGHTHOUSE.**

Automatic.—See **Otter Rock, Scotland.**

Electric.—See **ELECTRIC LIGHTING—Coast.**

France.—The New Lightships of the Coast of France. Translated from "La Nature." Illustrations with brief descriptions. 1200 w. Sci Am Sup—May 23, 1903.

Lightships (Les Feux Flottants). M. Ribière. A well illustrated description of several new lightships for the French coast, some with a crew and some without, the system of lighting with compressed oil gas, the sound signal apparatus, and other features. 3 plates. 7000 w. Ann des Ponts et Chaussées—4 Trimestre, 1902.

See also **LIGHTHOUSE.**

Launching.—See **SALVAGE—Lightship.**

Otter Rock, Scotland.—An Automatic Lightship. Waldon Fawcett. An illustrated description of a lightship stationed at Otter Rock, off the west coast of Scotland. Its ingenious mechanical devices render its service automatic. 800 w. Sci Am—Aug. 2, 1902.

LIGHT TELEPHONY.

See also **ARC LIGHT—Singing; SPACE TELEPHONY.**

The Speaking Electric Arc (Der Sprechende Elektrische Flammenbogen). E. Ruhmer. An examination of the vibrating electric arc as a receiver and transmitter, and its application to wireless telegraphy. 2000 w. Elektrotech Zeitschr—Feb. 28, 1901.

Recent Experiments in Light Telephony (Neuere Versuche mit Lichttelephonie). Ernst Ruhmer. Describing experiments recently conducted on the Wannsee, near Berlin. Communication was had for a distance of 3.8 kilometers by means of light waves received by a telephone. 3000 w. Elektrotech Zeitschr—Sept. 25, 1902.

Wireless Telephony. From the "Elektrotechnische Zeitschrift." A description of the experiments on the transmission of sounds along a beam of light, which Herr Ernst Ruhmer made last summer. Ill. 1900 w. Elect'n, Lond—Nov. 7, 1902.

Selenium and Its Applications in Light Telephony (Ueber das Selen und Seine Bedeutung für die Elektrotechnik unter Besonderer Berücksichtigung der Lichttelephonie). Ernst Ruhmer. A long paper upon the application of selenium for converting light waves into electricity. 7000 w. Elektrotech Zeitschr—Dec. 1, 1904.

Ruhmer's Photoelectric Telephone. A. Frederick Collins. An illustrated article giving an account of Ernst Ruhmer's experiments on the Wannsee, near Berlin, in which a beam of light from an electric arc in a parabolic reflector was sent 7 kilometers to a selenium cell in another reflector. 2000 w. Elec Wld & Engr—Dec. 20, 1902.

Ruhmer's System of Light Telephony. An illustrated account of what has been accomplished in this field by Ernst Ruhmer. 900 w. Sci Am—June 6, 1903.

Photo Telephony. Shelford Bidwell. Reviews what has been accomplished in this field, especially recent work of Mr. Ernst Ruhmer. 1200 w. Nature—Feb. 18, 1904.

Wireless Telephony by Use of the Properties of Selenium (Draadloose Telefonie en de Eigenschappen en Toepassingen van Selenium). A. H. Opten Noort. Discussing the experiments of Simon, Duddell, Ruhmer and others in the transmission of speech without wires. Two articles. 7500 w. De Ingenieur—June 18, 25, 1904.

Wireless Telephony with the Aid of the Selenium Cell (La Téléphonie sans Fil au Moyen des Piles à Selenium). A. Gradenwitz. A review of the experiments of Ruhmer by which articulate messages have been transmitted over a space of 7 kilometres. Two articles. 3000 w. Revue Technique—April 25, May 10, 1904.

High Frequency Currents and Space Telephony (Les Courants de Haute Fréquence et la Téléphonie sans Fil). L. Ancel. An examination of the phenomena of high frequency currents, and a discussion of the Ruhmer system of telephony by the action of light on selenium. 4000 w. Mem Soc Ing Civ de France—Feb., 1905.

LIGNITE.

See **BROWN COAL.**

LIMBURGITE.

An Occurrence of Limburgite in the Cripple Creek District. E. A. Stevens. An illustrated description of this occurrence, with the writer's view. 1300 w. Trans Am Inst of Min Engs—Aug., 1900.

LIME.

See also **CEMENT; CONCRETE; FLUX; MORTAR.**

Analysis.—The Analysis of Raw and Spent Lime. H. Leicester Greville. Describes the method devised by the writer for the analysis of spent lime, and the methods in use for the determination of free lime. 2200 w. Jour of Gas Lgt—Oct. 17, 1905.

The Chemical Analysis of Limes and Cements.

M. J. Malette. Remarks on the advantages and need of agreement in the methods of testing such materials, giving a method considered as giving a very satisfactory guarantee of exactitude. 2000 w. Builder—Sept. 2, 1905.

Hydrated.—The Use of Hydrated Lime. Explanation of the properties of hydrated lime, as given in a paper by E. W. Lasell, before the Nat. Lime Mfrs. Assn. 1600 w. Eng Rec—June 3, 1905.

Hydraulic.—See **CEMENT—Grappier.**

Lead Roasting.—See **LEAD METALLURGY—Lime Roasting.**

Manufacture.—The Manufacture and Properties of Hydrate of Lime. S. Y. Brigham. Describes the method of manufacture, showing the results of comparative tests, and making a general comparison with the qualities of quick lime in the lump form. 1600 w. Eng News—Aug. 27, 1903.

Sand.—See **CEMENT—Sand.**

Strength.—Tensile Strength of High Calcium and Magnesium Lime. George V. Rhines. A comparison of the strengths of these two limes made by George S. Mills is given, with other information of value. 1200 w. Munic Engng—Jan., 1905.

LIMESTONE.

See also **FLUOR-SPAR; FLUX.**

Michigan.—Michigan Limestones and Their Uses. A. C. Lane. Map showing general distribution, with outline of the uses, and related information. Serial. 1st part. 2000 w. Eng & Min Jour—May 25, 1901.

LINK BELT.

See **BEARING; CONVEYOR; POWER TRANSMISSION.**

LINK MOTION.

See also **KINEMATICS; VALVE GEAR.**

Bench.—Link-Motion Bench for the Technical College Finsbury. Illustration, with description of an apparatus designed by Prof. W. E. Dalby for investigating the properties of a link motion. 1000 w. Engng—July 8, 1904.

Inventor.—Who Really Invented the Link Motion? W. L. Campbell. Presents facts in proof of the claim that Williams, and not Howe, invented the link motion. 4000 w. Am Mach—Feb. 11, 1904.

LIQUEFACTION.

See **CARBONIC ACID—Liquid; LIQUID AIR; LOW TEMPERATURE.**

LIQUID.

Non-Freezing.—See **AUTOMOBILE, GASOLINE—Non-Freezing Liquids.**

LIQUID AIR.

See also **LOW TEMPERATURES.**

Liquid Air: Its Manufacture, Distillation into Commercial Oxygen and Nitrogen, and the Application of Oxygen in the Industries, Especially for Use in Connection with Illuminating Gas. G. A. Bobrick. Read before the Pacific Coast Gas Assn. Reviews the history of the liquefaction of gas and describes the processes now employed in the manufacture of liquid air and its distillation. 4800 w. Am Gas Lgt Jour—Aug. 24, 1903.

Commercial Possibilities of Liquid Air. A theoretical consideration of the principles involved and the energy absorbed by its production and subsequently set free by its volatization. 2000 w. Engr, Lond—Dec. 23, 1904.

Automobile.—See **AUTOMOBILE—Liquid Air.**

Blythswood Plant.—Lord Blythswood's Liquid Air Plant for Experimental Work at Low Temperatures. Illustrates and describes apparatus for liquefying air and hydrogen gas. 1800 w. Sci Am Sup—July 2, 1905.

D'Arsonval.—D'Arsonval on Liquid Air. An account of the interesting lecture before the Société des Electriciens upon preparation and properties of liquid air, and the experiments shown. 1700 w. Sci Am Sup—June 14, 1902.

Hampson Apparatus.—The Hampson Liquid Air Plant at McGill University, Montreal. Prof. John Cox. Briefly reviews the processes of various experimenters, and gives an illustrated description of the Hampson apparatus and its performance. 1300 w. Can Elec News—Nov., 1902.

Iron.—See **IRON—Low Temperatures.**

Linde Lecture.—Liquid Air. Editorial review of a lecture by Dr. Carl von Linde, on "The Technical Application of Liquid Air." Denies the possibility of using it for cold storage on a commercial scale. 2200 w. Engng—Nov. 7, 1902.

Practical Liquid Air Possibilities. Dr. Carl von Linde. Extracts from an address before the Ice and Cold Storage Assn. of London, considering its use for refrigeration and power. 3200 w. Cassier's Mag—June, 1903.

See also **Oxygen.**

Oxygen.—Industrial Oxygen (L'Oxygen Industriel). Rauol Pictet. Describing an improved method for obtaining pure oxygen at a cost lower than that of common illuminating gas by fractional distillation of liquid air. The liquid air supply is continually replaced by the process. An important paper. 6000 w. Mem Soc Civ de France—June, 1901.

The Production of Oxygen by the Fractional Distillation of Liquid Air (Sauerstoffgewinnung mittels Fraktionierter Verdampfung Flüssiger Luft). C. Linde. Professor Linde's paper before the Society of German Engineers, giving details of the construction of his most recent apparatus. 2000 w. Zeitschr d Ver Deutscher Ing—Aug. 9, 1902.

The Use of Liquid Air in the Manufacture of Oxygen and Nitrogon (La Liquéfaction de l'Air et ses Applications à la Fabrication Industrielle de l'Oxygène et de l'Azote). Georges Claude. A detailed account of the commercial production of oxygen as now actually conducted in France, by the rectification of liquid air. 7000 w. Mem Soc Ing Civ de France—Nov., 1905.

The Separation of Oxygen and Nitrogen by the Partial Liquefaction of Air (Sur l'Application de la Liquéfaction Partielle de l'Air avec Retour en Arrière à la Separation Intégrale de l'Air en Oxygene Pur et Azote Pur). Georges Claude. Describing the operation of a regenerative apparatus for the fractional separation of oxygen. 1200 w. Comptes Rendus—Nov. 20, 1905.

The Liquefaction of Air (Liquéfaction de l'Air). Discussing especially the production of pure oxygen by fractional distillation of liquid air. 2500 w. Génie Civil—Dec. 9, 1905.

See also **Linde.**

Pictet.—See **Oxygen.**

Tests.—See **REFRIGERATION.**

University of California.—The Liquid Air Plant of the Chemistry Department, University of California. F. G. Cottrell. Illustrates and describes the plant and its operation, and the uses made of it. 4000 w. Cal Jour of Tech—Sept., 1905.

LIQUID FUEL.

See also **LOCOMOTIVE—Oil Burning; PETROLEUM.**

Oil as a Fuel. William Kennedy, in "Southern Industrial and Lumber Review." Discusses the effect of location on the cost, methods of burning and the uses to which it may be applied. 2000 w. Am Gas Lgt Jour—Aug. 5, 1901.

Petroleum as Fuel. From an article by A. Adiassewich, in "Fairplay." Gives some reasons why it can be regarded as a competitor of coal, experimental determinations of its heating value, etc. 2000 w. Marine Rev—Sept. 5, 1901.

Liquid Fuel for Steam Boilers, Forges, and Furnaces. W. H. Wakeman. Reviews the history of the use of crude oil, and describes the commonly used instruments for drilling oil wells, the process of distillation, oil burners, etc., giving cautions regarding safety in the use. Ill. 5800 w. Engr, U S A—Jan. 1, 1902. Special number.

Fuel Oil. W. W. Reed. Read at meeting of the Southwestern Gas, Electric and Street Railway Assn. Discusses the commercial side of the question, and the utilisation of oil as fuel for steam purposes. 2600 w. Am Gas Lgt Jour—May 12, 1902.

Liquid Fuel—Its Application, Past and Present. R. G. Paddock. Considers methods of application, devices used, experimental tests, etc. 7500 w. Jour Assn of Engng Soc's—April, 1902.

Liquid Fuel—Boiler Firing with Oil. James W. Warren and H. T. Edgar. On the advantages of liquid over solid fuel for steam generating, method of burning, etc. Serial. 1st part. 2200 w. Elec Rev, N Y—June 21, 1902.

Liquid Fuel for Steam Purposes. J. S. S. Brame. Considers the various methods of burning liquid fuel, estimations of the calorific value of different liquid fuels, cost, etc. 2800 w. Nature—June 19, 1902.

The Present State of the Question of Liquid Fuel. Considers briefly the economy, the difficulty of satisfactorily burning moderate quantities of oil, the uses, etc. 2000 w. Jour Gas Lgt—Dec. 2, 1902.

Liquid Fuel. H. F. Schmidt. A discussion of the advantages, apparatus used, cost, etc., showing that a special study must be made of each plant and the conditions under which it is to operate. 2500 w. Am Elect'n—March, 1903.

Liquid Fuel for Power Purposes. Arthur L. Williston. A valuable synopsis of the mechanical aspects of the question, based on the successful experience of some very large users of fuel oil. Gives diagrams of burners and furnaces for stationary and locomotive practice. Illustrated. 4000 w. Engineering Magazine—May, 1903.

Liquid Fuel for Power Purposes. Arthur L. Williston. A discussion of the economic side of the question, showing when and where it will pay to substitute oil for coal; gives also a clear summary of the present and possible future output of fuel oil. Illustrated by charts. 4500 w. The Engineering Magazine—July, 1903.

Liquid Fuel for Power Purposes. Arthur L. Williston. A thorough presentation of the economic side of the question, with figures and diagrams showing the fluctuation of production and price over long periods, and an estimate of the future supply of fuel oil. Illustrated. 3200 w. The Engineering Magazine—August, 1903.

The Science of Burning Liquid Fuel. W. N. Best. Considers some of the advantages of this fuel over others, and how to obtain the best results. 1600 w. Sci Am Sup—Aug. 20, 1904.

Oil Burning in Steam Boilers. W. H. Fowler. Compares coal and petroleum as a fuel, discussing the properties of the latter, the method of burning, and related matters. Ills. 2500 w. Mech Engr—May 20, 1905.

Crude Oil Burning. J. R. Collins. Points on the requirements for the successful use of this fuel. Ills. 800 w. Engr, U S A—Dec. 15, 1905.

Alcohol.—See **Automobile; ALCOHOL.**

Atomization.—Oil Burning Utilities and Futilities. Amanda T. Jones. The present article discusses the question of whether atomization previous to ignition is necessary, giving the writer's views. Serial. 1st part. 3200 w. Steam Engng—Aug. 10, 1903.

Advantages.—Liquid Fuel. Presents the advantages over coal and coke, and thinks it only needs to have the furnaces for its use correctly designed to demonstrate its great economy. 800 w. Am Engr & R R Jour—Dec., 1902.

Automobiles.—Alcohol and Petroleum Essence in Automobilism (L'Alcohol et l'Essence de Pétrole dans l'Automobilism). E. Dieudonné. An examination of the relative calorific power of the liquid fuels with regard to their use in the internal-combustion motors of automobile vehicles. 2500 w. Revue Technique—April 25, 1901.

Fuel Tests of Automobile Vehicles (Epreuves de Consommation pour Voitures Automobiles). Data and results of various trials, with especial reference to internal-combustion motors using alcohol and essence. 1200 w. Génie Civil—March 22, 1902.

The Fuel Question. Albert L. Clough. Discusses gasoline and kerosene as fuels for automobile use. Also editorial. 2800 w. Horseless Age—May 28, 1902.

Fuels for Motor Cars. The first of a series of articles introducing a discussion of suitable fuels. Serial. 1st part. 1300 w. Autocar—Sept. 5, 1903.

The Problem of Heavy Oil for Automobile Engines. A letter on "Kerosene for Explosion Engines," with editorial comments. 3300 w. Auto Jour—Aug. 29, 1903.

Oils for Motor Cars. C. Simmonds. Information concerning the oils in use at the present time as fuels for motors. 2400 w. Nature—Dec. 29, 1904.

See also **Benzole; Burners; Kerosene; AUTOMOBILE; AUTOMOBILE, GASOLINE; AUTOMOBILE, STEAM.**

Beaumont.—Tests of Beaumont Oil as Fuel. Report submitted by Prof. James E. Denton of the results of the full value of crude petroleum as used to operate a horizontal return tubular boiler. Ill. 5000 w. Eng & Min Jour—Feb. 1, 1902.

Oil as Fuel. Data from New Orleans, Mobile and other cities regarding the utility and efficacy of Beaumont oil as fuel in street railway power stations. Considers the saving secured and the oil-burning apparatus. 5800 w. St Ry Rev—June 20, 1902.

Texas Oil as a Steam Boiler Fuel. Gives results of experience in the use of Beaumont oil. 5200 w. Steam Engng—July 10, 1902.

On the Use of Beaumont Oil as Fuel. Henry H. Humphrey. Discusses the advantages and disadvantages of oil fuel, and the questions relating to its use. 3800 w. Jour Assn of Engng Soc's—March, 1903.

See also **PETROLEUM.**

Benzol.—Benzol as a Motor Fuel. Discusses the nature of benzol, its efficacy, advantages, etc. 2800 w. Autocar—Jan. 16, 1904.

The Value of Benzol as a Motor Fuel. A report of investigations made, giving results. 4000 w. Autocar—May 21, 1904.

Billow.—Oil Burning. Frank H. Bates. Reviews the Billow system of oil burning. The present paper illustrates and describes the methods and apparatus used for the preparation and delivery of oil to the burners. Serial. 1st part. 900 w. Jour of Elec—Oct., 1902.

Burners.—Gasoline and Kerosene Burners. Joseph W. Jones. Advocates the use of petroleum for the purpose of generating heat in steam vehicles, and discusses the defects of the burners now used. 1200 w. Horseless Age—Oct. 16, 1901.

Digest of Kerosene Burner Patents. F. W. Barker. Brief illustrated outlines of patents treating the subject of vaporizing kerosene and burning the vapor under a boiler. 3200 w. Horseless Age—May 28, 1902.

Some Kerosene Burners. Illustrations and particulars of eight types of burners. 4000 w. Horseless Age—May 28, 1902.

Kerosene Carburetters and Burners. L. Berger. Illustrates and describes various carburetters and burners and their principles of construction. 1200 w. Horseless Age—May 28, 1902.

Miscellaneous Methods of Kerosene Combustion. J. S. V. Bickford. Gives a description of petroleum blow-pipes, and of two types of apparatus for applying the principle of introducing steam in petroleum Bunsen burners, etc. Ill. 2200 w. Horseless Age—May 28, 1902.

Petroleum Vapor Burners—General Principles. J. S. V. Bickford. Aims to give the principles on which petroleum apparatus may be designed. Ill. Horseless Age—May 28, 1902.

Bunsen and Injector Burners. J. S. V. Bickford. Experimental investigation of the class of burners in which the jet of vapor mixed with air passes through a length of tube before being ignited. Ill. 2500 w. Horseless Age—May 28, 1902.

Liquid Fuel Burners. J. S. V. Bickford. The present article considers the class of vapor burners designed for the use of petroleum lamp oil, discussing the production of the vapor. Ills. Serial. 1st part. 4400 w. Engng—April 15, 1904.

Experiments with Kerosene Burners. Henri G. Chatain. Gives illustrated descriptions of burners which represent the general line along which most burners are constructed, endeavoring to show why they fail. 20000 w. Horseless Age—June 25, 1902.

Fuel Oil and Oil Burners for Steam Boilers. William Kent. Gives some of the advantages of oil as fuel, and an experimental study of its heating value, and the right way to burn it. Illustrates numerous types of burners. 2700 w. Engr, U S A—April 1, 1903.

Oil Burners and Their Accessories. Amanda T. Jones. Begins a discussion of ways of successfully using petroleum for steam making. Serial. 1st part. 1000 w. Engr, U S A—March, 1904.

Types of Oil Burners. Gives suggestions of the Naval Liquid Fuel Board. Ills. 1800 w. Ir Age—Sept. 29, 1904.

Steam vs. Air for Liquid Fuel and Oil Burners. From a paper by George G. Bennett, read before the Ohio Soc. of Mech., Elec. and Steam Engrs. On the advantages of oil as fuel, and the best ways of burning it. 2300 w. Am Mach—Vol. 27, No. 51.

A Good Way to Burn Oil. E. H. Notthoff. Describes the method used with success by the writer. Ills. 1200 w. Engr, U S A—Nov. 15, 1905.

Some Observations on Oil Burners. John J. Smith. An account of experiments with these burners. Ills. 1800 w. Am Mach—Vol. 28, No. 45.

See also **Combustion; LOCOMOTIVE—Oil Burning.**

Chlorination.—Fuel Oil in Roasting for Chlorination. E. C. Voohries. From Trans. Cal. Min. Assn. Briefly describes the furnace used and its operation, detailed statement of the amount of oil and coal used. 1000 w. Min & Sci Pr—March 26, 1904.

Combustion.—Liquid Fuel Combustion. Charles E. Lucke. The difficulties are described and methods classified. An illustrated account is given of a series of experiments which were carried on to find a satisfactory burner, and the burner which proved successsful. 8700 w. Trans Am Soc of Mech Engrs, No. 0934—May, 1902.

Comparison.—Test of Texas Oil. An account of a comparative test with coal and oil, and the results. Ill. 2700 w. Ir Age—Jan. 30, 1902.

Petroleum Oil vs. Coal as Fuel. Arguments favoring the use of oil. 600 w. Loc Engng—April, 1903.

Coal and Oil Fuel Compared. George E. Walsh. Considers the question of transportation in its bearing on fuel supply, and thinks oil will be more and more used. Discusses various sides of the fuel problem. 2300 w. Power—Aug., 1903.

Core Ovens.—Oil as Fuel for Core Ovens. S. F. Barnes. Read before the Phila. Found. Assn. Describes the system of piping employed in using oil as fuel. Ills. 1500 w. Ir Age—Jan. 19, 1905.

See also **MOLDING.**

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See also **Marine Boiler; LOCOMOTIVE—Oil-Burning.**

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On the Use of Liquid Fuel in Sea-Going Merchant Steamers. E. L. Orde. Read before the N. E. Coast Inst. of Engrs. and Shipbuilders, at Sunderland, England. Discusses the possibilities of the fuel and the merits of the different classes of apparatus used. 2800 w. Marine Engng—July, 1901.

Liquid Fuel for Steamships. Edwin L. Orde. Considers the characteristics and calorific value of the various forms available, the general conditions governing its combustion, the type of apparatus for utilising it, and the results which have been obtained. 5 plates. 4000 w. Inst of Mech Engrs—July 29, 1902.

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Notes on Burning Crude Oil in Scotch Boilers. H. S. Markey. Suggestions for the successful burning of oil, noting the troubles experienced. 1300 w. Marine Engng—Feb., 1903.

Liquid Fuel. W. D. Hoffman. An illustrated article discussing the advantages and obstacles to the use of liquid fuel for locomotive and marine boilers; the fire box, burners, etc. 8200 w. Jour Am Soc of Nav Engrs—Feb., 1903.

The Navy Experiments on Oil Fuel. Results and conclusions reached by the Bureau of Steam Engineering, with illustrations. 2500 w. Locomotive—Jan., 1903.

Oil Burning Utilities and Futilities. Amanda T. Jones. Reviews the tables of the Naval Bureau's Liquid Fuel Board, and gives the writer's conclusions. 2600 w. Engr, U S A—Jan. 15, 1904.

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See also **Pacific Coast; Tug "Dauntless;" BOILER, MARINE—Hohenstein.**

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Open-Hearth Furnace.—See **Russia; OPEN-HEARTH PROCESS—Liquid Fuel.**

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The Use of Fuel Oil on the Pacific Coast. Illustrates and describes the more important features of oil handling for fuel purposes, and various applications. Serial. 1st part. 1800 w. Am Mach—Vol. 28, No. 38.

See also **Crude Oil; Locomotive.**

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Ship.—See **Marine Boiler.**

Smelting.—The Use of Crude Oil in Smelting. Alfred von der Ropp. Abstract of a paper read before the California Miners' Assn. Setting forth the economy and advantages derived from the use of this fuel. 1600 w. Eng & Min Jour—Jan. 10, 1903.

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Steamship "Nevadan."—See **STEAMSHIP.**

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Tug "Dauntless."—Ocean-Going, Oil-Burning Tug "Dauntless." Illustrates and describes a vessel recently launched in San Francisco. Open-hearth steel is used throughout. 1000 w. Marine Engng—Aug., 1903.

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Electro-Chemistry.—Electro-chemistry in Lithography. E. C. Handy. A brief account of a new process which greatly reduces the cost of this class of work. 900 w. Elec Wld & Engr—Dec. 13, 1902.

LIVERPOOL.

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See **GEAR—Lobed.**

LOCK.

See also **CANAL; CANAL LIFT; CANAL LOCK; RIVER REGULATION; WATERWAY.**

Oberlin Smith.—Development of the Star-Point Permutation Lock. Illustrated description of a new combination lock which is noiseless, can be worked in the dark, and is cheap to manufacture; the invention of Oberlin Smith. 4500 w. Am Mach—Vol. 27, No. 34.

LOCOMOBILE.

See **AUTOMOBILE, GASOLINE; AUTOMOBILE, STEAM—Locomobile; BOILER — Temperature; PORTABLE ENGINE; STEAM ENGINE—Portable.**

LOCOMOTIVE.

See also **BENZINE LOCOMOTIVE; COMPRESSED AIR LOCOMOTIVE; ELECTRIC LOCOMOTIVE; GASOLINE LOCOMOTIVE; LOCOMOTIVE BOILER; LOCOMOTIVE, COMPOUND; LOCOMOTIVE CONSTRUCTION; LOCOMOTIVE CYLINDER; LOCOMOTIVE DESIGN; LOCOMOTIVE DRIVING WHEEL; LOCOMOTIVE EXHIBITION; LOCOMOTIVE EXPLOSION; LOCOMOTIVE FIREBOX; LOCOMOTIVE FRAME; LOCOMOTIVE GRATE; LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE POOLING; LOCOMOTIVE RATING; LOCOMOTIVE ROD; LOCOMOTIVE SHOP; LOCOMOTIVE SMOKEBOX; LOCOMOTIVE STACK; LOCOMOTIVE TENDER; LOCOMOTIVE TEST; LOCOMOTIVE TRUCK; LOCOMOTIVE VALVE; LOCOMOTIVE VALVE GEAR;**

LOCOMOTIVE WORKS; RAILWAY; RAILWAY MOTIVE; TRAIN; TRAIN, FAST.

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The Locomotive. Ira C. Hubbell. Extracts from a paper read before the Ry. Club of Pittsburg, discussing the question of cylinder-clearance and economy of steam distribution in general. 1200 w. Ry & Engng Rev—March 1, 1902.

A Discussion of Locomotive (Note sur les Locomotives). E. Sauvage. A general discussion of modern locomotive construction comparing the practice of different countries. Serial. Part 1. 7500 w. Bull Soc d'Encour—March, 1902.

The Growth of the Locomotive. Angus Sinclair. The first of a series of illustrated articles reviewing the development, the first locomotives to run upon rails having been built 100 years ago. Serial. 1st part. 3500 w. Loc Engng—Jan., 1903.

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American.—Locomotive Building in the United States. John H. Converse. An account of the development of this industry, taken from a statement made to the Industrial Commission. 2700 w. Ir Age—April 4, 1901.

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The Progress of Locomotive Building in America. Editorial reviewing the figures prepared by the census authorities indicating the progress of this industry in the United States during the last ten years. 1000 w. Engng—Oct. 24, 1902.

Notes on the History of the American Locomotive. Herbert T. Walker. Reviews the history from 1802-3 of railroad engines, tracing in outline the development. Ill. 2500 w. Sci Am—Dec. 13, 1902.

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The Development of the Freight Locomotive in America. Charles S. Lake. The present article discusses the types of freight locomotives in use and recent freight engine practice. Ils. Serial. 1st part. 1200 w. Prac Engr—July 28, 1905.

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American Abroad.—American Locomotives and Foreign Buyers. S. R. Calloway. Reprint from the "Saturday Evening Post" of Philadelphia. On the recent criticisms of American locomotives sent to England. 3000 w. Ry & Engng Rev—Aug. 10, 1901.

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American and British.—European Railway Jottings. Charles Rous-Marten. Concerning the American engines furnished for the Midland railway, and the qualities of British and American locomotives. 2000 w. Loc Engng—July, 1901.

Relative Merits of British and American Locomotives. Editorial on the recent controversy over the American locomotives sold to railway companies abroad. 1300 w. Loc Engng—July, 1901.

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American in England.—The Actual Working of American Locomotives on British Railways. C. Rous-Marten. Showing the satisfactory service both in England and in British colonies, with much authentic information as to actual conditions and performances. 4500 w. Engineering Magazine—March, 1901.

American Locomotives in England Charles Rous-Marten. An article in defence of the American engines, and showing the injustice of the comparison recently made with British engines. 3000 w. Engr, Lond—June 14, 1901.

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American in France.—A French Opinion on American Locomotives. Daniel Bellet. Some information concerning the experiments in France with the American locomotives, and the comparisons made with the French machines. 3000 w. Sci Am Sup—Jan. 14, 1905.

Appenzell Ry.—See **MOUNTAIN RAILWAY.**

Argentine.—Ten-Wheel Coupled Locomotive for the Great Western Railway of Argentina. Illustrations showing the general appearance and leading dimensions of an experimental locomotive to meet special conditions. 200 w. Engng—Nov. 24, 1905.

See also **LOCOMOTIVE COMPOUND—Argentine; Articulated.**

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Atchison, Topeka & Sante Fe.—Some Ten-Wheel Passenger Locomotives—Atchison, Topeka & Santa Fe. Illustrated description of engines listed under the general head of Class B. 2000 w. R R Gaz—Jan. 18, 1901.

Ten-Wheel Passenger Locomotives—Atchison, Topeka & Santa Fe, Class B-15. Illustrated detailed description, with general specifications. 1500 w. R R Gaz—Jan. 25, 1901.

See also **Freight; Prairie Type; LOCOMOTIVE, COMPOUND—Balanced Baldwin; Sante Fe.**

Atlantic.—New Locomotives for the "Atlantic City Flyers." An account of this rapid service and the competition between the Pennsylvania R. R. and the Philadelphia & Reading R. R., with illustrated description of the latest locomotives built for the last named road. 2500 w. Engr, Lond—Nov. 9, 1900.

Atlantic Type Fast Passenger Locomotive. Illustrated detailed description of Class E2 fast passenger locomotive. 1200 w. Am Engr & R R Jour—June, 1902.

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Atlantic, Baden.—See **Atlantic, Germany.**

Atlantic, B. & O.—Wide Fire-Box, Atlantic Type. Locomotive Baltimore & Ohio Railroad. Illustrations and general dimensions. 500 w. R R Gas—Jan. 11, 1901.

Compound "Atlantic" Type Passenger Locomotive. Illustration, drawings and general dimensions of a wide firebox engine for burning soft coal, built for the B. & O. Ry. 400 w. Am Engr R R Jour—Feb., 1901.

Atlantic Type (4-4-2) Locomotive for the Baltimore & Ohio. Illustrated description of engines for use on heavy and fast passenger trains. 500 w. R R Gas—July 31, 1903.

Atlantic, Big Four.—Passenger Locomotive for Big Four. Illustrated detailed description of a recent design of the Atlantic type. 800 w. Ry Age—Oct. 24, 1902.

Fast Express Locomotive for the Big Four R. R. Illustrated description of a very heavy locomotive, with critical comments. 1000 w. Eng News—Oct. 23, 1902.

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Atlantic, C. B. & Q.—Compound Atlantic Type Passenger Locomotive. Illustrated description of the first of a number of heavy Atlantic type, Vauclain compounds with wide fire boxes for the C. B. & Q. Ry. 400 w. Am Engr & R R Jour—April, 1902.

Atlantic, C. M. & St. P.—Atlantic Type Passenger Locomotives—Chicago, Milwaukee & St. Paul Ry. Illustrates the principal features of the design and the boiler and frame details and gives the general specifications. 500 w. R R Gas—Sept. 20, 1901.

Atlantic, Germany.—Atlantic Type Locomotive for the Baden State Railways (Locomotive Type "Atlantic" des Chemins de Fer de l'Etat Badois). F. Barbier. An illustrated description of a four-cylinder-compound, Atlantic-type locomotive built by Maffei, of Munich. 1 plate. 2500 w. Génie Civil—March 14, 1903.

Atlantic Type Engine in Germany. Illustrated description of a German four-cylinder Atlantic type compound. 450 w. Loc Engng—July, 1903.

Atlantic, Great Central.—Locomotive for the Great Central Railway. Principal dimensions and illustrations of a powerful engine of the Atlantic type. 700 w. Engr, Lond—June 10, 1904.

Atlantic, Great Northern, Eng.—Four-Cylinder Compound Locomotive, G. N. R. Illustrates and describes one of a new series of Atlantic type locomotives recently put into service on the Great Northern Ry. 500 w. Engr, Lond—May 19, 1905.

An "Atlantic" Compound for the Great Northern of England. Illustrations, with brief description. 850 w. Ry Age—Aug. 11, 1905.

Atlantic, Ill. Cent.—Atlantic Type Passenger Engine for the Illinois Central. Illustrated detailed description of engine built to be tested with a sample engine of the Prairie type. 800 w. Ry Age—April 18, 1902.

Atlantic, Mich. Cent.—A Michigan Central 4-4-2. Illustration, with description of an Atlantic type passenger engine. 700 w. Ry & Loc Engng—May, 1904.

Atlantic, N. J., Central.—New Passenger Power for the Jersey Central. Illustrated description of recent engines of the Atlantic type furnished for fast passenger service. 800 w. Ry Age—Nov. 14, 1902.

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Atlantic, N. & W.—Norfolk & Western Atlantic Locomotive. Illustrated detailed description of an engine expected to run at rather high speed. 400 w. Ry Age—Feb. 13, 1903.

Atlantic-Type Locomotive for the Norfolk & Western. Illustrated general description of high-speed engines. 500 w. R R Gas—Feb. 6, 1903.

Atlantic, Pennsylvania.—Atlantic Locomotive for Pennsylvania Lines. Illustrated description of the class E-2a engines, for the Northwest system of the Pennsylvania lines. General dimensions are given. 1000 w. Ry Age—March 27, 1903.

A 4-4-2 High-Speed Machine on the Pennsylvania Lines. Illustrated description of an Atlantic type of engine for fast passenger work. 1100 w. Loc Engng—Aug., 1904.

Atlantic, Pittsburg and Lake Erie.—Pittsburg & Lake Erie Atlantic Locomotive. Illustrated description of engine for hauling heavy passenger trains. 700 w. Ry Age—Oct. 16, 1903.

Atlantic, Vandalia.—New Passenger Locomotives for the Vandalia Line. Illustrated description of recently built engines of the Atlantic type. 1400 w. Ry & Engng Rev—Nov. 1, 1902.

Atlantic Type Passenger Locomotive—Vandalia Line. Illustration, cross sections, rear and side elevations, with general dimensions. 5000 w. Ry Mas Mech—Dec., 1902.

Atlantic, Wabash.—Atlantic Type Passenger Locomotive for the Wabash Railway. Illustrations, principal dimensions and description of engine of the 4-4-2 type to handle heavy traffic. 700 w. Eng News—March 17, 1904.

Atlantic Locomotive for the Wabash. Illustrated description. 400 w. Ry Age—Sept. 9, 1904.

Austrian.—See **LOCOMOTIVE, COMPOUND—Goelsdorf.**

Austro-Hungarian at Paris.—The Hungarian Locomotives at the Exposition of 1900 (Les Locomotives Hongroises à l'Exposition de 1900). R. Godfernaux. Illustrated description of the three Hungarian locomotives exhibited at Vincennes. 2500 w. 1 plate. Rev Gen d Chemins de Fer—Jan., 1901.

Austro-Hungarian Compound Locomotives at the Paris Exposition (Les Locomotives à l'Exposition de 1900: Locomotives Compound de la Société Austro-Hongroise des Chemins de Fer de l'Etat). F. Barbier. An illustrated description of some ten-wheel, compound locomotives. 1000 w. Génie Civil—April 6, 1901.

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Automatic Control.—See **RAILWAY SIGNAL—Locomotive Cab.**

Automatic Stoker.—See **MECHANICAL STOKING—Locomotive.**

Auxiliary Driving Gear.—The Paris Exhibition—Express Engine with Auxiliary Driving Gear. An illustrated detailed description of this interesting engine with explanation of its operation. 1700 w. Engr, Lond—Jan. 4, 1901.

German Express Locomotive with Auxiliary Driving Axle. Frank C. Perkins. Illustrated detailed description of a recently constructed express locomotive exhibited at the Paris Exposition. 1500 w. Sci Am—Jan. 26, 1901.

See also **Geared.**

Axle Loads.—See **LOCOMOTIVE FRAME—Equalizing.**

Balancing.—See **Counterbalancing; LOCOMOTIVE COMPOUND; LOCOMOTIVE VALVE.**

Baldwin.—See also **Chicago & Alton; Decapod; LOCOMOTIVE COMPOUND; LOCOMOTIVE CONSTRUCTION—American;** and under names of railroads and countries.

Baldwin, 1847.—A Baldwin Freight Engine of 1847. C. H. Caruthers. Illustrated description. 1300 w. R R Gas—Nov. 15, 1901.

Baldwin Fast Freight.—Baldwin Fast Freight Ten-Wheel Engine for the Northern Pacific. Illustrated description of a type of which forty have recently been ordered. 900 w. Loc Engng—Sept., 1902.

Baldwin, Southern Ry.—Baldwin Consolidation and

10-Wheel Locomotives, Southern Ry. Photographs and general dimensions of each type are given; the consolidation locomotives are for freight service and the 10-wheel engines for passenger service. 1200 w. Ry & Engng Rev—March 29, 1902.

Baldwin-Vanderbilt.—See **Oil-Burning; Vanderbilt-Baldwin.**

Baltimore and Ohio.—See **Atlantic; Eight-Wheel Connected.**

Barrow "Coppernob."—A Locomotive Curiosity. Brief illustrated description of an engine built in 1846 and but recently withdrawn from service in England. 500 w. Sci Am—Sept. 28, 1901.

Bavarian.—Express Locomotives on the Bavarian State Railways. Illustration of one type of these engines, with description and dimensions. 1200 w. Engr, Lond—Jan. 27, 1905.

See also **LOCOMOTIVE, COMPOUND.**

Belfort, France.—The Construction of a First-Class French Locomotive. Describes the construction of a first-class four-cylinder compound express engine as carried out at the Belfort works. Serial. 1st part. 3200 w. Engr, Lond—July 4, 1902.

Belgian.—Belgian State Railways Locomotive with Six Coupled Wheels and Leading Bogie. Illustrations, principal dimensions, and detailed description of one of the most powerful locomotives recently constructed in Europe. 1500 w. Bul Int Ry Cong—June, 1904.

Four-Coupled Express Locomotive for the Belgian State Railways. H. W. Hanbury. Illustration with description of an engine for express passenger service, of simple type with inside cylinders and Stephenson motion. 800 w. Engng—Dec. 1, 1905.

See also **Superheater, Belgium; LOCOMOTIVE, COMPOUND.**

Belgian at Liége.—Locomotives of the Belgian State Railway at the Liége Exhibition. F. Matthei. Illustrations, descriptions of types, and general remarks. 9400 w. Table. Bul Int Ry Cong—Nov., 1905.

See also **LOCOMOTIVE EXHIBITION.**

Belgian at Paris.—Belgian Locomotives at the Exposition of 1900 (Les Locomotives Belges à l'Exposition de 1900). F. Barbier. Detailed description with weights, dimensions, etc., of the engines shown by Belgian works at Vincennes. 3500 w. 4 plates. Rev Gen des Chemins de Fer—March, 1901.

See also **LOCOMOTIVE EXHIBITION.**

Belpaire, Midland Ry.—"Belpaire" Express Locomotive, Midland Railway. Illustrations, with brief description of recently built engines. 600 w. Engr, Lond—March 13, 1903.

Passenger Belpaire Engines, Midland Railway. Illustration and particulars of a new express locomotive. 300 w. Engr, Lond—Sept. 29, 1905.

Bengal-Nagpur.—See **India, Bengal-Nagpur.**

Benzine.—See **BENZINE LOCOMOTIVE; ELECTRIC LOCOMOTIVE—Mine.**

Big and Compound Compared.—Big Locomotives and the Compound. Editorial discussion of the big engines, their failures, and how to make them satisfactory. 900 w. Am Engr & R R Jour—Oct., 1903.

Big Four R. R.—See **Atlantic, Big Four; LOCOMOTIVE EXPOSITION—St. Louis Big Four.**

Bituminous—Slack-Burning. — See **Culm-Burning; Wide Firebox.**

Borsig at Paris.—See **Superheater, Schmidt.**

Boston & Maine.—Boston & Maine 10-Wheel Passenger Locomotive. Illustrations and discussions of powerful engines. 500 w. Ry Age—Nov. 11, 1904.

British.—British Locomotives in 1900—Designs and Work. Charles Rous-Marten. From the Bulletin of the International Ry. Cong. 2000 w. R R Gaz—April 26, 1901.

European Railway Jottings. Illustrated descriptions of a small tank engine used about the year 1850, and two of the latest arrivals among the British express engines. 3000 w. Loc Engng—June, 1901.

European Railroad Jottings. Charles Rous-Marten. Discusses late locomotives in Great Britain. 1800 w. Loc Engng—Sept., 1901.

European Railroad Jottings. Charles Rous-Marten. Describing some recent engines showing a radical reform in freight-train practice in England. Ill. 1600 w. Loc Engng—Nov., 1901.

European Railway Jottings. Charles Rous-Marten. Discusses the single-driven engines recently built for the Great Northern Railway, and other recent locomotives. 1800 w. Loc Engng—Jan., 1902.

Some Abnormal British Locomotive Types. Charles Rous-Marten. An illustrated article describing peculiar types that have appeared on British railways. 6300 w. Cassier's Mag—March, 1903.

British Locomotives in 1902. Charles Rous-Marten. Remarks on the general tendency, with illustrated descriptions of designs, and report of the performances that show progress. 5700 w. Bul Internat Ry Cong—April, 1903.

British Locomotives for Abroad. Charles Rous-Marten. Discusses the locomotive industry of Great Britain, giving illustrations of British engines recently constructed for the export trade. Serial. 1st part. 4000 w. Page's Mag—June, 1903.

British Locomotives in 1903. Charles Rous-Marten. Remarks on the design and work of new types on the fifteen leading railways of Great Britain. 5400 w. Bul Int Ry Cong—April, 1904.

British Locomotives in 1904. Charles Rous-Marten. Discusses the designs and the good locomotive work. 6200 w. Ills. Bul Int Ry Cong—Oct., 1905.

Recent Types of Powerful British Goods Locomotives. Illustrations and brief account of some of the recent types of goods locomotives built for work on British systems. 2500 w. Transport—April 3, 1903.

Locomotive Types of Great Britain. J. F. Gairns. An illustrated review of all the types of British locomotives at present in use, old as well as new. 3000 w. Cassier's Mag—Dec., 1902.

Goods Locomotives on British Railways. Charles S. Lake. The practice of recent years in England is illustrated and described. Serial. 1st part. 1600 w. Mech Engr—Dec. 9, 1905.

Ten-Wheel Express Locomotive. Illustrated description of a large engine to be used in service between London and Glasgow. 600 w. Engng—Sept. 25, 1903.

See also **American and British; European.**

British and Continental.—British and Continental Locomotive Types. Charles S. Lake. Brief discussion of various types of engines employed in dealing with specified classes of traffic. Ill. Serial. 1st part. 1800 w. Prac Engr—June 19, 1903.

British at Paris.—The English Locomotive at the Exposition of 1900 (Les Locomotives Anglaises à l'Exposition de 1900). R. Godfernaux. With plates showing constructive details of the principal engines exhibited. 5000 w. 5 plates. Rev Gen des Chemins de Fer—Sept., 1901.

English Locomotives at the Paris Exposition (Die Englischen Locomotiven auf der Pariser Weltausstellung 1900). Rolf Sanzin. Illustrated description of various British locomotives. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 27, 1901.

See also **LOCOMOTIVE EXHIBITION.**

British Special.—See **Special, British.**

British vs. German.—Competition for the Foreign Locomotive Trade. Extracts from a correspondence between the Secretary of State for India and certain British firms as to competition between German and British builders of locomotives. 3300 w. R R Gaz—Aug. 29, 1902.

Brooks "Chautauqua."—See **Brooks, Pere Marquette; "Chautauqua."**

Brooks Oil-Burning.—See **Oil-Burning.**

See also **Export Trade.**

Brooks, Pere Marquette.—Brooks Locomotives for the Pere Marquette. Illustrated description of a wide firebox consolidation freight locomotive, mogul freight engine, and a passenger engine of the Chautauqua type. 700 w. R R Gaz—May 3, 1901.

See also **LOCOMOTIVE EXPOSITION.**

Brotan.—See LOCOMOTIVE FIREBOX.

Brown Coal.—See Lignite Burning; BROWN COAL.

Buffalo, Rochester & Pittsburg.—See Wide Firebox.

Burlington.—See C. B. & Q.; Prairie; LOCOMOTIVE, COMPOUND—Balanced.

Burma.—Metre-Gauge Fairlie Engines for the Burma Railway Company. An illustrated description of the most modern form of double-bogie engine. 2500 w. Engr, Lond—May 16, 1902.

See also Export Trade.

Metre-Gauge Fairlie Engines for the Burma Railway Company. Illustrates and describes the most modern form of these engines. 2200 w. Sci Am Sup—Aug. 16, 1902.

Cab Signal.—See RAILWAY SIGNAL—Locomotive Cab.

Caledonian Ry.—Six-Wheeled Coupled Passenger Locomotive; Caledonian Railway. Illustrated description of a locomotive designed for heavy gradients and sharp curves. 400 w. Engng—Aug. 29, 1902.

A Caledonian Locomotive Giant. Charles Rous-Marten. States the conditions to be met, and gives illustration and description of the engine designed. 2000 w. Engr, Lond—April 3, 1903.

Two Large Express Passenger Locomotives. Illustrations, with brief descriptions of engines, for use on the Caledonian and North-Eastern Railways. 500 w. Mech Engr—June 27, 1903.

The New Caledonian Giants at Work. Charles Rous-Marten. On the performance of recently built engines for the Caledonian Railway. 3000 w. Engr, Lond—Aug. 21, 1903.

The Caledonian Engines. An account of their performance, with cuts illustrating the boiler used. 800 w. Loc Engng—Dec., 1903.

Newest Caledonian Engines and Their Work. Charles Rous-Marten. Describes in detail the latest engines of the Caledonian Railway, and some of the work done by them. 4300 w. Engr, Lond—Dec. 8, 1905.

See also RAILWAY SIGNAL—"Boulder."

Cambrian Express.—Express Locomotive for the Cambrian Railways. Illustrates and describes some fast and powerful four-coupled leading bogie locomotives built by Stephenson & Co., for conveying mails and tourist traffic in Wales. 400 w. Engng—May 26, 1905.

Camel.—See Hayes.

Canadian Pacific.—Canadian Ten-Wheeler. Illustration and principal dimensions of a passenger engine designed to haul transcontinental trains. 900 w. Loc Engng—Aug., 1902.

New Canadian Pacific Passenger Locomotives. Drawings and description. 600 w. Ry Age—Dec. 19, 1902.

Ten-Wheel Passenger Locomotive. Canadian Pacific. Illustrated description of new engines with features of interest. 500 w. R R Gaz—Jan. 2, 1903.

Canadian Pacific Locomotives from Germany. Illustrated description of a freight locomotive. 600 w. R R Gaz—Nov. 27, 1903.

Cape Colony.—Schenectady Ten-Wheel Locomotive for Cape Government Railways. Illustrated description of a ten-wheel narrow-gauge engine. 700 w. Loc Engng—March, 1901.

American Locomotives for South Africa. Brief illustrated description of ten-wheel passenger engines for the Cape Government Ry's of Cape Colony. 300 w. Eng News—April 25, 1901.

Six-Wheeled Coupled Bar-Frame Passenger Locomotive for the Cape Government Railways. Illustrated description, with two-page plate. 800 w. Engng—May 23, 1902.

Goods Engine, Cape Government Railways. Illustrated description of a narrow-gauge locomotive embodying the latest improvements on engines of this type. 900 w. Engr, Lond—Sept. 5, 1902. See also Superheater, Schmidt.

Central Atlantic.—"Central Atlantic" Type Passenger Locomotive. Illustrated description of a large capacity engine with traction increaser attachment, built for the N. Y. C. & H. R. R. R. 1600 w. Am Engr & R R Jour—Feb., 1901.

The New Class I. Central-Atlantic Type Locomotives—New York Central Railroad. Concerning the new classification of engines on this road, with illustrated description of the new type which will pull the Empire State Express. 1800 w. R R Gaz—Feb. 1, 1901.

Most Powerful Express Locomotive in the World. Illustration with description of an engine for the New York Central & Hudson River R. R., of the Atlantic type. The primary object was to provide a huge boiler with sufficient capacity to furnish a plentiful supply of steam at 200 pounds pressure under the most exacting conditions of service. 1000 w. Sci Am—March 16, 1901.

New York Central 4-6-2 Engine. Illustration, with description of the heaviest type of passenger engine on this road. 1000 w. Loc Engng—May, 1904.

Four-Cylinder Balanced Compound Locomotive, New York Central Ry. Illustrates and describes an Atlantic (4-4-2) engine designed by F. J. Cole. 1200 w. Eng News—June 23, 1904.

See also LOCOMOTIVE VALVE GEAR.

"Chautauqua."—Brooks Chautauqua Type Locomotive, B. C. R. & N. Ry. Illustrations, leading dimensions, and general particulars. 1500 w. Ry & Engng Rev—Nov. 24, 1900.

"Chautauqua" Type Passenger Locomotive. Illustrated description of a fast locomotive built for the Chicago, Rock Island and Pacific Ry. 1500 w. Am Engr & R R Jour—April, 1901.

"Chautauqua" Type Passenger Locomotive; Chicago, Rock Island & Pacific Ry. Illustrations and details of a recently built engine. 700 w. Eng News—July 11, 1901.

Brooks Chautauqua Type Passenger Locomotive, B., R. & P. Ry. Illustrated description of recently built engines using bituminous coal. 900 w. Ry & Engng Rev—Dec. 7, 1901.

Chautauqua Type Passenger Locomotives. Illustrates and describes the heaviest four-coupled passenger locomotives ever built. Used in service between New York and Philadelphia on the Central Railroad of New Jersey. 900 w. Am Engr & R R Jour—Jan., 1902.

Chautauqua Type Passenger Locomotive—Buffalo, Rochester and Pittsburg Railway. Engravings and description of the principal details of these recently built engines. 900 w. Ry Mas Mech—Jan., 1902.

See also Brooks, Pere Marquette.

Chesapeake & Ohio.—Passenger Engines for the Chesapeake & Ohio and the Missouri Pacific. Illustrates and describes the notable features of two engines, giving general description. 600 w. R R Gaz—Aug. 1, 1902.

Six-Wheel Connected Passenger Locomotive for the C. & O. Ry. Illustrated description of mountain type passenger engines for fast service under exacting conditions. 900 w. Ry & Engng Rev—Aug. 2, 1902.

New Six-Coupled Passenger Locomotives. Gives special plans of two new engines of this type, one for the C. & O. Ry. and the other for the M. P. Ry. Comparisons may be made by aid of the drawings and information given. 800 w. Am Engr & R R Jour—Sept., 1902.

Chicago & Alton.—Some New Engines for the Chicago & Alton. Gives erecting card and principal dimensions of simple consolidation engines. 600 w. R R Gaz—Sept. 5, 1902.

Powerful Passenger Locomotive. Illustrated detailed description of engines of the 4-6-2 type built by Baldwin for the Chicago & Alton Ry., intended for very heavy and comparatively slow passenger excursion trains. 600 w. Am Engr & R R Jour—March, 1903.

New Passenger Locomotives for the Chicago & Alton Ry. Illustrated description of heavy engines designed to make long runs with heavy trains at high speed. 1500 w. Eng News—May 28, 1903.

Chicago & Eastern Illinois.—See Wide Firebox.

Chic. & Ind.—Suburban Equipment. Illustrates and describes the new locomotives and coaches put in service on the Chicago & Western Indiana R. R. 1200 w. Ry & Engng Rev—April 22, 1905.

Chicago, Burlington & Quincy.—New Six-Coupled Freight Locomotives. Describes the 2-6-2 type on the C. B. & Q. Ry. Ill. 400 w. Am Engr & R R Jour—Nov., 1902.

New Freight Locomotive for the "Burlington." Illustrated description of a heavy locomotive of the 2-8-0 type. 800 w. Am Engr & R R Jour—Feb., 1903.

Heavy Freight Locomotives for the Chicago, Burlington & Quincy System. Illustrated description of a consolidation freight engine which represents the heaviest class yet built for this line. 1600 w. Ry & Engng Rev—Feb. 28, 1903.

Ten-Wheel Passenger Locomotive, with Wide Firebox Boiler.—C. B. & Q. Lines West. Dimensions and descriptions. 1000 w. Ry Mas Mech—Oct., 1904.

See also **Prairie, C. B. & Q.; LOCOMOTIVE, COMPOUND—Balanced.**

Chicago, Hamilton & Dayton.—Ten-Wheel Freight Locomotives for the C. H. & D. Ry. Brief illustrated description. 500 w. Ry & Engng Rev—Oct. 11, 1902.

Chicago, Rock Island & Pacific.—Freight Locomotives. Drawings, photograph and general description of engines of the 2-8-0 type being built for the C., R. I. & P. Ry. 600 w. Am & R R Jour—March, 1903.

Freight Locomotive 4-6-0 Type. Illustration and dimensions of locomotives to which Walschaert valve gear has been applied. A ten-wheel type for the C., R. I. & P. Ry. 250 w. Am Engr & R R Jour—Oct., 1905.

China.—Six-Coupled Locomotive for the Pekin Syndicate Railways. Illustration and principal dimensions. 500 w. Engng—Sept. 30, 1904.
See also **RAILWAY.**

Choice.—See **ELECTRIC RAILWAY—Steam Compared.**

Classification.—The Comparison of Locomotives. Lawford H. Fry. An extension of the analysis of the "B D" method to cover compound locomotives. 2000 w. Am Engr & R R Jour—Feb., 1903.

A Tabular Comparison of Notable Examples of Recent Locomotives. Gives table of passenger locomotives, and of freight locomotives, arranged with respect to classes and weights. Am Engr & R R Jour—May, 1905.

See also **BRIDGE DESIGN—Loading.**

Classification, N. Y. Central.—See **Central Atlantic.**

Classification, Pennsylvania.—Locomotive Classification on the Pennsylvania. An explanation of the classification now used. 600 w. R R Gaz—Feb. 1, 1901.

C., C., C. & St. L.—Heavy Ten-Wheel Passenger Locomotives of the Cleveland, Cincinnati, Chicago & St. Louis Railway. Engravings and dimensions of simple engines doing remarkably fine work on the road named. 600 w. R R Gaz—May 24, 1901.

Cleveland Cylinders.—Intercolonial Locomotives With Cleveland Cylinders. Illustrated description of one of the passenger engines recently ordered from the Dickson Locomotive Works. 1700 w. R R Gaz—June 14, 1901.

Coal.—A New Coal Locomotive. Sectional views and elevation with description and dimensions of an eight-coupled goods engine. 900 w. Engr, Lond—Sept. 6, 1901.

Eight Wheels Coupled Coal Locomotive. Drawing and description of the latest type of mineral engine built for the North-Eastern Ry. Co. of England, with an account of the work done by this class. 1200 w. Engr, Lond—Nov. 29, 1901.

Colombian Government.—Standard Freight Locomotives of the Colombian Government. Illustrated description of a new type of engine for heavy freight service. 500 w. R R Gaz—May 16, 1902.

Compound.—See **LOCOMOTIVE, COMPOUND.**

Compressed Air.—See **COMPRESSED AIR LOCOMOTIVE.**

Connecting and Side Rods.—See **CONNECTING ROD; LOCOMOTIVE ROD.**

Connecting Rod Stresses.—See **CONNECTING ROD; LOCOMOTIVE ROD.**

Consolidation.—Consolidation Freight Locomotive—Norfolk & Western Railway. Illustrated description of interesting engines known as the Class W. 900 w. R R Gaz—April 25, 1902.

Wide Firebox Consolidation Locomotive, Norfolk & Western Ry. General view, side elevation and sectional views with description. 900 w. Ry & Engng Rev—April 5, 1902.

The Class H-6-a Consolidation Locomotive of the Pennsylvania. Illustrations showing the principal changes made in the H-6 consolidation freight locomotive and interesting details of this new type. 700 w. R R Gaz—April 4, 1902.

Pennsylvania Standard Consolidation Engine. Illustrated description of standard freight locomotives of this road. 800 w. Ry Age—May 23, 1902.

Consolidation Engine for the Nickel Plate. Illustrated description of a heavy freight locomotive, ten of which have just been placed in service. 900 w. Ry Age—May 9, 1902.

Consolidation Freight Locomotive for the New York, Chicago and St. Louis Railroad. Illustrated description. 600 w. Ry Mas Mech—July, 1902.

Consolidation Locomotive of the Chicago Terminal Transfer Railroad. Illustrates and describes locomotives designed to meet the unusual requirements of the switching service about the Chicago terminals. 400 w. Ry Age—Dec. 26, 1902.

Narrow Gauge Consolidation Locomotive. Illustrated detailed description of powerful locomotives constructed for the Mexican Railways. 400 w. Engr, Lond—Dec. 2, 1904.

A Michigan Central 2-8-0 Freighter. Illustrated description of a heavy consolidation freight engine. 600 w. Ry & Loc Engng—Feb., 1905.

Consolidation 2-8-0 for the Colorado-Utah Construction Company. Illustrates and describes engines of great strength, recently completed. An interesting feature is the adjustable hood on the smokestack. 400 w. Ry & Loc Engng—Sept., 1905.

See also **Baldwin; Lignite Burning; Oil Burning; Superheater, Cole; Switching; Vanderbilt-Baldwin.**

Consolidation, B. & O.—Consolidation Locomotive for the Baltimore & Ohio. Illustrations and general description. 400 w. R R Gaz—Dec. 5, 1902.

Consolidation Locomotive for the Baltimore & Ohio Railroad. Gives particulars of interest regarding these engines. 1500 w. R R Gaz—Vol. XXXIX., No. 24.

Baltimore& Ohio Consolidation Locomotive. Illustrated descriptions of locomotives from special designs, 210 of which are being built. An account of the requirements to be met is also given. 1700 w. Ry Age—Dec. 22, 1905.

See also **LOCOMOTIVE—Vanderbilt.**

Consolidation Compound.—See **LOCOMOTIVE, COMPOUND—Consolidation.**

Consolidation, D. & H.—Consolidation (2-8-0) Locomotive for the Delaware & Hudson. Illustrated detailed description of a wide fire-box engine designed for burning fine anthracite coal. 400 w. R R Gaz—April 8, 1904.

Consolidation, Erie.—Erie Class H-12 Consolidation Locomotive. Illustrated detailed description. 800 w. R R Gaz—June 14, 1901.

Consolidation, Lake Shore.—Heavy Consolidation Locomotive, Lake Shore & Michigan Southern Ry. Illustrated description of an engine of the 2-8-0 type. 1500 w. Ry & Engng Rev—Jan. 2, 1904.

Consolidation, L. I. R. R.—A New Consolidation Locomotive for the Long Island Railroad. An illustrated description of Engines with Wooten type of boilers, having grates adapted for burning either lump or fine anthracite or bituminous coal, or a mixture. 300 w. Ry Age—Oct. 9, 1903.

Consolidation, Mexican.—Consolidation Locomotive for the Mexican Central. Illustrated detailed description of large engine designed by F. W. Johnstone. 2200 w. Ry Age—Nov. 29, 1901.

Consolidation, N. Y. Central.—Simple Consolidation Locomotive for N. Y. C. & H. R. R. R. Illustrations and general dimensions of engines designed for heavy, fast freight work. 700 w. Ry & Engng Rev—Jan. 30, 1904.

New York Central Simple Consolidation Engine. Illustration, with description, of an engine on exhibition at Washington, during the International Railway Congress. It has the Walschaert valve gear. 700 w. Ry Mas Mech—June, 1905.

Consolidation, N. & W.—Norfolk & Western Standard Equipment: Illustrated description. 1200 w. Ry Age—May 9, 1902.

Consolidation, Northern Pacific.—Northern Pacific Consolidation Locomotive. Illustrated description of a heavy engine for freight service. 700 w. Ry Age—Aug. 28, 1903.

Consolidation, Norway.—Consolidation Engines for the Norwegian State Railway. Illustration and description of engines for service on heavy gradients. 1100 w. Engr, Lond—Nov. 28, 1902.

Consolidation, Oregon.—New Consolidation Locomotives for the Oregon Short Line. Illustrated description of recently built heavy locomotives. 500 w. Ry Age—June 24, 1904.

Consolidation, Pushing. — Consolidation Mountain Pushing Locomotive. Illustrated description of an engine for service on the Atchison, Topeka & Santa Fe Railway. Dimensions are given. 500 w. Am Engr & R R Jour—Sept., 1901.

Consolidation, Rock Island.—Rock Island Consolidation (2-8-0) Locomotive. Illustrated general description with notes on the features of interest. 700 w. R R Gaz—April 17, 1903.

Consolidation, Schenectady.—Two New Schenectady Consolidation Locomotives. Illustrates and describes two engines for freight service, one on the Southern Pacific, the other on the Boston & Maine R. R. 1800 w. Ry & Engng Rev—March 30, 1901.

Consolidation, S. Buffalo.—Consolidation (2-8-0) Locomotives for the South Buffalo Railway. Illustrates and describes engines for handling heavy freight traffic over a hilly road. 800 w. R R Gaz—May 8, 1903.

Consolidation, Southern Ry.—Consolidation Locomotive for Southern Railway. Illustrations, general dimensions and description. 300 w. Ry Age—March 4, 1904.

Consolidation Locomotive for Southern Railway. Illustrated description of simple cylinder balanced slide valve engines. 700 w. Ry & Engng Rev—July 4, 1903.

Construction.—See **LOCOMOTIVE CONSTRUCTION.**

Continental.—See **Europe.**

Cornwall.—See **History.**

Counterbalancing.—The Balancing of Locomotives. Prof. W. E. Dalby. Explains and illustrates a convenient semi-graphical method of obtaining the magnitude and position of the balance weights, and the different ways of dealing with the reciprocating masses in coupled engines, considering the effect of the balance weights on the permanent way and on the tractive force of the engine. Ill. 6800 w. Inst of Mech Engrs—Nov., 1901.

Balancing Locomotives. W. E. Dalby. A formal proof that the only force acting to constrain the motion of a balance-weight in its trochoidal path passes through the center of the axle, and therefore the balance-weights have no effect on the crank-axle. 900 w. Engng—June 13, 1902.

The Balancing of Locomotive Engines. Information from leading locomotive superintendents and engine builders of Great Britain as to what is the best practice of to-day. 4600 w. Engr, Lond—Feb. 28, 1902.

On the Balancing of Locomotive Engines. W. C. Kernot. Read before the Australasian Assn. for the Adv. of Science. An account of engines which had proved unsatisfactory because there were no balance weights, and the results after being properly balanced. A general discussion of the subject. 3200 w. Engng—Oct. 31, 1902.

Counterbalancing Locomotive Driving Wheels. Editorial reviewing early rules for the counterbalancing of driving wheels. 1300 w. Loc Engng—Oct., 1903.

Disturbing Influences of a Locomotive's Reciprocating Parts. Abstract of a paper by Prof. v. Borries. Considers the disturbances due to the unbalanced moving parts. 6000 w. R R Gaz—Nov. 27, 1903.

Locomotive Counterbalance. Review of the paper of R. A. Parke, before the New England R. R. Club, giving formulae deduced for correctly counterbalancing the locomotives. 2200 w. R R Gaz—Dec. 11, 1903.

Counterbalancing Locomotives. G. E. Lee. Explains a method the writer has used with good results, giving an example from actual experience. 800 w. Mach, N Y—March, 1904.

Locomotive Counterbalancing. Roger Atkinson. Gives directions for counterbalancing. Ills. 1500 w. Ry & Loc Engng—Jan., 1905.

A Comparative Study of Locomotive Counterbalancing. Irving G. Downs. A study aiming to see approximately what effect the driving wheel still has upon the rail when counterbalanced by a generally accepted rule, and to make a comparison of the effects produced by the "Davis" type. Also discussion. 6800 w. Pro Cent Ry Club—Jan., 1905.

Comparative Magnitude of Longitudinal Disturbing oFrces in a Cole Balanced Compound and a Single Expansion Express Locomotive. Edward L. Coster. Gives an analysis of the relative horizontal inertia effects. 800 w. Am Engr & R R Jour—Dec., 1905.

See also **LOCOMOTIVE, COMPOUND; MECHANICS—Rolling Disc.**

Coupling Rod Stresses.—See **Connecting Rod Stresses.**

Crane Loads.—See **CRANE—Loads.**

Creusot.—See **Thuile.**

Culm-Burning.—Culm-Burning Switching Locomotives. Side elevation and general dimensions of engine for the D., L. & W. R. R. 350 w. Am Engr & R R Jour—March, 1901 .

Eight-Wheel Passenger Locomotive, D., L. & W. R. R. Principal dimensions with illustration. 400 w. Ry & Engng Rev—April 27, 1901.

Eight-Wheel. Wide Fire-box Passenger Locomotives. Illustrated description of engines for the D., L. & W. R. R. designed for culm burning. 500 w. Am Engr & R R Jour—May, 1901.

Wide Firebox Locomotive for Burning Anthracite Culm; Delaware, Lackawanna & Western R. R. Illustrated description of a passenger engine now building. 500 w. Eng News—July 25, 1901.

New Culm-Burning Switching Locomotive. Describes locomotives of the Wootten type, being built for the Delaware & Hudson. Ill. 800 w. Ry Age—Dec. 27, 1901.

Passenger Mogul for the New York, Ontario & Western. Illustrated description of a large culm-burning engine for fast freight and passenger service. 1000 w. Ry Age—Jan. 24, 1902.

4-6-0 Engine for the D., L. & W. Illustration and description of recently completed passenger engines designed to burn fine anthracite coal. 600 w. Ry & Loc Engng—Nov., 1905.

See also **Delaware & Hudson; Superheater, Cole; LOCOMOTIVE GRATE.**

Decapod.—See **LOCOMOTIVE, COMPOUND.**

Delaware & Hudson Ry.—Heavy Eight-Wheel Passenger Engines for the Delaware & Hudson. Illustrated detailed description with general dimensions and remarks on this type of engine. 800 w. Ry Age—June 12, 1903.

Culm Burning Passenger Locomotives. Illustrated description, with dimensions, of an engine of the 4-6-0 type of the Delaware & Hudson Co. 350 w. Am Engr & R R Jour—Aug., 1903.

Del., Lack. & Western.—See **Culm Burning; Lackawanna.**

Depreciation.—See **RAILWAY MOTIVE POWER—Rock Island Report.**

Design.—See **LOCOMOTIVE DESIGN.**

Development.—The Development of Large Locomotives. Arthur M. Greene, Jr. An illustrated review of the development and growth of the large locomotive. 3500 w. Pro St Louis Ry Club—June 9, 1905.

See also **Future; History; Modern; Progress; St. Louis Exposition; LOCOMOTIVE EXHIBITION.**

Diversity.—The Growing Diversity in Locomotive Designs. Reviews the efforts made toward uniformity, and the causes that brought the movement into disfavor. 1000 w. Loc Engng—Nov., 1900.

Double Bogie.—Double Bogie Suburban Locomotive (Machine de Grande Banlieue, à Deux Bogies). G. Du Bousquet. Illustrated description of locomotives designed for the mixed suburban traffic of the Northern Railway of France about Paris. 2500 w. 3 plates. Rev Gen de Chemins de Fer—Oct., 1901.

See also **Articulated.**

Draft.—Experiments with Stacks and Exhaust Pipes. Extracts from a paper by T. H. Symington, presented at meeting of the Richmond R. R. Club. Gives results of experiments made which are of interest and importance in proportioning exhaust nozzles to produce chimney draft in locomotives. 2500 w. R R Gaz—Oct. 30, 1903.

Some Experiments with Stacks and Exhaust Pipes. T. H. Symington. From a paper before the Richmond Ry. Club. An account of experimental investigations made and the results. 2500 w. Ry & Engng Rev—Nov. 28, 1903.

Exhaust Discharge Nozzles for Locomotives (L'Echappement dans les Machines Locomotives). H. Noalhat. An exhaustive discussion of the use of the exhaust steam to assist the draft of locomotive boilers, with illustrations of nozzles used in various countries. 4500 w. Revue Technique—Oct. 10, 1902.

See also LOCOMOTIVE SMOKEBOX; LOCOMOTIVE STACK; LOCOMOTIVE TEST—Purdue.

Drummond.—See London & South-Western.

Dutch State Ry.—Four-Wheel Coupled Locomotive for the Dutch State Railways. Illustration and dimensions of engine for heavy and fast mail service. 400 w. Engng—Feb. 1, 1901.

Dutch Locomotives. J. Janette Walen. Illustrates and describes engines used by the Dutch State Railways. 1000 w. Ry & Loc Engng—July, 1901.

Eastern Ry., France.—Six-Wheels Coupled Express Locomotive.—Chemin de Fer de l'Est. Illustrated description. 500 w. Engr, Lond—Dec. 11, 1903.

Economizer.—See ECONOMIZER—Locomotive.

Efficiency.—See LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE.

Egypt.—Egyptian Experimental Locomotives. Illustrates and describes six striking examples of modern locomotive engineering, two British and four American built. 1200 w. Engr, Lond—Feb. 7, 1902.

Narrow-Gauge Side-Track Locomotive for the Egyptian Delta Railway. Illustrations of a four-coupled engine with a four-wheel bogie in front. Brief description. 250 w. Engng—Sept. 6, 1901.

American, British and Belgian Locomotives. On the report of Lord Cromer concerning the consumption of fuel on locomotives used on the Egyptian lines. 4500 w. Ir Age—April 24, 1902.

British, Belgian and American Locomotives in Egypt. Abstract of a parliamentary paper containing correspondence respecting the comparative merits of British and American locomotives in Egypt. Also editorial. Serial. 1st part. 5600 w. Engr, Lond—April 4, 1902.

Tank Locomotive for Egyptian Delta Light Railways. Dimensions and illustrations of a six-wheel coupled bogie tank engine, 2 ft. 5 1-2 in. gauge. 800 w. Engng—Sept. 8, 1905.

1861.—See Rebuilt.

Eight-Wheel Connected.—The Development of the Eight-Wheel Connected Engine on the Baltimore & Ohio Railroad. J. Snowden Bell. An illustrated historical review. 8000 w. Loc Engng—Jan., 1904.

Electric.—See ELECTRIC LOCOMOTIVE.

Electric vs. Steam.—See ELECTRIC LOCOMOTIVE—Steam Compared; ELECTRIC RAILWAY—Steam Compared.

El Paso & Southwestern.—Heavy Pacific Type Locomotives for the El Paso & Southwestern. Illustrated description of heavy engines for fast freight service. 500 w. R R Gaz—Nov. 6, 1903.

Empire State Express.—New Empire State Express Locomotive. Brief illustrated description of an 8-wheel engine for fast service. 300 w. Am Engr & R R Jour—Jan., 1901.

New York Central's Latest Express Engine. Illustrates and describes an eight-wheel locomotive for fast express service. 250 w. Loc Engng—Nov., 1900.

See also Central Atlantic.

Equipment.—Engine Equipments. R. Emerson. Gives a representative list of the appurtenances and appliances, discussing how to improve conditions, the cost of installing a new system, the method, &c. 3500 w. Am Engr & R R Jour—Nov., 1905.

European.—European Express Locomotives. Frank C. Perkins. Illustrated descriptions of designs now in use on French, English and German railways. 1200 w. R R Digest—Jan., 1901.

European Railway Jottings. Charles Rous-Marten. Illustrates the engines that drew the funeral train of the Queen, also the latest Great Weseern engine. 2300 w. Loc Engng—April, 1901.

European Railway Jottings. Charles Rous-Marten. Reviews the principal features of the past year's progress in locomotive engineering in Great Britain, and the Continent. Serial. 1st part. 1500 w. Loc Engng—March, 1902.

European Railway Jottings. Charles Rous-Marten. Describes the new British outside cylinder engines and the new valve gear designed by J. T. Marshall, now in course of experimental trial on the Great Northern Ry. 2000 w. Loc Engng—April, 1902.

European Railway Jottings. Charles Rous-Marten. Discusses the growing popularity of ten-wheel passenger engines, illustrating a new engine, and considering a decapod suburban engine and powerful French engines. 1600 w. Loc Engng—July, 1902.

Features of Continental Locomotive Building. Chas. R. King. The first of a series of illustrated papers reviewing the latest European practice in locomotive construction. 5000 w. Engineering Magazine—June, 1902.

Features of Continental Locomotive Building. Chas. R. King. Mr. King's second paper illustrates and discusses very fully the locomotives of Italy and Austria-Hungary. 4500 w. Engineering Magazine—July, 1902.

Features of European Locomotive Construction. Charles R. King. Mr. King's concluding paper discusses the engines of Switzerland, Saxony, Russian and northern Europe generally. 4500 w. Engineering Magazine—August, 1902.

Continental Locomotive Types. Charles S. Lake. Begins a general survey of the principal modern types used on the Continent. Serial. 1st part. 1200 w. Prac Engr—Oct. 16, 1903.

See also RAILWAY; and under subhead names of countries.

Exhaust Pipes.—See Draft.

Exhibition.—See LOCOMOTIVE, COMPOUND; LOCOMOTIVE EXHIBITION; and under specific subheadings.

Export Trade.—The British and American Locomotive Export Trade. W. Pollard Digby. A study of American and English returns, showing that British locomotive builders hold a high repute. 3000 w. Engr, Lond—Dec. 16, 1904.

See also American Abroad; American in Europe; British vs. German.

Extended Piston Rod.—See LOCOMOTIVE, COMPOUND; PISTON ROD.

Fads and Fancies.—Fads and Fancies. W. E. Symons. A discussion of some object lessons in the mechanical department. General discussion. 10,800 w. Pro W Ry Club—Oct. 17, 1905.

Fairlie.—Special Locomotive Types. J. F. Gairns. Begins a series of articles illustrating and describing some of these types. The present number illustrates two engines of the "Fairlie type"—double locomotives. Serial. 1st part. 900 w. Prac Engr—Dec. 2, 1904.

See also Burma; Narrow Gauge.

Feed Water.—See FEED WATER PURIFICATION—Locomotives; RAILWAY WATER SERVICE.

Finland.—Richmond Locomotives for Finland. Illustrated description of the ten-wheel locomotives for the State Railways. 800 w. Ry Age—May 31, 1901.

Frames.—See LOCOMOTIVE FRAME.

Freight.—New Types of Freight Locomotives on the Atchison, Topeka & Santa Fe and Northern Pacific Rys. An illustrated article describing the present development in freight motive power equipment and new types of locomotives, and a traction-increasing device. 3900 w. Eng News—April 24, 1902.

Heavy Freight Locomotive. Illustrates and describes some of the details of construction. 600 w. Am Engr & R R Jour—Dec., 1903.

Goods Locomotives on Foreign Railways. Charles S. Lake. Illustrated descriptions of types, noting features of special interest. Serial. 1st part. 1500 w. Mech Engr—Dec. 23, 1905.

French.—Locomotives and Other Rolling Stock. Abstract of a paper by Edouard Savage, presented to the International Engineering Congress, St. Louis. Considers modern locomotives and their performance on French railroads, with brief reference to passenger carriages and goods wagons. 3000 w. R R Gaz—Vol. XXXVII., No. 17.

French Express.—Express Locomotive, Eastern of France Railway. Illustrated description of an engine designed for service from Paris to Belfort, where fast and heavy trains have to be hauled up long gradients of 6 in 1000. 700 w. Engng—Oct. 25, 1901.

'Frisco System.—See **St. Louis & San Francisco.**

Furness Railway.—Express Engines, Furness Railway. Sectional drawings, with dimensions and description of some powerful express bogie passenger engines. 600 w. Engr, Lond—Feb. 21, 1902.

Gas Engine.—See **GAS ENGINE—Locomotive and Steamship.**

Gasoline.—See **CAR, MOTOR-DRIVEN; GASOLINE LOCOMOTIVE.**

Geared.—Freight Locomotive for Heavy Grades. Illustration and description of an engine of the Canadian Pacific R. R., of great tractive power, successfully used on grades of exceptional severity. Vertical sylinders work a longitudinal shaft, which is geared to all the wheels. 700 w. Sci Am—Aug. 24, 1901.

The Largest Geared Locomotive Yet Built—El Paso & Rock Island Route. General view, with description and general dimensions. 1500 w. Ry & Engng Rev—June 14, 1902.

See also **Auxiliary Driving Gear; LOCOMOTIVE TEST—Shay.**

German.—Locomotives and Cars for Express Service (Lokomotiven und Wagen für Schnellverkehr). An examination of the designs awarded prizes at the recent competition of the Verein Deutscher Maschinen Ingenieure. 2500 w. 6 plates. Glasers Annalen—March 1, 1903.

German Freight and Switching Locomotives. Illustrations, with brief description of two types of freight locomotives and a switching engine, all of recent construction. 700 w. Ry & Engng Rev—Feb. 28, 1903.

German Locomotive Designs for High Speed Service. Lawford H. Fry. Illustrations and tabulated comparison of four prize designs, and illustrated description of Prof. von Borries' train design. 1400 w. R R Gaz—Aug. 21, 1903.

Recent Locomotive Construction in Germany. Illustrations with brief descriptions of interesting examples of freight and passenger engines. 1200 w. Ry & Engng Rev—Aug. 8, 1903.

Recent Locomotives for Local Traffic (Neuere Vorortszug-Lokomotiven). E. Metzeltin. Illustrating and describing a number of small engines for local service, from recent German designs. Serial. Part I. 3000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Oct. 1, 1904.

German-Asiatic.—Asiatic Locomotives Constructed in Germany. Frank C. Perkins. Illustrations of two types, with brief notes. 800 w. Sci Am Sup—Feb. 20, 1904.

German at Paris.—German Locomotives at the Exposition (Les Locomotives Allemandes à l'Exposition). D. Bellet. The first installment of a serial review of the engines exhibited by German makers at Vincennes. Serial. Part I. 2500 w. Revue Technique—Jan. 25, 1901.

German Locomotives at the Exposition of 1900 (Les Locomotives Allemandes à l'Exposition de 1900). R. Godfernaux. Giving detailed descriptions of the various engines, with illustrations of valve gears and parts. Serial. Part I. 5000 w. 7 plates. Rev Gen des Chemins de Fer—April, 1901.

See also **Auxiliary Driving Gear; Saxon at Paris; LOCOMOTIVE, COMPOUND—Hanover at Paris; LOCOMOTIVE EXHIBITION.**

German High-Speed.—See **High Speed.**

German, Switching.—See **German.**

German vs. British.—See **British vs. German.**

Glasgow and South-Western.—Six-Coupled Express Engine for the Glasgow and South-Western Railway. Illustration, with brief description. 500 w. Engr, Lond—Nov. 13, 1903.

Six-Coupled Express Engine. Two-page drawing and brief description of bogie engine for heavy and fast service between Glasgow and Carlisle on the Glasgow & South-Western Ry. Particulars of the working will be given in the next issue. 700 w. Engr, Lond—Dec. 29, 1905.

Goss Address.—Some Features of the Modern Locomotive. W. F. M. Goss. Extract from an address delivered before the Am. Soc. of Mech. Engrs. Discusses the limit of power and of draw-bar pull, boiler modifications, steam pressure, superheating, etc. 3300 w. Eng News—May 5, 1904.

See also **LOCOMOTIVE TEST—Purdue.**

Great Central, Eng.—Express Passenger Engine, Great Central Railway. Illustrated description of a single-wheeled bogie engine with tender designed for service on the new London extension line. 1500 w. Engr, Lond—April 12, 1901.

New Express Engines—Great Central Railway. Charles Rous-Marten. Illustration, with description of one of four new express engines of large and powerful type. These engines differ in important details, and are introduced for comparison with the view of determining which gives the best results. 3500 w. Engr, Lond—May 6, 1904.

Eight-Coupled Locomotive for Goods Traffic, Great Central Railway. Brief, illustrated description, with two-page plate. 400 w. Engng—Nov. 18, 1904.

Express Passenger Locomotive for the Great Central Railway. Gives dimensions of six-coupled engines, with their tenders, with illustrations. 800 w. Engng—Dec. 30, 1904.

Express Engine, Great Central Railway. Illustration, with description of an engine for through express passenger traffic. 800 w. Engr, Lond—July 4, 1902.

Six-Coupled Locomotive for Fast Goods Traffic, Great Central Railway. Illustration of a six-wheeled coupled bogie mixed train engine and tender recently constructed for fast goods and fish trains on this road. Leading particulars are given. 500 w. Engng—March 20, 1903.

Great Eastern, Eng.—"Decapod" Passenger Locomotive for the Great Eastern Railway. Illustrates and describes an engine of exceptional power, possessing features of interest. 1200 w. Engng—Jan. 23, 1903.

Suburban Locomotive, Great Eastern Railway. Explains the reasons for this enormous locomotive, and gives illustrated detailed description of this machine, which is a great departure from normal railway practice in Great Britain. 2000 w. Engr, Lond—Feb. 6, 1903.

The Great Eastern Railway "Decapod." James Holden. Introductory remarks on the needs of British railways, with illustrated description of this powerful engine and its operation. 2000 w. Cassier's Mag—May, 1903.

See also **Great Western.**

Great Power.—See **High Speed; International Congress; Large.**

Great Western, Eng.—Coupled Express Engines on the Great Western Railway. Charles Rous-Marten. Explains the origin of the Atbara class of engines, and also discusses the Badminton and Camel classes. Reports concerning their operation. Ill. 2000 w. Engr, Lond—Aug. 2, 1901.

The French Locomotive of the Great Western Railway. Charles Rous-Marten. An account of the first business trip of engine No. 102, La France. Not a trial trip. 1000 w. Engr, Lond—Feb. 5, 1904.

New Six-Coupled Express Engine for the Great Western Railway. Charles Rous-Marten. Illustrated description. 800 w. Engr, Lond—March 18, 1904.

Trials of the Great Western French Engine. Charles Rous-Marten. An interesting report of the satisfactory performance of this engine on two trips. 2500 w. Engr, Lond—March 4, 1904.

Great Western Locomotives and Their Recent Work. Charles Rous-Marten. Comments on recent changes, and on the striking features of some of the new engines is given in the present number. Serial. 1st part. 2800 w. Engr, Lond—May 12, 1905.

Two Locomotive Experiments. Corrects misconceptions in regard to experiments made with the new engine No. 102, La France, and the Decapod designed for suburban traffic on the Great Eastern Railway. 2800 w. Engr, Lond—Feb. 19, 1904.

Harriman Railways.—Common Standard Locomotives. An account of the complete locomotive standards adopted on the Harriman lines, indicating the economical advanteges. Serial. 1st part. 900 w. Ills. Am Engr & R R Jour—May, 1905.

Common Standard Locomotives. Illustrates and describes details of the standard locomotives for the Harriman lines. 1000 w. Am Engr & R R Jour—June, 1905.

See also **Oil Burning; Standardising.**

Hayes, Camel.—The Hayes Ten-Wheel Camel. C. H. Caruthers. Illustration, with brief description of engines in service in 1853. 600 w. Loc Engng—Sept., 1902.

Headlight.—See **HEADLIGHT.**

Heavy.—See **Large; LOCOMOTIVE, COMPOUND.**

Heavy Grade.—See **Mountain; Narrow Gauge; Rack; Rack and Adhesion.**

Helping.—Helping Engines. F. F. Gaines. Read before the Saratoga Convention of the Mas. Mechs.' Assn. Considers the conditions that determine the economy of using a helper, and the factors which determine the size. 2500 w. R R Gaz—June 27, 1902.

Henri.—See **LOCOMOTIVE, COMPOUND.**

Henschel.—See **Tank, Henschel.**

High Speed.—The Design of a Locomotive to Make a Speed of 200 Kilometers (Bedingungen für die Bauart von Dampflokomotiven für 200 km. Geschwindigkeit). E. Fränkel. A discussion of the conditions to be met in designing an express engine to make a speed of about 125 miles per hour. 1200 w. Glasers Annalen—April 15, 1901.

High-Speed Transport with Steam Locomotives (Dampflokomotive und Schnellverkehr). E. Fränkel. A comparison of the performance of express locomotives with the results on the Berlin-Zossen high-speed electric railway. 4000 w. Glasers Annalen—March 15, 1902.

The American Locomotive as a High-Speed Machine. E. P. Watson. A discussion of future possibilities in railway speeds, showing the track rather than the engine to be in need of improvement. 3500 w. Engineering Magazine—Aug., 1901.

The High Speed Steam Locomotive (Die Dampflokomotive für Grosse Geschwindigkeit). H. von Borries. An examination of the lines along which improvement may be expected, with a review of the study of Fränkel upon the same subject. 1000 w. Glasers Annalen—June 15, 1901.

Steam Locomotive for a Speed of 200 Kilometers per Hour (Dampflokomotiven für 200 km. St. Geschwindigkeit). R. Sanzin. A discussion of the essentials of a locomotive to make a speed of 125 miles per hour. 2000 w. Glasers Annalen—Oct. 1, 1901.

High Speeds on Railways. James Charles Inglis. Read at the Engng. Con. of the Inst. of Civ. Engrs., England. Considers the design of permanent way and locomotives for high speed. 1500 w. Engng—June 19, 1903.

Some Notes on Recent Fast Passenger Locomotives. Notes the greatest development of passenger locomotives since 1900, giving illustrations of designs. 1100 w. Sib Jour of Engng—Oct., 1903.

The Design of Locomotives and Motor Cars to Attain High Speeds (Die Gestaltung der Lokomotiven und Einzelfahrzeuge zur Erreichung Hoher Fahrgeschwindigkeiten). Albert Frank. A discussion of the resistances to be overcome at high speeds, and the corresponding influences upon design and construction. 3000 w. Zeitschr d Ver Deutscher Ing—Jan. 9, 1904.

High-Speed Passenger Locomotives (Lokomotiven zur Beförderung mit Grosser Fahrgeschwindigkeit). W. Wolters. Illustrated descriptions of the successful designs in the recent competitions in Germany. 3500 w. 6 plates. Glasers Annalen—April 1, 1904.

High Speeds on Steam Railways (Les Grandes Vitesses sur les Chemins de Fer). R. Bonnin. Describing some of the steam locomotives recently designed in Germany for the attainment of high speeds. 3500 w. Revue Technique—Sept. 10, 1904.

See also **Atlantic; Central Atlantic; Empire State Express; Thuile High Speed; Wheel Base; ELECTRIC RAILWAY—Zossen; LOCOMOTIVE, COMPOUND; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE TEST; RAILWAY OPERATION; TRAIN, FAST.**

History.—The Early Locomotives and Their Builders. Herman L. Morse. Describes the methods and appliances used by the builders of fifty years ago. 1700 w. Loc Engng—Jan., 1901.

The Locomotive. Brief illustrated outline of the changes which have led to the locomotive of the present. 2200 w. Engr, U S A—Jan. 15, 1901.

Locomotives of the Nineteenth and Twentieth Centuries. S. M. Vauclain. Read before the New England R. R. Club. An interesting illustrated review of the history of locomotive building, with questions and replies following. 10,200 w. Loc Firemen's Mag—Sept., 1901.

The Differentiation of the American Locomotive. J. C. Bayles. A comparison of engines built 70 years ago with those of to-day, the types being represented by "Old Ironsides," built in 1832, and the ten-wheeled locomotive recently built for the Plant system. 2200 w. Ir Age—March 6, 1902.

Reminiscences of Half a Century. M. W. Forney. Interesting review of the writer's railroad career, giving many incidents and facts relating to this industry, describing early locomotives, equipment, etc. 15,200 w. N Y R R Club—May 15, 1902.

The First Successful Coal Burner and Its Modern Successor. Two illustrations, with an account of the introduction of coal for locomotive fuel. 1100 w. Loc Engng—Aug., 1902.

Twenty-five Years of Locomotive Development. A brief review of locomotive practice in 1878, and the improvements introduced since that date. 4000 w. Ry Mas Mech—Feb., 1903.

Some Old High-Speed Engines. Herbert T. Walker. An illustrated article on some English express engines of historical interest. 3300 w. R R Gaz—June 17, 1904.

Early Engines in Michigan. Clinton B. Conger. Describes an interesting engine built about 1850. 1000 w. Loc Engng—July, 1904.

Three Historic Locomotives—and Some Others. Herbert T. Walker. Brief description, with illustrations of the principal historical additions to the collection owned by the Field Columbian Museum, recently exhibited at St. Louis. 1200 w. R R Gaz—Vol. XXXVII., No. 27.

A Historical Locomotive. Illustration, with brief description, of the first Oregon locomotive. 400 w. Sci Am—May 27, 1905.

An Old High-Speed Locomotive. Herbert T. Walker. Historical sketch and illustrated description of the "Cornwall," first built in 1847, and rebuilt in 1858. It is running to-day. 1700 w. Sci Am—June 10, 1905.

See also **Baldwin, 1847; Barrow "Coppernob"; British; Development; "Novelty;" Peter Cooper; "Pioneer;" Santiago; Stephenson; Stevens; Trevithick; Unusual; LOCOMOTIVE BOILER; LOCOMOTIVE, COMPOUND—Balanced; LOCOMOTIVE EXPLOSION; RAILWAY—History; Hudson River.**

History, Pennsylvania.—Locomotive Development on the Pennsylvania Railroad, 1849-1905. C. H. Caruthers. Gives diagrams to scale showing the development in size during 56 years, with notes. 1200 w. R R Gaz—Vol. XXXVIII., No. 17.

Holland.—See **Dutch State Ry.**

Holy Land.—See **Palestine.**

Hungarian at Paris.—See **Austro-Hungarian at Paris.**

Hungarian Mine.—See **Mine, Hungary.**

Hungary.—See **LOCOMOTIVE, COMPOUND.**

India.—American vs. British Locomotives in India. A letter from the chief engineer of the Bengal Central Railway, comparing the performance and cost. 500 w. U S Cons Repts, No. 1184—Nov. 8, 1901.

Locomotives for India. Editorial on the orders India has given to Germany for locomotives, and the importance to England of foreign industrial competition. 3000 w. Engng—Oct. 25, 1901.

British and Foreign Built Locomotives. Editorial on the recent conference of Indian Railway Engineers, and the subjects discussed. 800 w. Engng—April 11, 1902.

Narrow-Gauge Locomotive for Indian States Military Light Railways. Illustration with brief description. 400 w. Engng—Dec. 26, 1902.

New Locomotives for the Indian State Railroads. Illustrates and describes a bogie express engine, and a freight engine designed for Indian climatic conditions. 600 w. R R Gaz—Vol. XXXIX., No. 11.

See also **American and British; Burma; Mushkaf-Bolan; Narrow Gauge; Scotland-India; Tank, India.**

India, Bengal-Nagpur Ry.—Express Engine, Bengal-Nagpur Railway. Illustration and principal dimensions of a six-wheel coupled express passenger locomotive. 400 w. Engr, Lond—July 31, 1903.

Heavy Goods Engine for the Bengal-Nagpur Railway. Illustrating sectional drawings and brief description. 2500 w. Engr, Lond—Nov. 6, 1903.

Narrow-Gauge Tank Locomotive for the Bengal

Nagpur Railway. Two-page plate and other illustrations of an exceptionally powerful narrow-gauge engine. 600 w. Engng—July 3, 1903.

Indian Conference.—The Indian Locomotive in Calcutta. A report of matters discussed, with editorial. 4800 w. Engr, Lond—Jan. 17, 1902.

Industrial.—Industrial Locomotives. J. F. Gairns. The present article deals with steam locomotives mainly for mining or factory use. Ills. Serial. 1st part. 3500 w. Cassier's Mag—July, 1904.

See also **COMPRESSED-AIR LOCOMOTIVE; ELECTRIC LOCOMOTIVE; MINE HAULAGE.**

Injector.—See **INJECTOR—Repair.**

Inspection.—C. B. & Q. Inspection Locomotive. Illustrated description. 600 w. Ry & Engng Rev—June 8, 1901.

Inspection Locomotive—Chicago, Burlington & Quincy Railroad. Brief illustrated description. 300 w. Am Engr & R R Jour—Aug., 1901.
See also **CAR; CAR, MOTOR-DRIVEN.**

Inspection, N. Y. Central.—New York Central Inspection Locomotive. Illustration, with brief description. 150 w. Ry Age—Aug. 11, 1905.

Inspection Locomotives, New York Central Lines. Illustrates and describes a combination locomotive and car found to be very useful. General dimensions are given. 1200 w. Ry & Engng Rev—Aug. 26, 1905.

International Ry. Congress.—On the Question of Locomotives of Great Power (Subject V for Discussion at the Seventh Session of the Railway Congress). E. Sauvage. Report No. 1 for all countries except America. 21,400 w. 14 tables. Bul Int Ry Cong—Dec., 1904.

On the Question of Locomotives of Great Power. J. E. Muhlfeld. Report (No. 2) for America, on subject V. for discussion at the seventh session of the Railway Congress. Tables and Ills. 3500 w. Bul Int Ry Cong—March, 1905.

Italian at Paris.—Express Passenger Engine, Mediterranean Railway of Italy. Illustrated detailed description of an engine exhibited at Vincennes. 1600 w. Engr, Lond—April 5, 1901.

The Italian Locomotives at the Exposition of 1900 (Les Locomotives Italiennes à l'Exposition de 1900). F. Barbier. Illustrated description of the three engines exhibited. 2000 w. 2 plates. Rev Gen des Chem de Fer—June, 1901.

See also **LOCOMOTIVE, COMPOUND; LOCOMOTIVE EXPOSITION; LOCOMOTIVE TEST.**

Italian Express.—Curious Express Locomotive. From "The Locomotive Magazine." Illustrated description of a suggested design, adapted from a Continental design introduced on the Southern Italian Ry. 600 w. Loc Engng—Jan., 1904.

Japan.—American and English Locomotives in Japan. Clippings from the Kobé "Herald" giving views of the Sanyo Ry. Co., relative to the respective merits of English and American locomotives. 1600 w. U S Cons Repts, No. 1137—Sept. 12, 1901.

Mogul Locomotives for Japan, Kiushiu Railway. Illustration, sectional drawings, and general dimensions, with details of construction. 500 w. Ry Mas Mech—Nov., 1903.

Consolidation Locomotive for the Imperial Government of Japan. Illustrates the 2-8-0 type of locomotive, a number of which have been built in America for Japan. 500 w. Ry & Loc Engng—Nov., 1905.

See also **LOCOMOTIVE, COMPOUND.**

Narrow Gauge.—See **Tank, Japan.**

Java.—See **LOCOMOTIVE, COMPOUND; RAILWAY—Dutch East Indies.**

Joy.—Locomotive Improvement. A letter from David Joy giving a sketch of a novel locomotive design for a large engine for heavy work. 1300 w. Engr, Lond—April 11, 1902.

Jura-Simplon.—See **Swiss at Paris; LOCOMOTIVE, COMPOUND.**

Kansas City Southern Ry.—Freight Locomotives of the Kansas City Southern Railway. Line drawings, photograph and general description of one of five recent built engines. 800 w. Ry Mas Mech—June, 1903.

Kincaid Stoker.—See **MECHANICAL STOKING.**

Krauss.—Locomotive and Tender with Two Coupled Axles (Locomotives-Tenders à Deux Essiux Accouplés). F. Barbier. Description of the simple coupled tank-locomotive exhibited at Paris by Krauss, of Munich. 1800 w. 1 plate. Génie Civil—Oct. 27, 1900.

Express Locomotive: Krauss System. Illustrated description of an engine exhibited at the Paris Exhibition. A twelve-wheeled express engine, of which four wheels were coupled. It was fitted with auxiliary motor wheels (system Krauss), and had a truck at each end. 1100 w. Engng—April 12, 1901.

Krauss Locomotives. Illustrated descriptions and particulars of special types of engines. 1500 w. Engng—May 10, 1901.

Lackawanna.—Fast Freight Engines for the Lackawanna. Illustrated description of medium size mogul locomotives, for hauling fast freight; some for the use of soft coal, and others for anthracite, the only difference being in the fireboxes. 700 w. Ry Age—June 26, 1903.

Heavy Passenger Locomotive for Lackawanna. Illustrates and describes what is believed to be the heaviest passenger locomotive ever built in the 10-wheel type. 500 w. Ry Age—Oct. 27, 1905.

Heavy Ten-Wheel Passenger Locomotive for the Delaware, Lackawanna & Western R. R. Illustration, dimensions and brief description of a heavy (4-6-0) passenger engine. 500 w. R R Gaz—Vol. XXXIX., No. 20.

See also **Culm-Burning; Superheater, Cole.**

Lake Shore Ry.—The New Class "J" Passenger Locomotive of the Lake Shore & Michigan Southern Railway. Illustrated description of a new engine for heavy and fast passenger service. 2700 w. Am Engr & R R Jour—March, 1901.

Heavy Freight Locomotive. Illustrated description of the 2-8-0 type of the L. S. & M. S. Ry., with information of interest relating to it. 1500 w. Am Engr & R R Jour—Nov., 1903.
See also **Wide Firebox.**

Large.—Heavy Locomotives. Discussing the present tendency, and whether it is justified, and related questions in transportation. 2200 w. Am Engr & R R Jour—Feb., 1902.

Large Modern Locomotives—Repairs and Loading. William McIntosh. Discusses these points in their relation to the greatest economy and the best results. 900 w. Am Engr & R R Jour—June, 1902.

Large Locomotives. A summary of opinions in regard to their service and the causes of failures, with editorial comment. 4000 w. Ry Age—May 29, 1903.

Note on Modern Locomotives. P. F. Kupka. A sketch of the present condition of locomotive building, limited to the last five years, and to heavy locomotives. Ill. 2000 w. Bul Int Ry Cong—Sept., 1903.

See also **Development; International Ry. Congress; LOCOMOTIVE COMPOUND.**

Large vs. Small.—Comparing Heavy and Light Locomotives. Edward Grafstrom. Comments on recent road tests made, and the lessons from them. Favors moderating the size of engines to suit the traffic demands. 1000 w. Am Engr & R R Jour—Feb., 1902.

Leaks.—See **LOCOMOTIVE BOILER; LOCOMOTIVE OPERATION—Blows and Vibrations; Wide Firebox; LOCOMOTIVE TEST.**

Lehigh.—Lehigh Valley Ten-Wheel Locomotive. Illustrates and describes engines principally remarkable for their great weight. The total weight in working order is 199,200 pounds. The heating surface also is large. 250 w. Ry Age—Sept. 22, 1905.

Letterkenny & Burtonport.—Ten-Wheeled Locomotive for the Yetterkenny and Burtonport Railway. Two-page plate with brief description of one of four recently built locomotives. 400 w. Engng—April 24, 1903.

Liége Exhibition.—See **Belgian at Liége; LOCOMOTIVE EXHIBITION.**

Lignite-Burning.—Lignite-Burning Consolidation Locomotive—Bismarck, Washburn & Great Falls. General description, with illustrations, of a recently built locomotive. The first of its kind, as to wheel arrangement, in the United States. 700 w. R R Gaz—Jan. 10, 1902.

Test of Bismarck, Washburn & Great Falls Lignite-Burning Locomotive, No. 3. A report of test which proved conclusively that as a lignite-burning locomotive the engine is a success. 900 w. R R Gaz—March 28, 1902.

Lignite Burning in Locomotives. M. H. Wickhorst. Gives results of experience with the burning of lignite coal in locomotives in Montana, with methods and results of smoke-box analyses. Ill. 1200 w. Am Engr & R R Jour—June, 1903.

"Little Sharp."—See British Express.

Liquid Fuel.—See Oil Burning; LIQUID FUEL—Locomotive; LOCOMOTIVE TEST.

Logging.—Logging Locomotives. Illustrations of a novel design used in Canada, with brief description. 700 w. Engng—May 8, 1903.

London & N. W.—Mineral Locomotive, London & North-Western Railway. Illustration with brief description. 350 w. Engr, Lond—July 18, 1902.

Eight-Wheel Passenger Locomotive for the London & North-Western. Illustrated description of a new fast passenger engine. 400 w. R R Gaz—June 24, 1904.

Express Passenger Engine, London and North-Western Railway. Illustrations, with dimensions of a new type of express engine for working heavy high-speed passenger traffic. 400 w. Engr, Lond—Oct. 14, 1904.

Six-Coupled Passenger Locomotive, London & North-Western Railway. 2-page plate and drawings, with principal dimensions and notes. 400 w. Engr, Lond—Oct. 6, 1905.

Six-Coupled Express Engines on the London & North-Western Railway. Charles Rous-Marten. Describes the latest locomotive designed for the express service of this road, explaining the difficult conditions between Crewe and Carlisle. 4500 w. Engr, Lond—Nov. 10, 1905.

See also LOCOMOTIVE PERFORMANCE.

London & South-Western.—Express Passenger Locomotive for the London & South-Western Railway. Illustrated description, with dimensions. 900 w. Engng—Sept. 23, 1904.

Four-Cylinder Express Locomotive for the London & South-Western Railway. Illustrated detailed description of a new and interesting engine designed by Mr. Drummond. 1000 w. Engng—Nov. 10, 1905.

London, Brighton & South Coast.—Express Engine, London, Brighton and South Coast Railway. Illustration and principal dimensions with remarks. 1000 w. Engr, Lond—June 7, 1901.

London, Chatham & Southeastern.—Express Passenger Engine. Illustrated detailed description of a powerful type of locomotive for handling very heavy traffic on the London, Chatham & Southeastern Ry., which abounds in steep inclines and sharp curves. 800 w. Engr, Lond—Feb. 27, 1903.

Londonderry & Lough Swilly Ry.—Locomotive for the Londonderry and Lough Swilly Railway. Illustrated detailed description. 900 w. Engng—Aug. 26, 1904.

Lubrication.—See LUBRICATION—Locomotive.

Lubricator.—See LUBRICATION—Locomotive.

"Madison Incline," Ind.—Locomotives of the Madison Incline. An illustrated account of the building of the "Madison Incline" in the State of Indiana, and a study of the engines which have been used on this line. 3000 w. Ry Age—Dec. 7, 1900.

Maffei, Munich.—See LOCOMOTIVE, COMPOUND—Bavaria.

Maine Central.—Maine Central Ten-Wheel Locomotive. Illustrations, descriptive specification and notes. 600 w. Ry & Engng Rev—May 13, 1905.

Mallet Articulated.—See Narrow Gauge; LOCOMOTIVE, COMPOUND—Articulated.

Mechanical Stokers.—See MECHANICAL STOKING.

Mexican Central.—New Locomotives for the Mexican Central Ry. Illustrates a 2-6-0 type as an example of the engines designed for this road. Description and dimensions. 800 w. Ry & Engng Rev—July 30, 1904.

Mexican National.—Ten-Wheel Passenger Locomotives for the Mexican National Ry. Illustrations with description of recently completed engines designed for burning bituminous coal. 1000 w. Ry & Engng Rev—Aug. 23, 1902.

Passenger Locomotives for the National Railroad of Mexico. General description with illustrations. 500 w. R R Gaz—Aug. 29, 1902.

Mexican Southern.—Locomotives for the Mexican Southern. General dimensions with illustrations of a ten-wheel narrow-gauge engine, and a consolidation narrow-gauge engine. 500 w. Ry Mas Mech—July, 1902.

Michigan Central.—See Pacific, Michigan Central.

Midland.—See also Belpaire; LOCOMOTIVE COMPOUND.

Midland at Paris.—The Midland Locomotive at the Exposition (La Locomotive de la Cie. du Midland à l'Exposition de 1900). A description of the engine, together with computations of the tractive power of locomotives with single driving axles. 2000 w. Revue Technique—April 25, 1901.

Midland Great Western.—New Rolling Stock, Midland Great-Western Railway of Ireland. Describes new rolling stock, giving illustrations of new locomotives. 1200 w. Engr, Lond—July 25, 1902.

Mikado, Northern Pacific.—The Northern Pacific Mikado Locomotive. Illustrated description of heavy freight engines of the Mikado type, 2-8-2. 500 w. Ry Age—Dec. 9, 1904.

Freight and Passenger Locomotives. An illustrated description of heavy freight locomotives of the 2-8-2 Mikado type, for the Northern Pacific Railway. 800 w. Am Engr & R R Jour—Jan., 1905.

Mikado (2-8-2) Locomotive for the Northern Pacific. Illustrated description, with dimensions. 3300 w. R R Gaz—Vol. XXXVIII, No. 3.

Mine.—See BENZINE LOCOMOTIVE; COMPRESSED AIR LOCOMOTIVE; ELECTRIC LOCOMOTIVE; MINE HAULAGE.

Mine, Hungary.—Tank Locomotive for the Vajda-Hunyad Mine, Hungary. Illustrated description of these narrow-gauge engines, with four coupled axles, the two end axles being made to pivot for taking short sharp curves. 400 w. Engng—Jan. 3, 1902.

Missouri Pacific.—New Six-Coupled Passenger Locomotive. Illustration and general dimensions of a design for the Missouri Pacific Railway. 800 w. Am Engr & R R Jour—Aug., 1902.

See also Chesapeake & Ohio.

Model.—See LOCOMOTIVE OPERATION—Oscillations.

Modern Tendencies.—Some Modern Tendencies of Locomotive Engineering. Charles Rous-Marten. The first of a series of articles discussing modern tendencies, and the lessons learned by experience. Serial. 1st part. 2800 w. Engr, Lond—Sept. 20, 1901.

See also Development; Future; Progress.

Mogul.—See also Culm-Burning; Japan; Wabash.

Mogul, A., T. & S. F.—Mogul Fast Freight Locomotives. Illustrated description of simple and compound engines with wide fireboxes, for the Atchison, Topeka & Santa Fé Ry. 450 w. Am Engr & R R Jour—April, 1901.

Mogul, Dickson.—Dickson Grand Trunk Moguls. Illustration and dimensions of large locomotives. 800 w. Loc Engng—May, 1901.

Mogul, N. Y., O. & W.—Heavy Mogul Passenger Locomotive, N. Y., O. & W. Illustrated description of an engine for heavy service. 700 w. Ry & Engng Rev—May 18, 1901.

A New Mogul for the New York, Ontario & Western. Illustrated description. 600 w. R R Gaz—July 26, 1901.

Mogul, Pennsylvania.—Pennsylvania Moguls—Classes F-3 and F-3-b. Illustrations and brief description of the latter class, with points of difference between this engine and Class F-3. 500 w. R R Gaz—Nov. 1, 1901.

Mogul, "Soo Line."—Class D2 Mogul (2-6-0) Locomotive for the "Soo Line." Illustration with general description. 500 w. R R Gaz—Oct. 23, 1903.

Mogul, So. Pacific.—Mogul Freight Locomotives for the Southern Pacific. Illustrations, dimensions, and brief description. 600 w. R R Gaz—Nov. 29, 1901.

Mountain.—See Pacific, Northern Pacific; Rack; Rack and Adhesion; Tank; MOUNTAIN RAILWAY.

Mountain, Europe.—The Development of the Mountain Locomotive (Die Entwicklung der Gebirgslokomotive). Dr. Rudolf Sanzin. An illustrated review of the successive improvements in steam locomotives for use on heavy grades, with especial reference to adhesion engines of Continental design. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—May 19, 1905.

Multi-Cylinder.—See LOCOMOTIVE, COMPOUND.

Munich-Augsburg.—See ENGINE.

Mushkaf-Bolan Ry.—Tank Locomotive for the Indian State Railways; Northwestern Ry., Mushkaf-Bolan Division. Brief illustrated description. 400 w. Eng News—May 23, 1901.
See also **India.**

Narrow-Gauge.—Narrow-Gauge Locomotives (Les Locomotives à Voie Etroite). H. Martin. With diagrams and data of a number of recently constructed engines. Serial. Part I. 2000 w. Génie Civil—Sept. 12, 1903.

Narrow-Gauge Locomotives for Heavy Grades and Sharp Curves (Les Locomotives pour Voie Etroite avec Fortes Rampes et Courbes de Faible Rayon). R. Bonnin. Illustrating locomotives of the Fairlie and Mallet types. 2000 w. Revue Technique—Dec. 10, 1903.

Tank Locomotive (3-ft. Gauge) for the Cavan & Leitrim Railway. Illustration and drawings, with brief description of an engine for very severe conditions of service 400 w. Engng—May 5, 1905.

See also **Burma; Cape Colony; Consolidation; Egypt; India; Japan; Mexican Southern; Mine, Hungary; Tank.**

Natal.—New Locomotives—Natal Government Rail ways. Illustrated description of engines specially designed to work the mail traffic in the main line between Durban and Charlestown. 400 w. Engr, Lond—Sept. 15, 1905.

New South Wales—Locomotive Building.—Locomotive Building in New South Wales. Editorial review of the industrial history that has led to the giving of the contract for sixty locomotives within the State of New South Wales. 1700 w. Engng —Sept. 22, 1905.

N. Y. Central.—Ten-Wheeled (4-6-0) Locomotive for the New York Central & Hudson River. Illustrates and describes this type of locomotive, fifteen of which have been recently built for fact freight and heavy passenger service on the road named. 800 w. R R Gaz—Vol. XXXIV., No. 24.

See also **Central Atlantic; Empire State Express; ELECTRIC LOCOMOTIVE.**

New Zealand.—Locomotives for the New Zealand Government Railways. Illustrated description cf the two most recent types adopted for the main line service. 700 w. Engr, Lond—Nov. 9, 1900.

American Locomotives for New Zealand. Illustrations an l general dimensions of three locomotives furnished for the Government Railways of New Zealand. 1100 w. Ry & Engng Rev—Sept. 28, 1901.

Norfolk & Western.—New 2-8-0 Freight Locomotive, N. & W. Ry. Illustrated description of interesting features. 700 w. Ry & Engng Rev—Sept. 25, 1903.
See also **Consolidation.**

North-Eastern, Eng.—Heavy Express Locomotive (Locomotive Express pour Trains Lourds). An illustrated description of the ten-wheel passenger locomotive exhibited at Paris by the North-Eastern Railway. 1800 w. 1 plate. Génie Civil—June 22, 1901.

The Newest Six-Coupled Express Engines on the North-Eastern Railway. Charles Rous-Marten. Describes the new engine No. 2111 and gives a report of work accomplished by it. 3000 w. Engr, Lond—July 26, 1901.

The Latest North-Eastern Six-Coupled Express Engines. Charles Rous-Marten. Particulars of the actual work performed by these engines. 2700 w. Engr, Lond—Oct. 4, 1901.

New Express Engines, North-Eastern Railway. Illustration with particulars of four-wheel coupled engines with leading bogie and a pair of carrying wheels under the fire-box. 800 w. Engr, Lond—Jan. 15, 1904.

Express Passenger Locomotive for the North-Eastern Railway. Illustrations, with principal dimensions of a new type of locomotive, the largest and most powerful ever built in England. 800 w. Engng—Feb. 19, 1904.

See also **Caledonian Ry.; ELECTRIC LOCOMOTIVE; LOCOMOTIVE, COMPOUND.**

Northern Pacific.—Passenger Locomotive—Northern Pacific Railway. Illustration, general dimensions and description of an engine of the 4-6-2 type. 500 w. Am Engr & R R Jour—Feb., 1903.

See also **Freight.**

Norway.—See **Tank, Norway; LOCOMOTIVE, COMPOUND.**

"Novelty."—A Unique Railroad Relic. Illustration, with description of the "Novelty," one of three engines which competed at the famous trial of locomotives at Rainhill, Lancashire, in Oct., 1829. 1200 w. R R Gaz—Vol. XXXVIII, No. 15.

Oberursel.—See **BENZINE LOCOMOTIVE.**

Oil Burning.—Brooks Locomotive for San Pedro, Los Angeles & Salt Lake Railway. Illustrated description of an oil-burning engine for passenger trains. 250 w. Loc Engng—Nov., 1901.

Oil-Burning Locomotives on the Gulf, Colorado & Santa Fe. Drawing and information concerning the locomotives equipped for this road. 1500 w. R R Gaz—Nov. 22, 1901.

Baldwin-Vanderbilt Ten-Wheel Passenger Locomotives—Atchison, Topeka & Santa Fe. Illustrates details of oil-burning 10-wheel passenger locomotives recently delivered. 600 w. R R Gas —Nov. 29, 1901.

The Player-Baldwin Oil-Burning Consolidation Locomotives. General views and details of the design of Mr. John Player, with description and editorial. 2300 w. R R Gaz—Dec. 20, 1901.

Oil-Burning Locomotives on the Southern Pacific. Illustrates and describes oil-burning apparatus used very successfully on the western lines of the Southern Pacific. 800 w. R R Gaz—Jan. 24, 1902.

Thomas & Stetson Oil Burning Locomotive. An illustrated description of a new style boiler for locomotives burning oil as fuel. 600 w. Loc Engng—Feb., 1902.

Comparative Tests of Oil-Burning Locomotives, Southern Pacific Railway. A report of interesting service tests. 600 w. Am Eng & R R Jour—April, 1902.

Oil-Burning Locomotives (Locomotives Chauffées au Naphte et au Goudron). F. Barbier. A well illustrated description of various kinds of locomotives, in different countries, burning oil, naphtha and petroleum residues. 1 plate. 3000 w. Génie Civil—April 19, 1902.

The Advantages of an Oil Burning Locomotive. G. B. Von Boden. Concerning the arrangements for burning the oil and methods for successful operating, with statement of the advantages. 1200 w. Loc Engng—June, 1902.

Oil Fuel for Locomotives. Concerning the application of oil fuel to the Hoosic Tunnel helping locomotives by the Boston & Maine Railroad, with the object of keeping the tunnel clear of smoke from the coal-burning engines. 1200 w. Am Engr & R R Jour—June, 1902.

Apparatus Used in Roumania for Burning Petroleum Residues in Locomotives (Des Dispositifs Employé en Roumanie pour Bruler les Résidus de Pétrole dans les Locomotives). Illustrated descriptions of the Urquhart, Holden and Körting oil burners. 600 w. Rev Technique—June 25, 1902.

The Use of Oil Fuel on the Southern Pacific. P. Sheedy. Drawings and description of the arrangements for burning fuel oil on the engines. 700 w. Am Engr & R R Jour—July, 1902.

The Application of Masut on the Russian Railways (Application du Mazout au Chauffage des Locomotives Russes). H. Guérin. Describing the apparatus used for burning the petroleum residues of Southeastern Russia. 1200 w. Génie Civil—Aug. 9, 1902.

Oil Fuel for Locomotives. Abstract of a paper by James McDonough presented before the Traveling Engrs.' Association. Concerning the changes necessary to convert a coal to an oil burning locomotive. Also gives report of tests made by the Santa Fe Pacific R. R. to determine the relative economy of oil and coal in freight service. 1000 w. R R Gaz—Oct. 10, 1902.

Oil Fuel for Locomotives. Information from a pamphlet issued by the Baldwin Locomotive Works discussing at length the subject of oil fuel for locomotives. 3300 w. R R Gaz—Oct. 31, 1902.

Oil as Locomotive Fuel. Abstracts from a comparison of oil and coal as locomotive fuel from an economical standpoint, as given in a pamphlet issued by the Baldwin Locomotive Works. Ill. 4000 w. Ry Mas Mech—Nov., 1902.

Test of Oil Burning Locomotive. Report of a running test, with full tonnage, made on the A. T. & S. F. Ry. for a distance of 1,422 miles. 600 w. Am Engr & R R Jour—March, 1903.

Oil Burning Atlantic (4-4-2) Type Locomotive for the Southern Pacific. Illustration, with brief description. 150 w. R R Gaz—June 12, 1903.

Oil-Burning Passenger Locomotive. Illustrated description of a Vauclain compound 4-4-2 type, for the Southern Pacific Ry. 800 w. Am Engr & R R Jour—Sept., 1903.

Oil Fuel for Locomotives. Howard Stillman. Deals with the California deposits, the calorific values, specifications for fuel oil adopted by the Harriman Lines, method of burning, tests made, and related matters of interest. 5000 w. Pro Pacific C Ry Club—July 15, 1905.

See also **Southern Pacific; LIQUID FUEL—Locomotive; LOCOMOTIVE BOILER—Water-Tube; LOCOMOTIVE TENDER.**

Oscillations.—See **LOCOMOTIVE OPERATION.**

Pacific.—Six Coupled Passenger Locomotive. Illustrated description of a new design, 4-6-2 (Pacific) type, a very large and heavy engine. 1000 w. Am Engr & R R Jour—March, 1904.

See also **El Paso & Southwestern; Superheater, Erie.**

Pacific, C. & A.—Chicago & Alton "Pacific" Locomotive. Illustrated description of engines built for passenger service between Chicago and St. Louis. 900 w. Ry Age—Feb. 20, 1903.

Pacific, Chic. Mil. & St. P.—Chicago, Milwaukee & St. Paul Pacific Locomotive. Illustrated description of a powerful passenger engine, with principal dimensions. 600 w. Ry Age—March 17, 1905.

Heavy Passenger Locomotives for the C., M. & St. P. Detail drawings and description of some heavy Pacific type passenger locomotives recently placed in service. 500 w. R R Gaz—Vol. XXXVIII., No. 23.

Pacific, C., R. I. & P.—New Passenger Locomotives. Illustration, with description of the Pacific, or 4-6-2 type passenger engine for the C., R. I. & P. Ry. 500 w. Am Engr & R R Jour—Oct., 1903.

Pacific, Erie.—See **Superheater, Erie.**

Pacific, Michigan Central.—Passenger Locomotive, Michigan Central Railroad. An illustrated description of a 4-6-2 (Pacific) type. 1000 w. Am Engr & R Jour—Sept., 1904.

Michigan Central Pacific Type Locomotive. Illustration and descriptive specifications of six-wheel connection engines for heavy passenger traffic. 800 w. Ry & Engng Rev—April 16, 1904.

Pacific Type (4-6-2) Locomotives for the Michigan Central. Illustrated description of heavy locomotives for passenger service. 700 w. R R Gaz—April 29, 1904.

Pacific, N. Y. Central.—New York Central Pacific Type Locomotives. Illustrated detailed description of engines designed to handle fast trains. 1500 w. Ry & Engng Rev—Feb. 13, 1904.

Pacific, Northern Pacific.—Pacific Type Locomotive for Northern Pacific. Illustrations, elevations and plan of an engine for heavy fast passenger service in mountain districts, with description. 500 w. Ry Age—Feb. 27, 1903.

Pacific, Union Pacific.—Pacific Type Engine, Union Pacific R. R. Illustrated description of a recently built engine for heavy traffic. 500 w. Ry and Engng Rev—Feb. 27, 1904.

Painting.—See **PAINTING—Locomotive.**

Palestine.—The First Locomotive in the Holy Land. William Crawford, Jr. Brief illustrated account of the first engine run over the road from Joppa to Jerusalem. 1000 w. Loc Engng—Dec., 1900.

Panama.—Locomotives for the Panama R. R. Illustrates one of the engines of the 2-6-4 type, 24 of which are now ready. 500 w. Ry & Engng Rev—Oct. 28, 1905.

Panama Canal Engines. Illustrated description of a 2-6-4 type of engine to be used in the construction of the canal. 144 are to be built. 700 w. Ry & Loc Engng—Dec., 1905.

Paris Belt Line.—See **LOCOMOTIVE, COMPOUND.**

Paris Exposition.—See under sub-heads of countries and makers; and also **LOCOMOTIVE, COMPOUND; LOCOMOTIVE EXHIBITION.**

Parts.—See **TESTING—Locomotive Parts.**

Pennsylvania R. R.—Pennsylvania R. R. Standard Passenger Locomotives. Describes an engine representing the highest type of construction thirty-five years ago, and also the most recent locomotives of the road named. These are of the 4-4-2 type wide firebox, Belpaire boiler, passenger locomotives for heavy and fast work. 2500 w. Ry & Engng Rev—June 20, 1903.

Frames, Cylinders and Saddles—Pennsylvania Class E-2 Locomotives. Illustrates and describes changes made in the development of this class of engine. 800 w. R R Gaz—Dec. 13, 1901.

Standard Locomotives of the Pennsylvania Railroad. Examines the standard locomotive equipment of this road in the passenger, freight and switching service. Ills. 2000 w. Ry & Engng Rev—June 10, 1905.

See also **Atlantic, Pennsylvania; History, Pennsylvania; Mogul, Pennsylvania.**

Peter Cooper.—Peter Cooper's Locomotive. A brief account of one of the earliest locomotives in America, running from Baltimore to Ellicott's Mills in 1830. 400 w. Ry & Loc Engng—Nov., 1905.

Philadelphia & Reading.—Philadelphia & Reading Double-End Interurban Engine. Illustration, elevation, cross sections and brief description of an engine for suburban service. 400 w. Ry Age—Sept. 25, 1903.

See also **Atlantic.**

"Pioneer."—An Engine Built in 1832. Herbert T. Walker. A drawing of the engine "Pioneer," with information concerning it. 1200 w. R R Gaz—April 12, 1901.

Piston Rod.—See **Repairs; LOCOMOTIVE, COMPOUND—Extended Piston Rod; LOCOMOTIVE ROD; PISTON ROD.**

Plant System.—Some New Locomotives of the Plant System. Specifications and brief description, with illustrations. 500 w. R R Gaz—Nov. 2, 1900.

Player.—See **Oil-Burning; LOCOMOTIVE TRUCK.**

Pooling.—See **LOCOMOTIVE POOLING.**

Prairie.—New "Prairie" Type Wide Firebox Locomotives. Illustrates and describes the chief characteristics of both simple and compound types. 1000 w. Am Eng & R R Jour—May, 1901.

American "Prairie" Type Locomotives. Arthur E. Kyffin. An illustrated article discussing the special features of this class of engine. Serial. 1st part. 2000 w. Prac Engr—Nov. 21, 1902.

Powerful Prairie Type Passenger Locomotives. Illustration, description, and general dimensions of the heaviest passenger locomotives ever built, noteworthy for their power, heavy wheel loads and the wheel arrangement. 700 w. Am Engr & R R Jour—Nov., 1904.

Powerful Prairie Type Locomotives. Shows side elevation, sections, the leading truck, stack, and the arrangement of the front end, with brief description. 500 w. Am Engr & R R Jour—Jan., 1905.

See also **TRACTION INCREASER.**

Prairie, A., T. & S. F.—Prairie Type Passenger Locomotives. Atchison, Topeka & Santa Fe. General description, with illustrations of a design for handling fast and heavy work. Also editorial discussion. 2000 w. R R Gaz—Nov. 22, 1901.

Prairie Type Passenger Locomotives. Illustrated description of one of the forty-five large engines being built for the A., T. & S. F. Ry. for working passenger trains over the 16-degree curves and grades of 184-ft. per mile. 600 w. Am Engr & R R Jour—Dec., 1901.

Prairie Type Compound Freight Locomotives for the Atchison, Topeka & Santa Fe. Illustrated description of engines to use bituminous coal. 900 w. Ry Age—April 4, 1902.

See also **TRACTION INCREASER.**

Prairie, C., B. & Q.—New Type of Freight Locomotives for the Chicago, Burlington & Quincy R. R. Illustrates and describes the new "Prairie" type of engines under construction for this road. 1700 w. Eng News—May 30, 1901.

Prairie Type Locomotive for the Burlington. Brief illustrated description of new engines known as Class R-4. 500 w. Ry Age—Feb. 24, 1905.

Prairie Type Freight and Passenger Locomotives. Brief illustrated description of engines of the 2-6-2 type for the C., B. & Q. Ry. 600 w. Am Engr & R R Jour—March, 1905.

Prairie Type Engine for the Chicago, Burlington & Quincy. Illustrates and describes the interesting features of these engines, giving general dimensions. 900 w. R R Gaz—Vol. XXXIX., No. 16.

Prairie, Ill. Cent.—Prairie Type Passenger Locomotive for the Illinois Central R. R. Illustrates and describes one of the three types of engines with the wide firebox which will take part in the tests to be made by this road. 1600 w. Ry & Eng Rev—May 17, 1902.

Prairie, Lake Shore.—New Passenger Locomotives for the Lake Shore. Illustrated description, with general dimensions of the new Prairie (2-6-2) type passenger locomotives just put into service. 500 w. R R Gas—Vol. XXXVII, No. 25.

Prairie, Long Island.—Suburban Engine for the Long Island Railroad. Brief illustrated description of a suburban tank locomotive of the Prairie or 2-6-2 type. 500 w. Loc Engng—Sept., 1904.

Prairie, N. J., Central.—New Suburban Engines of the Central Railroad of New Jersey. Illustrated description of engines of the Prairie type having features of interest. 1200 w. R R Gas—June 20, 1902.

Prairie, Rock Island.—El Paso—Rock Island Locomotives. Engraving, line drawings and brief description of an engine of the Prairie type. 400 w. Ry Age—Oct. 31, 1902.

"Precursor."—See **LOCOMOTIVE TEST—London & Northwestern.**

Progress.—Locomotive Progress. Annual review of changes in design and progress in construction. 1400 w. Ry Mas Mech—June, 1901.

See also **Development; Future; History; Modern.**

Prussian.—See **Superheater, Germany.**

Prussian Specifications.—Prussian State Railway Locomotives. Quotations from the specifications dealing with the quality and testing of material used in building rolling-stock. 6500 w. Engng—Jan. 8, 1904.

Queensland.—Eight-Coupled Locomotive for the Queensland Government Railways. Two-page plate, illustration, and description. 800 w. Engng—May 27, 1904.

Eight-Coupled Locomotive Built in Queensland. Illustrated description of 3 ft. 6 in. gauge freight locomotive built at Government workshops, Queensland, Australia. 500 w. Engr, Lond—Aug. 5, 1904.

Rack.—A Critical Description of Recent Rack Locomotives for Mixed Service (Kritische Beschreibung der bis jetzt Gebauten Zahnradlokomotiven für Gemischten Betrieb). A. Werner. A tabulated account of the various types of locomotives in use for rack railways on mountain inclines. Serial. Part I. 4000 w. Glasers Annalen—Aug. 15, 1903.

See also **MOUNTAIN RAILWAY.**

Rack and Adhesion.—Powerful "Rack and Adhesion" Locomotives for the Central South African Railway. Illustrated description of an engine for exceptionally severe gradients. 1000 w. Prac Engr—March 17, 1905.

Rack and Adhesion Locomotives for Central South Africa. Illustrated detailed description. 1000 w. Ry Age—May 19, 1905.

A Freak Locomotive for South Africa. Illustrations and description of a combination rack and adhesion tank locomotive for exceptionally heavy grades. 900 w. R R Gas—Vol. XXXVIII., No. 17.

Combined Rack and Adhesion Locomotive for South Africa. Illustration and description of a powerful engine for assisting the heavy express trains over exceptionally severe gradients. 800 w. Sci Am—Sept. 30, 1905.

A Unique Locomotive for South Africa. F. C. Coleman. Illustration, with brief description of an unusual design for working heavy freight trains over the severe grades and sharp curves on the Rhodesia railway. 800 w. Sci Am—July 29, 1905.

See also **South Africa; MOUNTAIN RAILWAY—Appenzell.**

Renshaw.—See **Wide Firebox.**

Rebuilt.—Rebuilding Locomotives—Philadelphia & Reading. S. F. Prince, Jr. An illustrated article giving examples of rebuilding. 500 w. R R Gas—June 24, 1904.

A Handsome Passenger Locomotive of 1861. C. H. Caruthers. Drawing and description of an engine rebuilt when materials were very high. 700 w. R R Gas—Vol. XXXIX., No. 8.

A Lehigh & New England Rebuild. Illustrates the engine before and after rebuilding, describing the changes. 500 w. Ry & Loc Engng—Nov., 1905.

Repair Records.—Locomotive Repair Records. Describes a new system which is about to be tried on one of the large railroads. A rational system in which engine ton miles is the measure of work done. 8700 w. Am Engr & R R Jour—April, 1904.

Rational Locomotive Repair Records. H. H. Vaughan. Discusses the various factors entering into the maintenance of locomotives account, and explains method giving statement showing the cost of running repairs. 5500 w. Am Engr & R R Jour—June, 1905.

The Cost of Locomotive Repairs per 1,000-Ton Miles. Harrington Emerson. Does not consider it safe to generalise under existing conditions, suggesting the best way to cheapen engine repairs. 700 w. Am Engr & R R Jour—Nov., 1905.

See also **LOCOMOTIVE SHOP; RAILWAY SHOP.**

Repairs.—Crosshead and Piston Rod Connection. Roger Atkinson. The causes of failures are discussed, and the methods of overcoming the difficulties. 1000 w. R R Gas—July 18, 1902.

Break-Downs. Joseph A. Baker. Discusses the easiest and quickest way of making temporary repairs to a disabled locomotive, with the few tools supplied. 2000 w. Loc Engng—Nov., 1903.

See also **LIFT—Electric Gin; LOCOMOTIVE FIREBOX; LOCOMOTIVE FRAME; LOCOMOTIVE ROD; LOCOMOTIVE SHOP; RAILWAY SHOP.**

Repair Schedule.—See **LOCOMOTIVE SHOP.**

Reynolds.—A Curious Locomotive. Brief illustrated description of a design of Mr. Michael Reynolds, patented in 1895. 450 w. Engr, Lond—Jan. 16, 1903.

Rhodesia.—See **Rack and Adhesion; South Africa.**

Richmond.—Richmond Ten-Wheeler of Atlantic Coast Line. Illustration and dimensions. 300 w. Loc Engng—Jan., 1901.
See also **LOCOMOTIVE, COMPOUND.**

Richmond for Finland.—See **Finland.**

Rickie.—See **LOCOMOTIVE, COMPOUND.**

Road.—See **AUTOMOBILE—Steam; ROAD ROLLER; TRACTION ENGINE.**

Robert Water-Tube.—See **LOCOMOTIVE BOILER—Water Tube, Robert.**

Rock Island Report.—See **RAILWAY MOTIVE POWER.**

Rod Repair.—See **Repairs; LOCOMOTIVE ROD.**

Roumania.—Roumanian Locomotives. Illustrated description of the standard type of goods engine for the Roumanian State Railways. 600 w. Engng—June 6, 1902.

Russian at Paris.—Russian Locomotives at the Exposition of 1900 (Les Locomotives Russes à l'Exposition de 1900). R. Godfernaux. Illustrated description of the engines exhibited by the works of Poutiloff, Kolomna, and Briansk. 4000 w. 10 plates. Rev Gen de Chemins de Fer—Aug., 1901.

Russian State Railways.—Locomotives for Russian State Railways. Particulars, with illustrations. 500 w. Engng—Nov. 9, 1900.

Rutland.—Ten-Wheeled Engine for the Rutland. Illustration, with brief description. 300 w. Loc Engng—March, 1903.

St. Louis & San Francisco R. R.—New Power for the Frisco System. Illustrates and describes two types of engines recently built. A consolidation and a 10-wheel passenger, in which as many castings and forgings as possible are made interchangeable. 1000 w. Ry Age—June 13, 1902.

New Locomotive Equipment for the St. Louis & San Francisco R. R. Illustrated detailed description of the three types of engines most recently constructed. 1600 w. Ry & Engng Rev—June 21, 1902.

Eight-Wheel Passenger Locomotive for the 'Frisco System. Drawings, illustrations and description. 500 w. Ry Age—Nov. 20, 1903.

Ten-Wheel Locomotive for the 'Frisco. Illustrated description. 500 w. Ry Age—Oct. 30, 1903.

St. Louis Exposition.—See **Superheater; LOCOMOTIVE, COMPOUND—Articulated; Cole; LOCOMOTIVE EXHIBITION.**

Sand Dryer.—See **SAND DRYER.**

Santiago de Cuba.—A Locomotive in Service Sixty Years. Herbert T. Walker. Illustrations, with details of an engine in use nearly sixty years on a branch railroad in Santiago de Cuba. 800 w. Sci Am—Dec. 3, 1904.

Saxon at Paris.—Locomotives at the Paris Exposition (Les Locomotives à l'Exposition de 1900). F. Barbier. A well illustrated description of a high-speed, ten-wheel, compound locomotive, built by the Chemnitz (Saxony) works. 1 plate. 2000 w. Génie Civil—March 23, 1900.

Paris Exhibition—Express Engine, Saxony State Railways. Illustrated detailed description. Serial. 1st part. 1000 w. Engr, Lond—Jan. 18, 1901.

Saxony.—See **Superheater, Saxony; LOCOMOTIVE, COMPOUND.**

Scales.—See **WEIGHING MACHINE—Dopp Locomotive.**

Schenectady.—See **Cape Colony; Culm-Burning; LOCOMOTIVE, COMPOUND.**

Schenectady Superheater.—See **Superheater, Cole.**

Schmidt Superheater.—See **Superheater, Schmidt.**

Schneider at Paris.—High-Speed Locomotive for International Express Service; Schneider & Co. Exhibit, Paris Exposition. An illustrated description of an interesting machine with many novel features. 1800 w. Eng News—Oct. 18, 1900.

Scotland-India.—Ten-Wheel Express Locomotive for India, Built in Scotland. Illustration and leading dimensions. 400 w. Ry Age—Feb. 12, 1904.

Self-Cleaning.—See **LOCOMOTIVE FRONT END.**

Shay.—See **Geared; LOCOMOTIVE TEST.**

Sheedy Circulator.—See **LOCOMOTIVE CYLINDER.**

Shoes and Wedges.—See **LOCOMOTIVE DESIGN.**

Siamese Railway.—See **RAILWAY—Siam.**

Simon's Express.—Simon's Express Ten Wheeler. Illustrates and describes a powerful ten-wheel passenger engine. 850 w. Loc Engng—Nov., 1900.

Single Driver.—A Proposed Single Driver Locomotive. Paul T. Warner. Gives diagram showing the principal features of a single driver locomotive with single cylinders, designed for burning bituminous coal and capable of hauling 250 tons exclusive of its own weight, at 60 miles an hour. Discusses its efficiency. 900 w. R R Gaz—Feb. 27, 1903.

Six-Coupled.—Are Six-Coupled Locomotives Necessary for Trains That Run 100 Miles or More Between Stops? General discussion by members. 9000 w. N Y R R Club—Nov. 15, 1900.

Six-Coupled Express Locomotive, Eastern Railway of France. Illustrated description of a locomotive representative of recent French practice. 2000 w. Engr, Lond—Jan. 24, 1902.

Smith & Perkins.—Smith & Perkins' Last Type of Locomotives. C. H. Caruthers. Illustrated description. 1000 w. Loc Engng—Dec., 1900.

Smoke Consumer.—See **LOCOMOTIVE SMOKEBOX; SMOKE PREVENTION—Locomotive.**

Snow.—See **TRACTION ENGINE.**

South Africa.—Locomotives for the Central South African Railroads. Brief illustrated description. 350 w. R R Gaz—July 8, 1904.

Locomotives for the Central South African Railways. H. W. Hanbury. Illustrations, with detailed description of a passenger, and also a goods locomotive, which are believed to be the heaviest and largest of their class ever built for the 3 ft. 6 in. gauge. 2000 w. Engng—July 1, 1904.

Ten-Wheel Coupled Locomotives in South Africa. Illustration, with brief description of the largest and most powerful engines yet used on so narrow a gauge, 3 ft. 6 in. 600 w. Engr, Lond—Feb. 13, 1903.

See **Cape Colony; Natal; Rack and Adhesion.**

South-Eastern & Chatham.—Express Locomotive for the South-Eastern & Chatham Railway; Glasgow Exhibition. Illustrated description, giving dimensions. 900 w. Engng—June 21, 1901.

Express Locomotives, South-Eastern & Chatham Railway. Gives illustrations and principal particulars of bogie express engines. 600 w. Engr, Lond—July 19, 1901.

See also **Tank.**

Southern Pacific.—Ten-Wheel Passenger; Engines Southern Pacific Ry. Brief illustrated description, with dimensions. 700 w. Eng News—May 9, 1901.

New Locomotives for the Southern Pacific. Brief illustrated description of four recent locomotives, three of which use oil as fuel. 500 w. R R Gaz—Vol. XXXVII., No. 16.

Standard Locomotives for the Southern Pacific. Illustrations, with brief descriptions of engines of the Consolidation, Atlantic, Pacific and 6-wheel switching types. 400 w. Ry Age—Nov. 25, 1904.

Spain.—See **Tank, Spain.**

Special, British.—Locomotives for Special Service on British Railways. J. F. Gairns. With numerous illustrations of inspection, crane, works, and other special forms of locomotives. 3000 w. Engineering Magazine—Feb., 1904.

Springs.—See **SPRING.**

Stack.—See **Draft; LOCOMOTIVE STACK.**

Standardizing.—Standards for Locomotives and Cars. Concerning the standardizing of equipment on the Harriman Lines." Ill. 800 w. Am Engr & R R Jour—June, 1902.

Steam Crane.—See **CRANE—Locomotive.**

Steam Jackets.—See **Superheaters and Steam Jackets.**

Steam Reversing Gear.—See **LOCOMOTIVE VALVE GEAR—Reversing.**

Stephenson.—The Oldest-Working Locomotive in the World. Illustrates and describes an engine built by George Stephenson in 1822, still at work after 80 years of continuous service on the Hetton Railway. 800 w. Engr, Lond—July 18, 1902.

Stevens, Southern Pacific.—A Western Pioneer. J. A. Baker. Illustration, with information concerning a Stevens engine on the Southern Pacific. 500 w. Loc Engng—Sept., 1904.

Suburban.—Heavy Double-End Suburban Locomotive for the New York Central. Illustrated detailed description of a type from which 16 have been ordered, and 6 are in service. 900 w. R R Gaz—March 28, 1902.

Heavy 6-Coupled Suburban Locomotive. Illustrates and describes a locomotive in use on the New York Central & Hudson River Railroad. 700 w. Am Engr & R R Jour—April, 1902.

Suburban Locomotive Development. An illustrated description of types, showing the development since 1860. 3000 w. R R Gaz—May 15, 1903.

See also **Double-Bogie; German; Tank, Suburban.**

Superheated Steam.—See **Superheater; LOCOMOTIVE TEST; SUPERHEATED STEAM.**

Superheater.—The Question of Superheated Steam in Locomotives (Zur Frage der Anwendung der Dampfüberhitsung im Lokomotivbetriebe). Otto Berner. A systematical discussion of tests, by different investigators, on the use of superheated steam in locomotives. Tables and illustrations. Serial. 2 parts. 10,000 w. Zeitschr d Ver Deutscher Ing—May 23 and 30, 1903.

The Application of Superheated Steam to Locomotives (Die Anwendung des Heissdampfes im Lokomotivbetriebe). Ernst Happel. A discussion of the economy to be effected, and a description of a simple form of superheater for locomotive boilers. 1200 w. Glasers Annalem—Nov. 1, 1904.

The Promise of Superheaters. Editorial discussing steam superheaters for locomotives. 1700 w. Ry & Loc Engng—April, 1905.

The Use of Superheated Steam on Locomotives. H. H. Vaughan. Read before the Am. Ry. Mas. Mech. Assn. Reviews the history of the use of superheated steam, discussing briefly the theory and results, and giving conclusions. Ills. 10,000 w. Ry & Engng Rev—June 17, 1905.

Superheating Locomotives. Rudolf Vogdt in "Die Umschau." States briefly the advantages of superheated steam, giving illustrations of several types of locomotive superheaters, and information concerning their use. 1000 w. Sci Am Sup—June 10, 1905.

Superheated Steam in Locomotive Service. W. F. M. Goss. Discusses the development and present state of this latest phase of locomotive engineering, giving illustrations of the most promising inventions that have been introduced. 6800 w. Jour Fr Inst—Sept., 1905.

See also **LOCOMOTIVE TEST; SUPERHEATED STEAM.**

Superheater and Steam Jacket.—Superheaters and Steam Jackets for Locomoties. Drawing and notes concerning an experiment being tried in England by the Lancashire & Yorkshire Ry. 400 w. Am Engr & R R Jour—Nov., 1900.

Superheater, Belgium.—Superheaters in Locomotives. J. B. Flamme. Read before the Inst. of Mech. Engrs. at Liége. Illustrated description of the arrangements for producing superheated steam in some engines on the Belgium State Railways and report of results. 2800 w. Engng—June 23, 1905.

Tests of Superheater Locomotives by the Belgian State Railways. Extract from a paper by J. B. Flamme, read before the Inst. of Mech. Engrs., giving an account of experiments with locomotives combining superheating with compounding. 700 w. Ry Age—Aug. 4, 1905.

Superheater, Canada.—Freight Locomotives with Superheaters, 2-8-0 Type. Illustrated detailed description of new engines for the Canadian Pacific Railway. 1500 w. Am Engr & R R Jour—Dec., 1904.

See also **Superheater, Schmidt.**

Superheater, C., St. P., M. & O. Ry.—Superheating Ten-Wheel Engine C., St. P., M. & O. Ry. A short illustrated article giving particulars of interest. 6000 w. Ry Mas Mech—Sept., 1905.

Superheater, Cole.—The Schenectady Super-Heater Locomotive. Brief illustrated description of the design of F. J. Cole. 1400 w. Am Engr & R R Jour—Sept., 1904.

Two-Cylinder Compound for the "Soo" Line, with Superheater. Illustrated description of a consolidation engine with the Schenectady superheater. 600 w. Ry Age—April 14, 1905.

Compound Superheater Freight Locomotive. Illustration, with brief description of an engine of the 2-8-0 type, having Cole superheaters in service on the "Soo Line" railway. 400 w. Am Engr & R R Jour—May, 1905.

Eight-Wheel Passenger Engine with Superheater, D. L. & W. R. R. Illustrations and descriptive data of an anthracite culm burner. 800 w. Ry Mas Mech—July, 1905.

Lackawanna Locomotive with Schenectady Superheater. Illustrated description of the eight-wheeled (4-4-0) locomotive recently built and fitted with the Cole superheater. 900 w. R R Gaz—Oct. 15, 1905.

Compound Locomotives with Superheaters. Illustrated description of a compound consolidation freight locomotive with superheater, for the Minneapolis, St. Paul & Sault Ste. Marie Ry. 1200 w. Eng News—Nov. 23, 1905.

Lackawanna Eight-Wheel Passenger Locomotives with Superheater. The engine 955 equipped with Cole superheater, with piston valves, is illustrated and described. 500 w. Ry Age—Dec. 15, 1905.

Superheater, Erie.—Pacific Type Engine with Superheater, Erie Railroad. Illustrated description of an engine designed to meet hard conditions of service. 700 w. Ry Mas Mech—June, 1905.

Superheater, Germany.—Four-Cylinder Balanced Compound for the Prussian State Railways. Illustrated detailed description of a locomotive on exhibition at St. Louis, a type used on the Prussian State Railways. 600 w. R R Gaz—June 24, 1904.

Superheated Steam for Locomotives in Germany. A report on the experiments in Germany with superheaters for locomotives, the types, and the conclusions. 4000 w. Ry & Engng Rev—Aug. 6, 1904.

German High-Speed Three-Cylinder Compound Locomotive. Illustrated description of locomotive and tender exhibited by Henschel & Son, of Cassel, at the St. Louis Fair. 1800 w. Ry & Engng Rev—Aug. 13, 1904.

Four-Cylinder Compound Locomotive. Illustration, with brief description of the engine at the St. Louis Exhibition representing the Von Borries balanced system. 1200 w. Engr, Lond—Sept. 9, 1904.

Superheated Steam for Locomotives in Germany. An account of what has been accomplished in this field. 4000 w. U S Cons Repts—July, 1904.

German Four-Cylinder Balanced Compound Locomotive, with Superheater, at the St. Louis Exhibition. Illustrated detailed description of this engine, which is one of 30 engines for the Prussian State Railways. 1800 w. Eng News—Nov. 24, 1904.

German Compound Locomotive with Superheater. Illustrates an interesting type of high-speed locomotive, giving brief description. 300 w. Ry Age—Dec. 1, 1905.

See also **Superheater, Pielock; Superheater, Saxony; Superheater, Schmidt; Tank, Henschel.**

Superheater, Pielock.—The Pielock Superheater for Locomotives. Illustrated description of a superheater which is a strong competitor of the Schmidt in Germany. Also editorial. 1800 w. Ry Age—Sept. 9, 1904.

Superheater, Saxony.—Superheated Steam Freight Locomotives—Saxony State Railways. Charles R. King. Illustrated description of a recent design for heavy grades. 2000 w. R R Gaz—Jan. 8, 1904.

Compound Goods Locomotive, Saxony State Railways. Illustrated description of an engine of large power using superheated steam, and having features of interest. 2000 w. Engr, Lond—Jan. 22, 1904.

Superheater, Schmidt.—Express Locomotive for the Prussian State Railways (Locomotive à Grande Vitesse des Chemins de Fer de l'Etat Prussien). A. Morizot. Illustrated description of engine with the Schmidt superheater exhibited at Paris by Borsig of Berlin. 1200 w. Revue Technique—Feb. 25, 1901.

The Use of Superheated Steam in Locomotives (Die Anwendung von Hochüberhitztem Dampf (Heissdampf) in Locomotivbetriebe). Hr. Garbe. A well illustrated account of the Schmidt system of using highly superheated steam in locomotives with a particular description of the Borsig locomotive exhibited at Paris, and many indicator diagrams. Serial. 2 parts. 1200 w. Zeitschr d Ver Deutscher Ing—Feb. 1, 8, 1902.

The Application of Superheated Steam to Locomotives (Applications de la Vapeur Surchauffée aux Locomotives). T. Barbier. Discussing especially the experiments made with the Schmidt system on locomotives built by Borsig for the Prussian State Railways. 2000 w. 1 plate. Génie Civil—May 31, 1902.

The Schmidt Locomotive. Illustrated description of interesting locomotives adapted for the use of superheated steam on the Schmidt system, with information concerning their performance. 2000 w. Engng—June 20, 1902.

The Use of Superheated Steam in Locomotives. Condensed translation from "Glaser's Annalen für Gewerbe und Bauwesen," discussing the use of the Schmidt superheater on German locomotives. Ill. 3000 w. R R Gaz—Oct. 10, 1902.

Locomotives Using Superheated Steam. G. Lentz. States the advantages of superheated steam, and the points of importance in their arrangement, illustrating and describing the Schmidt superheater. Also short editorial. 3000 w. Am Engr & R R Jour—Nov., 1902.

The Advantages and Disadvantages of the Superheated-Steam Locomotive (Für nnd Wider die Heissdampflokomotive). Inspector Teuscher. A discussion of the Schmidt locomotive, comparing its economy with the modern compound locomotive. 2500 w. Zeitschr d Ver Deutschr Ing—Jan. 24, 1903.

The Use of Superheated Steam on Locomotives. A critical note on the Schmidt system, by Inspector Teuscher, and a long answer by Mr. Otto Berner, both appearing in the "Zeitschrift des Vereines deutscher Engenieure." 12,400 w. Bul Int Ry Cong—Feb., 1904.

Locomotive for Superheated Steam (Heissdampflokomotive). J. Obergethmann. An illustrated description of the Schmidt locomotive, exhibited at Düsseldorf and built for the Prussian State Railways. Serial. Part I. 2500 w. 1 plate. Zeitschr Ver Deutscher Ing—Feb. 28, 1903.

Superheated Steam in Locomotive Service. The first of a series of articles presenting an elementary view of the problem, to be followed by a discussion of the development of the practice in America and Europe, with special attention to the Schmidt system. Serial. 1st part. 2000 w. R R Gaz—June 5, 1903.

Compound Locomotive with Superheater. Illustrates and describes a locomotive of the 4-6-0 type, equipped with the Schmidt system of superheating—Canadian Pacific Ry. 1100 w. Am Engr & R R Jour—Sept., 1903.

Locomotives for the Cape Government Railways. H. W. Hanbury. Full illustrated detailed description of two new six-wheel coupled engines, adapted for the use of superheated steam, on the Schmidt system. 3000 w. Engng—Jan. 22, 1904.

The Schmidt Superheated Steam Locomotive. Emile Guarini. Illustrated description of an application of highly superheated steam to locomotives. 1000 w. R R Gaz—Vol. XXXVIII. No. 24.

See also **Superheater, Germany; LOCOMOTIVE TEST—Superheated Steam.**

Superheater, "Soo" Line.—See Superheater, Cole.

Swiss at Paris.—The Paris Exhibition—Société Suisse, Winterthur. Illustrated descriptions of four railway locomotives and a tramway locomotive, exhibited by this firm. 1500 w. Engr, Lond—Nov. 30, 1900.

Swiss Locomotives at the Exposition of 1900 (Les Locomotives Suisses à l'Exposition de 1900). R. Godfernaux. General description, with illustrations of the engines exhibited by the Winterthur locomotive works. 3500 w. 4 plates. Rev Gen de Chemins de Fer—Feb., 1901.

Locomotives at the Exposition of 1900 (Les Locomotives à l'Exposition de 1900). F. Barbier. Illustrating and describing the compound express locomotives of the North-Eastern and the Central Railways of Switzerland. 1200 w. 1 plate. Génie Civil—Feb. 2, 1901.

See also **LOCOMOTIVE, COMPOUND— Jura-Simplon; Swiss; LOCOMOTIVE EXHIBITION.**

Switching.—See also **Culm-Burning; German; LOCOMOTIVE, COMPOUND.**

Switching, C. & O.—Chesapeake & Ohio Eight-Wheel Switching Locomotive. An illustrated description of probably the heaviest switching locomotive ever built. 500 w. Ry Age—Jan. 21, 1904.

Switching, Chicago Transfer.—Consolidation Switching Locomotives for the Chicago Union Transfer Railway. Engraving and brief description. 500 w. R R Gaz—April 25, 1902.

Switching, Erie.—The Erie's Six-Wheel Switching Locomotives—Wide Fire-Box. Illustrated description. 600 w. R R Gaz—Dec. 21, 1900.

Switching, Kansas City.—Switching Engine for the Kansas City Belt. Illustrated description of a heavy switching locomotive especially designed for transfer work and pushing service. 700 w. Ry Age—March 28, 1902.

Switching, Lake Shore.—Six-Coupled Switching Locomotive. Illustrated description of locomotives for the L. S. & M. S. Ry. designed for heavy yard service. 500 w. Am Engr & R R Jour—Oct., 1902.

Powerful Switching Locomotives for the Lake Shore. Illustrated description of the largest and most powerful switching engines yet built, intended for pushing trains over the humps in gravity yards. 300 w. R R Gaz—Vol. XXXIX., No. 3.

Ten-Wheel Switcher for the Lake Shore. Illustrates and describes the heaviest and most powerful engines yet built for yard service. 700 w. Ry Mas Mech—Aug., 1905.

Switching, Lehigh Valley.—Baldwin Eight-Coupled Locomotive for the Lehigh Valley R. R. Illustrated description of a recently built switching engine, interesting because of its type and extreme weight. 900 w. Ry & Engng Rev—Jan. 25, 1902.

Switching, N. Y. Central.—Heavy Six-Wheel Switcher for the New York Central R. R. Illustrated description of locomotive built at the Schenectady Locomotive Works. 700 w. Ry & Eng Rev—Aug. 20, 1904.

Switching, Pennsylvania.—Switching Locomotive for the Pennsylvania Lines. Illustrated description of a 6-wheel switcher. Class B-6. 400 w. Ry Age—Jan. 29, 1904.

Switching, P. S. and N. Ry.—Switching Locomotives, Pittsburg, Shawmut & Northern Railroad. Illustrates and describes a medium size engine intended for heavy switching service where there are sharp curves and heavy grades. 500 w. Ry Age—May 29, 1903.

Switching, Saddle Tank.—Saddle Tank Switching Locomotive. An illustrated description of the application of a wide firebox to a saddle tank switcher. 300 w. Ry Mas Mech—Sept., 1903.

Switching, Side Tank.—Side Tank Switching Locomotive for the Kanawha and Michigan. Illustrated description of an engine of the "Calumet" type designed to work on 4 and 4½ per cent. grades. 1500 w. Ry Age—Jan. 2, 1903.

Switching, Southern Ry.—Six-Wheel Switcher, Southern Ry. Illustration and drawings, with description of switching engines for the Southern Railway. 500 w. Ry & Engng Rev—Feb. 18, 1905.

Southern Railway Six-Wheel Switching Engines. Illustration, and views and cross section, with brief description. 300 w. Ry Age—March 3, 1905.

Six-Wheel (0-6-0) Switching Engine, Southern Railway. Brief illustrated description. 200 w. R R Gaz—Vol. XXXVIII., No. 26.

Symington Dust Guard.—See **DUST GUARD.**

Tank.—English and German Tank Locomotives. Frank C. Perkins. Illustrated descriptions of a British "Saddle Tank" engine, and a similar side tank engine of the "Bengal" class, and of a four-wheel connected tender locomotive of German build. 700 w. Sci Am Sup—Feb. 28, 1903.

Tank Locomotives. E. E. R. Tratman. Discusses the advantages and disadvantages of tank engines, giving particulars of the tank engines employed in this and other countries. General discussion. Ills. 11,700 w. Pro W Ry Club—April 16, 1905.

Foreign Tank Locomotives. Illustrated descriptions of types. Also editorial calling attention to difference in practice in Europe and America. 1800 w. Ry Age—April 21, 1905.

See also **Articulated; Mushkaf-Bolan Ry; Rack and Adhesion; Switching; Wrexham Quay Railway.**

Tank, Berlin.—See **LOCOMOTIVE, COMPOUND—Berlin Metropolitan.**

Tank, Chic. & West. Ind.—Double Ender Tank Locomotive. Illustrates and describes a 2-6-2 engine built for the Chicago & Western Indiana. 500 w. Ry & Loc Engng—March, 1905.

Tank, Compound.—See **LOCOMOTIVE, COMPOUND.**

Tank, Duplex.—Duplex Tank Locomotive. Sectional drawings of an engine described in a previous issue. The engine constructed for the Compagnie de Chemins de Fer Departementaux, by La Société Suisse, of Winterthur. 200 w. Engr, Lond—Aug. 7, 1903.

See also **LOCOMOTIVE, COMPOUND—Articulated.**

Tank, Express Train.—Tank Engines on Express Trains. Charles Rous-Martin. Discusses the suitability of these engines for fast running and some of the reasons pro and con. 4000 w. Engr, Lond—Feb. 10, 1905.

Tank, France.—Double-Bogie Tank Locomotive, Northern Railway of France. Illustration with brief description. 300 w. Engr, Lond—March 21, 1902.

Tank Locomotive for Suburban Traffic, Northern Railway of France. Illustrated description of a new type of tank locomotive for service between Paris and towns within 50 miles. 500 w. Engng—Sept. 12, 1902.

Sixteen-Wheel Double Tank Locomotive for the Northern Railway of France. Illustrated detailed description of an interesting engine shown at the recent exposition at Liége, Belgium. 1500 w. R R Gaz—Vol. XXXIX., No. 14.

Tank, Furness, Eng.—Six-Coupled Tank Locomotive for the Furness Railway. Illustrations, principal dimensions, and brief description. 600 w. Engng—March 3, 1905.

Tank, Great Northern.—Heavy Tank Locomotive for the Great Northern Railway. Two-page plate and drawings of an engine for suburban traffic, with brief description. 700 w. Engng—Dec. 25, 1903.

Tank, Henschel.—Tank Locomotive with Seven Axles for Mountain Railways (Locomotive Tender à Sept Essieux pour Chemins de Fer de Montagne). Description of powerful mountain locomotive by Henschel, of Cassel. 1500 w. 1 plate. Génie Civil—July 2, 1904.

High-Speed Tank Locomotive for Mountain Service (Schnellzug-Tender-Lokomotive für Gebirgsbahnen). Describing a four-cylinder compound engine with superheater for heavy mountain service, built by Henschel & Son, of Cassel, Germany. 2500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Aug. 27, 1904.

Tank, Hungary.—See **Mine, Hungary.**

Tank, India.—Eight-Wheeled Six-Coupled Tank Engine. Illustrations with brief description of engines for the Bombay, Baroda and Central India Ry. to meet unusual conditions of service. 300 w. Engr, Lond—June 27, 1902.

Tank, Japan.—Double End Narrow Gauge Tank Locomotive for Japan. Illustrated description with principal dimensions. 500 w. Ry Age—March 10, 1905.

Narrow Gauge Tank Engine for Japan. Illustration, with brief description. 500 w. Ry & Loc Engng—Feb., 1905.

Locomotives for Japan. Illustrates and describes a type of narrow gauge tank engine for which an order for sixty-eight has been given by Japan to an English firm. 600 w. Engr, Lond—March 10, 1905.

Tank, Java.—See **LOCOMOTIVE, COMPOUND—Java.**

Tank, Lancashire & Yorkshire.—Tank Locomotive for Heavy Suburban Traffic, Lancashire and Yorkshire Railway. Illustrated detailed description of a very powerful suburban locomotive. 600 w. Engng—May 6, 1904.

Tank, London & Brighton.—Tank Engine, London and Brighton Railway. Illustration and leading dimensions of a very powerful engine. 250 w. Engr, Lond—May 1, 1903.

Tank, Norway.—Tank Engines for Norway. Illustration and longitudinal section of two very powerful locomotives constructed for the Dunderland Iron Ore Co., Norway. The specifications are given. 1800 w. Engr, Lond—Oct. 31, 1902.

Tank, Port Talbot.—Heavy Tank Locomotive for the Port Talbot Railway and Docks Company. Illustrates and describes a new type for mineral traffic. 450 w. Engng—April 25, 1902.

Tank, South Africa.—See **Rack and Adhesion.**

Tank, South-Eastern.—Tank Locomotive for the South-Eastern and Chatham Railway. Illustration, particulars and dimensions. 900 w. Engng—March 15, 1901.

New Bogie Tank Engines, Southeastern and Chatham Railway. Dimensions and illustrated particulars of engines designed for heavy suburban trains. They are fitted with spark arresters and fuel economizers. 700 w. Engr, Lond—Aug. 25, 1905.

Tank, Spain.—Bogie Tank Locomotive, Madrid and Alicante Railways. Illustrates and describes double-bogie tank engines for heavy suburban service. 400 w. Engr, Lond—Nov. 17, 1905.

Tank, Suburban.—Tank Locomotives for Suburban Service on American Railways. A general summary concerning the use of tank locomotives for suburban service in the United States, giving brief illustrated descriptions of types used on various roads. 3000 w. Eng News—Feb. 16, 1905.

Tank, Wales.—Saddle Tank Locomotive. Illustration, with brief description, of a locomotive recently built for a railway in South Wales. 250 w. Engr, Lond—Nov. 23, 1900.

Tank Engine for the Llanelly and Mynydd Mawr Railway. Illustration and particulars of a powerful side tank locomotive recently built. 250 w. Engr, Lond—Oct. 3, 1902.

Tender Engine.—The Locomotive of the Future—A Suggestion. Discusses the advisability of removing the engines and driving-wheels to the tender. 1100 w. Sci Am—April 27, 1901.

See also **LOCOMOTIVE TENDER.**

Test Plant.—See **LOCOMOTIVE TEST—St. Louis Exposition.**

Thuile High Speed.—The Thuile High-Speed Locomotive (Locomotive à Grande Vitesse, Système Thuile). F. Barbier. Illustrated description of the peculiar and powerful locomotive exhibited by the Creusot works at the Paris Exposition. 2000 w. 1 plate. Génie Civil—Nov. 17, 1900.

A Creusot High-Speed Locomotive. From "La Nature." Illustrated description of engine constructed after plans of M. Henri Thuile, built with the object of attaining speeds of 72 miles and commercial speeds of about 60 miles for the hauling of 200 tons. 600 w. Sci Am Sup—April 13, 1901.

Tire.—See **TIRE—Locomotive Wear.**

Traction Increaser.—See **Freight; Prairie Type; TRACTION INCREASER.**

Tractive Power.—See **LOCOMOTIVE PERFORMANCE; TRACTION; TRAIN RESISTANCE.**

Trevithick.—Centenary of the Locomotive Engine. W. B. Paley. Reviews the work of Richard Trevithick. 2500 w. R R Gaz—Feb. 12, 1904.

Trevithick's Locomotive Experiment in 1808. In regard to a trial of a locomotive in the year 1808, giving extracts from the newspapers of the day. 1300 w. Engr, Lond—Dec. 18, 1903.

See also **History.**

Twentieth Century.—Notes on Some Twentieth Century Locomotives. Charles Rous-Marten. Paper read before the Soc. of Engrs. Indicates the writer's opinion of what appear to be some of the most prominent, interesting and important features in the locomotive practice of this century so far as it has yet gone. Serial. 1st part. 4500 w. Mech Engr—June 7, 1902.

Union Pacific.—See **Harriman Lines.**

United States.—See **American.**

Unusual.—Some Unusual Locomotives. A. B. Eddowes. Illustrated descriptions of types selected for their engineering interest. 9200 w. Pro Engrs' Club of Phila—Oct., 1901.

See also **British; Reynolds.**

Valves.—See **LOCOMOTIVE VALVE; LOCOMOTIVE VALVE GEAR.**

Vanderbilt.—Vanderbilt Locomotive Boiler. An illustrated description of one of the two Consolidation locomotives. 1800 w. R R Gaz—Nov. 15, 1901. remarks on the distinctive features. 1000 w. Sci Am—Feb. 16, 1901.

The Vanderbilt Locomotive Boiler. Information concerning this design, the service of those already in use, the number under construction, etc. 3900 w. R R Gaz—May 10, 1901.

Vanderbilt Locomotive and Tender, Illinois Central Railroad. Illustrated description of a ten-wheel freight locomotive on exhibition at the Pan-American Exposition, which is attracting much attention. 1200 w. R R Gaz—May 31, 1901.

Weight and Capacity of Locomotives with Vanderbilt Boilers and Tenders. Editorial discussion of this design as compared with other locomotives. 1800 w. R R Gaz—Nov. 15, 1901.

See also **LOCOMOTIVE, COMPOUND.**

Vanderbilt-Baldwin.—See also **Oil-Burning; LOCOMOTIVE, COMPOUND—Baldwin-Vanderbilt.**

Vanderbilt-Baldwin Consolidation.—Vanderbilt-Baldwin Consolidation Locomotive, Buffalo, Rochester & Pittsburg Railway. Photograph, drawings and general specifications. 1500 w. R R Gaz—Sept. 13, 1901.

Von Borries.—See **High Speed; LOCOMOTIVE, COMPOUND.**

Wales.—See **Cambrian Express.**

Water-Tube.—See **LOCOMOTIVE BOILER.**

Weight and Heating Surface.—Ratios of Total Weight to Heating Surface in Recent Locomotives. Gives the proportions recommended by the Master Mechanics' Assn. in 1897, with remarks on this subject. 700 w. Am Engr & R R Jour—March, 1901.

Ratios of Total Weight to Heating Surface. F. F. Gaines. A letter called out by an article in the March issue of this same publication, suggesting a comparison of heating surface and horse power, and discussing the subject. 1700 w. Am Engr & R R Jour—May, 1901.

Wheel Base.—Best Type of Engine for Heavy Fast Passenger Service. F. F. Gaines. Discusses the best type as regards wheel base arrangements. Ill. 1200 w. Am Engr & R R Jour—June, 1901.

Wheel Manufacture.—See **CAR WHEEL—Manufacture.**

Wide Firebox.—Wide Firebox Freight Locomotives for the Chicago & Eastern Illinois. Illustrates and describes one of the wide firebox, compound, 12-wheel freight locomotives which will burn bituminous coal. 600 w. R R Gaz—Nov. 16, 1900.

Twelve-Wheel Wide-Firebox Freight Locomotive. Illustrates and describes a locomotive of the Buffalo, Rochester & Pittsburg Ry. designed to burn bituminous slack in a firebox extending over the rear driving wheels, the construction being such as to bring the engineer and fireman together in the same cab. 500 w. Am Engr & R R Jour—Nov., 1900.

Heavy Ten-Wheel Compound Passenger Locomotives with Wide Firebox, Lehigh Valley Railroad. An illustrated detailed description of an advanced design, with general dimensions, and inset. 1200 w. R R Gaz—Dec. 28, 1900.

New Passenger Locomotives for the Lake Shore & Michigan Southern. Illustrated description of new wide firebox locomotives. 800 w. R R Gaz—March 29, 1901.

Wide Firebox Passenger Locomotives for the Chicago, Rock Island & Pacific Railway. Illustrated description, with general dimensions of a locomotive for burning bituminous coal. 700 w. R R Gaz—April 26, 1901.

Ten-Wheel Wide Firebox Locomotive for the Wisconsin Central Railway. Illustrated description, with dimensions, of engines burning bituminous coal. 600 w. R R Gaz—May 10, 1901.

Wide Firebox Locomotives. An illustrated account of the development in the direction of increased grate surface. 4800 w. Ry Age—June 14, 1901.

Competitive Locomotive Types for the Illinois Central. Illustrates and describes two designs by Mr. William Renshaw, of the wide firebox type for passenger service. Their performance is to be carefully watched to determine which of the two to adopt for general use. 1500 w. R R Gaz—June 20, 1902.

See also **Atlantic; Central Atlantic; Culm Burning; Mogul; Pacific; Prairie; Switching; LOCOMOTIVE, COMPOUND—Consolidation; LOCOMOTIVE FIREBOX; LOCOMOTIVE OPERATION.**

Winterthur at Paris.—See Swiss at Paris.

Wootten.—See Culm-Burning.

Wrexham Quay Railway.—Engine No. 3—Wrexham, Mold and Connah's Quay Railway. A six driving wheel tank locomotive having eight wheels in all. Illustrations and dimensions. 400 w. Engr, Lond—Nov. 21, 1902.

LOCOMOTIVE ACCIDENT.

See **LOCOMOTIVE EXPLOSION; RAILWAY ACCIDENT.**

LOCOMOTIVE AXLE.

See **AXLE; LOCOMOTIVE; LOCOMOTIVE TRUCK.**

LOCOMOTIVE, BENZINE.

See **BENZINE LOCOMOTIVE.**

LOCOMOTIVE BOILER.

See also **LOCOMOTIVE; LOCOMOTIVE EXPLOSION; LOCOMOTIVE FIREBOX; LOCOMOTIVE GRATE; LOCOMOTIVE SMOKEBOX; LOCOMOTIVE TEST; STAYBOLT.**

Brotan.—See LOCOMOTIVE FIREBOX.

Care.—The Care and Management of the Locomotive Boiler. Thomas J. Rossell. On the advantages gained by keeping the boiler and flues clean, and concerning the rapidity with which the work may be done by devices invented by the writer. 900 w. Loc Engng—Sept., 1902.

Maintenance of Boilers and Roundhouse Work. Reynold C. Young. Read at Columbus Convention of International Ry. Master Boilermakers' Assn. Considers the causes that increase the cost of maintenance, and the repairs and care in roundhouse work. 1400 w. Ry & Engng Rev—June 6, 1903.

The Care of Locomotive Boilers. M. E. Wells. Second prize paper. On the damage boilers suffer from the lack of proper care. General discussion. 13,700 w. Pro Pacific Coast Ry Club—July 18, 1903.

The Care of Locomotive Boilers. M. E. Wells. Second prize paper of the Pacific Coast Ry. Club. Details of care needed. 5000 w. Ry Age—Sept. 11, 1903.

The Care of Locomotive Boilers. M. E. Wells. Discussion of this subject from the conclusion that it is inequality of temperature which causes most boiler troubles. Serial. 1st part. 1200 w. Ry Age—Oct. 21, 1904.

Care, Use and Design of Locomotive Boilers. Two papers, by George Austin, and by J. J. Malone, discussed together. 10,400 w. Pro Pacific C Ry Club—Dec. 16, 1905.

Copper Tubes.—Copper Tubes for Locomotive Boilers. Francis W. Webb. Abstract of a paper presented to the Inst. of Civ. Engrs., London. An account of experimental investigations made to ascertain the composition of the copper tubing most suitable for use in locomotive boilers. Ills. 1200 w. R R Gaz—July 15, 1904.

Covering.—Tests of Various Methods of Covering Locomotive Boilers (Essais de Divers Modes d'Enveloppes de Chaudières de Locomotives). H. Ledoux. Data and results of tests made upon various laggings for locomotive boilers by the Paris, Lyons and Mediterranean Railway. 3000 w. Rev Gen des Chem de Fer—Feb., 1903.

Danish.—See STAYBOLTS—Adjustable.

Design.—The Best Improvement in Boiler Design. Committee report and general discussion. 4500 w. Cent Ry Club—Jan., 1902.

Rational Design of Locomotive Boilers. D. Van Alstine. Calls attention to important points in the design of locomotive boilers. 700 w. Am Engr & R R Jour—June, 1902.

Special Features in the Design of Locomotive Boilers and Fireboxes. Charles S. Lake. Discussing the efforts to increase the steaming efficiency of the boiler to meet the increased demands for hauling power and speed. The first of two articles. 3500 w. Engineering Magazine—Oct., 1903.

Special Features in the Design of Locomotive Boilers and Fireboxes. Charles S. Lake. Mr. Lake's second paper treats especially of recent exomples of boiler design in British locomotives, including the use of water tubes, corrugated furnaces and superheaters. 3000 w. Engineering Magazine—Nov., 1903.

Special features in the Design of Locomotive Boilers and Fireboxes. Charles S. Lake. Mr. Lake's third and concluding paper treats of recent advances in firebox construction in America and on the Continent. 2500 w. Engineering Magazine—Dec., 1903.

Designing of Locomotive Boilers. Roger Atkinson. Considers the general principles and discusses details. Serial. 1st part. 1500 w. Loc Engng—April, 1904.

Boiler Design. A discussion opened by R. H. Soule. 6300 w. Pro N Y R R Club—April 15, 1904.

How to Lay Out a Locomotive Boiler. Frank B. Kleinhans. An illustrated article taking up the various parts of the boiler in their turn. 3000 w. Boiler Maker—Sept., 1905.

See also **LOCOMOTIVE DESIGN.**

Dimpfel.—The Dimpfel Boiler. C. H. Caruthers. Brief illustrated description of a type built in 1856. 900 w. Loc Engng—Jan., 1903.

Explosion.—See LOCOMOTIVE EXPLOSION.

Heating Surface.—The Value of Heating Surface. H. H. Vaughan. A study of this subject in locomotive practice, with general discussion. 10,000 w. Pro W Ry Club—April 19, 1904.

The Value of Heating Surface. Lawford H. Fry. Discussing the relative value of the various parts of the heating surface in a locomotive. The present article gives a preliminary survey. 3800 w. R R Gaz—June 24, 1904.

Heating Surface and Boiler Power. L. B. Jones. Compares the performance of a locomotive on the Pennsylvania R. R. with one on the Michigan Central, showing that a boiler with 2,640 sq. ft. of heating surface can maintain an output equal to the one with 3,505 sq. ft. 1700 w. R R Gaz—June 24, 1904.

The Relative Merits of Large Grates and Heating Surfaces and Their Proportions. Extracts from the report of the Committee on Coal Consumption in Locomotives, read at the last convention of the Am. Ry. Mas. Mechs.' Assn. Also discussion. 5700 w. Pro W Ry Club—Sept. 20, 1904.

The Value of Heating Surface for Steaming and Superheating in Locomotive Boilers (Der Wert der Heisfläche für die Verdampfung und Ueberhitzung im Lokomotivkessel). H. Strahl. A discussion of experiments upon the transmission of heat in various parts of a locomotive boiler. 4000 w. Zeitschr d Ver Deutscher Ing—May 6, 1905.

See also **LOCOMOTIVE—Weight and Heating Surface.**

Heat Transmission.—See HEAT TRANSMISSION—Boiler Scale.

History.—Evolution of the Locomotive Boiler. O. H. Reynolds. A review of the progress during the last 100 years. Ill. 2000 w. Loc Engng—Jan., 1903.

See also **LOCOMOTIVE.**

Hydrostatic Test.—Hydrostatic Tests of Locomotive Boilers. George Wagstaff. Discusses whether it is necessary or desirable to give a locomotive boiler the hydrostatic test, and if so, whether it should be greater than the allowed steam pressure. Also general discussion. 3300 w. Pro Cent Ry Club—Sept. 8, 1905.

Leaky.—One Cause of Leaky Flues. S. W. Miller. Mentions the primary cause as bad water, and discusses the setting of flues. General discussion follows. 2400 w. W Ry Club—Sept. 16, 1902.

Concerning Leaky Fireboxes. T. S. Reilly. Considers that the lowering of the percentage of firebox to total heating surface has been carried below desirable limits. General discussion. 10,000 w. Pro W Ry Club—Oct. 20, 1903.

Leaky Fire Boxes and Tubes. Editorial discussing the causes of this trouble. 1200 w. Loc Engng—Dec., 1903.

Leaky Tubes and Fireboxes. A. Parfitt. A boilermaker's opinion of some causes of trouble, and ways of remedying. 4500 w. Ry & Engng Rev—Dec. 12, 1903.

See also **LOCOMOTIVE OPERATION—Blows and Vibrations; Wide Firebox; LOCOMOTIVE TEST.**

Maintenance.—See **Care.**

Oil Burning.—See **Water-Tube; LIQUID FUEL; LOCOMOTIVE.**

Robert.—See **Water-Tube, Robert.**

Setting.—Locomotive Boilers Free From Strains (Der Spannungsfreie Locomotivkessel). H. Lentz. A paper before the German Railway Society, discussing a form of suspension for locomotive boilers by which distorting strains may be avoided. Cast frames are also discussed. 3000 w. Glasers Annalen—Jan. 15, 1901.

Shell Chart.—A Boiler-Shell Chart. Lawford H. Fry. Chart, with explanation and illustration of its use. 800 w. Am Engr & R R Jour—June, 1901.

Slope Sheet.—A Method of Developing the Slope Sheet of a Locomotive Boiler When Center of the Cone is Inaccessible. Frank B. Kleinhans. Illustrated description of method used. 500 w. Loc Engng—Aug., 1901.

Staybolt.—See **STAYBOLT.**

Steaming Capacity.—See **LOCOMOTIVE RATING; LOCOMOTIVE TEST—German.**

Test, Hydrostatic.—See **Hydrostatic Test.**

Test, Purdue.—See **LOCOMOTIVE TEST—Purdue.**

Tube Cleaner.—See **BOILER TUBE CLEANER.**

Tubes.—Long Tubes Do Not Vibrate. Description of an experiment made on a fast passenger engine on the L. S. & M. S. Ry. 600 w. Loc Engng—Nov., 1902.

Locomotive Boiler Tubes. Lawford H. Fry. Discusses the effect of tube spacing. 900 w. R R Gaz—Sept. 11, 1903.

See also **Copper Tubes; Water-Tube.**

Vanderbilt.—See **LOCOMOTIVE; LOCOMOTIVE, COMPOUND—Baldwin-Vanderbilt.**

Water-Tube.—A Water-Tube Locomotive Boiler. Illustrated description of a type used on the London & Southwestern Railway, England. 500 w. Ry Age—March 28, 1902.

The Oil-Burning Water-Tube Locomotive Boiler. Brief illustrated description of a design used on the Northern Pacific Railroad. 600 w. Sci Am—March 29, 1902.

Water-Tube Boiler for Locomotives. An illustrated description of a boiler of the locomotive type, with modifications, in use on the London and South Western Ry., England. Also describes spark-preventing apparatus. 2200 w. Engng—May 30, 1902.

A Water-Tube Locomotive Boiler. Illustrates and describes the design of J. M. McClellon. 900 w. Loc Engng—Dec., 1903.

See also **LOCOMOTIVE FIREBOX—Brotan.**

Water-Tube, Robert.—A French Locomotive with Water-Tube Boiler. Describes a locomotive, designed by Jacques Robert, for the Algerian division of the Paris, Lyons & Mediterranean Ry. Ills. 500 w. Eng News—June 15, 1905.

A French Locomotive with Water-Tube Boiler. Information and sections of a locomotive put in service on the Algerian lines of the Paris, Lyons and Mediterranean Railway. 700 w. Mech Engr—July 1, 1905.

Water Tube Locomotive Boiler (Chaudière de Locomotive à Tubes d'Eau). F. Barbier. Illustrated description of the Robert water-tube boiler as fitted to engines of the Algerian railways. 1800 w. 1 plate. Génie Civil—July 29, 1905.

Robert Water-Tube Locomotive Boiler. F. Barbier, in "Le Génie Civil." Illustrated description of a boiler of this type, which for more than a year has been in successful working in France. 1000 w. R R Gaz—Vol. XXXIX., No. 13.

LOCOMOTIVE BUFFER.

See **DRAFT GEAR—Locomotive.**

LOCOMOTIVE CAR.

See **CAR, MOTOR-DRIVEN.**

LOCOMOTIVE, COMPOUND.

See also **LOCOMOTIVE; LOCOMOTIVE EXHIBITION; LOCOMOTIVE TEST; LOCOMOTIVE VALVE GEAR.**

The Relative Advantages of Ordinary and Compound Locomotives. Charles Ernest Wolff. Considers compound locomotives in general, and also various types, their advantages and disadvantages, and gives conclusions reached. 4200 w. Prac Engr—Nov. 30, 1900.

Modern Locomotive Practice. C. E. Wolff. Discusses the compound principle and how the special conditions under which a locomotive works affects the question. Ill. 2000 w. Mech Engr—Nov. 29, 1902.

Progress of Two-Cylinder Compound Locomotives During the Past Ten Years. C. J. Mellin. Reviews the progress in its evolution to the present state, and states its advantages over the simple engine. 3000 w. R R Gaz—Jan. 25, 1901.

Strength and Weakness of Compound Locomotives. C. R. Petrie. States some facts brought out by the use of compounds. 600 w. Loc Engng—Feb., 1901.

Why is a Locomotive Compounded? Roger Atkinson. Explains the manner in which compounding reduces losses from cylinder condensation. 2100 w. Loc Engng—May, 1901.

A Review of the Different Systems of Compounding. F. F. Gaines. Reviews the mechanical features. 900 w. R R Gaz—Sept. 27, 1901.

To Make Compound Locomotives Efficient. W. A. Buckbee. Discusses various types and the need of a better understanding of the construction and operation of these engines in the service for which they are adapted. 1800 w. Loc Engng—May, 1902.

Compound Engines. Editorial review of the development and the advantages. 2500 w. Loc Engng—Jan., 1904.

The Compounding of Locomotives. A. T. J. Kersey. Abstract of a paper read before the Swindon Engng. Soc. The present number considers the advantages due to compounding in marine engines, contrasting conditions of working, and discussing the considerations, and the possibilities of a condenser. Serial. 1st part. 2800 w. Mech Engr—May 13, 1905.

The Compound Locomotive of To-Day. J. F. Gairns. The present article is introductory and reviews the position occupied by the compound locomotive to-day. The principal systems in use will be considered. Serial. 1st part. 2000 w. Prac Engr—Dec. 15, 1905.

American.—American Locomotives. Abstract of a paper by William Forsyth, presented before the Int. Engng. Cong. Discusses modern designs, the changes made in four-cylinder balanced compounds, boilers, etc., and the operation of locomotives as affected by the fireman, valves, etc. 6000 w. R R Gaz—Vol. XXXVII., No. 18.

American vs. European.—Heavy Freight Locomotive of the Atchison, Topeka & Santa Fé Railroad (Schwere Güterzuglokomotive der Atchison, Topeka & Santa Fé Bahn). H. Metzeltin. Illustrated description of new tandem-compound engines with table comparing American and European locomotives. 1800 w. Zeitschr d Ver Deutscher Ing—March 5, 1904.

Argentina.—Compound Locomotives in South America. R. Gould. Read before the Glasgow Congress. Some particulars of the results of the compound locomotive on the Buenos Aires Great Southern Railway. Ill. 1700 w. Engng—Sept. 27, 1901.

See also **Articulated.**

Arrangement.—The Engine Arrangement in Four Cylinder Compounds. Gives a sketch indicating the arrangement in four types, with brief description of each design. 250 w. Ry Age—July 29, 1904.

Articulated.—Locomotives at the Exposition of 1900 (Les Locomotives à l'Exposition de 1900). F. Barbier. An account of the Mallet system of compound articulated locomotives in connection with the exhibit of Maffei, of Munich. 2000 w. 1 plate. Génie Civil—Jan. 5, 1901.

Compound Duplex Tender Locomotive on the Mallet System (Verbund-Duplex-Tender-Lokomotive, System Mallet). An illustrated description of a 1-meter gauge locomotive with two sets of three coupled driving wheels on the Mallet articulated system, built by the Swiss Winterthur works for the French "Departementaux" railway. 400 w. Schweiz Bauzeitung—April 26, 1902.

Duplex Tank Locomotive. Illustration and brief description of a trial locomotive on the Mallet system for use on French railways. 500 w. Engr, Lond—May 23, 1902.

Meter-Gauge Locomotive. Drawings, photographs and description of a 12-wheel coupled compound duplex tank locomotive designed and built on the Mallet system. 500 w. Engng—Aug. 1, 1902.

Mallet Articulated Locomotive for the Baltimore & Ohio. Elevation view and brief description of an engine having a frame hinged in the middle to allow of horizontal swing. 600 w. Ry Age—Sept. 4, 1903.

Mallet Articulated Compound for the Baltimore & Ohio. Illustrated description of a type extensively used in Europe, particularly adapted to heavy freight service on many grades with sharp curves. Inset. 1000 w. R R Gaz—May 27, 1904.

Mallet Articulated Compound Locomotive, B. & O. R. R. Illustrated detailed description of the heaviest locomotive ever built. 700 w. Ry & Engng Rev—May 28, 1904.

The Mallet Duplex Compound Locomotive, Baltimore & Ohio Ry. Illustrated detailed description of this remarkable locomotive of 334,500 lbs. weight, carried on 12 wheels. 1700 w. Eng News—June 30, 1904.

The Mallet Articulated Locomotive at the St. Louis Exhibition. H. W. Hanbury. Well-illustrated description of large compound locomotive built by the American Locomotive Co. 1 plate. 2000 w. Engng—Aug. 5, 1904.

The Mallet Articulated Locomotive at the St. Louis Exhibition. H. W. Hanbury. Especially discusses the intercepting, reducing and emergency valves, which are the leading feature of the Richmond System of Compounding. 1500 w. Engng—Nov. 11, 1904.

A New Type of Compound Articulated Locomotive. Sections and descriptions of two freight locomotives recently built for the Northern Railway of France. 700 w. Ry Age—April 28, 1905.

Compound Articulated Locomotive for South America. Gives the first of a series of drawings of compound locomotives on the articulated system, built for the meter-gauge line of the Central Northern Railway of the Argentine Republic, with brief note. Serial. 1st part. 1500 w. Engng—July 14, 1905.

Details of Argentine Locomotives. Illustrates compound articulated locomotives (meter gauge) for the Central Northern Railway of the Argentine Republic. The engines work on heavy grades up to 1 in 40 and wood is used as fuel. They have many interesting features. 1600 w. Engng—Aug. 4, 1905.

Compound Articulated Locomotive for the Northern Railway of France. H. W. Hanbury. Illustrated detailed description of an engine exhibited at Liége, which is attracting much attention because of its novel design. It is to be used for coal traffic, which is exceedingly heavy. 2200 w. Engng—Oct. 6, 1905.

French 6-2-2-6 Compound Freight Locomotive. Illustrated description of a new design for hauling heavy coal trains over variable grades. 900 w. Ry & Engng Rev—Oct. 7, 1905.

Compound Freight Locomotive (Locomotive Compound à Marchandises). F. Barbier. Describing a double motor-bogie engine of 102 tons weight designed for the heavy coal traffic of the Northern Railway of France. 2000 w. 1 plate. Génie Civil—Oct. 28, 1905.

Articulated Locomotives. Charles S. Lake. Illustrates and describes several types of articulated locomotives, which are well suited for working round curves of small radius and on steep gradients. 2800 w. Mech Engr—Oct. 14, 1905.

Heavy Duplex Compound Goods Locomotive. Photograph and sectional elevation, with description of one of two heavy articulated compound locomotives designed by Mons. de Bousquet, of the Northern Ry. of France. 900 w. Prac Engr—Oct. 27, 1905.

See also **LOCOMOTIVE PERFORMANCE—Mallet B. & O.**

Atch., Top. & Sante Fe.—See **American vs. European; Balanced Baldwin; Vauclain; Sante Fe; LOCOMOTIVE PERFORMANCE.**

Atlantic.—See **Goelsdorf; LOCOMOTIVE.**

Austria.—See **Goelsdorf.**

Austro-Hungarian at Paris.—See **LOCOMOTIVE.**

Balanced.—Four-Cylinder Balanced Compound Locomotives. Designs and extracts from two letters received by W. F. M. Goss, giving suggestions for new designs of balanced engines and the advantages claimed. Ill. 700 w. R R Gaz—Jan. 2, 1903.

The Turning Moments of Four-Cylinder Balanced Compound Locomotives. Calls attention to an error in an article by Edward L. Coster in the December issue of the "American Engineer." Ill. 1000 w. R R Gaz—Jan. 1, 1904.

The Balanced Compound-Results Obtained from Service. Lawford H. Fry. An illustrated description of this type of locomotive, with illustrations of various machines and report of their working. General discussion. 6000 w. Pro W Ry Club—Dec. 20, 1904.

Balanced Compound Locomotives in Service. Lawford H. Fry. Gives illustrations and describes types of these engines, presenting results obtained in actual service. Short discussion. 5500 w. S & S-W Ry Club—Nov. 16, 1905.

A New Design for a Four-Cylinder Balanced Compound Locomotive. Samuel F. Prince. A description of the writer's four-cylinder balanced system. Ills. 700 w. R R Gaz—Vol. XXXVIII., No. 23.

See also **Cole Balanced; Counterbalancing; German; N. Y. C. & H. R. R.; Prussian; Von Borries; LOCOMOTIVE — Counterbalancing; Superheater; Germany.**

Balanced, A. T. & S. F.—Santa Fe Four-Cylinder Balanced Compound. Illustration, plan, cross sections, and detailed description. 1400 w. Ry Age—Sept. 18, 1903.

Balanced Atlantic.—See **Baldwin; Vauclain, C. R. I. & P.**

Balanced Baldwin.—Baldwin Four-Cylinder Balanced Compound Locomotives for the Santa Fe. Illustrated detailed description, with data of tests. 1000 w. R. R. Gaz—Jan. 22, 1904.

Four-Cylinder Balanced Compound Locomotives, Atchison, Topeka & Santa Fe Ry. Illustrated detailed description of these new engines, with editorial. 6000 w. Eng News—March 31, 1904.

Baldwin Four-Cylinder Compound Locomotive. W. J. McCarroll. Read before the Traveling Engrs.' Assn. Remarks on the value of compounding, with illustrated description of this engine and its action. 3800 w. Ry & Engng Rev—Nov. 12, 1904.

Advantages of Four-Cylinder Balanced Compound Locomotives. From "Record of Recent Construction," No. 49, issued by the Baldwin Locomotive Works. 1905. Discusses the advantages obtained and gives a record of test rules. Ills. 2000 w. R R Gaz—Vol. XXXVIII., No. 6.

Two Baldwin Four-Cylinder Balanced Compound Locomotives. Illustrated descriptions of two new types. An Atlantic (4-4-2) type engine, and a Pacific (4-6-2) engine. 500 w. R R Gaz—Vol. XXXIX., No. 19.

Pacific Balanced Compound for the Santa Fé. Illustrated description of a large passenger engine with four compound cylinders and Vauclain's engine arrangement. 300 w. Ry Age—Dec. 8, 1905.

Balanced, Burlington.—Baldwin Four-Cylinder Balance Compound for the Burlington. Illustrated general description. 600 w. R R Gaz—June 3, 1904.

Vauclain Four-Cylinder Balanced Compound. Illustrated description of a 4-4-2 type for passenger service on the Chicago, Burlington & Quincy Railway. 500 w. Am Engr & R R Jour—June, 1904.

Balanced, Erie.—Schenectady Balanced Compound Locomotive for the Erie. Illustrates and describes this experimental engine built for hauling heavy passenger trains on the grades between Jersey City and Port Jarvis. 600 w. Ry Age—Aug. 4, 1905.

Balanced, N. Y. Central.—Balanced Compound for the New York Central. Illustrated description of a 4-cylinder balanced compound of the Vauclain type. 300 w. Ry Age—March 31, 1905.
See also **Cole Balanced.**

Balanced, Origin.—The Origin of Four-Cylinder Balanced Compound Locomotives. Charles R. King. A review of designs of four-cylinder engines, and of balanced compounds, aiming to trace the first four-cylinder balanced compounds built. Ills. 4500 w. R R Gaz—Vol. XXXIX., No. 23.

Balanced Pacific.—Four-Cylinder Balanced Compound Passenger Locomotive, Pacific Type. Illustrated description of an important design for the Oregon R. R. & Nav. Co., in which the Vauclain 4-cylinder compound arrangement was applied to a six-coupled engine. 500 w. Am Engr & R R Jour—July, 1905.

Pacific Type Four-Cylinder Balanced Compound Locomotive. Illustrated description of an engine built for the Oregon Railroad & Navigation Co. 300 w. Ry Age—July 14, 1905.

See also **Balanced Baldwin.**

Baldwin-Vanderbilt.—Compound Ten-Wheel Passenger Locomotive. Illustrated detailed description of this new locomotive for the Plant System, which is the 20,000th locomotive built by the Baldwin Locomotive Works, and a most interesting engine. It combines the four-cylinder balanced construction with the Vanderbilt boiler and tender. 900 w. Am Engr & R R Jour—March, 1902.

Bavaria.—New Compound Locomotives in Bavaria. Charles R. King. An illustrated description of locomotives largely representative of the most approved and latest European practice, with discussion of details. 2500 w. R R Gaz—Vol. XXXVII., No. 19.

The New Express Locomotives of the Bavarian State Railways (Die Neuen 2-5 und 3-5 Gekuppelten Schnellzug-Lokomotiven der Bayerischen Staatsbahnen). E. Weiss. Illustrating and describing heavy compound four-cylinder express engines by Maffei, of Munich. 2000 w. 1 plate. Zeitschr d Ver Deutscher Ing—March 18, 1905.

New Type of Bavarian Four-Cylinder Compound Locomotives. Charles R. King. Also editorial. Illustrated description of powerful new engines recently designed for hauling heavy trains, with explanatory notes and comments. 4000 w. Ry Age—Sept. 15, 1905.

The New Ten-Wheeled Express Locomotives of the Bavarian State Railways. E. Weiss. Gives a statement of the performances demanded, general arrangement and chief dimensions, with illustrated description. 2800 w. Bul Int Ry Cong—Nov., 1905.

Belgium.—Four-Cylinder Compound Locomotives in Belgium. Charles S. Lake. Reviews the tendencies of modern locomotive practice in Belgium, and gives illustrated descriptions of two heavy engines of great power recently built. 1500 w. Mech Engr—Oct. 28, 1905.

Berlin Metropolitan.—Heavy Tank Engines with Three Cylinders, Berlin Metropolitan Railway. Illustration, with description of powerful engines for suburban traffic. 800 w. Engr, Lond—April 15, 1904.

British.—English Three-Cylinder Compound on the Midland. Illustrated description of an engine which works the express passenger trains between Leeds and Carlisle. 700 w. Loc Engng—May, 1904.

Compound Locomotives. Charles S. Lake. A discussion of the subject of compounding, and the practice in Great Britain. Concludes that the compound locomotive is far from a perfect machine, but capable of development to much greater excellence. 3000 w. Prac Engr—May 27, 1904.

The Development of the Compound Locomotive in England. W. E. Dalby. The first portion of a review of the growth of the compounding of locomotives on British railways, with many illustrations of important engines. 3500 w. Engineering Magazine—September, 1904.

The Development of the Compound Locomotive in England. W. E. Dalby. Professor Dalby's second article deals with the compound engines of the Northeastern, Midland and Great Northern railways, with details and data of performances. 8000 w. Engineering Magazine—Oct., 1904.

British and French.—Notes on English and French Compound Locomotives. Charles Rous-Marten. Paper read before the Soc. of Engs., England. A review of the merits and demerits of compounding from the viewpoint of its practical value in regular service, with conclusions. Serial. 1st part. 1700 w. Transport—Nov. 9, 1900.

Buenos Aires Ry.—See **Argentina; Articulated; LOCOMOTIVE PERFORMANCE.**

Bulgaria.—Compound Locomotive, Bulgarian State Railways. Illustration, with brief description. 500 w. Engr, Lond—Oct. 25, 1901.

Compound Locomotive, Bulgarian State Railways. Sectional drawings and description. 2500 w. Engr, Lond—Nov. 15, 1901.

Canadian Pacific.—Ten-Wheel Compound Passenger Locomotive, Canadian Pacific Ry. Engraving and outline diagram of recently built engine designed to burn bituminous coal. 1200 w. Ry & Engng Rev—Sept. 27, 1902.

Two-Cylinder Compound Locomotives. Illustrated description and dimensions of the most recent development of the two-cylinder compound for passenger service. It has a double-ported valve for the low-pressure cylinder. For use on the Canadian Pacific Ry. 3500 w. Am Engr & R R Jour—Dec., 1902.

See also **LOCOMOTIVE—Superheater, Canada.**

Central Atlantic.—See **LOCOMOTIVE.**

Chicago & Eastern Illinois.—Chicago & Eastern Illinois Twelve-Wheeler. Illustrated description of a very heavy compound engine. 450 w. Loc Engng—Dec., 1900.

Ten-Wheel Compound Locomotive for the Chicago & Eastern Illinois. Illustrated detailed description of engines for heavy passenger or fast freight service. 500 w. Ry Age—July 10, 1903.

C., B. & Q.—See **Balanced, Burlington.**

Classification.—See **LOCOMOTIVE.**

Cole Balanced.—Cole's 4-Cylinder Balanced Compound Locomotive. Illustration, with description of an interesting engine which will form a part of the exhibit of the N. Y. C. & H. R. R. R. at St. Louis. 500 w. Am Engr & R R Jour—May, 1904.

New York Central Express Compound Locomotive. Illustrated description of the balanced compound locomotive at the head of the Empire State Express, on exhibition at St. Louis. 700 w. Sci Am—July 30, 1904.

The Cole Balanced Compound Locomotive at the St. Louis Exhibition. H. W. Hanbury. Perspective view, general drawing and description. 2000 w. Engng—Oct. 21, 1904.

Four-Cylinder Balanced Compound Locomotives. F. J. Cole. Explains the reasons which led to the use of these locomotives, stating some of their advantages, giving illustrated descriptions of many applications of different types of locomotives. General discussion. 10,800 w. Pro Ry Club of Pittsburgh—Jan., 1905.

Four-Cylinder Compound Locomotives in America. F. J. Cole. Explains some of the conditions on American railroads which make this type of advantage, and reviews briefly the history of four-cylinder, balanced engines in this country. Ills. 3000 w. R R Gaz—Vol. XXXVIII., No. 20.

Balanced Compound Locomotive, P. R. R. Illustrations and general dimensions of a new Cole compound passenger engine. 600 w. Ry & Engng Rev—Oct. 7, 1905.

Cole Superheater.—See **LOCOMOTIVE—Superheater, Cole.**

Colorado and Southern.—Tandem-Compound Consolidations for the Colorado & Southern. Illustrated description. 500 w. R R Gaz—Nov. 13, 1903.

Consolidation.—Two-Cylinder Compound Consolidation Locomotive. Illustration and brief description of engines for the "Soo" Line. 250 w. Am Engr & R R Jour—Dec., 1900.

Compound Consolidation Freight Locomotives with Wide Firebox. Illustration and particulars of a new locomotive for the N. Y. C. & H. R. R. R., known as the "Central Consolidation." It is a two-cylinder compound, with a wide grate, large boiler and 210-lb. boiler pressure. 800 w. Am Engr & R R Jour—March, 1901.

Two-Cylinder Compound Consolidation Locomotives, Class G-1—New York Central Railroad. Illustrated description of engine designed for heavy freight service, but so equipped that they may be used in emergency on passenger trains. 55 of these engines have been ordered. 700 w. R R Gaz—March 1, 1901.

Compound Consolidation Locomotive, M., St. Paul & S. Ste. M. Ry. Illustration, noting important features of one of four recently built engines. 900 w. Ry & Engng Rev—Feb. 15, 1902.

Compound Consolidation Passenger Locomotive. Illustrated description of a locomotive used on grades of 3 and 4 per cent., and curves of 16 degrees in the mountains of Colorado. 600 w. Am Engr & R R Jour—Feb., 1902.

Two-Cylinder Compound Consolidation for the Wheeling and Lake Erie R. R. Illustrates and describes an engine designed to burn bituminous coal and for a working boiler pressure of 200 lbs. 1000 w. Ry & Engng Rev—June 7, 1902.

Tandem Compound Freight Locomotive. Illustrated description of the powerful locomotives of the 2-8-0 type, belonging to class known as G-4. 800 w. Am Engr & R R Jour—May, 1903.

See also **Northern Pacific Ry.**; **Vauclain**; **LOCOMOTIVE.**

Consolidation, Vermont Central.—See Richmond System.

Counterbalancing.—The Computation of Counterweights for Multiple-Cylinder Locomotives (Die Berechnung der Gegengewichte bei Zwei, Drei- und Viercylinder-Lokomotiven). J. Kempf. An examination of the action of the disturbing forces for various crank positions, and the extent to which they can be balanced. Serial. Part I. 3000 w. Glasers Annalen—May 1, 1904.

Balancing Balanced Compound Locomotives. Gives method of counterbalancing revolving parts on a crank-axle. Ills. 500 w. Am Engr & R R Jour—June, 1905.

Counterbalance for Balanced Compound Locomotives. Lawford H. Fry. Illustrations showing the position of the counterbalance, with explanation of the reason. 600 w. R R Gaz—Vol. XXXVIII., No. 23.

See also **Balanced**; **LOCOMOTIVE.**

De Bousquet.—See Articulated.

Decapod.—See Santa Fe.

Defect Location.—Locating Defects in Schenectady Cross Compound Engines. V. C. Randolph. Suggestions. 900 w. Loc Engng—March, 1904.

De Glehn.—Four-Cylinder Compound Locomotives (De Glehn Type). Illustration of this type, with views of prominent railroad men, and notes giving results of work done by these engines. 2500 w. Transport—Nov. 9, 1900.

The "De Glehn" Compounds on the Northern of France. R. Hope. Records of the actual performances of these engines, with remarks. 2700 w. R R Gaz—June 7, 1901.

The de Glehn Four-Cylinder Compound. A. G. de Glehn. A discussion of the construction of this type of engine answering arguments that have been used to oppose it. 2600 w. Am Engr & R R Jour—Sept., 1902.

Four-Cylinder Compound Locomotives. Alfred G. de Glehn. A general description of the de Glehn compound as now built, with discussion of the reasons that have conduced to its extended use. 2400 w. Engr, Lond—Oct. 30, 1903.

The French Locomotive for the Great Western Railway. Charles Rous-Marten. On the latest engine of the de Glehn compound type—No. 102. Ill. 2500 w. Engr, Lond—Dec. 4, 1903.

See also **Von Borries.**

De Glehn, Paris-Orleans. — Four-Cylinder De Glehn Compound Locomotive. Inset, with detailed description and general dimensions of the 4-4-2 type of the Paris-Orleans Railway of France. The illustrations indicate the construction, with the exception of a few details, of the new Pennsylvania locomotive of this type. 1500 w. Am Engr & R R Jour—June, 1904.

Four-Cylinder Compound Locomotive. Paris-Orleans Railway. Illustrations, description and principal dimensions. 600 w. Engr, Lond—June 3, 1904.

The New Four-Cylinder Compound Locomotives of the Orleans Railway (Les Nouvelles Locomotives Compound de la Compagnie Orleans). P. Conte. Illustrated description of heavy express and freight engines of the de Glehn type. 6000 w. 5 plates. Rev Gen des Chem de Fer—July, 1904.

Distribution of Work.—The Distribution of Work in Compound Locomotives (Répartition du Travail dans les Machines Compound). G. Mohr. An examination of the steam distribution in compound locomotives for various positions of the link. 1000 w. Génie Civil—Aug. 2, 1902.

England.—See British.

European.—Some Foreign Four-Cylinder Compound Locomotives. Illustrations of five engines, discussing some superficial features. 1500 w. R R Gaz—Dec. 7, 1900.

Four Cylinder Compounds in Europe. Reginald Gordon. Illustrates an engine showing recent German practice, and gives comparative tables showing weights and dimensions of four-cylinder compound locomotives. 800 w. R R Gaz—April 10, 1903.

Extended Piston Rod.—Extended Piston Rods on Union Pacific Vauclain Compounds. G. H. Likert. States the difficulties experienced with the first design, and the remedy by the use of the extended piston rods. 900 w. R R Gaz—Vol. XXXIX., No. 4.

See also **PISTON ROD—Extension.**

France.—High Speed Compound Locomotives of the Northern Railway of France (Les Locomotives Compound à Grande Vitesse du Chemins de Fer du Nord). A review of the criticisms of Von Borries of the new express engines of the Northern Railway of France. 2000 w. Génie Civil—May 4, 1901.

Compound Locomotives with Four Cylinders and Eight Driving Wheels (Note sur les Machines Compound à 4 Cylindres et 8 Roues Accouplées de la Compagnie des Chemin de Fer du Midi). A well illustrated description of compound locomotives, with four pairs of coupled drivers and pony truck, built by the Société Alsaciens, at Belfort, for the "Midi" Ry. Co., of France. 3 plates. 3000 w. Rev Gen d Chemins d Fer—April, 1902.

Goods Locomotive for the Southern Railway of France. Illustrated detailed description of a compound engine. 1700 w. Engng—July 18, 1902.

The Compound Locomotive and Its Development in France. A. Herdner. An interesting review of types and advantages of each and the work for which each is suited, with discussion of their development in other countries and in France. Ill. Serial. 1st part. 4500 w. Am Engr & R R Jour—Dec., 1902.

Locomotives for the Mediterranean Railway. Illustrates and describes recently completed engines of the compound type, having four axles coupled and a four-wheeled bogie. They were designed for heavy trains on mountain lines. 1000 w. Engng—March 27, 1903.

Express Engine, Western Railway of France. Two-page plate, with description of four-cylinder compound locomotives used for express service. 2200 w. Engr, Lond—May 15, 1903.

Compound Passenger Locomotives on the Eastern Railway of France. Charles S. Lake. An illustrated description of engines in use on the Chemins de Fer de l'Est. Serial. 1st part. 1500 w. Prac Engr—May 15, 1903.

Compound Locomotives in France. M. Edouard Sauvage. Details of locomotive practice, especially considering the four-cylinder compound. Many tables and illustrations. 12,000 w. Inst of Mech Engrs—March 18, 1904.

Four-Cylinder Locomotive for the Eastern Railway of France. H. W. Hanbury. Plate, illustration and description of a compound locomotive exhibited at the Liége Exhibition. 2200 w. Engng—Dec. 22, 1905.

See also **Articulated**; **De Glehn**; **Henri**; **Paris.**

France Western.—See LOCOMOTIVE TEST.

Fuel Consumption.—See LOCOMOTIVE PERFORMANCE.

German at St. Louis.—High-Speed Three-Cylinder Compound German Locomotive. Illustrated description of an engine on exhibition at St. Louis which is entirely inclosed above the running board in a continuous steel housing, wedge-shaped at the front end, for the purpose of reducing air resistance. 2200 w. Ry Mas Mech—Sept., 1904.

Goelsdorf.—The Four-Cylinder Compound Express Locomotive for the I. R. State Railways of Austria. Iaroslav Iirdra. Illustrated description of an engine of the Atlantic type. 600 w. Loc Engng—April, 1902.

Four-Cylinder Compound Locomotives with Goelsdorf Steam Distribution System (Nouvelles Locomotives Compound à Quatre Cylindres à Dispositif de Démarrage Système Goelsdorf). Illustrated description of Atlantic type locomotives for the Austrian Government railways. 2500 w. Génie Civil—July 12, 1902.

Express Compound Locomotive, Austrian State Railways. Illustration and description of the fine two-cylinder four-coupled locomotive employed for the fast international train services. 800 w. Engr, Lond—Sept. 12, 1902.

Goelsdorf Compound Locomotives. Reginald Gordon. An illustrated article stating some of the advantages claimed by this system. 1400 w. R R Gaz—Jan. 16, 1903.

Austrian 0-10-0 Locomotive. Karl Gölsdorf. Illustrated description of a design built in 1901 for the State Railways. Also some of the most recent designs. 400 w. Ry & Loc Engng— Nov., 1905.

Great Northern, Eng.—See British.

G. W. Ry., England.—French Express Engine for an English Railroad. Brief illustrated description of the type of new four-cylinder compound express engine building for the Great Western Ry., England. 600 w. Sci Am—June 20, 1903.

Handling.—See **LOCOMOTIVE OPERATION—Compound.**

Hanover at Paris.—German Locomotives at the Paris Exhibition. Illustrates and describes the exhibit of the Hanover Engine Construction Company. 800 w. Engng—Jan. 18, 1901.

German Four-Cylinder Compound. Illustrated description of eight-wheel compound exhibited at Paris by the Hanover Construction Company. 600 w. Loc Engng—March, 1901.

Four-Cylinder Compound Express Locomotive (Locomotive Compound à Grand Vitesse, à Quatre Cylindres). F. Barbier. Description of the engine exhibited at Paris by the Hanover Machine Works, at Linden, near Hanover. 2000 w. 1 plate. Génie Civil—Sept. 28, 1901.

Henri.—High-Speed Compound Locomotives (Locomotives Compound à Grande Vitesse). Ch. Baudry. Illustrated description of four-cylinder compound express locomotives for the Paris-Lyons-Mediterranean system, with complete specifications and drawings. 3500 w. 3 plates. Rev Gen d Chem de Fer—Feb., 1905.

Henri Four-Cylinder Compound Express Locomotives—Paris, Lyons and Mediterranean Railway. F. C. Coleman. Illustration, sections and brief explanation of the Henri system of express locomotives. 400 w. Ry Age—Aug. 18, 1905.

Four-Cylinder Compound Locomotive for the Paris, Lyons and Mediterranean Railway. H. W. Hanbury. Illustrated detailed description of a six-coupled locomotive believed capable of maintaining an average speed of 50 miles per hour on varying gradients, with a load of 300 tons. 1500 w. Engng—Nov. 24, 1905.

Henschel, Cassel.—See **LOCOMOTIVE—Tank, Henschel.**

High-Speed.—Some Recent High-Speed Locomotives (Neuere Schnellzuglokomotiven). M. Weiss. Illustrated descriptions, mainly of European compound locomotives. 2 parts. 1 plate. 3500 w. Schweiz Bauzeitung—June 20 and 27, 1903.

See also **De Glehn; Henri; LOCOMOTIVE.**

Hungary.—Compound Express Engine, Hungarian State Railways. Illustrated detailed description of an engine exhibited at Paris, which possesses novel features. 1800 w. Engr, Lond—Aug. 9, 1901.

Compound Passenger and Goods Locomotives for the Hungarian State Railways. Illustrates and describes an engine with two-coupled driving axles, a bogie in front and trailing wheels in the rear, for hauling heavy train at a high speed. 1200 w. Engng—Dec. 27, 1901.

Italian.—Six-Wheel Coupled Compound Locomotive; South Italian Railways. Illustrations of a new type of high-speed compound locomotive possessing some very remarkable features. Description to be given later. 150 w. Engng—May 17, 1901.

SixCoupled Compound Express Engine, Mediterranean Railway of Italy. Dimensions and some constructional details of this engine. 3700 w. Engr, Lond—May 31, 1901.

Italian Express Locomotive. Illustrates details of this high-speed compound locomotive giving dimensions. 800 w. Engng—June 14, 1901.

Four Cylinder Compound Express Locomotive (Locomotive Compound à Grand Vitesse à Quatre Cylindres). D. Bellet. Illustrated description of the 66 ton express compound locomotives of the Italian Adriatic Railway. 2000 w. Revue Technique—Aug. 25, 1901.

Compound Express Locomotive of the Adriatic Railway, Italy (Locomotive Compound Express des Chemins de Fer de l'Adriatique). F. Barbier. A well illustrated description of an Italian locomotive with the cab in front and smokestack in rear, three pairs of drivers and four-wheeled bogie truck, exhibited at Paris. 1 plate. 2500 w. Génie Civil—March 8, 1902.

A Four-Cylinder Compound for Fast Trains. Illustrates and describes an engine of somewhat peculiar design built for the Southern Railroad of Italy. 1100 w. R R Gaz—April 18, 1902.

Compound Coupled Locomotive for the Mediterranean System (Locomotiva Compound a 4 Assi Accoppiati e Carello della Rete Mediterranea). Illustrated description of 70 ton freight engine of which type 30 are under construction for the Mediterranean railway system of Italy. 1200 w. Rivista delle Strade Ferrate—Feb. 15, 1903.

Experiments with a New Type of Compound Locomotive in Italy. The first of a series of articles describing the new type in use on the Adriatic railways, its development and working results. The boiler is reversed on the frames so that the fire-box fits into the space above the bogie trucks. 3500 w. Engr, Lond—Oct. 2, 1903.

New Type of Compound Locomotive. Adriatic System, of Italy. Drawings and description of novel engines of excellent efficiency. 1300 w. Ry & Engng Rev—Sept. 10, 1904.

A Recent Type of Italian Compound Express Locomotive. Dimensions, with illustrated detailed description of a locomotive of the "Italian crab engine" type. 450 w. Ry Age—Feb. 17, 1905.

Japan.—Express Compound Locomotive for the Karsei Railway, Japan. Illustrated description, with dimensions. 600 w. Engng—Dec. 21, 1900.

Java.—Compound Tank Locomotive. Indian Netherlands Railway, Java. Illustration with description of an engine employed on the Java narrow-gauge railways, and an account of the service. Serial. 1st part. 1000 w. Engr, Lond—Jan. 3, 1902.

Compound Tank Locomotive, Indian Netherlands Railway, Java. Sectional drawings with brief note. 180 w. Engr, Lond—Feb. 14, 1902.

Jura-Simplon. — Three-Cylinder Compound Locomotive for the Jura-Simplon Railway. Illustrations and description of one of sixty locomotives constructed for this railway which was exhibited at Paris. 800 w. Engng—Nov. 30, 1900.

Three-Cylinder Compound Locomotive for the Jura-Simplon Railway (Locomotive Mixte Compound à Trois Cylindres des Chemins de Fer Jura Simplon). F. Barbier. Description of the engines built at Winterthur for the special Alpine service of the Jura-Simplon road, and exhibited at Paris. 1500 w. Génie Civil—Dec. 1, 1900.

Four-Cylinder Compound Locomotives for the Jura-Simplon Railway (Note sur la Locomotive Compound à 4 Cylindres de la Compagnie des Chemins de Fer du Jura-Simplon). Camille Barbey. An illustrated description of compound locomotives, with three pairs of drivers and a bogie truck forward, built at Winterthur, and also a plan and profile of the Jura-Simplon Railway through Switzerland. 2 plates. 2000 w. Rev Gén des Chemins de Fer—April, 1903.

Four-Cylinder Compound for the Jura-Simplon. Camille Barbey. Translated from the "Revue Generale des Chemins de Fer." Illustrated detailed description. 700 w. R R Gaz—May 1, 1903.

Four-Cylinder Compound Locomotive for the Jura-Simplon Railways. Illustrated detailed description. 1000 w. Engng—Aug. 28, 1903.

See also **LOCOMOTIVE—Swiss at Paris.**

Leaks.—See **LOCOMOTIVE BOILER; LOCOMOTIVE OPERATION; LOCOMOTIVE TESTS.**

London and N. W. Ry.—Four-Cylinder Compound Goods Locomotive. Illustrated description of engine used for heavy express trains on the L. & N. W. Ry. 800 w. Engr, Lond—May 29, 1903.

Mallet.—See **Articulated.**

Mediterranean.—See **France; Italian.**

Midland, Eng.—Four-Wheel Coupled Three-Cylinder Compound Locomotive. Illustrated description of an engine for passenger service on the Midland Railway, England. 800 w. Engng—Aug. 15, 1902.

Midland Railway Three-Cylinder Compound Passenger Locomotives. Two-page engraving and full illustrated description of this new type engine for the heaviest express traffic, with indicator diagrams, and report of trials, experiments, etc. 3300 w. Engng—Feb. 6, 1903.

See also **British.**

Mikado.—See **Vauclain, Atchison; LOCOMOTIVE.**

Mogul.—See **LOCOMOTIVE.**

Mountain Service.—See **LOCOMOTIVE—Tank, Henschel.**

Muchnic.—Four-Cylinder Balanced Compound Locomotive. Charles M. Muchnic. Engravings illustrating a design based on the principles of the successful de Glehn compounds, combined with the simplicity which characterize American practice. 1500 w. Am Engr & R R Jour—Jan., 1902.

Multi-Cylinder.—Multi-Cylinder Locomotives. J. F. Gairns. An illustrated review of the world's practice in multi-cylinder simple and compound locomotives. Serial. 1st part. 4000 w. Cassier's Mag—Dec., 1903.

N. Y. Central.—See **Cole Balanced; Tandem.**

Northeastern.—Three-Cylinder Compound Locomotive for the North-Eastern Railway. Illustrated detailed description of an engine which can be worked as a simple engine, as a semi-compound, or a compound. 2000 w. Engng—July 5, 1901.

Northeastern, Midland.—See **British.**

Northern Pacific Ry.—Schenectady Four-Cylinder Tandem Compound Locomotives—Classes Y-2 and Y-3, Northern Pacific Railway. An illustrated detailed description of a locomotive design of unusual interest, with additional comment. 3200 w. R R Gaz—Aug. 30, 1901.

Four-Cylinder Tandem Compound Locomotive. Half-tone drawings, with description and general dimensions. The type has been found satisfactory after a year of service on the Northern Pacific Ry. and an order for 26 engines has been given. 1600 w. Am Engr & R R Jour—Sept., 1901.

Tandem Compound Consolidation Locomotive, Northern Pacific Ry. Illustration and principal dimensions of the Y-2 engines, with description of details. 900 w. Ry & Engng Rev—Sept. 21, 1901.

Tandem Compound Freight Locomotive, N. P. Ry. Illustrated description of very heavy freight locomotives of the 2-8-2 type. 800 w. Ry & Engng Rev—Sept. 16, 1905.

Norway.—Compound Freight Locomotive for the Norwegian State Railway (Die Verbund-Güterzuglokomotive der Norwegischen Staatsbahnen). Illustrated description of ten-wheel, two-cylinder freight engine, built by the Winterthur Works. 1000 w. 1 plate. Schweizerische Bauzeitung—Oct. 4, 1902.

Compound Engine—Norwegian State Railways. Illustration, with description of an engine designed to have a great traction effort and yet run smoothly and steadily in traversing curves while hauling passenger trains. 1500 w. Engr, Lond—Oct. 24, 1902.

Oil Burning.— See **LOCOMOTIVE.**

Operation.—See **Baldwin; LOCOMOTIVE OPERATION.**

Orleans-France.—See **De Glehn; France.**

Paris Belt Line.—The Locomotives of the Paris Belt Line (Les Nouvelles Locomotives au Chemin de Fer de la Petite Ceinture de Paris). J. Koechlin. Illustrating and describing recent tandem compound locomotives for local passenger service. 6000 w. 4 plates. Rev Gen des Chem de Fer—May, 1904.

The New Compound Locomotives of the Paris Belt Line (Les Nouvelles Locomotives Compound du Chemin de Fer de Ceinture, à Paris). F. Barbier. Illustrating and describing the four-cylinder, tandem, compound engines designed by M. de Bousquet for the special service of the Paris Belt Line. 2000 w. 1 plate. Génie Civil—Sept. 10, 1904.

New Locomotives for the Paris Railroad. Abstract of an article by J. Koechlin, in the "Revue Generale des Chemins de Fer." Illustrated description of engines designed for local passenger service. 2300 w. R R Gaz—Vol. XXXVII, No. 21.

Paris Ceinture Railway. Tandem Compound Locomotive. Illustrates and describes a type in use in France, with report of performance on suburban rapid service. 1200 w. Engr, Lond—July 7, 1905.

Paris-Orleans.—See **De Glehn.**

Prairie.—See **LOCOMOTIVE.**

Prince.—See **Balanced.**

Prussia. — See **LOCOMOTIVE — Superheater, Germany.**

Richmond.—Richmond Compound Locomotives for the Rio Grande Western. Illustrated description. 500 w. R R Gaz—June 28, 1901.

Compound Locomotives and the Richmond Locomotive Exhibit. H. Wade Hibbard. Describes the Pan-American exhibit of the Richmond Works, which has been given to Sibley College, with remarks on this class and a statement of its advantages. 1500 w. Sib Jour of Engng—Jan., 1902.

The Richmond Compound. H. C. Ettinger. An illustrated article giving a description of the proposed functions of this type of locomotive, and discussing its diseases and remedies. Serial. 1st part. 700 w. Loc Engng—Dec., 1904.

Compound Freighter for the Central Vermont. Illustration, description, and principal dimensions. 500 w. Ry & Loc Engng—June, 1905.

Central Vermont Compound Consolidation. Illustrated detailed description of compounds constructed on the Richmond system. 850 w. Ry Age—June 30, 1905.

See also **Articulated; LOCOMOTIVE.**

Riekie.—A Proposed Compound Express Locomotive. Chas. S. Lake. Illustrates and describes a 4-4-2 passenger engine compounded on Mr. Riekie's system, discussing its use for highest grade express passenger duty under British restrictions. 2200 w. Transport—Oct. 28, 1904.

The Compounding of Locomotive Engines. John Riekie. Briefly considers the various types and the systems of working. 2000 w. Trans Inst of Engrs & Shipbuilders of Scot—Feb. 21, 1905.

Rogers Cross.—Rogers Cross Compound for the Great Northern. Detailed description with illustration. 800 w. Loc Engng—March, 1902.

Russia.—Tandem Compound Express Locomotive—Russian Empire Railways. Explains the conditions for the construction of these machines, and the peculiarities of this design, giving an illustrated description. 2500 w. Engr, Lond—Oct. 23, 1903.

Russian at Paris.—Tandem Compound Express Locomotive by the Poutiloff Works, St. Petersburg (Locomotive à Grande Vitesse "Compound Tandem" Construite par l'Usine Poutiloff à St. Petersburg). F. Barbier. Full detailed description of 56-ton Russian engine, exhibited at Paris. 2500 w. Génie Civil—Dec. 8, 1900.

St. Louis Exposition.—See **German; Von Borries; LOCOMOTIVE—Superheater, Germany; LOCOMOTIVE EXHIBITION.**

Santa Fe.—Four-Cylinder Compound Decapod Locomotive—Largest Engine Yet Built. Illustrates and describes this interesting engine built for the Atchison, Topeka & Santa Fe Railway, comparing it with other large engines. 2000 w. Ry & Engng Rev—Jan. 11, 1902.

Tandem Compound Decapod for the Santa Fe. Illustrated detailed description of the heaviest locomotives ever built up to the present time. Oil is the principal fuel used. 2000 w. Ry Age—Jan. 31, 1902.

Baldwin Decapod for the Santa Fe. Illustrated detailed description of a powerful engine for freight service on the mountain division of this road. 1700 w. Ry Age—May 30, 1902.

Decapod Tandem Freight Locomotive. Illustrated description of this locomotive for the A. T. & S. F. R. R. which is supposed to be the most powerful in the world. 600 w. Am Engr & R R Jour—June, 1902.

Heaviest Locomotive Ever Built. Illustration and chief characteristics of the 2-10-2 type, tandem compound, built for the A. T. & S. F. Ry. 200 w. Am Engr & R R Jour—Oct., 1903.

Tandem Compound "Santa Fe" Type (2-10-2) Locomotive for the Santa Fe. Illustrated descriptions. 500 w. R R Gaz—Oct. 9, 1903.

The Heaviest Locomotive Ever Built. Sections, with detailed description of heavy freight engines of the 2-10-2 type, for the A., T. & S. F. Ry. 900 w. Am Engr & R R Jour—Nov., 1903.

The "Santa Fe" Type Tandem Compound. An illustrated description of the 2-10-2 type which has five pairs of drivers, with a pony truck in front and rear. 500 w. Ry Age—Nov. 27, 1903.

Some Details of a Very Heavy Locomotive. Illustrates and describes details of the running gear of the 2-10-2 (Santa Fe) type, built for the Atchison, Topeka & Santa Fe Ry. 500 w. Am Engr & R R Jour—May, 1904.

See also **American vs. European.**

Saxony.—See **LOCOMOTIVE—Saxon at Paris; Superheater, Saxony.**

Schenectady.—See **Cole; Defect Location; Northern Pacific Ry.; LOCOMOTIVE; LOCOMOTIVE WORKS.**

"Soo" Line.—See **LOCOMOTIVE—Superheater, Cole.**

Southern Pacific Ry.—Compound Consolidation Locomotive for the Southern Pacific. Illustrated description of large recently built engines. The principal new feature is the semi-cylindrical tender for oil and water. 400 w. Ry Age—June 5, 1903.

Steam Capacity.—See **LOCOMOTIVE RATING.**

Steam Distribution.—See **LOCOMOTIVE VALVE GEAR—Compound.**

Superheated Steam.—See **LOCOMOTIVE—Superheater.**

Swiss.—Two-Cylinder Compound Locomotive for the North-Eastern Railway of Switzerland. Illustrated description. 600 w. Engng—Nov. 16, 1900.

Four-Cylinder Compound Freight Locomotive for the Swiss Railways Vierzylinder Verbund Güterzug Lokomotive der Schweizerischen Bundesbahnen). M. Weiss. Illustrated description of a 66 ton counterbalanced compound engine for heavy freight service in Switzerland. 1800 w. 1 plate. Schweiz Bauzeitung—Oct. 21, 1905.

See also **Jura-Simplon; LOCOMOTIVE.**

Switching.—Two-Cylinder Compound Switching Locomotive. Illustrated description of an engine designed for heavy yard work for the N. Y., N. H. & H. R. R. 350 w. Am Engr & R R Jour—Nov., 1902.

See also **LOCOMOTIVE.**

Tandem.—Tandem Compound Locomotive for Chicago Great Western. Illustrated description of heavy engines to be used in freight service. 900 w. Ry Age—April 11, 1902.

"Lake Shore" Type Tandem Compound Locomotive. Illustrated description of engines built for freight service on the Chicago Great Western Ry. 900 w. Am Engr & R R Jour—April, 1902.

Good Work of a Tandem Compound. Report of engine No. 1705 on the Baltimore & Ohio R. R. 600 w. Loc Engng—June, 1902.

Tandem Compound Consolidation Locomotives for the Erie RR.. Half-tone engraving, elevation and sectional views, with description. 1000 w. Ry &·Engng Rev—Aug. 30, 1902.

Experimental Tandem Compound Freight Locomotive. Illustrates and describes an engine of the 2-8-0 type, class G-2a for freight service. 1400 w., Am Engr & R R Jour—April, 1903.

Tandem Compounds for the New York Central. Illustration, cross sections, dimensions, and general information. 1100 w. Ry Age—May 15, 1903.

See also **Colorado & Southern; Northern Pacific Ry.; Russia; Santa Fe.**

Tank.—Great Eastern 3-Cylinder 10-Wheeled Coupled Tank Engine. Illustrated description of an engine designed for accelerated service on a suburban system. 1000 w. Mech Engr—April 4, 1903.

See also **Berlin; Java; LOCOMOTIVE.**

Test.—See **LOCOMOTIVE TEST.**

Union Pacific.—Vauclain Compound Consolidation Locomotives. Illustrated description of engines for the Union Pacific Ry. 400 w. Am Engr & R R Jour—Jan., 1901.

Heavy 10-Wheel Compound Passenger Locomotive. Brief illustrated description of one of twenty engines built for the Union Pacific Ry., the heaviest of their type ever built. 350 w. Am Engr & R R Jour—Feb., 1901.

Ten-Wheel Compound Locomotives. Union Pacific Railroad. Brief illustrated description of heavy engines for passenger service. 250 w. Ry & Engng Rev—Oct. 5, 1901.

Valve Gear.—See **LOCOMOTIVE VALVE GEAR.**

Vanderbilt.—See **Baldwin-Vanderbilt; LOCOMOTIVE.**

Vauclain.—The Vauclain Compound Locomotive. C. T. Noyse. Read at meeting of the Pacific Coast Ry. Club. Briefly considers the present standing of various types of compound locomotives, and gives information regarding the construction and operation of the Vauclain type. 3000 w. Ry Mas Mech—Oct., 1901.

Vauclain Consolidation Compound Atlantic Type Passenger Locomotive—Chicago, Milwaukee & St. Paul Ry. Illustrated detailed description. 800 w Am Engr & R R Jour—Oct., 1901.

Vauclain Four-Cylinder Balanced Compound Locomotive. Illustrated description of locomotives of the 4-6-0 type recently delivered to the New York, New Haven & Hartford Railroad. 500 w. Am Engr & R R Jour—Dec., 1904.

See also **Union Pacific; LOCOMOTIVE—Atlantic; LOCOMOTIVE VALVE GEAR.**

Vauclain-Atchison.—Heavy Compound Freight Locomotives. Illustrated description of the heavy Vauclain compounds, the 2-8-2 (Mikado) type, building for the Atchison, Topeka & Santa Fe Ry. 300 w. Am Eng & R R Jour—Jan., 1903.

Mikado (2-8-2) Compounds for the Atchison. Illustrated detailed description of Vauclain compound freight locomotives to be used on a mountain division having a maximum grade of 185 ft. per mile. 600 w. R R Gaz—April 3, 1903.

Compound Passenger Locomotives, 4-4-2 Type. Diagrams and description of Vauclain four-cylinder balanced compound locomotives for the A., T. & Santa Fe Ry. 600 w. Am Engr & R R Jour—June, 1903.

Vauclain, C., R. I. & P.—Vauclain 4-Cylinder Balanced Compound Atlantic Type Locomotive. Illustrated description of locomotives recently built for the C., R. I. & P. Ry. 400 w. Am Engr & R R Jour—Nov., 1905.

Vauclain, Oregon R. R. & Nav. Co.—See **Balanced Pacific.**

Vermont Central.—See **Richmond.**

Von Borries.—Von Borries Four-Cylinder Compound Locomotive. From "Le Génie Civil." An illustrated description of an example of the best practice in compound locomotive work abroad. 1200 w. Ry Age—Dec. 20, 1901.

European Four-Cylinder Compound Locomotives. Abstract of a paper by Prof. von Borries, translated from the "Zeitschrift des Vereins Deutscher Ingenieure," with critical review by Lawford H. Fry. 2400 w. Ry Age—Aug. 7, 1903.

Four-Cylinder Balanced Compound Locomotives. A. von Borries. States the advantages of the writer's system, comparing with the de Glehn system. Ill. 1500 w. Engr, Lond—Jan. 29, 1904.

Recent Development of the Four-Cylinder Balanced Locomotive. A. von Borries. Discusses essential points and gives suggestions of value, with comments on superheating. 3000 w. Am Engr & R R Jour—May, 1905.

See also **LOCOMOTIVE—Superheater, Germany; LOCOMOTIVE TEST—Superheated Steam; LOCOMOTIVE EXHIBITION—St. Louis.**

Vulcan.—Compound Goods Locomotive of the Vulcan Company. Illustrations with detailed description of four-coupled goods engine for the Prussian State Railways. 800 w. Engng—Dec. 6, 1901.

Compound Freight Locomotive by the Vulcan Company (Locomotive Compound à Marchandises Construit par la Société Vulcan). F. Barbier. Illustrated description of eight-wheel engine exhibited at Paris, 1900. 1200 w. 1 plate. Génie Civil—Nov. 23, 1901.

Wabash Mogul.—Two-Cylinder Compound Locomotives for the Wabash. Illustrated description of fast freight mogul engines. Also editorial. 1500 w. Ry Age—Nov. 13, 1903.

Wide Firebox.—See **LOCOMOTIVE; LOCOMOTIVE FIREBOX.**

Winterthur, Rhaeticon Ry.—The New Compound Locomotives for the Rhaeticon Railway (Die Neue 4-5 Gekuppelte Verbund-Lokomotive der Rhätischen Bahn). An illustrated description of a 46-ton two-cylinder compound engine built at the Winterthur works. 1000 w. Schweiz Bauzeitung—Jan. 7, 1905.

LOCOMOTIVE CONSTRUCTION.

See also **LOCOMOTIVE; LOCOMOTIVE DESIGN; LOCOMOTIVE FRAME; LOCOMOTIVE SHOP; LOCOMOTIVE WORKS.**

American.—Locomotive Construction in the United States. A review of information from the census report with interesting comments on the conditions which necessitated great changes in the railroad transportation systems. 3000 w. Sib Jour of Engng—April, 1903.

The Building of an American Locomotive. Frank H. Fayant. An illustrated account of standard locomotive construction in the United States, based upon practice in the Baldwin works at Philadelphia. 5000 w. Page's Mag—Jan., 1903.

American Locomotive Practice. Percy John Cowan. Paper and discussion before the Inst. of Civ. Engrs. in London. Gives an account of the latest ideas adopted by American locomotive engineers as observed by an expert. Also a summary of the views drawn out by this paper. Ills. 14,800 w. Bul Int Ry Cong—June, 1904.

See also **LOCOMOTIVE.**

Details.—The Constructional Details of Modern Locomotives. Charles S. Lake. The first of a series of illustrated articles dealing with present-day practice. Serial. 1st part. 2000 w. Prac Engr—Dec. 4, 1903.

Frame.—See **LOCOMOTIVE FRAME.**

Germany.—Recent Progress in Locomotive Construction (Neuere Fortschritte im Lokomotivbau). H. v. Borries. A review of the recent developments in locomotive work, including superheating, compounding, improved materials, etc. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—July 19, 1902.

Locomotive Building in Germany. A. von Borries. Illustrates and describes many recent types built in Germany, indicating the character of the engines of different works. 3500 w. Cassier's Mag—Nov., 1903.

Packing.—See **PACKING.**

Rebuilding.—See **LOCOMOTIVE.**

Repairs.—See **LOCOMOTIVE; LOCOMOTIVE SHOP.**

Shoes and Wedges.—See **LOCOMOTIVE DESIGN.**

LOCOMOTIVE CRANE.

See **CRANE—Locomotive.**

LOCOMOTIVE CYLINDER.

See also **LOCOMOTIVE; LOCOMOTIVE, COMPOUND.**

Clearance.—Effect of Cylinder Clearance upon the Quantity of Steam Consumed in Doing Specific Work, with Special Reference to Locomotive Practice. Ira C. Hubbell. A study of this subject, followed by discussion. 18,500 w. N Y R R Club—Sept. 18, 1903.

Cylinder Clearance and Valve Events. O. W. Young. Gives diagrams illustrating points the writer desires to make in regard to the importance of reducing back pressure, giving suggestions of value. General discussion. 11,000 w. Pro W Ry Club—Dec. 20, 1904.

See also **STEAM ENGINEERING.**

Cleveland.—See **LOCOMOTIVE.**

Sheedy Circulator.—Sheedy Circulator for Locomotive Cylinders. Indicator diagrams, illustrating the effect of the invention, and the conditions that exist in the cylinders when the circulator is not in use, with explanatory notes. 900 w. Loc Engng—Aug., 1903.

The Sheedy Circulating Pipe for Locomotive Cylinders. Illustrates and describes the device and its operation. 700 w. Am Engr & R R Jour—Sept., 1903.

Wear.—See **PISTON ROD—Extension.**

LOCOMOTIVE DESIGN.

See also **LOCOMOTIVE; LOCOMOTIVE BOILER; LOCOMOTIVE CONSTRUCTION; LOCOMOTIVE FRAME.**

The Proportions of Modern Locomotives. Lawford H. Fry. Gives tabulated results of investigations of over 200 modern locomotives of all classes, with notes. 1500 w. Am Engr & R R Jour—June, 1903.

Tendencies in Locomotive Design. A review of the development of the different types, showing the conditions that had to be met and the expedients used, and describing notable engines. 1 plate. 5500 w. R R Gaz—June 19, 1903.

Possible Improvements in Locomotive Design. Walter Longland. Read before the Jr. Inst. of Engrs. Examines the structure and working of a locomotive and describes structural alterations proposed to effect improvements. 4000 w. Mech Engr—March 25, 1905.

American.—See **LOCOMOTIVE; LOCOMOTIVE CONSTRUCTION.**

British.—The Tendencies of British Locomotive Design. J. F. Gairns. Notes the principal features of recent locomotive design in Great Britain, tracing the development. 2000 w. Prac Engr—Dec. 23, 1904.

Some Factors in British Locomotive Design. Charles S. Lake. An illustrated article considering improvements in power capacity of locomotives intended for maximum service on main lines of railway. Serial. 1st part. 1200 w. Mech Engr—Aug. 26, 1905.

See also **LOCOMOTIVE.**

British Express.—Express Locomotives. A. A. H. Tokeley. Discusses the design of high-speed locomotives. 2800 w. Engr, Lond—Sept. 15, 1905.

Dimension Ratios.—See **Proportions; LOCOMOTIVE BOILER—Heating Surface.**

Graphical Methods.—Locomotive Proportion by Graphical Methods. F. K. Caswell. The first of a series of graphical charts dealing with problems in locomotive design. 1300 w. Ry & Engng Rev—Sept. 5, 1903.

Great Western, Eng.—Locomotive Engine Details, Great Western Railway. Illustrations, with principal dimensions. 2000 w. Engr, Lond—May 13, 1904.

Italian Express.—See **LOCOMOTIVE—Italian Express.**

Proportions.—The Proportions of Modern Locomotives. Lawford H. Fry. Investigations covering over 250 locomotives, showing the tendencies of American practice, and comparing the dimensions. Also discussion. 13,600 w. Pro N Y R R Club—Sept. 18, 1903.

Locomotive Proportion. F. K. Caswell. The second in a series of graphical charts relating to locomotive design, with notes. 1000 w. Ry & Engng Rev—Oct. 3, 1903.

The Trend of Locomotive Proportions. Curves and tables, illustrating the trend which proportions have followed, with explanatory notes. 900 w. Ry Mas Mech—Dec., 1903.

See also **Graphical Methods.**

Railroads.—Should Railroads Design Their Own Locomotives? F. F. Gaines. Answers the question in the affirmative (conditionally), and discusses details frequently overlooked by builders. 1600 w. Am Engr & R R Jour—June, 1902.

Shoes and Wedges.—Lining of Shoes and Wedges. W. D. Chamberlin. Reproduced from the issue of Feb., 1900. An illustrated explanation of method recommended. 2800 w. Loc Engng—Sept., 1903.

Method of Laying Off Shoes and Wedges. John W. Percy. Drawing and explanation of method used in laying off shoes and wedges on offset frames where the rocker box and hanger on the fire box are in the way of the trams. 800 w. Loc Engng—Aug., 1904.

Stack Hood, Adjustable.—See **LOCOMOTIVE—Consolidation.**

Suspension.—See **LOCOMOTIVE OPERATION—Oscillations.**

Weight Distribution.—The Distribution of Weight in Locomotives. Jas. Horsfall. Begins with a study of the four-wheeled engine, using the graphic method. Serial. 1st part. 1500 w. Prac Engr—Oct. 6, 1905.

LOCOMOTIVE DRIVING WHEEL.

See also **AXLE; LOCOMOTIVE; WHEEL.**

The Unresilient Driving Wheel. Editorial on the need of an invention to soften the blow of tires on the track and to reduce the noise. 900 w. Loc Engng—Oct., 1903.

Counterbalancing.—See **LOCOMOTIVE; LOCOMOTIVE, COMPOUND.**

Lubrication.—See **LUBRICATION—Locomotive Driving Boxes.**

LOCOMOTIVE, ELECTRIC.

See **ELECTRIC LOCOMOTIVE.**

LOCOMOTIVE EXHIBITION.

See also **LOCOMOTIVE; LOCOMOTIVE, COMPOUND; RAILWAY EXHIBITION.**

American.—Representative American Locomotive Exhibits. William B. Aiken. A comparison of the exhibits made at various American expositions during the last twenty-five years. 1000 w. Loc Engng—Feb., 1902.

Liége.—Locomotives at the Liége Exhibition. C. R. King. Describes interesting locomotives being shown at this important exhibition. 3800 w. Ry Age—July 14, 1905.

Locomotives at the Liége Exhibition. H. W. Hanbury. Discusses the Belgian and French locomotives exhibited. Serial. 1st part. 4000 w. Engng—Aug. 18, 1905.

See also **EXPOSITION; LOCOMOTIVE—Belgian at Liége;** and under names and makes of locomotives.

Paris, 1900.—The Locomotive Exhibit at the Paris Exhibition. Charles Rous-Marten. The second installment of an expert review of the leading exhibits, showing the broad tendencies and national traits of modern practice. 5000 w. Engineering Magazine—Nov., 1900.

A General Examination of the Locomotives Exhibited at Paris (Allgemeine Betrachtungen über die in Paris Ausgestellten Locomotiven). Rolf Sanzin. A comparative study of the various engines, with respect to their national characteristics, having reference to the various loading gauges of different countries. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 7, 1900.

Observations Upon the Locomotives at the Exposition of 1900 (Quelques Observations Relatives aux Locomotives à l'Exposition de 1900). The first installment of a general review of the exhibited locomotives as illustrative of the development of the subject. Serial, Part I. 2500 w. Revue Technique—Dec. 10, 1900.

Locomotives and Cars at the Exposition of 1900 (Die Weltausstellung in Paris, 1900. Lokomotiven und Wagen). E. Brückmann. A general review of the exhibits at Vincennes. Serial. Part I. 2000 w. Zeitschr d Ver Deutscher Ing—Dec. 15, 1900.

Notes on the Locomotives Exhibited at Paris, 1900 (Quelques Observations Relatives aux Locomotives à l'Exposition de 1900). A general review of the exhibited engines, with regard to economy, design, and novelty. 3000 w. Revue Technique—Dec. 25, 1900.

Locomotives at the Paris Exposition, 1900 (Die Lokomotiven der Pariser Weltausstellung, 1900). S. Fraenkel. The beginning of an exhaustive review of the exhibits at Vincennes, with tabular view of the various engines, giving data as to dimensions and performance. Serial. Part I. Glasers Annalen—Jan. 1, 1901.

Locomotives at the Paris Exposition of 1900 (Exposition Universelle de Paris, 1900. Les Locomotives). A. Stevart. A comprehensive review by the honorary Chief Engineer of the Belgian State Railways. Serial. Part I. 5000 w. Rev Univ des Mines—Jan., 1901.

Express Locomotives at the Paris Exposition, 1900 (Die Schnellzug-Locomotiven auf der Weltausstellung in Paris 1900). C. Schlöss. With tabular view giving classified arrangement of exhibited locomotives. Serial. Part I. 3500 w. 1 plate. Zeitsch d Oesterr Ing u Arch Ver—March 15, 1901.

Observations upon the Locomotives at the Exposition of 1900 (Quelques Observations Relatives aux Locomotives à l'Exposition de 1900). With especial reference to the weight and stability of the engines exhibited. Two articles. 5000 w. Revue Technique—March 25, April 10, 1901.

The Locomotive Exhibits at the Paris Exhibition of 1900. Storm Bull. An extensively illustrated review of the locomotives, with tabulated statistics. 6000 w. Trans Am Soc of Mech Engrs, No. 910—May, 1901.

Locomotives at the Exposition of 1900 (Les Locomotives à l'Exposition de 1900). F. Barbier. Describing and illustrating the American and the French engines exhibited at Vincennes. 8000 w. 2 plates. Rev Gen de Chem de Fer—Dec., 1901.

See also **LOCOMOTIVE; LOCOMOTIVE, COMPOUND.**

St. Louis.—Locomotives at the St. Louis Exhibition. H. W. Hanbury. Briefly notes the important features of the transportation exhibits and begins a survey of the exhibits of the United States. Serial. 1st part. 3800 w. Engng—May 27, 1904.

Locomotives at the St. Louis Exhibition. H. W. Hanbury. The first of a series of illustrated articles describing the locomotives exhibited. The present number deals with the locomotives built at the Rogers Locomotive Works. Serial. 1st part. 2000 w. Engng—Dec. 2, 1904.

Four-Cylinder Locomotives at the St. Louis Exhibition. Brief descriptions of the types shown. 3800 w. Engr, Lond—May 27, 1904.

Modern Locomotives at the St. Louis Exposition. A double-page engraving of a series of the more interesting exhibits, with remarks on the various types. 2500 w. Sci Am—Sept. 17, 1904.

The Locomotive Exhibits at the St. Louis Exhibition. Illustrations and leading dimensions of the engines, with particulars, also editorial. 4800 w. Engng News—Oct. 6, 1904.

Locomotives at the St. Louis Exposition (Les Locomotives à l'Exposition de Saint Louis). A general review of the engines exhibited, with illustrations and a comparative table. 4000 w. Rev Gen d Chem de Fer—Sept., 1905.

The Steam Locomotive. J. K. Brassill. An illustrated review of its evolution and development as evidenced by the exhibits in the transportation building at the St. Louis World's Fair. 18,500 w. Pro Pacific C Ry Club—Oct. 21, 1905.

The Evolution and Development of the Steam Locomotive as Evidenced by the Exhibits in the Transportation Building at the St. Louis World's Fair. William A. Doble. Read before the Pacific Coast Ry. Club. An interesting illustrated review. Serial. 1st part. 7800 w. Jour of Elec—Dec., 1905.

See also **LOCOMOTIVE—Superheater; LOCOMOTIVE, COMPOUND—Articulated; Cole; LOCOMOTIVE TEST.**

St. Louis "Big Four."—The Exhibit of the "Big Four Route" at the St. Louis Exhibition. H. W. Hanbury. Illustration, with description of the locomotive shown and of the turntable on which it stands. Serial. 1st part. 1200 w. Engng—Sept. 9, 1904.

LOCOMOTIVE EXPLOSION.

See also **RAILWAY ACCIDENT.**

The Explosion of Modern Locomotive Boilers. Considers faulty design as a contributing cause in connection with low water. 1500 w. Ry Age—Jan. 2, 1903.

History.—Explosions of Historical Locomotives. Reviews explosions of interest since the earliest use of locomotives. 1500 w. Engr, Lond—Aug. 2, 1901.

Knottingley, Eng.—The Knottingley Boiler Explosion. An account of the explosion of a new locomotive on the Lancashire and Yorkshire Railway, on the 11th of last March, with editorial. 6300 w. Ill. Engr, Lond—Aug. 9, 1901.

See also **TRAIN, FAST—London—Edinburgh.**

New York Central.—Boiler Explosion on the New York Central. George L. Fowler. An illustrated account of an explosion which derailed and wrecked another passing train. 2000 w. R R Gaz—Vol. XXXVIII, No. 7.

Paris.—Explosion of a Locomotive Boiler (Explosion d'Une Chaudière de Locomotive). P. Bardy. A description of a serious explosion of the boiler of a locomotive at the St. Lazare Station, at Paris. 1500 w. Génie Civil—July 9, 1904.

A Locomotive Explosion (Une Explosion de Locomotive). R. Bonnin. A fully illustrated account and discussion of the serious explosion of the boiler of a locomotive at the St. Lazare station in Paris. 2500 w. Revue Technique—July 25, 1904.

Boiler Explosions (Sur les Explosions de Chaudières). L. Le Cornu. A discussion of the dynamic effects due to the sudden liberation of highly heated water in a boiler explosion; with especial reference to the explosion of a locomotive at the Gare St. Lazare, July 4, 1904. 1200 w. Comptes Rendus—Nov. 7, 1904.

Explosion of a Locomotive Engine (Explosion d'une Locomotive). S. Périssé. A full report upon the explosion of a locomotive at the Gare St. Lazare, Paris, July 4, 1904, with data of tests of the material of the exploded boiler. 4000 w. Génie Civil—Dec. 17, 1904.

Explosion of a Locomotive Boiler (L'Explosion d'une Chaudière de Locomotive). A discussion of possible causes for the recent disastrous explosion of a locomotive at the Gare Saint Lazare, Paris. 1000 w. Génie Civil—April 15, 1905.

The St. Lazare Boiler Explosion. An illustrated article reviewing the report of M. Charles Frémont in regard to the cause of the explosion of this locomotive boiler, on July 4, 1904. Also comments on the earlier report of H. Sylvain Périssé. Serial. 1st part. 3000 w. Engr, Lond—April 21, 1905.

Explosion of a Locomotive at the St. Lazare Station, Paris (Explosion d'une Locomotive aux Abords de la Gare Saint-Lazare, Paris). Ch. Frémont. With photographs of the fragments and a discussion of the probable manner and cause of an explosion which occurred July 4, 1904. 2500 w. Génie Civil—Oct. 21, 1905.

Explosion of a Locomotive Boiler at the St. Lazare Station, Paris (Explosion d'une Chaudière de Locomotive aux Abords de la Gare Saint-Lazare). Robert Dubois. Fully illustrated account of explosion and investigation into its causes. 6000 w. Bull d l Soc d'Encouragement—July 31, 1905.

Westerfield, Eng.—The Explosion of a Locomotive at Westerfield. An illustrated account of an unusual explosion on an English railway, and a study of the cause. 1300 w. Engr, Lond—Oct. 26, 1900.

LOCOMOTIVE FIREBOX.

See also **LOCOMOTIVE; LOCOMOTIVE BOILER; LOCOMOTIVE GRATE; STAYBOLT.**

Large Locomotive Fireboxes. A. Bement. Compares an engine of ten years ago with one of recent date, and discusses the influence on combustion. 1500 w. Am Engr & R R Jour—Nov., 1900.

A Study in Locomotive Fireboxes. F. F. Gaines. A discussion of remedies for the prevention of staybolt failures in the firebox of a locomotive boiler, suggesting a possibility of discontinuing their use. Ill. 1800 w. Am Engr & R R Jour—Dec., 1900.

The Fire-Boxes of Locomotives. An editorial discussion of the construction, especially the side stays. 1700 w. Engr, Lond—April 19, 1901.

Brotan.—Defects in Locomotive Fireboxes and the Brotan Tubular Firebox (Defekte an Lokomotivkesseln Normaler Bauart und das Neue Lokomotiv-Rohrboxkessel—System Brotan). J. Brotan. An examination of the weakness of stayed fireboxes for locomotive boilers, and a description of a design constructed of water tubes. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 21, 28, 1903.

A Locomotive Boiler with Water-Tube Firebox. An illustrated detailed description of the invention of J. Brotan, an Austrian engineer. Abstracted from an article in the "Zeitschrift des Oesterr. Ing. u. Arch. Vereins." 2500 w. Eng News—Oct. 1, 1903.

The Brotan Locomotive Boiler with Water-Tube Firebox. Abstract of a paper by Johann Brotan, published in the "Zeitschrift des Oesterreichischen Ingenieur-und Architekten-Vereines." Illustrated detailed description, with statement of advantages. 4500 w. Bul Int Ry Cong—May, 1904.

Locomotive Boiler with Water-Tube Firebox (Lokomotivkessel mit Wasserrohr Feuerbuchse). G. Elbel. A description of the Brotan boiler, combining a water-tube firebox with the fire-tube shell. 2000 w. Glasers Annalen—Oct. 15, 1904.

The Brotan Locomotive Boiler. H. W. Hanbury. Illustrated description of a novel water-tube locomotive boiler shown at the Liége exhibition, discussing its advantages and disadvantages. 2200 w. Engng—Sept. 1, 1905.

Corrugated.—See **LOCOMOTIVE—Vanderbilt.**

Design.—See **LOCOMOTIVE BOILER; LOCOMOTIVE DESIGN.**

Deterioration.—The Causes of Rapid Wear and Tear of Fireboxes of Locomotives. Robert Weatherburn. Discusses the causes of deterioration and suggests ways of obviating some of the troubles. 4300 w. Engr, Lond—Dec. 28, 1900.

Italian.—Combustion Chambers in Italian Locomotives. Information concerning designs now in preparation which give a saving in repairs, and in earning time of the engines. 900 w. Engr, Lond—March 18, 1904.

Langer Smokeless.—The Langer Smokeless Furnace on the Swiss Locomotives (Le Fumivore Automatique Langer sur les Locomotives Suisses). Emile Bernheim. Describing a combination of steam jet and brick arch, which has been effectively used on the Viége-Zermatt line. 2000 w. Bul Soc d'Encour—Nov. 30, 1904.

Leaky.—See **LOCOMOTIVE BOILER; LOCOMOTIVE OPERATION—Blows and Vibrations; Wide Firebox; LOCOMOTIVE TEST.**

Mechanical Stoking.—See **MECHANICAL STOKING—Locomotive.**

Smoke Consuming.—Early Experiments with Smoke-Consuming Fireboxes on American Locomotives. C. H. Caruthers. An interesting illustrated review of types of boilers, fireboxes, &c., brought out between 1857 and 1859 aiming to consume the smoke and gases of bituminous coal. 2500 w. R R Gaz—Vol. XXXIX., No. 22.

Staybolt.—See **STAYBOLT.**

Vanderbilt.—See **LOCOMOTIVE.**

Water Arch.—A Water Arch for Locomotive Fireboxes; Montana Central Ry. Illustrated description of the application of water arch to a wide firebox locomotive of the Great Northern Ry., invented by A. E. Taber. Gives results of experience with its use. 700 w. Eng News—March 19, 1903.

Water Tube.—See **Brotan; LOCOMOTIVE BOILER.**

Wide.—The Depth of Wide Fireboxes. Editorial giving the opinions of various correspondents, with comments. 1000 w. Am Engr & R R Jour—Dec., 1900.

Wide Fireboxes for Soft Coal. F. A. Delano. A review of recent changes in the designs of fireboxes and why they were made. 1200 w. Am Engr & R R Jour—June, 1901.

See also **LOCOMOTIVE—Consolidation; Switching; Wide Firebox; LOCOMOTIVE OPERATION.**

LOCOMOTIVE FRAME.

See also **LOCOMOTIVE; LOCOMOTIVE CONSTRUCTION; LOCOMOTIVE DESIGN.**

Locomotive Frames. A discussion with lengthy introduction by Mr. Vauclain. Ills. 8000 w. N Y R R Club—March 18, 1904.

Cast Steel.—An Improved Cast-Steel Locomotive Frame. Robert M. Galbreath. Also editorial. A statement of the several features of the steel frame question, with illustrated description of design and record of wear of driving boxes. 3000 w. R R Gaz—June 14, 1901.

Design.—A Rational Method of Design of Locomotive Frames. Abstract of a paper by G. S. Edmonds, presented at meeting of the Pacific Coast Ry. Club. Gives facts based on the examination of some 100 designs of representative product. 1500 w. R R Gaz—Oct. 9, 1903.

Equalizing.—Equalizing Apparatus for Bogie-Trucks (Rückstellvorrichtung für Drehgestelle bei Lokomotiven). M. Kuhn. An illustrated description of hydraulic, spring and lever apparatus for equalizing the turning and side-motions of locomotive bogie-trucks. 1800 w. Glasers Annalen—June 15, 1902.

A Diagram for Axle Loading and Its Application to Locomotives (Das Diagramm der Achsenbelastung und Seine Anwendung bei Drei und Mehrachsigen Lokomotiven). J. Kempf. A graphical and analytical examination of the distribution of weights in locomotives by means of equalizing levers. 1200 w. Glasers Annalen—Aug. 1, 1902.

Distribution of Loads on Locomotive Axles. A. T. J. Kersey. Gives mathematical investigation made to determine the distribution of the loads on the axles of a six-coupled tank engine. 1200 w. Engr, Lond—March 11, 1904.

The Locomotive Frame Considered as a Rigid Beam with Spring Supports (Der Lokomotivrahmen als Starrer Balken auf Federnden Stützen). W. Lindemann. A discussion of the various arrangements of springs and equalizing levers as distributing the load upon the frames of a locomotive. 3000 w. Glasers Annalen—Dec. 15, 1904.

Repair.—The Locomotive Steel Frame and Its Repairs. A. W. McCaslin. Presented before the Ry. Club of Pittsburg. Discusses the many failures of steel frames and how the repairs should be made. 2500 w. Ry & Engng Rev—April 25, 1903.

The Locomotive Steel Frame and Its Repairs. A. W. McCaslin. Considers the locomotive cast steel frame and its defects. General discussion. 7500 w. Pro Ry Club of Pittsburg—April, 1903.

Setting.—Setting the Frames. James Kennedy. Remarks on the construction of engines, and especially the treatment of the frames. 1700 w. Ry & Loc Engng—April, 1905.

Welding.—See **WELDING—Locomotive Frames.**

LOCOMOTIVE FRONT END.

See also **LOCOMOTIVE SMOKE BOX; LOCOMOTIVE STACK; LOCOMOTIVE—Draft Appliances.**

Recent Progress in the Design of Locomotive Front-Ends. W. F. M. Goss. An illustrated paper considering the distribution of draft, action of the exhaust jet, form of exhaust nozzle, etc., etc. 4500 w. Pro Cent Ry Club—Nov. 13, 1903.

Front Ends and Steam. F. P. Roesch. Some particulars about front end conditions and the writer's views as to their design, &c. 1200 w. Loc Engng—Aug., 1904.

Self-Cleaning.—Self-Cleaning Locomotive Front Ends. Frank Slater. Diagrams and discussion of various types, with general discussion by members. 7800 w. W Ry Club—Nov. 18, 1902.

LOCOMOTIVE, GASOLINE.

See **CAR, MOTOR-DRIVEN; GASOLINE LOCOMOTIVE.**

LOCOMOTIVE GRATE.

See also **LOCOMOTIVE; LOCOMOTIVE BOILER;**

LOCOMOTIVE FIREBOX; LOCOMOTIVE OPERATION.

Emancipation of the Grates. Editorial discussion of the importance of recent changes in grate area. 1400 w. Am Engr & R R Jour—Nov., 1900.

Culm Burning.—Grate Areas for Burning Culm. T. S. Lloyd. Gives table of fuel tests, and discusses the practice on the D., L. & W. R. R. 1500 w. Am Engr & R R Jour—June, 1901.
See also **LOCOMOTIVE.**

LOCOMOTIVE HEADLIGHT.

See **HEADLIGHT.**

LOCOMOTIVE HOUSE.

See also **LOCOMOTIVE SHOP; RAILWAY SHOP; ROUNDHOUSE.**

Elkhart, Ind.—See **ROUNDHOUSE.**

Ventilation.—See **VENTILATION—Baldwin Engine House.**

LOCOMOTIVE OPERATION.

See also **LOCOMOTIVE; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE POOLING; LOCOMOTIVE TEST; LOCOMOTIVE RATING; RAILWAY OPERATION.**

Successful Locomotive Engine Running. Paper by R. S. Goble, read before the Pacific Coast Ry. Club. 'On the necessity of practical experience. 2000 w. Ry Mas Mech—March, 1902.

Locomotive Operation. G. R. Henderson. The first of a series of articles discussing the various laws of mechanics which govern a locomotive in operation. Serial. 1st part. 4000 w. Ry Age —Jan. 15, 1904.

Bituminous Coal.—Efficiency of Bituminous Coal. Harlan J. German. Discusses some of the losses which are incident to the combustion of bituminous fuels on locomotives. 2200 w. Ry Mas Mach—March, 1902.

Blows and Vibration.—The Destructive Action of Locomotive Engines (Die Störenden Bewegungen der Dampflokomotive). Herman Diepen. A mathematical investigation of the injurious inertia action of the moving parts of locomotives, including vibration, hammerblow, etc. 6000 w. Glasers Annalen—Feb. 1, 1904.

Blows and Pounds in Simple Locomotives. Discusses the causes, effects and remedies for these annoyances. 800 w. Loc Engng—Feb., 1904.

See also **Oscillations; Wide Firebox; LOCOMOTIVE BOILER—Leaky.**

Boiler Feed.—Engine Failures—Use Both Injectors Regularly. J. W. Reading. Remarks on the feeding of boilers, and faulty practice. 1000 w. Ry & Loc Engng—April, 1905.

Brown Coal.—See **LOCOMOTIVE—Lignite Burning.**

Combustion.—Combustion in Locomotives. Letters and editorial commenting on Mr. Rous-Marten's article comparing American and British engines. 3400 w. Engr, Lond—June 21, 1901.

Locomotive Combustion. J. W. Shepherd. Considers processes involved in locomotive combustion without entering into details of application. Also discussion. 4300 w. W Ry Club—Nov., 1901.

Compound.—The Proper Handling of Compound Locomotives. Abstract of a paper by W. J. McCarroll read before the Trav. Engrs. Assn. Suggestions for handling compounds as they are at present constructed. 2500 w. R R Gaz—Sept. 26, 1902.

Care and Handling of the Compound Locomotive. A. L. Beardsley. Abstract of a paper before the Traveling Engrs.' Con. Suggestions helpful in obtaining good results, with mention of some things to be avoided. 2500 w. R R Gaz—Sept. 18, 1903.

See also **LOCOMOTIVE, COMPOUND—Baldwin.**

Cost.—The Cost of Locomotive Operation. G. R. Henderson. A study aiming to give a clear understanding of the expenses with the effect of various influences. Serial. 1st part. 2200 w. R R Gaz—Vol. XXXVIII, No. 7.

Cylinder Clearance.—See **LOCOMOTIVE CYLINDER —Clearance.**

Double Heading.—See **RAILWAY OPERATION.**

Economy.—Economy in Locomotive Service. G. R. Henderson. Discusses economies regarding this service, and the various functions pertaining to it. The present article is devoted mainly to fuel and the practices affecting it. Serial. 1st part. 3500 w. R R Gaz—Dec. 6, 1901.

See also **Steam Economy.**

Electric vs. Steam.—Electric vs. Steam Locomotives. R. H. Probert. Read before the Ohio Soc. of Elec., Mech., and Steam Engrs. Considers a general example showing the lower cost of operation and other advantages from electrical equipment. 4500 w. Engr, U S A—Dec. 1, 1905.

See also **ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY—Steam Compared.**

Engineer Alternating.—The Question of Alternating Locomotive Engineers (Zur Frage des Wirthschaftlichen Nutzens der Doppelbesetzung der Lokomotiven). M. Herrmann. An examination of the advantages of alternating engineers for locomotives in place of leaving the engine to a single operator. 3000 w. Glaser's Annalen—June 1, 1901.

Fire Throwing.—Fire-Throwing from Locomotives. Robert Weatherburn. A discussion of the causes such as coal, firing, blast pipe action, cylinder posts, large and small tubes, size of smoke-box, fire grate, and mechanical appliances, all of which contribute to the emission. 3000 w. Engr, Lond —April 19, 1901.

Firing.—Best Method of Firing Locomotives. Gives the report of the committee of the Traveling Engineers' Assn. 1700 w. Ry & Engng Rev—Nov. 16, 1901.

Locomotive Firing. T. J. Hoskins. The present article discusses theoretical and practical points, and the science of light and heat. Serial. 1st part. 1500 w. Loc Engng—June, 1902.

Firing Locomotives. F. R. Wadleigh. Instructions aiming to cover the vital points and to expose clearly the work required of the fireman. 2000 w. R R Gaz—May 13, 1904.

Fuel Accounts.—Economical Use and Accounting Methods for Handling Fuel for Locomotives. F. A. Healy. Read before the Southern & Southwestern Ry. Club. Considers mainly the accounting and its difficulties. 2800 w. Ry Age—Feb. 6, 1903.

Fuel Consumption.—What Is the Most Promising Direction in Which to Effect a Reduction in Locomotive Fuel Consumption. Report of the committee concerning methods worthy of consideration. 5700 w. Am Mas Mech Assn—Saratoga meeting, 1901.

Locomotive Coal Consumption. M. N. Forney. Brief discussion of the available sources of economy in fuel consumption. 1200 w. Am Engr & R R Jour—June, 1901.

Saving in Fuel Consumption by the Compound Locomotive. C. J. Mellin. Gives a table showing the results collected from various records of performances in regular service and road tests, with comments. 800 w. R R Gaz—June 14, 1901.

Suggested Methods for Reducing Locomotive Fuel Consnmption. Abstract of a report presented to the Am. Ry. Mas. Mech.'s Assn. Considers means along which economy may be secured. Also editorial on feed-water heating for locomotives. Ill. 4300 w. Eng News—June 27, 1901.

Methods of Reducing Fuel Consumption in Locomotives (Massnahmen zur Herabminderung des Kohlenverbrauchs im Lokomotivenbetrieb). H. Glasenapp. A description of the method of using the exhaust from the air-brake pump to heat the feed-water as practised in America. 1500 w. Tram & Ry Wld—Nov. 14, 1901.

Fuel as an Important Factor in Railroad Operation. A. D. Parker. Read at meeting of the Rocky Mt. Ry. Club. Shows what a large expense fuel forms in the operation of a railroad, and discusses the losses and ways of lessening them. 2500 w. Ry & Engng Rev—May 3, 1902.

The Time Element in Coal Consumption. Editorial discussion of the advantages of weighing coal instead of measuring it. 900 w. Loc Engng—Dec., 1902.

Combustion, or the Source of Energy in the Locomotive. T. J. Henderson. A discussion of the question of fuel economy. 4000 w. Pro Pacific C Ry Club, Oct. 15, 1904.

Saving Coal on Locomotives. A. Saillot. Discusses how to reduce the quantity of coal burned for the same service, giving methods used in France, and the steps taken to induce men to use it carefully. 2500 w. Ry Age—March 17, 1905.

The Burning of Fuel. Editorial on the burning of coal, especially in locomotives, and the effect of large grate area. 1000 w. Ry & Loc Engng—Nov., 1905.

Fuel Consumption Diagram.—Fuel Consumption of Locomotives. G. R. Henderson. Gives a diagram for solving problems in fuel consumption, with explanation of its use. 2300 w. Trans Am Soc of Mech Engrs, No. 046—Dec., 1904.

Grate Areas.—Large and Small Grate Areas and Combustion. A. Bement. Discusses the advantages of frequent, light firing and shaking of grates, studied by gas analysis. 2000 w. Am Engr & R R Jour—April, 1901.

See also **LOCOMOTIVE GRATE.**

Injector.—See **INJECTOR.**

Instruction.—See **COMBUSTION.**

Large.—Why Large Locomotives Lack Economical Efficiency. F. P. Roesch. Practical demonstrations on the road, of theory enunciated by Prof. Goss. 2700 w. Loc Engng—July, 1902.

Leaks.—See **Blows and Vibrations; Wide Firebox; LOCOMOTIVE BOILER.**

Lignite.—See **LOCOMOTIVE.**

Marine Engine Compared.—See **Stationary Engine Compared.**

Mismanagement.—A Remarkable Runaway of a light engine and tender, and the cause. Amos Judd. 600 w. Loc Engng—Dec., 1904.

Modern.—Modern Locomotive Engine Management. T. McHattie. Read before the Canadian Elec. Club. Comments on the improvements made in the locomotives of the last thirty years, and the modern safety methods and appliances, and the requirements for handling them. 1600 w. Can Engr—July, 1902.

New Zealand.—See **RAILWAY OPERATION.**

Oscillations.—Model to Illustrate the Oscillations of a Locomotive. A. von Borries. Abstract of a paper read before the Verein für Eisenbahnkunde. Illustrates and describes this model. 1700 w. Bul Int Ry Cong—May, 1904.

The Oscillations of Locomotives under the Perturbing Action of Various Forces (Oscillations des Locomotives sous l'Action de Diverses Forces Perturbatrices). Georges Marié. A study of the influence of inertia and centrifugal forces upon the oscillations of locomotives. 1200 w. Comptes Rendus—May 29, 1905.

Unsymmetrical Movement of Locomotives. Gives the contribution of Mr. Herdner to the discussion of Baron Joseph Engerth's report to the International Ry . Cong. concerning experimental investigations made. 2800 w. R R Gaz—Dec. 6, 1901.

The Behavior of Locomotive Suspensions (Le Fonctionnement des Organes de la Suspension dans les Locomotives). A. Herdner. An examination of the influence of the method of suspension of a locomotive upon the magnitude and extent of its oscillations. Serial. , Part I. 7500 w. Rev Gen des Chem de Fer—June, 1905.

See also **Blows and Vibrations.**

Overloading.—Big Locomotive Overloading and Locomotive Failures. Gives five questions sent to leading railroad officials, with the replies received. 8000 w. Am Engr & R R Jour—June, 1904.

Piston Valve.—Position of Reverse Lever on Piston Valve Engines. Jas. Spellen. Gives the writer's ideas on the proper handling of these engines. 1200 w. Loc Engng—Jan., 1904.

Pounds.—See **Blows and Vibrations.**

Relief Valve.—See **LOCOMOTIVE VALVE—Relief.**

Runaway.—See **Mismanagement.**

Slipping.—Slipping of Locomotives at High Speeds. C. E. Wolff. A study of the conditions under which slip takes place, giving results of tests and conclusions. 800 w. Mech Engr—May 9, 1903.

Smoke Prevention.—Smokeless Combustion in Locomotive Fireboxes. A. Bement. Abstract of a paper presented before the W. Ry Club. Treats of details of the combustion process. 1200 w. Eng News—Oct. 18, 1900.

Modern Equipment of Locomotives for the Prevention of Smoke—Using Coal for Oil as Fuel. W. M. Best. Considers the equipments of coal-burning and of oil-burning locomotives, favoring the latter. 3000 w. Pro Pacific Coast Ry Club—May 16, 1903.

See also **LOCOMOTIVE FIREBOX—Langer Smokeless; SMOKE PREVENTION.**

Stationary Engine, Compared.—The Recent Development of the Locomotive Engine. Calls attention to certain points in recent development, and the fact that the performance, economies and wastes cannot be treated on any basis of comparison drawn from the performance of stationary or marine engines. 3500 w. Engr, Lond—Dec. 1, 1905.

Steam Distribution.—See **LOCOMOTIVE VALVE GEAR.**

Steam Economy.—Steam Economy in the Locomotive. J. B. Allfree. A careful treatment of this subject, considering distribution of steam, the volume of cylinder clearance, mean temperature, and material and workmanship. Also general discussion. 13700 w. Pro St. Louis Ry Club—Feb. 12, 1904.

Steam Production.—Steam Production in Locomotives. R. Gordon Sharp. Discusses firing and the causes of poor combustion, suggesting means of remedying. 2000 w. Engr, Lond—Oct. 16, 1903.

Stopping.—Stopping with Engine Reversed and Air Brakes Applied vs. Stopping with Air Brakes Alone. Editorial discussion of the best practice, favoring the latter method. 1200 w. Loc Engng—April, 1904.

Terminals.—The Cost of Handling Locomotives at Terminals. Charles H. Fry. Gives figures showing what these costs average for different roads in different parts of the country. 2000 w. R R Gaz—Feb. 19, 1904.

Train Handling.—Points to Be Observed by Enginemen While in Service in Order to Successfully Meet Modern Methods of Freight and Passenger Train Operation. W. I. Hurley. Reviews the methods of successful engineers. Discussion. 8500 w. Pro Cent Ry Club—May, 1905.

See also **RAILWAY OPERATION.**

Unsymmetrical Movement.—See **Oscillations.**

Wide Firebox.—Leaky Flues and Circulation in Wide Firebox Locomotives. John Player. Discusses the causes of trouble, the chief being the class of fuel used, the inexperience of firemen and engineers, and the ignorance of those in charge at terminals. 1500 w. Am Engr & R R Jour—June, 1903.

LOCOMOTIVE PERFORMANCE.

See also **LOCOMOTIVE; LOCOMOTIVE OPERATION; LOCOMOTIVE RATING; LOCOMOTIVE TEST; RAILWAY OPERATION; TRAIN, FAST.**

Some Factors Affecting the Power of Locomotives. Abstract of a paper presented by Prof. W. F. M. Goss before the Dec. meeting of the New England R. R. Club, with diagrams. A discussion of the effect of speed on tractive efforts. 4500 w. R R Gaz—Jan. 24, 1902.

Chart for Tractive Power of Locomotives. Diagram, with description of its construction and use. 400 w. Am Engr & R R Jour—June, 1903.

American in England.—See **LOCOMOTIVE.**

American in France.—See **LOCOMOTIVE.**

Articulated.—See **Mallet, B. & O.; LOCOMOTIVE, COMPOUND.**

Automatic Stoker.—See **MECHANICAL STOKING—Locomotive.**

Balanced Compound.—See **Compound; LOCOMOTIVE, COMPOUND.**

Baltimore & Ohio.—See **Mallet, B. & O.**

British.—British Locomotive Work in 1903. Chas. Rous-Marten. A review of the principal characteristics of the work performed. Serial. 1st part. 2500 w. Engr, Lond—Jan. 22, 1904.

Recent British Railway Records. Charles Rous-Marten. Discusses the services on the London and Northwestern Railway and the Great Western Railway. 1890 w. Engr, Lond—May 13, 1904.
See also **LOCOMOTIVE.**

Buenos-Aires Ry.—Some Particulars of the Results of the Compound Locomotive on the Buenos-Aires Great Southern Railway. R. Gould. Read before the Inst. of Mech. Engrs. Detailed description of the engines, with tabulated report of coal consumption and cost of repairs. Ill. 1900 w. Inst of Mech Engrs—Glasgow Eng., 1901.

Caledonian.—See **LOCOMOTIVE.**

C., B. & Q.—A Trip on the Big 2700. Angus Sinclair. Describes a ride on a four-cylinder balanced compound locomotive on the C. B. & Q. R. R. 1500 w. Loc Engng—Nov., 1904.

Compound A. T. & S. F.—Performance of a Balanced Compound Locomotive, A. T. & S. F. Ry. Illustration, with report of very satisfactory work. 800 w. Ry & Engng Rev—Nov. 4, 1905.

De Glehn.—See **LOCOMOTIVE COMPOUND.**

Denmark.—See **LOCOMOTIVE TEST—Denmark.**

Economical Load.—What Should Be the Maximum Economical Load for a Locomotive? Charles T. Noyes. Considers the requirements of locomotive service. General discussion. 3000 w. Pro Pacific C Ry Club—Jan. 16, 1904.

Economical Speeds.—Economical Train Speeds. G. R. Henderson. Diagrams showing results of experiments from the fuel standpoint, with explanatory notes. 1800 w. Am Engr & R R Jour—June, 1901.

Efficiency.—The Efficiency of Locomotives (Rendement des Locomotives). J. Nadal. A discussion of the mathematical formula for efficiency, with applications to various types of simple and compound locomotives. 15,000 w. Rev Gen des Chemins de Fer—Sept., 1901.

See also **TRAIN RESISTANCE—Locomotive Efficiency.**

French in England.—See **LOCOMOTIVE—Great Western.**

Great Central, Eng.—See **Reports.**

Great Western, Eng.—Locomotive Work on the Great Western Railway. A brief review, with report of a recent run from Bristol to London on the train known as the "Flyer." 2000 w. Engng —April 29, 1904.

The Record Run on the Great Western Railway. Charles Rous-Marten. Briefly describes the road over which the run was made and gives details of the work, explaining why it was undertaken. 4800 w. Engr, Lond—May 20, 1904.

Some Features of the Great Western Record Run. Charles Rous-Marten. Considers the coal consumption, steam pressure, &c. 2800 w. Engr, Lond—June 10, 1904.

Compound Locomotives on the Great Western Railway. A. G. Robins. An interesting account of the work of the express locomotives of the Great Western Railway, and the results of test made with engines of the Glehn type. Ills. 4500 w. Engng—Nov. 3, 1905.

See also **LOCOMOTIVE; TRAIN, FAST.**

High-Pressure Steam.—Locomotive Performance Under a Steam Pressure of 250 Pounds. W. F. M. Goss. An account of an investigation conducted under the patronage of the Carnegie Institution. 1800 w. R R Gaz—Vol. XXXVIII., No. 23.

High Speed.—Prize Announcement (Preisausschreiben). Record of the meeting of the Verein Deutscher Maschinen-Ingenieure for the award of prizes for high-speed express steam locomotives for passenger service; with discussion of the awards. 2500 w. Glasers Annalem—Feb. 1, 1903.

See also **LOCOMOTIVE; TRAIN, FAST—Cost.**

India.—See **LOCOMOTIVE.**

London & Northwestern.—Recent Locomotive Work on the London and Northwestern Railway. Charles Rous-Marten.—A review of the manner in which the time-table promises have been fulfilled. The present article especially considers Mr. Whale's new engines. Serial. 1st part. 2800 w. Engr, Lond—Nov. 4, 1904.

See also **LOCOMOTIVE TEST.**

London-Plymouth.—See **Great Western; TRAIN FAST; TRAIN SERVICE.**

London South Western.—Record Run on the L. S. W. Railway. Charles Rous-Marten. An account of a run between Plymouth and London. 1700 w. Engr, Lond—April 29, 1904.

Mallet, B. & O.—Performance of Mallet Compound Locomotive. Report of J. E. Muhlfeld, general superintendent of motive power of the B. & O., giving information in regard to the performance of the articulated duplex compound locomotive, No. 2400, which was exhibited at St. Louis. 1200 w. Am Engr & R R Jour—June, 1905.

Performance of the Baltimore and Ohio Ry's Mallet Compound Locomotive in Service. Illustration, with report of the working, coal consumption, road record, &c. 1200 w. Eng News—June 15, 1905.

Service of the Mallet Compound on the Baltimore & Ohio. Gives the average performance of this locomotive for 24 consecutive trips helping trains over the mountain districts, with information. 1000 w. Ry Age—July 7, 1905.

Michigan Central.—The Fast Run Record Beaten on the Michigan Central. Gives the schedule of the run made by the President's Special, from Niagara Falls, Ont., to Chicago, Ill., on April 27, 1904. 700 w. Ry Age—May 6, 1904.

See also **LOCOMOTIVE TEST.**

Midland Ry., Eng.—Acceleration and Velocity Curves Obtained with the New Midland Compound Express Engines. Gives interesting diagrams showing the accelerating power of the fine three-cylinder compound engines recently put on this line. 500 w. Engng—March 27, 1903.

Recent Locomotive Work on the Midland Railway. Charles Rous-Marten. The first of a series of articles reporting the performance by modern types of locomotives. Serial. 1st part. 2200 w. Engr, Lond—Jan. 20, 1905.

N. Y. Central.—Performance of Class I and Class C Locomotives—New York Central Railroad. Indicator diagrams from both classes, with train data and profiles of the divisions in which the work was done. 500 w. R R Gaz—Nov. 1, 1901.

New Zealand.—Locomotive Practice on the New Zealand Government Railways. Charles Rous-Marten. Describes interesting features of the railway history, the conditions to be met, the early construction, types of locomotives used, their work, etc. Ills. 5700 w. Cassier's Mag—March, 1905.

"Northwestern."—Performance of "Northwestern" Type Locomotives. Profile of the C. & N. W. Ry., with record showing sustained high horse-power for a run of 138 miles, and indicator cards corresponding, with comments. 1300 w. Am Engr & R R Jour—Nov., 1900.

See also **London & Northwestern.**

Paris Ceinture Ry.—See **LOCOMOTIVE, COMPOUND —Paris Belt Line.**

Rainhill, Eng.—See **LOCOMOTIVE—British.**

Recording.—Statistics of International Transport (Statistique des Transports Internationaux). Gen. A. de Wenderich. Giving forms and procedure employed for recording locomotive performance. 2000 w. Rev Gen d Chem de Fer—March, 1905.

Reports.—Express Locomotives and Their Work. Charles S. Lake. Remarks on the wisdom of keeping careful records of the performance of locomotives of various design, with report of particulars gained during experimental trips on the Great Central Railway on engines designed by J. G. Robinson. Diagrams. 3000 w. Transport—July 8, 1904.

Ton Mile.—See **LOCOMOTIVE RATING; RAILWAY OPERATION; RAILWAY TRAFFIC.**

Tractive Power.—See **LOCOMOTIVE RATING; TRAIN RESISTANCE; TRACTION.**

Von Borries-Schmidt-Garbe.—See **LOCOMOTIVE TEST—Superheated Steam.**

Zossen, Germany.—See **TRAIN, FAST.**

LOCOMOTIVE PISTON ROD.

See **LOCOMOTIVE, COMPOUND—Extended Piston Rod; LOCOMOTIVE ROD; PISTON ROD.**

LOCOMOTIVE POOLING.

See also **RAILWAY OPERATION; RAILWAY TRAFFIC.**

The Proper Utilization of Motive Power. T. M. R. Talcott. Condensed from a paper presented at meeting of the Southern & Southwestern Ry. Club. Generally favorable to pooling or double crewing locomotives. 2800 w. Ry & Engng Rev —Feb. 8, 1902.

Pooling Engines. J. V. N. Cheney. A statement of some of the trials and troubles due to the pooling of engines. 2400 w. R R Gaz—March 6, 1903.

Pooling Locomotives—Double and Multiple Crews. Camille Boell. Report to be presented at the Int. Ry. Cong. in Washington May, 1905. Report based on information from 26 roads, with conclusions. 3300 w. Ry Age—Aug. 5, 1904.

Report No. 2 on the Question of Pooling Locomotives (Subject VI. for Discussion at the Seventh Session of the Railway Congress). G. W. Rhodes. On the use of two or more crews; the advantages and disadvantages of the practice and the result of such common use with respect to the efficiency and the care of the locomotive. 6700 w. Bul Inst Ry Cong—Aug., 1904.

On the Question of Pooling Locomotives (Subject VI. for Discussion at the Seventh Session of the Railway Congress). Mr. Bell. Report (No. 1) for all countries, except United States, Belgium, England and Colonies, Holland, Denmark, Russia, Sweden and Norway. 4000 w. Bul Int Ry Cong—Sept., 1904.

On the Question of Pooling Locomotives (Subject VI for Discussion at the Seventh Session of the Railway Congress). E. Hubert. Report (No. 3) for Belgium, England and colonies, Holland, Denmark, Russia, Sweden and Norway. 7000 w. 1 table. Bul Int. Ry Cong—Feb., 1905.

Pooling of Locomotives. A. M. Waitt. Explains the meaning of the term, discussing the advantages to the crews and to the railroad companies, and some of the disadvantages, but generally favorable to the practice. 2500 w. R R Gas—Vol. XXXVIII., No. 18.

LOCOMOTIVE RATING.

See also **LOCOMOTIVE PERFORMANCE; LOCOMOTIVE TEST; RAILWAY OPERATION.**

The Basis of Engine Rating. J. Shirley Eaton. Discusses methods of tonnage rating. 2800 w. R R Gas—June 14, 1901.

Equated Tonnage Rates—Methods of Test and Calculation. Max H. Wickhorst. A discussion of engine rating; methods of determining the tractive force, friction, train resistance, &c., giving tables and diagrams. Also general discussion. 12,000 w. W Ry Club—March 17, 1903.

Loading of Locomotives on the Equated Tonnage of Drawbar-Pull Basis. J. M. Daly. Discusses the proper method of rating and loading locomotives, giving illustrated description of a computing device that automatically registers the number of cars in train and adjusts the drawbar-pull of each gross weight of car at each location in the train. Lengthy discussion of interest. 15,500 w. Pro N Y R R Club—Oct. 20, 1905.

Canadian Pacific.—A New Method of Rating and Loading Engines in Freight Service. Thomas Tait. An explanation of new method adopted by the Canadian Pacific, giving tabulated information, forms of reports, etc. General discussion follows. 18,000 w. N Y R R Club—Jan. 17, 1901.

Denmark.—The Computation of the Loads for the Locomotives of the Danish State Railways (Determination des Charges à Appliques aux Locomotives des Chemins de Fer de l'Etat Danois). Formulas and curves showing the hauling capacity of the engines at various speds. 1200 w. Génie Civil—Oct. 7, 1905.

Speed Curves.—The Capacity of Locomotives at Various Speeds (Ueber die Bestimmung der Leistungen von Lokomotiven aus dem Verlaufe der Geschwindigkeitskurven). Karl Schlöss. A study of the tractive power of locomotives based upon the performance at various points in the speed curve. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 24, 1905.

Steaming Capacity.—The Relation Between Heating Surface and Cylinder Power. Lawford H. Fry. Gives a measure for the steaming capacity of locomotives. 2000 w. Am Engr & R R Jour—Oct., 1902.

The Steaming Capacity of Locomotives. Editorial, reviewing briefly some of the methods proposed for comparing the steaming capacity of locomotives, and giving methods of making the calculations. 2700 w. R R Gas—June, 1903.

Locomotive Steaming Capacity. L. L. Bentley. Describes method of finding the steaming capacity, giving the results of a study of compound engines. 1200 w. Am Engr & R R Jour—July, 1904.

Ton Mileage.—Should Engine Ton Mileage Be Included in Motive Power Statistics? C. H. Quereau. Discusses this question at some length. 4000 w. Am Engr & R R Jour—June, 1901.

Tonnage.—Practical Tonnage Rating. George R. Henderson. Presents rules and diagrams by the use of which the writer believes it will be possible to rate almost any modern engine on any profile and alignment, and with very few calculations to establish a satisfactory schedule. 3500 w. Am Mas Mechs' Assn—Saratoga meeting, 1901.

Suggestions for the Establishment of a Practical System of Tonnage Rating. B. A. Worthington. Outlines the system that has been worked out on the Pacific system lines of the So. Pacific Co., giving results for the past year. 1600 w. Am Engr & R R Jour—Oct., 1901.

Tonnage Rating on Railways. J. W. Harkom. Describes methods of rating locomotives in use on the Canadian Pacific Railway. 2000 w. Am Engr & R R Jour—Feb., 1902.

Tonnage Rating of Locomotives. W. M. Ray. Concerning the methods of making the rating, with information received in answer to questions addressed to different roads, tests, diagrams, etc. 4000 w. Jour Assn of Engng Socs—Feb., 1902.

What Tonnage Rating Really Is. An explanation of draw bar pull, and how it differs from train weights, with description of J. M. Daly's locomotive rating cabinet. 1200 w. Loc Engng—Nov., 1902.

The Proper Handling of the Tonnage Rating System. R. S. Wickersham. Discusses points that are important in making tonnage rating a success. 1500 w. Am Engr & R R Jour—Sept., 1903.

The Most Economic Tonnage Rating for a Locomotive in Freight Service. Papers by V. F. Finch, and by Harry Bentley, discussed together. 8000 w. Pro Iowa Ry Club—June 13, 1904.

Tonnage, Rock Island.—Classification of Locomotives for Tonnage Rating Purposes. J. H. Louie. Explains a method of classification used on the Rock Island System. 1000 w. Am Engr & R R Jour—Dec., 1905.

Tractive Power.—The Tractive Power of Locomotives. W. F. M. Goss. Offered in discussion of a paper by G. R. Henderson on "A Practical Tonnage Rating," at the Mas. Mech's Con., June, 1901. 700 w. R R Gas—Aug. 16, 1901.

The Tractive Power of Locomotives. Edward C. Schmidt. Gives tables and curves showing the results of two methods of determining the drawbar pull of four locomotives. 600 w. R R Gas—March 7, 1902.

Tractive-Power Formulae. George F. Summers. Gives approximate formulae arranged for the purpose of basing one engine upon experience with another. 700 w. Am Engr & R R Jour—Sept., 1902.

The Tractive Force of Locomotives. Edward L. Coster. Most of the article is a compilation from the paper entitled "Practical Tonnage Rating," presented at the 1901 convention of the Master Mechanics' Assn., by George R. Henderson, and from information supplied in private correspondence. 1700 w. Am Engr & R R Jour—Oct., 1902.

See also **TRAIN RESISTANCE; TRACTION.**

Tractive Power Chart.—The Tractive Power Chart. Lawford H. Fry. Gives a chart designed as a time and labor-saving device for use in the calculation of the cylinder tractive power of a locomotive. 1800 w. Am Engr & R R Jour—Oct., 1901.

LOCOMOTIVE ROD.

See also **CONNECTING ROD; LOCOMOTIVE—Repairs; LOCOMOTIVE, COMPOUND—Extended Piston Rod; PISTON ROD.**

Forging and Repairing Locomotive Motion Rods. S. Uren. Read before the Nat. R. R. Mas. Blacksmiths' Assn. Describes methods used in the Sacramento shops to meet the changed conditions. Ills. 900 w. R R Gas—Vol. XXXIX., No. 11.

Stresses.—Connecting and Coupling-Rods. P. H. Parr. Gives the results of an original analysis of the stresses in the connecting-rods and coupling rods of locomotives, indicating the methods of investigation used. Serial. 1st part. 1200 w. Engr, Lond—Jan. 16, 1903.

LOCOMOTIVE SHOP.

See also **LOCOMOTIVE WORKS; RAILWAY SHOP; ROUNDHOUSE.**

Suggestions Concerning Locomotive Erecting Shops. C. H. Quereau. Remarks presented with the view of stimulating study and investigation. 1200 w. Am Engr & R R Jour—June, 1902.

Du Bois.—See **ELECTRIC DRIVING.**

Eastern Ry., France.—A New Locomotive Erecting Shop (Nouvel Atelier de Montagne des Locomotives). M. Desgeans. An illustrated description of the important new works of the Eastern Railway of France at Epernay. Two articles. 6 plates. Rev Gen des Chem de Fer—Sept., Oct., 1902.

French.—The Tool Equipment of French Locomotive Shops. Information from the "Official Journal of the French Republic" concerning their superannuated tools. 2200 w. Am Mach—May 29, 1902.

Italy.—Locomotive Works, and Shop Practice in Italy. The present number is principally a description of the "Elvetica" works of The Ernesto Breda Company, of Milan, and the methods used there. Ills. Serial. 1st part. 4400 w. Engr, Lond—Dec. 15, 1905.

Machine Rating.—Plan to establish a Machine Rating in a Locomotive Machine Shop, with Special Reference to New Tools. J. F. De Voy. Explains a system of card rating, giving information relative to the number of cuts, length of time and movement of work to be performed. General discussion. 7500 w. Pro W Ry Club—Dec. 15, 1903.

Machine Tools.—Special Machine Tools for Locomotive Shops. Joseph Horner. Illustrates and describes examples from British and Continental practice. 3700 w. Cassier's Mag—May, 1904.

See also **MACHINE TOOL; RAILWAY SHOP.**

Noisy-le-Sec, Paris.—See **ROUNDHOUSE.**

Reading, Pa.—New Locomotive Repair Shops of the Philadelphia and Reading. Illustrated description of the shops at Reading, Pa., and their equipment. 5200 w. R R Gaz—Dec. 12, 1902.

New Locomotive Shops. The present article gives an illustrated general description of the new shops of the Philadelphia & Reading Ry., Reading Pa. Serial. 1st part. 1600 w. Am Engr—R R Jour—Jan., 1903.

The Reading Locomotive Shops. An illustrated detailed description of one of the most extensive locomotive repair shops in the United States, and the equipment. 4500 w. Ry Age—March 6, 1903.

Repairs.—See also **LOCOMOTIVE; RAILWAY SHOP.**

Repairs, Grand Rapids.—See **RAILWAY SHOP—Grand Rapids, Pere Marquette.**

Repair Schedule.—Repairing Locomotives by Schedule. A detailed description of the scheme in use at the Chicago shops of the Chicago & Northwestern with one of the schedules. 1600 w. R R Gaz—June 13, 1902.

A Shop Schedule for Locomotive Repairs. Presents the schedule for locomotive repairs at the Chicago shops of the Chicago & Northwestern. 700 w. Am Engr & R R Jour—Feb., 1904.

Sioux City, Iowa.—New Locomotive Shops of the Chicago, St. Paul, Minneapolis & Omaha at Sioux City. Illustrated detailed description. 2400 w. R R Gaz—Sept. 11, 1903.

Slade's Green, Eng.—Electrical Equipment of the South-Eastern and Chatham Railway Co.'s Locomotive Sheds at Slade's Green. An illustrated description of a modern plant furnishing electricity for light and power. 2500 w. Elect'n, Lond—Dec. 21, 1900.

The Slades Green Engine Sheds and Electrical Equipment. An illustrated description of the applications of electricity at these sheds of the South-Eastern & Chatham Ry., England. 1600 w. Transport—July 11, 1902.

Topeka.—Improvements at the Topeka Shops of the Atchison, Topeka & Santa Fé Ry. Illustrates and describes the plans for a complete reconstruction and rearrangement of a plant for heavy locomotive work. 4500 w. Eng News—April 2, 1903.

LOCOMOTIVE SMOKEBOX.

See also **LOCOMOTIVE—Draft Appliances; LOCOMOTIVE STACK; LOCOMOTIVE FRONT END.**

Some Modern Locomotive Smokeboxes: Their Blast Pipes and Fittings. G. Willans. Illustrated description of various modern arrangements. 1400 w. Prac Engr—Nov. 9, 1900.

Smoke-Box Action. R. Weatherburn. Discusses the essentials of efficient smokebox action, and prevailing practice. 3800 w. Engr, Lond—April 15, 1904.

Spark Arrester.—The Development of the Locomotive Spark Arrester. J. Snowden Bell. Considers the leading and characteristic features of the development. Ill. 2200 w. Loc Engng—Jan., 1903.

Locomotive Draft and Spark Arrester Appliances. J. E. Muhlfeld. States the advantageous features claimed for this device, discussing criticisms. Ill. 2000 w. Ry Age—Feb. 13, 1903.

LOCOMOTIVE STACK.

See also **LOCOMOTIVE; LOCOMOTIVE SMOKEBOX.**

Diamond.—The Passing of the Diamond Stack. Thomas P. Whelan. On the advantages of the old diamond stack as compared with straight stacks, and the reason of the change. 1000 w. Loc Engng—Nov., 1900.

LOCOMOTIVE STAYBOLT.

See **LOCOMOTIVE BOILER; LOCOMOTIVE FIREBOX; STAYBOLT.**

LOCOMOTIVE SUSPENSION.

Oscillations.—See **LOCOMOTIVE OPERATION—Oscillations.**

LOCOMOTIVE TENDER.

See also **LOCOMOTIVE—Tender Engine.**

Italy.—Tender for Compound Locomotive, Mediterranean Railway, Italy. Two-page plate of sectional views, with illustration and details of tender, chief dimensions, weights, etc., of these recently constructed engines. 1000 w. Engng—June 5, 1903.

Krauss.—See **LOCOMOTIVE.**

Louisville & Nashville.—7,000-Gal. Tender of the Louisville & Nashville. Drawings of underframe, plan and sections of tank are given, with brief description. 600 w. R R Gaz—Vol. XXXIX., No. 2.

Michigan Central Ry.—Tender of 6,000 Gallons Capacity—Michigan Central Railway. Illustrated description of a recent design to be used with consolidation engines now building. 800 w. R R Gaz—Sept. 6, 1901.

Oil.—Tender for Oil-Burning Locomotives. Illustrated description. 600 w. R R Gaz—Oct. 3, 1902.

Tank Fittings.—Fittings Around the Tank. James Kennedy. A criticism of the present methods, and statement of the evils they cause. 1000 w. Loc Engng—Aug., 1904.

Tool Box.—See **Tank Fittings.**

Vanderbilt.—See **LOCOMOTIVE.**

LOCOMOTIVE TEST.

See also **INDICATOR; LOCOMOTIVE BOILER; LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE RATING.**

Tests of Light and Heavy Locomotives. Tabulated results, showing heavy locomotives to be advantageous when they may be loaded to capacity. 1100 w. Am Engr & R R Jour—Nov., 1901.

Acceleration.—Acceleration Tests on the Great Eastern of England. A detailed account of tests made with a new 10-coupled suburban tank engine. 900 w. R R Gaz—Sept. 25, 1903.

See also **ELECTRIC RAILWAY.**

Baldwin Compound.—Instructive Tests of a Baldwin Balanced Compound Locomotive. Gives results of tests comparing this locomotive with three simple engines. The results are of special interest. 1500 w. Am Engr & R R Jour—Dec., 1904.

Belgium.—See **LOCOMOTIVE—Superheater, Belgium.**

Boston & Maine R. R.—The Power of a Locomotive and Its Steaming Capacity. David L. Gallup. Reports investigations of tractive power made on Boston & Maine wide firebox locomotives. 1800 w. Jour Worcester Poly Inst—Nov., 1901.

Brooks.—Road Tests of Brooks Passenger Locomotives. E. A. Hitchcock. Gives results representing every-day practice on two types of machines, giving illustrated description of apparatus, and methods. 2700 w. Trans Am Soc of Mech Engrs., No. 054—Dec., 1904.

Compound.—Indicator Tests of a Large Tandem Compound. Cards and data obtained from one of the tandem consolidation engines of the Santa Fe, showing the net tractive effort. 500 w. Am Engr & R R Jour—Feb., 1904.

Working Indicator Trials (Essais Effectués en Service Courant et à l'Aide d'Indicateurs de Pression). MM. Marchis and Ménétrier. Report of tests of 2-cylinder compound locomotive, with numerous indicator diagrams. 1000 w. 4 plates. Rev Gen des Chemins de Fer—Feb., 1904.

Compound, Chicago, G. W. Ry.—The Cross-Compound Locomotive. W. L. Kinsell. Gives a report of tests made on the Chicago, Great Western Railway, which emphasize the necessity for a careful study of the power distribution of these engines. 1200 w. Am Engr & R R Jour—Oct., 1904.

Compound, Paris-Orleans Ry.—Four-Cylinder Compound Locomotives on the Paris-Orleans Railway. Abstract of an article by M. P. Gone, in "La Revue Générale." Description, with results of tests, dynamometer records, etc. 1500 w. R R Gaz—Vol. XXXIX., No. 4.

Consolidation, Santa Fe.—See **Compound.**

Cornell University.—Railway School Locomotive Tests. An illustrated description of the locomotive tests conducted each fall by the Railway School of Sibley College, Cornell, on the Delaware, Lackawanna and Western Railroad. 1200 w. Sibley Jour Mech Engng—Dec., 1902.

De Glehn.—See **LOCOMOTIVE COMPOUND; LOCOMOTIVE PERFORMANCE—Great Western, Eng.**

Denmark.—Experiments and Observations Made on the Locomotives of the Danish State Railway. O. Busse, in the "Organ für die Fortschritte des Eisenbahnwesens." 2000 w. Bul Int Ry Cong—Aug., 1904.

Electric vs. Steam.—Comparative Speed Tests of Steam and Electric Locomotives. A report of a series of tests made April 29 over the experimental track at Schenectady, N. Y., to secure data on the relative acceleration and speed characteristics of electric and steam locomotion. 1400 w. St Ry Jour—May 13, 1905.

Comparative Tests of Steam and Electric Locomotives. An account of the tests made on the experimental track of the New York Central Railroad, giving results. Ill. 1400 w. Sci Am Sup—Aug. 5, 1905.

See also **ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY—Steam Compared.**

England.—I. Testing Locomotives in England. G. J. Churchward. Describes the testing plant on the Great Western Railway at Swindon. II. Measured Tests in Service. W. F. Pettigrew. On the instruments and results required at a test. 2700 w. Inst of Mech Engrs—June, 1904.

Flue Gases.—See **German.**

France.—Tests of Locomotives on the French State Railway. Abstract of articles by Joseph Nadal, appearing in the "Revue Generale des Chemins de Fer." An account of tests made of five different types of locomotives, for the purpose of examining the efficiency of operation of the steam in the cylinders, and other matters of interest. The results are discussed. Serial. 1st part. 1600 w. R R Gaz—Oct. 28, 1904.

Experiments on the Efficiency of Locomotives (Expériences sur le Rendement des Locomotives). Joseph Nadal. An illustrated account of tests on French railways to determine the performance and efficiency of locomotives of various types, with particular reference to the action of the steam in the cylinders. Tables and diagrams. 1 plate. 9000 w. Rev Gén des Chem de Fer—May, 1903.

France Western.—Trials of the Compound Locomotives of the Western Railway of France (Essais Comparatifs avec les Machines Compound de la Compagnie de l'Ouest). E. Decourt. Full data and results of important trials of four-cylinder compound French and Italian locomotives. 10,000 w. 5 plates. Rev Gen des Chem de Fer—Nov., 1901.

Fuel Value.—Fuel Tests on the Furness Railroad, England. From a paper by W. F. Pettigrew, giving results of a series of tests made to determine the fuel value of several grades of coal. 1500 w. R R Gaz—March 4, 1904.

Furness, Eng.—See **Fuel Value.**

German.—High-Speed Steam-Locomotive Tests in Germany. An account of the recent experiments made, describing the engines and giving the results. 1500 w. U S Cons Repts—June, 1904.

Investigations Upon the Steaming Capacity of Locomotives and the Composition of Flue Gases (Rauchgasanalysen und Verdampfungsversuche an Lokomotiven). H. Strahl. A study of combustion and steaming in locomotives, with the practical application of the Orsat apparatus to the flue gases. Two articles. 9000 w. Glasers Annalen—Sept. 1, 15, 1904.

See also **Superheated Steam.**

Great Western, Eng.—See **LOCOMOTIVE PERFORMANCE.**

Italian at Paris.—Trials of an Italian Locomotive on a French Railway. An account of the trials of a locomotive exhibited at Paris, designed to run cab first, and the favorable results. 3000 w. Engr, Lond—July 12, 1901.

See also **LOCOMOTIVE.**

Italy.—Economical Locomotives. Illustrations and description of a locomotive of novel design, recently tested in Italy, which shows some excellent results in coal economy, as given by Charles R. King in the "Railway Engineer." 2000 w. Ry & Engng Rev—April 16, 1904.

Leaks.—The Location of Steam Blows in Tandem Compound Locomotives. F. P. Roesch. Instructions, with illustrations showing sections through steam chests, valves and cylinders with valves in various positions for testing. 700 w. Ry Mas Mech—May, 1903.

To Locate Blows on Tandem Compound Engines. S. H. Draper. Suggestions for locating the blowing of steam by sound. 700 w. Loc Engng—June, 1904.

See also **LOCOMOTIVE OPERATION—Blows and Vibrations; LOCOMOTIVE BOILER.**

Lignite Burning.—See **LOCOMOTIVE.**

Liquid Fuel.—See **LIQUID FUEL—Harriman Railways.**

London & North-Western.—Train Experiments on the London and North-Western Railway. Gives report of trial trips made with a new type of engine, the Precursor, No. 513, for heavy traffic. Diagrams. 500 w. Engr, Lond—April 15, 1904.

See also **LOCOMOTIVE PERFORMANCE.**

Mallet Compound.—See **LOCOMOTIVE PERFORMANCE.**

Michigan Central.—Comparative Locomotive Tests. A record of locomotive tests on the Mich. Cent. Ry., undertaken to determine the policy of building heavier engines, and to ascertain the extent of their advantages, combined with wide fireboxes and compounding. 2500 w. Am Engr & R R Jour—Dec., 1901.

Plant.—Locomotive Testing Plants. W. F. M. Goss. Illustrates and describes the plants at Purdue University and the plants of the Chicago & Northwestern Railroad Co., Columbia University, the Pennsylvania Railroad System at St. Louis, and of other experimenters. 8000 w. Trans Am Soc of Mech Engrs, No. 048—June, 1904.

See also **England; St. Louis Exposition.**

Purdue.—Tests of the Boiler of the Purdue Locomotive. W. F. M. Goss. Briefly describes the locomotive and its boiler, and the tests. Ill. 7200 w. Trans Am Soc of Mech Engs, No. 878—Dec., 1900.

Locomotive Draft Appliances. The first of a series of articles upon tests made by Prof. Goss of Purdue Univ., to bring the information on this subject up to date and render it applicable to the large locomotives of the present. This number is mainly a discussion of existing information. Serial. 1st part. 2200 w. Am Engr & R R Jour—Oct., 1901.

Road.—Road Tests of Consolidation Freight Locomotives. E. A. Hitchcock. A report of trials made, showing the engine performance, and also the losses incurred for the particular conditions encountered. 4500 w. Trans Am Soc of Mech Engr. No. 033—June, 1904.

See also **Brooks.**

St. Louis Exposition.—The Locomotive Testing Plant of the Pennsylvania R. R. at the St. Louis Exposition. Describes the organisation and plan of work as set forth in a bulletin issued by the Pennsylvania system. 3500 w. Eng News—Nov. 26, 1903.

Locomotive Tests at St. Louis in 1904. Editorial review of the bulletin describing the proposed work. 1500 w. R R Gaz—Nov. 27, 1903.

The First Bulletin of the Pennsylvania Railroad's Testing Plant at St. Louis. Describes the work to be carried on with the locomotive-testing plant. 4000 w. R R Gaz—Dec. 4, 1903.

Locomotive Testing Plant at the Louisiana Purchase Exposition. Information from Bulletin No. 2 of the Pennsylvania Railroad, which describes the plant, giving illustrations. 2000 w. Ry Age—May 13, 1904.

Locomotive Testing Plant at the St. Louis Exhibition. H. W. Hanbury. Indicates the principle upon which the plant is based, and explains the difficulties in connection with the installation which have delayed its completion. Ills. 2200 w. Engng—June 17, 1904.

Locomotive Testing Plant of the Pennsylvania at St. Louis. An illustrated detailed description. 2000 w. R R Gaz—Vol. XXXVIII., No. 10.

Locomotive Tests of St. Louis. Extract from Bulletin No. 4, published by the Penn. Ry. Co., describing tests of Pennsylvania Railroad consolidation locomotive No. 1499. Ills. 4500 w. R R Gaz—Vol. XXXVIII., No. 14.

Shay.—Tests of a Heavy Shay Locomotive. Illustration of a locomotive of the Shay type recently put in service on the Chesapeake & Ohio, with a description of its work as a bill-climber. 500 w. R R Gaz—Vol. XXXVIII., No. 23.

Slipping.—See **LOCOMOTIVE OPERATION.**

Superheated Steam.—Comparative Experiments with Saturated and Moderately Superheated Steam in Locomotives (Vergleichende Versuche mit Gesättigtem und Mässig Ueberhitztem Dampf an Lokomotiven). H. Strahl. Data and results of tests on the Prussian State Railways, showing fuel economies of 10 to 12 per cent. by superheating. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 2, 1904.

Comparative Tests of Locomotives Using Saturated and Superheated Steam. Abstract of an article by Herr Strahl in "Zeitschrift des Vereins Deutscher Ingenieure." Describes the experiments and gives results. Ill. 3300 w. R R Gaz—Feb. 19, 1904.

Comparative Trials of Locomotives Using Saturated Steam and Using Moderately Superheated Steam. Wm. Strahl, in "Zeitschrift des Ver. Deut. Ing." Abstract of report of trials on the Prussian State Railway. 4900 w. Bul Int Ry Cong—Oct., 1904.

Trial Runs of Modern Locomotives. A. von Borries. A report of trials made in 1902, having as object the experimental comparison of the four cylinder compound locomotive on the von Borries system, with the most recent type of locomotive with superheated steam on the Schmidt-Garbe system. 4900 w. Bul Int Ry Cong—Feb., 1904.

Test of a Superheater Locomotive. Gives interesting results of a test on the Chicago & Northwestern with superheater locomotives to determine their relative efficiency. 800 w. R R Gaz—Vol. XXXVIII., No. 23.

See also **LOCOMOTIVE.**

Swindon, Eng.—Locomotive Testing Plant at Swindon. A detailed description of this machine. 1000 w. Engr, Lond—April 22, 1904.

Locomotive Testing Plant at Swindon. Drawings and photographs illustrating the plant of the Great Western Railway, England, with description of the mechanism. 2000 w. Engr, Lond—Dec. 22, 1905.

Wide vs. Narrow Firebox.—Tests of Wide and Narrow Firebox Locomotives. Gives results of road tests, burning soft coal, which furnish the most recent and thorough facts concerning wider grates. Also editorial. 3700 w. R R Gaz—March 29, 1901.

Zossen, Germany.—High-Speed Trials with Steam Locomotives (Schnellfahrversuche mit Dampflokomotiven). Data and results of recent trials of steam locomotives upon the Marienfelde-Zossen experimental track. 1800 w. Glasers Annalen—Aug. 1, 1905.

See also **ELECTRIC RAILWAY; LOCOMOTIVE—High-Speed.**

LOCOMOTIVE TRUCK.

See also **CAR TRUCK.**

Equalizing.—See **LOCOMOTIVE FRAME.**

France.—Engine Truck of the Western Railroad of France. Illustrations and description of an interesting engine truck, with shifting center, designed for fast express locomotives. 500 w. R R Gaz—Dec. 14, 1900.

Player Radial.—The Player Patent Improved Radial Truck. Illustrates and describes the construction of trucks used under a number of recent Brooks locomotives. 1500 w. Ry Mas Mech—May, 1901.

LOCOMOTIVE VALVE.

See also **LOCOMOTIVE; LOCOMOTIVE, COMPOUND; LOCOMOTIVE VALVE GEAR; VALVE.**

Locomotive Valves and Valve-Gears. W. F. M. Goss. Explains the requirements, and describes the Stephenson valve-gear, discussing its merits and defects. Improved valve gears, valve setting, foreign valve-gears, etc., are also briefly considered. 5500 w. Pro S & S-W Ry Club—March 16, 1905.

Allfree-Hubbell.—See **Young; LOCOMOTIVE VALVE GEAR—American.**

Allfree-Hubbell.—See **Young.**

Balanced.—Note on Balanced Valves (Note sur les Tiroirs Equilibrés). A communication from the Eastern Railway of France upon the behavior of the balanced slide valves used upon the "Series 3000" locomotives of that road. 3000 w. Revue de Mécanique—Sept. 30, 1901.

By-Pass and Starting.—By-Pass and Starting Valves, A. T. & S. F. Four-Cylinder Tandem Compound. Illustrated description. 700 w. Ry Age—Feb. 14, 1902.

Cylindrical.—The Application of Cylindrical Steam Distributing Valves to Locomotives. Walter M. Simth. Gives illustrated descriptions of valves tried, and much information concerning the working of engines fitted with them, their action under different conditions, etc. Ill. 6000 w. Inst of Mech Engrs—July 30, 1902.

Emergency.—See **LOCOMOTIVE, COMPOUND—Articulated.**

Haberkorn.—See **Young.**

High Speed.—Proposed Design of Locomotive Valves for High Speeds. J. V. N. Cheney. A brief discussion, giving the writer's views. 900 w. R R Gaz—April 10, 1903.

Piston.—Piston Valves. Wilson Worsdell. Illustrates and describes valves used by the North Eastern Railway of England. 900 w. R R Gaz—Nov. 12, 1900.

Link Motion and Piston Valves. C. A. Seley. Discusses the extensive use of piston valves in locomotives, their location, various styles and their advantages. 1800 w. Am Engr & R R Jour—June, 1901.

Locomotive Piston Valve. Discussion of this subject introduced by Mr. John Player. 6800 w. Cent Ry Club—Nov., 1901.

Piston Valves. Illustrates and describes various types. 2200 w. Loc Engng—March, 1902.

The Piston Valve as Applied to the Locomotive. J. E. Dixon. Reviews the history of the application of piston valves to locomotives, considering the benefits derived. Ill. 3500 w. Wis Engr—April, 1902.

The Use of Piston Valves on Four-Cylinder Compound Locomotives (l'Emploi de Liroirs Cylindriques sur les Locomotives Compound à Quatre Cylindres). L. C. M. Pelletier. Data and results of the experience of the Eastern Railway of France, with details of construction of recent locomotives. 8000 w. 3 plates. Mem Soc Ing Civ de France—Sept., 1902.

Handling Piston Valves. Jas. Spellen. The writer's views on the proper handling of piston valve engines. 1200 w. Ry & Engng Rev—Nov. 14, 1903.

See also **LOCOMOTIVE, COMPOUND—Lackawanna; LOCOMOTIVE OPERATION.**

Reducing.—See **LOCOMOTIVE, COMPOUND—Articulated.**

Relief.—The Relief Valve as a Detriment to the Successful Operation of a Locomotive. G. W. Mudd. Gives the writer's theories in regard to this question. General discussion. 3000 w. St. Louis Ry Club—Jan. 8, 1904.

Setting.—Negative Work of Back Pressure and Compression. Ira C. Hubbell. Claims that compression is negative, and that by delaying the closure of the exhaust part the volume in compression is decreased and also the negative work, and consequently the work to be obtained from a given quantity of steam is increased. Discussion follows. 11,000 w. Pro W Ry Club—Sept. 20, 1904.

Throttle.—The Design of Locomotive Throttle Valves. A discussion of a "compensating" throttle-valve invented by J. S. Chambers. 1900 w. Eng News—April 25, 1901.

Young.—The Young Valve and Gear for Locomotives. Illustrated detailed description of a system of rocking valves, designed by O. W. Young and carefully tested. 2000 w. R R Gaz—Vol. XXXVII., No. 21.

New Types of Valves and Valve Gears for Locomotives. Illustrates and describes the Young system, the Allfree-Hubbell system, and the Haberkorn system; three new types designed to improve the steam distribution of locomotives. 4000 w. Eng News—May 4, 1905.

See also **LOCOMOTIVE; LOCOMOTIVE, COMPOUND; LOCOMOTIVE VALVE; VALVE GEAR.**

Locomotive Valve Motion. S. J. Dillon. Abstract of a talk given to engineers and firemen of the Pennsylvania Railroad. Serial. 1st part. 800 w. Loc Engng—Aug., 1901.

Steam Distribution for Locomotive Engines. H. T. Herr. Extracts from a paper presented at the N. W. Ry. Club. Deals principally with valve motion, its design and importance. 2900 w. Ry Age—Nov. 1, 1901.

Dr. W. F. M. Goss on Valve Gears. From a paper read before the So. & So. W. Ry. Club. Discusses the improvement of locomotive valve gear, with remarks on valve setting. 1500 w. Am Engr & R R Jour—Sept., 1905.

American.—New American Valve Gears for Locomotives. Illustrates and describes the Allfree valve gear, and the Young locomotive valve gear. 1200 w. Engr, Lond—Oct. 20, 1905.

"Central Atlantic."—Valve Motion of Recent Passenger Locomotives. Gives a diagram of the valve motion of the "Central Atlantic" type locomotives, and calls attention to the remarkable uniformity of cut-off. 400 w. Am Engr & R R Jour—Aug., 1901.

See also **LOCOMOTIVE.**

Compound.—The Distribution of Steam in the Cylinders of Compound Locomotives (La Distribution de la Vapeur dans les Cylindres des Locomotives Compound). A mathematical analysis of the action of the valve gear in the distribution of steam in compound locomotives, with numerous examples. 4500 w. Revue Technique—Nov. 10, 1900.

Valve Gear for Compound Locomotives (Steuerung für Verbundlokomotiven). M. Kuhn. Describing a form of valve gear permitting a variable cut-off in the high pressure, and fixed cut-off in the low pressure cylinder. 2500 w. 1 plate. Glasers Annalen—Nov. 1, 1901.

A New Valve Gear for Compound Locomotives (Neue Steuerung für Verbundlokomotiven). M. Kuhn. With diagrams of an improved form of straight-link motion, and indicator cards showing the steam distribution. 3000 w. Zeitschr d Ver Deutscher Ing—July 26, 1902.

Steam Distribution in Compound Locomotives (Les Distributions des Locomotives Compound). R. Godfernaux. Discussing especially the Gölsdorf and the Henschel valve gears for compound locomotives. 2000 w. Rev Gen des Chem de Fer—March, 1903.

See also **Vauclain; Von Borries; LOCOMOTIVE, COMPOUND.**

Goelsdorf.—See Compound; **LOCOMOTIVE COMPOUND.**

Gt. Northern Ry., England.—The Valve Motion That Promises to Save Forty Per Cent. Particulars in regard to the new gear being tried on the Great Northern Ry. of England. 1200 w. Loc Engng—April, 1902.

Henschel.—See Compound; **LOCOMOTIVE—Tank, Henschel.**

Heusinger.—Studies in the Heusinger Valve Gear (Untersuchungen an der Heusinger Steuerung). W. Pfitzner. An examination of the so-called Heusinger, or Walschaert type of radial valve gear, extensively used on Continental locomotives. 2000 w. Zeitschr d Ver Deutscher Ing—March 25, 1905.

See also **Walschaerts.**

Marshall.—See **LOCOMOTIVE—Europe.**

Piston.—See **LOCOMOTIVE VALVE.**

Reversing.—Steam Reverse Gear Once on P. & R. Illustrated description of a device in use on the Philadelphia & Reading passenger locomotives before balance valves were used. 700 w. Loc Engng—May, 1905.

Vauclain.—Steam Distribution of the Vauclain Compound Locomotive. Lawford H. Fry. Introductory description, showing how the theoretical diagram given, constructed by Zeuner's method, represents the processes through which the steam passes. 3000 w. R R Gaz—May 29, 1903.

See also **LOCOMOTIVE, COMPOUND.**

Von Borries.—Valve Gear for Four-Cylinder Balanced Compound Locomotives, Von Borries Patent. From an article in "Glasers Annalen für Gewerbe und Bauwesen." Illustrated description. 600 w. R R Gaz—July 25, 1902.

Walschaerts.—History of the Walschaerts Valve Gear (Historie de la Distribution Walschaerts). Prof. J. Boulvin. A biographical sketch of Egide Walschaerts, of Belgium, and an illustrated history of his valve gear, which was mistakably attributed to Heusinger von Waldegg. 2000 w. Rev de Mecanique—Feb., 1902.

The History of the Walschaerts Valve Gear. Translation of an article by M. J. Boulvin in the "Revue de Mecanique," relating the circumstances under which Walschaerts brought forth his invention. 1800 w. R R Gaz—Oct. 24, 1902.

The Walschaerts Valve Gear. Editorial giving general description. 1000 w. Ry Age—Aug. 12, 1904.

Valve Gear for Four-Cylinder Compound Locomotives (Steuerung für Vier-Cylinder Verbundlokomotiven). Ernst Happel. Describing a modification of the Walschaerts gear, adapting it to both inside and outside cylinders. 800 w. Glasers Annalen—Jan. 15, 1905.

History of the Walschaerts Valve Motion. M. J. Boulvin. Translated from "Revue de Mécanique." Ills. 1500 w. R R Gaz—Vol. XXXIX., No. 21.

Freight Locomotive with Walschaerts Valve Motion. An explanation of the Walschaerts link motion, and an illustrated description of a Lake Shore locomotive to which this valve gear has been applied. 700 w. Am Engr & R R Jour—Feb., 1905.

A Study of the Walschaerts Valve Motion. W. Pfitzner. Translated from the "Zeitschrift des Verein Deutscher Ingenieure." The object of the study was to enable a valve motion to be designed on paper to a convenient scale and with sufficient certainty to render it unnecessary to test the design on a model. Ills. 2400 w. R R Gaz—Vol. XXXIX., No. 4.

The Construction of the Link of the Heusinger-Walschaerts Valve Gear (Die Konstruktion des Schleifbogens der Heusinger Steuerung). W. Hanff. Giving equations and diagrams for laying out slide-valve gears of the Walschaerts type. 800 w. Zeitschr d Ver Deutscher Ing—Oct. 7, 1905.

Walschaerts Valve Gear. Max Pfander. Diagram and description, with a statement of its advantages as compared with ordinary link motion. 2000 w. Ry & Loc Engng—Dec., 1905.

See also **LOCOMOTIVE—C. R. I. & P. Ry.; Consolidation, N. Y. Central.**

Walschaerts vs. Stephenson.—Walschaerts vs. Stephenson Valve Gear. A comparison showing the saving in weight by using the Walschaerts gear, and giving other facts. Also editorial. 1700 w. Engr & R R Jour—June, 1905.

The Stephenson and Walschaerts Valve Gears. James Kennedy. Describes the Walschaerts valve gear, stating its apparent advantages. Ills. 1800 w. Ry & Loc Engng—Oct., 1905.

Young.—See American; **LOCOMOTIVE VALVE.**

LOCOMOTIVE WHEEL.

See **CAR WHEEL; LOCOMOTIVE; LOCOMOTIVE DRIVING WHEEL.**

LOCOMOTIVE WORKS.

See also **LOCOMOTIVE SHOP; MACHINE TOOL—Locomotive Works; RAILWAY SHOP.**

Baldwin.—Mathias Baldwin and the American Locomotive. Editorial review of the Baldwin Locomotive Works of Philadelphia, which have reached their seventieth anniversary as an industry, and completed their twenty-thousandth locomotive. 1700 w. Ir Age—Feb. 20, 1902.

Building of American Locomotives. The present article deals with the Baldwin Locomotive Works. Ill. Serial. 1st part. 2400 w. Sci Am—June 7, 1902.

Enlargement of the Baldwin Locomotive Works. An illustrated description of the principal features of the extensive enlargement now under way. 3200 w. Ry Age—Nov. 21, 1902.

Improvements at the Baldwin Locomotive Works. An illustrated account of extensive improvements, mostly additions and remodeling of present equipment. 1500 w. R R Gaz—Oct. 31, 1902.

See also **WORKS MANAGEMENT.**

Borsig, Germany.—See **ENGINE WORKS.**

Canada.—See **Montreal.**

Darlington.—The Darlington Works of Robert Stephenson & Co. The first of a series of articles giving the history and detailed description of these works. Serial. 1st part. 3000 w. Engr, Lond—Sept. 11, 1903.

Glasgow.—Hyde Park Locomotive Works, Springburn, Glasgow. Illustrated detailed description of the largest locomotive manufactory in Europe, and its equipment, with history of the undertaking. Serial. 1st part. 14,000 w. Engr, Lond—May 17, 1901.

Hydraulic Machinery.—See **HYDRAULIC MACHINERY—Locomotive Works.**

Improvements.—See **Baldwin.**

Machine Rating.—See **LOCOMOTIVE SHOP.**

Montreal.—Plant of the Locomotive & Machine Company of Montreal. Brief description, with illustration and plans. 700 w. Am Engr & R R Jour—Dec., 1904.

Shops of the Locomotive & Machine Company of Montreal. Illustrated detailed description of works with a capacity of about 300 locomotives a year. Also general business in machine and structural work. 1500 w. R R Gaz—Aug. 21, 1903.

New Locomotive Works in Canada. Illustrated description of the recently built works of the Locomotive and Machine Company of Montreal, Limited. 900 w. Engr, Lond—Sept. 30, 1904.

Schenectady.—Improvements in the Schenectady Works of the American Locomotive Co. Illustrates and describes new buildings, including a boiler shop, foundry, blacksmith shop, tank shop, hammer shop and drop forge shop, besides minor structures. 1600 w. R R Gaz—Oct. 3, 1902.

The New Shops of the American Locomotive Company of Schenectady. Lindsay Duncan. Illustrates and describes the design and construction of important additions to the plant at Schenectady, the transportation arrangements, power distribution, etc. 3500 w. Eng Rec—June 27, 1903.

Swiss.—The Tools and Methods of a Swiss Locomotive Works. C. R. King. An illustrated description of the Swiss Locomotive and Machine Works at Winterthur, showing the union of English, American and Continental practice there found. 3500 w. Engineering Magazine—Sept., 1903.

Topeka.—See **LOCOMOTIVE SHOP.**

United States.—Locomotive Building in the United States. Fred H. Colvin. A collection of notes from various sources, giving information concerning locomotive works. Serial. 1st part. 2000 w. Loc Engng—Feb., 1902.

LOG.

See also **SPEED INDICATOR.**

Electric.—See **SPEED RECORDER.**

Electric Dead Reckoner.—Electric Dead Reckoner on "Valhalla" in the Ocean Race. Illustrates and describes an apparatus for automatically recording the distance and the course traveled. 1200 w. Sci Am—June 3, 1905.

Errors.—See **NAVIGATION—Stranding.**

Guyou.—Measurement of the Speed of Ships (Mesure des Vitesses des Navires à la Mer). E. Guyou. Description of a modification of the ship log, the speed of the log line and the revolutions of the main shaft being both electrically registered on a strip of paper. 600 w. Comptes Rendus—May 18, 1903.

The Measurement of the Speed of Ships (Mesure des Vitesses des Navires à la Mer). M. Guyou. Description of an improved form of the old-fashioned log and line, with electric recording apparatus. 600 w. Moniteur Industriel—June 6, 1903.

LONGITUDE.

See also **NAVIGATION.**

Chronometer.—The Determination of Difference of Longitude by Transport of Timepieces (Essai d'une Détermination de Difference de Longitude par Transport de l'Heure). Paul Ditisheim. A determination of the difference in longitude between Paris and Neuchatel by transport of chronometers provided with compensated balances of nickel steel alloy. 1200 w. Comptes Rendus—April 25, 1904.

Honolulu.—The Determination of the Longitude of Honolulu, 1555-1903. John F. Hayford. An account of the recent determination by the telegraphic method of the difference of longitude of San Francisco and Honolulu through the new Pacific Cable. 1700 w. Eng News—Nov. 5, 1903.

Manila.—The Completion of the Longitude Girdle of the Globe: Determination of the Difference in Longitude Between San Francisco and Manila. Edwin Smith. Gives results of the recent determination, describing the methods. 3500 w. Eng News—Oct. 6, 1904.

LOOM.

See **TEXTILE MACHINERY.**

LOW TEMPERATURES.

See also **CARBONIC ACID—Liquid; LIQUID AIR; REFRIGERATION.**

The Production and Maintenance of Low Temperatures (Production et Maintien des Basses Températures). M. d'Arsonval. A discussion of the uses of solidified carbonic acid, of acetylene snow, and of liquid air. 1200 w. Comptes Rendus—Dec. 9, 1901.

The Production of Very Low Temperatures. Begins a review of work in this field referring to the British exhibit at the St. Louis Exhibition and the lectures given there. Ills. Serial. 1st part. 2500 w. Engr, Lond—June 2, 1905.

The Production of Very Low Temperatures (Production des Très Basses Températures). A. Lafay. A review of the methods employed in the liquefaction of air and of hydrogen, with illustrations of the apparatus. Serial. Part I. 2500 w. Génie Civil—Sept. 23, 1905.

Electric Phenomena.—See **ELECTRO-PHYSICS—Low Temperatures.**

LUBRICATION.

See also **BEARINGS; FRICTION; OIL; OIL SEPARATOR; PETROLEUM;** and under the various kinds of engines and machines.

On the Subject of Lubrication. W. H. Edgar. Concerning cylinder oils, the selection, the conditions and requirements, tests, etc. 1700 w. Marine Rev—April 11, 1901.

Lubrication of Machinery. Notes some of the points most essential in the lubrication of the bearings of modern machinery. Ill. 1600 w. Mod Mach—Nov., 1901.

Friction of Lubricating Oils. R. H. Thurston. Discusses some of the results obtained, and the deductions drawn. 1200 w. Am Mach—Jan. 23, 1902.

Lubrication. William F. Parish, Jr. Abstract of a paper presented to the New England Cotton Mfrs. Assn. Considers the selection of oils; cylinder, engine, dynamos and shafting lubrication. 3500 w. Power—Dec., 1902.

Lubrication. William M. Davis. States the requirements of a good lubricant, and considers essential points in lubrication. 1500 w. Power—March, 1903.

The Theory of Lubrication Reduced to Practice. J. K. Nye. On the importance of understanding the correct lubricating qualities for the purpose intended. 2000 w. Marine Engng—April, 1903.

Oiling System. P. E. Moock. Discusses the essentials of a successful oiling system, and gives information in regard to an inexpensive system recommended. 1500 w. Power—June, 1903.

✓ Friction and Lubrication. J. Stormonth. References to the light gained through the experiments of Mr. Towers, Prof. Goodman and others, is made, and points bearing on this subject discussed. 3500 w. Engr, Lond—June 19, 1903.

Oils and Oiling. H. R. Carter. The various kinds of oil are discussed and their value as lubricants, illustrating instruments used in testing them. Serial. 1st part. 2400 w. Prac Engr—Dec. 15, 1905.

✓ Friction, Lubricants and Lubrication. Stanley H. Moore. Discusses these subjects in detail. 3000 w. Power—Dec., 1905.

Albion.—See **Automobile.**

Analysis.—Analyses of Lubricating Greases. P. H. Conradson. Considers solid lubricants, and the methods of analyzing them. 5000 w. Pro Engrs' Soc of W Penn—March, 1904.

Automatic.—Automatic Cylinder Lubrication. C. G. Robbins. Discusses the hydrostatic lubricator, stating objections to its use, and describes "pressure" systems in common use. Ill. 1800 w. Power—Dec., 1902.

See also **BEARING—Tests.**

Automobiles.—Positive and Cleanly Lubrication. Albert L. Clough. Explains forced feed lubrication and its advantages. 900 w. Horseless Age—Jan. 8, 1902.

Wrist Pin Lubrication of Vertical Engines—A Positive System. Hugh D. Meier. Describes ways of lubricating wrist pins, illustrating one device. 1400 w. Horseless Age—July 23, 1902.

Cylinder Lubrication in Petrol Motors. C. C. Longridge. Discusses the maximum working temperature of the cylinder walls and the maximum stability of the oil under heat. 1400 w. Autocar—Oct. 4, 1902.

To Prevent Short Oil Pipes Robbing Long Ones. Thomas Clarkson. Extracts from a paper read at a meeting of the Automobile Club of Great Britain and Ireland. Gives statements of interest in regard to lubrication in automobiles. 900 w. Automobile—March 7, 1903.

Cylinder and Crankshaft Lubrication. E. W. Walford. On the lubrication of motor-car engines. considering the oiling of the gudgeon pin, the supply of lubricant, and experiments with graphite. 1400 w. Autocar—Aug. 15, 1903.

The Albion Lubricator. Illustrated description of the mechanical lubricator on the Albion car. It is a multiple-feed lubricator, occupying very small space. 1000 w. Auto Jour—Sept. 16, 1905.

The Albion Mechanical Lubricator. Illustrates and describes the ingenious lubricator fitted to all Albion cars, invented by T. Blackwood Murray. 600 w. Autocar—Oct. 28, 1905.

The Albion Mechanical Lubricator. Calls attention to the tendency toward over-lubrication and the disagreeable results, and gives an illustrated description of a device designed to overcome these features and yet ensure efficient lubrication at all times. 1000 w. Motor-Car Jour —Nov. 11, 1905.

See also **AUTOMOBILE, GASOLINE—Smoke Prevention.**

Bearing.—See also **BEARING.**

Cars.—Lubrication of Cars. George P. Zachritz. Extracts from a paper presented at the December meeting of the Northwest Ry. Club. Discusses the things to be considered in successfully and economically preventing journals from heating. 2000 w. R R Gaz—Jan. 24, 1902.

See also **CAR BEARING; JOURNAL.**

Compressed Air Apparatus.—The Use of Low Grade Oil and its Effect upon the Air Discharged from a Condenser. R. S. Carter. States an experience in tunnel work which caused the air to become so impure as to affect the workers, which was traced to the use of poor oil. 600 w. Compressed Air—Oct., 1902.

Crandall.—The Crandall Mechanical Lubricating System. Illustrated description. 1000 w. Ir Age —April 14, 1904.

Cylinder.—Cylinder Lubrication. J. S. V. Bickford. Reports of tests of oils for heat resisting properties, and of cylinder oils under steam conditions, etc. Ill. 3500 w. Horseless Age—Sept. 24, 1902.

Cylinder Oil and Cylinder Lubrication. Henry M. Wells. An article dealing with cylinder oil for steam engines. How to find the best oil for given working conditions. Gives a general outline of the process of manufacture and treatment of cylinder oil. Serial. 1st part. 2500 w. Engr, Lond—July 17, 1903.

Steam Cylinder Lubrication. Charles E. Carpenter. A talk on this subject, giving general rules and discussing oils and their troubles. 6500 w. Power—Jan., 1905.

See also **Automatic; Automobile; Testing; AIR BRAKE.**

Electric Motor.—See **Street Car.**

Electric Testing.—See **Test, Electric.**

Engineering Value.—The Engineering Value of Lubricating Oils. William F. Parish, Jr. Discusses the practical value of lubricants, and gives results of power tests on a rolling-mill engine. Indicator cards, diagrams and tables. 5000 w. Trans N E Coast Inst of Engrs and Shipbuilders—Dec. 15, 1905.

Forced Feed.—Forced-Feed Lubricators. James F. Hobart. Brief illustrated descriptions of various lubricating devices. 2300 w. Am Elect'n—Aug., 1902.

Gas Engine.—Lubrication of Gas Engines. J. D. Lyon. Considers troubles due to insufficient lubrication and to excessive lubrication. 1500 w. Am Mfr—July 31, 1902.

Gasoline Engine.—Piston Lubrication of Internal Heat Engines. Hugh D. Meier. Considers the two distinct systems employed and the advantages of each. 2800 w. Horseless Age—Dec. 26, 1900.

Gasoline Engine Lubrication. A. E. Potter. Causes of heating and sticking and of excessive oil in cylinders are considered; also best forms of design and proper qualities and quantities of oil. 1700 w. Automobile—March 26, 1904.

Graphite.—Graphite Lubrication. Hugh D. Meier. Discusses various lubricants and gives tabulated results of a test made by Prof. R. H. Thurston. 1000 w. Horseless Age—June 11, 1902.

Gravity.—Oil Systems. H. D. Drew. Illustrates and describes a gravity system installed in a large power plant. 1700 w. Power—Nov., 1902.

Greases.—See **Analysis; LOCOMOTIVE; Oil vs. Grease.**

Grooves.—Something About Oil Grooves. Charles J. Mason. Describes a system efficient in all particulars, and considers the supply of oil to the journals and bearings of a horizontal shaft. Ill. Serial. 1st part. 2200 w. Engr, U S A—Oct. 1, 1902.

High Temperatures.—The Friction of Lubricants at High Temperatures (Die Reibung von Schmierölen bei Höheren Wärmegraden). Dr. S. Kapff. A review of the experiments of Prof. Thurston and a comparison with German experiences as to temperature and viscosity. 2000 w. Zeitschr d Ver Deutscher Ing—March 9, 1901.

Hydrocarbon Oils.—Hydrocarbon Oils and Their Value as Lubricants, with a Few Practical Tests. Frank Harris Floyd, in "The International Steam Engineer." Explains the qualities of a good lubricant, the refining of the hydrocarbon oils, tests, etc. 2400 w. Sci Am Sup—Sept. 30, 1905.

Inclosed Engines.—The Oil Supply in Crank Cases of Inclosed Engines. Hugh D. Meier. Considers ways of accomplishing the desired results. 700 w. Horseless Age—Dec. 18, 1901.

Internal Friction.—A Theoretical and Experimental Study of the Internal Friction of Lubricants (Etude Théorie et Expérimentale sur le Frottement Médiat). N. Petroff. A paper presented before the Institute of Technology of St. Petersburg, with much valuable information on the action of lubricants. 12,000 w. Revue de Mécanique—Nov., 1900.

Journal Friction.—See **FRICTION—Journal.**

Locomotive.—Automatic Grease Lubricator. Illustrated description of a new device in use on the D. L. & W. R. R. for lubricating locomotive driving and truck journals. 1200 w. Am Engr & R R Jour—Nov., 1902.

Locomotive Lubrication. A very practical discussion on valves, cylinders and journals as well as lubricating oils, and their use, with illustrations. 6500 w. Pro Rocky Mountain Ry Club—Nov., 1902.

Simple vs. Compound Lubrication. C. B. Sopper. A comparison of the amount of lubricant required for simple and compound locomotives. 1600 w. Loc Engng—March, 1903.

The Latest Makes of Lubricators. Their Operation and Maintenance. C. B. Conger. Abstract of a paper read before the Trav. Engrs. Assn. Describes changes introduced in late designs. 2000 w. Ry Age—Oct. 6, 1905.

Locomotive Cylinders.—The Lubrication of Locomotive Valves and Cylinders. D. R. MacBain. Believes the trouble to be largely caused by wet steam. General discussion. 1600 w. Pro W Ry Club—Feb. 16, 1904.

Locomotive Driving Boxes.—Hot Driving Boxes on Locomotives. M. E. Wells. Emphasizes the importance of care in packing, and discusses the kind of boxes, oil holes, etc. General discussion. 9000 w. W. Ry Club—Jan., 1901.

Effective Lubrication of Driving Boxes. Illustrates and describes methods in use, and thinks that in common practice too little motion is allowed. 1400 w. Am Engr & R R Jour—Jan., 1901.

Marine Machinery.—Internal Lubrication of Marine Machinery. H. C. Duryea. Considers remedies to secure as nearly as possible the desired conditions. 2000 w. Marine Engng—Oct., 1903.

Mineral Oils.—Mineral Lubricating Oils. J. N. Bruck. A lecture before the Engrs.' Assn. of Boston. Deals with the process of refining and testing mineral oils, and the characteristics of an efficient lubricator. 2500 w. Engr, U S A—July 1, 1904.

Mineral Lubricating Oils. J. N. Bruck. Gives some historical facts relating to petroleum; considers its refining, gravity and fire tests, and concludes that the mineral oil which has the greatest adhesion to metallic surfaces, and the least cohesion between its own particles, is the best lubricant. 3000 w. Aust Min Stand—Sept. 1, 1904.

Murray.—See **Automobile.**

Oil Pumps.—See **PUMP—Oil.**

Oil vs. Grease.—Oil vs. Grease as a Lubricant for the Plungers of Pumping Engines. William M. Davis. Gives an account of tests made with these lubricants, which prove conclusively that the friction loss by use of grease is excessive. 900 w. Power—Jan., 1903.

Power Plants.—Oiling System for Power Plants. P. E. Moock. Read at meeting of the Ohio Soc. of Mech., Elec. and Steam Engrs. Considers the essentials of a good oiling system, giving suggestions. Ill. 1400 w. Engr, U S A—March 16, 1903.

Prussian Railway.—The Consumption of Lubricants on Prussian State Railways (Der Schmierölverbrauch für die Lokomotiven der Preussischen Staats-Eisenbahnen). A. Baum. With numerous tables, showing the quantity of lubricant required per engine-kilometer and per 1000 kilometer for various kinds of locomotives. Two articles. 4000 w. Glasers Annalen—Oct. 1, 15, 1902.

Pumping Engine Plungers.—See **Oil vs. Grease.**

Regulator.—A Lubrication Regulator. From "La Nature." Illustrates and describes an apparatus designed by M. Caloin, giving automatic lubrication for the entire engine, and possessing many advantages. 1100 w. Sci Am Sup—Sept. 21, 1901.

Rolling-Mill Engine.—See **Engineering Value.**

Selection.—Selection of Oils. A. O. Towney. Suggestions for the selection of the right oils. Engr, U S A—Oct. 2, 1905.

See also Test.

Slinging and Dripping.—Oil Dripping and Oil Slinging. Hereford Berry. An illustrated article discussing the causes and cures for these troubles. 1800 w. Am Mach—Vol. 27, No. 32.

Steam Engine.—Lubricating the Valves and Cylinder. J. W. Parker. Shows that to effectually lubricate the valves and pistons of a steam engine the oil must be applied on the upper sides of the parts to be lubricated. Ills. 1000 w. Power—Dec., 1904.

The Lubrication of Steam Engines and Machinery. Considers an example showing the loss due to low efficiency, and discusses the lubrication of cylinders and valves and the motion work of engines. Serial. 1st part. 2000 w. Mech Engr—Feb. 25, 1905.

Engine Friction and Lubricants. R. T. Strohm. Discusses the effect of friction, the theory and the action of a lubricant, the selection of lubricants, and their use. 2000 w. Am Elect'n—Nov., 1905.

Steam Engine Lubrication. R. T. Strohm. Illustrates and describes the construction and operation of various lubricators, as applied to the steam engine, with the exception of those used in cylinder lubrication. 3000 w. Am Elect'n—Dec., 1905.

Steel Works Machinery.—Lubrication of Steel Works and Blast Furnace Engines and Machinery. William M. Davis. Read before the Ohio Soc. of Mech., Elec. and Steam Engrs. Treats the subject from the engineer's point of view, considering efficient lubrication cost. 2200 w. Engr, U S A—July 15, 1904.

Street Car.—Street Car Lubrication. George L. Fowler. Considers the variation in practice and discusses the importance of the subject, and means of securing the best results. 2200 w. St Ry Jour—March 19, 1904.

Lubrication of Street Railway Motors. W. H. Pope. Remarks on the growing practice of using oil instead of grease, with illustrated descriptions of some of the oil cups used and statistics. 1800 w. St Ry Jour—Nov. 12, 1904.

Test.—A New Oil Testing Machine and Some of Its Results. Albert Kingsbury. Illustrates and describes the apparatus and methods of testing, arranged with special reference to investigating the effects of either body or viscosity while excluding the effects of the other. 2500 w. Trans Am Soc of Mech Engrs, No. 0978—Dec., 1902.

Simple Methods of Testing Oils. J. K. Nye. considers methods of determining the viscosity, gravity and fire test. 2000 w. Marine Engng—June, 1903.

A Comparative Oil Test. William F. Parish, Jr. Describes tests made for showing the relative efficiency of two different grades of lubricating oil made for the same kind of service. 1400 w. Trans Am Soc of Mech Engrs—June, 1903.

A New Method of Testing Lubricants (Ueber eine Neue Untersuchungsmethode Flüssiger Schmiermittel). K. Wilkens. Illustrating a device consisting of a paddle-wheel in a closed chamber containing the oil, the resistance to motion of the wheel giving a measure of viscosity. 5000 w. Elektrotech Zeitschr—Feb. 18, 1904.

The Selection and Testing of Lubricants. A. O. Doane. Information concerning various oils, with suggestions helpful in selecting and testing. 2000 w. Power—April, 1904.

Lubricating Oils and Their Properties—How to Test Them and to Detect Adulterations. William Davis. 900 w. Power—April, 1904.

Lubricating Oils and Their Properties—How to Test Them and Detect Adulterations. William M. Davis. Explains how the products of crude petroleum are separated, and the means of testing. 1200 w. Power—March, 1904.

Lubricating Oils and Their Properties—How to Test Them and to Detect Adulterations. W. M. Davis. 700 w. Power—Sept., 1904.

Testing Cylinder Oils. M. Emile Lecocq, in "Le Journal de Petrole." Suggests a method of analysis for the examination of lubricating oils. 1800 w. Am Gas Lgt Jour—Jan. 23, 1905.

New Method of Testing Lubricants. Illustrates and describes the method and machinery used by the Gebrüder Körting Electrical Co., of Berlin. 700 w. U S Cons Repts—June, 1905.

See also FRICTION.

Test, Dettmar.—Testing of Lubricants and Metals for Bearings (Méthode pour l'Expérimentation des Huiles et Métaux pour Coussinets). Pierre Breuil. A discussion of the method of Dettmar, based upon the number of turns made by a free journal after disconnection. 2000 w. Génie Civil—Dec. 13, 1902.

A New Oil Testing Apparatus (Ein Neuer Oelprüfapparat). G. Dettmar. A revolving spindle carrying sheaves is driven to a certain speed and released, and the time elapsing when it comes to rest is taken as a measure of the value of the lubricant. 1200 w. Glasers Annalen—March 1, 1903.

Test, Electric.—Electrical Investigations of Lubricants (Ueber Elektrische Schmiermitteluntersuchungen). A. Boje. Describing apparatus for measuring frictional resistance, rise of temperature, etc., as applied to lubricants, with tables and diagrams of results. Two articles. 3500 w. Elektrotech u Polytech Rundschau—Dec. 15, 1904, Jan. 15, 1905.

A New Process of Testing Lubricating Oils. Emile Guarini. Illustrated description of an instrument for testing lubricating oils by means of their internal electrical resistance. 900 w. Sci Am Sup—Jan. 14, 1905.

Test, Lahmeyer.—The Lahmeyer Oil Tester. H. B. Hodgson. Illustrated detailed description of an apparatus designed to be driven by an electric motor, by mechanical means, or by hand, explaining its operation. 3300 w. Elec Engr, Lond—April 28, 1905.

Textile Mills.—Lubrication of Textile Mills. William F. Parish, Jr. Extracts from a paper before the New England Cotton Mfrs. Assn. Discusses difficulties due to oils, and other matters relating to proper lubrication of heavy machinery. 3600 w. Am Mach—Sept. 10, 1903.

Valve Oil.—Valve Oil. Editorial discussion of some of its characteristics, rate of feed in lubricators, fire test, effects of thick oil, packing boxes, etc. Loc Engng—July, 1902.

Waste Purification.—The Purification of Waste Lubricating Oil. F. H. Davies. Illustrates and describes various types of oil fillers, and other methods of purification. 1800 w. Elec Engr, Lond—Jan. 13, 1905.

The Purification of Waste Lubricating Oil. F. H. Davies. Considers the extraction of mechanical impurities by filtration, illustrating methods. 1700 w. Can Elec News—May, 1905.

Worm Gearing.—See **GEAR—Worm.**

Zöller System.—The Zöller Lubrication System (Zöller's Zentral-Schmiervorritchtung). W. K. Macka. An illustrated description of a system of lubrication in which the oil is in holes bored through the centers of shafts and journals and is conducted to the bearings by centrifugal action.

1 plate. 1600 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 9, 1903.

LUMBER.
See **FORESTRY; TIMBER; WOOD.**

Transportation.—See **TRANSPORTATION—Lumber.**

LUTE.
See **CEMENT.**

M

MACADAM.
See **PAVEMENT; ROAD.**

MACHINE.
See also **ENGINE; MACHINERY; MACHINE SHOP; MACHINE TOOL;** and under specific kinds of machines.

Art and Craft.—The Art and Craft of the Machine. Frank Lloyd Wright. The address deals chiefly with the effect of the machine on architecture, and that it should be made evident that it is a help in the line of progress to the very best work possible for men. 9000 w. Jour W Soc of Engrs—Aug., 1901.

Cataloging Parts.—See **WORKS MANAGEMENT.**

Coal Pulverizing.—See **POWDERED COAL.**

Coremaking.—See **MOLDING.**

Economy.—See **STRUCTURE.**

Electro-Magnets.—See **ELECTRO-MAGNET.**

Gaggers.—See **MOLDING.**

Locke.—See **Steel Belt; CHAIN.**

Nail.—See **NAIL.**

Operation.—Phenomena of Machine Operation. John Richards. Read before the Tech. Soc. of the Pacific Coast. Gives observed facts and typical examples, especially in regard to centrifugal pumping, turbine water-wheels and piston steam engines. 3500 w. Am Mach—Vol. 28, No. 35.

Riddell.—See **Winding.**

Steel Belt.—The Locke Steel Belt Machine. Illustrated description of a machine for automatically manufacturing steel sprocket chains. 2500 w. Ir Age—May 12, 1904.
See also **CHAIN—Locke.**

Type Seting.—See **TYPE-SETTING MACHINE.**

Winding.—Winding Machine for Coils of Flat Copper Ribbon. An illustrated description of a remarkable machine, the invention and design of Mr. John Riddell, which winds automatically and edgewise upon various forms. 1000 w. Am Mach—July 9, 1903.
See also **ARMATURE WINDING—Formers.**

MACHINE DESIGN.
See also **MACHINERY; MACHINE TOOL; STEAM ENGINE—Design.**

Discrepancies of Precept in Machine Designing. Leicester Allen. An exposition of the wide divergence and disagreement of authorities over fundamental data and principles. 2500 w. Engineering Magazine—June, 1901.

Careless Designing. Peter H. Bullock. Remarks on mistakes in designing. 800 w. Am Mach—Oct. 2, 1902.

Some Practical Points in Machine Designs. W. S. Leonard. Discusses some of the practical considerations to be kept in mind. 2800 w. Mach, N Y—April, 1904.

Balancing.—See **MACHINERY.**

Beam Deflection.—See **BEAM—Deflection.**

Bending Moments.—Bending Moments Not in the Same Plane. H. F. Moore. Presents a phase of a problem in machine design frequently encountered, describing method used. Ill. 1000 w. Sib Jour of Engng—May, 1903.
See also **BEAM.**

Bevel Gears.—See **GEAR—Bevel.**

Charts.—Charts in Designing. John S. Myers. Explains the applicability of record charts and of calculating charts. 2800 w. Mach, N Y—Sept., 1904.

Constants.—Determining Design Constants from Practice. Sanford A. Moss. Gives a method of working up known facts so as to obtain the various stresses, bearing pressures, and other design constants. 2700 w. Am Mach—Sept. 24, 1903.

Elements.—Elements of Successful Machine Design. Ralph Scott. Considers various factors with respect to their relation to design, and gives rules to be borne in mind by designers. 3000 w. Elec, N Y—May 20, 1903.

Faults.—Things That Are Usually Wrong. John E. Sweet. The first of a series of articles commenting on faults overlooked by designers in making new machines or improving old ones. Ills. 700 w. Am Mach—Vol. 27, No. 45.

Formulas.—A Development of Machine Shop Formulas. Stanley H. Moore. Considers methods for finding the cost and proportions of machines built in a series of sizes. 2000 w. Mach, N Y—Nov., 1902.

Internal Angles.—A Weak Point in Machine Design (Eine Stelle an Manchen Maschinenteilen deren Beanspruchung auf Grund der Ueblichen Berechnung Stark Unterschätzt Wird). C. Bach. An examination of the weakness of internal angles in machine castings. 2000 w. Zeitschr d Ver Deutscher Ing—Nov. 2, 1901.

Pitch Circle.—See **GEAR—Worm.**

Prime Movers.—See **MOTOR—Construction; STEAM ENGINE; STEAM TURBINE; TURBINE; WATER WHEEL;** and under other kinds of prime movers.

Profiling Fixtures.—Profiling Fixtures and Formers. C. H. Rowe. Hints regarding fixture design and the cutting of formers. Ill. 1300 w. Am Mach—Dec. 3, 1903.

Repairs.—Designing Machinery to Facilitate Repairs. Joseph Horner. An illustrated article offering suggestions in design that will facilitate the quick removal of the parts of a machine most subject to wear, and the substitution of new parts 3500 w. Cassier's Mag—Nov., 1905.

Reuleaux.—A Review of Progress in Machine Construction. Dr. Francis Reuleaux. Reviews the work of this paper during its life of twenty-five years. 1000 w. Am Mach—Nov. 6, 1902.

Safety.—Design and the Safety of Machinery. Edward Crowe. Abstract of a paper read before the Cleveland Inst. of Engrs. and of the discussion. Considers the influence of design on the strength and safety. 2500 w. Ir & Coal Trds Rev—Dec. 15, 1905.

Shafting.—Notes on Design. C. F. Blake. The present article considers machinery shafting. Serial. 1st part. Mach. N Y—March, 1904.
See also **SHAFTING.**

Steam Engine.—A Tendency in Machine Design. Editorial mainly discussing the tendency to smoothness of outline in steam-engine practice. 1800 w. Engng—Sept. 5, 1902.

See also **STEAM ENGINE.**

Superheated Steam.—See **SUPERHEATED STEAM—Mechanical Features.**

Worm Gear.—See **GEAR—Worm.**

MACHINERY.
See also **MACHINE; MACHINE SHOP; MACHINE TOOL; STEAM ENGINE;** and under specific kinds of machinery.

Aligning.—See **SHAFTING—Lining.**

Balancing.—Balancing Rotating Parts. Warren E. Willis. Discuses unbalanced conditions and the conclusions that have been reached in regard to the method of correcting them. Ill. 1500 w. Am Mfr—Feb. 5, 1903.

Notes Upon Balancing High-Speed Machinery. Explains the "critical speed" of bodies rotating with high velocity, and other points connected with the subject of balancing, particularly the de Laval turbine method. Ill. 1500 w. Mach, N Y—Dec., 1904.

Can Making.—See **CAN MACHINE.**

Civilization.—The Age of Machinery and Its Relation to Public Welfare (Das Maschinenzeltalter in Seinem Zusammenhang mit dem Volkswohlstand und der Sozialen Verpassung der Volkswirtschaft). Gustav Schmoller. An address delivered before the Münich convention of the Society of German

Engineers showing the great influence of machinery upon civilization. 6000 w. Zeitschr d Ver Deutscher Ing—Aug. 15, 1903.

Color Works.—See **MECHANICAL PLANT.**

Defects.—See **MOTOR—Longridge Report.**

Düsseldorf Exposition.—See **COMPRESSED AIR.**

Earthenware.—See **EARTHENWARE.**

Farm.—See **AGRICULTURAL MACHINERY.**

Forging.—See **FORGING—Machinery.**

Foundations.—See **FOUNDATION—Heavy Machinery.**

Foundry.—See **FOUNDRY—Machinery.**

Friction.—See **FRICTION; LUBRICATION.**

Hauling.—Hauling Heavy Machinery Through City Streets. An illustrated discussion of methods. 2000 w. Power—July, 1901.

History.—Chronology of the Nineteenth Century. A record of mechanical progress during the past one hundred years, reviewing the important events in the development of machinery, chiefly in the United States, and to some extent in other countries. 18700 w. Mach, N Y—Dec., 1900.

Hot Climates.—See **Protection.**

Iron Works.—See **IRON WORKS—Auxiliary Machinery.**

Liége Exposition.—The German Machinery Industry at the Liége Exposition (Lütticher Weltausstellung, Die Deutsche Maschinenindustrie). General account of engineering and mechanical exhibits with illustrations. Serial. Part I. 3000 w. Stahl u Eisen—Sept. 15, 1905.

See also **EXPOSITION; MACHINE TOOL.**

Locomotive Business.—See **ELECTRIC RAILWAY—Steam Compared.**

Metal Working.—See **METAL WORKING—Machinery.**

Model Basin, Washington.—See **MODEL BASIN—Washington.**

Moving.—Moving Heavy Machinery. Suggestions with illustrations. 1800 w. Power—May, 1901.

Packing.—Note on the Packing of Machinery for Export. Paul Roux. Contributed to the American Chamber of Commerce, Paris. Directions for the preservation of the machines up to the time of delivery. 3000 w. Engng—Feb. 26, 1904.

Paris Exposition.—The Machinery and Transportation Exhibit at the Paris Exposition of 1900. Prof. Storm Bull. The writer's personal impressions of these exhibits, with remarks by others. 12000 w. Pro W Ry Club—Feb., 1901.

See also **PARIS EXPOSITION.**

Preservation.—On the Preservation of Instruments and Machinery in Bengal. Paul Bruhl. Read before the Calcutta section of the Inst. of Elec. Engrs. On the preservation of machinery in hot and moist climates, considering the adverse influences. Serial. 1st part. 4000 w. Engr, Lond—July 24, 1903.

Rolling Mills.—See **ROLLING MILL—Machinery Treatment.**

Russian Market.—See **RUSSIA.**

Safety.—See also **MACHINE DESIGN; SAFETY APPLIANCE.**

St. Louis Exposition.—See **St. LOUIS EXPOSITION—Machinery.**

Strength.—See **MATERIALS' STRENGTH; TESTING.**

Weak Points.—Weak Points in Machinery. Albert Stritmatter. Mentions certain evils that have thrown machines out of use, and discusses the remedy. Advises the manufacturer to keep track of as many machines as possible and endeavor to learn whether or not they are satisfactory, and if not, why not. 1200 w. Am Mfr—Feb. 27, 1902.

See also **MACHINE DESIGN—Internal Angles.**

MACHINE SHOP.

See also **BRIDGE WORKS; ENGINE WORKS; FACTORY; LOCOMOTIVE SHOP; MACHINE TOOL; MACHINE WORKS; RAILWAY SHOP; TOOL ROOM; WORKS; WORKS MANAGEMENT.**

Accident Prevention.—See **SAFETY APPLIANCE.**

Accrington, Eng.—A Progressive English Machine Shop. Robert I. Clegg. Describes the interesting features of the works of Howard & Bullough, at Accrington, manufacturers of textile machinery. 1600 w. Ir Trd Rev—May 9, 1901.

American.—Some Impressions of American Workshops. A. J. Gimson. General impressions only. 1000 w. Inst of Mech Engrs—Jan. 20, 1905.

See also **Practice; WORKS MANAGEMENT.**

Appliances.—See **JIG; LATHE—Attachments; MACHINE TOOL—Fixtures.**

Armour Institute of Technology.—The New Shops of the Armour Institute of Technology. G. F. Gebhardt. Illustrated description of this fine shop building, recently completed, in Chicago. 1000 w. Am Mach—Feb. 12, 1903.

Arrangement.—See **Design; WORKS MANAGEMENT.**

Aschersleben, Prussia.—A Modern Machine Shop (Eine Moderne Maschinenfabrik). E. Alberts. A description of the new and well-arranged plant of the Aschersleben Machine Works, at Aschersleben, in Prussia. 2000 w. Stahl und Eisen—Sept. 1, 1901.

Betts Machine Co.—The Reconstructed Shop of the Betts Machine Co. Illustrated detailed description. 2300 w. Mach, N Y—Sept., 1903.

Bliss Co., Brooklyn.—The Shops of the E. W. Bliss Company, Brooklyn, New York. Joseph V. Woodworth. An illustrated detailed description of a large and finely equipped machine manufacturing plant. 4000 w. Ir Trd Rev—June 4, 1903.

Boyer Machine Co.—See **Detroit.**

Bridge Work.—See **BRIDGE CONSTRUCTION; BRIDGE WORKS.**

Brown & Sharpe.—See **MACHINE WORKS.**

Bullock.—Shop No. 8 of the Bullock Electric Mfg. Company. Illustrated detailed description. 1800 w. Mach, N Y—Feb., 1904.

See also **ELECTRIC WORKS.**

Cincinnati Shaper Co.—See **MACHINE WORKS.**

Concrete Reinforced.—See **CONCRETE REINFORCED.**

Cramp's, Philadelphia.—The Cramp Machine Shop and Power House. Illustrated description of a 333 x 142 ft. steel frame machine shop and a 60 x 71 ft. power house; the description is confined to the structural details of the building. 2300 w. Eng Rec—March 9, 1901.

The New Machine Shop and Power House at the Cramp Shipyard. An illustrated description of the recent improvements made which nearly doubles the capacity of this plant. 800 w. Naut Gaz—Nov. 7, 1901.

See also **SHIPYARD.**

Design.—Shop Construction. Oscar E. Perrigo. The first of a series of illustrated articles upon the design and construction of machine shops, with hints upon the arrangement of tools, and the management. Serial. 1st part. 2200 w. Mach, N Y—Oct., 1902.

The Designing and Construction of Modern Engineering Workshops. J. H. Humphreys. Read before the Manchester (England) Assn. of Engrs. An illustrated discussion of stanchions, crane girders, floors and floor girders, roof principals, and bracing. Serial. Two parts. 4500 w. Mech Engr—Dec. 13 and 20, 1902.

The Laying Out of Engineers' Workshops. Joseph Horner. The first of a series of articles concerning the conditions which should govern the arrangements, dealing with extensions of old works, laying out of new, etc. Serial. 1st part. 3000 w. Page's Mag—March, 1903.

Suggestions for Shop Construction. F. A. Scheffler. Describes a plan in which the various departments radiate from the administration building. Diagram. 900 w. Trans Am Soc of Mech Engrs, No. 09—Dec., 1903.

Modern Work-Shop Design. A. Pringle. The bearing of the class of work upon the design and equipment of shops; the important features, the materials, roofing, &c., are discussed. 5200 w. Can Soc of Civ Engrs, Adv Proof—Dec., 1903.

See also **WORKS MANAGEMENT.**

Detroit.—The New Detroit Shops of the Boyer Machine Company. New shops prepared for a company removing from St. Louis are illustrated and described in detail. 2200 w. Am Mach—March 7, 1901.

Drawings.—See **DRAWING ROOM.**

Durban Harbor.—See **FLOATING DOCK.**

Electric Driving.—See **ELECTRIC DRIVING.**

Equipment.—The Equipment of Machine Shops. Joseph Horner. Considers questions that have to be settled in the purchase of machinery and plant. Ill. 4500 w. Cassier's Mag—June, 1903.

Machine Shop Equipment. Oscar E. Perrigo. The present article considers planning the different departments, suggesting the proper selection and arrangement of machines. Serial. 1st part. 3700 w. Ill. Mach, N Y—Sept., 1903.

See also Design; Practice; **MACHINE TOOL; TOOL; MECHANICAL HANDLING.**

Floating.—See **FLOATING DOCK—Durban; TRAINING SHIP—British Navy.**

Floor.—Machine Shop Floors. From "Woodcraft." Gives the ideas of a number of prominent engineers on the wearing quality of shop floors. 2500 w. Ir Trd Rev—Oct. 26, 1905.

Floor-Plate System.—The Floor-Plate Portable Tool System of Handling Heavy Work at the Works of the General Electric Company. Illustrations and description, showing the utility of this system. 700 w. Am Mach—Nov. 29, 1900.

Gauges.—See **GAUGE; TOOL.**

Gear Blanks.—See **LATHE.**

General Electric, Lynn.—The New Building for the General Electric Machine Shop and Power House, Lynn. An illustrated detailed description of a steel-frame building at Lynn, Mass. Serial. 1st part. 3500 w. Eng Rec—Sept. 17, 1904.

Germany, Belgium and Switzerland.—Recent Improvements in Technology (Ueber einige Technologische Neuerungen). Prof. F. Kick. A discussion of a number of shop methods and processes, mostly seen in a tour of Germany, Belgium, and Switzerland. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 25, 1901.

Grant Tool Co.—See **MACHINE WORKS.**

Heating and Ventilation.—See **HEATING AND VENTILATION.**

History.—Early Machine Shops and Mechanics. Historical notes on the development of the machine shop during the early part of the nineteenth century. Ill. 4800 w. Mach, N Y—Oct., 1902.

Hydraulic Power.—See **HYDRAULIC MACHINERY.**

Interchangeability.—See **GAUGE; INTERCHANGEABILITY; WORKS MANAGEMENT.**

Jobbing.—Some Jobbing Shop Methods. Joseph V. Woodworth. Illustrates and describes cutting a coarse pitch screw, making thin threaded brass rings, a stepping jig for drilling small holes, etc. 3500 w. Am Mach—Jan. 2, 1902.

Jones & Lamson.—See **MACHINE WORKS.**

Kawasaki Shipyard.—Tool Shops of the Kawasaki Dockyard Company. Gompei Kuwada. An illustrated explanation of the outfit of machine tools and how they are arranged. 900 w. Am Mach—Vol. 28, No. 30.

Limit Gauge System.—See **GAUGE; INTERCHANGEABILITY.**

Marine Engine.—See **INTERCHANGEABILITY; MARINE ENGINE WORKS.**

Measurement.—See **GAUGE; MEASUREMENT; WEIGHTS AND MEASURES.**

Metric System.—See **WEIGHTS AND MEASURES.**

Michigan Stove Co.—See **STOVE WORKS.**

Milling vs. Planing.—See **MACHINE TOOL.**

Milwaukee.—See **MILLING MACHINE.**

Navy Yard, Brooklyn.—The New Steam Engineering Building for the Brooklyn Navy Yard. Illustrated description of structural details of the new shop buildings being constructed. 1100 w. Eng News—April 25, 1901.

Description of the Steam Engineering Plant at the Navy Yard, New York. C. H. Matthews. An illustrated description of the new buildings and their equipment. 2700 w. Jour Am Soc of Nav Engrs—Nov., 1901.

Steam Engineering Department Shops, N. Y. Navy Yard. Illustrated description of the new shops which the writer thinks are the best built and best equipped shops for the repair and building of marine steam engines in the United States, if not in the world. 4000 w. Mach, N Y—July, 1902.

See also **ELECTRIC EQUIPMENT; POWER PLANT.**

Newark, N. J.—See **ELECTRIC RAILWAY SHOP; RAILWAY SHOP.**

Niles, Berlin.—See **MACHINE WORKS.**

Organization.—See **WORKS MANAGEMENT.**

Pencoyd Iron Works.—The Machine Shop and Foundry of the Pencoyd Iron Works. Begins an illustrated description of these works near Philadelphia, remarkable for their great strength—the construction is a steel frame with curtain walls of concrete filled in between the columns—also for the crane arrangements. Serial. 1st part. 1200 w. Ill. Am Mach—June 25, 1903.

Planing.—See **PLANER.**

Practice.—Machine Shop Practice. D. B. Dixon. Discusses tools and their use, methods of work, etc. 1800 w. Am Mfr—April 11, 1901.

Tool Room and Machine Shop Practice. George B. Martin. Discusses errors due to temperature, boring in the lathe with a tool bar, keyseating gauges, a crank shaft fixture, a boring tool, and a gauge for ball race. Ills. 1500 w. Am Mach—Vol. 28, No. 31.

Machine Shop Practice. G. M. Campbell. Discusses chiefly the equipment of the shops, indicating how much can be done in the way of cheapening the output. Also discussion. 9000 w. Pro Engrs' Soc of W Penn—Nov., 1905.

See also **WORKS MANAGEMENT.**

Rating.—See **LOCOMOTIVE SHOP—Machine Rating.**

Roofing.—See **ROOF—Machine Shop.**

Sanitation.—The Ventilation, Lighting and Cleanliness of Small Workshops. John Robertson. Discusses the proper sanitation of such shops. 3000 w. Plumb & Dec—Dec. 2, 1901.

See also **HEATING AND VENTILATION; WORKS MANAGEMENT.**

Saving Methods.—The Saving Methods for the Machine Shop. Frank F. Kleinhans. Describes a fixture for milling tool post wedges, the finishing up work from the screw machine; and a fixture for milling square head screws. Ill. 1400 w. Ir Trd Rev—Jan. 7, 1904.

Science.—See **WORKS MANAGEMENT.**

Slide Rule.—See **SLIDE RULE—Machine Shop.**

Stanley, Newark-on-Trent.—See **MACHINE WORKS.**

Stores.—See **WORKS MANAGEMENT.**

Surveying.—See **SURVEYING INSTRUMENT—Machine Shop.**

Switch and Signal Co.—See **RAILWAY-SIGNAL WORKS.**

Tool Room.—See **TOOL ROOM.**

Tools.—See **GAUGE; TOOL; TOOL BOX; TOOL ROOM; WORKS MANAGEMENT.**

Transport.—See **MECHANICAL HANDLING—Machine Shop.**

Traveling.—A Machine Shop on Wheels. George D. Campbell. An illustrated description of a novel traveling shop. 700 w. Am Mach—May 2, 1901.

Warner & Swasey.—See **MACHINE WORKS; MEASUREMENT—Refined.**

Westinghouse.—The Westinghouse Electric & Mfg. Co.'s Works. Illustrates and describes interesting things seen at the machine shops of this company. 3000 w. Mach, N Y—Oct, 1901.

Willans & Robinson, Rugby.—The Shops of the Willans & Robinson Company, at Rugby, England. An illustrated description of some interesting things seen when the Am. Soc. of Mech. Engrs. were entertained by this firm. 3800 w. Am Mach June 6, 1901.

Work Bench.—See **WORK BENCH.**

MACHINE TOOL.

See also **BORING MACHINE; DRILLING MACHINE; GEAR CUTTING; LATHE; MACHINE SHOP; MACHINE WORKS; MILLING MACHINE; PLANER; SCREW MACHINE; SHAPER; TOOL.**

Some New Machine Tools. Illustrates and describes a cold saw for crank shafts, a six-spindle drill, a two-spindle boring machine, a reaming machine, and a gear cutter. 1000 w. Am Mach—Nov. 7, 1901.

Machine Tools. Jas. K. Cullen. On the present design, application and utility of these tools. Also discussion. 9500 w. W Ry Club—Nov. 18, 1902.

American.—An English View of American Tools. William H. Booth. Considers the effects of American competition as regards machine tools upon English work. 3000 w. Am Mach—Nov. 6, 1902.

Automoboile.—Automobile Machine Tools. George

E. Walsh. Discusses the outlook for the automobile industry, the need of standardization and the design of special tools. 2000 w. Ir Age—March 12, 1908.

See also **AUTOMOBILE—Construction; AUTOMOBILE WORKS.**

Baltimore Repair Shops.—Labor-Saving Tools at the Baltimore Repair Shops. Illustrates and describes some especially designed tools. 3000 w. St Ry Jour—April 4, 1903.

Bending Machinery.—See **BENDING MACHINE.**

Berlin Works.—Improved Planing and Shaping Machines (Neuere Hobel- und Stossmachinen). P. Janson. Illustrating the heavy planer built by the Berlin Machine Tool Works. The bed is driven by a pair of longitudinal screws. Serial. Part I. 1000 w. Zeitschr d Ver Deutscher Ing—Nov. 16, 1901.

Beveling Machine.—See **BEVELING MACHINE.**

Bicycle Manufacture.—Machine Tools for Bicycle Manufacture (Machines-Outils pour la Fabrication des Vélocipèdes). G. Richard. Especially devoted to machines for constructing the wheels; mostly of American make. 5000 w. Revue de Mécanique—April, 1901.

See also **BICYCLE MANUFACTURE.**

Big.—Big Machine Tools. Joseph Horner. Discusses the leading problems and aspects of the big machine tools. Ills. 4000 w. Cassier's Mag—Jan., 1905.

Boiler Making.—See **Turning Mill; BOILER MANUFACTURE—Belleville.**

Bolt Cutter and Tapping Machine.—The Acme Automatic Unit Tapping and Bolt Cutting Machines. Illustrated descriptions of two interesting and valuable machines and their operation. 1600 w. Ir Age—April 3, 1902.

Boring.—See **BORING MACHINE; BORING MILL.**

Boring and Facing.—A Special Form of Boring and Facing Machine. Walter S. Russel. Brief illustrated description. 400 w. Trans Am Soc of Mech Engrs, No. 906—May, 1901.

A Lifting Table—Finishing Mower Wheels. S. A. Worcester. Illustrates and describes an application of the spring counter balance, and the operations for finishing mower wheels. 1200 w. Am Mach—April 7, 1904.

See also **BORING MACHINE; FACING MACHINE.**

Boring Mill.—See **BORING MACHINE; BORING MILL.**

British.—See **Glasgow Exhibition; National Show; Stanley Show.**

Cam-Cutting.—Uniform Feed Cam-Cutting Machine. Illustrated description of an interesting cam-cutting machine used in the manufacture of cash registers. 700 w. Am Mach—Feb. 28, 1901.

Capitaine.—Special Methods for Machine Shop Operations (Verfahren zur Bearbeitung von Maschinenkörpen). E. Capitaine. With details of various convenient machining operations as conducted in the writer's establishment; including drilling, milling, and shaping special pieces. 2000 w. Zeitschr d Ver Deutscher Ing—Aug. 24, 1901.

Universal Portable Machine Tool (Machine Outil Transportable Universelle). F. Morin. An illustrated account of the portable tool of Capitaine for drilling, boring, milling, etc. 1800 w. Génie Civil—Oct. 5, 1901.

See also **Portable.**

Car Shop.—Tools Used in the United States for Railroad Car Work (Outils Employés aux Etats Unis pour l'Usinage des Roues de Voitures et Wagons). M. Oudet. An illustrated description of wheel lathes, slotters, boring mills, and other tools of American design for car-shop work. 7500 w. Rev Gen de Chem de Fer—Jan., 1905.

See also **CAR SHOP; ELECTRIC RAILWAY SHOP; RAILWAY SHOP.**

Casting Fixtures.—See **Fixture.**

Chain Riveter.—See **Roll Grooving.**

Codron Experiments.—See **Power Consumption; DRILLING MACHINE; PUNCH.**

Compressed Air Drive.—See **Power.**

Corliss Engine.—Some Corliss Engine Tools. Illustrates and describes some special appliances in use in the shops of the Hardie-Tynes Works, Birmingham, Ala. 1200 w. Am Mach—Vol. 28, No. 28. See also **Special.**

Crank Pin.—A New Crank Pin Turning Machine. Illustrated description of a machine where the work remains stationary and the tool travels around it. 1000 w. Ir Age—Jan. 16, 1902.

Crank Press.—See **PRESS—Crank.**

Crank Shaft.—See **CRANK SHAFT—Machining.**

Cullen's Paper.—Machine Tools. Gives extracts from a paper by James K. Cullen, presented to the Western Ry. Club, with editorial notes. 3000 w. Loc Engng—Feb., 1904.

Design.—The Rational Design of Machine Tools. Editorial comment on a recent lecture by Prof. J. T. Nicolson before the graduates of the Inst. of Mech. Engrs. on "Results of Force Measurements with Cutting Tools and the Application to Lathe Design." 2000 w. Engng—Feb. 24, 1905.

Machine Tool Design. Prof. J. T. Nicolson, and Dempster Smith. The first of a series of articles offering a new series of rules of design, based upon extensive experiments on cutting with the new steels, and checked by numerical data collected from the most recent practice of machine tool makers. Serial. 1st part. 3300 w. Engr, Lond—April 7, 1905.

See also **Part Proportions; MACHINE DESIGN.**

Development.—How Machine Tools Are Developed. John Randol. A criticism of the methods of machine-tool builders. 1800 w. Am Mach—March 24, 1904.

Die Cutting.—See **DIE—Cutting.**

Drill Columns.—Machining Drill Columns. William Doran. Illustrates tools and describes their use. 1000 w. Am Mach—Dec. 12, 1901.

Drilling.—See also **Boring; DRILLING MACHINE.**

Drive Gear.—Constant Speed Belt-Drive for Machine Tools—Milling Machine Feeds. Herman Isler. An illustrated description of an arrangement of a constant speed belt drive with a table giving the different speeds obtained. 1200 w. Am Mach—March 19, 1903.

See also **BELTING; PULLEY; VARIABLE SPEED.**

Drive Mechanism.—See **Feed Mechanism.**

Düsseldorf Exposition.—Machine Tools (Die Werkzeugmaschinen). H. Fischer. A detailed review of the various machine tools shown at the Düsseldorf Exposition. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—June 7, 1902.

Medium and Light Machine Tools (Mittelgrosse und Leichtere Werkzeugmaschinen). H. Unger. An illustrated description of the light lathes, planers, shaping machines, etc., shown at the Düsseldorf exposition, 1902. Serial. Part I. 3000 w. Glasers Annalen—Feb. 15, 1903.

Heavy Machine Tools at the Düsseldorf Exposition (Die Düsseldorfer Austellung—Die Riesen-Werkzeugmaschinen). H. Unger. With illustrations of heavy milling, boring and planing machines; also lathes and special tools. Two articles. 6000 w. Glasers Annalen—Jan. 1, 15, 1903.

See also **EXPOSITION.**

Dynamometer.—See **Power Consumption; DYNAMOMETER—Tool; TORSION METER.**

Early.—Some Early Machine Tools. Calls attention to early contrivances devised to relieve hand labor. Ills. Serial. 1st part. 3300 w. Engr, Lond—May 6, 1904.

Electrical Manufacturing.—Machine Tools and Outfit for Electrical Manufacturers. W. H. Booth. A discussion of the modern system of manufacture, the importance of possessing modern high-class machine tools, methods, and suggestions for improvement. 4000 w. Elec Rev, Lond—Feb. 8, 1901.

See also **ELECTRIC WORKS; MACHINE SHOP—Westinghouse.**

Electric Driving.—See **Portable; ELECTRIC DRIVING.**

Electric Portable.—See **Portable; DRILL.**

Elkhart Shop, L. S. & M. S. Ry.—Special Tools in the Elkhart Shops of the L. S. & M. S. Ry. Illustrated descriptions of a number of interesting special appliances to facilitate the progress of work. 2500 w. Ry Mas Mech—Sept., 1904.

Elliptical Cutting.—See **BORING; LATHE.**

Engine Builders'.—Machine Shop Tools for Engine Builders. George T. Reiss. Presented at meeting of Engine Builders' Assn. An illustrated description of appliances of special character that are useful for special purposes. 3500 w. Engr, U S A—Jan. 15, 1902.

Engine Works.—See **ENGINE WORKS.—Hamilton, O.**

English.—Some English Tools. James Vose. Illustrates and describes a series of machine tools, designed to reproduce quickly and accurately any predetermined outline. 2200 w. Am Mach—Vol. 28, No. 36.

Escape-Wheel Cutting Engine.—See **WATCH-MAKING.**

Evolution.—Some Examples of the Evolution in Machine Tool Practice. Robert I. Clegg. Reviews the development of the machine shop industry, giving illustrated descriptions of labor-saving machines introduced, and discussing methods adopted in advanced practice. 7500 w. Ir & Trd Rev—Nov. 14, 1901.

See also **Development; History; Progress.**

Exhibition.—See **Glasgow; National; Liége; Paris; Stanley.**

Facing Machine.—See **Boring and Facing; FACING MACHINE.**

Feed Mechanism.—Machine Tool Progress. C. W. Obert. The present article gives illustrated descriptions of feed and drive mechanisms. Serial. 1st part. 1500 w. Am Engr & R R Jour—Jan., 1903.

Feeds and Speeds.—Feeds and Speeds. Stanley H. Moore. Outlines the method used in the attempt to secure some definite knowledge on this subject. Diagrams. 1100 w. Am Mach—Dec. 25, 1902.

Speeds and Feeds. Frederick Hols. Read at meeting of the Cincinnati Metal Trds. Assn. An account of experimental work, and report of work accomplished. Ill. 2200 w. Ir Trd Rev—Oct. 8, 1903.

See also **LATHE; MILLING MACHINE.**

Filing.—See **FILING MACHINE.**

Fixtures.—Three Fixtures for Machining a Special Casting. William Doran. Illustrates and describes fixtures for machining a cast-iron bracket. 1200 w. Am Mach—Nov. 21, 1901.

Two Fixtures for Finishing Cast-Iron Segments. D. E. MacCarthy. Illustrated description. 400 w. Am Mach—March 6, 1902.

A Good Machinist With Only One Hand. C. W. Putnam. An illustrated article describing a device that enabled a good workman who had lost his left hand, to resume his place. 600 w. Am Mach—April 3, 1902.

Some Simple Lathe Fixtures. William Doran. Illustrates and describes devices for rapid handling and machining duplicate parts in the lathe, miller, and drill press. 700 w. Am Mach—Sept. 3, 1903.

From a Designer's Note Book. Brief sketches describing nuts, clamps, pulleys, etc. 1200 w. Am Mach—June 26, 1902.

Arc Milling and Boring Rigs. Gustave Fiedler. Illustrates and describes fixtures and methods adopted in doing work where convenient tools were wanting. 600 w. Am Mach—Jan. 14, 1904.

See also **Taper-Tube Fixture; JIG; LATHE—Attachment; MILLING.**

Fly-Wheels.—See **FLY-WHEELS—Machine Tools.**

Foreign Shipment.—Boxing Machine Tools for Foreign Shipment. J. M. Richardson. Considers some of the requirements in packing machinery to send abroad. 1800 w. Am Mach—Aug. 15, 1901.

French Locomotive Shops.—See **LOCOMOTIVE SHOP.**

Gear Cutting.—See **GEAR CUTTING.**

Gearing.—See **Drive Gear; Reversing Gear; Speed; GEAR; LATHE; PULLEY—Cone; VARIABLE SPEED.**

Germany.—The Development of Machine-Tool Building in Germany (Aufgaben und Fortschritte des Deutschen Werkzeugmaschinenbaues). F. Ruppert. An examination of machine details with especial reference to the modifications due to American practice. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 9, 1901.

Improvements in Machine Tools (Neuerungen im Werzeugmaschinenbau). Hermann Fischer. Describing especially minor details of construction in recent German lathes and drilling machines. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 23, 1902.

Recent Machine Tools (Neuere Werkzeugmaschinen). Paul Möller. Illustrating some recent German designs for lathes and slotting machines. 2000 w. Zeitschr d Ver Deutscher Ing—April 22, 1905.

Glasgow Exhibition.—British Machine Tools at the Glasgow Exhibition. Illustrations and descriptions of the exhibits. 16,800 w. Engr, Lond—June 28, 1901.

Machine Tools at the Glasgow Exhibition. Fred. Bathurst. An illustrated articles with special reference to the requirements of dynamos and motor manufacture. Serial. 1st part. 2500 w. Elec Rev, Lond—Nov. 22, 1901.

See also **GLASGOW EXHIBITION.**

Globe Valve Manufacture.—Some Tools Used in the Manufacture of Globe Valves. J. R. Gordon. Illustrates and describes tools designed to lower the cost of manufacture. 1000 w. Mach, N Y—April, 1904.

High-Speed.—High-Speed Metal Cutting. Oberlin Smith. Discusses the recent improvements in tool steel, and the consequent improvement needed in machine-tool design; considers the planer problem. 2000 w. Am Mach—May 21, 1903.

What Are the New Machine Tools to Be? John E. Sweet. Considers machine design, and the capabilities of high-speed steel. 1500 w. Trans Am Soc of Mech Engrs, No. 04.—Dec., 1903.

Machine Tools and High Speed Steel. J. A. Carney. Considers the question of what shall be done with serviceable machines which cannot keep up with the high speed steel pace. General discussion. 4000 w. Pro W. Ry Club—Dec. 15, 1903.

New Machine-Tools for High-Speed Steel (Neue Werkzeuge für Hohe Arbeitsgeschwindigkeit). Alfred Haussner. A discussion of modern methods of cutting with high-speed steels, and their influence upon machine-tool design. 7000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 4, 1905.

See also **TOOL STEEL; WORKS MANAGEMENT—Metal Cutting.**

History.—Machine Tool Progress. Charles E. Hadley. The first of a series of illustrated articles dealing with this subject, and briefly reviewing the history of standard tools. Serial. 1st part. 1500 w. Elec Rev, N Y—Oct. 25, 1902.

See also **Evolution; Mandslay; MACHINE SHOP.**

Hydraulic Device.—Hydraulic Device for Adjusting Heavy Work on Machine Tools. Illustration and description of a device applicable to large work to be machined where work is stationary and the cutting tools movable, the work having to be adjusted to the correct position for the cutting. 600 w. Am Mach—March 27, 1902.

Jig.—See **JIG.**

Key-Seating and Slotting.—See **KEYSEATING.**

Lathe.—See **LATHE.**

Lathe Apron.—See **LATHE—Apron.**

Liége Exposition.—Machine Tools at the Liége Exposition (Die Weltausstellung in Lüttich 1905. Die Werkzeugmaschinen). Paul Möller. Preliminary report, with illustrations and descriptions. 4000 w. Zeitschr d Ver Deutscher Ing—Sept. 9, 1905.

Machine Tools at the Liége Exposition (Die Weltausstellung in Lüttich, 1905. Die Werkzeugmaschinen). G. Schlesinger. The first of a series of fully illustrated articles showing the machine tools from various countries exhibited at Liége. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—Nov. 4, 1905.

See also **EXPOSITION—Liége; MACHINERY.**

Locomotive Works.—Machine Tools and Their Use in Locomotive Works. A supplement giving many illustrated descriptions of machines and explaining how they are used. 19,300 w. Engr, Lond—Dec. 13, 1901.

See also **LOCOMOTIVE SHOP; LOCOMOTIVE WORKS.**

Marking Machine.—See **MARKING MACHINE.**

Mandslay.—The Early Machine Tools of Henry Maudslay. W. A. S. Benson. An illustrated historical sketch of the products of an old English firm. Serial. 1st part. 3000 w. Engng—Jan. 18, 1901.

Mechanical Engineering.—The Mechanical Engineering of Machine Tools. Prof. Charles L. Griffin. A review of the essential principles and very exacting requirements of this branch of mechanical designing, with a concise statement of the requirements of the best practice. 3600 w. The Engineering Magazine—May, 1901.

Milling.—See **MILLING MACHINE.**

Milling vs. Planing.—Planing and Milling (Hobeln und Fräsen). Dr. G. Schlesinger. A comparison of the relative advantages of planing and milling as machining processes, showing the economical advantages of the latter method of metal working.

3500 w. Zeitschr d Ver Deutscher Ing—Sept. 10, 1904.

Modern Methods.—Modern Machine Methods. H. F. L. Orcutt. Read before the Inst. of Mech. Engrs. A slightly abridged paper on machine operations, dealing with the latest practice of economical manufacture. Ill. Serial. 1st part. 5300 w. Elect'n, Lond—Aug. 15, 1902.

Modern American Machine Tools. Charles H. Benjamin. A discussion of the problem from the standpoint of a designer, considering the architectural and utilitarian sides. Ill. 2500 w. Cassier's Mag—May, 1903.

See also **High Speed.**

National Show, London.—Machine Tools at the National Show. Illustrated description of interesting exhibits. 3400 w. Engng—Dec. 7, 1900.

Machine Tools at the National Show. Illustrations of screw machine, and shaving lathe, with description of these and other exhibits. 2700 w. Engng—Dec. 6, 1901.

Machine Tools at the National Show. An illustrated review of the machine tools on exhibition at the Crystal Palace, London. 2700 w. Engng —Nov. 28, 1902.

Notching.—See **NOTCHING MACHINE.**

Nut Facing.—Armor Plate Nut-Facing and Chamfering Machine. Illustrates and describes two machines, made in England, for facing, chamfering and turning cylindrical parts of armor plate nuts. 600 w. Am Mach—Vol. 26. No. 26.

Nut-Tapping Machine. Illustrated description of bolt-forging, cutting and screwing machinery shown in operation at the St. Louis Exhibition. Plate. 1800 w. Engng—Aug. 25, 1905.

One-Handed.—See **Fixture.**

Paris Exposition.—Some Continental Machine Tools. An illustrated study of these tools as presented at the Paris Exhibition. 15,600 w. Engr, Lond—Nov. 23, 1900.

Railway Machine Tools at the Paris Exposition, 1900 (Die Werkzeugmaschinen zur Herstellung und Reparatur von Eisenbetriebsmitteln auf der Pariser Weltausstellung 1900). H. Unger. A review of the machine tools exhibited at Paris, with especial reference to their use in railway repair shops. Serial. Part I. 2500 w. Glasers Annalen—Sept. 15, 1901.

Supplementary Report on Machine Tools at the Paris Exposition 1900 (Nachtrag zum Bericht über die Werkzeugmaschinen auf der Weltausstellung in Paris. 1900). Hermann Fischer. Describing special forms of turret lathes and milling machines. 3500 w. Zeitschr d Ver Deutscher Ing—Dec. 7, 1901.

See also **PARIS EXPOSITION.**

Parkhead Works, Glasgow.—Machine Tools at the Parkhead Works. Illustrations, with brief descriptions, of three powerful machine tools recently installed in these Glasgow works. 1000 w. Engng—Nov. 18, 1904.

Part Proportions.—Proportions of Machine Tool Parts. Thomas R. Shaw. Tables and figures. Serial. 1st part. Mech Engr—April 8, 1905.

Plano-Milling and Profiling.—See **MILLING MACHINE.**

Plates and Angles.—Machine Tools for Plates and Angles. Illustrated description of punching, shearing and bending machines driven by electricity. 600 w. Engr, Lond—May 17, 1901.

Portable.—Portable Electrically-Driven Machine Tools. An illustrated description of recently designed machine tools for work connected with the manufacture of large electric generators. 700 w. Engr, Lond—Jan. 31. 1902.

See also **Capitaine; Universal Portable.**

Portable vs. Stationary.—Portable versus Stationary Machine Tools. John Riddell. Illustrated description of some portable machine tools, comparing their work with the stationary tools formerly used. 800 w. Trans Am Soc of Mech Engrs, No. 899—May, 1901.

Power.—The Application of Compressed Air to the Driving of Machine Tools (Verwendung von Pressluft zum Antrieb von Werkzeugmaschinen). Hr. Leiber. Discussing the comparative advantages of compressed air, direct steam driving, belting, and electricity for driving machine tools. 5000 w. Zeitschr d Ver Deutscher Ing—Nov. 5, 1904.

Power Consumption.—Experiments on the Work of Machine Tools (Experiences sur le Travail des Machines Outils). M. Codron. The first portion is devoted to experiments with grinding machines, the power consumed being dynamometrically measured. Serial. Part I. 7500 w. Bull Soc d'Encour—Jan., 1901.

Experiments on the Work of Machine Tools. (Experiences sur le Travail des Machines-Outils). M. Codron. A second part, dealing with cutting tools, of this article on the power consumed by machine tools. Many diagrams and figures. 5000 w. Bull Soc d'Encour—March, 1901.

Experiments on the Work of Machine Tools (Expériences sur le Travail des Machines-Outils). M. Codron. A study of the action of tools in shearing various metals with analysis of the external and internal forces. 8000 w. Bull Soc d'Encour—July 31, 1901.

Shearing with Circular Shears (Cisaillage avec Lames Circulaires). M. Codron. A continuation of the author's investigation of the work of machine tools. The power required to shear various metals was determined by belt hydraulic, steam, and electric driving. 8000 w. Bull Soc d'Encour —Aug. 31, 1901.

The Power Consumption of Electrically Driven Machines (Force Motrice Applications du Moteur Electrique). M. Derry. From a paper before the congress of the "Syndicat des Usines d'Electricité," giving figures for a great variety of machines. 700 w. Electricien—Dec. 28, 1901.

Power Test of an Electrically-Driven Shaper. An account of an interesting test made by the Cincinnati Shaper Company. Ill. 800 w. Am Engr & R R Jour—April, 1903.

Measuring the Power of Machine Tools. George E. Walsh. A study of the power required by electrically driven machine tools. 1800 w. Am Elect'n—Sept., 1903.

Some Tests of Iron and Woodworking Machinery. C. H. Hines. An account of tests made to determine the amount of power used by old machine tools in a shop which was to be equipped with electricity and yet retain the old machines. 3000 w. Elec Wld & Engr—July 16, 1904.

See also **DRILLING MACHINE; ELECTRIC DRIVING—Case School Test; Du Bois, Pa.; POWER COST; PUNCH.**

Prentice.—See **Turret; MACHINE WORKS.**

Progress.—A Review and a Glance Forward. John E. Sweet. Notes the progress of the last 25 years, and the future outlook in machine tools. 1500 w. Am Mach—Nov. 6, 1902.

See also **Development; Evolution.**

Railway Shop.—The Value of Up-to-date Tools for Railroad Work. M. K. Barnum. Shows the saving made by installing new machinery, with comments on recent types and what they accomplish. Followed by general discussion. 4500 w. W Ry Club—March 18, 1902.

Railroad Shop Tools. Charles H. Fitch. An illustrated article describing recent improvements due to the use of forging presses and dies. 1500 w. Ry Mas Mech—Dec., 1903.

Railroad Shop Tools. An illustrated description of the present state of the art, and the changes made necessary by the use of high-speed tool steel. Serial. 1st part. 1000 w. R R Gaz—June 17, 1904.

See also **LOCOMOTIVE SHOP; RAILWAY SHOP; WORKS MANAGEMENT.**

Rapid Planing.—See **PLANER—Special Tools.**

Rating.—See **LOCOMOTIVE SHOP—Machine Rating.**

Reamers.—The Construction and Working of Machine Reamers and Reaming Heads. E. Bruce Ball. The present article gives illustrated descriptions of various types of reamers and their work, explaining their economy and reliability. Serial. 1st part. 3500 w. Engng—May 8, 1903.

Reciprocating.—Reciprocating Machine Tools. Illustrations and descriptions of many types. Special supplement. 15,600 w. Engr, Lond—Dec. 11, 1903.

Reversing Gear.—Reversing Gear for Reciprocating Machine Tools (Kehrgetriebe für Werkzeugmaschinen mit Hin- und Hergehender Bewegung). Hermann Fischer. Describing an improved auxiliary reversing gear adapted for use with planers and similar machine tools. 2000 w. Zeitschr d Ver Deutscher Ing—Feb. 27, 1904.

Roll Grooving.—Machine for Cutting Circumferential Grooves in Steel Rolls—A Simple Chain Riveter. Brief illustrated descriptions of these machines. 800 w. Am Mach—Oct. 8, 1903.

Sattler-Berner.—Recent Machine Tools (Neuere

Werkzeugmaschinen). Prof. F. Bock. A well illustrated description of machine tools manufactured by Sattler, Berner & Co., of Nuremberg, Germany. Serial. Part I. 800 w. Zeitschr d Ver Deutscher Ing—Jan. 1, 1902.

Segment.—Tools for Machining Segments. Edward Snyder. Illustrates and describes tools and methods used. 2000 w. Am Mach—Vol. 28, No. 52.

Shaper.—See **SHAPER.**

Shavings.—See **DRILLING MACHINE.**

Shear Blades.—See **SHEARS—Blades.**

Shipyards.—Machine Tools in Shipyards. Waldon Fawcett. An illustrated article describing the large machine tools in use at Newport News, Va. 2000 w. Mod Mach—Feb., 1902.

Some Special Tools at the Fore River Shipyard. An illustrated description of the equipment of these works, located at Quincy, Mass. Electricity and compressed air are used throughout the plant. 2500 w. Ir Age—Aug. 7, 1902.

See also **MACHINE SHOP—Cramp's; Kawasaki; SHIPYARD.**

Slotting.—See **SLOTTING MACHINE.**

Special.—Special Machine Tools at the Corliss Shops. Illustrates and describes designs of two decades ago made by Mr. Corliss for economical production of his engines. 4300 w. Ir Age—Feb. 4, 1904.

Specialised Machine Tools. Joseph Horner. An explanation of the present understanding of "special tools," with illustrations of various machines, and discussion of their development, value, etc. 4500 w. Cassier's Mag—Aug., 1904.

Specifications.—Specifications for Machine Tools. An account of the practice of various companies, giving examples. 2000 w. Eng News—May 12, 1904.

Speed.—Speed of Machine Shop Tools. J. W. B. Littledale. Read before the Northern Coast Inst. of Engrs. & Shipbuilders. Suggestions tending to improve the results of out-of-date tools, as well as the proper working of new tools. 4000 w. Ir Trd Rev—Dec. 26, 1901.

Speeds and Gearing of Machine Tools. P. V. Vernon. Read before the Manchester Assn. of Engrs. Indicates a method by which the calculations required may be organised with the practical certainty of obtaining the desired sub-division for any given range and number of speeds. 5000 w. Mech Engr—Nov. 21, 1903.

Cutting Speeds for Shapers and Slotting Machines. Frank B. Kleinhans. The first of an article in three parts. Explains the four ways of obtaining the quick return motion for shapers and slotting machines, investigating, in the present number, the cutting speed of the tool on a slotting machine. Serial. 1st part. 1200 w. Mod Mach—July, 1905.

See also **Feeds; High Speed; PULLEY—Cone.**

Speed Cones.—See **PULLEY—Cone.**

Speed Control.—See **PULLEY—Cone; VARIABLE SPEED—Electric vs. Mechanical.**

Speed Indicators.—Fixtures and Tools for Making Speed Indicators. Joseph Vincent Woodworth. Illustrated description. 800 w. Mach, N Y—Jan., 1902.

See also **SPEED INDICATOR.**

Spherical Boring.—See **BORING MACHINE.**

Spindle.—See **SPINDLE—Machine Tool.**

Stanley Show, London.—Machine Tools at the Stanley Show. Illustrated description of interesting exhibits. 5000 w. Engng—Nov. 30, 1900.

Machine Tools at the Stanley Show. Illustrates and describes tools of special interest. 4200 w. Engng—Nov. 29, 1901.

Surfacing Machine.—See **SURFACING MACHINE.**

Swedish.—A Swedish Miller and Gear Cutter, Boring Machine and Variable Speed Countershaft. Illustrated description. 900 w. Am Mach—Nov. 7, 1901.

Taper-Tube Fixture.—Fixture for Forming Taper Tubes with Feed Motion for the Blanks. Moses G. Wilder. Illustrated description of a fixture where the blanks are fed across the front of the press from left to right, and capable of forming 100 to 150 tubes per minute. 1100 w. Am Mach—Jan. 16, 1902.

Tapping.—A Three-Spindle Tapping Machine. John Tangye. Elevation and plan, with description. 2200 w. Prac Engr—Oct. 20, 1905.

Tariff.—See **TARIFF—Machine Tool.**

Thread Cutting.—Adjustable Die Head and Method for Making Threaders for Use in Same. Joseph M. Stabel. Describes the tools and method used. Ill. 1500 w. Mach, N Y—Dec., 1903.

See also **SCREW MACHINE.**

Tooling.—The Tooling of Machines. John Ashford. On the preparing of the tools and the getting of the machines into proper working condition. The present article gives an illustrated and detailed description of selected work. Serial. 1st part. 3500 w. Engng—Oct. 11, 1901.

See also **TOOL.**

Tool Steels.—See **High Speed; TOOL STEEL.**

Turning Mill.—Mill for Turning and Finishing Boiler Heads (Drehwerk zum Abdrehen und Ausschneiden von Kesselboden). With photograph and details of a vertical turning lathe, especially adapted for finishing pressed-steel boiler heads. 1000 w. Zeitschr d Ver Deutscher Ing—June 10, 1905.

Turret.—Some Special Turret Head Tools. Joseph V. Woodworth. Illustrates and describes tools for making small tubes used for perforating leather shoe tips. Also a tool for pointing slender needle valves on an incandescent oil lamp. 600 w. Am Mach—Dec. 5, 1901.

The Prentice Multiple Spindle Automatic Turret-Machine. Illustrates and describes a machine for boring, turning, drilling, reaming and threading small castings, forgings or pieces that have been finished on one end in a rod machine and require operation on the reverse end. 1200 w. Ir Age—Nov. 30, 1905.

See also **LATHE.**

Universal Portable.—A Universal Portable Machine Tool. Illustrated descriptions of devices for drilling, boring and mining, and of the methods of using them. 900 w. Engng—Jan. 17, 1902.

Variable Speed.—See **VARIABLE SPEED.**

Ways.—Chilled Machine Tool Ways. Henry Hess. An illustrated article describing improvements due to the introduction of partially chilled guide surfaces and other applications. 1000 w. Am Mach—Oct. 8, 1903.

Woodworking.—See **WOODWORKING MACHINERY.**

Yorkshire.—Some Yorkshire Machine Tools. Illustrates and describes representative tools of some nine separate firms. 10,900 w. Engr, Lond (Sup)—June 13, 1902.

MACHINE-TOOL EXHIBITION.

See **MACHINE TOOL—Glasgow Exhibition; Liége; National Show; London; Paris Exposition; Stanley Show, London.**

MACHINE WORK.

See also **MACHINE SHOP; MACHINE TOOL; MACHINE WORKS; METAL WORKING; TOOL STEEL.**

Estimates.—Estimating the Cost of Machine Work. J. A. Webster. Gives an analysis of the various operations to be performed in a machine taken as an example. Ills. 3500 w. Mach, N Y—July, 1905.

Gasoline Engine.—Inaccurate Machine Work on Cylinders and Pistons. Albert L. Clough. A criticism on work observed on three horizontal gasoline vehicle engines. 1200 w. Horseless Age—Sept. 10, 1902.

Hunt's Methods.—Hunt's Measurements and Drawings. John Randol. The first of a series of illustrated articles describing the method of making measurements in machine work used by the C. W. Hunt Company. Serial. 1st part. 2800 w. Am Mach—May 21, 1903.

Measurement.—See **Hunt's Methods; FIT; GAUGE; MEASUREMENT.**

Tool Steel.—See **TOOL STEEL.**

MACHINE WORKS.

See also **ELECTRIC WORKS; ENGINE WORKS; FACTORY; LOCOMOTIVE WORKS; MACHINE SHOP; WORKS; WORKS MANAGEMENT.**

Aldine, N. J.—The New Shops of the Watson-Stillman Co. Illustrates and describes this new plant at Aldine, N. J., used for the manufacture of hydraulic machinery. 3000 w. Eng Rec—Oct. 14, 1905.

Allis-Chalmers.—The Great West-Allis Plant of the Allis-Chalmers Company, Milwaukee, Wis. An illustrated description of an immense plant, nearly completed, for machine building. 3000 w. Mach, N Y—Feb., 1903.

The West Allis Plant of the Allis-Chalmers Company. An illustrated detailed description of an important industrial plant and its operation. Serial. 1st part. 2800 w. Eng Rec—Aug. 22, 1903. See also ENGINE WORKS.

American Turret Lathe.—New Works of the American Turret Lathe Mfg. Company. Gives an illustrated detailed description of the works, stating the considerations that were given prominence in their design. 1800 w. Ir Age—April 30, 1903.

New Shops of the American Turret Lathe Mfg. Co. Illustrates and describes the interesting features in shop construction. 1500 w. Mach, N Y—June, 1903.

Becker-Brainard.—The New Works of the Becker-Brainard Milling Machine Company. Illustrated detailed description of these works at Hyde Park, Mass., and some of the equipment. 2700 w. Mach, N Y—Aug., 1901.

Beverly, Mass.—See SHOE MACHINERY.

Birdsboro, Pa.—The Works of the Birdsboro Steel Foundry and Machine Company. Illustrated description of the plant of what was formerly known as the Diamond Drill & Machine Co., which has greatly enlarged the scope of work and assumed the new name. 3500 w. Ir Age—May 11, 1905.

Brown & Sharpe.—The Brown & Sharpe Mfg. Co.'s Works. An illustrated description of the buildings and views of several departments. 3000 w. Mach, N Y—April, 1901.

Browning.—See WORKS MANAGEMENT—Stores.

Cail, Denain, France.—The New Cail Shops at Denain (Les Nouvelles Usines Cail à Denain). Ch. Dantin. A fully illustrated account of the new shops of the Société Française de Constructions Mécaniques, successors to the old firm of Cail & Co. Two articles, two plates. 5000 w. Génie Civil—Sept. 24, Oct. 1, 1904.

Cincinnati Shaper Co.—New Shop of the Cincinnati Shaper Co. Illustrated description of a shop manufacturing crank, geared and traverse shapers. 2000 w. Mach, N Y—Nov., 1903.

Coates & Co., Belfast.—The Works of Messrs. Victor Coates & Co., Limited. Illustrated description. 1600 w. Engng—Dec. 11, 1903.

Cudahy, Wis.—See GAS POWER PLANT.

Diamond Drill & Machine Co.—See **Birdsboro, Pa.**

Emlyn, Gloucester.—The Emlyn Engineering Works. Illustrated detailed description of the works at Gloucester, England, and their equipment. Repairs and renewal work are carried on, and the manufacture of mortar mills, steam winches, travelling jib cranes, etc. 900 w. Engr, Lond—May 30, 1902.

Gear Cutting.—See **Lockwood, Eng.**; GEAR CUTTING.

Grant, Franklin, Pa.—New Shops of the Grant Tool Company. Illustrated description of new works at Franklin, Pa. 2000 w. Mach, N Y—March, 1902.

Herbert, Coventry.—The Works and Some of the Product of Alfred Herbert, Ltd., of Coventry, England. Illustrated detailed description of large tool works. Serial. 1st part. 900 w. Am Mach—Oct. 17, 1901.

Huddersfield.—Park Works, Huddersfield. Illustrated description of new gear-cutting works and their equipment. 2000 w. Engr, Lond—July 14, 1905.

Ingersoll-Sergeant.—See WORKS.

Jones and Lamson.—The Jones & Lamson Machine Co.'s Plant and Methods. Illustrated detailed description of a plant at Springfield, Vt. 4500 w. Ir Trd Rev—July 3, 1902.

The Shops of the Jones & Lamson Machine Company. Illustrates and describes the new building and the present arrangement of this plant for building turret lathes; located at Springfield, Vermont. 3000 w. Am. Mach—June 2, 1904.

Notes from the Jones & Lamson Shops. Brief illustrated descriptions of tools and methods used. 1800 w. Am Mach—Vol. 27, No. 47.

Kendall & Gent, Manchester.—An English Machine-Tool Shop. Illustrated description of the new workshops of Kendall & Gent, Belle Vue Station, Manchester, England. 900 w. Am Mach—Feb. 7, 1901.

Lang, Johnstone.—Shops of John Lang & Sons, Johnstone, Scotland. Illustrates and describes this machine-tool building establishment of Scotland. 900 w. Am Mach—July 4, 1901.

Lang's Lathe Works at Johnstone, Scotland. J. William Chubb. Illustrated detailed description. 3200 w. Am Mach—Vol. 28, No. 44.

Lathes.—See **American**; LATHE.

Le Blond, Cincinnati.—The R. K. Le Blond Machine Tool Company's shop. Illustrated detailed description of an interesting shop in Cincinnati, and its equipment. 2500 w. Mach, N Y—April, 1904.

Lockwood, Eng.—An English Gear-Cutting Works. J. W. Chubb. Illustrated detailed description of new shops at Lockwood, near Huddersfield, and their arrangement and equipment. 2000 w. Am Mach—Vol. 28, No. 31.

Mechanical Handling.—See MECHANICAL HANDLING.

Meldrum, Manchester.—The Works of Messrs. Meldrum Brothers, Ltd. An illustrated detailed description of new works for the manufacture of refuse destructors, mechanical stokers, etc., and their equipment, near Manchester, Eng. 5500 w. Trac & Trans—Nov., 1903.

Milwaukee.—See **Allis-Chalmers**; **Pawling & Harnischfeger.**

Montreal.—See LOCOMOTIVE WORKS.

Morris.—See **Port Richmond.**

New Britain, Conn.—Model Plant of the New Britain Machine Company. Illustrates and describes a model example of the mill, type of construction applied to machine shop use. 3300 w. Mach, N Y—Aug., 1903.

Niles, Berlin.—A Modern German Machine-Tool Shop, the Deutsche Niles Werkzeugmaschinen-Fabrik. Illustrated detailed description of these works in Berlin. Serial. 1st part. 2800 w. Mach—May 16, 1901.

The German Niles Machine Shop (Die Deutsche Niles-Werkzeugmaschinen Fabrik). A very full account of the new machine-tool building establishment at Ober-Schöneweide, near Berlin. 5000 w. 3 plates. Zeitschr d Ver Deutscher Ing—May 25, 1901.

The German Niles Tool Works, Berlin. Begins an illustrated detailed description of these interesting works, where American and German systems of engineering are combined. Serial. 1st part. 5600 w. Engng—May 30, 1902.

Nuremberg.—The Nuremberg Shops of the Nuremberg and Augsburg Machine Works (Das Neue Werk der Vereinigten Maschinenfabrik Augsburg und Maschinenbaugesellschaft Nürnberg A. G.). A fully illustrated description of the new shops at Nuremberg belonging to the great Augsburg combination. Three articles, three plates. 9000 w. Zeitschr d Ver Deutscher Ing—Aug. 22, 29, Sept. 12, 1903.

Pawling & Harnischfeger.—The New Pawling & Harnischfeger Plant. Illustrated description of a Milwaukee plant for the manufacture of cranes, hoists, goring mills, steam sawmill feeding engines and electrical machinery. 3000 w. Ir Age—June 15, 1905.

Pond.—See WORKS MANAGEMENT—Stores.

Port Richmond, Pa.—Heavy Work of the Port Richmond Iron Works. From a bulletin recently issued by the I. P. Morris Co. An illustrated account of recent engineering construction. Turbines, centrifugal pumps, &c. 1600 w. Mach, N Y—Jan., 1905.

Potter & Johnston.—See LATHE—Turret.

Power Cost.—See POWER COST—Lancashire Works.

Prentice, Worcester, Mass.—Notes Taken on the Manufacture of Machine Tools at the Shops of Prentice Bros. Company, Worcester, Mass. Ill. 3500 w. Mach, N Y—Dec., 1900.
See also MACHINE TOOL—Turret.

Queen's, Bedford.—Queen's Engineering Works, Bedford. Detailed description, with illustrations of the works of W. H. Allen, Son & Co., builders of marine auxiliary machinery, and power-plant equipment. Serial. 1st part. 2700 w. Engng—Feb. 27, 1903.

Ridgway, Pa.—The Plant of the Ridgway Machine Tool Company. Illustrated detailed description of new works at Ridgway, Pa., for the building of high class heavy machine tools. 3500 w. Ir Age—March 30, 1905.

Royles, Irlam.—Royles Engineering Works, Irlam. Illustrated description of new works, covering about five acres, near Manchester, England. They consist of iron and brass foundries, pattern shop and stores, machine and erecting shop, offices, etc. 1500 w. Engr, Lond—July 4, 1902.

Soest, Düsseldorf.—The New Machine Works of Louis Soest & Co. (Neuanlage der Maschinenfabrik Louis Soest & Co.). W. Grueber. Describing an important new plant near Düsseldorf, devoted to the manufacture of steam and gas engines, as well as mining and general machinery. 2500 w. Stahl und Eisen—Sept. 1, 1902.

Stanley, Newark-on-Trent.—Stanley Works, Newark-on-Trent. Illustrated detailed description. 4500 w. Engr, Lond—Dec. 20, 1901.

Turret Lathe.—See **American; LATHE.**

Warner & Swasey.—Something About the Warner & Swasey Shops and Work. Illustrated description of Shops in Cleveland, for the manufacture of high-grade machine tools, astronomical instruments, etc. 2800 w. Am Mach—April 4, 1901.

See also **MEASUREMENT—Refined.**

Watson & Stillman.—See **Aldine.**

Weir, Glasgow.—Works of G. & J. Weir, Limited, Glasgow. Illustrated description of shops where modern methods are used in the manufacture of feed-pumps, feed-heaters, evaporators, &c. 6800 w. Engng—June 21, 1901.

Woodward & Powell.—The New Shops of the Woodward & Powell Planer Co., Worcester, Mass. Illustrated description of the shops, system used, methods of manufacture, etc. 2800 w. Mach, N Y—Jan., 1901.

MACHINING.

See **MACHINE SHOP; MACHINE TOOL; MACHINE WORK; METAL WORKING.**

MADAGASCAR.

See **TRANSPORTATION.**

MAGNALIUM.

See **ALLOY—Magnalium.**

MAGNESITE.

California.—Magnesite in California. Charles G. Yale. Brief description of deposits at Red Mountain and Porterville, and account of operating company. 800 w. Eng & Min Jour—Aug. 25, 1904.

Magnesite and Its Uses. Charles H. Spinks. Describes the deposits in California, and explains some of the many uses to which the ore can be put. 2000 w. Cal Jour of Tech—Oct., 1904.

Furnace Lining.—See **ELECTRIC FURNACE—Lining.**

MAGNESIUM.

Aluminum Alloy.—See **ALLOY—Magnalium.**

MAGNET.

See also **ELECTROMAGNET; MAGNETISM.**

Brake.—See **BRAKE—Magnetic.**

Cast-Iron, Hardened.—The Properties of Magnets Made of Hardened Cast-Iron. B. O. Peirce. Abstract of a paper presented before the Am. Acad. of Arts & Sciences. Reports results of experiments made to determine whether such magnets might be used as a substitute for special steel magnets. 2000 w. Elec Rev, N Y—July 15, 1905.

See also **MAGNETISM.**

Lifting.—See **ELECTROMAGNET.**

Permanent.—A Contribution to the Theory of Permanent Magnets (Zur Theorie Permanenter Magnete). J. Busch. A discussion of the magnetomotive force, the length of the magnetic circuit and the air gap in permanent magnets. 500 w. Elektrotech Zeitschr—March 14, 1901.

Temperature Effects.—The Effects of Changes of Temperature on Permanent Magnets. Hiram B. Loomis. An account of some experiments undertaken to determine more accurately the kind of change that takes place when a magnet is heated and cooled after it has been brought to the "permanent state." 4800 w. Am Jour of Sci—March, 1903.

See also **MAGNETISM—Heat Effects.**

Tractive Force.—See **ELECTROMAGNET.**

MAGNETIC CONCENTRATION.

See **MAGNETIC SEPARATION.**

MAGNETIC CURVES.

See also **ELECTRIC GENERATOR—Characteristic; MAGNETIC FIELD; MAGNETIZATION.**

Notes on Magnetic Curves. Jesse Pawling, Jr. Gives full solutions of examples 37, 38 and 39, page 51, of "Minchin's Statics," Vol. 1, fifth edition. 600 w. Jour Fr Inst—Oct., 1901.

MAGNETIC DECLINATION.

See **MAGNETISM—Terrestrial.**

MAGNETIC DEFLECTION.

Plumb Lines.—See **PLUMB LINE—Magnetic Deflection.**

MAGNETIC DETECTOR.

See **SPACE TELEGRAPHY.**

MAGNETIC EXPANSION.

The Magnetic Expansion of Iron and Steel. Philip E. Shaw, and S. E. Laws. Thorough investigation of Swedish iron, mild steel and hard steel. Ill. Serial. 1st part. 3000 w. Elect'n, —Lond—Feb. 21, 1902.

Iron and Nickel.—Magnetic Expansion of Iron and Nickel. Philip E. Shaw and S. C. Laws. Briefly reviews past research in this field, where the optical lever method has been adopted for measuring, and shows in this paper that these changes can be observed by an entirely different method, which has the advantages of greater delicacy and much greater range. Ill. Serial. 1st part. 2200 w. Elect'n, Lond—Feb. 22, 1901.

MAGNETIC FIELD.

See also **ELECTRO-PHYSICS; MAGNETIC INDUCTION; MAGNETIC SEPARATION; MAGNETIZATION; MAGNETOSTRICTION.**

Alternating and Rotating.—Alternating and Rotating Magnetic Fields. Harold B. Smith. An outline of the methods and laws by which magnetic fields are developed under the application of alternating electromotive forces and resulting currents. 2200 w. Jour Worcester Poly Inst—Jan., 1902.

Alternator.—The Laws of the Distribution of Lines of Force in Alternators (Die Gesetze der Kraftlinienvertheilung ueber den Umfang der Wechselstrommaschinen). Ch. Westphal. A mathematical discussion, with diagrams showing the manner in which the lines of force are distributed around the circumference of an alternator. 3000 w. Elektrotech Zeitschr—Oct. 25, 1900.

Armatures.—See **ARMATURE—Flux Distribution.**

Distortion.—Distorted Alternating and Rotating Magnetic Fields. R. Goldschmidt. A study of the effect of distorted voltage, illustrating by example. Serial. 1st part. 1200 w. Elec Rev—April 8, 1904.

Stray.—On the Experimental Determination of the E. M. F. of Dispersion of Stray Field of an Armature Winding. C. F. Guilbert. Describes a method applying particularly to a revolving-field alternator, in which the armature is the external stator and the revolving field the internal rotor. 2500 w. Elec Wld & Engr—Dec. 3, 1904.

See also **COMMUTATOR—Sparkless.**

MAGNETIC INDUCTION.

See also **HYSTERESIS; MAGNETIC FIELD; MAGNETIC TESTING.**

Air Gap Induction.—See **ELECTRIC GENERATOR DESIGN.**

Law.—The Law of Magnetic Induction (Das Gesetz der Magnetischen Induktion). E. Müllendorf. A mathematical study of the laws governing induction, with tables showing the close agreement of computed and experimental values. 4500 w. Elektrotech Zeitschr—Nov. 7, 1901.

MAGNETIC MEASUREMENT.

See **ELECTRIC MEASUREMENT; MAGNETIC TESTING; MAGNETISM; MAGNETIZATION; MAGNETOGRAPH.**

MAGNETIC OBSERVATORY.

See also **MAGNETISM—Terrestrial.**

Cheltenham, Md.—New Magnetic Observatory of the United States Government. An illustrated description of the buildings at Cheltenham, Md., and their equipment. 2200 w. W Elect'n—Feb. 9, 1901.

United States.—The Magnetic Observatories of the United States Coast and Geodetic Survey in Operation on July 1, 1902. L. A. Bauer and J. A. Fleming. From the annual report of the Supt. of the U. S. Coast & Geodetic Survey, 1902. Illustrated descriptions. 3300 w. Sci Am Sup—Aug. 8, 1903.

MAGNETIC ORE.

See also **IRON ORE.**

Electric Smelting.—See **ELECTRO-METALLURGY—Iron and Steel.**

MAGNETIC PERMEABILITY.

See **MAGNETIC TESTING; MAGNETISM.**

MAGNETIC PROPERTIES.

See **MAGNETISM.**

MAGNETIC RESISTANCE.

Air Gap.—See **ELECTRIC GENERATOR DESIGN.**

MAGNETIC SEPARATION.

See also **ELECTRIC SEPARATION; ELECTRO-METALLURGY; IRON METALLURGY; ZINC METALLURGY.**

The Magnetic Separation of Iron Ores (Magnetische Aufbereitung der Eisenerze). H. Smits. Describing a number of machines and plants now in operation, being a paper read before the Mining Congress at Paris. 3000 w. Stahl und Eisen—Dec. 1, 1900.

Investigations of Magnetic Fields, with Reference to Ore-Concentration. Walter R. Crane. A thesis presented for the degree of Ph. D. at Columbia Univ., N. Y. Describes apparatus and methods of testing, giving the relative magnetic permeability of various iron ores. Ill. 10,000 w. Trans Am Inst of Min Engrs—June, 1901.

Progress in Magnetic Concentration of Iron Ore. J. Walter Wells. Discusses concentration, reasons for concentrating iron ores, methods, and the present status of magnetic concentration, describing a few machines in use. 6000 w. Can Min Rev—June 30, 1903.

Magnetic Separation. F. T. Snyder. Read before the Can. Min. Inst. Remarks on the develment of magnetic separation, the early types of separators, the present extensive use and the results. 3300 w. Can Min Rev—May 31, 1904.

Cleveland-Knowles.—See **Knowles.**

Copper.—Electro-Magnetic Concentration. V. F. Stanley Low. Its employment in the treatment of copper ores is discussed. 1000 w. Aust Min Stand—Feb. 27, 1902.

Copper-Nickel.—A Process for Separating Copper and Nickel from Magnetic Gravels (Verfahren zur Gewinnung von Kupfer und Nickel aus Kupfer und Nickelhaltigen Magnetkiesen). E. Günther. An abstract of an inaugural dissertation on an electrolytic process for extracting nickel and copper separately after metallurgical treatment of the ore. 5000 w. Zeitschr d Ver Deutscher Ing—April 18, 1903.

Düsseldorf Exposition.—The "Humboldt" Company's Pavilion for Ore Treatment and Concentration at the Düsseldorf Exposition (Düsseldorfer Ausstellung. 1902. Pavillion für Erzaufbereitung der Maschinenbauanstalt "Humboldt" in Kalk). An illustrated description of ore-treating apparatus and particularly of magnetic separators for iron ore. 2 plates. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 14, 1902.

Edison.—The Edison Process at the Dunderland Mines. W. Simpkin and J. B. Ballantine. Read before the Inst. of Min & Met. Brief illustrated description of the Edison process of crushing and grinding as it has been applied to iron ore franklinite, limestone, etc. 3500 w. Ir & Coal Trds Rev—Oct. 28, 1904.

Eriksson.—See **Forsgren.**

Finland.—Magnetic Ore Separating at Pitkäranta in Finland (Die Magnetische Erzaufbereitung zu Pitkaranta in Finland). G. Gröndal. A description of the use of the author's magnetic separator with the magnetic ores of Finland. 1800 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 10, 1901.

Forsgren.—Two New Magnetic Ore Separators (Zwei Neue Magnetische Erzscheider). Dr. Hecker. Describing the Forsgren and the Eriksson separators, used in the magnetite districts of Norway and Sweden. 1800 w. Glückauf—Jan. 23, 1904.

The Forsgren Magnetic Separator (Neues Separatorsystem zur Anreicherung von Magneteisenerzen des Ingénieurs Emil Forsgren). Dr. Leo. Describing the work of magnetic concentration of magnetite ores at Falun, Sweden. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 12, 1904.

Foundry Shot Iron.—See **FOUNDRY—Shot Iron.**

Fröding.—The Fröding Magnetic Separator (Frödings Magnetischer Erzscheider). From "Tecknisk Tidskrift." An illustrated description of a Swedish magnetic separator, in successful operation at Herräng, which has a flat conical table revolving over electromagnets. 500 w. Glückauf—April 12, 1902.

Gröndal.—See **Finland.**

"Humboldt."—See **Düsseldorf Exposition.**

Iron Sands, St. Lawrence.—Notes on Some Recent Experiments on the Magnetic Concentration of Iron Sands from the Lower St. Lawrence. John F. Robertson. Deals with attempts to cheaply overcome the low percentage of iron, and the presence of titanium. Ills. 1600 w. Can Soc of Civ Engrs—Nov. 30, 1905. (Adv. Proof).

Knowles.—A Magnetic Separator. W. R. Crane. An illustrated detailed description of the Cleveland-Knowles electro-magnetic separator used at Joplin. 2000 w. Min & Sci Pr—April 30, 1904.

Electro-Magnetic Separators of the Secondary Induction Type. Explanation, with illustrated description of the Knowles magnetic separator and its operation. 3000 w. Mines & Min—Dec., 1904.

Mineville, N. Y.—See **IRON MINE.**

Nickel-Copper.—See **Copper-Nickel.**

Port Henry, N. Y.—See also **IRON MINE—Mineville, N. Y.**

Scrap and Ore.—Notes on the Magnetic Separation of Scrap Iron from Mined Ore. J. P. Ward. On the need of a mechanical sorter, suggesting a method. 1600 w. Jour S African Assn of Engrs—Dec., 1904.

Snyder.—The Snyder Magnetic Separator. Frederick T. Snyder. Illustrated detailed description of a magnetic separator and its operation. 1000 w. Eng & Min Jour—Sept. 2, 1905.

Static Electricity.—See **ELECTRIC SEPARATION.**

Sweden.—Swedish Ore Separators (Schwedische Erzscheideapparate). Dr. Leo. Giving a series of brief notices of all the magnetic iron-ore separators which have been used in Sweden. Two articles. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 25, April 2, 1904.

The Concentration of Iron Ores (Ueber Anreicherung von Eisenerzen). Dr. A. Weiskopf. An examination of the various magnetic devices for concentrating iron ores, with especial reference to Swedish practice. Two articles. 4000 w. Stahl u Eisen—April 15, 1905.

See also **Forsgren; Fröding.**

Thomson-Houston.—The Thomson-Houston Magnetic Separator (Séparateur Magnétique Thomson-Houston). A brief illustrated description. 400 w. Génie Civil—May 10, 1902.

Tin and Wolfram.—Magnetic Separation of Tin and Wolfram at Gunnislake Clitters. Edward Skewes. Describes the work accomplished by a magnetic separator having a capacity of about 5 tons per day. 700 w. Eng & Min Jour—Sept. 19, 1903.

Waring.—The Waring System of Magnetic Concentration. Outlines the five types of magnetic separators that have been tried, and gives an illustrated description of the system named. It is in use for the purification of zinc blende ores, the extraction of blende from pyritic jig stuff, and for the separation of pure zinc, copper and iron material from complex sulphide ores. 2000 w. Eng & Min Jour—Sept. 14, 1901.

Wedding.—The Magnetic Separation of Iron Ores. Hermann Wedding. On the machines used to separate the ores, and the attempts made to utilise the iron dust. 1200 w. Ir & Trd Coal Trds Rev—Dec. 7, 1900.

Wetherill.—Some Applications of the Wetherill Process of Magnetic Separation of Iron Ores. An abstract translation of a paper read at the Paris Exposition by M. Smits, describing this process. 1500 w. Eng & Min Jour—March 30. 1901.
See also **ZINC METALLURGY—Joplin.**

Zinc—Iron Sulphides.—Notes on the Magnetic Separation of Zinc-Iron Sulphides, with Observations on Preparatory Wet Concentration. Guy H. Elmore. Describes the treatment of lead-zinc-iron ores and the workings of the magnetic separator. Ill. 4000 w. Min Rept—Dec. 18, 1902.

Zinc Ore.—See **Knowles; Waring; ZINC METALLURGY.**

MAGNETIC TESTING.

See also **ELECTRIC MEASUREMENT; ELECTRIC TESTING; HYSTERESIS; MAGNETIC SEPARATION; MAGNETISM.**

Some Recent Tests of American Iron and Steel. J. Walter Esterline and Robert B. Treat. Tests made of a large number of samples to determine the variation in magnetic quality, with results. 1200 w. Elec Wld & Engr—Dec. 22, 1900.

An Instrument for Measuring the Permeability of Iron and Steel. C. G. Lamb and Miles Walker. Read before the Inst. of Elec. Engrs. Illustrates and describes an instrument designed to meet the demand for a simple, cheap and reliable piece of apparatus for this use. 3700 w. Elect'n, Lond—June 7, 1901.

Industrial Tests of the Magnetic Properties of Iron (Rapport sur les Travaux de la Sixième Commission: Les Essais Magnetiques des Fers dans l'Industrie). M. Armagnat. A report of a committee of the Société Internationale des Electriciens on the advisability of making magnetic tests in comemrcial and practical work, with list of questions sent to manufacturers. 1500 w. Bull Soc Internationale d'Elect—March, 1902.

Note on Magnetic Tests of Iron (Note sur les Essais Magnétiques du Fer). M. Armagnat. A preliminary report of a committee of the Soc. Int. des Electriciens, giving some data on testing for permeability, hysteresis, etc., making recommendations and requesting information. 1600 w. Bull Soc Internationale des Electriciens—June, 1902.

Industrial Magnetic Measurements (Sur les Mesures Magnétiques Industrielles). M. Armagnat. A discussion of practical methods of determining the magnetic properties of iron in connection with the commercial manufacture of apparatus. 1200 w. Bull Soc Int des Electriciens—Nov., 1902.

The Measurement of Magnetic Induction. C. W. Burrows. Experimental investigations with description and illustrations of instrument used. 1500 w. Horseless Age—May 21, 1902.

A New Apparatus for Testing Iron (Vorschlag zu Einem Neuen Eisenprüfapparat). R. Richter. Describing a simple apparatus for determining the permeability of sheet iron, and its suitability for use in electrical machinery. 1500 w. Elektrotech Zeitschr—June 5, 1902.

Magnetic Testing of Iron and Steel. Statements from the report of the committee of the American Society for Testing Materials appointed to investigate the magnetic testing of iron and steel. 1500 w. Elec Wld & Engr—Oct. 29, 1904.

Apparatus and Methods of Measurement of Coefficients of Magnetization (Appareil et Méthode de Mesure des Coefficients d'Aimantation). Georges Meslin. Describing the use of the torsion balance for determining magnetic coefficients. 1200 w. Comptes Rendus—June 26, 1905.

Ballistic Method.—Studies in Magnetic Testing. G. F. C. Searle. Read before the Inst. of Elec. Engrs. (Abridged). Describes investigations made by the author on the effects of magnetic treatment. A critical examination of the use of the ballistic method in magnetic tests of transformer iron. Serial. 1st part. 4000 w. Elect'n, Lond—Dec. 9, 1904.

Compensation Magnetometer.—A Compensation Magnetometer (Kompensations-Magnetometer). Dr. Max Corsepius. Describing an improved instrument for the practical determination of the magnetic properties of various kinds of iron. 1800 w. Elektrotech Zeitschr—Nov. 13, 1902.

Diamagnetism.—Measurement of the Specific Magnetization of Diamagnetic on Slightly Magnetic Bodies. Emile Guarini. Brief description of an apparatus designed by M. P. Curie and M. C. Cheneveau. 1000 w. Sci Am Sup—Nov. 11, 1905.

Liquids.—The Permeability of Magnetic Liquids. Fitzhugh Townsend, S. Diamant. and L. S. Thurston. Describes a method of measuring the permeability which involves practically the same idea as the Hughes balance. 700 w. Elec Wld & Engr—Nov. 22, 1902.

Magnetograph.—See MAGNETOGRAPH.

Magnetometer.—An Apparatus for Exploring Feeble Magnetic Fields (Nouveaux Systèmes Magnétiques pour l'Etude des Champs Très Faibles). V. Cremieu and H. Pender. A description of a magnetometer consisting of a small horizontal arm suspended by a fine wire, with a vertical magnet at one end and a counterweight at the other. This arrangement may be applied also in a sensitive galvanometer. 600 w. Comptes Rendus—March 9, 1903.

Magnetomotive Force.—A Method of Measuring Magnetomotive Forces. Rudolf Goldschmidt. Illustrated description of a method of measuring the "magnetic potential drop." which is easy to manipulate, and requires a minimum of special apparatus or fine adjustment. 1200 w. Elect'n, Lond—Nov. 25, 1904.

Materials in Bulk.—A Permeameter for Testing the Magnetic Qualities of Materials in Bulk. Charles V. Drysdale. Read before the Inst. of Elec. Engrs., England. Illustrates and describes an appartus for iron-testing, explaining methods and the principles involved. 4200 w. Elect'n, Lond—Dec. 6, 1901.

Null Method.—See Zero Method.

Oxidation Errors.—Errors in Magnetic Measurements Caused by Oxidation of Iron (Ueber die durch Oxydschichten des Eisens Verursachten Fehler Magnetischer Messungen). H. Kamps. Discussing and computing the influence of films of oxide of various thicknesses. 5000 w. Elektrotech Zeitschr—Jan. 24, 1901.

Permeameter.—A Universal Permeameter (Permeameter Universel). R. V. Picou. Giving details of the connection and methods of using the instrument, by means of which the magnetic permeability of iron for use in electrical machinery may be accurately determined. 2000 w. L'Electricien—Feb. 21, 1903.

A Direct-Reading Permeameter. Prof. F. G. Baily. Read before the British Assn. at Glasgow. Illustrates and describes the instrument and explains its use. 2000 w. Elect'n, Lond—Nov. 22,

Quantometer.—An Electric Quantometer. R. Beattie. An illustrated description of an instrument for magnetic measurements, particularly the measurement of magnetic fluxes in dynamos. A sort of "summation" ballistic galvanometer. 2500 w. Elect'n, Lond—Dec. 26, 1902.

Reichsanstalt.—Comparative Magnetic Researches with the Iron-Testing Apparatus of Epstein, Möllinger, and Richter (Vergleichende Magnetische Untersuchungen mit den Eisenprüfapparaten von Epstein, Möllinger und Richter). E. Gumlich and P. Rose. A very full account of investigations upon hysteresis conducted at the Reichsanstalt. 8000 w. Elektrotech Zeitschr—April 27, 1905.

Schuckert Works.—The Testing of Iron at the Schuckert Works (Fabrikationsmässige Eisenprüfungen bei der Elektrizitäts-A-G., vormals Schuckert & Co., Nürnberg). J. A. Mollinger. A description of the methods employed for investigating the magnetic properties of iron for electrical constructions. 2000 w. Electrotech Zeitschr—May 2, 1901.

Sheet Iron.—The Investigation of Sheet Iron (Zur Untersuchung von Eisenblechen). Dr. G. Brion. An account of methods for investigating the magnetic properties of sheet iron, with respect to its use in electrical machinery. 2000 w. Elektrotech Zeitschr—March 5, 1903.

Appartus for Making Magnetic Tests of Entire Sheets of Iron (Eisenprüfapparat für Ganze Blechtafeln). Rudolf Richter. An illustrated description of a large cylindrical apparatus used by Siemens & Halske for making electromagnetic tests of whole sheets of iron for electric apparatus. 1800 w. Elektrotech Zeitschr—May 7, 1903.

Magnetic Tests of Whole Sheets of Iron. Illustrates and describes apparatus on which whole sheets can be tested without any waste of material. 1000 w. Engng—Jan. 29, 1904.

Sheet Steel.—The Commercial Testing of Sheet Steel for Electrical Purposes. C. E. Skinner. Read before the Am. Soc. of Test. Materials. Describes methods of testing in daily use which have been found satsifactory, and capable of giving valuable results from an investigation standpoint. Ills. 3000 w. Ir Age—June 23, 1904.

Transformer Iron.—The Testing of Transformer Iron. Lancelot W. Wild. Remarks on the wattmeter method of testing transformer iron, describing the apparatus used at the Westminster Electrical Testing Laboratory. 1000 w. Elect'n, Lond—Nov. 11, 1904.

Zero Method.—Zero Method for Magnetic Measurements (Nullmethode für Magnetische Messungen). R. Goldschmidt. Discussing applications of methods employing auxiliary windings in opposite directions to the main winding. 1200 w. Elektrotech Zeitschr—April 10, 1902.

A Null Method of Magnetic Measurements. Rudolf Goldschmidt. From the "Electrotechnische Zeitschrift." Illustrated description of method determining the magnetic force of given windings which gives fairly accurate results. 900 w. Elect'n, Lond—May 2, 1902.

Zero Method for Magnetic Measurement (Nullmethode für Magnetische Messungen). A. Roth. Referring to the method of Goldschmidt, and describing a simple method of approximate accuracy. 1800 w. Elektrotech Zeitschr—July 24, 1902.

MAGNETIC UNIT.

See also **ELECTRIC UNIT.**

Magnetic Units and Other Subjects that Might Occupy Attention at the Next International Electrical Congress. A. E. Kennelly. Considers the C. G. S. system and the adapting it to practical requirements. Also discussion. 2500 w. Trans Am Inst of Elec Engrs—Oct., 1903.

MAGNETISM.

See also **ELECTROMAGNET; ELECTRO-PHYSICS; HYSTERESIS; MAGNET; MAGNETIC TESTING; MAGNETIZATION.**

Alloys.—See Iron Alloy; **ALLOY—Magnetic.**

Aluminum.—The Influence of Aluminum Upon Iron for Magnets (Ueber den Einfluss von Aluminum-Beimengungen auf die Magnetischen Eigenschaften des Gusseisens). Dr. A. Schweitzer. With tables and diagrams, showing the influence of various percentages of aluminum upon permeability and hysteresis. 1000 w. Elektrotech Zeitschr—April 25, 1901.

Cast-Iron.—The Magnetic Properties of Cast-Iron (Magnetische Eigenschaften des Gusseisens). H. Nathusius. Data and results of investigations into the permeability, remanance, and other magnetic properties of cast-iron with relation to the chemical constitution. Serial. Part I. 2500 w. Stahl u Eisen—Jan. 15, 1905.

See also **MAGNET.**

Chronometer.—Action of Terrestrial Magnetism Upon a Magnetized Chronometer (Action du Champ Magnetique Terrestre sur la Marche d'un Chronometre Aimanté). A. Cornu. With especial reference to the effect of magnetism upon the chronometers of iron vessels. 2500 w. Comptes Rendus—Nov. 26, 1900.

Constants.—See **MAGNETIZATION; PHYSICS.**

Curie's Laws.—See **Theory.**

Dynamos.—See **ELECTRIC GENERATOR DESIGN—Magnetic Attraction.**

Earth.—See **Terrestrial; MAGNETIC OBSERVATORY.**

Expansion.—See **MAGNETIC EXPANSION.**

Gilbert.—William Gilbert and Terrestrial Magnetism in the Time of Queen Elizabeth. Prof. Sylvanus P. Thompson. Address to the Royal Geog. Soc. An analysis of the work of Gilbert in this field, with reference to other investigators. 3300 w. Elect'n, Lond—April 10, 1903.

See also **GILBERT.**

Heat Effects.—The Effect of Heat on New Varieties of Iron (Glühversuche mit Neueren Eisensorten). Max Mauermann. Data and results of extended experiments upon the effect of heat upon the magnetic properties of irons. 1500 w. Elektrotech Zeitschr—Oct. 10, 1901.

On the Calorimetric Properties of the Ferro-Magnetic Substances. Bruce V. Hill. A report of experimental investigations of the specific heat, magnetic and other properties of steel, iron and nickel steel. 2000 w. Elec Rev, N Y—March 29, 1902.

See also **MAGNET—Temperature Effects; NICKEL STEEL—Magnetic Properties; PYROMETRY—Magnetic Selector.**

Inertia.—Magnetic Inertia (Ueber Magnetische Trägheit). K. Krogh and H. Rikli. A discussion, graphical and analytical, of the behavior of soft iron under magnetization, as occurring in alternating electrical apparatus. 3500 w. Elektrotech Zeitschr—Dec. 27, 1900.

See also **HYSTERESIS.**

Iron Alloys.—Magnetic Investigations Upon Modern Varieties of Iron (Magnetische Untersuchungen an Neueren Eisensorten). E. Gumlich & E. Schmidt. A report to the Reichsanstalt of the conductivity, coercitive force, permeability, and general magnetic properties of a variety of irons and steels. 10,000 w. Elektrotech Zeitschr—Aug. 29, 1901.

The Relation between the Magnetic Properties and the Electrical Conductivity of Magnetic Materials (Ueber das Verhältniss der Magnetischen Eigenschaften zum Elektrischen Leitvermögen Magnetischer Materialien). E. Gumlich. A review of experiments by Barrett, Brown and Hadfield described in the "Scientific Transaction of the Royal Dublin Society," showing particularly the influence of aluminum and silicon on iron. Tables. 1500 w. Elektrotech Zeitschr—Feb. 6, 1902.

The Conductivity and Magnetic Properties of Alloys of Iron. Abstract of a paper by Prof. W. F. Barrett and W. Brown, read at meeting of the Inst. of Elec. Engrs, England. Discusses electric conductivity, magnetic properties, non-magnetic alloys of iron, alloys of iron more magnetic than the purest commercial iron, etc. 3200 w. Elect'n, Lond—Feb. 21, 1902.

The Electrical and Magnetic Properties of Iron Alloys. Editorial on the researches of Prof. Barrett, with Messrs. Brown and Hadfield. 1200 w. Engng—March 14, 1902.

See also **ALLOY—Magnetic.**

Iron Sand Wrought-Iron. — The Magnetic Properties of Annealed Wrought-Iron Manufactured from the Iron sand of New Zealand. Ernest Wilson. Describes the experimental investigations made, giving the results. 800 w. N Z Mines Rec—May 16, 1902.

Low Temperatures.—The Magnetic Properties of Iron and Steel at Liquid Air Temperatures. C. C. Trowbridge. A brief account of investigations of this subject, giving the results obtained. Also editorial. 4000 w. Elec Wld & Engr—Aug. 30, 1902.

Nickel Steel.—See **NICKEL STEEL.**

Peregrinus.—The Letter of Peregrinus on the Magnet. 1269. Translation of a letter written in August, 1269, explaining the principle of the magnetic motor. 4400 w. Elec Wld & Engr—March 26, 1904.

Sun Spots.—See **SUN SPOTS.**

Tellurium.—See **TELLURIUM—Magnetic Effects.**

Temperature Effects.—See **Heat Effects; MAGNET.**

Terrestrial.—The Absolute Value of the Magnetic Elements on Jan. 1, 1902 (Sur la Valeur Absolue des Eléments Magnétiques au 1er Janvier, 1902). Th. Moureaux. The terrestrial magnetic components, declination, inclination and total force at the observatory of Val-Joyeux near Versailles away from the influence of railway currents. 200 w. Comptes Rendus—Jan. 6, 1902.

Terrestrial Magnetism in Its Relation to Geography. Capt. Ettrick W. Creak. Abstract of a presidential address to the Geog. Sec. of the British Assn. Reviews the work that has been done in the study of the earth's magnetism, and discusses magnetic changes, and work needing to be done in this field. 5400 w. Elect'n, Lond—Sept. 18, 1903.

See **Chronometer; Gilbert; COMPASS; ELECTRIC METER; MAGNETIC OBSERVATORY; MAGNETOGRAPH.**

Terrestrial, Westphalia.—Results of Magnetic Observations at Bochum, Westphalia, in 1901 (Ergebnisse der Magnetischen Beobachtungen in Bochum im Jahre 1901). Hr. Lenz. Curves and tables of the magnetic declination for every hour of the year. Glückauf—Special Supplement. Feb. 1, 1902.

Theory.—The Cyclone Theory of Magnetism. Henry E. P. Cottrell. Describes experiments of Mr. C. L. Weyher and the theories advanced by him. Ill. Serial. 1st part. 2000 w. Elec Rev, Lond—June 27, 1902.

The Theory of Magnetism (Sur la Theorie du Magnetism). P. Langevin. An examination of the corroboration of Curie's laws by the theory of electrons. 900 w. Comptes Rendus—Dec. 26, 1904.

See also **Zacharias; ELECTRO-PHYSICS; MAGNET—Permanent.**

Traction.—See **ELECTRIC RAILWAY.**

Zacharias.—A Theory of Magnetism. Johannes Zacharias. An attempt to prove that the magnetic force is a phenomenon due to pressure. 1800 w. Elec Wld & Engr—Dec. 20, 1902.

The Causes of Magnetism (Die Ursachen des Magnetismus). J. Zacharias. A study of magnetic curves produced with metal filings, with a discussion of the laws of their formation. 3000 w. Glasers Annalen—March 1, 1903.

Recent Experiments on the Nature of Magnetism. Emile Guarini. A review of some of the results of researches by Herr Johannes Zacharias. Ills. 3300 w. Sci Am Sup—April 15, 1905.

MAGNETITE.

See **IRON ORE.**

MAGNETIZATION.

See also **MAGNETIC FIELD; MAGNETIC INDUCTION.**

Alternating & Direct Current.—Magnetising by Continuous Currents (Ueber die Magnetisierung durch

Gleichstrom und durch Wechselstrom). E. Gumlich and P. Rose. With diagrams showing the difference in magnetizing action of the two kinds of currents, and the respective current consumption. 6000 w. Elektrotech Zeitschr—June 1, 1905.

Constants.—The Determination of the Magnetization Constants (Die Bestimmung der Konstanten in der Magnetisirungsfunction). E. Müllendorff. A mathematical discussion of formulae expressing the relation between the magnetizing force H and the magnetic induction B, and their agreement with Kapp's experimental curves. Tables. 2400 w. Elektrotech Zeitschr—Jan. 9, 1902.

Curve.—Calculation of the Magnetization Curve (Rechnerische Ermittelung der Magnetisierungskurve). Iwan Döry. Formulae and methods of calculating the magnetization curve of iron which give results agreeing very well with those observed. 1000 w. Zeitschr f Elektrotechnik—March 29, 1903.

See also **ELECTRIC GENERATOR—Characteristic; MAGNETIC CURVE; MAGNETIC FIELD.**

Energy Losses.—Energy Losses in Magnetizing Iron. W. M. Mordey and A. G. Hansard. Read before the British Assn. A report of investigations made and their results. 2500 w. Elec Engr, Lond—Aug. 26, 1904.

See also **EDDY CURRENT; HYSTERESIS.**

Measurement.—On the Measurement of Magnetic Force. G. F. C. Searle. A brief account of a method of using a millivoltmeter to indicate directly the magnetic force due to the magnetizing current. 800 w. Elect'n, Lond—June 12, 1903.

Rapid Oscillations.—Magnetization by Rapid Oscillations. Ferdinand Braun. A report of experimental investigations. 2000 w. Elect'n, Lond—May 29, 1903.

MAGNETO.

Selective Signaling.—See **TELEPHONE.**

Telephone.—See **TELEPHONE**—Generator Efficiency.

MAGNETOGRAPH.

Quartz Thread.—A Quartz-Thread Vertical Force Magnetograph. W. Watson. An illustrated description of an instrument for recording rapid vibrations of vertical force, which has been actually run for some time. 2500 w. Sci Am Sup—Oct. 8, 1904.

MAGNETOSTRICTION.

See also **ELECTROSTRICTION.**

On Magnetostriction. Prof. H. Nagaoka. A brief survey of the experimental knowledge on this subject, including some new results. 4400 w. Int Elec Cong of St Louis—Sept., 1904.

Torsional.—Apparent Hysteresis in Torsional Magnetostriction, and Its Relation to Viscosity. C. Barus. Experimental investigations with results. 4200 w. Am Jour of Sci—Feb., 1901.

Torsional Magnetostriction in Strong Transverse Fields, and Allied Phenomena. C. Barus. Methods of experimenting are described and the results discussed. 4000 w. Am Jour of Sci—Dec., 1900.

MAIL TRANSPORTATION.

Cities.—Mail Transportation in Cities. Waldon Fawcett. An illustrated article on the recent improvements made, by the establishing of sub-stations for postal distribution, electric cars, pneumatic tubes, and automobiles for transportation, etc. 1000 w. Sci Am—Feb. 15, 1902.

See also **AUTOMOBILE.**

Railway.—Railway Mail Service in 1856. John Kirby. A brief history of the growth of the railway postal service between Toledo and Chicago in 1856, compared with the service bewteen New York and Chicago at the present time. 1200 w. Ry Age—June 10, 1904.

MAINTENANCE OF WAY.

See **RAILWAY PERMANENT WAY; TRACK.**

MALACATE.

See **HOISTING—Malacate.**

MALLEABLE IRON.

See **CASTING — Malleable Iron; IRON—Heat Treatment; Malleable.**

MANGANESE.

See also **FOUNDRY; IRON ALLOY; MINERAL REGION; STEEL ALLOY.**

Baden.—Manganese in the Upper Black Forest, Baden (Die Manganerz-Vorkommen im Oberen Schwarzwald, Grossherzogthum Baden). Josef Lowag. A description of occurrences of manganese ore and the general geological formation of this region in Germany. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 14, 1903.

Bohemia and Saxony.—The Occurrence of Manganese Associated with Iron at Platten in Bohemia and Johanngeorgenstadt in Saxony (Das Vorkommen von Manganerzen in Gesellschaft von Eisenerzen bei Platten in Böhmen und Johanngeorgenstadt in Sachsen). Josef Lowag. Geological and mineralogical description, with some production figures. Serial. 2 parts. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 8, 15, 1902.

Brazil.—On the Manganese Ore Deposits of the Queluz (Lafayette) District, Minas Geraes, Brazil. Orville A. Derby. Describes the deposits and discusses their origin, giving reasons for conclusions reached. 5400 w. Am Jour of Sci—July, 1901.

The Manganese Deposits of Gandarella, Minas Geraes, Brazil. Joaquin G. Michaeli. Describes the deposits and their location. 1100 w. Eng & Min Jour—Dec. 21, 1901.

Bronze.—See **BRONZE—Manganese.**

Caucasus.—Manganese Ore in the Caucasus. Interesting particulars of the mining of this ore. 1400 w. Col Guard—June 21, 1901.

Colorimeter Estimation.—Manganese in Cyanide Solutions. J. E. Clennell. Describes a process based on the method given by C. and J. Beringer for the colorimetric estimation of manganese in ores and compounds free from chlorides. 600 w. Eng & Min Jour—Nov. 24, 1904.

Foundry Use.—See **FOUNDRY—Manganese; IRON ALLOY—Manganese.**

Hydraulic Mining.—A New Departure in Manganese Mining. J. S. C. Wells. Describes the washing out of the ore by hydraulic methods, similar to those used for gold. 500 w. Eng & Min Jour—Aug. 2, 1902.

Melting Point.—The Determination of the Melting Point of Manganese (Schmelzpunktsbestimmung von Mangan). W. C. Heraeus. A description of the use of electric fusion methods by which the melting point of manganese is found to be 1245 degrees centigrade. 1200 w. Zeitschr f Elektrochemie—April 3, 1902.

Panama.—The Manganese Industry of the Department of Panama, Republic of Colombia. E. G. Williams. Gives a general description of the region, the topography, deposits, character of the ore, the mines worked, etc. 11,800 w. Trans Am Inst of Min Engrs—Nov., 1902.

Queensland.—Some Manganese Deposits in the Gingin, Deglibo and Warwick Districts. Lionel C. Ball. Reports of these districts, as a part of a scheme to have all manganese deposits inspected and reported. Map. 3800 w. Queens Gov Min Jour—Jan. 15, 1904.

Manganese. Lionel C. Ball. Introductory to reports on the manganese deposits of Queensland, dealing with the mineralogy, chemistry, metallurgy, uses, markets, and occurrence. 4500 w. Queens Gov Min Jour—Sept. 15, 1904.

Santiago, Cuba.—The Manganese Deposits of Santiago Province, Cuba. Arthur C. Spencer. Gives the location of deposits thus far worked, describing the ores, mode of occurrence, geology, etc. Ill. 2300 w. Eng & Min Jour—Aug. 23, 1902.

Spain.—The Managanese Deposits of Huelva Province, Spain (Die Manganerz-Lager der Provinz Huelva). Carl Doetsch. An account of the ores, analyses, mining industry and production. 2200 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 19, 1902.

Spiegel.—On the Determination of Manganese in Spiegel. Thomas F. Hildreth. A comparison of new and modified methods for the estimation of manganese. 2000 w. Sch of Mines Qr—Nov., 1901.

Steel.—See **STEEL ALLOY—Manganese.**

MANHOLE.

Cylindrical Vessels.—See **Weakening Effect; BOILER —Manhole; Strength.**

Subway Standardization.—Standardizing of Subway Manhole Construction. Hugh C. Baker, Jr. Illustrated description of a system designed and patented and used, and last year used experimentally by the N. Y. Telephone Co. 700 w. Elec Wld & Engr—March 19, 1904.

Weakening Effect.—The Weakening of Cylindrical Vessels by Cutting Manholes (Zwei Versuche zur Klarstellung der Verschwächung Zylindrischer Gefässe durch den Mannlochausschnitt). C. Bach. Data and results of experiments to test the reduction in strength due to non-reinforced manhole openings. 1800 w. Zeitschr d Ver Deutscher Ing —Jan. 3, 1903.

See also **BOILER—Manhole; Strength.**

MANOGRAPH.

The Manograph—Its Utility and Construction. Illustrated detailed description of an apparatus for producing diagrams which enable the internal action of an engine to be seen. Serial. 1st part. 1200 w. Auto Jour—Sept. 16, 1905.

MANTLE.

Incandescent Gas Lighting.—See **INCANDESCENT GAS LIGHTING.**

MANUAL TRAINING.

See **EDUCATION—Manual Training.**

MANUFACTORY.

See **ENGINE WORKS; FACTORY; MACHINE WORKS; TEXTILE WORKS; WORKS.**

MANUFACTURER.

Organization.—See **LABOR—Employers' Association; Founders' Agreement.**

MANUFACTURES.

U. S. Census.—The Census of Manufactures. S. N. D. North. Information concerning the cost and work of preparing valuable statistics in the industries, and a review of the more important facts of this latest census of manufactures. 4200 w. Rev of Revs—Sept., 1902.

The Census of Manufactures of 1900. Charles E. Monroe. Reviews the history of census taking in the United States, especially discussing the methods of obtaining statistics in regard to manufactories, the defects of the system, and the effects. Serial. 1st part. 7000 w. Jour Fr Inst —July, 1903.

MANUFACTURING.

See also **FACTORY; INDUSTRIAL ENGINEERING; INDUSTRY; WORKS MANAGEMENT;** and under specific headings.

Railway.—See **RAILWAY MANUFACTURING.**

Specialization.—See **FACTORY.**

MAP.

See also **CITY PLAN; MINE MAP; SURVEYING.**

Accuracy.—The Determination of the Accuracy of a Map (Die Genauigkeitsbestimmung eines Planes). S. Wellisch. Showing the method of determining the true scale of a map, also the mean error. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 30, 1900.

Marshall Islands.—See **MARSHALL ISLANDS.**

Mine.—See **MINE MAP.**

Street.—See **GAS DISTRIBUTION—Maps.**

Vienna.—See **CITY PLAN.**

MARBLE.

See also **BUILDING MATERIAL; QUARRY; STONE.**

Flow.—An Experimental Investigation into the Flow of Marble. Frank D. Adams. An illustrated article indicating the methods employed in the investigation and the results attained. 2800 w. Can Engr—May, 1902.

Gouverneur, N. Y.—See **QUARRY—Marble.**

Ireland.—See **STONE.**

MARBLE QUARRY.

See **QUARRY.**

MARINE BOILER.

See **BOILER, MARINE.**

MARINE DEPOSITS.

Marine and Estuarine Deposits. Prof. W. B. Scott. Lecture at the Wagner Inst., Philadelphia. An interesting description of deposits in shallow and deep waters, coral rock, etc. 4000 w. Sci Am Sup—Oct. 12, 1901.

MARINE ENGINE.

See also **BOILER, MARINE; MARINE ENGINEERING; NAVY; SHIP PROPULSION; STEAMBOAT; STEAM ENGINE; STEAMSHIP;** and under specific types of vessels.

Modern Marine Engines (Moderne Schiffsmaschinen). R. J. Sansin. A review of changes in design and proportion resulting from increase in speed and pressure. 3000 w. Schiffbau—Oct. 23, 1900.

The Marine Steam Engine. William Frederick Durand. Hints relating to the overhauling, adjustment and repair of marine machinery. 4800 w. Marine Engng—May, 1901.

Air Pumps.—See **AIR PUMP—Marine Engine.**

American.—The Construction of American Marine Engines (Die Konstruktion der Amerikanischen Schiffsmachinen). Walter Ments. Notes of a journey of inspection, with illustrations of engines of American cruisers and other vessels. Serial. Part I. 3000 w. 3 plates. Schiffbau—March 8, 1903.

"Argyll."—The Machinery of H. M. S. "Argyll." Illustration, with description of the twin engines of this armored cruiser. Also briefly describes the vessel and its equipment, the machinery, &c. 2400 w. Engng—Jan. 13, 1905.

Assistant Cylinder.—On a New Assistant Cylinder. David Joy. Read before the Brit. Inst. of Naval Archts. On recent improvements and advances in construction and efficiency. 1700 w. Engng—April 5, 1901.

Auxiliary Machinery.—The Auxiliary Machinery of Steam Vessels. Jasper E. Cooper. Two articles dealing with this subject. The present considers turning and reversing engines, air and circulating pumps, condensers, feed pumps, and feed heaters. Ill. 6500 w. Cassier's Mag—July, 1903.

Improvement in the Installation and Fitting of Naval Machinery. Lieut. H. C. Dinger. A consideration of some of the lines along which improvements are to develop. 7800 w. Jour Am Soc of Nav Engrs—Feb., 1904.

Balance Cylinders.—Balance Cylinders. Luther D. Lovekin. An illustrated article explaining the problem which confronts a true balance cylinder, and considering the forces to be overcome, and the applications made. 3500 w. Jour Am Soc of Nav Engrs—Aug., 1904.

Balancing.—The Balanced and Unbalanced Engines of Torpedo Boat S. 42 (Vergleich Zwischen der Ausgeglichenen und der Unausgeglichenen Maschine des Torpedobootes S. 42). Hans Mohr. A study of the problem of balancing four-crank engines, taking into account the finite length of the connecting rod. Two articles. 5000 w. Schiffbau—Jan. 8, 23, 1901.

The Vibration of Steamers. Otto Schlick. Read before the Brit. Inst. of Naval Archts. On some experiments made on board the Atlantic liner "Deutschland," during her trial trip in June, 1900. 6300 w. Engng—March 29, 1901.

Pallographic Investigations on the Steamship "Deutschland" (Pallographische Untersuchungen an Bord des Schnelldampfers "Deutschland"). A full review of the tests of the Schlick system of counterbalancing as made on the "Deutschland" in June, 1900. 3 articles, 5000 w. Schiffbau—April 23, May 8, 23, 1901.

On the Balancing of the Reciprocating Parts of Engines, Including the Effect of the Connecting-Rod. W. E. Dalby. Read before the Brit. Inst. of Naval Archts. The paper is wholly concerned with balancing reciprocating masses amongst themselves, taking into account the variation of the simple harmonic motion caused by the connecting-rods. Ill. and Dis. Serial. 1st part. 5500 w. Engng—April 5, 1901.

Balancing Marine Engines. Prof. W. E. Dalby. Read before the Inst. of Nav. Archts. A comparison of five types of engines with respect to their inertia forces and couples, their increases in weight due to the addition of balance-weights, and the variations of turning moment on their crankshafts. 4000 w. Engng—July 11, 1902.

The Geometry of Engine Balancing. J. Macfarlane Gray. Read before the Inst. of Nav. Archts. Considers the drawing-office methods of applying the principles of engine balancing. Ill. 4000 w. Engng—May 31, 1901.

A Solution of the Vibration Problem. J. H. Macalpine. Read before the Inst. of Naval Archts. Describes a special form of balanced engine, giving reasons why the author claims that it is a practical solution of the balancing problem for steamships. Serial. 1st part. 4200 w. Engng—July 12, 1901.

The Theoretical and Practical Methods of Balancing Marine Engines. D. W. Taylor. Description and demonstration of methods for the determination of unbalanced forces and moments of unbalanced couples in a known engine, and of balancing engines so as to reduce or extinguish unbalanced forces. Ill. 17,000 w. Soc Nav Archts & Marine Engrs—Nov., 1901.

The Vibrations of Steamships. With Special Reference to Those of Second and Higher Period. Rear Admiral George M. Melville. A supplementary paper to one on the balancing of engines. Deals with the three questions—1st, Do important vibrations of second and higher periods occur? 2d, Are the unbalanced forces of higher period in the four crank engines important? 3d, Are the forces of higher period sufficient to account for the vibrations of corresponding period? 8 plates. 7000 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 9—Nov., 1902.

The Vibrations of Steamships. G. W. Melville. An exhaustive study of the methods of balancing marine engines, reviewing the Yarrow-Schlick-Tweedy system, and showing its inability to provide for the second and higher periods. An important paper by the Engineer-in-Chief of the U. S. Navy. Serial, Part I. 2000 w. Engng—Jan. 2, 1903.

The Theoretical and Practical Methods of Balancing Marine Engines. Rear Admiral George W. Melville. A discussion of the various methods proposed or actually tried, giving their merits and demerits, and especially describing the MacAlpine system. Ill. 15,000 w. Soc Nav Archts & Marine Engrs—Nov., 1901.

Recent Investigations Concerning Dynamical Action in Shafting of Marine Engines, with Special Reference to Synchronous Torsional Vibrations. Hermann Frahm. A description of the experimental plant, researches made, results and conclusions. Illustrations and diagrams. 9800 w. Jour Am Soc of Nav Engrs—Aug., 1902.

The Balance of a Four-Cylinder, Triple Expansion Marine Engine. Harvey D. Williams. An investigation of the possible causes of vibration in a marine engine of a type quite generally used. Ill. 2800 w. Jour Am Soc of Naval Engrs—Feb., 1902.

The Theory of Balancing in Its Application to the Engines of Paddle-Wheel Steamers (Die Theorie des Massenausgleichs in Ihrer Anwendung auf Radschiffsmaschinen). Alb. Achenbach. A discussion of the balancing of paddle-wheel engines, with diagrams and illustrations. 2 plates. 1000 w. Schiffbau—April 8, 1903.

The Balancing of Engines (Equilibrage des Machines). H. Brillié. A discussion of the theory and practice of the balancing of various engines. Diagrams and tables. 8000 w. Serial. 3 plates. Génie Civil—May 23, 30 and June 6, 1903.

Balancing Marine Engines. A mathematical discussion of the vibratory effects. Ill. 1900 w. Naut Gaz—Dec. 3, 1903.

Apparatus for Recording the Vibrations of Steamers. An illustrated description of Schlick's recording apparatus for steamship vibrations, called a pallograph. 1200 w. Engng—March 3, 1905.

The Schlick Pallograph. Dr. Alfred Gradenwitz. Illustrates and describes an apparatus for measuring and registering the vibrations of steamers. 2300 w. Sci Am Sup—July 15, 1905.

Vibration Phenomena of Steamships (Vibrationserscheinungen der Dampfer). Otto Schlick. General review of the present state of knowledge of ship and engine vibrations, and their remedies. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—Sept. 16, 1905.

See also **CRANK SHAFT—Schlick System; SHAFT—Vibrations.**

Battleship.—See **Warship; BATTLESHIP**; and under names of vessels.

"Black Prince."—Engines of H. M. S. Black Prince. Illustrated detailed description of the propelling engines, of the inverted-cylinder twin-screw type. 2200 w. Engr, Lond—Dec. 30, 1904.

British.—See under names and types of vessels.

Comparison.—A Comparison of Five Types of Engines. W. E. Dalby. Read before the Inst. of Naval Archts. A comparison with respect to their inertia forces and couples, their increases in weight due to the addition of balance weights and the variations of turning moment on their crank shafts. 4000 w. Mech Engr—May 31, 1902.

Corliss.—A Marine Engine with Corliss Valve Mechanism. William H. Crawford, Jr. An account of the compound engine placed in the Steamer "City of Puebla," now running in the service of the Pacific Coast Steamship Co. Ill. 1200 w. Marine Engng—April, 1903.

The Corliss Valve for Marine Work. Charles M. Jones. Shows the ease with which the valve may be fitted, and claims it is as near perfect against leakage as can be wished. 800 w. Am Shipbldr—Feb. 11, 1904.

"Dakota."—Main Engines of the American Steamship "Dakota." Illustrated detailed description of engines of more than usual interest. 2000 w. Marine Rev—March 16, 1905.

Design.—The Design of Engines of Varying Powers from One Set of Drawings. Prof. H. C. Sadler. Considers the principal conditions which influence the power developed by an engine, and those that govern the sizes of the different parts; then shows a larger or smaller power may be designed from the same drawings. Serial. 1st part. Marine Engng—Nov., 1901.

Marine Engine Designs. Comparative Practice, 1903. John Calder. Considers the ways in which the demand for greater power has been met, and the classes of service for which the designs must be made. Gives tabulated comparative practice. 3000 w. Marine Engng—June, 1903.

See also **INDICATOR DIAGRAM—Marine Engine Design; MARINE ENGINEERING.**

Destroyer.—See **Stresses; TORPEDO-BOAT DESTROYER.**

Details.—Notes on Details of Construction and Arrangement of Marine Machinery. Emil Theiss. Calls attention to details of construction often slighted. Results of observations and experience on the battleships "Alabama" and "Kearsarge." 6500 w. Jour Am Soc of Naval Engrs—Feb., 1902.

"Deutschland."—See **Balancing.**

Frame Stresses.—See **Stresses; STEAM ENGINE.**

Freight Steamers.—Developments in Cargo-Boat Machinery. Benjamin Taylor. Traces developments of the marine engine during the last quarter of the last century. 3800 w. Marine Rev—Dec. 26, 1901.

German Navy.—Results of Investigations on Recent Engines of the German Navy. Chief Naval Constructor Köhn von Jaski, in "Schiffbau." Translation. Investigations into the degree of uniformity of the stresses on the shafts in the new vessels, with other facts necessary to judge of the efficiency of the engines. 3800 w. Jour Am Soc of Naval Engrs—Feb., 1902.

Governor.—See **GOVERNOR—Marine Engine.**

Great Lakes.—Marine Engines on the Great Lakes from a Coast Engineer's Point of View. L. D. Lovekin. A comparison with coast practice, showing that the one great aim of the lake engines seems to be reduced cost. Covers the work done on an average freighter. 1600 w. Marine Engng—Nov., 1902.

See also **SHIPBUILDING; STEAMSHIP.**

History.—The Marine Engine. An illustrated review of the history of steam propulsion for vessels. 4800 w. Engr, U S A—Jan. 15, 1901.

See also **MARINE ENGINEERING; STEAMSHIP.**

"Hohenzollern."—See **STEAM YACHT.**

"Inchdune" and "Inchmarlo."—Engines and Boilers of the "Inchdune" and "Inchmarlo." Illustrated description of marine machinery, of interest because of the construction and the highly economical results obtained. 2200 w. Engng—Jan. 18, 1901.

Interchangeability.—See **INTERCHANGEABILITY—Marine Work.**

"John W. Gates."—See **BOILER, MARINE—Coal Consumption Tests.**

Lubrication.—See **LUBRICATION—Marine Machinery.**

Macalpine Balancing.—See **Balancing.**

Maintenance.—Maintenance of Machinery in Merchant Ships. Robert Haig. Discusses this subject, considering the various changes, improvements and developments that experience gained in maintenance has brought about. 12,000 w. Soc of Naval Archts & Marine Engrs, No. 11—Nov., 1904.

Manufacture.—Some Facts Affecting the Economical Manufacture of Marine Engines. William Thomson. Considers the premium system, good tools, arrangement, shop conditions, and standardization. 3200 w. Inst of Mech Engrs—Glasgow Congress, 1901.

Metallography.—See **METALLOGRAPHY — Marine Engine.**

Metric System.—See **WEIGHTS AND MEASURES.**

Models.—Marine Engine Models at South Kensington. Brief descriptions of interesting models on exhibition in England. 2400 w. Engr, Lond—Nov. 18, 1904.

Naval College, Dartmouth.—Machinery at the New Royal Naval College, Dartmouth. Illustrates and describes a triple-expansion engine, with independent surface condenser, air and circulating pumps, and all necessary tanks, pipes, etc., installed for the purpose of instructing young officers in the practical working of the steam engine. 1000 w. Engr, Lond—Dec. 15, 1905.

"Orontes."—The Machinery of the Orient-Pacific Liner "Orontes." Illustration, with description, of one of the twin sets of quadruple-expansion engines, and a general description of the vessel. 1200 w. Engng—Jan. 2, 1903.

Pallograph.—See **Balancing.**

"Port Royal" and "Port Antonio."—See **STEAMSHIP.**

"Prince of Wales."—Engines of H. M. S. Prince of Wales. Illustrations, with brief description. 500 w. Engr, Lond—July 1, 1904.

"Regina Margherita."—See **BATTLESHIP.**

Regulation.—See **GOVERNOR—Marine Engine.**

Roller Bearings.—See **ROLLER BEARINGS.**

"St. Louis."—Engineering Life on an Atlantic Liner. Harry Cornell. A narrative of the routine of the operation and maintenance of the machinery of the steamship "St. Louis." 2600 w. Steam Engng—June 10, 1903.

"St. Paul" Accident.—Smashup of the Starboard Engines of the American Liner "St. Paul." An account of the accident during the last westward trip, so far as now known. Ill. 1000 w. Marine Engng—Dec., 1900.

Schlick System.—See **Balancing; CRANK SHAFT.**

Spare Fittings.—Spare Gear for Steamers. F. J. Kean. Gives lists of spare gear customary at the present time for an ocean-going steamer to carry, discussing the necessity of carrying certain fittings. Serial. 1st part. 1500 w. Prac Engr—Nov. 10, 1905.

Stresses.—An Investigation Into the Stresses on the Framework of a Destroyer's Engines. Jasper E. Cooper. The present article investigates the stresses caused by the dead weight of the cylinders, by the steam pressure on the cylinder covers, by the steam pressure on the piston valves, and by the steam pressure transmitted to the guides by the connecting rod. Serial. 1st part. 2000 w. Prac Engr—June 27, 1902.

The Investigation of the Stresses on Frames of Vertical, Inverted Steam Engines. G. Schwarz. Translated from the "Zeitschrift des Vereines Deutscher Ingenieure." Mathematical demonstration. 2200 w. Jour Am Soc of Nav Engrs—Feb., 1903.

Investigation of the Stresses on Frames of Vertical Steam Engines—As Modified for Marine Engines. John H. Meyer. Mathematical investigations of stresses due to the rolling and pitching of the vessel. 11,000 w. Jour Am Soc of Nav Engrs—Nov., 1903.

Test, "James C. Wallace."—Test of the Machinery of the "James C. Wallace" under Superheated and Saturated Steam. W. W. White. A description and report of tests carried out on this large freighter on the Great Lakes for the purpose of securing comparative data. Ills. 2800 w. Jour Am Soc of Nav Engrs—Aug., 1905.

Torpedo Boat.—See **Balancing.**

Torpedo-Boat Destroyer.—See **Stresses; TORPEDO-BOAT DESTROYER—Machinery.**

Triple Expansion.—Drawings of Modern Triple-Expansion Engines. Gives a set of working drawings of a modern triple-expansion engine of the vertical inverted cylinder, direct-connected, triple-expansion type, explaining the correct names of the different parts. 700 w. Marine Engng—July, 1903.

"Umbria."—Four-Crank Quadruple-Expansion Engine (Macchine a Quadruplice Espansione con Quattro Manovelle). Salvatore Orlando. A description of the construction and trials of the quadruple-expansion engines of the steamship "Umbria," of the "Navegazione Generale Italiana." 10,000 w. 6 plates. Rivista Marittima—July, 1903.

U. S. Warships.—See **Warship;** and under specific types of warships.

Valve Replacing.—See **VALVE—Replacing.**

Vibration.—See **Balancing; SHAFT.**

Warship.—Machinery for the New U. S. Battleships and Armored Cruisers. Illustrated description of the engines, representing very large units and all modern improvements. 1500 w. Marine Engng—Feb., 1901.

Triple-Expansion Twin-Screw Propelling Engines of the U. S. Battleships "Connecticut" and "Louisiana." Illustrated description of the engines, which will be right and left hand, placed in water-tight compartments, separated by a middle-line bulkhead. 1200 w. Marine Engng—April, 1903.

Weight.—See **NAVAL ARCHITECTURE—Weight Machinery.**

Westinghouse.—The Westinghouse Vertical Marine Type Engine. An illustrated description of an engine designed to meet the requirements of the isolated plant at the Union Ry. Station at Pittsburg, Pa. 2700 w. Power—Aug., 1903.

Yarrow-Schlick-Tweedy.—See **Balancing.**

MARINE ENGINEER.

See also **MARINE ENGINEERING; NAVAL ARCHITECTURE; NAVAL ENGINEER.**

The Marine Engineer. Howard Patterson. Discusses his present oportunities and prospects. 1300 w. Naut Gaz—Dec. 27, 1900.

Examination.—The Examination of Sea-Going Engineers. Editorial review of the alterations in the new regulations initiated by the British Board of Trade. 1300 w. Engng—May 24, 1901.

United States.—National Prospects on the Sea and the Young Marine Engineer. George W. Melville. Briefly reviews national conditions, and the American merchant marine, calling attention to the opportunities awaiting young marine engineers. 4500 w. Stevens Ind—July, 1901.

MARINE ENGINEERING.

See also **MARINE ENGINE; MARINE ENGINEER; NAVAL ARCHITECTURE; NAVAL ENGINEERING; SHIPBUILDING; SHIP PROPULSION; SHIP RESISTANCE; STEAM ENGINEERING.**

American Navy.—See **NAVAL ENGINEERING.**

Berlin School.—See **SHIPBUILDING.**

British.—See **SHIPBULDING; NAVY.**

Designs.—Factors of Safety in Marine Designs. A. E. Seaton. Read before the Inst. of Naval Archts. Discusses the margins now imposed, especially on boilers, and the evils and cost of the present way of insuring satisfactory performance. 4000 w. Engng—April 28, 1905.

See also **MARINE ENGINE.**

Economy.—The Progress of Economy in Marine Engineering. W. M. McFarland. A review of marine engineering, noting the lines along which progress has been made. 6400 w. Sib Jour of Engng—May, 1901.

The Growth of Economy in Marine Engineering. W. M. McFarland. The first of an important series of articles dealing with the development of steam economy in the marine engine from the beginning of steam navigation to the present. The first paper deals with the period of the simple engine. 4000 w. Engineering Magazine—March, 1902.

The Growth of Economy in Marine Engineering. W. M. McFarland. Mr. McFarland's second paper deals with the introduction of higher steam pressures and the development of the compound engine. 3500 w. Enginering Magazine—April, 1902.

The Growth of Economy in Marine Engineering. W. M. McFarland. Mr. McFarland's third paper deals with the multiple expansion engine and the great advances in economy which followed its introduction. 4000 w. Engineering Magazine—May, 1902.

The Growth of Economy in Marine Engineering. W. M. McFarland. Mr. McFarland's concluding paper discusses the improvements which have particularly affected the performance of naval engines. 5000 w. Engineering Magazine—June, 1902.

Some Considerations Affecting the Economy of Marine Screw Engines. E. Hall-Brown. Discussion of this paper, which was read before the Inst. of Engrs. & Shipbuilders in Scotland. 8 plates. 7500 w. Trans of Inst of Engrs & Shipbldrs in Scotland—Aug., 1902.

Some Considerations Affecting the Economy of Marine Screw Engines. E. Hall-Brown. Read before the Brit. Inst. of Engrs. & Shipbuilders. Discusses mechanical efficiency, drawing conclusions from the results of Prof. Weighton's experiments, and also other points affecting the economy. 2300 w. Naut Gaz—Aug. 21, 1902.

History.—Review of Marine Engineering During the Last Ten Years. James McKechnie. An interesting review of the development, with 11 plates and other illustrations, 15 tables and much information. 10,600 w. Inst of Mech Engrs—Aug., 1901.

Epochs in Marine Engineering. George W. Melville. Address delivered before the A. S. M. E. on Jan. 31, 1905. Considers the various periods with reference to the special inventions or changes which have characterized them; as the paddle wheel, the screw propeller, surface condensers, cylindrical boilers, compound engine, etc. 5400 w. Marine Engng—March, 1905.

See also Economy; **MARINE ENGINE; MARINE ENGINE WORKS; PROPELLER; STEAMSHIP.**

Japanese College.—Schools of Marine Engineering and Naval Architecture. George Crouse Cook. Illustrated account of the facilities for study at the Engineering College of the Imperial University of Tokyo, Japan. 3200 w. Marine Engng—July, 1901.

Japanese Navy.—Engineering in the Japanese Navy. Engineer-Rear-Admiral Miyabara. Read before the Japanese Soc. of Naval Archts. Translated by Prof. S. Terano. Outline description of recent developments of marine engineering in the Japanese navy, with special reference to Miyabara's patent water-tube boiler. Ills. 4300 w. Engng—April 15, 1904.

Piping.—See **PIPING—Marine Engineering; STEAM PIPE.**

Propeller History.—See **PROPELLER—History.**

Scotch.—Some Useful Data from Scotch Marine Engineering Practice. H. Wilkes. Table and diagrams giving figures based upon engines, boilers and accessories actually constructed in Scotch shipyards. 600 w. Eng News—Feb. 26, 1903.

Useful Data of Scotch Marine Engineering Practice. H. Wilkes. Gives tables and diagrams giving figures based upon engines, boilers, and accessories actually constructed by Scotch and English marine-engine builders. 1000 w. Marine Engng—Nov., 1905.

U. S. Navy.—See **NAVAL ENGINEERING.**

White Address.—See **SHIPBUILDING.**

MARINE-ENGINE WORKS.

See also **MACHINE SHOP; MARINE ENGINE; MARINE ENGINEERING; SHIPYARD.**

Harrison, N. J.—See **ENGINE WORKS.**

History.—The Changes of a Half-Century in the Marine Engine Shop. Egbert P. Watson. An interesting account of early shop practice, and the changes which have gradually been wrought. 4000 w. Enginering Magazine—September, 1902.

Mitsu Bishi, Nagasaki.—See **SHIPYARD.**

Rowan.—Messrs. David Rowan & Co.'s Works, Glasgow. An interesting detailed description of these marine engineering works, with discussion of the engineering economy in the management of such works. 5400 w. Engng—May 9, 1902.

Wallsend.—See **SHIPYARD.**

MARINE INSURANCE.

See **INSURANCE—Marine.**

MARINE RAILWAY.

See also **DRY DOCK; SHIP RAILWAY; SHIPYARD.**

Friedrichshafen, Würtemberg.—The Marine Railway at the Royal Dock at Friedrichshafen (Der Schiffsaufzug der Kgl. Werft in Friedrichshafen). A. Seeman. The railway is at Friedrichshafen, on the Lake of Constance, and enables the lake steamers of 175 feet in length drawing 5 feet of water to be hauled out of the water for inspection and repair. 4000 w. Zeitschr d Ver Deutschr Ing—Feb. 23, 1901.

Shooter's Island, N. Y.—The Largest Marine Railroad in the World. Ralph C. Davison. An illustrated description of the cradle, the ways and the hauling-out gear, etc., with statement of the advantages. 1200 w. R R Gaz—Aug. 9, 1901.

See also **SHIPYARD.**

Tucacas, Venezuela.—Slipway at Tucacas, Venezuela. Arthur Drew Thomas. Short description, with illustration, of the construction of a slipway on the northern coast of South America. 1000 w. (No. 3511.) Inst of Civ Engrs.

MARKING MACHINE.

Compressed-Air.—Compressed Air Marking Machine. H. J. White. Drawings and description, explaining operation. 900 w. Am Mach—Vol. 28, No. 29.

MARL.

See also **CLAY.**

Cement.—See **CEMENT—Marl.**

MARSHALL ISLANDS.

Charts and Navigation.—On Sea Charts Formerly Used in the Marshall Islands, with Notices on the Navigation of These Islands in General. Capt. Winkler. Translated from "Marine Rundschau," in the Annual Report of Smithsonian Institution for 1899. 4500 w. Ill. Sci Am Sup—Aug. 31, 1901.

MASONIC TEMPLE.

Toledo, O.—See **CONCRETE REINFORCED—Masonic Temple.**

MASONRY.

See also **ARCH; ARCHITECTURE; BRICKWORK; BRIDGE; BRIDGE PIER; BUILDING CONSTRUCTION; CEMENT; CONCRETE; CONCRETE REINFORCED; DAM; MORTAR; RETAINING WALL; VIADUCT.**

Notes of Experience in Masonry Construction. F. A. Mahan. A discussion on the construction work of different kinds of masonry and some of the difficulties. 1700 w. Eng News—July 17, 1902.

Notes on Cement Masonry. I. N. Knapp. Written for the annual meeting of the Am. Gas Lgt. Assn. Facts of interest from the writer's experience in concrete construction, with much valuable information. Also discussion. 10,000 w. Stevens Ind—Jan., 1903.

Notes on Stone Masonry. Charles Arthur Hague. A discussion of stone masonry work and methods of adjusting cost and conditions. 2500 w. Cassier's Mag—June, 1905.

Austrian Tests.—An Austrian Investigation of Masonry Piers. Abstract of the report of tests on the compressive resistance of masonry, made by order of the Austrian Soc. of Engrs. & Archts. Ill. 3300 w. Eng Rec—Nov. 23, 1901.

Blackwell's Island Bridge.—See **BRIDGE.**

Canal Lock.—See **CONCRETE.**

Cement.—See **CEMENT—Masonry.**

Chic., Mil. & St. Paul Ry.—See **BRIDGE PIER.**

Disintegration.—The Cause of Masonry Disintegration. Halbert Powers Gillette. Arguing that masonry destruction in cold climates is due primarily to stresses developed by expansion and contraction due to changes in temperature. 2800 w. Eng News—Oct. 23, 1902.

Graphical Design.—Graphical Design of Retaining Walls, Dams, Abutments and Bridge Piers, with Plane and Curved Surfaces (Graphostatisches Verfahren zur Directen Dimensionirung von Stütz und Staumauern, Widerlagern und Brückenpfeilern mit Ebenen und Gekrümmten Begrenzungsflächen). Josef Schreier. Graphical methods for masonry structures, with formulae and diagrams. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—April 25, 1902.

Permanence.—See **STEEL CONSTRUCTION.**

Preservatives.—Preservatives for Stone Walls. F. S. Hardesty. Discusses the cause of dampness and decay, and various processes for preserving walls of stone, brick or concrete. 2500 w. Ice & Refrig—March, 1905.

Railway.—Masonry. Report of the Com. of the Am. Ry. Engng. & Main. of Way Assn. Classifies the different kinds of masonry, discussing the materials, economic considerations and designs.

Also discussion. 15,500 w. Ry Age (Spe. No.)—March 15, 1901.

Masonry. Report of the American Railway Engineering and Maintenance of Way Association, with discussion. 25,600 w. Ry Age, Special No—March 21, 1902.

Concrete Masonry. Extracts from the report of the Committee of the Am. Ry. Engng. & Maintenance of Way Assn. Presents specifications for cement, recommending the use of a wet concrete. 4000 w. R R Gaz—March 27, 1903.

Masonry.—Abstract of report at meeting of the Am. Main. of Way Assn. On the use of concrete and reinforced concrete, its adaptability, specifications for cement, etc., with discussion. 8500 w. Ry Age—March 24, 1905.

Rigidity.—Rigidity of Masonry Construction and the Decay of Stone. Reports some recent failures in stone masonry and gives the greater part of Sir Thomas Drew's report on Truro Cathedral, which contains much valuable information. 4500 w. Stone—April, 1902.

MATERIAL.

Building.—See **BUILDING MATERIAL.**

Inspection.—See **INSPECTION—Materials.**

Mechanical Engineering.—Mechanical Engineering. Materials: Their Properties and Treatment in Construction. Edward C. R. Marks. The present article considers cast iron, giving notes, analyses, etc., from named sources. Serial. 1st part. 2500 w. Prac Engr—Aug. 4, 1905.

Refractory.—See **REFRACTORY MATERIAL.**

Road.—See **ROAD MATERIAL.**

MATERIALS' STRENGTH.

See also **BEAM; COLUMN; PLATE; TESTING;** and under specific materials.

New Methods in the Study of the Resistance of Materials (Neuere Methoden der Festigkeitslehre). S. Rappaport. A mathematical discussion of the resistance of materials and framework calculations, with diagrams. Serial. 1st part. 1500 w. Schweiz Bauzeitung—May 10, 1902.

Notes on the Strength of Beams, Plates and Columns. R. P. King. An explanation of a method using the moment of resistance. 1500 w. Mach, N Y—June, 1905.

Alternate Stresses.—A Possible Explanation of the Phenomena Caused by Repetitions of Stress. F. Foster. Read before the Owens College Engng. Soc. A study of the effects of cyclical repetitions of stress on a material, and associated phenomena. Serial. 1st part. 2500 w. Mech Engr—Nov. 22, 1902.

The Fracture of Metals Under Repeated Alternations of Stress. J. A. Ewing and J. C. W. Humfrey. From the "Philosophical Transactions" of the Royal Soc. of London. Describes experiments in which the microscope has been applied to study the nature of the process of fatigue by which breakdown occurs under repeated reversals of stress. Ill. 8500 w. Metallographist—April, 1903.

Alternate Bending Stresses. Charles B. Dudley. Some remarks on the strains involved and the kind of metal best calculated to resist them. Ills. 1700 w. Ir & Steel Met—Feb., 1904.

Beams.—See **Bent Pieces; BEAM.**

Bending Steel.—See **TESTING.**

Bent Pieces.—The Stresses in Bent Prismatic Bodies (Beitrag zur Bestimmung der Biegungsspannung in Gekrümmten Stabförmigen Körpern). A. Bantlin. A mathematical investigation, with practical applications to hooks, riveting machine frames, etc. Two articles. 7500 w. Zeitschr de Ver Deutscher Ing—Feb. 2, 9, 1901.

The Determination of the Stresses in Curved Rods (Zur Ermittelung der Spannungen Krummer Stäbe). Prof. M. Tolle. A mathematical discussion of the stresses in curved pieces, such as the links of chains, etc., with diagrams. 4500 w. Zeitschr d Ver Deutscher Ing—June 20, 1903.

Statical Investigations upon Crooked Struts (Statische Untersuchung Einfach Gekrümmter Stäbe). G. Ramisch. A mathematical analysis, deriving formulas for various sections and shapes. 8500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 1, 1904.

The Bending Stresses in Curved Prismatic Bodies (Beitrag zur Bestimmung der Biegungsspannung in Gekrümmten Stabförmigen Körpern). Ernst Werner. An analytical examination of the stresses on loaded beams when curved. 1800 w. Zeitschr d Ver Deutscher Ing—Feb. 18, 1905.

Brickwork and Concrete.—See **CONCRETE—Tests.**

Brittleness.—See **TESTING.**

Buckling.—The True Formula for Buckling (Die Richtige Knickformel). J. Kübler. A further contribution to this much discussed subject, with table of coefficients for the author's formula. 1500 w. Zeitschr d Ver Deutscher Ing—April 20, 1901.

The Theory of Buckling (Zur Theorie der Knickfestigkeit). Alois Schneider. A discussion of the various formulas from the time of Euler to the present, with a mathematical treatment of the elastic theory. Two articles. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 27, Oct. 4, 1901.

The Buckling of Multiple Supported Rods (Die Knicklast Mehrfach Befestigter Stäbe). F. Wittenbauer. A mathematical investigation of the resistance to buckling rods supported at several points, and subjected to endlong pressure. 2000 w. Zeitschr d Ver Deutscher Ing—April 5, 1902.

The General Character of the Euler Law of Buckling (Die Verallgemeinerung der Eulerschen Knicklast). F. Wittenbauer. A mathematical examination of Euler's law for the buckling of columns, showing its generality. 2500 w. Zeitschr d Ver Deutscher Ing—Feb. 14, 1903.

The Buckling Formula of Rankine and Schwarz in the Form of a Graphical Diagram (Darstellung der Knickungsformel von Rankine und Schwarz in Form von Zeichnerischen Rechentafeln). Alexander Coulmas. Showing the method of drawing curves to represent the formula, and the transformation of these into straight lines. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 30, 1904.

Recent Studies and Experiments on the Resistance of Pillars (Neue Studien und Versuche über die Tragkraft der Säulen). Prof. Bernhard Kirsch. A comparison of the formulas for the buckling of columns with experiments on small rods in the testing machine. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 17, 1905.

Tests Upon the Buckling Resistance of Pillars with Fixed Ends (Ergebnisse von Versuchen über die Knickfestigkeit von Säulen mit Fest Eingespannten Enden). Prof. B. Kirsch. Data and tabulated results of tests upon round pillars of wrought iron under longitudinal pressure. 4000 w. Zeitschr d Ver Deutscher Ing—June 3, 1905.

A Simple Demonstration of the Principles of Buckling Action (Eine Einfache Vorrichtung zur Veranschaulichung des Knickungsvorganges). A. Sommerfeld. Describing an experimental method by observing the vibrations of a rod fastened at one end and adjustable as to length. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 12, 1905.

See also **COLUMN; CONCRETE REINFORCED.**

Cast Iron.—See **IRON; TESTING.**

Cast Iron Bars.—See **TESTING—Bars.**

Centrifugal Stresses.—See **Rotating Bodies.**

Columns.—See **Buckling; Strut; COLUMN.**

Combined Stresses.—The Determination of the Maximum Shearing Stress in a Bar Under Torsion (Bestimmung der Grössten Schubspannung im Querschnitt eines Geraden auf Drehung Beanspruchten Stabes). E. Autenrieth. A mathematical examination of the external and internal forces in a rod subjected to torsion. 4000 w. Zeitschr d Ver Deutscher Ing—Aug. 3, 1901.

A Diagram for the Combination of Direct and Shearing Stresses. E. R. Douglas. Gives diagram and explanation of its use. 600 w. Am Mach—July 10, 1902.

A Preliminary Report on the Effect of Combined Stresses on the Elastic Properties of Steel. Edward L. Hancock. Presented before the Am. Soc. of Test. Mat. Gives results of a series of tests on solid steel rounds in torsion while under tension, explaining methods used. Ills. 1800 w. Eng News—Aug. 24, 1904.

Countershafts.—See **SHAFTING.**

Curved Beams.—See **Bent Pieces.**

Deformations.—An Experimental Study of Permanent Deformations (Etude Experimentale des Deformations Permanentes). H. Bouasse. A fundamental treatment of the deformation of materials produced by stresses of various kinds. 7500 w. Bull Soc d'Encour—Oct. 31, 1903.

See also **TESTING.**

Dynamics.—The Dynamics of the Resistance of Materials (Beiträge zum Dynamischen Ausbau der Festigkeitslehre). A. Sommerfeld. A discussion of the action of vibration in engineering structures, and its influence upon the resistance of materials of construction. 4000 w. Zeitschr d Ver Deutscher Ing—March 15, 1902.

Elasticity.—The Elastic Deformation of Solids (La Déformation Elastique des Solides). A. Mesnager. A comparison of the theoretical principles with the results obtained in the study of glass by polarized light. 12,000 w. Ann des Ponts et Chaussées—4 Trimestre, 1901.

The Conditions of Elasticity and Resistance of Various Kinds of Iron (Die Elastizitäts- und Festigkeitseigenschaften der Eisensorten). C. Bach. A study of the relation of elasticity and resistance of materials to temperature, with tables and diagrams of experimental results.. 2000 w. 2 plates. Zeitschr d Ver Deutscher Ing—Oct. 11, 1902.

The Laws of Elastic Extension (Zur Gesetzmässigkeit der Elastischen Dehnungen). W. Schüle. A review of recent experimental results, with curves of tests and comparisons between computed and experimental values. 2000 w. Zeitschr d Ver Deutscher Ing—Oct. 4, 1902.

Researches in the Theory of Elasticity (Weitere Untersuchungen über die Theorie der Elastizität). F. Rust. A mathematical study of the elastic resistance of beams to transverse loads. 4000 w. Oesterr Wochenschr f d Oeff Baudienst—June 11, 1904.

Elastic Limit.—The Use of the Term "Elastic Limit" in Metals Under Stress. W. C. Popplewell. Discusses the true meaning of the term and its limitations. The material referred to is the metals. 4500 w. Engng Rev—April, 1904.

See also **Mohr Theory; Plastic Yielding; Yield Point; TESTING—Optical Examination.**

Elbows.—The Bursting Strength of Standard Screwed Cast-Iron Elbows and Tees. S. M. Chandler. Abstract of a thesis presented to the Case School of Applied Science. Ills. Gives results of tests and incidents of interest. 700 w. Power—Oct., 1905.

Fatigue.—See **PLATE.**

Fire Effect.—See **FIRE; IRON—Molecular Mobility.**

Flanged Rings.—The Flanged Mouth-Piece Rings of Vulcanizers and Similar Vessels. An illustrated article dealing with the strength of the flanged ring which is riveted to the main shell of the vessel, particularly considering one mode of failure of this ring. Also the mathematical theory of the stresses in these mouthpiece rings, etc. 11,500 w. Locomotive—July, 1905.

Flat Plate.—See **PLATE.**

Flexure.—The Determination of Unit Stresses in the General Case of Flexure. L. J. Johnson. Calls attention to methods by which the distribution of stress can be determined for any case of flexure in a straight bar. Gives fully worked numerical examples. 8500 w. Jour Assn of Engng Socs—May, 1902.

See also **BEAM; PLATE.**

Fragility.—See **TESTING—Nicked Bars.**

German Convention.—See **TESTING.**

Gradual vs. Sudden Stresses.—On the relations Between the Effects of Stresses Slowly Applied and of Stresses Suddenly Applied in the Case of Iron and Steel. Pierre Breuil. Abstract of a paper before the Iron & Steel Inst. Results of investigations are discussed. 2200 w. Ir & St Trds Jour—May 7, 1904.

Gun-Steel Test Pieces.—The Presence of Greenish-Colored Markings in the Fractured Surfaces of Test-Pieces. H. G. Howorth. Read before the Ir. & Steel Inst. Describes markings found in gun-steel test-pieces, the large proportion in which defects have been observed, and discusses their probable cause. 2800 w. Ir & Coal Trds Rev—Sept. 29, 1905.

Hardness.—See **TESTING.**

Heat Effects.—The Action of Iron and Steel Under Different Degrees of Heat. Gives an illustrated account of investigations which seem to establish that wrought iron is stronger when at a white heat than when at a red heat. 1800 w. Am Mach—Dec. 25, 1902.

See also **IRON; IRON METALLURGY; PLATE; STEEL; STEEL METALLURGY.**

Internal Strains.—The Internal Strains of Iron and Steel and Their Bearing Upon Fracture. Arthur Wringham. Abstract of a paper read before the Glasgow Congress. Studies the behavior of metals and unexpected breakages. 5600 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Machinery Sections.—Strength of Sections of Machinery. Frank B. Kleinhans. Presents a table which gives the moment in inch-pounds for various fiber stresses for circular sections, explaining its use. 700 w. Engr, U S A—Oct. 2, 1905.

See also **MOMENT OF INERTIA.**

Mohr Theory.—The Relation of the Elastic Limit to the Rupture of a Material (Welche Umstände Bedingen die Elastizitätsgrenze und den Bruch eines Materiales?). O. Mohr. A mathematical investigation of the conditions of rupture, discussing old and new theories and the deductions to be made from an observed elastic limit. Two articles. 8000 w. Zeitschr d Ver Deutscher Ing—Nov. 17, 1900.

The Study of the Resistance of Materials (Zur Festigkeitslehre). O. Mohr. A general review of the physical problems involved in the study of the resistance of materials. 3000 w. Zeitschr d Ver Deutscher Ing—May 25, 1901.

The Resistance of Materials (Von der Festigkeitslehre). A review of the development of the study of the strength of materials with especial reference to the theory of Mohr. 3000 w. Zeitschr Oesterr Ing u Arch Ver—Nov. 15, 1901.

Moment of Inertia.—See **MOMENT OF INERTIA.**

Neutral Surfaces.—See **Optical Examination.**

Nut Tightening Strains.—See **NUT—Tightening Strains.**

Optical Examination.—The Direct Observation of the Distribution of Stresses (Ueber Unmittelbare Beobachtung der Spannungsverteilung). Otto Hönigsberg. An examination of the location of neutral lines and surfaces in bodies under stress, including optical methods of investigation. 6000 w. Zeitschr u d Oesterr Ing u Arch Ver—March 11, 1904.

Simplified Methods for Rendering Neutral Layers Visible (Vereinfachtes Verfahren zur Sichtbarmachung der Neutralen Schichte). Otto Hönigsberg. An account of experiments upon glass beams with polarized light, supplementing those of the author published in March, 1904. 1200 w. Zeitschr d Oesterr Ing u Arch Verein—Oct. 20, 1905.

See also **TESTING.**

Penetration.—See **TESTING.**

Pistons.—See **PISTON.**

Plastic Yielding.—The Plastic Yielding of Iron and Steel. Walter Rosenhain. Read before the Iron & Steel Inst. A re-examination of evidence, because of disagreement of French authors with results, and the new developments. Ills. 4500 w. Ir & Coal Trds Rev—May 6, 1904.

The Plastic Yielding of Iron and Steel. Walter Rosenhain. Read before the Iron & Steel Inst. Deals with the lines of argument advanced by various writers in recent papers, examining the evidence on which their views are based. Serial. 1st part. 3300 w. Engng—Sept. 9, 1904.

See also **Yield Point.**

Plate.—See **Spherical Plate; PLATE.**

Punching.—See **TESTING.**

Rods.—See **Buckling.**

Rotating Bodies.—The Stresses in a Rotating Disc (Die Spannungen in einer Rotierenden Scheibe). C. Reimann. A mathematical investigation of the stresses set up in various parts of a flat disc when rotated at high velocities. 2000 w. Glasers Annalen—Aug. 1, 1904.

Radial Stresses Due to Centrifugal Force in Revolving Bodies. A. M. Levin. A mathematical study to determine to what extent the material will be strained, and what form would ensure the greatest strength. 2500 w. Am Mach—Vol. 27, No. 42.

Systematic Method of Computing Centrifugal Stresses. Sanford A. Moss. Gives a convenient system for the computation of stresses in rotating bodies due to "centrifugal force." 1800 w. Mach, N Y—Sept., 1905.

See also **MECHANICS—Rolling Disc; MOMENT OF INERTIA; STEAM TURBINE—Discs.**

Sandstone Arch Hinges.—See **ARCH.**

Shear.—Behavior of Materials of Construction Under

Pure Shear. E. G. Izod. A report of experimental tests made of the better known and commercially used materials. 3300 w. Ills. Inst of Mech Engrs—Dec. 15, 1905.

See also Combined Stresses.

Ship Details.—See **SHIPBUILDING—Structural Details.**

Spherical Plates.—The Resistance of Spherical Plates to External Pressure (Die Widerstandsfähigkeit Kugelförmiger Wandungen gegenüber Aeusserem Ueberdruck). C. Bach. A well illustrated experimental determination of the resistance of curved heads of boilers, etc., to pressures on the convex side. Serial. 1st part. 2000 w. Zeitschr d Ver Deutscher Ing—March 8, 1902.

Splicing and Riveting.—Effects of Splicing and Riveting. George S. Morison. A statement of conclusions drawn from a study of the stresses and strains, with report of mechanical tests, and general discussion. 6600 w. Jour W Soc of Engrs—June, 1901.

Effects of Splicing and Riveting. Extracts from a paper by George S. Morison describing experiments on the strength of riveted tension members, with editorial discussing the experiments and Mr. Morison's deductions. 3200 w. Eng Rec—Aug. 10, 1901.

Staybolted Surfaces.—Strength of Curved Staybolted Surfaces. C. G. Robbins. Explains the method of determining the safe working pressure of such surfaces. Ill. 3800 w. Power—Jan., 1903.

See also **LOCOMOTIVE FIREBOX; STAYBOLT.**

Stress Effects.—Lecture on Recent Researches on the Effects of Stress Upon Metals. Dr. E. G. Cocker. An account of investigations which gave results of interest and importance. Ills. Also discussion. 3500 w. Pro Can Ry Club—April 5, 1904.

Stresses.—The Permissible Stresses Upon a Material Subjected to Forces Acting in Several Directions (Die Zulässige Anstrengung eines Materials bei Belastung nach Mehreren Richtungen). H. Wehage. An examination of the stresses caused by multiple loading, with formulas for determining the maximum stress. 3000 w. Zeitschr d Ver Deutscher Ing—July 1, 1905.

Structures.—Note on the Summation of Stresses in Certain Structures. Carl Hering. The distribution of stresses among members of mechanical structures, with results of an investigation, giving illustrations. 1800 w. Pro Engrs' Club of Phila—Jan., 1905.

Struts.—The Strength of Struts. R. H. Smith. A review of a paper on the "Practical Column" by J. M. Moncrieff, in the March, 1900, number of the Pro. of the Am. Soc. Civ. Engrs. Serial. 1st part. 2500 w. Engr, Lond—April 19, 1901.

See also **Buckling; COLUMN.**

Tank Bottoms.—See **TANK.**

Testing Progress.—See **TESTING—Progress.**

Thin Cylinders.—Stresses in Thin Cylinders Subjected to Internal Pressure. A. T. Weston. Gives a brief description of a method of dealing with this problem in its most general form, and points out the direction in which its practical applications will lie. 1800 w. Engr, Lond—Sept. 23, 1904.

Torsion.—The Deformation Work in Torsion (Zur Frage: Formänderungsarbeit bei Torsion). Prof. Zschetzsche. A mathematical discussion, deriving formulas for computing the work of torsion for bodies of various sections. 2500 w. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 11, 1905.

The General Applicability of the Torsion Formula of Saint Venant (Mitteilung zur Gültigkeit der Saint-Venantschen Formel für den Verdrehungswinkel). C. Bach. A brief note, showing the inapplicability of the formula to prisms of all sections. 600 w. Zeitschr d Ver Deutscher Ing—June 10, 1905.

The Work of Deformation in Torsion (Zur Frage: Formänderungsarbeit bei Torsion). M. T. Huber. A criticism of the theory of Professor Zschetzsche, with a reply by the latter. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—June 3, 1905.

See also Combined Stresses; **SHAFT; TORSION METER.**

Variable Load.—A Diagram for Determining the Working Stress in Metals, with Variable Load. John H. Barr. Presents a graphical representation of the Johnson formula explaining its use and discussing the subject. 1700 w. Sib Jour of Engng—Dec., 1901.

Vibration.—See **Dynamics; TESTING.**

Yield Point.—The Yield Point (Zum Begriff "Streckgrenze"). C. Bach. A discussion of the need of a term to indicate the limit of ductility in testing materials, and a suggestion as to its correct definition and determination. 1800 w. Zeitschr d Ver Deutscher Ing—July 9, 1904.

A Study of the Yield Point (Zur Kenntnis der Streckgrense). C. Bach. Experiments to determine the relation of the flow of metals under stress to the ultimate breaking strength. 1800 w. 1 plate. Zeitschr d Ver Deutscher Ing—April 15, 1905.

See also **Elastic Limit; Plastic Yielding.**

MATHEMATICS.

See also **EDUCATION; ELECTRO-PHYSICS; MECHANICS; PHYSICS.**

Reform in Mathematical Education. Robert H. Smith. A discussion of the plan advocated by Prof. John Perry. 5400 w. Engr, Lond—Feb. 7, 1902.

The Reform in Mathematical Education. An account of the present position of the new method of teaching mathematics to young engineers in England. 3700 w. Engng—June 19, 1903.

The Mathematical Training of Engineers. R. Howard Duncan. A discussion of the training needed by a professional engineer, considering the usual training given in mathematics and how it may be improved. Serial. 1st part. 2000 w. Prac Engr—Jan. 29, 1904.

Engineering Mathematics. E. Sherman Gould. Illustrates the part mathematics plays in developing engineering formula, claiming that it is the basis of all scientific engineering. 3000 w. Cassier's Mag—Jan., 1905.

Curves.—See **CURVES—Formulae.**

Elementary.—Arithmetic of Machinery. A series of practical and instructive talks to serve as evening studies for machinists, mechanics, and apprentices. Ill. Serial. 1st part. 600 w. Mod Mach—Jan., 1901.

Harmonic Analysis.—Harmonic Analysis Reduced to Simplicity. Silvanus P. Thompson. A description of a new rapid method of harmonic analysis. 2800 w. Elect'n, Lond—May 5, 1905.

Prismoidal Formula.—See **PRISMOIDAL FORMULA.**

MATTE.

See **COPPER METALLURGY; SMELTING.**

MATTER.

See also **CHEMISTRY; ELECTRO-PHYSICS; PHYSICS; RADIOACTIVITY; RADIOGRAPHY.**

Atom Divisibility.—The Divisibility of Atoms. Edwin Edser. Discusses the subject and concludes that there is evidence that particles can be split off from atoms, and can lead an independent existence for a limited time. Electrical experiments are given. 4200 w. Elec Engr, Lond—June 28, 1901.

Atomic Theory.—Recent Developments of the Atomic Theory and Its Connection with Light and Electricity. C. C. Garrard. Gives, in the present article, a summary of recent investigations and discoveries which show that long accepted theories must be revised. Serial. 1st part. 1600 w. Elec Rev, Lond—Feb. 7, 1902.

Theory.—Extension of the Group Theory of Atoms and Molecules. Arthur A. Skeels. Results and conclusions of several years' study of the laws governing the properties and phenomena of matter. 6200 w. Jour Assn of Engng Socs—March, 1901.

Modern Views on Matter. Sir Oliver Lodge. The Romanes Lecture, delivered in the Sheldonian Theatre, Oxford, June 12, 1903. Contains much information of interest to students of electro-physics. 7000 w. Pop Sci M—Aug., 1903.

Modern Views on Matter. The Realisation of a Dream. Sir William Crookes. Address before the Congress of Applied Chemistry, at Berlin. Discussing the latest views as to the constitution of matter. 6000 w. Sci Am Sup—July 11, 1903.

Reflections Suggested by the New Theory of Matter. Presidential address by the Right Hon. A. J. Balfour to the British Assn. A lucid survey of the electrical theory of matter. 6000 w. Elect'n, Lond—Aug. 19, 1904.

Evolution of Inanimate Matter. Prof. G. H. Darwin. Excerpt from the presidential address before the British Assoc. giving a review of the modern theory of matter and atoms. 2500 w. Elec Rev, N Y—Sept. 2, 1905.

See also **ELECTRO-PHYSICS; PHYSICS; RADIO-ACTIVITY.**

MEASUREMENT.

See also **CALCULATING; ELECTRIC MEASUREMENT; GAUGE; INSTRUMENT; PLANIMETER; SLIDE RULE; SURVEYING; WEIGHTS AND MEASURES.**

Cloud Distances.—See **SURVEYING.**

Contact.—The Measurement of Contacts. Harvey D. Williams. Explains how such measurements can be made, and that when the method is applied to gear teeth it brings out facts of importance. Ill. 2500 w. Am Mach—Feb. 19, 1903.

Electrical.—See **ELECTRIC MEASUREMENT; ELECTRO-PHYSICS.**

Granular and Lump Material.—Continuous Measuring and Mixing of Crushed or Powdered Materials in Accurate Proportions. E. N. Trump. Briefly outlines various methods in use, and gives an illustrated description of a measuring table, and explains how a combination will regulate the proportioning and mixing. 3500 w. Trans Am Soc of Mech Engrs, No. 071—June, 1905.

A Problem in the Storage of Granular and Lump Material. W. E. Hunter and J. S. Myers. Gives diagrams for computing the contents of conical piles of material enclosed by walls at the base, with notes. 1000 w. Eng News—July 27, 1905.

Interferometer.—See **INTERFEROMETER.**

Magnetic.—See **ELECTRO-PHYSICS; MAGNETIC OBSERVATORY; MAGNETIC TESTING; MAGNETISM.**

Mean Error.—See **MECHANICS.**

Refined.—Some Refinements of Mechanical Science. Ambrose Swasey. Presidential address on the methods and mechanisms which have been developed and perfected to a high degree of precision, such as clocks, sextants and other instruments for measurement. 500 w. Trans Am Soc of Mech Engrs, No. 058—Dec., 1904.

See also **MACHINE WORKS—Warner & Swasey.**

Refractometer.—See **REFRACTOMETER.**

Screw Threads.—See **SCREW THREAD.**

Slide Rule.—See **SLIDE RULE.**

Units.—See **WEIGHTS AND MEASURES.**

MEASURING MACHINE.

See also **CALCULATING MACHINE; MEASUREMENT—Granular and Lump Material; PLANIMETER.**

Newall.—Recent Improvements in the Newall Measuring Machine. Illustrates and describes the new features recently introduced and the increase in size, the latest machine having a capacity of six feet. 900 w. Am Mach—Vol. 28, No. 48.

Screw Threads.—See **SCREW THREAD.**

MECHANICAL ANTIQUITIES.

Mechanical Antiquities of America. Edward P. Buffet. The present article gives the history of Henry F. Frase, an old New York machinist, and his work. Ill. Serial. 1st part. 2200 w. Am Mach—Nov. 21, 1901.

MECHANICAL DRAFT.

See also **BOILER; COMBUSTION; DRAFT; FAN; MARINE ENGINE; SMOKE PREVENTION; STEAM GENERATION.**

Fuel Combustion with Draft Furnished by Mechanical Methods. W. W. Christie. A critical comparison of the relative advantages of natural and chimney draft, showing the conditions under which either is to be preferred. 3000 w. Engineering Magazine—April, 1901.

The Advantages of Mechanical Draft. H. F. Schmidt. Considers the advantages of mechanical draft as compared with natural draft. Diagrams. 3000 w. Am Elect'n—Feb., 1902.

Mechanical Draft. F. R. Still. Discusses the factors that make the fan more economical than chimney draft, even when that is good. Ill. 11,000 w. Jour W Soc of Engrs—June, 1902.

Modern Production of Boiler Draft and Its Influence on Fuel Consumption and Steam Production. W. L. Sutcliffe. Paper before the Manchester Assn. of Engrs. A discussion of mechanical or machine draft producers. Does not deal with steam jet apparatus. 1700 w. Mech Engr—Nov. 29, 1902.

Mechanical Draft for Modern Steam Boiler Plants. S. R. Sheldon. Considers the opportunities for economy by the application of mechanical draft, and related subjects. 2200 w. Can Engr—Dec., 1902.

Mechanical Draft. J. I. Lyle. Read before the Engine Builders' Assn. Explains the advantages of forced draft, describing types. 2000 w. Engr, U S A—Feb. 15, 1904.

Artificial Draft for Boiler Plants. F. H. Davies. Discusses briefly the systems of mechanical draft and their operation. 2000 w. Elec Engr, Lond—Aug. 11, 1905.

Centrifugal Fan.—See **FAN—Centrifugal.**

Ellis and Eaves.—Ellis and Eaves' System of Induced Draft Applied to Marine Boilers. Illustrated description. 2300 w. Engng—May 6, 1904.

Power Plant.—See **POWER PLANT—Berlin Store.**

Stationary Boilers.—The Application of Mechanical Draft to Stationary Boilers. Walter B. Snow. Presented at meeting of the N. Eng. Cotton Mfrs.' Assn. Illustrated paper dealing with cost, expense of maintenance and operation, methods of application, etc. 4000 w. Power—Dec., 1900.

Application of Mechanical Draft to Stationary Boilers. Walter B. Snow. Considers the advantages of mechanical draft and shows that it costs less for installation than the chimney. Ill. 3000 w. W Elect'n—Feb. 16, 1901.

Tests.—Report of Comparative Tests Made With Chimney and Mechanical Blower Drafts. From the Proceedings of the Bavarian Steam Boiler Inspection Society. Describes the tests, and the plant where they were made. Ill. 3500 w. Power—July, 1901.

Yates' Paper.—Mechanical Draft for Boilers. Walter Yates. Paper before the Institution of Heating and Ventilating Engineers (British), giving descriptions and illustrations of mechanical draft apparatus. 3000 w. Mech Engr—Aug. 13, 1904.

Mechanical Draft for Boilers. Walter Yates. Read at Liverpool, before the Inst. of Heat & Ven. Engrs. Considers the combustion of fuel, natural draft, and several forms of mechanical drafts. Ills. 4500 w. Elec Engr, Lond—July 29, 1904.

Mechanical Draft for Boilers. Abstract of a paper read by W. Yates, of Liverpool, before the Inst. of Heat. and Vent. Engrs. Remarks on the combustion of fuel, and the best means of producing the requisite draft, discussing forms of mechanical draft. Ils. Serial. 1st part. 2000 w. Prac Engr—Sept. 30, 1904.

MECHANICAL ENGINEER.

See also **ENGINEER; MECHANICAL ENGINEERING.**

Bryan's Address.—The Mechanical Engineer, His Duties, Responsibilities and Opportunities. William H. Bryan. Address before the Washington Univ. Assn., St. Louis, Mo. 4500 w. Engr, U S A—April 15, 1903.

Liége Congress.—The International Congress of Applied Mechanics at Liége (Congrès Internationale de Mécanique Appliquée, Tenu à Liége). Aime Witz. A general review of the discussions at the Mechanical Congress at the Liége exposition. Two articles. 6000 w. Génie Civil—Dec. 16, 23, 1905.

Maw Address.—Presidential Address of William H. Maw, before the Institution of Mechanical Engineers. Abstracted. On the present position of the mechanical engineer. 5000 w. Engr, Lond—April 26, 1901.

Mining and Smelting.—The Mechanical Engineer a Factor in Modern Mining, Milling and Smelting. C. H. Repath. Read at the Butte meeting of International Min. Cong. Calls attention to illustrations shown at Copper mining and reduction works, Butte, Mon. 6800 w. Mines & Min—Nov., 1902.

The Mechanical Engineer a Factor in Modern Mining, Milling and Smelting. C. H. Repath. Read at the Butte meeting of the Min. Cong. A resume of smelting operations in Montana, and the part taken by the mechanical engineer. 5800 w. Min & Sci Pr—Sept. 13, 1902.

MECHANICAL ENGINEERING.

See also **ENGINEERING; MECHANICAL ENGINEER.**

Address.—See **MECHANICAL ENGINEER; TRANSPORTATION—Land.**

Coal Mines.—See **COAL MINE—Mechanical Engineering.**

Coal Mining.—See COAL MINING—Mechanical Engineering.

Electric Railway.—See ELECTRIC RAILWAY—Mechanical Engineering.

History.—Mechanical Engineering. Editorial, calling attention to the practice of one hundred years ago and its lessons and the present standing and future outlook. 3700 w. Engr, Lond—Jan. 4, 1901.

Japan.—See JAPAN.

Machine Tool.—See MACHINE TOOL—Mechanical Engineering.

Materials.—See MATERIAL.

Nineteenth Century.—Progress and Tendency of Mechanical Engineering in the Nineteenth Century. Robert H. Thurston. An address before the Washington Acad. of Sciences. Columbian University. Serial. 1st part. 4300 w. Pop Sci M—May, 1901.

St. Louis Exposition.—See ELECTRICAL ENGINEERING; ST. LOUIS EXPOSITION.

Topical Discussion.—Topical Discussions and Notes of Experience. Prof. F. R. Hutton discusses what it costs to run trains at high speed; Stephen W. Baldwin considers some peculiarities of springs; and F. F. Nickel considers the "Linvolpon" system of units. 2700 w. Trans Am Soc of Mech Engrs, No. 914—Dec., 1901.

Topical Discussions and Notes of Experience. 3000 w. Trans Am Soc of Mech Engrs, No. 0954—Dec., 1902.

Topical Discussions and Notes of Experience. Includes a short description of a milling machine attachment for cutting worms; the adoption of a standard form of boiler for testing the calorific value of fuels is suggested, and a new form of flexible metallic tubing is described. Ill. 1500 w. Trans Am Soc of Mech Engrs—June, 1903.

Wicksteed Lecture.—Progress in Iron and in Mechanical Art. J. H. Wicksteed. Lecture at Leeds before the Assn. of Yorkshire Students of the Institute of Civil Engineers. Discusses some improvements now in progress, and of recent date in the present number. Serial. 1st part. 5000 w. Engr, Lond—Dec. 8, 1905.

MECHANICAL HANDLING.

See also CABLEWAY; COAL HANDLING; COKE HANDLING; CONVEYOR; CRANE; DOCK; HARBOR; IRON ORE HANDLING; PORT; TELPHERAGE.

American.—Some American Conveying Machinery (Ueber Einige Amerikanische Umladevorrichtungen)., R. Mellin. Illustrated description of modern American appliances for handling, conveying and storing iron ore, coal, etc. 4500 w. 6 plates. Glückauf—Dec. 13, 1902.

Baggage.—The Mechanical Handling of Baggage (Manutention Mécanique des Bagages). M. Pons. An illustrated description of the conveyors and apparatus for the handling of luggage at the new terminal of the Orleans railway on the Quai d' Orsay, Paris. 6000 w. 2 plates. Rev Gen des Chemins de Fer—July, 1901.

Baggage Handling at the Quai d'Orsay, Paris. From the "Revue Génerale des Chemins de Fer." An illustrated description of the method used at this station of the Orleans Railway. 1200 w. R R Gaz—Nov. 15, 1901.

Mechanical Sorting of Small Packages at the Austerlitz Railway Station in Paris (Triage Mécanique des Petits Colis de Messageries (au depart) dans la Gare de Paris-Austerlitz). M. Pons. A well illustrated account of the mechanical handling, transporting of packages and parcels at this Paris station of the Orleans Railway. Serial. 2 parts. 4 plates. 12,000 w. Rev Gen d Chemins de Fer—Feb., March, 1902.

Blast Furnaces.—See BLAST FURNACE—Charging Apparatus.

Breslau Harbor.—The 30-Ton Conveyor in the Port of Breslau (Die 30-t Entlade-Anlage für Massengüter im Städtischen Hafen zu Breslau). M. Buhle. Overhead cantilever trestle work, traveling crane and conveyor for handling merchandise in bulk. 1200 w. Glückauf—Dec. 23, 1905.

British Ports.—Mineral Shipments at British Ports. Brysson Cunningham. An illustrated review of the various systems in vogue for the shipment of minerals, such as coal and ore. 3000 w. Cassier's Mag—Aug., 1904.

Improvements in Shipping Ports. An illustrated description of recently completed improvements and those in progress in British ports. Serial. 1st part. 3800 w. Ir & Coal Trds Rev—Jan. 27, 1905.

See also HARBOR; PORT.

Cargo.—Some Modern Quayside Cargo Appliances. Brysson Cunningham. Briefly reviews the modern systems of handling coal, grain, ore, oil, timber and other cargoes. Ills. Serial. 1st part. 3500 w. Cassier's Mag—May, 1904.

Charlottenburg Gas Works.—Apparatus for Handling Coal and Iron (Technische Hülfsmittel zur Beförderung und Lagerung von Kohlen und Eisenerzen). M. Buhle. Describing especially the appliances in use at the Charlottenburg gas works. 1500 w. Zeitschr d Ver Deutscher Ing—Sept. 27, 1902.

Coal.—Fuel Handling Machinery. Philip Dawson. An illustrated detailed description of machines and apparatus for mechanical handling. Serial. 1st part. 4600 w. Trac & Trans—Jan., 1904.

See also British Ports; COAL HANDLING.

Coal and Ash.—Locomotive Coal and Ashes Handling Plant, Philadelphia and Reading Ry., Philadelphia, Pa. Illustrated description of the construction and operation. 800 w. Eng News—Aug. 15, 1901.

See also COAL HANDLING; CONVEYOR; FIRING—Mechanical Auxiliaries.

Coal, Ore and Iron.—The Mechanical Handling of Coal, Ore and Pig-Iron. Illustrates and describes some of the best types of plants in use on the Continent. 4000 w. Ir & Coal Trds Rev—July 19, 1901.

The Mechanical Handling of Coal, Ore and Pig Iron. Illustrates some new devices and new applications of old devices, giving descriptions. 5000 w. Ir & Coal Trds Rev—Oct. 11, 1901.

See also COAL HANDLING; CONVEYOR; IRON ORE HANDLING.

Coke.—See COKE HANDLING.

Dirt and Ballast.—An Economical Method of Handling Dirt and Ballast. Spencer Miller. Plan views of two rapid unloaders, with comparison of important dimensions showing the difference in the strength of the various parts. 1000 w. R R Gaz—April 19, 1901.

Düsseldorf Exposition.—Crushing, Preparing and Conveying Machinery (Müllerei, Hartzerkleinerung, und Mechanische Aufbereitung nebst Transport und Umladevorrichtungen). H. Rasch. Reviewing especially the devices shown at the Düsseldorf exposition. Serial. Part I. 2000 w. Zeitschr d Ver Deutscher Ing—Oct. 11, 1902.

Excavated Material.—Balanced Cable Cranes for Handling Excavated Material at Devonport, England, and Zambesi Falls, South Africa. Describes the methods of excavation and the plants for handling materials. Ills. 1700 w. Eng News—May 12, 1904.

Modern Appliances for the Economical Handling of Material. Henry E. P. Cottrell. Describes and illustrates modern grabs, excavators, etc., and the work they accomplish. 5700 w. Engng Rev—Oct., 1904.

See also EXCAVATION.

Exhaust System.—See WASTE REMOVAL; WOODWORKING MACHINERY—Sawdust Removal.

Factory.—Factory Schemes—Overhead Trolley Systems and Dipping Apparatus. S. A. Worcester. Outline drawings and description of these appliances and their operation. 1200 w. Am Mach—Feb. 11, 1904.

Labor Saving in the Handling of Materials. A. J. S. B. Little. A fully illustrated description of the increasing use of conveying machinery in general manufacturing plants. 4000 w. Engineering Magazine—Jan., 1905.

Freight Handling.—Handling of Freight in British Ports. An illustrated article on the immense amount of freight entering these ports and the modern facilities for dealing with it expeditiously. 3500 w. Marine Rev—Dec. 1, 1904.

Fuel.—See Coal.

Gas Works.—The Mechanical Transport of Materials in Gas Works. William Reginald Chester. Describes the apparatus in use for transporting coal, coke, purifying material and sulphate of ammonia. 2200 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Mechanical Conveying of Coal and Coke in Gas Works. Henri Laurain. Read at meeting of the Société Technique. Considers the hauling of the coal to the retorts and the mechanical conveying of the coke from the retorts, giving illustrations of the De Brouwer apparatus. 3800 w. Jour Gas Lgt—Sept. 3, 1901.

The Mechanical Handling of Coal and Coke (Manutention Mécanique du Charbon et du Coke). J. Laverchère. Describing and illustrating very fully the apparatus used at the gas works of Dijon and of Havre. 2000 w. 1 plate. Génie Civil—Dec. 7, 1901.

See also **COAL HANDLING; COKE HANDLING.**

Gold Ore.—New Rock-Handling Machinery. Alexander Forsyth. Illustrates and describes the skips, cars and conveyors forming a part of the present system, which has proved a success for the Portland Gold Mining Co. 1800 w. Eng & Min Jour—Oct. 3, 1903.

Goodwin System.—See **COAL HANDLING.**

Grain.—See **Materials; GRAIN HANDLING.**

Harbor.—The Distribution of Power for the Operation of Harbor Cranes (Mode de Transport et de Distribution de Force pour la Commande des Grues de Port). B. Lambert. A comparative study of the relative merits of hydraulic and electric power for harbor cranes. 8000 w. Revue de Mécanique—Sept., 1903.

Loading and Unloading Apparatus for Harbors (Lösch- und Ladevorrichtungen für Hafenanlagen). Bruno Müller. Illustrated description of cranes and other mechanical handling apparatus for loading and unloading ships. Serial. 1st part. 3000 w. Schiffbau—Sept. 13, 1905.

See also **Breslau; British Ports; Cargo; Freight; DOCK; HARBOR; PORT.**

Iron and Steel Works.—Recent Hoisting Devices for Steel and Iron Works (Neuere Ausführungen von Hebezeugen für Hüttenwerke). Illustrating and describing electric cranes, conveyors, charging machines, etc. Serial. Part I. 2500 w. Stahl u Eisen—Oct. 1, 1903.

Modern Hoisting and Conveying Apparatus for Workshops (Moderne Hebe- und Transportvorrichtungen für Hüttenwerke). H. Rupprecht. A review of modern cranes, cableways, bucket conveyors, etc., as applied to manufacturing establishments. Serial. Part I. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 2, 1904.

Special Transport Appliances in Modern Machine Works (Spezial Konstruktionen Moderner Transportmittel für Hüttenwerke). Illustrating furnace-charging machines, traveling cranes, and special appliances for handling ingots, etc. Three articles. 8000 w. Stahl u Eisen—Sept. 15, Oct. 1, 15, 1904.

Mechanical Handling in the Manufacture of Iron and Steel. James N. Hatch. The influence of labor saving machinery in the steel industry upon national economy. 4000 w. Engineering Magazine—Jan., 1905.

Iron Ore.—See **IRON-ORE HANDLING.**

Jerome Park Reservoir.—Handling Excavated Material at Jerome Park Reservoir. An illustrated description of modern methods of handling and transporting materials, the labor-saving devices used, etc. 1000 w. Sci Am—July 6, 1901.

See also **RESERVOIR.**

Machine Shops.—Shop Transportation. Cloyd Marshall. Illustrates and describes some mechanical appliances for the transportation of heavy materials. 2000 w. Engr, U S A—May 15, 1902.

Mechanical Transport in the Modern Machine Shop. F. A. Waldron. A discussion of the economies effected by the use of cranes, hoists, and other conveying devices for minimizing the nonproductive labor of the machinist. 4000 w. Engineering Magazine—Jan., 1905.

Magnets.—See **ELECTROMAGNET—Lifting.**

Materials.—The Handling of Bulky Material (Die Bewegung von Massengütern). A. Lemmer. Presidential address before the Kiel meeting of the Verein deutscher Ingenieure, discussing especially modern methods of handling grain cargoes. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 24, 1901.

Developments in Machinery for Transmitting Materials. Gilbert Little. An illustrated article describing appliances for the mechanical transit of materials. 2000 w. Jour Gas Lgt—Aug. 1, 1905.

See also **Excavated Material.**

Ore Conveyors.—See **CONVEYOR—Ore; IRON-ORE HANDLING.**

Overhead Tramrail.—Overhead Tramrail Systems in Shops and Foundries. A. W. Moyer. Read before the Philadelphia Foundrymen's Assn. An illustrated article showing the overhead tramrail to be an important labor-saving factor, and describing briefly the kinds of rail most used and a few instalaltions. 4600 w. Ir Age—Jan. 22, 1903.

Traveling Blocks and Hoists. Illustrates and describes apparatus used with the overhead trolley conveying, stating the uses to which this form of transport may be applied and its advantages. 3500 w. Ir & Coal Trds Rev—March 11, 1904.

See also **Factory; TELPHERAGE.**

Paris Exposition.—Apparatus for the Mechanical Handling of Material at Paris (Einrichtung für die Mechanische Handhabung von Erzen, Kohlen und Koks auf der Pariser Weltausstellung). Herr Frahm. A full and illustrated review of the exhibits at the Paris Exposition. Three articles. 8000 w. Stahl u Eisen—June 1, 15, July 1, 1901.

Power House.—See **Coal; COAL HANDLING; CONVEYOR.**

Railway Station.—See **Baggage.**

Robins System.—See **COAL HANDLING—N. Y. Interborough; CONVEYOR.**

Shipyards.—Handling Material in Shipyards. Waldon Fawcett. Some of the recent devices for expeditiously and economically handling heavy material are illustrated and described. 1200 w. Sci Am—May 24, 1902.

Handling Steel in Shipyards. Waldon Fawcett. Illustrates and describes the great cantilever cranes, and the methods of handling the heavy material in various ship yards. 2000 w. Am Mfr—Aug. 7, 1902.

See also **ELECTRIC EQUIPMENT; SHIPYARD.**

Steel Bars.—A Manipulator for Steel Bars. Douglas Upton. Read before the Iron and Steel Inst. Illustrates and describes appliances for the mechanical handling of sectional material during the process of manufacture. 700 w. Engng—Sept. 29, 1905.

Steel Works.—See **Iron and Steel Works; STEEL WORKS.**

Stone.—See **CABLEWAY—Aberfeldy; QUARRY.**

Tailings.—See **ELEVATOR; HYDRAULIC MINING—Elevator.**

Waste Material.—See **WASTE REMOVAL; WOODWORKING MACHINERY—Sawdust Removal.**

MECHANICAL PLANT.

See also **ELECTRIC EQUIPMENT; ELECTRIC PLANT; HEATING; HEATING AND VENTILATION; POWER PLANT; REFRIGERATION; STEAM PLANT; VENTILATION.**

Albany Station.—Mechanical Plant of the Albany Station of the New York & Hudson River Railroad Company. Illustrated description of a very compact plant, particularly noteworthy for the forced circulation, hot-water heating system for the buildings, a waterproof concrete piping tunnel and a self-sustained steel-plate smokestack. 2300 w. Eng Rec—Feb. 15, 1902.

Apartment Hotel.—The Mechanical Plant of the Collingwood Apartment Hotel, New York. Illustrated description of the plant in a 12-story apartment hotel for electrict lighting, refrigerating, heating and ventilating services. 2100 w. Eng Rec—April 5, 1902.

Power Plant of the Ansonia, New York, the Largest Apartment House Ever Built. Arthur L. Rice. Illustrated detailed description of a 17-story building, containing 340 suites of apartments, besides stores, restaurants, baths, etc., especially describing the great power plant which furnishes heat, light, refrigeration, telephone service, elevator power, etc., etc. 7000 w. Engr, U S A—Aug. 1, 1902.

Apartment House.—The Mechanical and Heating Apparatus in the New Century Apartment House, New York. Illustrated description of the mechanical plant for an electric lighting, refrigerating, elevator service, laundry and heating system in a 9-story apartment house 96 ft. square. 1500 w. Eng Rec—April 12, 1902.

The Power Plant and Mechanical Equipment of Apartment Houses. P. R. Moses. An account of the heating, lighting, refrigerating and general power and mechanical equipment of the large apartment house in America. 5000 w. Engineering Magazine—Feb., 1904.

Baltimore.—See **REFRIGERATION.**

Bank, Chicago.—Power Plant of the First National Bank Building, Chicago. An illustrated detailed description of a fine isolated plant that supplies power for a 17-story building. 3800 w. Engr, U S A—May 1, 1903.

Bank, Pittsburg.—Mechanical Plant of the Farmers' Deposit National Bank Building, at Pittsburg. Describes this fine 24-story office building, and the plants for lighting and for furnishing power for the elevators. Ill. 5500 w. Engr, U S A—June 1, 1903.

Bank, Uniontown.—The Mechanical Plant of the First National Bank, Uniontown, Pa. Illustrated description of the electric, heating and elevator plant in an 11-story office structure, 10,100 sq. ft. in plan. 1700 w. Eng Rec—July 5, 1902.

Carpet Mill, Worcester, Mass.—The Power Installation at the Whittall Mills. Howard S. Knowlton. Illustrates and describes an interesting steam and electric installation recently placed in operation in some carpet mills in Worcester, Mass. 2500 w. Eng Rec—May 6, 1905.

Central Station.—A Central Heating, Lighting and Ice-Making Station, Gulfport, Miss. An illustrated description of a station for supplying heat, light and ice to an adjacent hotel and other buildings. 1300 w. Eng Rec—Feb. 27, 1904.

See also **HEATING.**

Chicago Cold Storage.—See **REFRIGERATION.**

Chicago Tribune Building.—The Mechanical Plant of the Chicago Tribune Building. Brief illustrated description of the building and its equipment, especially the mechanical features. 3600 w. Eng Rec—June 28, 1902.

Coal Mine.—The Mechanical Equipment of Collieries. George H. Winstanley. Abstract of an address before the Manchester Geological and Mining Society. Briefly considers various applications made in modern collieries. 4000 w. Col Guard—Feb. 26, 1904.

See also **COAL MINE; ELECTRIC EQUIPMENT.**

Cold Storage Warehouse.—See **REFRIGERATION—Chicago Warehouse.**

College, Boston.—The Mechanical Plant of Simmons College, Boston. K. S. Howard. Brief description, with illustration showing the arrangement of the indirect heating apparatus. 1500 w. Eng Rec—Feb. 11, 1905.

College, New York.—Lighting and Heating Plant at Teachers' College, New York City. Illustrated description of a steam power plant for furnishing light and heat for six buildings. 2800 w. Engr, U S A—Nov. 15, 1902.

See also **Medical College.**

Color Works.—The Machinery Plant of the New Leverkusen Color Works (Die Maschineneinrichtung des Neuen Werkes Leverkusen der Farbenfabriken vorm. Friedrich Bayer & Co. in Elberfeld). Describing especially the pumping machinery and the power plant. 4000 w. 2 plates. Zeitsch d Ver Deutscher Ing—Jan. 2, 1904.

Country Estate.—Some Engineering Features in the Development of a Country Estate. Illustrated description of the heating, lighting and plumbing on a notable country estate of 600 acres, near New York. 4000 w. Eng Rec—March 16, 1901.

Dayton, O.—See **Office Building.**

Department Store.—See **Store.**

Du Bois Shops.—Power, Lighting and Heating at the Du Bois Shops of the Buffalo, Rochester & Pittsburg Ry. Illustrated description of an electric and compressed air system of power transmission, with power, lighting, compressed air and heating all served from a central station. 2500 Eng Rec—Sept. 6, 1902.

Ferry Terminal, N. Y.—Mechanical Plant of the New 23d St. Ferry Terminals, New York. Describes the central power plant and heating system that will serve the new terminals of the Lackawanna, the Erie, and the Central Railroad of New Jersey. Ills. 3500 w. Eng Rec—Dec. 2, 1905.

Frick Building, Pittsburg.—See **Office Building, Pittsburg.**

Graphite Factory, Jersey City.—The Steam and Electric Plant of a Graphite Factory. Illustrates and describes the plant of the Joseph Dixon Crucible Company. 1700 w. Am Elect'n—Nov., 1901.

Guy's Hospital, London. — See **HOSPITAL — Guy's, London.**

Hippodrome, N. Y.—Mechanical Plant of the New York Hippodrome. Illustrates and describes a remarkable plant for producing theatrical effects for amusement purposes. Both electrical and mechanical means are utilized. Also for lighting, heating and artificial cooling. 5000 w. Eng Rec—Aug. 26, 1905.

See also **THEATRE.**

Hospital, Boston.—The Power Plant of the Massachusetts General Hospital, Boston, Mass. F. W. Dean. Illustrated description of a combined plant for two institutions. 1800 w. Trans Am Soc of Mech Engs, No. 871—Dec., 1900.

Hospital, Connecticut.—New Mechanical Plant of the Connecticut Hospital for the Insane. Illustrated detailed description of recent important changes in the mechanical plant, especially the new boiler-house, system of piping, etc. 2200 w. Eng Rec—July 8, 1905.

Hotel Astor, N. Y.—The Mechanical Plant of the Hotel Astor, New York City. An illustrated detailed description of the fine power and refrigerating plant in the latest great hotel of this city. 5200 w. Eng Rec—July 23, 1904.

The Mechanical and Electrical Equipment of the Hotel Astor. Illustrated detailed description. 1800 w. Elec Rev, N Y—Sept. 17, 1904.

See also **ELECTRIC PLANT.**

Hotel Belmont, N. Y.—The Mechanical Plant of the Hotel Belmont, New York City. Briefly outlines the interesting features of this structure on the corner of 42d St. and Park Ave. and describes the extensive plant that has been installed. Ils. Serial. 1st part. 4800 w. Eng Rec—Dec. 30, 1905.

Hotel, Buffalo.—Mechanical Plant of the Hotel Lafayette, Buffalo. Description, with plan, of steam, electric, compressed air, refrigerating, heating, pumping and elevator plant. 1500 w. Eng Rec—Aug. 20, 1904.

Hotel Gotham, N. Y.—Power and Lighting Equipment of a Modern Hotel. Illustrates and describes the engineering features of the Gotham Hotel, at Fifth Ave. and Fifty-fifth St., New York City. 2000 w. Am Elect'n—Nov., 1905.

Hotel, Nassau.—The Power Plant of the Colonial Hotel, Nassau, Bahama Islands. Illustrated description of a small station noteworthy for the garbage crematory connected with the boiler plant and for the system of steam piping. 2000 w. Eng Rec—Oct. 12, 1901.

Hotel, Philadelphia.—The Mechanical Equipment of the Bellevue-Stratford Hotel, Philadelphia. Begins an illustrated detailed description of a very extensive mechanical plant for hotel service. Serial. 1st part. 3000 w. Eng Rec—Dec. 31, 1904.

Hotel Savoy, N. Y.—The Engineering Plant at the New Savoy Hotel. Sydney F. Walker. An illustrated article describing in detail the boiler plant, electricity generating plant, lighting service, cold storage and ice-making plant, ventilating and heating system, elevator system, etc. 3000 w. Engng Rev—Dec., 1904.

Japan.—See **HEATING AND VENTILATION.**

Kimberley Diamond Mines.—See **DIAMOND.**

Library, Newark, N. J.—The Mechanical Plant of the Newark Free Public Library. Illustrates and describes a plant furnishing power, heat and light for a large library. 4200 w. Eng Rec—July 6, 1901.

The Power Plant of the Newark Public Library. Illustrated description of the apparatus for heating, lighting and other purposes. A correction of an error in printed plan of a former article. 1500 w. Eng Rec—July 13, 1901.

Mechanical Plant in the Newark, N. J., Free Public Library. Illustrates and describes plant for furnishing light, heat and ventilation, power for elevators, book lifts, &c. 2000 w. Elec Rev, N Y—Aug. 15, 1903.

Macy's Store, N. Y.—See **Store.**

Medical College, N. Y.—The Mechanical Plant of the Cornell Medical College, New York. Illustrated description of a large ventilating, heating and cooling plant, also operating an extensive electric lighting sytem, a refrigerating plant, and an hydraulic elevator installation. Full details are given. 6000 w. Eng Rec—Oct. 5, 1901.

Minnesota State Capitol.—The Mechanical Plant of the Minnesota State Capitol. Illustrates and describes the plant for this building in St. Paul, which is heated by the plenum system, lighted by electricity, provided with hydraulic elevators and furnished with water distribution, and extensive call-bell and telephone systems. 4500 w. Eng Rec—April 16, 1904.

Murphy Building, Detroit.—The Plant of the Murphy Power Building. Illustrated description of the plant for a Detroit building which furnishes power for all kinds of manufacturing and industrial purposes, an office building and a central district heating plant. 2500 w. Engr, U S A—Jan. 16, 1905.

Music Temple, Chicago.—Power and Ventilation in the Bush Temple of Music, Chicago. Illustrated description of the mechanical steam plant, especially the arrangement for ventilating and heating the auditorium. 1700 w. Eng Rec—Nov. 8, 1902.

Muskogee, I. T.—The Gas and Electric Plant at Muskogee, I. T. Brief illustrated description of a gas and electric and ice plant installation. 700 w. Elec Rev, N Y—Feb. 11, 1905.

Mutual Life, New York.—The New Mechanical Plant of the Mutual Life Building, New York. Illustrates and describes an extensive plant containing many features of interest. 4300 w. Eng Rec—Jan. 17, 1903.

Nassau Co. Court House.—Lighting, Heating and Ventilation in the Nassau County Court House, Mineola, N. Y. The heating is largely by means of direct-indirect radiation, and lighted by electricity. Illustrated description. 2200 w. Eng Rec—Jan. 18, 1902.

Office Building.—Some Mechanical Details in High Office Buildings. Notes on the elevator equipment, chimneys, and other plant, given in a paper by R. P. Bolton before the Inst. C. E. 800 w. Eng Rec—June 1, 1901.

Mechanical Installation in the Modern Office Building. Charles G. Darrach. Presents for discussion the various necessities of the modern office building and some general rules for practice which experience indicates. 5500 w. Pro Am Soc of Civ Engrs—Aug., 1901.

Mechanical Installation in the Modern Office Building. Continued discussion of paper by Charles G. Darrach. 6500 w. Pro Am Soc of Civ Engrs—Dec., 1901.

Mechanical Installation in the Modern Office Building. Continued discussion of paper on this subject by Charles G. Darrach. 9600 w. Pro Am Soc of Civ Engrs—Feb., 1902.

Mechanical Installation in the Modern Office Building. Reginald Pelham Bolton. Discussion of paper by Charles G. Darrach. 6800 w. Pro Am Soc of Civ Engrs—Nov., 1901.

The Power Plant of the Tall Office Building. S. H. Bunnell. A comparison between compound and four-valve simple engines running non condensing. 1600 w. Trans Am Soc of Mech Engrs, No. 045—Dec., 1904.

The Power Plant of Tall Office Buildings. Reginald Pelham Bolton. An illustrated article giving an interesting discussion of the elevator systems and service, heating and ventilation, water supply, lighting systems, etc., in the tall buildings of New York City. 5500 w. Trans Am Soc of Mech Engrs, No. 027—June, 1904.

The Power Plant of the Tall Office Building. James Hollis Wells. Deals with the engineering problems that enter into the construction, the elevators, steam plant, electric plant and wiring, etc. Ills. 4500 w. Trans Am Soc of Mech Engrs, No. 028—June, 1904.

See also BUILDING—Operating Costs.

Office Building, Baltimore.—The Mechanical Plant of a Baltimore Office Building. Illustrated description of the steam, elevator, lighting, telephone, heating and ventilating plant in the building of the Maryland Telephone and Telegraph Co. 3800 w. Eng Rec—May 4, 1901.

Office Building, Boston.—Power, Ventilation and Heating in the Colonial Building, Boston. A ten-story structure in which the four lower stories and basement are used as a theatre, and the remaining stories as an office building. Many interesting features are described. Ill. 3500 w. Eng Rec—Nov. 30, 1901.

The Power Plant of the Oliver Building, Boston. Howard S. Knowlton. Brief description of an isolated plant for supplying heat, light and power. 1000 w. Eng Rec—Dec. 17, 1904.

Office Building, Chicago.—New Power Plant of the Heyworth Building, Chicago. Illustrated description of a plant for lighting, ventilating, heating, refrigerating and elevator service in a modern office building of 17 stories. 3000 w. Engr, U S A—Sept. 15, 1905.

Office Building, Cleveland.—Power Plant of the Rose Building, Cleveland. Illustrated detailed description of plant. All the machinery in the building is steam driven except the elevators. 4200 w. Engr, U S A—Nov. 1, 1901.

Office Building, Dayton.—The Arcade Building Power Plant, Dayton, O. An isolated mechanical equipment for power and lighting service, and also including an ice-making and cold-storage plant. Ills. 1700 w. Eng Rec—June 18, 1904.

Office Building, Milwaukee.—Power Plant of the Wells Building, Milwaukee. Illustrates and describes a fine plant installed in a high office building, and having a capacity about double of the requirements of the building, to furnish lighting and steam service to neighbors. 3200 w. Engr, U S A—March 2, 1903.

Office Building, N. Y.—The Steam Plant in the Atlantic Mutual Building, New York. Illustrated description of the power plant in an 18-story office building, giving details of the machinery, extracts from the specifications, and general features of the electrical installation. 5000 w. Eng Rec—Sept. 7, 1901.

Lighting and Heating in the Graham Court, New York. Illustrated description of the mechanical plant, including water-tube boilers, direct-connected electric units, electric elevators with a storage battery, and a special annunciator service, in an 8-story 170x200 ft. apartment house. 3500 w. Eng Rec—Nov. 2, 1901.

The Mechanical Plant of the Broad Exchange Building. Illustrated description of the plant for operating 18 passenger elevators and a steam and electric plant of proportionate capacity in a building having over 11 acres of floor space. 2300 w. Eng Rec—April 19, 1902.

The Mechanical Plant of a New York Office Building. Illustrated description of the installation in a 15-story building for heating, lighting and elevator service. 1500 w. Eng Rec—July 26, 1902.

The Mechanical Plant of the Broadway-Maiden Lane Building, New York. Illustrated description of a plant to supply the demands of an 18-story office building. 3000 w. Eng Rec—Dec. 19, 1903.

Power Plant of the Flat-Iron Building, New York. An illustrated description of the fine plant installed in this rather unusual office building. 3500 w. Engr, U S A—April 15, 1903.

Proportions of the Mechanical Equipment of the Whitehall Building, New York. Floor plan of the building with description of the equipment. 2000 w. Eng Rec—Sept. 17, 1904.

Office Building, Philadelphia.—The Steam and Electrical Plant of the North American Building, Philadelphia. Description with plans of the plant for a twenty-one story office building. 6500 w. Eng Rec—Nov. 23, 1901.

Office Building, Pittsburg.—The Mechanical Plant of the Frick Building, Pittsburg. Illustrated description of the installation in a 20-story office building, embracing 1200-H. P. in water-tube boilers, four 150-KW. generating units, 11 long travel hydraulic elevators, a refrigerating plant and a special system of electric wiring. 3100 w. Eng Rec—May 17, 1902.

Power Plant of the Frick Building, Pittsburg. Illustrates and describes the plant of this mammoth office-building of interest for its size, cost, magnificent finish and many mechanical problems that had to be solved. 4500 w. Engr, U S A—July 1, 1902.

The Designing of an Office Building. Colbert A. MacClure. A statement of the problem, some of the conditions to be met, etc., giving some mechanical features of the Keystone building, Pittsburg, Pa. Ill. 2000 w. Pro Engrs' Soc of W Penn—June, 1902.

Oliver Building, Boston.—See **Office Building, Boston.**

Paris Exposition.—The Mechanical Installation at the Paris Exposition (Installations Générales du Service Mécanique de l'Exposition Universelle et Internationale de 1900). Charles Bourdon. A complete account of the organisation of the mechanical service, the power plant, the distribution of water, etc., ventilation, etc. Two plates. 13.-000 w. Mem d l Soc d Ing Civils—January, 1901.

Philadelphia Mint.—The Power Plant of the New United States Mint at Philadelphia. Illustrated description of a plant having a nominal capacity of about 800 H. P. in electric generating units, besides boiler capacity for heating. The article describes the boiler and engine equipment, the generators and motors, the switchboard and the auxiliary plant. 5400 w. Eng Rec—Feb. 15, 1902.

"Power" Building, Providence, R. I.—Mechanical Plant of a Power Building in Providence, R. I. Illustrated description of the plant for furnishing heat, light and power for a five-story mill-construction building. 1800 w. Eng Rec—Feb. 11, 1905.

Princeton University.—The Power Plant of Princeton University. A. M. Feldman. Brief illustrated description of a plant furnishing heat, light and power for the forty buildings of the university, and planned with a view to furnishing light and heat outside of the grounds. 1000 w. Engr, U S A—June 15, 1904.

Printing Office.—See **PRINTING OFFICE—Sackett & Wilhelms.**

Prudential, Newark.—A Large and Modern Isolated Power Plant. A well illustrated description of the steam and electrical plant and equipment of the buildings of the Prudential Insurance Co., Newark, N. J. 4000 w. Am Elect'n—Jan., 1903.

Railway Exchange Building, Chicago.—Power Plant of the Railway Exchange Building, Chicago. Illustrated description of a plant possessing some novel features necessitated by the somewhat unusual conditions under which it is operated. 2500 w. Engr, U S A—Nov. 15, 1904.

Railway Station, Pittsburg.—The Power Plant of the New Union Station. D. B. Kinch. Describes the power plant of the new station of the Pennsylvania R. R. at Pitsburg, Pa. 3000 w. Pro Engrs Soc of W Penn—July, 1902.

Power Equipment of the Pennsylvania Union Station, Pittsburg. Drawings and description of interesting features. 2200 w. Eng Rec—March 21, 1903.

The Mechanical and Electrical Equipment of the Pittsburg & Lake Erie Railroad Terminal, Pittsburg. An illustrated description of apparatus for warming and ventilating, lighting, power, etc. The equipment consists of boilers and stokers, coal and ash-handling plant, electric generating sets, air compressors, water distilling and refrigerating plant, pumping plants, etc. Serial. 1st part. 2500 w. Eng Rec—Aug. 2, 1902.

Railway Terminal, Boston.—The Mechanical Plant at the Boston South Terminal (Die Stellwerkanlage des Bostoner Süd-Bahnhofes). Prof. F. Reuleaux. A detailed account of the whole plant with many illustrations. Two articles. 1 plate. 4000 w. Glaser's Annalen—July 1, 15, 1901.

Railway Terminal, Weehawken.—An Important New Terminal-Yard-Lighting and Power Plant. Illustrates and describes an installation in process of construction at Weehawken, N. J., for the West Shore R. R. Serial. 1st part. 1600 w. Am Engr & R R Jour—Feb., 1904.

The New Weehawken Railroad Terminal Power Plant. Illustrated detailed description of an electric plant for the operation of the grain elevators, shops, &c., and the lighting of the large terminal yard and buildings of the West Shore R. R. 4500 w. Eng Rec—Nov. 11, 1905.

Rogers-Peet Building.—The Mechanical Plant in the Rogers-Peet Building, New York. Illustrated description of a plant in an 8-story clothing house where a number of machines are driven electrically, and which has rather unusual accessories to the heating plant. 2200 w. Eng Rec—July 12, 1902.

Sanatorium, Colorado.—The Power Plant of the Agnes Memorial Sanatorium. Howard S. Knowlton. An illustrated study of a power plant for an institution designed and built with great care, for the treatment of pulmonary tuberculosis, near Denver, Colo. 3500 w. Eng Rec—Sept. 10, 1904.

School, Lancaster, O.—The Boys' Industrial School at Lancaster, Ohio. Illustrates and describes the general features of a mechanical plant for a number of detached buildings. 2100 w. Eng Rec—Oct. 5, 1901.

Schwarzschild & Sulzberger.—Power Plant of the Schwarzchild & Sulzberger Company, Chicago. Illustrated detailed description of a fine modern electric and refrigerating plant for a meat-packing establishment. 2800 w. Eng Rec—June 7, 1902.

Simmons College.—See **College, Boston.**

Stecher Lithographic Co.—The Power Plant of the Stecher Lithographic Company, Rochester, N. Y. Illustrated description of the lighting, heating and ventilating installation in a 2-story, 146x225-ft. building. 2000 w. Eng Rec—Sept. 27, 1902.

Store, Berlin.—Power Plant with Mechanical Draught. Illustrated description of an interesting plant in Berlin, designed by Prof. E. Josse, where it was necessary to use as little space as possible. Serial. 1st part. 2300 w. Engng—Dec. 18, 1903.

The Mechanical Plant of the Tietz Warehouse in Berlin (Die Technischen Einrichtungen des Warenhauses Hermann Tietz in Berlin). Wilhelm Küppers. Including engines, boilers, hoisting machinery and electric plant of a large modern warehouse with numerous illustrations. 2500 w. Zeitschr de Ver Deutscher Ing—March 12, 1904.

Power Plant with Mechanical Draft (Kraftwerk mit mechanischem Zug). E. Josse. An illustrated description of a steam, electric and mechanical plant in a large Berlin store, the boilers in the top story being operated with mechanical draft, and the engines and generators being placed in the basement. Serial. Two parts. 7000 w. Zeitschr d Ver Deutscher Ing—March 14, April 4, 1903.

Store, Minneapolis.—The Power Plant of the "Glass Block," Minneapolis. Illustrates and describes a plant designed to supply heat, light, power and water to a large department store. 8000 w. Elec Rev, N Y—Nov. 26, 1904.

Store, Munich.—The Mechanical Plant of the Tietz Warehouse in Munich (Die Technischen Einrichtungen des Warenhauses Hermann Tietz in München). Julius Weil. Describing the plant of a large department store. Four 200 H. P. Diesel motors are coupled direct to dynamos for power and lighting. 2000 w. Zeitschr d Ver Deutscher Ing—Nov. 25, 1905.

The Technical Arrangement of the Oberpollinger Warehouse in Munich (Die Technischen Einrichtungen des Kaufhauses Oberpollinger in München). Julius Weil. Details of the sub-station converters, illumination, elevator service, etc., of a department store in Munich. Nernst lamps are extensively used. 4500 w. Elektrotech Zeitschr—Oct. 26, 1905.

Store, Newark.—The Mechanical Plant in a Newark, N. J., Department Store. Illustrates and describes the interesting plant installed in the store of Hahne Bros. 1700 w. Eng Rec—Aug. 30, 1902.

Store, N. Y.—Mechanical Equipment of the Macy Building, New York City. D. M. Quay. An illustrated description of the heating, ventilating and power plant of a modern mercantile building. 3000 w. Steam Engng—Jan. 10, 1903.

Store, Philadelphia.—Power Plant of the Snellenburg Building. Walter Lewis Fleisher. Illustrates and describes the plant of a Philadelphia department store where peculiar conditions were imposed by the enlargement of the building. 2700 w. Steam Engng—Aug. 10, 1903.

See also **Wanamaker.**

Store, St. Louis.—Power Plant of the Ferguson-McKinney Dry Goods Co., St. Louis. William H. Bryan. Illustrates and describes a plant representing present practice, and showing the severe conditions of plants for furnishing light, heat, power, etc., for large buildings. 6000 w. Engr, U S A—Feb. 2, 1903.

Tall Building.—See **Office Building; BUILDING CONSTRUCTION.**

Teachers' College.—See **College, New York.**

Theatre.—See also **THEATRE.**

Theatre, Boston.—The Power Plant of B. F. Keith's Theater, Boston. Describes the main features of the lighting, heating and ventilating plant, and the unusually fine equipment of this public building. Ill. 4000 w. Engr, U S A—Sept. 1, 1902.

University Club.—The Mechanical Plant in the University Club, New York City. Illustrated description of the plant for heating, ventilation, electric light and elevator service in a leading New York clubhouse. 2300 w. Eng Rec—May 3, 1902.

University of California.—The Central Light, Heat and Power Plant at the University of California. G. C. Noble. Illustrated description of this new plant which supplies light, heat and power for the various buildings and laboratories, and also serves as an experimental equipment. 2500 w. Engr, U S A—April 15, 1905.

University of Chicago.—The University of Chicago Power Plant. Illustrated detailed description of a new central lighting, heating and power generating station which will meet the requirements of 25 separate buildings. 4000 w. Steam Engng —Aug. 10, 1902.

Wanamaker, Philadelphia.—Details of the Wanamaker Power House, Philadelphia. Illustrated detailed description of arrangements for furnishing steam heat, electric light, pneumatic service, ventilation and refrigeration for one of the largest stores ever built. Serial. 1st part. 2500 w. Eng Rec—July 22, 1905.

The Power Plant for the New Wanamaker Store, Philadelphia. Illustrated description of a plant for a twelve-story department store, supplying electric power for lighting and motors, steam, compressed air, and water. It is located a block distant. 4500 w. Eng Rec—Oct. 28, 1905.

Warehouse.—See **Store.**

MECHANICAL STOKING.

See also **COMBUSTION; FIRING; GRATE; SMOKE PREVENTION; STOKING INDICATOR.**

The Economy of Mechanical Stoking. W. W. Christie. Mr. Christie's first paper describes the leading types of mechanical stokers in actual use in Europe and America, with the principles of their operation. 3500 w. Engineering Magazine —July, 1902.

The Economy of Mechanical Stoking. W. W. Christie. The second and concluding paper gives actual comparisons between machine and hand firing gathered from numerous tests. 3000 w. Engineering Magazine—August, 1902.

Mechanical Stokers. Edwin Fitts. Explains the combination of fuel in a furnace, different forms of furnaces, outlines the history of mechanical stoking, giving illustrations of various types. 3300 w. Pro Engrs' Soc of W Penn—April, 1903.

Mechanical Stokers. W. Rogers. Briefly describes the principles of the different forms of mechanical stokers, giving illustrations and discussing details. 3200 w. Elec Engr, Lond—June 24, 1904.

The Care and Management of Steam Boilers. W. H. Fowler. An illustrated review of the mechanical stokers of various types, discussing their merits. Serial. 1st part. 3000 w. Mech Engr—April 1, 1905.

Battersea Electric Station.—See **STEAM ENGINE—Scott Cornish Cycle.**

Bennis Paper.—Is Machine Stoking Economical? Alfred W. Bennis. Abstract of a paper read before the Keighley Assn. of Engrs. Gives facts tending to prove the economy. 1700 w. Elect'n, Lond —Oct. 27, 1905.

Chain Grate.—Some Performance of Boilers and Chain Grate Stokers with Suggestions for Improvement. A. Bement. Gives the performance of a Babcock & Wilcox, two Heine and one improved Heine boiler as shown in tests; considers the tile-roof furnace, and discusses the characteristics of the chain-grate stoker. General discussion. 14,200 w. Jour W Soc of Engrs—Feb., 1904.

Coke Breeze.—See **COKE BREEZE—Fuel.**

Coking Method.—Mechanical Stokers Depending Upon the Coking Method of Firing. Albert A. Cary. A discussion before the New England Cotton Mfrs.' Assn. Gives an illustrated description of the coking method of firing, considering its advantages and disadvantages, and discussing forms of mechanical stokers. 6000 w. Engr, U S A—April 1, 1903.

Crowe.—See **BOILER TEST—"John W. Gates."**

Electric Stations.—Stokers for Electricity Generating Stations. Albert Gay. Read before the Soc. of Engrs. Considers the essentials of perfect combustion, and various types of mechanical stokers which aim to increase the economy in the raising of steam. Ill. 5000 w. Elect'n, Lond—Dec. 11, 1903.

Evolution.—The Evolution of the Mechanical Stoker. A. A. Cary. From a discussion at meeting of the New England Cotton Mfgrs. Assn. Gives illustrated description of methods of firing, and of various patents for improving the system, the furnaces, their operation, etc. 6000 w. Power—March, 1903.

Feed Difficulties.—Coal Feeding Difficulties in Hoppers and Spouts. William L. Morris. Discusses defects in design, and other factors that enter into the maintenance of a uniform "dead fire line." Ill. 2000 w. St Ry Rev—Nov. 20, 1903.

Gas Retort.—See **GAS RETORT—Charging; GAS WORKS—Stoking Machinery.**

General Electric Works.—Contract Tests of Automatic Stokers at the General Electric Works, Schenectady, N. Y. A report of elaborate tests made on twelve under-feed automatic stokers and also of a plant of Roney stokers. 4000 w. Eng News—Nov. 7, 1901.

Graham, Morton & Co.—A Large Boiler Stoking Plant. A large plant at the works of Wm. Beardmore & Co., in Glasgow, is illustrated and described in detail. It was made by Graham, Morton & Co., of Leeds and supplies sixteen boilers and is capable of dealing with thirty tons of coal per hour. 1800 w. Engr, Lond—Dec. 6, 1901.

Hand-Firing Compared.—The Mechanical and the Human Operator. Edwin Yawger. Abstract of a paper before the Boston Convention of the Nat. Elec. Lgt. Assn. Presents some of the general considerations that bear on the art of combustion of fuel in boiler furnaces. Discusses the points needed by stokers to insure economy and the shortcomings of the human element on both kinds of firing. 3000 w. Am Elect'n—July, 1904.

See also **FIRING—Mechanical vs. Hand-Firing.**

India.—The Failure of Mechanical Stokers in India. Information from the report of Mr. Frederick Groves, as to the causes of the failure of types used in India. 1100 w. Engr, Lond—Jan. 1, 1904.

Invention.—Mechanical Stokers. Thomas L. Wilkinson. The present article reviews the causes that have stimulated the invention of mechanical stokers. Serial. 1st part. 1200 w. Min Rept—Oct. 15, 1903.

Jones Underfeed.—The Jones Underfeed Stoker. Report of the Franklin Institute, through its Committee on Science and the Arts, on the invention of Evan William Jones, giving illustrated detailed description of the apparatus. 5000 w. Jour Fr Inst—Dec., 1904.

Kilroy Indicator.—See **STOKING INDICATOR.**

Kudlicz Grate.—See **GRATE—Kudlicz.**

Locomotive.—Mechanical Stokers for Locomotives. Fred H. Colvin. The advantages of mechanical stokers are enumerated and the stoker invented by John W. Kincaid is described and illustrated. 2200 w. Trans Am Soc of Mech Engrs, No. 0935—May, 1902.

Watching the Automatic Stoker at Work. Angus Sinclair. An account of a ride from Cincinnati to Indianapolis on an engine equipped with an automatic stoker. 2000 w. Loc Engng—May, 1905.

Locomotive, Kincaid.—A Mechanical Stoker for Locomotives. Illustrated description of Kincaid's automatic stoker for locomotives, and an account of a trip with it in use. 1300 w. Loc Engng—May, 1901.

The Kincaid Locomotive Stoker. Illustrates and describes an invention which gives promise of great utility, adding to the efficiency, economy and abatement of smoke in locomotives. 1000 w. Sci Am Sup—Oct. 25, 1902.

See also **Locomotive.**

Locomotive, Victor.—The Victor Stoker. Illustrated detailed description of this locomotive stoker, with report of a trip on an engine fitted with it. 3500 w. R R Gaz—Vol. XXXVIII., No. 23.

Modern.—See **FIRING—Mechanical Auxiliaries.**

Roney.—See **BOILER TEST—P. O. Dep't, Washington.**

Tests.—Some Recent Tests of Mechanical Stokers. G. A. Hutchinson. A report of tests made on two representative types. 1200 w. Eng News—March 26, 1903.

Wegener.—See **SMOKE PREVENTION—Wegener Consumer.**

Willesden Junction Plant.—See **COAL HANDLING.**

MECHANICS.

See also **GRAPHICS; KINEMATICS; MATERIALS' STRENGTH; MATHEMATICS; MOVEMENT OF INERTIA; PHYSICS.**

The Evolution of Mechanics (L'Evolution de la Mécanique). P. Duhem. A review of the history of the growth of the study of mechanics, from the earliest times to the present. Serial. Part I. 5000 w. Rev Gen des Sciences—Jan. 30, 1903.

Beams.—See **BEAM; MATERIALS' STRENGTH; MOMENT OF INERTIA.**

Conservation of Energy.—See **CONSERVATION OF ENERGY.**

Crank.—See **CRANK.**

Eccentric Weights.—Forces Due to Eccentric Weights Attached to Rolling Wheels. Calvin M. Woodward. Mathematical demonstration of the action upon horizontal and curved tracks of a heavy mass attached to rigid rolling wheel. 1400 w. Jour Assn of Engng Socs—July, 1905.

Fluid Dynamics.—See **HYDRODYNAMICS; SHIP RESISTANCE.**

Force.—The Notion of Force (Der Kraftbegriff). H. Wehage. An examination of the correct definition and conception of the mechanical term force. 1800 w. Zeitschr d Ver Deutschr Ing—April 15, 1905.

See also **GRAPHICS.**

Graphostatics.—See **GRAPHICS; KINEMATICS.**

Gravitation.—See **PHYSICS.**

Gyroscope.—See **GYROSCOPE; SHIP STABILITY.**

History.—See **EDUCATION—Mechanics.**

Mean Error.—The Mechanical Principle of the Mean Error as a Measure of Precision (Die Mechanische Begründung des Mittleren Fehlers als Genauigkeitsmass). S. Wellisch. An examination of the analogy between the principle of least squares and the vibration of elastic bodies. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 4, 1904.

Moment of Inertia.—See **MOMENT OF INERTIA.**

Pendulum Systems.—Foucault Pendulum Systems. Ernest K. Adams. Describes a variety of Foucault pendulum suspension that might be tried for maintaining the swings of the pendulum indefinitely. Ills. 5600 w. Elec Wld and Engr—June 25, 1904.

Electrical Foucault Pendulum Systems. Ernest K. Adams. Considers various electromagnetic pendulums, and suggests ingenious electric expedients for maintaining the amplitude of vibration. Ill. 5200 w. Elec Wld & Engr—Jan. 30, 1904.

Phenomena.—The Definition of Mechanical Phenomena (Définition des Phénomènes. Application de la Mécanique des Systèmes Matériels). A. Gouilly. A discussion of natural phenomena and of the fundamental conceptions and "laws" of mechanics. Diagrams. 9000 w. Mem Soc Ing Civils de France—Feb., 1903.

Rolling-Disc.—The Mechanics of a Rolling Disc. G. A. Goodenough. A statement of the problem and its solution. Ill. 2300 w. Technograph, No. 15—1900-1901.

Rotation.—See **FLY WHEEL—Directional Tendency; MATERIALS' STRENGTH—Rotating Bodies; STEAM TURBINE—Discs.**

Sommerfeld's Address.—The Physical Results of Modern Technical Mechanics (Naturwissenschaftliche Ergebnisse der Neueren Technischen Mechanik). A. Sommerfeld. An address showing the extent to which engineering investigations upon the properties of materials have influenced the study of mechanical physics. 6000 w. Zeitschr d Ver Deutscher Ing—April 30, 1904.

MECHANISM.

See also **KINEMATICS.**

Efficiency.—See **HOISTING.**

Gearing.—See **GEAR—Diagrams.**

Linkage.—See **KINEMATICS.**

Quick Return.—See **KINEMATICS.**

Spring-Toggle Joint.—See **SPRING—Toggle Joint.**

Variable Speed.—See **VARIABLE SPEED.**

MELTING POINT.

See also under various metals and materials.

Gold.—See **GOLD—Melting Point.**

Manganese.—See **MANGANESE—Melting Point.**

MELVILLE.

See also **MARINE ENGINE—Balancing; NAVAL ENGINEERING.**

Rear-Admiral G. W. Melville, U. S. N., and Applied Science in Construction of the New Fleet. R. H. Thurston. On the influence of Admiral Melville in the creation of the "new navy" 1700 w. Pop Sci M—Dec., 1903.

MENSURATION.

See **MEASUREMENT; WEIGHTS AND MEASURES.**

MERCHANT MARINE.

See **SHIP; SHIPPING; SHIPBUILDING; STEAMSHIP; SALVAGE; WRECK.**

MERCURY.

See also **GOLD METALLURGY—Amalgamation; SILVER METALLURGY—Amalgamation.**

Quicksilver. R. S. Baverstock. Discusses its occurrence, characteristics, production, methods of reducing ores, uses, &c. 3800 w. Min & Sci Pr—Jan. 4, 1902.

Australia.—The Quicksilver Mines of Idria. T. L. Genter. Illustrated description of these mines in Australia, the second largest known. 2000 w. Eng & Min Jour—Dec. 17, 1903.

California.—The Quicksilver Deposits of California. William Forstner. A study of the formation and characteristics of these deposits. 3000 w. Eng & Min Jour—Sept. 8, 1904. Serial. 1st part.

China.—Chinese Methods of Mining Quicksilver. Henry Brelich. Describes the methods in the Wan Shen Chang mines, showing how they make a living by mining low grade ore in the most antiquated way, and smelting it with the most primitive appliances. Ills. Serial. 1st part. 2500 w. Min Jour—May 27, 1905.

Cleaning.—An Effective Mercury Cleaning Device. A. O. Doane. Illustrates and describes a device which furnishes a reliable means of cleaning mercury for pressure gauges. 900 w. Eng Rec—Feb. 21, 1903.

Cyanide Process.—See **CYANIDE PROCESS—Mercury Recovery.**

Determination.—The Determination of Mercury in Ores. W. W. Whitton. Reviews the methods for the determination of ores, especially the distillation-amalgamation assay, and gives a modification of this method. It is simple, quite accurate and requires no special apparatus. Ills. 2300 w. Cal Jour of Tech—Sept., 1904.

Electrolytic Purification.—The Electrolytic Purification of Mercury. Woolsey McA. Johnson. Describes an experiment made for clearing mercury by electro-chemical means. Ill. 850 w. Elec Wld & Engr—April 20, 1901.

New Method of Quicksilver Extraction. J. H. Jory. Describes the method and states its advantages. The most essential part of the new method is the electrolytic sluice. 1500 w. Min & Sci Pr—Dec. 28, 1901.

Flouring.—Quicksilver in Pan Amalgamation. W. J. Adams. An explanation of the causes of the flouring of quicksilver. Serial. 1st part. 900 w. Min & Sci Pr—Nov. 5, 1904.

Mexico.—The Quicksilver Deposits of Huitzuco. Frank D. Pagliucci. Illustrates and describes these deposits in Mexico and their development. 600 w. Eng & Min Jour—March 2, 1905.

Metallurgy.—The Metallurgy of Mercury. Dr. J. Ohly. General review. 1500 w. Min Rept—Aug. 11, 1904.

Metallurgy, New Almaden. — Quicksilver Reduction at New Almaden, Cal. Walter W. Bradley. A short description of the operations at the reduction works, with illustration. 1000 w. Min & Sci Pr—Sept. 26, 1903.

Mine Gas.—Some Occurrences of Gases in a Quicksilver Mine. Phil Rearden. A description of an experience in a California mine, with diagrams. 1000 w. Min Sci Pr—Jan. 18, 1902.

Oregon.—The Quicksilver Deposits of Oregon. W. B. Dennis. Reviews the condition of quicksilver, the steady decline in production, and gives an account of the deposits discovered in Oregon. Ill. 3400 w. Eng & Min Jour—Oct. 10, 1903.

Texas.—The Quicksilver Mines of Brewster County, Texas. E. P. Spalding. An illustrated account of these valuable deposits, the method of prospecting, production, etc. 2000 w. Eng & Min Jour—June 15, 1901.

The Cinnabar Deposits of the Big Bend Province of Texas. Robert T. Hill. Information concerning these deposits, especially their nature and geology. Map. 4000 w. Eng & Min Jour—Sept. 6, 1902.

The Terlingua Quicksilver Deposits of Texas. B. F. Hill. Describes these deposits, methods of mining, etc. Ill. Serial. 1st part. 1600 w. Min & Sci Pr—Jan. 17, 1903.

The Cinnabar Fields of Texas. David DeWitt Lawrence. An illustrated account of the Terlingua district and its development. 2000 w. Min Rept—Aug. 20, 1903.

A New Quicksilver Field in Brewster County, Tex. William B. Phillips. Gives the location of this new field, with particulars concerning the district. 1500 w. Eng & Min Jour—Jan. 28, 1904.

Condition of the Quicksilver Industry in Brewster County, Texas. William B. Phillips. Gives information of the work of the various companies, with the opinion that the industry is in a healthy condition in spite of the closing down of two plants. 2000 w. Eng & Min Jour—Oct. 6, 1904.

Terlingua Quicksilver District. William B. Phillips. Notes on the quicksilver industry in this district of Texas, describing the manner in which the cinnabar occurs in the upper cretaceous. 1200 w. Min Wld—Sept. 2, 1905.

The Quicksilver Deposits of Brewster County, Texas. William Battle Phillips. Gives an illustrated general description and detailed description of the Terlingua district and the Study Butte district. 2800 w. Ec Geol—Nov., 1905.

A New Quicksilver Mining District. M. P. Kirk and J. W. Malcolmson. A report of the development work in Texas. 800 w. Eng & Min Jour—April 28, 1904.

The Terlingua Quicksilver District. Morris P. Kirk. Brief account of this district in Texas, discovered in 1892. 1000 w. Min Mag—May, 1905.

The Terlingua Quicksilver Deposits. H. W. Turner. Describes the general geology of the district, the deposits in the tertiary lavas, and in sedimentary rocks, and the minerals of the quicksilver lodes. Ills. 5000 w. Ec Geol—Dec., 1905.

MERCURY VAPOR LAMP.

See also **ELECTRIC LIGHTING; LIGHTING; PHOTOMETRY.**

The Mercury Vapor Lamp (Die Quecksilber-Dampflampe). Arthur Libesny. An illustrated paper, giving a historical review and description of mercury vapor electric lamps, including the Cooper-Hewitt. Serial. Part I. 2000 w. Zeitschr f Elektrotech—July 19, 1903.

A New Mercury-Arc Lamp with Automatic Starter (Eine Neue Quecksilberbogenlampe mit Automatischer Zündung). Dr. Heinrich Paweck. The mercury tube is mounted on a vertical axis, and started by rotating it; this breaking a mercury short circuit, and causing the current to pass through the vapor. 2000 w. Zeitschr f Elektrochemie—April 29, 1904.

Principles and Applications of Mercury Vapor Apparatus. F. von Keller. Briefly considers its application in the lamp, the converter, the interrupter and the alternating current switch. General discussion. 5500 w. Pro Engrs' Club of Phila—April, 1905.

New American Lamps (Neue Amerikanische Lampen). Clarence Feldmann. Discussing especially the mercury vapor lamp, and the American forms of the Nernst lamp. 2000 w. Elektrotech Zeitschr—May 11, 1905.

Arons.—Radiant Efficiency of Arons Mercury Arc Lamp. William C. Geer. Read at the Pittsburg meeting of the A. A. A. S. A study of this mercury vapor lamp, by means of a thermopile, with results. 600 w. Elec Wld & Engr—July 19, 1902.

Converter.—See **ELECTRIC CURRENT RECTIFIER—Cooper Hewitt.**

Cooper Hewitt.—The Cooper Hewitt Lamp. Illustrated account of the mercury-vapor high-power electric lights exhibited at Columbia University, at the conversazione of the Am. Inst. of Elect. Engrs. 1000 w. Sci Am—April 27, 1901.

Notes on the Cooper Hewitt Lamp. Peter Cooper Hewitt. A brief illustrated article giving curves showing the characteristics of brilliant vapor tube lamps. Also editorial comments. 2000 w. Elec Wld & Engr—April 27, 1901.

Electric Gas Lamps and Gas Electrical Resistance Phenomena. Peter Cooper Hewitt. Describes some of the phenomena exhibited by mercury gas lamps and some of the difficulties encountered in determining the relative values of the resistances therein. 2500 w. Trans Am Inst of Elec Engrs—Dec., 1901.

Mr. P. Cooper Hewitt's New Mercury Vapor Lamp. Legh S. Powell. An account of an experiment made, illustrating the apparatus used, during which similar effects were observed as early as 1885. Also an article explaining the theory of this lamp. 2800 w. Elec Rev, Lond—May 24, 1901.

The Cooper-Hewitt Vapor Lamps. An account of the ten patents recently issued, with illustrated description of the lamp and its operation. Also editorial. 9200 w. Elec Wld & Engr—Sept. 28, 1901.

The Cooper Hewitt Mercury Lamp (Ueber die Quecksilberdampf-Lampe von P. C. Hewitt). Dr. Max v. Recklinghausen. A general description of the mercury vapor lamp, with data and results of tests. 4000 w. Elektrotech Zeitschr—June 5, 1902.

The Hewitt Mercury Vapor Lamp. Abstract translation of an article by Dr. Max V. Recklinghausen, published in the "Elektrotechnische Zeitschrift," describing this lamp and discussing its properties. Ill. 1200 w. Elect'n, Lond—June 27, 1902.

The Mercury-Vapor Lamp and Mercury Vacuum Devices (Die Quecksilberlampe und sonstige Quecksilber-Vakuumapparate). Max von Recklinghausen. Discussing the Cooper Hewitt lamp and the applications of the device as a current rectifier. 4500 w. Elektrotech Zeitschr—Dec. 22, 1904.

The Cooper Hewitt Mercury Vapor Lamp. P. H. Thomas. A lecture before the People's Institute at Cooper Union. An interesting description with brief account of some of the difficulties met with in its development. 2200 w. Elec Rev, N Y—March 19, 1904.

Progress with the Mercury-Vapor Lamp (Fortschritte bei Quecksilberdampflampen). S. Strauss. Describing recent developments with the Cooper Hewitt lamp in Europe and America. 3000 w. Zeitschr f Elektrotechnik—March 5, 1905.

Electric Conductivity.—Conductivity of Mercury Vapor. Peter Cooper Hewitt. Reports an investigation into the behavior of the mercury vapor and the results. Also editorial. 2200 w. Elec Rev, N Y—Dec. 19, 1903.

See also **ELECTRIC CONDUCTIVITY—Mercury Vapor; ELECTRIC-CURRENT RECTIFIER.**

Electro-Therapeutics.—Physiological Effects of the Mercury-Vapor Lamp (Physiologische Betrachtungen über die Wirkungen von Quecksilberdampflampen). Dr. E. Schiff. Discussing especially the action of the emitted violet rays upon the human skin. 1200 w. Zeitschr f Elektrotechnik—March 5, 1905.

General Electric Co.—The Mercury Arc Lamp and Rectifier. E. Weintraub. Reviews the history of the mercury arc, and gives an outline of work done in the Research Laboratory of the General Electric Company, discussing some of the practical properties, and the mercury arc rectifier. Also editorial. Ills. 5500 w. Elec Wld & Engr—June 3, 1905.

Photometry.—See **Radiant Efficiency; PHOTOMETRY.**

Physiological Effects.—See **Electro-Therapeutics.**

Radiant Efficiency.—Radiant Efficiency of the Mercury Arc. Prof. William C. Geer. Condensation of a paper in the Feb. issue of the "Physical Review," giving results of investigations. 1200 w. Elec Wld & Engr—Feb. 28, 1903.

Steinmetz.—The Mercury Arc. Charles P. Steinmetz. An account of the writer's investigations discussing the features of the mercury arc, and giving a review of the work of others. Also editorial. 2500 w. Elec Wld & Engr—Feb. 21, 1903.

Ultra Violet.—A New Ultra-Violet Mercury Lamp. Dr. O. Schott. Abridged translation of an article in the "Zeitschrift für Angewandte Chemie." Describes a modification of the Hewitt mercury vapor lamp, and some of the uses to which it is applied. 1800 w. Sci Am Sup—June 10, 1905.

The Uviol Mercury Lamp (Die Uviol Quecksilberlampe). Dr. Axmann. Describing a mercury vapor lamp using a special glass permitting the passage of the ultra-violet rays, and especially adapted for medical purposes. 1200 w. Elektrotech Zeitschr—July 6, 1905.

Uviol.—See **Ultra Violet Rays.**

METAL.

See also **MATERIALS' STRENGTH; METAL INDUSTRY; TESTING; and under specific metals.**

Ancient Egypt.—See **MINING—Egypt.**

Coloring.—Coloring of Metals. From the French of M. Paul Malberbe, in "La Revue des Produits Chemiques." Describes processes of coloring by oxidation, and by sulphuration, with processes of deposit of a metal. 2300 w. Sci Am Sup—Aug. 8, 1903.

Metal Coloring. W. J. Kaup. On the treatment of copper, brass, iron, and steel to produce color effects. 2800 w. Mach, N Y—Dec., 1903.

Corrosion.—See **METAL CORROSION.**

Corrugated.—See **CORRUGATED METAL.**

Crystalline and Amorphous States.—Crystalline and Amorphous States of Metals. Editorial review of the presidential address of Mr. G. T. Beilby, before the Chemical Section of the British Association at Johannesburg. On the researches in regard to the hard and soft states of metals. 2500 w. Engng—Sept. 22, 1905.

See also **IRON.**

Diseases.—See **IRON; METAL CORROSION; METALLOGRAPHY—Copper and Iron.**

Elastic Limit.—See **MATERIALS' STRENGTH.**

Electro-Chemical Series.—See **ELECTRO-CHEMISTRY—Metal Series.**

Expansion.—On the Expansion of Certain Metals at High Temperatures. Ludwig Holborn. An account of investigations by a new method, with tabulated report of observations. 5000 w. Am Jour of Science—May, 1901.

The Expansion of Iron, Copper, Aluminum, Brass, and Bronze at High Temperatures (Ueber die Ausdehnung von Eisen, Kupfer, Aluminum, Messing und Bronze in Hoher Temperatur). W. Dittenberger. Results of recent determinations of expansion coefficients made at the Reichsanstalt at Berlin. 2500 w. Zeitschr d Ver Deutscher Ing—Oct. 11, 1902.

Flow.—A Remarkable Case of the Flow of Metal Under Pressure. F. A. Halsey. Illustrates and describes the results of some experimental work. 1000 w. Am Mach—Nov. 22, 1900.

The Flow of Metal Exemplified by a Rivet. George S. Hodgins. An interesting explanation of what takes place in the setting of a good tight rivet. Ill. 1700 w. Loc Engng—Dec., 1900.

The Flow of Metal. Henrik V. Loss. An account of recent experiments supporting the writer's statement that the accepted power to punch steel is decidedly an unnecesarily large one. Discussion. 1500 w. Jour Fr Inst—June, 1901.

See also **MATERIALS' STRENGTH—Plastic Yielding; Yield Point.**

Hardness.—See **TESTING.**

Hardening.—See **HARDENING; STEEL ALLOY.**

Impact Tests.—See **TESTING.**

Phase Theory.—The Hard and Soft States in Metals. G. T. Beilby. A study of metals, explaining a new phase theory, illustrating by examples, and giving a full account of researches. General discussion. Ills. 12,000 w. Elec-Chem & Met—June, 1904.

Surface Flow and the Hard and Soft State in Metals. Reviews the researches of Mr. G. T. Beilby, of Glasgow, on surface flow and the hard and soft conditions of metals, which are of considerable practical importance. 3000 w. Engng—Oct. 7, 1904.

See also **IRON.**

Physical Structure.—The Physical Structure of Metals and Alloys. J. J. Kessler, Jr. A brief illustrated study. 1500 w. Jour Assn of Engng Socs—Dec., 1903.

See also **IRON; METALLOGRAPHY.**

Pure.—See **ALUMINOTHERMY—Pure Metals.**

Rare.—The Analysis, Detection and Commercial Value of the Rare Metals. J. Ohly. Information for the purpose of facilitating researches, and indicating the more reliable methods of distinguishing and analyzing the minerals containing rare metals. Serial. 1st part. Min Rept—Dec. 5, 1901.

Rare Metals and Others. J. Ohly. Considers briefly the deposits of platinum, wolframite, titanium, &c. 800 w. Min Rept—May 18, 1905.

Solutions.—Solutions of Solids and Solid Solutions. J. H. Stansbie. Abstract of paper read before the Met. Soc. at the Birmingham, Eng., Munic. Tech. School. A study of the changes which refer to the solid and liquid states of metals. 2500 w. Mech Engr—Nov. 18, 1905.

See also **Phase Theory; IRON—Constitution; Phase Theory.**

Steel Hardening.—See **NICKEL STEEL; STEEL ALLOY.**

Stress.—See **MATERIALS' STRENGTH; TESTING.**

Structure.—See **Phase Theory; ALLOY; IRON; METALLOGRAPHY; STEEL.**

Van der Waals.—The Physical Properties of Metals (Die Physikalischen Eigenschaften der Metalle). J. Traube. A comparison of the properties of metals according to the conditional equations of Van der Waals. 2000 w. Zeitschr d Ver Deutscher Ing—Aug. 15, 1903.

METAL CORROSION.

See also **IRON—Rusting; METAL PROTECTION.**

The Corrosion of Iron and Its Prevention. H. Carroll Alford. Briefly considers the general theory of the formation of rust, and discusses the methods of preventing or arresting corrosion. 2200 w. St Louis Ry Club—April 12, 1901.

Corrosion of Metals. J. F. Buchanan. Reviews the relative position of the more useful metals and alloys to corrosion, considering preventives and describing some experiences in brass-founding. 2200 w. Foundry—June, 1904.

The Corrosion of Metals. Prof. A. H. Sexton. A discussion of the corrosion of metals in common use under the conditions in which they are most generally used, and the means that have been found most efficient for protecting them. Serial. 1st part. 2500 w. Mech Engr—Feb. 18, 1905.

Condenser Tubes.—See **Sea Water; CONDENSER—Corrosion.**

Copper.—See **Sea Water.**

Copper Influence.—Influence of Copper in Retarding Corrosion of Soft Steel and Wrought Iron. F. H. Williams. Brief report of investigations made to find out what influence the presence of copper might have. 500 w. Pro Engs' Soc of W Penna—Sept., 1900.

Decay.—The Decay of Metals. J. T. Milton and W. J. Larke. Abstract of a paper read before the Inst. of Civ. Engrs. Discusses cases of decay and the probable causes. 1500 w. Sci Am Sup—May 16, 1903.

The Decay of Metals. J. T. Milton. Abstract of a paper read before the Inst. of Civ Engrs. Gives examples of decay, considering the causes. 1700 w. Elec Engr, Lond—May 22, 1903.

Pitting Rust.—The Pitting Rust of Iron. Dr. W. H. Birchmore. An account of the writer's observations and experiments in making a study of this trouble. 2800 w. Am Gas Lgt Jour—Nov. 16, 1903.

Sea Water.—The Corrosion of Copper Water Pipes (Ueber Anfressungen Kupferner Wasserleitungen). H. Hüllmann. A discussion of the behavior of copper water conductors in vessels of the German Navy. 2000 w. Zeitschr d Ver Deutscher Ing—April 12, 1902.

Corrosion of Condenser Tubes and Sea-Water Conductors. Prof. Ernst Cohen. Read before the Inst. of Naval Archts. An account of researches and the remedies recommended. Ill. 2000 w. Mech Engr—April 19, 1902.

The Influence of Sea Water on Copper and Copper Alloys (Einwirkung des Seewassers auf Kupfer und einige Kupferlegierungen). H. Diegel. Data and results of experiments upon the corrosion of copper sheets and pipes. 8500 w. Glasers Annalen—Sept. 1, 1903.

The Behavior of Certain Metals in Sea Water (Das Verhalten einiger Metalle im Seewasser). H. Diegel. A report of investigations upon the corrosive action of sea water upon copper, nickel and iron alloys. Two articles. 12,000 w. Stahl u Eisen—May 15, June 1, 1904.

The Protection of Copper and its Alloys against Corrosion from Sea Water (Schutz des Kupfers und seiner Legierungen gegen die Zerstörung durch Seewasser). F. Uthemann. Data and results of experiments upon a number of alloys suitable for marine condenser tubes. 2000 w. Zeitschr d Ver Deutscher Ing—May 6, 1905.

The Corrosion of Copper in Sea Water. Translation of an article by Herr Uthemann, on a number of interesting experiments carried out with a view to discovering an effective means of protecting copper and its alloys against corrosion through the action of sea water. 2800 w. Engr, Lond—May 5, 1905.

The Corrosion of Copper by Sea Water (La Corrosion du Cuivre par l'Eau de Mer). A review of the tests made by the German Navy, with discussion of the methods of prevention of corrosion. 2000 w. Génie Civil—Sept. 23, 1905.

A Study of the Corrosion of Condenser Tubes. A. Humboldt Sexton. A critical examination of the behavior of brass tubes in contact with sea water, with regard to the causes and possible prevention of corrosion. 4500 w. Engineering Magazine—Nov., 1905.

See also **SHAFT.**

Ship Pipes.—Corrosion in Metal Pipes on Board Ship. A. W. Stewart. Abstract of a paper before the Inst. of Nav. Archts. Gives details of investigations made by the writer on behalf of the Russian Volunteer Fleet, with the object of ascertaining if the dynamos on board were responsible for the very rapid deterioration taking place in some of the pipes. 2400 w. Engr, Lond —April 10, 1903.

Steel.—See Wrought Iron; **METAL PROTECTION; STEEL CONSTRUCTION**—Corrosion.

Steel Buildings.—See also **STEEL CONSTRUCTION**—Corrosion.

Wrought Iron.—Comparative Tests on the Rusting of Wrought Iron and Steel (Vergleichende Untersuchungen von Schweisseisen und Flusseisen auf Widerstand gegen Rosten). An abstract of Prof. Rudeloff's report in the Mitteilungen aus den Königlichen Technischen Versuchsanstalten" of elaborate experiments to determine the relative resistance to rusting, under various conditions, and with various methods of protection, of different kinds of iron and steel. 4000 w. Stahl u Eisen—March 15, 1903.

METAL CUTTING.

See **MACHINE TOOL—High-Speed; MACHINE WORK; METAL WORKING; SAW; TOOL STEEL; WORKS MANAGEMENT.**

METAL INDUSTRY.

See also **IRON INDUSTRY; METAL TRADES' ASSOCIATION; MINING INDUSTRY; STEEL INDUSTRY.**

German.—German Metal Exports and Imports in 1901. A review of statistics from the report for the first six months of the year. 1000 w. U S Cons Repts, No. 1122—Aug. 24, 1901.

Price Fluctuations, 1903-1904.—The Price Fluctuations of Certain Metals in the Years 1903-1904 (Preisbewegung einiger Metalle in den Jahren 1903 und 1904). B. Neumann. A tabulated view of prices of zinc, tin, lead and silver for 1903 and 1904, with diagrams giving curves for the continuous price fluctuations. 2000 w. 7 plates. Glückauf—April 8, 1905.

Statistics.—Metal Statistics for 1898 (Recueil Statistique des Petits Métaux Pendant l'Année 1898). An abstract of statistics published by the Metal Gesellschaft and the Metallurgische Gesellschaft, of Germany, giving production, prices, etc., of lead, copper, zinc, tin, nickel, aluminum, mercury and silver in various countries. 2500 w. Revue Technique—Jan. 25, 1902.

METALLOGRAPHY.

See also **ALLOY; IRON; STEEL;** and under other metals and alloys.

The Internal Structure of Iron and Steel with Special Reference to Defective Material. S. A. Houghton. Shows that chemical analysis is not all that is needed in determining the quality of metals, and that an examination of the structure is of great importance. Considers the causes of failure, etc. Ill. 8300 w. Metallographist—Oct., 1902.

The Microstructure of Iron and Steel. W. C. Post. Address before the Nat. R. R. Mas. Blacksmiths' Assn. Explains the manner of preparing the specimens and the methods of investigating. Ill. 2200 w. Ir Age—Nov. 20, 1902.

The Use of the Microscope in the Determination of the Properties of Steel. Prof. Albert Sauveur. An illustrated article showing the value of the science of metallography, especially considering iron and steel. Also discussion, and paper by W. J. Beck on "The Preparation of Samples for Microscopic Analysis, etc." 9900 w. Pro Engrs' Soc of W Penn—Dec., 1902.

On the Industrial Importance of Metallography. Albert Sauveur. Abstract of a paper, considering only iron and steel, and showing the commercial application of metallography. Discussion. 3000 w. Jour Fr Inst—April, 1903.

The Metallography of Iron and Steel. H. M. Howe. The first of a series of papers discussing the methods of investigating the real nature of the principal materials of construction by the methods of microscopical study. 4000 w. Engineering Magazine—Sept., 1903.

Microscopic Metallography (La Métallographie Microscopique). G. Cartand. The first installment of a serial treating of the development of the use of the microscope for the study of physical structure of metals. Serial. Part I. 2000 w. Revue Technique—April 10, 1904.

Notes on Metallography. William Campbell. On the present methods of research, particularly in iron and steel. 8500 w. Sch of Mines Qr—July, 1904.

Aix-la-Chapelle.—The Metallographic Department of the Technical School at Aix-la-Chapelle (Die Metallographische Einrichtung des Eisenhüttenmännischen Instituts in Aachen). A. Schüller. With illustrations of the micro-photographic apparatus, and a description of the methods of work. 2000 w. Stahl u Eisen—Oct. 15, 1904.

Alloys.—On the Microstructure of Metals and Alloys. William Campbell. An interesting illustrated paper showing the value of microscopic study of metals and treatment that causes changes. 8800 w. Elec-Chem Ind—Feb., 1904.

The Relation of Microstructure to the Rate of Cooling. W. Campbell. A lecture to the Philadelphia Found. Assn. An illustrated study of alloys, showing that changes occur far below the freezing point which are of great importance. 2500 w. Ir Age—April 21, 1904.

See also **ALLOY—Experimental Study.**

Annealing Effect.—See **Strain Effect.**

Bearing Metals.—See **BEARING—Microstructure.**

Blow Holes.—See **STEEL METALLURGY.**

Castings.—Metallography Applied to Foundry Work. Albert Sauveur. The first of a series of articles considering metallography in its application to the testing of castings. Serial. 1st part. 2000 w. Foundry—May, 1905.

Cast Iron.—Notes on the Micro-Structure of Cast Iron. Percy Longmuir. Discusses features of profitable interest revealed by microscopic examination. Ill. 800 w. Jour Am Found Assn—June, 1903.

A Microscopic Study of Cast Iron. Percy Longmuir. An examination of typical cast irons, reproducing characteristic structures, and giving notes on heat treatment for the production of "black heart" and malleable cast iron. 2700 w. Page's Mag—Aug., 1903.

On Fragments of Cast Iron, Designated as Crystals. Carl Benedicks. Gives results of some investigations made. Ills. 800 w. Ir & Steel Met—March, 1904.

Cast-Iron: Crushing Loads and Microstructure. W. J. Keep. A report of tests given with the object of making more complete the society's records of tests on cast iron. Ills. 2000 w. Trans Am Soc of Mech Engrs, No. 1078—June, 1905.

See also **IRON—Heat Treatment; TESTING—Bars.**

Cementation of Steel.—See **STEEL METALLURGY.**

Copper and Iron.—Diseases of Iron and Copper (Krankheitserscheinungen in Eisen und Kupfer). E. Heyn. A discussion of the molecular defects in iron and steel, and the methods of detecting them by physical examination. 3500 w. Zeitschr d Ver Deutscher Ing—July 26, 1902.

Copper and Magnesium.—See **ALLOY.**

Copper-Iron Alloy.—See **ALLOY—Copper-Iron.**

Crystals.—See **IRON.**

Elastic Limit.—See **MATERIALS' STRENGTH; TESTING—Optical Examination.**

Etching.—Notes on the Etching of Steel Sections. William Cobb Smeaton. Discusses the four general classes of etches; Heat-tinting; electro-deposition; polishing in bas-relief; solvent etches. 2500 w. Ir & Steel Mag—March, 1905.

Ferrite and Cementite.—See **STEEL.**

Iron-Carbon Alloys.—See **IRON—Constitution.**

Laboratory.—See **Aix-la-Chapelle; LABORATORY—Metallography.**

Malleable Cast Iron.—See **IRON—Malleable.**

Manganese Steel.—See **STEEL ALLOY—Manganese.**

Marine Engine.—Microscopic Observations on Naval Accidents. Thomas Andrews. A report of the writer's researches into some of the microscopic examinations of fractured portions of marine machinery. Fully illustrated. Serial. 1st part. 3300 w. Engng—Dec. 2, 1904.

Molecular Mobility.—See **IRON.**

Naval Construction.—Notes on Metallography (Note di Metallografia). A. Ruggieri. A discussion of the use of the microscope in metallographical investigation of materials used in naval construction. 5000 w. Rivista Marittima—Feb., 1902.

Nickel Steel.—See **NICKEL STEEL.**

1900.—The Progress of Metallography in 1900. Albert Sauveur. A brief critical review of the year. 5000 w. Metallographist—Oct., 1901.

Osmond.—General Method for the Micrographic Analysis of Steel. F. Osmond. Translated from the French. Gives a full description of methods from the preparation of samples, a study of the constituents and detailed examination of a few steels with illustrations. 13,000 w. Pro Engrs' Soc of W Penn—Dec., 1902.

Phase Theory.—See **IRON; METAL.**

Phosphoretic Iron.—Note on the Structure of Phosphoretic Pig Metals. J. E. Stead. From Pro. Cleveland Inst. of Engs. An illustrated study of this metal. 700 w. Metallographist—Oct., 1900.

Iron and Phosphorus. J. E. Stead. On investigations made of many hundreds of specimens, describing methods, and discussing results. Ill. Serial. 1st part. 8500 w. Metallographist—April, 1901.

Phosphorus Segregation.—Segregation of Phosphorus in a Piece of Cold Rolled Shafting. Henry Fay. An illustrated report of an examination, microscopically and chemically, of a broken shaft showing an interesting case of segregation. 800 w. Metallographist—April, 1901.

Platinum.—See **PLATINUM—Stress Effects.**

Rails.—Microscopic Observations in Deterioration in Steel Rails. Thomas Andrews. Observations on the micro-crystalline structure, chemical and physical properties, of a Bessemer steel rail, unbroken after fifteen years' main line service. 2500 w. Engng—April 18, 1902.

The Rolling and Structure of Steel Rails. P. H. Dudley. A report upon recent practice, giving a study of structure and tests. Ill. 4000 w. Metallographist—April, 1903.

See also **RAIL; STEEL—Rail.**

Saw.—Microstructure of the Steel in a Defective Circular Saw. James A. Aupperle. Brief illustrated account of microscopic examination to determine the cause of the failure. 450 w. Eng News—March 7, 1901.

Sawed Surfaces.—See **SAWED SURFACES.**

Silicon.—The Microstructure of Silicon and Alloys Containing Silicon. A. B. Albro. An illustrated report of investigations made under the direction of Henry Noel Potter. Serial. 1st part. 1800 w. Elec, Chem & Met Ind—Nov., 1905.

See also **IRON ALLOY; SILICON; STEEL ALLOY.**

Steel.—The Internal Architecture of Steel. J. O. Arnold. Read in the Mech. Sci. Section of the British Assn. for the Adv. of Science. An illustrated study of this subject. 2800 w. Metallographist—Oct., 1900.

Steel as an Igneous Rock. Explains Professor Arnold's views in regard to this material, based on extensive study and testing. He regards steel as an igneous rock, more or less crystalline. 2000 w. Engng—Sept. 8, 1905.

Practical Problems in the Metallography of Steel. J. O. Arnold. Discusses the use of micrographic analysis. 1400 w. Nature—April 25, 1901.

Notes on the Microstructure of Steel. James E. Howard. Reviews the history of microscopic investigations and points emphasized by different investigators, concluding that the microscope may not yet be relied upon for the accurate determination of physical properties. 2800 w. Ir Age—Oct. 29, 1903.

See also **STEEL; STEEL METALLURGY.**

Steel Manufacture.—See **STEEL METALLURGY—Microscope and Pyrometer.**

Strain Effect.—The Effects of Strain and Annealing in Aluminum, Antimony, Bismuth, Cadmium, Copper, Lead, Silver, Tin, and Zinc. Dr. William Campbell. An appendix to the 6th report to the Alloys Research Committee. Ills. by 16 plates. 7500 w. Inst of Mech Engrs—June, 1904.

Stress Effects.—See **MATERIALS' STRENGTH.**

Surface Constituents.—New Micrographic Constituents Upon the Surface of Hardened Steel (Neue Mikrographische Gefügebestandteile auf der Oberfläche des Gehärteten Stahls). W. Ichewsky. With reproductions of microphotographs showing the structure of various hardened steels. 1200 w. 1 plate. Stahl u Eisen—Jan. 15, 1903.

Technique.—The Technique of Microscopic Metallography (Sur la Technique de la Metallographie Microscopique). H. Le Chatelier. Practical directions for methods of research. 4000 w. Rev de Métallurgie—July, 1905.

Testing.—The Utilisation of Microscopic Metallography as a Method of Testing (La Métallographie Microscopique et son Utilisation comme Méthode d'Essais). Léon Guillet. A study of the practical applications of the methods of metallography to the determination of the quality of materials of construction. 10,000 w. 1 plate. Mem Soc Ing de France—July, 1903.

Tool Steel.—Tests on Finishing and Annealing Heats. F. C. Lau. From "Sparks from the Anvil." Illustrated account of experiments conducted along the regular line of shop practice, with deductions. 1000 w. Metallographist—Oct., 1903.

Wrought Iron.—See **IRON—Wrought.**

METALLURGICAL ENGINEER.

Cort.—See **CORT.**

Foundry.—See **FOUNDRY—Metallurgical Engineer.**

METALLURGY.

See also **COPPER METALLURGY; CYANIDE PROCESS; GOLD METALLURGY; GOLD MILLING; IRON METALLURGY; LEAD METALLURGY; MINING; MINING AND METALLURGY; MINING INDUSTRY; ORE; ORE TREATMENT; SILVER METALLURGY; SMELTING; STAMP MILL; STEEL METALLURGY; TIN METALLURGY; ZINC METALLURGY.**

Metallurgy as Applied in Engineering. Archibald P. Head. Address delivered to the students of the Inst. of Civ. Engrs., demonstrating the importance of the study of metallurgy. 8800 w. Engng—Feb. 12, 1904.

Alloy Equilibrium.—See **ALLOY—Equilibrium.**

America.—Notes on the Metallurgy of Copper, Lead and Zinc. Walter Renton Ingalls. A review of American metallurgical practice. 4200 w. Min Mag—July, 1904.

Axle Steel.—See **STEEL—Axle.**

Briquetting Ores.—See **BRIQUETTING—Ores.**

British Decline.—The Decline of Metallurgical Enterprise in England. Henry F. Collins. A review of the causes that explain the decline of all metallurgical industries with the exception of iron and steel. 2800 w. Eng & Min Jour—Feb. 4, 1904.

Bunsen Society.—Metallurgy at the Meeting of the German Bunsen Society. Brief reviews of papers and discussions dealing with the physical properties of metals and alloys, presented at the Karlsruhe meeting, June 2d and 3d, 1905. 2400 w. Engr, Lond—July 14, 1905.

Cast Iron.—See **IRON METALLURGY.**

Concentration.—See **GOLD METALLURGY; ORE TREATMENT.**

Congress, Liége.—The Congress of Metallurgy (Congrès de la Métallurgie). Léon Guillet. A general report of the metallurgical congress held at Liége in connection with the international exposition. Two articles. 6000 w. Génie Civil—Aug. 5, 12, 1905.

Copper.—See **COPPER METALLURGY.**

Copper Alloys.—See **ALLOY; BRASS; BRONZE; COPPER ALLOY.**

Crushing.—See **CRUSHING; GOLD MILLING; STAMP MILL.**

Electric Separation.—See **ELECTRIC SEPARATION.**

Fuels.—See **FUEL—Metallurgical.**

Gold.—See **GOLD METALLURGY.**

Iron.—See **IRON METALLURGY.**

Laboratory.—See **LABORATORY—Metallurgy.**

Lead.—See **LEAD METALLURGY.**

Molecular Mobility.—See **IRON.**

1902.—Recent Progress in the Metallurgical Industries (Die Neuesten Fortschritte auf dem Gebiete der Metallurgie). Dr. Carl Schnabel. A general review of developments in the metallurgy of gold, silver, copper, lead, zinc and nickel during 1902. 3500 w. Glückauf—Feb. 28, 1903.

1905.—Recent Progress in Metallurgy. A. E. Outerbridge, Jr. Address, reviewing briefly the field covered by the metallurgical industries and the progress during the past year. 7500 w. Jour Fr Inst—Dec., 1905.

Paris Exposition.—Cast, Forged and Flanged Work at Paris. A review of exhibits. Ill. 8200 w. Engng—Dec. 7, 1900.

Some Metallurgical Features of the Paris Exposition. Joseph W. Richards. Describes briefly the minerals and metals shown in various forms by the different countries. 3000 w. Mines & Min—Jan., 1901.

Pure Metals.—See ALUMINOTHERMY.

Silver.—See SILVER METALLURGY.

Smelting.—See SMELTING.

Spain.—Some Chemical and Metallurgical Industries in Spain. Notes on the sulphate of ammonia industry, sulphate of copper, dynamite, vitriol, sulphur, alkalies, arsenic, tartaric acid, etc. 2000 w. Engng—March 18, 1904.

Steel.—See STEEL METALLURGY.

Tin.—See TIN METALLURGY.

Vanadium.—See CARNOTITE; VANADIUM.

Zinc.—See ZINC METALLURGY.

METAL PRESERVATION.

See METAL PROTECTION; PAINT.

METAL PROTECTION.

See also BUILDING MATERIAL—Preservation; FIREPROOF CONSTRUCTION; METAL CORROSION; PAINT.

Practical Experience with Rust Prevention (Praktische Erfahrungen über Rostschutzmittel). Dr. T. Koler. A discussion of the action of the atmosphere upon metallic structures, describing the composition of numerous protective coatings. 3500 w. Glaser's Annalen—April 15, 1901.

Protection of Ferric Structures. M. P. Wood. A review of notable instances of failure to protect ferric structures from corrosion, and also instances of success, with discussion of coatings generally used. 20,000 w. Trans Am Soc of Mech Engs, No. 886—May, 1901.

Protection of Iron and Steel in Car Construction. Also as Applying to Building Material. Charles Koons. Remarks on the proper cleaning before painting, the kind of paint, etc. 2000 w. St. Louis Ry Club—July 11, 1902.

Protection of Metallic Surfaces. N. Brandon. Read before the Inst. of Marine Engrs. An explanation of the action that takes place when rust is formed and the coverings used to protect metals, the conditions necessary, etc. 4000 w. Prac Engr—Sept. 9, 1904.

Bengal.—See MACHINERY—Preservation.

Bower-Barff.—See FURNACE.

Bridges.—The Painting and Sand-Blast Cleaning of Steel Bridges and Viaducts. George W. Lilly. Read before the Engrs.' Club of Columbus, O. Describes a method of plastering the metal with a coating composed of Portland cement, red lead, and linseed oil. 6500 w. Eng News—April 24, 1902.

Cement.—The Permanence of Iron and Steel Structures. An editorial on the possibility of preserving inaccessible parts of a bridge structure by imbedding them in cement. 1000 w. Eng Rec—Jan. 5, 1901.

Concrete.—The Chemistry of the Protection of Steel Against Rust and Fire by Concrete. Extracts from an article by Prof. Spencer B. Newberry, read before the Assn. of Expanded Metal Cos. at Chicago, summarizing the chemical and physical laws supporting the belief that concrete is an efficient covering. 1000 w. Eng News—April 24, 1902.

The Chemistry of the Protection of Steel Against Rust and Fire by Concrete. Notes supporting the evidence of the efficiency of this protection. 1700 w. Sci Am Sup—Sept. 20, 1902.

The Protection of Steel from Corrosion. Charles L. Norton. Extract from report of the Insurance Engineering Experiment Station. Describes tests upon metal embedded in concrete. 1600 w. Eng News—Jan. 14, 1904.

See also CONCRETE REINFORCED; FIREPROOF CONSTRUCTION.

Copper Alloy.—See METAL CORROSION—Sea-Water.

Electro-Galvanizing.—See ELECTRO-GALVANIZING.

Galvanizing.—See Sherardizing; Galvanizing.

Gas Works.—The Practical Protection of Metal Surfaces in Gas Plants. L. P. Lowe. Read before the Pacific Coast Gas Assn. Considers the preservation of corrosive metal surfaces about gas plants, including buildings, machinery, gasholders, tanks, mains, pipes, etc. 5000 w. Am Gas Lgt Jour—Aug. 24, 1903.

Lacquers and Paints.—Lacquers and Paints for Metals. The first of a series of articles on compounds for protection or embellishment of metallic surfaces, and the proper way of applying them. Serial. 1st part. 3000 w. Engr, Lond—Sept. 11, 1903.

Locomotive Gases.—Protecting Low Overhead Structures from Gases and Blasts of Locomotives. Statements presented as the report of a committee at the convention of the Association of Railway Superintendents of Bridges and Buildings at Chicago. 1600 w. Eng News—Oct. 27, 1904.

Pabst Building, N. Y.—The Preservation of Steel. An illustrated description of the condition of the steel frame work found in the demolition of the Pabst Building in New York City. The conclusion reached is that concrete is a very efficient protection. 900 w. Ins Engng—Feb., 1903.

Official Report on Preservation of Structural Steel in a Tall New York Building. Condensed report of Jas. P. Whiskeman to the Superintendent of Buildings, in regard to the condition of the Pabst Building, recently demolished. Ill. 1800 w. Eng Rec—April 18, 1903.

Paint.—See PAINT.

Sea Water.—See METAL CORROSION.

Sherardizing.—A New Process for the Protection of Iron and Steel from Corrosion. Sherard Cowper-Coles. Describes a new process of coating iron and steel with a thin even deposit of zinc at a temperature several hundreds of degrees below the metling point of zinc. Serial. 1st part. 1800 w. Prac Engr—July 1, 1904.

Sherardising. Illustrates and describes a new process, invented by Sherard Cowper-Coles, for protecting iron and steel from corrosion. 2200 w. Ir Age—Oct. 20, 1904.

Steel Buildings.—The Steel Work in Skeleton Buildings. William Copeland Furber. Discusses rust prevention and fireproofing. 2000 w. Ins Engng—Nov., 1901.

Protecting Steel Structures. Reports the results of interesting experiments of Louis H. Barker, the testing of paints and the success obtained by using paraffin paper as a substitute for covering metal. Ills. 1500 w. Ry Age—March 24, 1905.

See also Concrete; STEEL CONSTRUCTION—Corrosion.

Steel Cars.—See PAINT.

Zinc Coating.—See Sherardizing; GALVANIZING.

Zonca.—See PAINT.

METAL TRADES' ASSOCIATION.

Constitution of the National Metal Trades' Association. A copy of the revised constitution as amended at the N. Y. meeting. 4400 w. Ir Trd Rev—June 20, 1901.

METAL WORKING.

See also DIE; HARDENING; MACHINE SHOP; MACHINE TOOL; PRESS; PUNCHING; SHEET METAL; TEMPERING; TOOL.

Aluminum-Magnesium Alloys.—See ALLOY—Magnalium.

Bar Drawing.—See Drawing.

Capitaine.—See MACHINE TOOL.

Drawing.—Drawn Bars of Round and Rectangular Sections. Amos Price. An illustrated description of the way round and other bars are made. 1500 w. Am Mach—Jan. 21. 1904.

See also PUNCHING—Half Balls.

Drawing Press.—See PRESS—Drawing.

Electricity.—Some Uses of Electricity in the Working of Metals. C. F. Burgess. Points out various electrical properties which have been utilized. 2000 w. Wis Engr—Feb., 1904.

See also ELECTRIC DRIVING; ELECTRIC EQUIPMENT; ELECTRIC WELDING.

Hopper Design.—See COAL CHUTE.

Machinery, U. S.—Metal Working Machinery. Abstract of a United States Census report, prepared by Edward H. Sanborn upon the production of metal working machinery in the United States during the census year. 4300 w. Ir Age—Nov. 20, 1902.

Modern.—The Modern Craft of Metal Working. Day Allen Willey. Brief illustrated description of methods of fashioning bronze, iron and other metals into ornamental work. 1000 w. Sci Am Sup—Oct. 3, 1903.

Oxygen Flame.—See **WELDING—Blowpipe.**

Perforating.—See **SHEET METAL.**

Platinum.—See **PLATINUM.**

Punch.—See **PUNCHING; TOOL—Sub-die.**

Sawing.—See **SAWING.**

Stamping.—See **STAMPING MACHINE.**

Sub-Die.—See **TOOL.**

Sub-Press.—See **PUNCHING; SHEET METAL.**

Tool Steels.—See **TOOL STEEL.**

Twisting.—See **SHEET METAL.**

Waste Utilization.—See **WASTE UTILIZATION.**

METEORITE.

See **IRON—Meteoric.**

METEOROLOGY.

Anemometer.—See **ANEMOMETER.**

Atmospheric Electricity.—See **ELECTRIC CURRENT—Earth; ELECTRO-PHYSICS—Electron.**

Electric Instrument.—See **AGRICULTURAL MACHINERY—Electric.**

Instruments.—A Few Meteorological Instruments. George M. Hopkins. Illustrated descriptions of a weather vane, a wind pressure gauge and a rain gauge. 1200 w. Sci Am—Nov. 16, 1901.

Kite.—See **AERONAUTICS.**

Space Telegraphy.—See **SPACE TELEGRAPHY—Meteorology.**

METER.

See also **ELECTRIC METER; GAS METER; STEAM METER; WATER METER.**

Torsion.—See **DYNAMOMETER; TORSION METER.**

METHANOMETER.

Firedamp.—See **FIREDAMP.**

METRIC SYSTEM.

See **LABORATORY—U. S. National; SCREW THREAD; WEIGHTS AND MEASURES.**

MICA.

See also **DIELECTRIC—Mica; INSULATION.**

Opportunities for Improvement in Mica Mining. George W. Colles. A timely presentation of a subject which owes its importance to the new and widely increasing field of usefulness of mica as an electrical insulator. 4000 w. Engineering Magazine—Feb., 1902.

Mica and the Mica Industry. George Wetmore Colles. The treatment is industrial rather than scientific or theoretical, and aims at setting forth the present, past and probable future of mica-mining in this and other countries. Serial. 1st part. 5000 w. Jour Fr Inst—Sept., 1905.

Mica—Its Uses and Value. Charles C. Schnatterbeck. Information in regard to deposits and their quality, method of mining, uses, etc. Eng & Min Jour—March 28, 1903.

Mica. Phillips Thompson. A description of a monograph on mica, by Fritz Cirkel, with information from this source. 2000 w. Eng & Min Jour—Nov. 4, 1905.

Brazil.—Mica in Brazil. H. Kilburn Scott. Read before the Inst. of Min. & Met. Discusses its varieties, its uses, where it is obtained, and a description of the deposits and mines of Brazil. 5000 w. Mines & Min—Aug., 1906.

Canada.—The Canadian Mica Industry (L'Industrie du Mica au Canada). A. Ladureau. A brief review of the mica industry in general and that of Canada in particular. 800 w. Génie Civil—June 14, 1902.

Mica Deposits. Fritz Cirkel. Notes the characteristic features of mica and the uses made of it; the various species and their commercial importance; the Canadian deposits and their value; other deposits, etc. Ills. Serial. 1s tpart. 4800 w. Can Min Rev—May 31, 1904.

Dielectric Strength.—See **DIELECTRIC—Mica.**

South Dakota.—The Crown Mica Mine, Custer City, South Dakota. Dennis Henault. Describes the peculiar occurrence at this mine, and the method of preparing for market. Ill. 1000 w. Min & Sci Pr—March 21, 1903.

United States.—The Production of Mica in the United States. Extracts from the report of J. A. Holmes for the year 1902. 900 w. Min Rept—May 28, 1904.

MICRO-METALLURGY.

See **METALLOGRAPHY.**

MICROMETER.

See **GAUGE.**

MICROMETER CALIPERS.

See **GAUGE.**

MICROPHONE.

See **TELEPHONE—Microphone.**

MICROSCOPE.

See also **METALLOGRAPHY.**

Measurements.—A Method of Measuring Objects in the Microscope. Frederick E. Ives. Directions, with illustrations. 400 w. Jour Fr Inst—July, 1902.

Screw Thread.—See **SCREW THREAD—Microscope.**

Steel Manufacture.—See **STEEL METALLURGY—Microscope and Pyrometer.**

Water Analysis.—See **WATER ANALYSIS—Bacteriological.**

MILITARY ENGINEERING.

See also **BRIDGE—Military; COAST DEFENSE; FORTIFICATION; SUBMARINE MINE.**

Philippines.—The Engineer in the Moro Campaign. An account of the extent to which engineering work has participated in the campaign of the American troops against the Moros in the Philippines. 2000 w. Engineering Magazine—November, 1902.

Military Engineering and Civil Opportunities in the Philippines. Captain William W. Harts. An illustrated account of what has been done by the army of occupation, with some interesting particulars of methods, and an estimate of the work to be accomplished by civil engineers under the civil administration of the islands. 1800 w. Ills. The Engineering Magazine—Aug., 1903.

MILLING.

See also **MILLING CUTTER; MILLING MACHINE.**

Development.—Milling as a Method of Machining. Charles S. Gingrich. An account of its development in American shop practice, giving illustrations and data showing what can be expected from the intelligent use of the modern milling machine. 4000 w. Cassier's Mag—July, 1903.

Fixtures.—Some Milling Operations. A series of illustrations of rigs and fixtures for performing milling operations. 1500 w. Engr, Lond—Jan. 15, 1904.

Fixtures for Milling a Sewing Machine Arm. H. Robinson. Illustrated description. 900 w. Am Mach—March 24, 1904 .

An Indexing Milling Fixture. Jos. M. Stabel. Illustrated description of a fixture used on a sensitive drill press, its indexing mechanism being semi-automatic. 800 w. Am Mach—April 7, 1904.

Milling Machine Fixtures. The present article considers the milling machine vise, which has a stationary and movable jaw, against which are placed removable jaws, held in place by means of screws. Ills. Serial. 1st part. 2000 w. Mach, N Y—Nov., 1905.

See also **MACHINE TOOL.**

Indexing.—See **Fixture; INDEXING.**

Jig.—See **Fixture; JIG—Lathe.**

Lathe.—See **LATHE—Milling.**

Methods.—Milling Machine Methods. Illustrations with descriptions of operations in ordinary, every-day work. Gives also particulars of the material used, and other details of interest. 1400 w. Engr, Lond—May 22, 1903.

Saving Methods.—See **MACHINE SHOP.**

MILLING CHUCK.

A Special Milling Chuck, and the Making of It. Mike Romitur. Illustrated description. 1600 w. Am Mach—April 4, 1901.

MILLING CUTTER.

Milling Cutters. S. N. Brayshaw. Read before the Manchester (Eng.) Assn. of Engrs. On the making of cutters, their use and abuse, giving methods that the writer has found successful. Ill. 4800 w. Mech Engr—Nov. 1, 1902.

A Milling Cutter Working on a New Principle. Illustrates and describes the cutter of the Hess machine. 900 w. Mach, N Y—March, 1904.

Milling Cutters. Thomas R. Shaw. Illustrations, with descriptions, of various types of cutters. Serial. 1st part. 3000 w. Mech Engr—Nov. 12, 1904.

Angle Measurement.—A Device for Measuring Angle Cutters. Horace E. Hext. An account of methods attempted for determining accurately the angle of a milling cutter, with illustrated description of the device which gave satisfactory results. 1700 w. Am Mach—Aug. 1, 1901.

Tool Steel.—See **TOOL STEEL—Milling Cutters.**

MILLING MACHINE.

See also **BORING—Connecting Rod; GEAR CUTTING; MACHINE TOOL; MILLING.**

Becker-Brainard Works.—Methods of a New England Milling Machine Establishment. Gives half-tones and line engravings illustrating some of the special tools and methods used at the Becker-Brainard works, Hyde Park, Mass. Explanatory notes. 1800 w. Am Mach—Vol. 28, No. 39.

Cam.—A New Drill and a Cam Miller. Illustrations, with brief descriptions, of a radial drilling machine, and a machine for milling grooved cams. 4000 w. Engr, Lond—Sept. 25, 1903.

A Special Cam Milling Machine. John Tangye. Illustrated description of a machine which succeeded in greatly reducing the cost of certain details of engines, and in saving much time and labor. 1200 w. Prac Engr—March 25, 1904.

Cam Cutting.—See **CAM.**

Chuck.—See **MILLING CHUCK.**

Connecting Rods.—Making Steam Engine Connecting Rods on the Milling Machine. Charles S. Gingrich. Describes an experiment showing the wide applicability of the milling machine. 1300 w. Am Mach—Nov. 21, 1901.

Constant Belt Speed.—Constant Belt Speed Milling Machine. Illustrates and describes modifications in design to overcome the defects of the cone pulley as a means of driving the spindle, and of a variable spindle speed as a source from which to make the feed motion. 1500 w. Am Mach—Oct. 22, 1903.

Feeds.—Milling Machine Feeds. P. V. Vernon. Describes a method of feed driving, which the writer considers efficient and practical. Also editorial note. 2000 w. Am Mach—Oct. 30, 1902.

Milling Machine Feeds. Considers the usual methods of driving the feed of a milling machine, and the advantages of each; troubles that occur and their remedies; features, and desirable improvements. 3300 w. Engr, Lond—Jan. 30, 1903.

A Milling Machine Gear Box Feed with 25 Changes. A. H. Schkommodan. Illustrated description. 600 w. Am Mach—Vol. 27, No. 38.

See also **MACHINE TOOL—Drive Gear; Feeds.**

Feeds and Speeds.—Milling Machine Feeds and Speeds. Aims to demonstrate that a guide for determining the proper feed of milling cutters is found in ascertaining the thickness of the chip per tooth of the cutter. Ills. 1200 w. Am Mach—March 31, 1904.

Fly-Wheel.—Fly-Wheel Milling Machine. Illustrates and describes a machine having features of special interest involving the discovery of a novel principle in the use of large face cutters. 1600 w. Engr, Lond—June 3, 1904.

Hinge.—Semi-Automatic Hinge-Milling Machine. Francis W. Shaw. Illustrated detailed description of the machine and its operation. 1300 w. Am Mach—Vol. 28, No. 28.

Indexing.—See **INDEXING—Compound; MILLING—Fixture.**

Le Blond.—The New Le Blond Milling Machine. Illustrated description of these machines, calling attention to some features which are of interest. 1300 w. Ir Age—April 2, 1903.

Milwaukee Shop.—Some Features of a Milling Machine Shop. An account of a shop in Milwaukee, and some of the things seen there. Ill. 1800 w. Am Mach—April 2, 1903.

Paris Exposition.—Milling Machine Heads at Paris. Notes certain features of design which have for their object the adaptation of the milling spindle to work at various angles. Ill. 2000 w. Engng—Dec. 21, 1900.

Planing and Profiling.—Large Plano-Milling and Profiling Machine. An illustrated description of a machine designed for heavy work. 800 w. Engr, Lond—Oct. 30, 1903.

Screw Cutting.—See **Thread; SCREW MACHINE.**

Slot.—A Slot Milling Machine. Illustrated description of an automatic machine for the slotting of nuts and other small pieces. 700 w. Ir Age—April 14, 1904.

Spacing Attachment.—An Odd Spacing Attachment for the Milling Machine. A. Cashman. Illustrated description. 1000 w. Am Mach—Vol. 27, No. 34.

Thread.—Large Thread-Milling Machine. Illustrated description of a machine designed especially for cutting large worms, hobs, etc., taking work up to 12 inches diameter and 48 inches in length. 1400 w. Am Mach—Vol. 28, No. 37.

Universal.—Universal Milling Machine. Illustrated description of a milling machine manufactured at Providence, R. I. 1200 w. Engng—Aug. 18, 1905.

Vertical.—Vertical Spindle Milling Machine with Constant Speed Drive. Illustrated description of a new machine and its operation. 1200 w. Am Mach—Vol. 28, No. 9.

Vertical Milling Machine. Illustrated description of a machine made in Birmingham, England. 1200 w. Engr, Lond—June 2, 1905.

MINE.

See also **MINERAL REGION; MINING; MINING INDUSTRY;** and under specific kinds of mines.

British Columbia.—See **GOLD; MINERAL REGION; TIMBERING.**

Deep.—See **Temperatures; BORING; COAL MINING; MINING; SHAFT SINKING; TIMBERING.**

Electric Equipment.—See **ELECTRIC EQUIPMENT—Mines.**

Entrances.—Methods of Getting Into and Out of Mines. Arthur Edwin Haynes. Illustrated review of the methods thus far used. 2000 w. Engs' Year Bk, Univ of Minn—1901.

See also **MINE SHAFT.**

Experimental, Birmingham University.—See **EDUCATION—Mining, Birmingham.**

Fire Protection.—See **FIRE PROTECTION—Mines.**

Head Frame.—See **HEAD FRAME.**

Iron Pipe Support.—See **TIMBERING—Iron Pipe.**

Locomotive.—See **ELECTRIC LOCOMOTIVE—Mine; MINE HAULAGE.**

Pumping.—See **MINE DRAINAGE; PUMP; PUMPING STATION—Mines.**

Submarine.—See **SUBMARINE MINE.**

Temperature, Deep.—See **TEMPERATURE—Deep Mines.**

Valuation.—See **MINE VALUATION.**

Water Problem.—See **COAL MINE—Floods; GOLD MINING; MINE DRAINAGE; MINE FLOOD; PUMP.**

Water Supply.—See **WATER SUPPLY—Mining Communities.**

Wyoming.—Leading Mines of Wyoming. An illustrated article reviewing briefly the principal mining camps. 2500 w. Pacific C Min—Feb. 27, 1904.

MINE ACCIDENT.

See also **COAL MINE ACCIDENT; COAL MINE EXPLOSION; MINE FIRE; MINE FLOOD; MINER; RESCUE APPARATUS; RESCUE STATION.**

Austria.—Mining Accidents in the Years 1896-1900 (Die Betriebsunfälle beim Bergbau in den Jahren 1896-1900). J. Sauer. A tabulated account of the mining disasters in the Vienna district, including upper and lower Austria, Salsburg, Moravia, Silesia and Bukowina. Serial. Part I. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 16, 1901.

British Report.—See **MINER.**

Cardigan, Australia.—See **MINE FLOOD.**

Electric Shock.—See **ELECTRIC SHOCK—Exhall Coal Mine.**

First Aid.—First Aid to Injured in Mining Accidents. Dr. George W. King. A paper read at Butte meeting of the International Min. Cong. Illustrates and describes methods of treatment and devices to prevent further injury in handling wounded persons. 4500 w. Mines & Min—Nov., 1902.

The First-Aid Packet in Civil Practice and the Organization of First-Aid Societies. M. J. Shields. Calls attention to their value, especially in mining regions. 1800 w. Mines and Min—Dec., 1900.

First Aid to the Injured in Mining. Dr. George W. King. Abstract of a paper read before the International Min. Cong. A discussion of the causes of accidents and the methods of rescuing and aiding the injured. 3300 w. Engr & Min Jour—Sept. 13, 1902.

First Aid to the Injured in Mines. M. J. Shields. The present article is introductory, explaining the growth of the movement of rendering first aid, and giving an account of the work as established in mines. Serial. 1st part. 2200 w. Eng & Min Jour—Sept. 16, 1905.

See also **RESCUE APPARATUS.**

Frank, Alberta.—See **LANDSLIDE.**

1901.—Important Mining Accidents in 1901 (Bemerkenswerthe Unfälle beim Bergwerksbetriebe im Auslande). A brief record of mine accidents and explosions in all parts of the world. 800 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 15, 1902.

Prussian Commission.—The Prussian Mine Accident Commission (Die Verhandlungen und Untersuchungen der Preussischen Stein-und Kohlenfall-Kommission). An account of the proceedings and investigations and regulations of a Prussian commission appointed to investigate accidents due to the fall of rock and coal in mines. Tables. 3000 w. Glückauf—Jan. 4, 1902.

Rescue Apparatus.—See First Aid; **RESCUE APPARATUS.**

Safety Measures.—Safety Measures in Mining. Donald Macaulay and Louis G. Irvine. The present paper discusses measures in cases of ordinary accidents, and measures in cases of gassing. 7000 w. Jour Chem, Met & Min Soc of S Africa—Nov., 1905.
See also First Aid; **RESCUE APPARATUS; SAFETY LAMP.**

Transvaal.—The Preservation of Life in the Witwatersrand Mines. T. Lane Carter. States the causes of the mortality and suggests remedies. 1500 w. Eng & Min Jour—Aug. 30, 1902.

United States.—Fatal Accidents in Metal Mining in the United States. Frederick L. Hoffman. Gives information concerning the number of accidents in different years, discussing the causes so far as ascertained. Serial. 1st part. 1800 w. Eng & Min Jour—Jan. 14, 1904.

MINE ACCOUNTING.

See **COST-KEEPING—Mine; MINE MANAGEMENT—Accounting.**

MINE BUILDING.

See also **COAL MINE BUILDING.**

Tile vs. Brick.—Tile vs. Brick for Mine Buildings. William L. Affelder. Statements in regard to cost and adaptability of tile for purposes for which brick is commonly used. 1200 w. Mines & Min—Oct., 1905.

MINE CAGE.

See **HOISTING; MINE SHAFT.**

MINE CAR.

See also **MINE HAULAGE.**

Coupler Deterioration.—See **CAR COUPLER—Mine; Car Deterioration.**

Electric.—See **ELECTRIC LOCOMOTIVE; MINE HAULAGE.**

Pennsylvania.—Types of Mine Cars. R. V. Norris. Illustrates and describes general types in use in the Pennsylvania coal mines. 1000 w. Eng & Min Jour—April 27, 1905.

Rock Handling.—Car for Handling Rock at Mines. L. L. Logan. An illustrated description of an arrangement for handling and dumping mine cars loaded with rock. 1000 w. Mines & Min—Oct., 1903.

Running Gear.—Mine Car Running Gear. R. V. Norris. Brief illustrated descriptions of various types of wheels and methods of lubricating. 1400 w. Eng & Min Jour—May 18, 1905.

Steel.—Steel Mine Cars. M. G. Moore. Illustrates forms of construction and gives comparison of weights of steel cars with wooden cars of like capacities. 2000 w. Mines & Min—Aug., 1901.

Wales.—Welsh Mine Cars. J. Fox Tallis. Read before the So. Wales Inst. of Engs. An illustrated detailed description of some of the various types of cars in use in South Wales. 2000 w. Mines & Min—Dec., 1900.

MINE DAM.

Chapin, Mich.—Mine Dams. James MacNaughton. Read before the Lake Superior Mining Inst. An interesting description of dam construction in Chapin Mine, in the iron district of Michigan. Ill. 2100 w. Eng News—March 21, 1901.

Pribram, Bohemia.—Dam Construction in the Mines at Pribram, Bohemia (Verdämmungsbauten beim Pribramer Hauptwerke). F. Mladek. With illustrations of wooden and masonry dams used in closing mining tunnels against water. 1500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—March 2, 1901.

Erection of Mine Dams at Pribram. Illustrated description of novel methods and the results attained in Bohemia. 900 w. Col Guard—March 15, 1901.

MINE DRAINAGE.

See also **AIR LIFT; MINE DAM; PUMP; PUMPING ENGINE; SHAFT SINKING.**

Achddu, Wales.—Unwatering of the Achddu Colliery. John Morris. Abstract of a paper read before the Inst. of Min. & Met. Gives an account of the work at this coal mine near Burry Port, Wales, describing the pumps used and stating the difficulties. 3000 w. Min Jour—Nov. 11, 1905.

Barza, Transylvania.—The Sumps of the Lower Workings of the Barza Gold Mine, near Brad, in Transylvania (Das Sümpfen der unter Wasser geratenen Tiefbaue der Goldgrube Barza bei Brad in Siebenbürgen). H. Wendeborn. Describing the use of electrically-driven centrifugal pumps for shaft sinking in water bearing strata. 8000 w. Glückauf—July 22, 1905.

Bore-Holes.—Bore-Holes for Pumping Purposes. Edward S. Wight. Read before the N. of England Inst. of Min. Engrs. Describes a method by which a bore-hole can be used for pumping purposes, not as an engineering feat, but to show that mine water may be delivered direct to the surface. 1500 w. Min Rept—April 21, 1904.

Compressed-Air Pump.—The "Dense Air" System of Power Transmission in Deep Mine Pumping. D. A. McNeill. Illustrated description of a plant recently installed at the Bisbee West Copper Min. Co.'s Shaft No. 1, in Arizona, which uses compressed air for operating a pump at the bottom of a mine. 800 w. Eng & Min Jour—Dec. 27, 1902.
See also **COMPRESSED AIR.**

Comstock, Nevada.—Pumping on the Comstock. Carl George P. de Laval. Describes the installation of modern pumps to overcome the difficulties at the Comstock. Ills. 2300 w. Eng & Min Jour—March 16, 1905.

Cripple Creek.—The Cripple Creek, Colo., Drainage Tunnel. W. B. Wilson. Describes this district, the water occurrence, and discusses the steps necessary to solve the water question, and the vast issues at stake. 3000 w. Min & Sci Pr—Jan. 17, 1903.

Water in the Mines of Cripple Creek. Victor G. Hills. Describes the distribution of water in the mines of this Colorado district. A valuable contribution to the data covering the occurrence of water in veins. 3300 w. Eng & Min Jour—Aug. 8, 1903.

Drainage of the Cripple Creek District. An epitome of the recommendations of D. W. Brunton relative to the construction of a drainage tunnel. Map. 500 w. Min Rept—Oct. 19, 1905.

Drainage of the Cripple Creek District. D. W. Brunton. A report prepared for a committee appointed by Cripple Creek mine owners, giving interesting information concerning the tunnels, their cost, location, etc. Ills. 4500 w. Eng & Min Jour—Nov. 4, 1905.

Electric. — See **ELECTRIC EQUIPMENT — Mine; HOISTING—Electric, Water; PUMP.**

Electric, Belgian.—Belgian Electrical Mine Drainage Installation of the Societe Anonyme des Charbonnage Reunis de la Concorde. Frank C. Perkins. Describes a polyphase installation. 1500 w. Min Rept—Dec. 31, 1903.

Electric, German.—German Electrical Installations: Mine Drainage and Ventilation. Emile Guarini. An illustrated article describing the uses to which electricity is applied in the mines. 2500 w. Min Mag—Jan., 1905.

Gold Mine.—See WATER FLOW.

Gold, New Zealand.—Water in the Hauraki Gold Field, New Zealand. Percy Morgan. Information in regard to these mines where water is always encountered immediately below the drainage level of the surface and requires the use of pumps. 1800 w. Eng & Min Jour—Sept. 15, 1904.

Harris System.—See AIR LIFT.

Horcajo, Spain.—The Drainage Plant of the Horcajo Mines (Installation d'Exhaure des Mines de l'Horcajo). Describing the system of high-pressure centrifugal pumps arranged in series, for draining the silver-lead mines of Horcajo, Spain. 2500 w. Génie Civil—Aug. 16, 1902.

Hydraulic Engine.—See HYDRAULIC ENGINE—Mine Drainage.

Induction Motor.—See ELECTRIC MOTOR—Induction, Slow Speed.

Iron Mountain, Mich.—Unwatering the Hamilton Mine. John T. Jones. Read before the L. Sup. Min. Inst. An interesting account of the work of unwatering the mines at Iron Mountain, Mich. 1200 w. Eng & Min Jour—Nov. 11, 1905.

Pennsylvania, Anthracite.—Water-Hoisting in the Pennsylvania Anthracite Region. R. V. Norris. A discussion of this paper at Albany meeting. 1200 w. Trans Am Inst of Min Engrs—Feb., 1903.

Water-Hoisting in the Pennsylvania Anthracite Region. R. V. Norris. Describes the present method of hoisting, giving particulars of the water hoists in use and under construction and related information. Ill. 3800 w. Trans Am Inst of Min Engrs—Feb., 1903.

Penrhyn Quarry.—See QUARRY—Penrhyn.

Rocky Mts.—Mine Drainage in the Rocky Mountain Region. A. W. Warwick. Gives an idea of the immense expense in handling the water of mines, and describes the methods of pumping now in use, discussing their efficiency, and means of more economical working. Ill. 4700 w. Min Rept—Jan. 9, 1902. Special No.

See also Cripple Creek.

Short Mountain, Pa.—The Cost of Pumping at the Short Mountain Colliery of the Lykens Valley Coal Company. R. V. Norris. Describes the conditions prevailing at these mines, the pumping plant, and the cost of pumping. Ill. Trans Am Inst of Min Engrs—Feb., 1903.

Staffordshire.—Mines Drainage in North Staffordshire. Richard H. Wynne. Notes on the Pottery Coal-field, describing its geological and general construction, and some characteristics of its minerals, and methods used in freeing the mines of water. 1600 w. Ir & Coal Trds Rev—Feb. 27, 1903.

Transvaal.—Water in the Witwatersrand Mines. T. Lane Carter. Account of pumping acid water from the Transvaal gold mines, with diagram. 1500 w. Eng & Min Jour—Aug. 11, 1904.

MINE FIRE.

See also COAL MINE ACCIDENT; COAL MINE FIRE; MINE ACCIDENT.

Mine Fires. John Herman. Discusses the causes of fire in various kinds of mines and methods used in overcoming them. 1800 w. Min Rept—March 19, 1903.

Smuggler Union.—The Smuggler Union Mine Fire. An account from the Inspector's report to the Commissioner of Mines, describing this disaster in Colorado, and discussing the causes which resulted in such large fatalities. 1800 w. Mines & Min—Jan., 1902.

MINE FLOOD.

Cardigan, Australia.—Cardigan Proprietary Disaster. An account of this disaster in Australia, with editorial comment. 2000 w. Aust Min Stand—March 27, 1902.

Pennsylvania Anthracite.—See COAL MINE—Flood.

MINE GAS.

See also COAL MINE EXPLOSION; FIREDAMP.

Gases in Mines. W. Poole. Lecture delivered at Charters Towers School of Arts. Considers the gases which poison the air for breathing purpose, and the necessity for efficient ventilation through the working places of mines. 3500 w. Queens Gov Min Jour—Dec. 15, 1904.

Dolcoath, Cornwall.—The Dust in the Air and the Gases from Explosives in Dolcoath Mine. R. Arthur Thomas and W. P. O. Macqueen. An account of an investigation undertaken at this Cornish tin mine to determine the amount of stone dust present in the air, the efficacy of water jets and other means for preventing dust, and the amount of gaseous impurities present after blasting. 2500 w. Ir & Coal Trds Rev—Dec. 16, 1904.

Mercury Mine.—See MERCURY—Mine Gas.

Metalliferous Mine.—Explosive Gas in a Metalliferous Mine. Read before the Inst. of Min. & Met., London. F. W. Grey. Notes on an unusual occurrence observed in the Hutti mine in India, while undertaking the development of old native gold workings. 1400 w. Col Guard—March 1, 1901.

Gases in Metalliferous Mines. Harry A. Lee. Read before the Colorado Sci. Soc. Describes conditions as found at the Happy Thought Mine, near Creede, Colo. 3000 w. Min Rept—March 3, 1904.

Gases in Metalliferous Mines. Abstract of a paper by Harry A. Lee, read before the Colorado Sci Soc. An account of the occurrence of free nitrogen gas in a vein in a mine at Creede, Colo., and its effects on those breathing it. 1500 w. Mines & Min—May, 1904.

Sulphuretted-Hydrogen.—Sulphuretted-Hydrogen Gas in Quartz Mines. R. M. Aitken. Discusses accidents due to mine gases, especially one on March 29, in the Energetic Mine, Rufton district. 1800 w. N Z Mines Rec—May 16, 1904.

Toxicology.—Some Mine Gases: Their Toxicology and Possible Connection with Miners' Phthisis. A. Heymann. Discusses the effects of higher oxides of nitrogen and carbon monoxide. 5800 w. Jour Chem & Met Soc of S Africa—June, 1903.

Some Mine Gases: Their Toxicology and Possible Connection with Miners' Phthisis. Discussion of paper by A. Heymann. 1200 w. Jour Chem & Met Soc of S Africa—Aug., 1903.

Some Mine Gases: Their Toxicology and Possible Connection with Miners' Phthisis. Discussion of a paper by A. Heymann. 13,000 w. Jour Chem, Met & Min Soc of S Africa—Sept., 1903.

Some Mine Gases: Their Toxicology and Possible Connection with Miners' Phthisis. Continued discussion of a paper by A. Heymann. 10,000 w. Jour Chem, Met & Min Soc of S Africa—Oct., 1903.

MINE HAULAGE.

See also COAL MINING; COMPRESSED AIR LOCOMOTIVE; ELECTRIC EQUIPMENT; ELECTRIC LOCOMOTIVE; HOISTING; LOCOMOTIVE—Industrial; MINING MACHINERY; ROAD—Mines; ROPE; WIRE ROPE.

Transportation of Material Underground. A. W. Warwick. As an example, the working of a small low-grade mine is considered. The present article deals principally with the financial side. Serial. 1st part. 2700 w. Min Rept—Jan. 30, 1902.

Different Methods of Mine Haulage Compared. B. F. Jones. Considers the good and bad methods found as parts of all systems. Ill. 7000 w. Mines & Min—Aug., 1902.

A Discussion of Methods of Underground Transportation. J. B. Porter. The application of mechanical power to mine haulage, and the economies thereby effected. 4000 w. Engineering Magazine—Jan., 1905.

Animal.—The Distribution of Power in English Mines. Sydney F. Walker. Discusses the horse, and the factors which enter into the expense of haulage by animal power. 2000 w. Mines & Min—May, 1902.

Care and Protection of Mules in Mines. Gives rules and regulations issued to employees by the Delaware & Hudson Co. at Scranton, Pa. 3800 w. Mines & Min—July, 1903.

Animal Haulage in Coal Mines. Charles E. Bowron. Notes and data in regard to costs, derived from experience at mines in Alabama and Tennessee. 2600 w. Mines & Min—Oct., 1905.

See also Compressed Air vs. Animal.

Antonio, Cuba.—See **MOUNTAIN RAILWAY.**

Atpontley, Tenn.—See **Incline.**

Belgian.—See **COAL MINING.**

Benzine.—See **BENZINE LOCOMOTIVE.**

Benzine and Electric.—See **ELECTRIC LOCOMOTIVE —Mine.**

Bingham, Utah.—See **ORE TRANSPORTATION.**

Cable-Electric.—Cableway Conveyors for Mining Service (Neuere Drahtseilbahnen für Zechenbetriebe). G. Dietrich. Illustrating numerous installations of cable conveyors, both on the surface and in underground workings, in connection with electric driving. Two articles. 6000 w. Glückauf—July 23, 30, 1904.

Coal.—See **CONVEYOR—Mine Hoist.**

Compressed Air.—Compressed-Air Haulage. Robert Peele. A comparison of the several forms of motor haulage, stating the particular advantages of compressed air for mine work. 4000 w. Mines & Min—July 1, 1902.

Compressed Air as a Motive Power Underground. T. G. Oliver. Abstract of a paper read before the Monkland Improvement and Debating Soc., Gympie, Q. Considers the serviceable pressure and the methods of aplication. 8300 w. Queens Gov Min Jour—July 15, 1903.

Tests with Haulage System to Economise Air. Translation from an article in "Glückauf," by Fr. Hempel. Gives practical results from trial tests with an endless-rope haulage driven by duplex air cylinders. Ills. 1200 w. Mines & Min —July, 1905.

See also Electric vs. Compressed Air; COMPRESSED AIR; COMPRESSED-AIR PLANT.

Compressed Air vs. Animal.—A Study in the Economical Arrangement of Compressed Air Haulage. Ernest Brackett. Considers the influence of haulage on the economical working limit and on the cross and haulage entry distances, and compares compressed air haulage with animal. 5600 w. Eng & Min Jour—Feb. 28, 1903.

Compressed-Air Motors for Gathering Cars in Coal Mines. Beverley S. Randolph. Gives a comparison of motors and mules used in gathering cars from working-places, and the comparative cost. Ill. 1000 w. Trans Am Inst of Min Engrs—Feb., 1903.

Diedenhofen, Lorraine.—See **Rope.**

Durham, Eng.—See **Electric.**

Electric.—Electric Haulage for Collieries. Ernest Kilburn Scott. Reviews the systems of haulage used in the collieries of Great Britain, considering points of importance in calculating the power neded. Ill. 3800 w. Ir & Coal Trds Rev—Dec. 21, 1900.

A Lancashire Electrical Haulage Plant. Illustrates and describes a plant at Breightmet Colliery, near Bolton, as a type of the ease with which electricity may be applied to mining machinery. 800 w. Col Guard—July 26, 1901.

Electric Mine Haulage. W. B. Clarke. Explains the influence of grades, curves, track construction, etc., upon the capacity of locomotive required for a given work. 2700 w. Mines & Min—Jan., 1902.

Electric Haulage in Coal Mines. W. B. Clarke. Brief illustrated description of plant, with general remarks. 1400 w. Elec Wld & Engr—March 29, 1902.

Electric Mine Haulage. W. B. Clarke. Considers the electric mine locomotive and its adaptation to underground haulage. Ills. 2000 y. Min Mag—Oct., 1904.

Some Notes on Electric Haulage for Mines. Discusses the plant, system, cost, locomotive haulage, etc. 2800 w. Elec Engr, Lond—June 13, 1902.

Florence Mine. An illustrated description of some ingenious contrivances used in connection with the electric haulage system of this coal mine. 1500 w. Mines & Min—July, 1902.

Electrical Transport of Ores. An illustrated description of the application of electricity for underground haulage. Serial. 1st part. 1600 w. Aust Min Stand—June 26, 1902.

Third-Rail Tail-Rope Haulage System. L. L. Logan. An illustrated description of an arrangement adapted to handling a large tonnage in a difficult place. 1400 w. Mines & Min—May, 1903.

Electric Haulage in Metal Mines. W. N. Clark. Discusses the conditions of haulage in a metal mine, and describes the system used by the United Gold Mines Company, of Victor, Colorado. 1700 w. Eng & Min Jour—Feb. 25, 1904.

Electric Haulage in Metal Mines. General remarks, with an illustrated description of the haulage system used by the United Gold Mines Co., of Victor, Colo. 1500 w. Bul Colo Sch of Mines—Jan., 1904.

Polyphase Hauling Plant at Bolsover Colliery. Illustrated description of recently installed plant. 800 w. Col Guard—March 4, 1904.

The Development of the Electric Mining Locomotive. Frank C. Perkins. Illustrated detailed description of patents for mining cars and locomotives and systems of transportation and haulage by electricity in mines. Serial. 1st part. 1200 w. Sci Am Sup—April 23, 1904.

Electric Traction for Mines. A. J. Bloemendal. Shows the advantages and good results obtained at the installations at the Szaboles coal mines. Ills. 2000 w. Trac & Trans—May, 1904.

High-Tension Underground Hauling-Gear. Illustrates and describes the electric haulage recently installed at Durham collieries. 1100 w. Engng—March 17, 1905.

See also ELECTRIC EQUIPMENT; ELECTRIC LOCOMOTIVE—Mine.

Electric, Gathering.—See **ELECTRIC LOCOMOTIVE —Mine.**

Electric Locomotive.—See **ELECTRIC LOCOMOTIVE —Mine.**

Electric, South Wales.—A Complete Electrical Installation Underground. Brief illustrated description of the electrical plant at the United National Collieries, Rhondda Valley, South Wales. 1700 w. Col Guard—May 26, 1905.

Electric, Stassfurt.—The Underground Railway of the Stassfurt Salt Mines (Die Untergrundbahn des Königlichen Salzwerkes zu Stassfurt). J. Westphal. Illustrating and describing the electric railway system recently installed in the Stassfurt salt mines. 4000 w. 3 plates. Glückauf—Oct. 4, 1902.

Electric vs. Compressed Air.—Mine Locomotives. W. B. Clarke. A comparison of the efficiencies and relative cost of installations of electricity and compressed air. 2200 w. Mines & Min—July, 1901.

Compressed Air and Electricity for Haulage in Coal Mines. A commentary on W. B. Clarke's paper, read at meeting of the Am. Inst. of Min. Engrs. 2000 w. Mines & Min—June, 1903.

Pneumatic and Electric Locomotives in and about Coal Mines. A. S. E. Ackermann. Abstract of paper read before the Inst. of Min. Engrs. Brief comparison of the working of the two systems. 1200 w. Elect'n, Lond—Aug. 14, 1903.

Endless Rope.—New Endless-Rope Haulage Plant. Erskine Ramsay. Describes the plant at Slope No. 3, Pratt Mines Div., Tennessee Coal, Iron & Railroad Co., in Alabama. 2000 w. Mines & Min —Dec., 1903.

See also Compressed Air; Oil Engine; CABLE RAILWAY—Penwyllt Brick Works.

Engineer.—See **HOISTING.**

Ensley, Alabama.—Electrical and Steam Haulage. Neil Hutchings. An illustrated description of the haulage system at Slope No. 3, Pratt mine, of the Tennessee Coal, Iron & Railroad Co., at Ensley, Alabama. 2200 w. Mines & Min—Nov., 1904.

Gunckel System.—Wire Rope Haulage Problem. George S. Whyte. Explains method of calculating for the application of the Gunkel endless rope system of haulage. Ills. 1200 w. Mines & Min—April, 1904.

Incline.—The Incline of the Atpontley Coal Company. Walter H. Finley. Illustrated description of the apparatus for handling coal in cars from a high to a low elevation at a Tennessee mine. 1200 w. Mines & Min—Aug., 1904.

See also Slope; HOISTING—Safety Appliance; MINE SHAFT; MOUNTAIN RAILWAY—Antonio, Cuba.

Intermediate Side Track.—Intermediate Side Track for Tail-Rope Haulage. L. L. Logan. Illustrates and describes a plan as operated at the Slope mine at Robertsdale, Pa. 800 w. Mines & Min —June, 1902.

Jig.—A Single Track Mining Jig. Sketches and description of a single track gravity tramway that has been in successful operation at the Gold Hill Mine, Grass Valley, California. 1200 y. Min & Sci Pr—Feb. 8, 1902.

Joplin, Mo.—See **HOISTING.**

Morgan.—New System of Haulage Adapted to Heavy Grades. Benedict Shubart. An illustrated description of the Morgan third-rail system. 1200 w. Min & Sci Pr—May 13, 1905.

Morgan Third Rail.—An Approved System of Mine Haulage. Benedict Shubart. An illustrated description of the Morgan third-rail system. 900 w. Min Rept—Jan. 12, 1905.

Mule.—See **Animal; Compressed Air vs. Animal.**

Oil Engines.—Notes on the Application of an Oil Engine to Main and Tail and Endless Rope Haulage Combined. W. C. Blackett. Read before the N. of Eng. Branch of the Nat. Assn. of Col. Mgrs. An account of the use of oil engines in secondary haulage, describing the method. Ils. 2000 w. Ir & Coal Trds Rev—Nov. 18, 1904.

Problems.—Problems in Hauling and Hoisting. Alexander Bowie. Mathematical discussion of problems useful to mining engineers. 600 w. Trans Am Inst of Min Engrs—June, 1901.

Redheugh, Eng.—Notes on the Utilisation of Surplus Power in a Self-Acting Incline at Redheugh Colliery. C. H. Steavenson. Describes a method of hauling coals by means of the surplus power derived from a self-acting incline. 1500 w. Ir & Coal Trds Rev—July 3, 1903.

Rhondda, South Wales.—See **Electric, South Wales.**

Rope.—The Rope Haulage Plant at Diedenhofen, Lorraine (Die Seilförderungsanlage im Karlstolln bei Diedenhofen). Hr. Heise. An illustrated description of a rope-haulage plant for an iron mine tunnel. 1 plate. 2500 w. Glückauf—Feb. 1, 1902.

See also **Endless Rope; Oil Engine; Tail Rope; ROPE; WIRE ROPE.**

Rope and Chain.—Distribution of Power in English Mines. Sydney F. Walker. Considers the use of ropes and chains and the causes of loss and waste of power. 2000 w. Mines & Min—Oct., 1902.

Rossland, B. C.—See **HOISTING.**

Safety Appliances.—Catches for Inclined Cable Railways (Fangvorrichtungen an Steilen Förderbahnen). H. Gertner. Illustrating various forms of safety appliances for use with inclined mine hoists, both for chain and wire cables. 1800 w. Glückauf—April 23, 1904.

See also **HOISTING.**

Self-Acting.—Self-Acting Haulage in Fifeshire. Philip Hodge. Read before the British Soc. of Min. Students. Illustrates and describes systems for bringing coals from a higher to a lower level. 2700 w. Ir & Coal Trds Rev—July 19, 1901.

Single Rail.—The Application of the Mono Rails in Underground Tramming at the Langlaagte Deep. Wager Bradford. A brief description, with illustrations, of a successful installation of a monorail system of motor traction, suspended from the roof. 5000 w. Jour S African Ass'n of Engrs —Dec., 1905.

Slope.—Wire-Rope Slope Haulage. An illustrated description of an arrangement for hauling on a slope under difficult conditions, with a record of the life of wire ropes. 1200 w. Mines & Min —April, 1904.

See also **Incline.**

Tail Rope.—The Tail-Rope Haulage System in a Coal Mine. An illustrated account of this system, with information concerning cost of equipment and maintenance. 2000 w. Eng & Min Jour—Nov. 22, 1902.

Underground Wire Rope Haulage. Gives illustrated descriptions of features of the tail rope system as operated in the workings of a mine in Illinois. 1700 w. Sci Am Sup—Dec. 27, 1902.

See also **Electric; Intermediate Side Track.**

Transvaal.—Underground Handling and Transport of Ore. Charles B. Saner and George Carter. Considers the conveying of the broken ore to levels, and transport of ore to shaft-loading stations. Chiefly in reference to the Rand. 5000 w. Jour Chem, Met & Min Soc of S Africa—Nov., 1903.

Turntable.—See **TURNTABLE—Mine Haulage.**

Wilczek, Austria.—See **HOISTING.**

MINE HOISTING.

See **HOISTING; HOISTING ENGINE; MINE HAULAGE.**

MINE LOCOMOTIVE.

See **BENZINE LOCOMOTIVE; COMPRESSED-AIR LOCOMOTIVE; ELECTRIC LOCOMOTIVE; LOCOMTIVE—Industrial; MINE HAULAGE.**

MINE MANAGEMENT.

See also **COAL-MINE MANAGEMENT; COST-KEEPING; MINE VALUATION; MINING; WORKS MANAGEMENT.**

The General Principles of Successful Mine Management. A. G. Charleton. The organization of personnel and plant and the functions of the manager; with a list of works of reference. 5500 w. Engineering Magazine—Nov., 1900.

The Practical Management of Mining Operations. John E. Hardman. A general review of the principles of successful practice in the management of mining operations. 5000 w. Engineering Magazine—Jan., 1901.

Commercial Mine Organization. Charles V. Jenkins. Shows the advantages of a systematic organisation of the mine and office force, giving suggestions for bookkeeping. 5000 w. Mines and Min—July, 1902.

Real Values in Mine Management. Charles H. Fitch. Discusses some considerations by which management can be judged. 2000 w. Min & Sci Pr—Aug. 8, 1903.

Accounting.—The Payment of Extensions of Mining Plant Out of Revenue. Discusses the suitability of the ordinary methods of accounting to the case of mining. 1600 w. Eng & Min Jour—July 11, 1903.

Cost-Accounts of Gold-Mining Operations. Thomas H. Sheldon. A detailed description of the system used by the Portland Gold Mining Co., Cripple Creek, Colo. 6500 w. Am Inst of Min Engrs—Nov., 1905.

See also **COST-KEEPING—Mine.**

Auditing.—Auditing a Mining Company's Accounts. Charles V. Jenkins. On the importance of an audit, the difficulties met and methods applicable. 6000 w. Mines & Min—June, 1902.

The Auditing of a Mining Company's Accounts. Charles V. Jenkins. On the value of an audit, inspection of accounts by mining engineers, the conduct of an audit, redemption of capital, etc. 5700 w. Trans Am Inst of Min Engrs—Feb., 1902.

Discipline.—Mine Discipline. D. C. Thomas. Read before the Ohio Min. Engrs. Discusses what constitutes discipline and the importance of system as an aid to its enforcement. 1900 w. Mines & Min—June, 1901.

Discipline and Danger in Mines. R. W. Raymond. A discussion of the recklessness and wastefulness of miners, especially coal miners. 2400 w. Eng & Min Jour—July 26, 1902.

"Hole Contract" System.—The Operation of the 'Hole-Contract" System in the Center Star and War Eagle Mines, Rossland, B. C. Carl R. Davis. An advance paper to be read before the Am. Inst. of Min. Engs., with editorial. An explanation of this system, discussing its advantages, disadvantages and economic results. 3800 w. Eng & Min Jour—June 29, 1901.

The Operation of the "Hole Contract" System in the Center Star and War Eagle Mines, Rossland, B. C. Carl R. Davis. Explains why the system was introduced, the details, advantages and disadvantages of the system. 2200 w. Trans Am Inst of Min Engrs—Nov., 1901.

The Operation of the "Hole-Contract" System in the Center Star and War Eagle Mines. Contribution to the discussion of paper by Carl R. Davis. 900 w. Trans Am Inst of Min Engrs—Nov., 1901.

See also **MINING—British Columbia.**

Machine Cutting.—See **COAL MINE MANAGEMENT.**

Metalliferous.—The General Management of Metalliferous Mines. Albert Williams, Jr. A discussion of the fundamental business principles upon which successful mining management depends. 2500 w. Engineering Magazine—January, 1903.

The General Management of Metalliferous Mines. Albert Williams, Jr. Mr. Williams' second paper discusses the important question of the relations between the technical and business departments, showing the conditions tending to greatest commercial efficiency. 3500 w. Engineering Magazine—February, 1903.

The General Management of Metalliferous Mines. Albert Williams, Jr. The concluding article of the series discusses the methods of increasing the efficiency of the management staff by a suitable division of duties. 3500 w. Engineering Magazine—March, 1903.

New Zealand vs. Africa.—Mining Costs on the Rand and in New Zealand. From the annual report on portions of the West Coast Gold Fields for 1902. A comparison of expenses of working. 2000 w. N Z Mines Rec—Sept. 16, 1903.

Opening, Number Scheme.—A Number Scheme for Mines. Matt W. Alderson. An explanation of system adapted to the needs of mine development. 1200 w. Min & Sci Pr—Oct. 24, 1903.

Ore Reserves.—The Auditing of Ore Reserves. Discussion of paper on this subject by B. J. Collings. 5700 w. Jour Chem, Met & Min Soc of S Africa—Feb., 1905.

The Economic Ratio of Treatment Capacity to Ore Reserves. H. C. Hoover. Discusses mine development with the view of securing the maximum profit. 2400 w. Eng & Min Jour—March 24, 1904.

Ore Schedule.—See **ORE—Schedule.**

Output.—Recording the Output of a Mine. Charles V. Jenkins. Describes a system of securing detailed record of ore production, distinguishing shipments, and identifying returns. 4200 w. Mines & Min—Sept., 1902.

Premium System.—See **WAGES.**

Russia.—See **COAL MINE MANAGEMENT.**

"Stope Books."—The Method of Keeping "Stope Books" in the Mines of the Butte District, Montana. Charles E. Morrison. An explanation, with diagrams. 2000 w. Sch of Mines Qr—Jan., 1905.

Superintending.—Mine Superintending. E. Rammelmeyer. On the duties and responsibilities of the man who directs the work in and about a mine. 1500 w. Min & Sci Pr—March 4, 1905.

Working Costs.—The Distribution of Power on Mines. C. E. Hutton. Describes the method of power account apportionment adopted at the Van Ryn mines. Tables and discussion. 7500 w. Jour S African Assn of Engrs—Nov., 1905.

MINE MAP.

See also **SURVEYING—Mine.**

When in Black and White. Claude V. Martin. Read before the Ohio Inst. of Min. Engs. Some suggestions in regard to the attainment of a neat and clear appearance in the making of mine maps. 1500 w. Mines & Min—Feb., 1901.

Mine Plans, Their Preparation and Use. J. D. Kendall. Read before the Inst. of Min. & Met. The present article discusses the preparation of plans and what they should show. Serial. 1st part. 1700 w. Min Rept—Aug. 20, 1903.

Geological Mine-Maps and Sections. D. W. Brunton. Recommends a more extended use of mine-maps, explaining method and giving drawings, showing how valuable they may be made. 1800 w. Am Inst of Min Engrs—Sept., 1905.

Coal.—See **SURVEYING—Mine.**

Mineral Veins.—See **DRAWING—Mineral Veins.**

Ore Bodies.—Graphic Method of Mapping Exposed Ore Bodies. G. W. Miller. Describes a method that has been tested and used extensively with satisfaction, and been found especially adapted for ore deposits lying in continuous sheets, or those of the fissure vein, or bedded types. Ill. 2800 w. Min & Sci Pr—March 28, 1903.

Sketching.—Free-Hand Sketching in the Mining Field. Arthur Lakes. On the importance of teaching sketching in technical education, naming some of the uses in the field, and offering some suggestions for education in mining sketching. Serial. 1st part. 2200 w. Min Rept—June 9, 1904.

MINE MODEL.

See also **GOLD MINE—California.**

Mine Models. E. S. Sheffield, Jr. Discusses methods that have been tried to quickly and clearly illustrate underground conditions, and describes the satisfactory model devised and used at the Treadwell mine, Alaska. 700 w. Cal Jour of Tech—April, 1904.

MINER.

See also **LABOR; MINE ACCIDENT; MINE MANAGEMENT; STRIKE.**

British Report.—Mining Labor and Accidents for the Year 1900. Part II. of Dr. Foster's General Report, containing valuable information concerning the labor conditions. 4500 w. Col Guard—Aug. 30, 1901.

Diseases.—See **ANKYLOSTOMIASIS; COAL MINER; MINE GAS; MINERS' PHTHISIS.**

Hygiene.—The Hygiene of Workers in Mines. Dr. E. W. King. Discusses some of the causes that tend to impair the health and shorten the lives of miners. 5000 w. W Min Wld—Jan. 11, 1902.

Johannesburg.—Labor Conditions in Johannesburg. T. Lane Carter. A statement of the labor conditions of the past, and the future outlook. 2000 w. Eng & Min Jour—July 12, 1902.

Kaffirs.—The Kaffir Miners of the Johannesburg Gold Mines. T. Lane Carter. Describes how they work and how they are managed. Ill. 1600 w. Mines & Min—Nov., 1901.

The Kaffir Mine-Workers. T. Lane Carter. Reports marked improvement in their efficiency, discussing the reasons, and outlining the methods of managing and caring for the miners. 1500 w. Eng & Min Jour—Feb. 18, 1904.

South Africa.—South Africa and Her Labor Problem. Charles Sydney Goldmann. Discusses present conditions in South Africa and the great need of labor, the remedy, &c. 7000 w. Nineteenth Cent—May, 1904.

Transvaal.—See **Johannesburg; Kaffir; South Africa; GOLD MINING.**

MINERAL.

See also **COAL; GEOLOGY; MINERAL REGION; MINING INDUSTRY; ORE DEPOSIT; PRECIOUS STONE.**

Analysis.—Modern Methods of Rock and Mineral Analysis. Dr. W. F. Hillebrand. An outline of present practice, showing why it differs from earlier times. Serial. 1st part. 5800 w. Jour Fr Inst—Feb., 1903.

British Colonial at Glasgow.—Colonial Minerals at the Glasgow Exhibition. The present article notices the mineral products of most interest from Rhodesia and Queensland. Serial. 1st part. 2300 w. Col. Guard—Aug. 23, 1901.

Cutting and Polishing.—Cutting and Polishing Mineral Specimens. Prof. Frank W. Brady. Gives a method of constructing apparatus at a small cost by which specimens may be prepared for exhibit or use. Ill. 1500 w. Mines & Min—Sept., 1903.

Serpentine.—See **SERPENTINE.**

Shipments.—See **COAL HANDLING; DOCK; HARBOR; MECHANICAL HANDLING—British Ports; PORT.**

MINERAL INDUSTRY.

See **COAL INDUSTRY; IRON INDUSTRY; MINERAL REGION; MINING; MINING AND METALLURGY; MINING INDUSTRY.**

MINERAL REGION.

See also **COAL REGION; COPPER; GEOLOGY; GOLD; IRON ORE; LEAD; MINE; MINING; MINING AND METALLURGY; MINING INDUSTRY; NATURE'S STORES; ORE; ORE DEPOSIT; PROSPECTING; SILVER; TIN; ZINC;** and under other metals and minerals.

Africa.—The Distribution of Mineral Wealth in Africa (La Repartition et les Caractères de la Richesse Minérale en Afrique). L. De Launay. A general study of the mineral resources of Africa, with maps showing the distribution and possibilities of development. 6000 w. Rev Gen des Sciences—Nov. 30, 1902.

See also **Rhodesia; Transvaal; MINING INDUSTRY.**

Alabama.—The Mineral District of Alabama. An illustrated article reviewing its resources in iron and coal. 5500 w. Ir & Coal Trds Rev—Aug. 9, 1901.

Alaska.—Mining along the Alaska Coast—Ketchikan, Alaska—The Atlin Country. W. M. Brewer. An account of a recent visit to these regions, with reports of the mining conditions. 3500 w. Eng & Min Jour—Aug. 24, 1901.

The Ketchikan Mining District, Alaska. William M. Brewer. Gives the boundaries of this district, which includes many islands, producing gold, silver and copper ores. Describes the country and the difficulties that must be overcome by prospectors. 3000 w. Eng & Min Jour—Nov. 16, 1901.

Mineral Resources of Southeastern Alaska. William M. Brewer. Information relating to the Ketchikan mining district. The ores carry variable values in gold, silver, copper, etc. 1800 w. Min & Sci Pr—May 16, 1903.

Ketchikan Mining District, Alaska. An account of this region describing the mines already located. Copper, gold, lead and silver are found. Map. 8500 w. Min & Sci Pr—Sept. 7, 1901.

Investigation of the Mineral Resources of Alaska. Map with brief account of work being done by the Geological Survey. 700 w. Eng & Min Jour—April 26, 1902.

Mining Opportunities in Alaska. Jno. D. McGillivray. Information concerning the climate and conditions affecting mining and transport, the returns for 1903, and facts of interest. 1800 w. Min & Sci Pr—Jan. 9, 1904.

The Investigation of Alaska's Mineral Wealth. Alfred H. Brooks. An outline of what has been and is being accomplished toward furthering the knowledge of Alaska's mineral wealth, giving the operations of the U. S. Geol. Survey in the Territory. Map. 6000 w. Trans Am Inst of Min Engrs—Sept., 1904.

Traveling in Alaska. J. P. Hutchins. An illustrated account, giving much information of interest to miners who have occasion to visit this region. 2000 w. Eng & Min Jour—March 16, 1905.

See also Yukon; ALASKA; GOLD.

Arizona.—The Tombstone, Arizona, Mining District. John A. Church. A description of this most puzzling mining district. Maps and illustrations. 10,300 w. Trans Am Inst of Min Engrs—Feb. & May, 1902.

A Trip Through Arizona. Prof. Arthur Lakes. Illustrates and describes interesting desert scenery showing the relation it bears to the geology and the mining interests of the region. 3500 w. Mines & Min—March, 1904.

See also COPPER; GEOLOGY; GOLD.

Australia.—The Minerals of West Australia. Information of value, taken from a bulletin recently issued by the Department Laboratory of the Western Australia Geological Survey. Gold is by far the most important mineral. 2500 w. Engr, Lond—March 27, 1903.

The Australian Northern Territory. John Plummer. Gives testimony of various explorers concerning valuable deposits of gold, silver, tin and other metals in this region. Ills. 1400 w. Min Wld—July 8, 1905.

Mining in Western Australia. W. H. Burrell. Brief report of the condition of the mines of gold, silver and copper, the past production, and the future outlook. 1500 w. Mines & Min—July, 1905.

See also New South Wales; Queensland; and under specific metals.

Black Hills, South Dakota.—Cambrian Ore Deposits in the Black Hills. Describes these deposits which carry a greater value in gold than in silver, and carry but little lead. 1500 w. Min & Sci Pr—April 4, 1903.

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Notes on the Geology and a Few Ore Deposits of South Eastern British Columbia. C. V. Corless. Notes which seem to indicate that the ore bodies treated of form part of a related group. 9000 w. Can Min Rev—Aug. 30, 1902.

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See also Texada Island; Vancouver; GOLD; MINING; ORE—Slocan, B. C.

British Columbia and U. S.—The International Mineral Zone. Horace F. Evans. Begins a discussion of some of the problems of the region on the boundary between the United States and British Columbia. Serial. 1st part. 1200 w. Min Wld—June 5, 1905.

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Canadian Rockies.—Mining Possibilities of the Canadian Rockies. Bernard MacDonald. Discusses the possibilities of this region in regard to the mining and production of the precious metals, suggesting method for their exploration. Maps. 7000 w. Can Min Rev—April 30, 1903.

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Colorado.—Some of the Ore Deposits of Colorado. Arthur Lakes. Illustrates and describes deposits, mostly in highly volcanic regions. 1600 w. Min & Sci Pr—June 4, 1904.

Sketch of the Economic Resources of the Foothills of the Front Range of Colorado. A. Lakes. Describes these foothills, discussing the building stones and the economics of the sedimentary beds. 2000 w. Min Rept—May 25, 1905.

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Notes on Death Valley and the Panamint. George D. James. An illustrated account of a trip to this region. Map. 3000 w. Eng & Min Jour—Nov. 18, 1905.

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Greece.—The Mines of Laurium, Greece. Henry F. Collins. Describes the geology of the region, and the deposits of silver, lead, iron and zinc ores. Ills. 3000 w. Eng & Min Jour—Nov. 10, 1904.

Idaho.—The Bellevue Mining District of Idaho. Prof. Arthur Lakes. Illustrates and describes the geological peculiarities of the veins as shown in the Minnie Moore and the Queen of the Hills mines. 1800 w. Mines & Min—Jan., 1903.

Some of the Veins and Ore Deposits of the Wood River District, Idaho. Arthur Lakes. Describes the occurence and mode of vein formation and ore deposition in this region. 2000 w. Min Wld—Dec. 23, 1905.

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Thunder Mountain District. William E. L'Hame. Describes the geological peculiarities and the situation of the various regions of this gold, silver and copper district. 4500 w. Mines & Min—Dec., 1903.

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Mexico.—Mining Camps Near Topia, Durango, Mexico. Frank B. Fowler. Brief accounts of Canelas, Birimoa, Guaysimillas, La Bajada, Tamazula, etc., worked principally for the gold and silver deposits. Serial. 1st part. 1000 w. Eng & Min Jour—March 16, 1901.

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From Parral to Guadaloupe y Calvo, Chihuahua, Mexico. H. Z. Osborne. An interesting account of a mule-back trip through this mineral district. Ill. 2800 w. Min & Sci Pr—July 25, 1903.

Rich Old Mines of Sonora. E. F. Nichols. Information of interest relating to these old mines yielding gold, silver, quicksilver and other ores. Map. 3200 w. Min Wld—April 1, 1905.

Thirty Days of a Mining Engineer's Life in Mexico. E. A. H. Tays. An interesting account of difficult traveling in the mining districts. Ills. Serial. 1st part. 4000 w. Min & Sci Pr—June 3, 1905

The Sahuayacan Mining District, Mexico. John C. Treadwell. Gives the location and geology of this district, with information concerning the mines, deposits, etc. Silver, gold, lead, copper, bismuth, antimony, iron and manganese are found, but the principal values are in gold. Ills. 3000 w. Eng & Min Jour—Dec. 30, 1905.

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Mexico, Maguarichic.—The Minerals of Maguarichic. Rufus M. Baggs, Jr. Points out some interesting crystallizations observed in specimens from this camp in Mexico. Ills. 1100 w. Eng & Min Jour—July 6, 1905.

Mexico, Moctezuma.—The Moctezuma District, Mexico. M. Clere. An illustrated brief account of the mining conditions in the northern part of this district. Copper, silver and gold, with other ores are mined. 2500 w. Eng & Min Jour—May 25, 1905.

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Montana.—The Elkhorn Mining District of Montana. Abstract and notes by Arthur Lakes of article by W. H. Weed in the Annual Report of the U. S. Geol. Survey. Silver, a little gold, copper, lead, etc. Ill. 2400 w. Mines & Min—Nov., 1903.

Nevada.—Geology and Economics from the Wasatch to the Sierra Nevada. A. Lakes. Illustrated description of this region and the substances of economic value found. In the plain region, salt, borax, soda and nitre are mined. The hills and volcanic rocks contain the precious metals. 2300 w. Min Rept—April 21, 1904.

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New Mexico.—The Oregon Mining District. F. H. Lerchen. An illustrated description of the region, with special reference to the Modoc mine, N. Mexico. The ores are lead-silver and copper-silver. 2400 w. Mines & Min—Aug., 1903.

Ore Deposits of the Sierra De Los Caballos. Charles R. Keyes. Describes these deposits in South Central New Mexico. The ores found are galena carrying a small amount of silver, chalcopyrite and bornite, and gold bearing ores. Coal is also found, and lime and iron. 1800 w. Eng & Min Jour—July 29, 1905.

See also ORE DEPOSIT.

New South Wales.—The Mineral Resources of New South Wales. T. A. Rickard. Review of information given in a recently issued volume by the government geologist, Edward F. Pittman. 3000 w. Eng & Min Jour—Oct. 19, 1901.

New Zealand.—Notes on the Geology, Quartz Reefs and Minerals of the Waihi Goldfield. P. G. Morgan. An account of the mining geology of this field, with list and description of minerals found. 7000 w. N Z Mines Rec—Dec. 16, 1903.

Norway.—Mining in Norway. M. Alger. Gives the locations, histories, and products of mines of various minerals with an account of their productions. 2500 w. Mines & Min—July, 1905.

Ontario.—Undeveloped Mineral Resources of Ontario. Willet G. Miller. Read before the Can. Min. Inst. An outline of the field awaiting development, considering metals and their ores, minerals used for grinding and polishing, refractory materials, pigments, gems, minerals used in chemical manufactures, in agriculture, for brick, pottery and glass, fuels, cement, stone, &c. 6400 w. Can Min Rev—June 30, 1904.

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See also GOLD; MINING INDUSTRY; NICKEL.

Oregon.—Metals and Minerals of Southern Oregon. D. H. Stowell. List of metals and minerals of value found in this district. Gold, silver, and a great variety are found. 700 w. Min Rept—Nov. 26, 1904.

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Peru.—Gold and Copper Mining in Peru. Enrique Laroza. An illustrated description of the region, its deposits of value, especially gold and copper, the methods of mining, extraction, etc. 3000 w. Min Mag—Jan., 1905.

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Philippines.—The Unexplored Mineral Resources of the Philippines. Frank L. Strong. An interesting explanation of the illusory and unreliable character of the Spanish data and surveys and of the scantiness of exact information, with a general statement of the resources, so far as actually known. 1800 w. The Engineering Magazine—May, 1901.

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Queensland.—Mining in Northwest Queensland. Reginald A. F. Murray. Describes the formation, ores, &c., giving brief reports of some of the mines. The principal ores are silver, lead and copper. Serial. 1st part. 1500 w. Aust Min Stand—July 2, 1903.

Certain Iron Ore, Manganese Ore, and Limestone Deposits in the Central and Southern Districts of Queensland. Lionel C. Ball. Illustrated descriptions of these deposits with account of their development. Serial. 1st part. 9800 w. Queens Gov Min Jour—Oct. 15, 1904.

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Redcliffe, Colo.—Redcliffe Ore Deposits. Prof. Arthur Lakes. Describes the characteristics of these deposits which are not unlike in some respects to the ore deposits of the Mancos Contact and the American Nettie at Ouray. 1000 w. Mines & Min—Jan., 1903.

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See also **GOLD.**

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San Juan, Colorado.—Across the San Juan Mountains. T. A. Rickard. An account of the mining districts of these Colorado mountains. The present article gives information of the American Nettie mine, and the Bachelor mine. Ill. Serial. 1st part. 1700 w. Eng & Min Jour—July 4, 1903.

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South Park, Colorado.—South Park, Colorado. Prof. Arthur Lakes. An illustrated description of its geology and economic resources in gold, silver, lead, coal and oil. 1800 w. Mines & Min—Sept., 1902.

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See also **COPPER; IRON ORE.**

Tasmania.—Mining in Tasmania. George A. Waller. A report on the Scamander River and St. Helens. The metals consist principally of copper, tungsten and tin. Serial. 4 parts. 9200 w. Aust Min Stand—Sept. 19 and 26, Oct. 3 and 10, 1901.

Tasmania Mining and Metallurgy. Donald Clark. The first of a series of articles describing the mining and metallurgical resources of Tasmania, and the development. Ill. Serial. 1st part. 2300 w. Aust Min Stand—March 12, 1903.

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Texada Island, B. C.—Texada Island. William M. Brewer. An illustrated article concerning the northern part of the island. Gold bearing quartz, copper ores, iron and other minerals of value are found. Reports the development of the mines and geological conditions. Ill. 3500 w. Eng & Min Jour—Nov. 23, 1901.

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Tonkin, Indo-China.—The Mineral Resources of Tonkin. Henry Charpentier. Information concerning the deposits of coal, iron ore, copper, tin, and manganese ores. 1800 w. Ir & Coal Trds Rev—Sept. 1, 1905.

Tonopah, Nevada.—See **SILVER.**

Transvaal.—Observations on the Rand Conglomerate. L. De Launay. Discusses their origin and occurrence, giving theories explanatory of the formation. 4500 w. Eng & Min Jour—April 4, 1903.

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Turkey.—The Minerals of the Ottoman Empire. H. R. Jastrow. Notes some of the important minerals and the hindrances to the development of mining. 1000 w. Eng & Min Jour—May 18, 1901.

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U. S. Southern.—Development of the Mineral Resources of the South. David T. Day. Explains how much is included in "the south," and reviews the developments. 3200 w. Mfrs Rec—Feb. 20, 1902.

Ural.—Minerals in the Ural Mountains. Information concerning the mineral deposits and the efforts being made by Russia to interest foreign capital in the mines. 800 w. U S Cons Repts, No. 975—March 2, 1901.

Utah.—A New Mining Region. Don Maguire. An account of a new locality for mining, comprising the greater part of Box Elder county. The ores are gold, silver, copper, lead, zinc, antimony, iron, nickel, cobalt, etc. Also illustrations showing the difficulties met in constructing an aerial tramway. 2000 w. Min & Sci Pr—Feb. 16, 1901.

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See also **Nevada, Utah, Cal.; IRON REGION.**

Vancouver.—The Mines of Vancouver Island. Illustrates and describes mines of the Mount Sicker district, carrying iron, copper, gold and other metals. 3000 w. B C Min Rec—June, 1901.

The Mineral Resources of Vancouver Island. W. M. Brewer. Abstract of an article published in the "Victoria Times Royal souvenir number." An illustrated review of its mineral resources and their development. 6000 w. B C Min Rec—Nov., 1901.

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Mineral Resources of Vancouver Island. W. M. Brewer. Read before the Can. Min. Inst. Gives a brief history of the coal mining and metal mining, geological formation, production, etc. 4500 w. Can Min Rev—Sept. 30, 1902.

Notes on the Economic Minerals of Vancouver Island, B. C. W. F. Best. The most important economic minerals are copper, coal and iron, but gold, silver and other minerals are found. The interior has not yet been explored. 1600 w. Can Min Rev—May 31, 1902.

Washington.—The Silverton Mining District, Snohomish County, Washington. R. H. Stretch. An account of various mines in this district, which yield a variety of ores, such as galena, silver, chalcopyrite, etc. 1500 w. Eng & Min Jour—July 27, 1901.

The Ore Deposits of Monte Cristo, Washington. J. E. Spurr. An illustrated account of this district, the metals for which ore is especially mined are lead, copper, silver, and gold, though others are found. 1800 w. Eng & Min Jour—Aug. 23, 1902.

Mt. Baker Mining District. J. D. Bone. Illustrated detailed description, with map, of this mining district in Whatcom County and its development. 2500 w. Min Rept—Dec. 8, 1904.

The St. Helena Mining District. Harvey W. Bailey. Information concerning this district in the Pacific northwest, where gold, silver, lead, iron, copper, zinc and other valuable minerals are found 2300 w. Ils. Min Wld—June 3, 1905.

See also **ORE DEPOSIT.**

Western Australia.—See **Australia.**

West Virginia.—See **GEOLOGY.**

Wyoming.—See **MINE.**

Yukon.—A Mining Journey to North-West Canada (Voyage Minier au Nord-Ouest Canadien). J. M. Bel. A very full account of travels in the Canadian Yukon district, with especial reference to mining developments. 12,000 w. 4 plates. Mem Soc Ing Civ de France—Nov., 1904.

Yukon Territory. From the recently issued annual report of the Department of the Interior, giving information of mining, assaying, and related matters. Ills. 4500 w. B C Min Rec—March, 1905.

The Yukon Territory. An address delivered by Dr. R. W. Raymond at the farewell banquet given to the visiting party of the Am. Inst. of Min. Engrs. at Dawson, Y. T. 1800 w. Eng & Min Jour—Aug. 12, 1905.

See also **Alaska.**

Zambesi—See **Rhodesia.**

MINERAL VEIN.

See also **GEOLOGY; GOLD; GOLD GEOLOGY; MINERAL REGION; ORE; ORE DEPOSIT.**

Law.—See **MINING LAW.**

MINERAL WAX.

See **OZOCERITE.**

MINERAL ZONE.

See **MINERAL REGION.**

MINE ROAD.

See **MINE HAULAGE; ROAD—Mines.**

MINER'S LAMP.

See **SAFETY LAMP.**

MINERS' PHTHISIS.

See also **MINE GAS—Toxicology.**

Miner's Phthisis. William Cullen. Discusses the cause and remedy for this disease so prevalent among miners. 5000 w. Jour Chem & Met Soc of S Africa—Feb., 1903.

Miners' Phthisis. Discussion of paper by William Cullen. 900 w. Jour Chem & Met Soc of S Africa—March, 1903.

Miners' Phthisis. Continued discussion of paper by William Cullen. 9500 w. Jour Chem & Met Soc of S Africa—April, 1903.

Miners' Phthisis. William Cullen. Reply to discussion on writer's paper on this subject. 2700 w. Jour Chem & Met Soc of S Africa—May, 1903.

So-Called Anthracosis and Phthisis in Coal Miners. R. S. Trotter. From the "British Medical Jour." Gives statements tending to show that coal dust is not the cause of these troubles, that phthisis is not common among miners, nor due to their occupation. 800 w. Ir & Coal Trds Rev—May 29, 1903.

The Causes and Prevention of Miners' Phthisis. J. S. Haldane and R. Arthur Thomas. Abstract of a paper read before the Inst. of Min. and Met. with editorial. An investigation of the causes, concluding that the inhalation of stone dust is the principal cause, and suggesting a means of remedying this trouble. 5700 w. Eng News—June 16, 1904.

MINE SALTING.

See **MINE VALUATION; ORE—Salting.**

MINE SHAFT.

See also **HEAD FRAME; HOISTING; MINE; MINE VENTILATION; SHAFT SINKING.**

Air-Tight Head Casings.—The Bentrop System of Air-Tight Pit Head Casings. Illustrated detailed description of this type of construction for discharging coal from mines without losing air, with particulars of its operation. 3300 w. Ir & Coal Trds Rev—Jan. 23, 1903.

Automatic Doors.—Automatic Shaft Doors (Selbsttätige Schachtverschlüsse). H. Siede. Illustrating and describing the Münger form of sliding doors for mine shafts, operated automatically by the cage. 1000 w. Glückauf—Oct. 31, 1903.

Belgium.—See **COAL MINING.**

Cages.—The Utilization of Cross Sections of Hoisting Shafts (Ueber die Ausnützung des Querschnittes in Förderschachten). H. Stegemann. A discussion of the various arrangements of cages in circular shafts, in order to utilize the space to the best advantage. 5000 w. Glückauf—Oct. 17, 1903.

Deep.—See **HOISTING; MINING.**

Dortmund, Germany.—See **Iron Fittings.**

Guidos.—See **HOISTING.**

Heating.—A Device for Preventing Freezing in Drawing Pits. Dr. Alfred Gradenwitz. Illustrated description of the use of warm air to prevent the formation of ice in mine shafts. 500 w. Min Rept—July 6, 1905.

Incline.—Some Considerations in the Equipment of Incline Shafts. F. N. Hambly. Discusses the size and grade of shaft, headgear bins, skips, tracks, and ore bins underground. 4000 w. Jour S African Assn of Engrs—Oct., 1905.

See also **HOISTING; MINE HAULAGE.**

Iron Fittings.—Iron Shaft Fittings with Cage Guides on One Side. F. Schulte in "Glückauf." Illustrated description of fittings in use in several pits in the Dortmund district. 800 w. Col Guard—Jan. 15, 1904.

Lining.—Steel Lining Mine at "B" Shaft, Pioneer Mine, Minnesota. Frank Drake. Read at meeting of Lake Superior Mining Inst. Abstract of a paper on the use of steel in lining mine shafts. Ill. 2200 w. Eng & Min Jour—Sept. 13, 1902.

Shaft Linings. An account of the different types of lining which have been employed. Ill. 3700 w. Col Guard—March 27, 1903.

A Concrete Lined Shaft. Describes in detail the work of lining the Grassy Island shaft of the D. & H. Co., near Olyphant, Penn. 1200 w. Eng & Min Jour—April 21, 1904.

A Concrete-Lined Shaft for the U. S. Coal & Coke Co. Francis Donaldson. Illustrated description of two elliptical shafts, lined with concrete, recently completed in W. Va. 1200 w. Eng News—Nov. 3, 1904.

The Lining of Old Shafts with Reinforced Concrete (Eisenarmierter Betonausbau alter Schachte). Ant. Schimitzek. Describing the successful replacement of old timbering with reinforced-concrete lining. 1000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Ang. 20, 1904.

Corrugated Tubbings (Gewellte Tubbings), Prof. Heise. A discussion of the use of corrugated metal for securing increased strength and lightness in lining shafts. 2500 w. Glückauf—Oct. 8, 1904.

Corrugated Tubbings for Lining Colliery Shafts. Prof. Heise, in "Glückauf." Illustrates form of corrugated tubbings, claiming to overcome the defects of previously used linings. 900 w. Ir & Coal Trds Rev—Dec. 30, 1904.

The Question of Corrugated Tubbings (Zur Frage der Gewellten Tubbings). Prof. Heise. A discussion of the advantages of corrugated sectional linings for shafts. 2000 w. Glückauf—Jan. 21, 1905.

The Question of Corrugated Tubbings (Zur Frage der Gewellten Tubbings). Prof. Heise. Practical data concerning the lining of shafts with metallic corrugated tubbings, showing the capacity of the system to resist pressure. 1800 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 4, 1905.

The Strength of Corrugated and Other Forms of Tubbings (Neues über die Festigkeitsverhältnisse Gewellter und anderer Tubbings). Prof. Heise. A theoretical investigation to determine the strongest form of shaft lining. 2000 w. Glückauf—March 4, 1905.

The Relative Strength of Corrugated and Ordinary Tubbings (Neues über die Festigkeitsverhältnisse Gewellter und Anderer Tubbings). Prof. Heise. An examination of the increase in resistance to external pressure in shaft linings by use of corrugated tubbings. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 8, 1905.

The Question of Shaft Tubbings and Methods of Strengthening Them (Zur Frage der Schachttubbings und deren Verstärkung). H. Hoffmann.

An examination of the stresses upon the linings of shafts, with arrangements for reinforcement by means of ribs and clamps. 1200 w. Glückauf—March 4, 1905.

Concrete Lining for Mine Shafts. F. R. Dravo. Briefly considers other materials that have been tried, and describes the work of lining a shaft with concrete. General discussion. 3300 w. Pro Engrs' Soc of W Penn—July, 1905.

Misplacement.—Misplacements of Shafts and Adits. Stanley Hunter. Gives examples in the mines of Victoria, where money has been needlessly expended through such misplacements. Ills. 1800 w. Aust Min Stand—May 26, 1904.

Misplacement of Mining Shafts and Adits. Stanley Hunter. Abstract of paper in Trans. Aust. Inst. Min. Eng. Vol. X. Gives typical examples showing waste due to mistakes in methods. Ills. 1600 w. Eng & Min Jour—Aug. 12, 1905.

Safety Appliances.—See HOISTING.

Steel Timbering.—See Lining; TIMBERING—Steel, Mine Shaft.

Swinging Track.—A Swinging Track. W. N. Cummings. Illustrates and describes a swinging track for shaft stations found useful in the opening of a prospect. 500 w. Eng & Min Jour—May 25, 1905.

MINE-SHAFT DOOR.

Münger Automatic.—See MINE SHAFT—Automatic Doors.

MINE SIGNAL.

Bell.—Mine Bell Signals. Urges the importance of adopting a uniform code of mine signals. 2500 w. Min & Sci Pr—May 13, 1905.

Compressed Air.—Mine Signalling by Compressed Air. Bernard MacDonald and William Thompson. Discusses methods of signaling from the mine workings to the engineer running the hoisting engine. Describes the system in general use and illustrates and describes the compressed air signal system, stating its advantages. 3000 w. Can Min Rev—Sept. 30, 1902.

Mine Signaling by Compressed Air. Describes the pull bell system in general use, and gives an illustrated detailed description of the compressed air signal system which is a modification of the system used on express trains. 2500 w. Ir & Coal Trds Rev—Sept. 2, 1904.

Coolgardie.—Signaling Between Levels. F. B. Allen. Notes on a new system of signalling at Bayley's gold mines, Coolgardie. Ill. 900 w. N Z Mines Rec—Aug. 17, 1903.

Electric.—Electric Mine Signals and Telephones. George E. Walsh. Brief review of what has been accomplished in Europe and America. 1200 w. Min & Sci Pr—July 8, 1905.

Electric, Brüx.—Electric-Optical, Acoustic Signals at the Julius III. Shaft at Brüx (Elektrisch, Optisch, Akustische Seilbahn Signalanlage am k. k. Schachte Julius III. in Brüx). Gustav Ryba. Describing a signal system for use in connection with an underground cable traction haulage installation. Two articles. 4000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 18, 25, 1905.

Electric, Shaft.—An Electric Shaft Signal System (Elektrische Schacht-Signal-Anlage). F. Rüdorff. Illustrating the Siemens & Halske electric indicator and signal system, similar to the telegraph used on shipboard. 800 w. Glückauf—April 22, 1905.

MINE SURVEYING.

See MINE MAP; SURVEYING; SURVEYING INSTRUMENT.

MINE TUNNEL.

See MINE DRAINAGE; MINING; TUNNEL—Mine.

MINE VALUATION.

See also ASSAYING; MINE MANAGEMENT; ORE; SAMPLING.

Valuing a Mining Property. Arthur Lakes. Some of the difficulties are discussed. 2000 w. Mines & Min—May, 1901.

Examination and Valuation of Mines. Prof. Arthur Lakes. Discusses the use of the term "ore in sight," the difference between a "mine" and a "prospect," and other matters. Also editorial. 5800 w. Mines & Min—Feb., 1903.

Variation of Ore Values—Caution in Valuing Mines. A. Lakes. Observations of an experienced mine examiner. 1200 w. Min Rept—Nov. 3, 1904.

Examining Mining Properties. Prof. Arthur Lakes. Suggestions as to methods of proceeding and facts to be included in reports on properties. Ills. 1600 w. Mines & Min—Nov., 1905.

Mine Valuation by Mining Experts. Editorial discussing a paper by Dr. Rossiter W. Raymond, read before the Am. Inst. of Min. Engrs. 2000 w. Eng News—Oct. 30, 1902.

The Valuation of Mines of Definite Average Income. H. D. Hoskold. Suggests a method of valuing mines, pointing out certain finacial features. 4000 w. Trans Am Inst of Min Engrs—Oct., 1902.

Mining Engineering in the Valuation of Mines. G. W. Miller. A brief discussion of educational qualifications of mining engineers and their duties. 1500 w. Min & Sci Pr—April 11, 1903.

The Valuation of a Well-Developed Mine. A. W. Warwick. Discusses methods and gives formulae for calculating values. 2800 w. Min Rept—Dec. 31, 1903.

The Examination and Valuation of Mines. James Park. Information for young mining graduates. Ills. 5500 w. N Z Mines Rec—March 16, 1905.

On the Examination and Valuation of Mines. John E. Hardman. Read before the Canadian Soc. of Civ. Engrs. An account of approved practice, with special reference to the difficulties or advantages, which Canadian deposits present. Serial. 1st part. 4800 w. Can Min Rev—June, 1905.

The Examination of Mines Preliminary to Purchase: To-day as Compared with Twenty-five Years Ago. R. Gilman Brown. Read before the Am. Min. Cong. A paper containing information of value to engineers, students, miners, and the general public. 3500 w. Min & Sci Pr—Nov. 25, 1905.

Coal.—Appraisal of the Value of Mineral Lands, with Especial Reference to Coal Lands. H. M. Chance. Discusses principally the methods used in the appraisal of the value of coal lands. 5000 w. Trans Am Inst of Min Engrs—Sept., 1904.

Cost Per Ton.—Cost per Ton as a Basis of Mine Valuation. R. Gilman Brown. Considers the method of determining the cost per ton. 2000 w. Eng & Min Jour—Aug. 29, 1903.

Gold.—Notes on Valuing a Gold Mine. T. Lane Carter. Considers some of the principal points in valuing a gold mine. 5400 w. Jour of Chem & Met Soc of S Africa—Sept., 1902.

Notes on Valuing a Gold Mine. T. Lane Carter. Mr. Carter's reply to the discussion on his paper. 3000 w. Jour Chem & Met Soc of S Africa—Dec., 1902.

Investigation and Valuation of Gold Mining Properties (Untersuchung und Wertberechnung von Goldbergwerken). S. Michaelis. A very complete account of a systematic method of investigating a gold mining property with a view of obtaining an accurate estimate of its value. Four articles. 7000 w. Oesterr Zeitschr f Berg u Hüttenwesen—July 16, 23, 30, Aug. 6, 1904.

Mexico.—See ORE.

Ore in Sight.—"Ore in Sight." A. W. Warwick. Discussion of the rulings of the committee of the Inst. of Min. & Met., London. Serial. 1st part. 2000 w. Min Rept—Nov. 20, 1902.

Ore in Sight. J. D. Kendall. Real before the Inst. of Min. & Met. Recommendations tending to reduce the losses due to errors in estimating. Ill. 2800 w. Ir & Coal Trds Rev—Dec. 20, 1901.

Salting.—Salting of Ore Samples. An account of a sensational case in Australia. 4800 w. Aust Min Stand—Feb. 28, 1901.

MINE VENTILATION.

See also AIR CURRENT; ANEMOMETER; COAL MINE; COAL MINE EXPLOSION; FAN; FIRE-DAMP; MINE GAS; TUNNEL VENTILATION.

The Ventilation of Preliminary Workings in Gaseous Mines (Die Bewetterung der Vorrichtungsbetriebe in Schlagwetter-Gruben). F. Pospisil. A discussion of the paper of M. Petit, presented at the Mining Congress at Paris. Two articles. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 5, 12, 1901.

Mine Ventilation. W. J. Mollison. Read before the Cent. Min. Inst. of W. Penn. Importance of improvement in methods, and some of the points which need to be considered to attain it. 2300 w. Mines & Min—Feb., 1904.

Outlines of Mine Ventilation. William Clifford. Discusses the art of producing a safe atmosphere in the underground workings of a coal mine, describing the earliest practice and tracing the progress. Ills. 3500 w. Pro Engrs' Soc of W Penn—July, 1905.

Air Currents.—See **AIR CURRENT.**

Anemometer.—See **ANEMOMETER—Testing Station.**

Bamfurlong Colliery.—On Experiments with Duplicate Ventilating Fans at Bamfurlong Collieries. J. W. Hutchinson. Read before the Manchester Geol. Soc. A statement of conditions to be met, and an account of experiments made, illustrations of the present arrangements of engines and fans, with table of tests and measurements made. 1800 w. Ir & Coal Trds Rev—Nov. 28, 1902.

Barometric Pressure.—See **FIREDAMP; WELL—Breathing.**

Bentrop Head Casings.—See **MINE SHAFT—Air-Tight Head Casings.**

Bruch, Bohemia.—See **SHAFT SINKING.**

Capell.—See **Dorstfeld.**

Centrifugal Fan.—Centrifugal Fans for the Ventilation of Mines. John Hayes. With special reference to a fan recently designed to meet colonial requirements. 2700 w. Queens Gov Min Jour—March 15, 1905.
See also **FAN.**

Deep Levels.—The Ventilation of Deep Levels. Thomas Johnson. Considers means of securing efficient ventilation. Ill. 6000 w. Jour Chem, Met & Min Soc of S Africa—July, 1903.

Dorstfeld, Westphalia.—Tests of a Capell Ventilator at the Dorstfeld Mines (Untersuchung eines Capell-Ventilators auf Zeche Dorstfeld II-III). Data and results of tests of a ventilating fan delivering 8,000 cubic metres of air, in actual service. 1200 w. Glückauf—July 29, 1905.

Durham, Eng.—See **FAN—Electric, Mine.**

Düsseldorf Exposition.—Mine Ventilation Apparatus at the Düsseldorf Exposition (Der Bergbau auf der Düsseldorfer Ausstellung, 1902. Wetterführung unter Besonderer Berücksichtigung der Ventilatoren). Hr. Stein. An illustrated description of blowers, sprayers and other ventilating apparatus. 8 plates. 2500. Glückauf—June 14, 1902.

Efficiency.—Manometrical Efficiency. J. T. Beard. Explains the meaning of the term which applies to the efficiency of a given circulation and does not express the efficiency of a fan. 1500 w. Mines & Min—June, 1901.

Electric, German.—See **MINE DRAINAGE.**

Eschweiler, Germany.—The Ventilating Plant of the Nothberg Mine in the Eschweiler District (Die Ventilatoranlage auf Grube Nothberg des Eschweiler Berpwerksvereins). F. Collischonn. With plan of the workings, and illustrations of the motor plant and electrically driven fans. 2000 w. Glückauf—July 9, 1904.

Fan.—See also **Centrifrugal Fan; Guibal; Sirocco Fan; Small Fan; FAN.**

Fan Driving.—Rope Driven versus Direct Driven Colliery Ventilating Fans. Francis T. Peacock. On the conditions which should determine a selection of the type to be used, and the advantages of each. 2400 w. Can Min Rev—March 31, 1901.

Rope Driven versus Direct Driven Colliery Fans. Francis T. Peacock. Read at meeting of the Canadian Min. Inst. Calls attention to the principal features to be considered in determining the type of driving, and discusses the objections and advantages of various systems. 1500 w. Eng & Min Jour—May 18, 1901.

Guibal Fan.—The Guibal Ventilating Fan. Fan described by John W. Robinson, in the "Journal" of the British Soc. of Min. Students," with the result of experiments. Ill. 1200 w. Col Guard—March 15, 1901.

Description of, and Experiments with, M. Guibal's Fan. John W. Robinson. From the "Jour. of the Brit. Soc. of Min. Students." 1800 w. Ir & Coal Trds Rev—Aug. 16, 1901.

Description of, and Experiments with, M. Guibal's Fan. John W. Robinson. From the "Jour. of the Brit. Soc. of Min. Students." 1800 w. Ir & Coal Trds Rev—Aug. 16, 1901.

A Guibal Fan with Volute Casing. E. Lagage. Translated from the "Revue Universelle des Mines." Illustrates and describes a fan installed in French mines. 800 w. Eng & Min Jour—Sept. 1, 1904.

Hamborn, Germany.—Air Locks in the Deutscher Kaiser Mine at Hamborn (Luftschleusen-Anlage auf dem Wetterschacht IV. der Gewerkschaft Deutscher Kaiser in Hamborn). H. Grahn. A description of special air locks in connection with the ventilation of a mine during deepening. 1500 w. 1 plate. Glückauf—June 18, 1904.

Hulton Colliery.—On the Erection and a Few Tests of a Turbo-Fan and Generator at Hulton Colliery. Alfred J. Tongue. Read before the Manchester (Eng.) Geol. Soc. States the conditions of the ventilation and the position of the shafts prior to the erection of the turbo fan, giving an illustrated description of the plant and testing. Also discussion. 3800 w. Ir & Coal Trds Rev—Oct. 31, 1902.

Improvised.—Improvised Ventilating Machinery. C. M. Myrick. Describing simple appliances for inducing air currents. 1200 w. Min & Sci Pr—April 11, 1903.

Neumühl, Germany.—Enclosing a Ventilating Shaft for Winding Purposes. Illustrates and describes the arrangements at Neumühl Colliery to prevent waste of air during the operation of winding. 600 w. Col Guard—Aug. 9, 1901.

The Closing of a Hoisting and Ventilating Shaft at Neumühl near Oberhausen (Der Abschluss des zur Förderung Dienenden Wetterschachtes auf Zeche Neumühl bei Oberhausen). A description of the method by which the outlet of a shaft was closely connected to a ventilating flue and yet retained available for hoisting. 1500 w. Glückauf—Oct. 5, 1901.

New Zealand Report.—The Ventilation of Mines. Abstracted from Appendix II. Inspection of Coal Mines Report (New Zealand), 1904. Gives formulas developed and explains their application. 1800 w. Col Guard (Sup.)—March 17, 1905.

North Wilkes-Barre, Pa.—A Successful Fan Test. J. T. Beard. Illustrated account of a successful test of a mine-ventilating fan at North Wilkes-Barre, Pa. 1000 w. Eng & Min Jour—Aug. 5, 1905.

Pressure Losses.—Losses of Pressure in the Ventilation of Mine Workings (Ueber Druckverluste bei der Bewetterung der Abbaubetriebe). Franz Pospisil. General discussion of various methods of working, with observations at a coal mine in Moravia. 1 plate. 2400 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 1, 1902.

Queensland.—The Carters Towers Mines. S. Horsley. Report on their ventilation and sanitary arrangements. Serial. 1st part. 6600 w. Queens Gov Min Jour—July 15, 1904.

Sirocco Fan.—The Sirocco Ventilator (Der Sirocco Ventilator). A comparison of a fan of British make with others of German construction for use in mine ventilation. 2500 w. Glückauf—Jan. 10, 1903.

Small Fans.—The Advantages of Small Fans for Mine Ventilation. Considers the tendency to ventilation workings by means of one or more small quick-running fans, showing the method to be efficient and economical. 2000 w. Col Guard—June 20, 1902.

Small Quick-Running Fans for Mine Ventilation. James Tonge. An illustrated account of some new ventilators for this purpose and the advantages claimed. 1700 w. Mines & Min—Nov., 1904.

South Wilkes-Barre.—See **COAL MINE—South Wilkes-Barre.**

Timbering.—See **TIMBERING—Ventilation.**

Transvaal.—The Vitiation of the Air in Transvaal Mines. James Moir. Discusses (1) Air from Compressors; (2) Ordinary Working Mine Air, and (3) Gases after Blasting with Nitro-Glycerine Explosives. 5000 w. Jour of Chem, Met & Min Soc of S Africa—July, 1905.

Victoria.—Progress in Ventilation of Victorian Gold Mines. F. D. Johnson. Describes the condition of these mines in the past and present, and some of the difficulties in bringing about better conditions. 2200 w. Min Jour—Sept. 16, 1905.

Western Australia.—Ventilation and Sanitation of Mines in Western Australia. Extracts from report of Royal Commission. Considers dust in mines and mills, gases due to explosives, fumes from the cyanide process, etc. 3500 w. Min Rep—Sept. 14, 1905.

Wilesek, Austria.—See **HOISTING.**

MINE WATER.

See also **MINE DAM; MINE DRAINAGE; MINE FLOOD.**

Cripple Creek, Colo.—See **MINE DRAINAGE.**

Wedekind, Nev.—See **GOLD GEOLOGY.**

MINING.

See also **FILLING; HYDRAULIC FILLING; MINE; MINE MANAGEMENT; MINERAL REGION; MINING AND METALLURGY; MINING INDUSTRY; PROSPECTING; QUARRY; SHAFT SINKING; TIMBERING; TUNNEL;** and under specific metals and minerals.

Mining. A. J. Bensusan. On the general subject of mining, discussing prospecting, exploration, exploitation, metallurgical treatment, etc. 3600 w. Aust Min Stand—Feb. 7, 1901.

Mining Methods in America and Europe. Impressions of Capt. G. A. Richard from a recent tour through Canada, America, Great Britain and the Continent in the interest of a gold mining company. 2300 w. N Z Mines Rec—June 16, 1902.

Development and Operation of a Mine. W. H. Storms. An illustrated article discussing economic methods to meet certain conditions, and the magnitude of recent mining operations. Serial. 1st part. 1600 w. Min & Sci Pr—Dec. 26, 1903.

Practical Mining. Abstract of a paper read before the Mining Assn. Discusses points of importance to a successful mining man. 2800 w. Cal Jour of Tech—Feb., 1905.

Alaska.—See **GOLD; GOLD MINING.**

American Methods.—Some American Mining and Engineering Methods. The present article discusses difference between British and American methods, the American mining schools and laboratories, system of mining education, etc. Ill. Serial. 1st part. 2500 w. Col Guard—Aug. 15, 1902.

Ancient Mexican.—See **Mexican, Ancient.**

Argentina.—The Mines of Argentina. R. B. Brinsmade. An account of the adaptation, by the natives, of the methods of working to the requirements and limitations of the country. 5000 w. Mines & Min—Jan., 1903.

Arid Regions.—Mining Camps in an Arid Region. Prof. Arthur Lakes. Calls attention to things that are absolute necessaries if they are to be prosperous. 2000 w. Mines & Min—July, 1903.

Australia.—Large Ore Bodies in Australia—Mining Methods. A. Selwyn Brown. A brief sketch of some of the more important methods adopted. 1500 w. Eng & Min Jour—Nov. 25, 1905.

Australian Examinations.—Mining Methods and Appliances. The first of a series of articles aiming to give information helpful to candidates for mine manager's examinations. Ill. Serial. 1st part. 1100 w. Aust Min Stand—Nov. 6, 1902.

Breaking Ground.—See **EXCAVATION.**

British Columbia.—Mining Practice at Rossland, British Columbia. R. B. Brinsmade. Illustrates and describes the methods of development at War Eagle and Centre Star. The diamond drilling, shaft sinking, drifting, raising, blasting, trimming, hoisting, ventilation, lighting, pumping, air compression, etc., and costs. 6000 w. Mines & Min—March, 1901.

See also **COPPER; MINE MANAGEMENT—"Hole Contract" System; MINERAL REGION; TIMBERING.**

Charleston Exposition.—The Charleston Exposition. Arthur L. Parsons. A brief survey of the mining features shown in the exhibits from the different States. 2200 w. Mines & Min—May, 1902.

Colorado.—Mining in Colorado. H. A. Lee. Epitome of report of the State Bureau of Mines, Colorado, 1899-1900. 1800 w. Mines & Min—April, 1901.

See also **GOLD; GOLD MINING; MINERAL REGION; MINING INDUSTRY.**

Computations.—The Computation of the Dimensions of Mine Workings (Die Berechnung der Abmessungen von Abbaufeldern). H. Kegel. A derivation of elaborate formulas for computing the most economical areas for mine workings. 10,000 w. Glückauf—Nov. 19, 1904.

Concrete.—See **CONCRETE—Mining.**

Costs.—The Cost of Mining. W. R. Ingalls. A general consideration of the comparative cost of mining, stating the conditions which determine the results. 2600 w. Eng & Min Jour—eb. 10, 1906.

See also **COST-KEEPING; MINE MANAGEMENT.**

Costs, New Zealand.—See **MINE MANAGEMENT—New Zealand vs. Africa.**

Deep.—The Limits and Possibilities of Deep Mining. E. H. Roberton. A discussion of the problems of temperature, pressure, and deep-winding machinery, and the extent to which they have been solved. 8500 w. Engineering Magazine—Jan., 1904.

See also **BORING; MINE SHAFT; SHAFT SINKING; TIMBERING.**

Development.—Mine Development Methods. B. J. Forrest. Notes on prospecting, proving and testing deposits, developing, transport, etc. 1400 w. Can Min Rev—June 30, 1903.

Drift.—See **GOLD MINING.**

Düsseldorf Exposition.—Mining Appliances at the Düsseldorf Exposition (Der Bergbau auf der Düsseldorfer Ausstellung 1902). H. Hecker. Illustrating and describing especially the improved forms of mine hoisting machinery exhibited. 8000 w. 12 plates. Glückauf—May 24, 1902.

Boring, Shaft Sinking and Underground Work (Tiefbohrung, Schachtabteufen, Abbau, und Grubenbetrieb). H. Herbst. Illustrating and describing the improved mining methods and apparatus exhibited at Düsseldorf. 8500 w. 5 plates. Glückauf—June 7, 1902.

Mining at the Düsseldorf Exposition (Der Bergbau auf der Düseldorfer Ausstellung 1902). H. Herbst. Discussing the exhibits of boring and cutting machines and rock drills, with many illustrations. 7500 w. 4 plates. Glückauf—Aug. 2, 1902.

Mining at the Düsseldorf Exhibition. Remarks on the various districts. Serial. 1st part. 3200 w. Engr, Lond—July 25, 1902.

Mining at the Düsseldorf Exposition (Der Bergbau auf der Düsseldorfer Ausstellung 1902). Dr. H. Hoffmann. Describing the various forms of cableways, cantilevers and other apparatus for conveying and loading ore, coal and other mineral exhibited at Düsseldorf. 5000 w. 5 plates. Glückauf—Aug. 9, 1902.

Mining Appliances at the Düsseldorf Exposition (Die Bergmännischen Gewinnungsarbeiten auf der Ausstellung zu Düsseldorf). H. Heise. Giving brief descriptions of various mining appliances exhibited at Düsseldorf, including boring and cutting machinery, explosives, igniters, etc. 3000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—July 19, 1902.

Mining at the Düsseldorf Exposition (Der Bergbau auf der Düsseldorfer Ausstellung 1902). H. Fändrich. Describing especially the exhibits relating to explosives, igniting devices and safety lamps. 7500 w. 2 plates. Glückauf—July 26, 1902.

Mining Plant and Machinery (Die Bergbaulichen Anlagen). The first of a series of articles describing the mining exhibits at Düsseldorf, 1902. Two articles. 5000 w. Glasers Annalen—Aug. 15, Sept. 1, 1902.

See also **EXPOSITION; MINING MACHINERY—Steam Driven.**

Egypt.—Mining and Use of Metals by the Ancient Egyptians. Prof. R. D. George. Information on this subject gathered from many sources. 7000 w. Pop Sci M—Dec., 1905.

Faults.—See **GEOLOGY; ORE DEPOSITS.**

Filling.—See **COAL MINING; FILLING; HYDRAULIC FILLING.**

Geology.—Application of Geology to Mining. J. E. Spurr. Read at the Butte meeting of the Min. Con. On the assistance of each to the other and the advantage of working together. 2500 w. Min & Sci Pr—Sept. 13, 1902.

See also **GEOLOGY.**

Germany.—Improved Appliances, etc., Introduced Into German Mines in 1902. From "Zeitschrift für Berg- Hütten- und Salinenwesen." Illustrated descriptions. Serial. 1st part. 1400 w. Col Guard—Aug. 14, 1903.

Grades.—Mine Grades. A. W. Warwick. Considers some of the principles affecting mine grades, and the conditions upon which the choice depends. 2100 w. Min Rept—Feb. 6, 1902.

Graphical Solutions.—See **GRAPHICS—Mining Problems.**

Hulst, Address.—The Future of Mining. Nelson P. Hulst. Extract from an address delivered before the graduating class of the Michigan College of Mines, on the opportunities and future outlook for mining students. 5500 w. Mines & Min—Jan., 1901.

Hydraulic.—See **HYDRAULIC MINING.**

India.—See **MINING INDUSTRY.**

Japan.—Mining in Japan. Fritz J. Frank. An illustrated description of the mines and plants of the Hokkaido Tanko Tetsudo Kaisha. 2200 w. Mines & Min—Sept., 1902.
See also **MINING INDUSTRY.**

Liége Exposition.—Mining at the Liége Exposition (Der Bergbau auf der Lütticher Weltausstellung). F. Herbst. An extended descriptive and critical review of the mining appliances and methods shown at the exposition. Serial. Part I. 4000 w. Glückauf—Oct. 21, 1905.

See also **EXPOSITION.**

Lining.—See **MINE SHAFT; TUNNEL.**

Lining Galleries.—See **TIMBERING.**

Lower California.—See **MINERAL REGION.**

Mechanical Engineering.—See **MECHANICAL ENGINEER—Mining and Smelting.**

Mexican, Ancient.—Old Time Mining in Mexico. O. H. Howarth. Describes the methods and tools used by the ancient miners and their processes of reducing the ore. Ill. 4000 w. Mines & Min—Nov., 1901.

Mountain Transport.—Mining Transport Methods in the Higher Alps (Transportmittel Hochalpiner Bergbaue). A. Pfeffer. Illustrated description of mining railways in Tyrolese Alps. Two articles. 4500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—March 23, 30, 1901.

See also **ROAD—Mines.**

New South Wales.—See Wide Lodes; **TIMBERING.**

New Zealand.—See **MINING INDUSTRY.**

Non-Metallic.—The Mining of Non-Metallic Minerals. Bennett H. Brough. The first of a series of lectures. The present number deals with combustible minerals, the coals and bitumens. Serial. 1st part. Ill. 6400 w. Jour Soc of Arts—Dec. 25, 1903.

Pan-American Exposition.—The Pan-American Exposition at Buffalo. I. The New York State Exhibit. Harriet C. Brown. An interesting account of the N. Y. State exhibits in the Mines Pavilion. Serial. 1st part. 1700 w. Eng & Min Jour—May 18, 1901.

Mining Features of the Pan-American Exposition. I. The Dedication Ceremonies, by Edward W. Parker; II. The Mines Building and Mining Exhibits, by Dr. David T. Day; III. A Tour Through the Building, by Joseph Hyde Pratt; IV. The Petroleum Exhibit, by Harriet Connor Brown; V. Mining Statistics as Shown at Buffalo. Ill. 3500 w. Min & Met—June 1, 1901.

Mining at the Pan-American Exposition. A description of the geological and mining exhibits. Ill. 4500 w. Mines & Min—Sept., 1901.

See also **PAN-AMERICAN EXPOSITION.**

Paris Exposition.—The Mining Exhibits at the Exposition of 1900 (L'Exploitation des Mines à l'Exposition de 1900). H. Schmerber. The first installment relates principally to the French collieries. 2500 w. Génie Civil—Feb. 2, 1901.

Mining at the Paris Exposition. David T. Day. A lecture before the Museum of Natural Hist., New York City. Describes the peculiar features of the industry as there illustrated. 1300 w. Mines & Min—March, 1901.

See also **MINING MACHINERY.**

Parral, Mexico.—Hidalgo del Parral, Chihuahua, Mexico. Illustration and brief description of this town, attracting attention because of the recent mining developments. 1500 w. Eng & Min Jour—Oct. 12, 1901.

See also **SILVER—Mexico.**

Philippines.—See **MINERAL REGION; MINING INDUSTRY; MINING MACHINERY.**

Power Transmission.—See **COMPRESSED AIR; ELECTRIC EQUIPMENT; POWER TRANSMISSION.**

Prussia.—See **COAL MINING.**

Rand.—See **GOLD MINING—Transvaal; MINING INDUSTRY—Transvaal.**

Rescue Apparatus.—See **Safety Appliances; RESCUE APPARATUS.**

Safety Appliances.—On Safety Appliances and Precautions Necessary in Mines. J. R. Godfrey. Read before the Aust. Inst. of Min. Engs. Reviews the precautions which should be adopted to minimise the dangerous factors. Ill. Serial. 1st part. 6500 w. Can Min Rev—Oct. 31, 1900.

See also **HOISTING; MINING LAW—Bituminous Coal Mining; RESCUE APPARATUS.**

Scotland.—Mining Practice in Scotland. David Rankin. Read before the Glasgow Assn. of Students. Considers the letting of mineral fields, proving, fitting, working, surveying, checking rental returns, valuing of minerals and of works and accessories as related to the duties of the mining engineer. 3000 w. Col Guard—March 29, 1901.

Tasmania.—See **MINING INDUSTRY.**

Tonge Address.—Legitimate and Illegitimate Mining. Thos. Tonge. Abridged report of an address before the Students' Technical Society of the Colorado School of Mines. 4500 w. Min Jour—Nov. 11, 1905.

Transvaal.—See **GOLD MINING; MINING INDUSTRY.**

Tunnel.—See **TUNNEL—Mine.**

Water Supply.—See **WATER SUPPLY—Mining Communities; U. S. Southwest Mines.**

Wide Lodes.—Some Methods of Timbering and Working Wide Lodes in New South Wales. J. R. Godfrey. Abstract of paper read before the Australian Min. Engrs. An illustrated study of cases of actual mining when local conditions require special methods. Serial. 1st part. 2300 w. Eng & Min Jour—Aug. 7, 1901.

Some Methods of Timbering and Working Wide Lodes in New South Wales. J. R. Godfrey. An illustrated study of a few typical cases of actual mining where the local conditions modify the methods employed. Serial. 1st part. 1600 w. Min Rept—Oct. 3, 1901.

MINING AND METALLURGY.

See also **METALLURGY; MINERAL REGION; MINING; MINING INDUSTRY;** and under specific metals and minerals.

Bosnia-Herzegovina.—Mining and Metallurgy in Bosnia and Herzegovina for 1901 (Das Berg- und Hüttenwesen in Bosnien und der Herzegovina im Jahre 1901). Statistics, with tables. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—July 5, 1902.

Mining and Metallurgy in Bosnia and Herzegovina in 1892 (Das Berg- und Hüttenwesen in Bosnien und Herzegovina im Jahre 1902). Statistical tables. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 6, 1903.

Chile.—The Mining and Metallurgical Situation in Chili (Situation Minière et Métallurgique du Chili). Ch. Vattier. A review of the gold, silver, copper and other mining industries of Chili, Peru, Brazil and other countries of South America. 8000 w. Mem Soc Ing Civ de France—Sept., 1901.

China.—See **MINERAL REGION.**

Germany.—Germany's Mining and Metallurgical Industries. H. L. Geissel. An illustrated review of these industries and their development. 2800 w. Min & Met—Dec., 1901.

Hungary.—Mining and Metallurgy in Hungary, in 1900 (Ungarns Berg und Hüttenwesen 1900). From "Bány. és Koh. lapok." General statistics. Serial. 3 parts. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 4, 11, 18, 1902.

Italy.—Mining and Metallurgy in Italy in 1900 (Bergwerks- und Hüttenproduction Italiens 1900). Statistical tables of all kinds of mining and metallurgical products. 400 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 14, 1901.

Mexico.—Notes on the Mining and Metallurgical Industries of Mexico. Joseph Struthers. Discusses the geology, mineral resources, production, etc., giving illustrated descriptions of important districts. 12,800 w. Eng & Min Jour—Oct. 26, 1901.

Prussia.—The Production of Prussian Mines, Salt Works and Metallurgical Works in 1900 (Die Production der Bergwerke, Salinen und Hütten des Preussischen Staates im Jahre 1900). General statistical tables. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 25, 1902.

Russia.—Mining and Metallurgy in Central Russia in 1900 (Les Mines et la Métallurgie dans le Midi de la Russie en 1900). A. Spilberg. An exhaustive report prepared for the 25th Russian Mining Congress, dealing especially with coal and iron of Central Russia. 9000 w. Rev Univ des Mines—Feb., 1901.

Mines and Metallurgy in South Russia in 1901 (Les Mines et la Métallurgie dans le Midi de la Russie en 1901). A. Spillberg. A paper before the 26th Congress of Mine Operators of South Russia, giving a general review, particularly of iron and manganese. 6000 w. Rev Univ d Mines—Feb., 1902.

See also **IRON INDUSTRY.**

St. Louis Exposition.—Mining and Metallurgy at the St. Louis World's Fair, 1904. Prof. Joseph A. Holmes. Information in regard to the proposed exhibits and what they are intended to show. 1200 w. Trans Am Inst of Min Engrs—Oct., 1902.

Mining Exhibits at the Louisiana Purchase Exposition. A. H. Storrs. Gives the location and general arrangement of the exhibits of the various States. 4200 w. Mines & Min—May, 1904.

Mining and Metallurgy at the Louisiana Purchase Exposition. Arthur H. Storrs. A short description of some of the exhibits. 3800 w. Mines & Min—June, 1904.

Mining and Metallurgy at the St. Louis Exposition. H. Bauerman. A review of exhibits of interest to the iron and steel industry. 14,000 w. Ir & Steel Inst—Oct., 1904.

See also **ST. LOUIS EXPOSITION.**

Saxony.—Mining and Metallurgy in Saxony in 1900 (Der Bergwerks und Hüttenbetrieb im Königreiche Sachsen im Jahre 1900). General statistics, with tables, from the "Jahrbuch für das Berg und Hüttenwesen im Königreich Sachsen." Vol. for 1901. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 12, 1902.

Silesia.—Mining and Metallurgy in Upper Silesia for 1901 (Statistik der Oberschleischen Berg- und Hüttenwerke für das Jahr 1901). Statistics, with tables, of iron and steel, coal and coke, zinc, lead, silver and sulphur. Two parts. 2400 w. Oesterr Zeitschr f Berg u Hüttenwesen—July 5 and 12, 1902.

Wastes.—Wastes in Mining and Metallurgy. James Douglas. Address before the Mich. Col. of Mines. Notes examples of saving valuable elements in ore, and fuels in the present number. Serial. 1st part. 1600 w. Eng & Min Jour—May 5, 1904.

MINING CAR.

See **MINE CAR; MINE HAULAGE.**

MINING ENGINEER.

See also **EDUCATION; ENGINEER.**

American.—The American Mining Engineer. Albert R. Ledoux. Presidential address discussing to what influences the superior efficiency of American mining engineers is due. 5300 w. Trans Am Inst of Min Engrs—Feb., 1904.

American Institute, Lake Trip.—Through the Lake Superior Iron and Copper Mines with the American Institute of Mining Engineers. A brief account of the trip, the sail through the lakes, the Duluth meetings, etc., in the present number. Serial. 1st part. 2200 w. Eng News—Sept. 29, 1904.

American Institute, Mexican Meeting.—The Mexican Meeting of the American Institute of Mining Engineers. Fritz J. Frank. An illustrated account of an interesting and enjoyable trip. 5500 w. Mines & Min—Jan., 1902.

Australian Examinations.—See **MINING.**

Convention, London.—See **ELECTRIC EQUIPMENT—Mines.**

Education.—See also **EDUCATION; MINING LABORATORY; MINING SCHOOL.**

Electrical Day, Eng.—See **ELECTRIC EQUIPMENT—Mines.**

J. Peter Lesley.—See **LESLEY.**

Tropics.—Life and Mining in the Tropics. G. M. Colvocoresses. Considers the climate and its influence, and gives suggestions for keeping in good health. 3000 w. Eng & Min Jour—Dec. 28, 1905.

William Earl Dodge.—See **DODGE.**

MINING EXHIBITION.

See **MINING; MINING AND METALLURGY.**

MINING INDUSTRY.

See also **MINE; MINERAL REGION; MINING; MINING AND METALLURGY; MINING LAW;** and under **specific** metals and minerals.

Africa.—African Mines and Mining. Arthur Stanley Riggs. An illustrated account of the gold, diamond and other mineral fields, and the mining industry in general. 3500 w. Min & Met—Sept. 1, 1901.

See also **South Africa; Transvaal; MINERAL REGION.**

Alaska.—The Mining Industry in Alaska. Alfred H. Brooks. Reports of production and the activity of the various districts, giving map and illustrations. 4800 w. Eng & Min Jour—Jan. 14, 1904.

Alaska. Alfred H. Brooks. A review of the output for the past year, with general information of the mining industry. Map. 2600 w. Eng & Min Jour—Jan. 5, 1905.

See also **GOLD; MINERAL REGION.**

American.—See **United States.**

Argentina and Brazil.—Copper, Silver and Gold in the Argentine Republic and Brazil. Reports from consular officers in Latin America on mining in their districts. 3000 w. U S Cons Repts, No. 1562—Feb. 4, 1903.

Australasia.—The Mining Industry of Australasia in 1902. F. Danvers Power. Reports a year of depression on account of low price of metals and prevailing drought. Reviews the year. 3800 w. Eng & Min Jour—Jan. 3, 1903.

See also **New Zealand.**

Australia.—The Australian Mining Industry. J. L. C. Rae. Extracts from the presidential address delivered to the members of the Engng. Assn. of N. S. W. Serial. 1st part. 2400 w. Aust Min Stand—March 26, 1903.

The Eastern States of Australia. F. Danvers Power. A report of the output from Queensland, New South Wales, South Australia and Tasmania, with information of conditions during 1903. 3300 w. Eng & Min Jour—Jan. 7, 1904.

See also **Queensland; Victoria; Western Australia; MINERAL REGION.**

Austria.—Mining in Austria. H. R. Jastrow. Concerning the production of the various minerals, and interesting facts relating to the mining industry. 1000 w. Eng & Min Jour—July 27, 1901.

The Mining Industry of Austria in 1900 (Der Bergwerksbetrieb Oesterreichs im Jahre 1900). Statistics of the mining and metallurgical products of all kinds, with tables. 2 parts. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 14, 21, 1901.

The Austrian Mineral Industry for 1900 (Die Bergwerksproduktion Oesterreichs im Jahre 1900). Statistical tables of the production of metals and minerals. 800 w. Glückauf—Jan. 18, 1902.

Brazil.—See **Argentina.**

British.—Mining Employment, Output and Accidents in 1901. A summary of the general results of the year as given in the General Report just issued. Col Guard—May 30, 1902.

The Mineral Wealth of Great Britain. Editorial review based on the record in a recent Home Office report. 1200 w. Engng—May 22, 1903.

See also **COAL INDUSTRY; IRON INDUSTRY.**

British Columbia.—The Mineral Production of British Columbia. Abstract of the report of William Fleet Robertson, the Provincial metallurgist. 3500 w. Eng & Min Jour—July 20, 1901.

Mining in British Columbia. E. Jacobs. Review of this important industry, especially the development during the last ten years. 3000 w. B C Min Rec—Aug., 1901.

The British Columbia Mining Industry in 1901. William M. Brewer. Review of the conditions in the mining districts, the production and matters affecting the industry. 8000 w. Eng & Min Jour—Jan. 4, 1902.

Mining Industry and Mineral Resources of British Columbia. W. M. Brewer. Mr. Brewer's second paper gives a general survey of the mainland districts, including deposits of gold, copper and silver-lead. 4500 w. Engineering Magazine—Oct., 1902.

The British Columbian Mining Industry of 1902. Review of the operations of the past year, giving an approximate estimate of the production of gold, silver, lead, copper, coal and other minerals. Ill. 4800 w. B C Min Rec—Jan., 1903.

Mining in British Columbia. Information from the official report of the minister of mines, in regard to production, value, etc. 500 w. U S Cons Repts, No. 1686—July 1, 1903.

British Columbia. S. S. Fowler. A review of the production of gold, silver, copper and lead during 1903, with general information. 2500 w. Eng & Min Jour—Jan. 7, 1904.

The British Columbia Mining Industry in 1903. H. Mortimer Lamb. A review of the conditions influencing it during the past year. 6000 w. Mines & Min—Feb., 1904.

Mining in British Columbia in 1903. Briefly reviews the progress made in each district, showing the development. 5000 w. Eng & Min Jour—Feb. 25, 1904.

See also **GOLD; MINERAL REGION; ZINC.**

Buildings.—See **COAL MINE BUILDING; MINE BUILDING.**

California.—Mineral Production of California for 1901. Report of the State mineralogist, with much information of interest. 2000 w. Eng & Min Jour—Aug. 9, 1902.

California. Charles G. Yale. A review principally of the gold and silver production for 1903, with general information. 1700 w. Eng & Min Jour—Jan. 7, 1904.

See also **GOLD; MINERAL REGION.**

Canada.—The National Importance of Mining. John E. Hardman. An address introducing topic for discussion at the annual meetings of the Canadian Mining Institute. 5000 w. Can Min Rev—March 31, 1902.

See also Government Aid; **GOLD; MINERAL REGION; NICKEL.**

Canada vs. U. S.—Mineral Production, Canada and United States. George Johnson. A comparison of the development of the two countries, based on the statistics for 1901. 2800 w. Can Min Rev—April 30, 1903.

Central America.—Copper, Silver and Gold in Central America. Reports concerning Honduras, Nicaragua and Salvador. 2500 w. U S Cons Repts, No. 1565—Feb. 7, 1903.

Chile.—Copper, Silver and Gold in Chile. A report of the mineral resources and mining industry. 2800 w. U S Cons Repts, No. 1564—Feb. 6, 1903.

See also **MINERAL REGION.**

China.—Mining in China. Information in regard to the working methods, labor and wages, etc. 1200 w. U S Cons Repts, No. 1319—April 18, 1902.

Mines and Railways in China. Comments on conditions in China, and the recent change of the control of mines and railways to the lately created Board of Commerce. Serial. 1st part. 1400 w. Aust Min Stand—Jan. 5, 1905.

Chinese Concessions. Charles D. Jameson. Discusses the opposition to concessions for railways or mines to foreign syndicates and the reasons. 2800 w. Eng & Min Jour—Sept. 9, 1905.

See also **MINERAL REGION.**

Colorado.—Twenty-five Years' Progress in Colorado. Thomas F. Walsh. Address at a banquet at Colorado Springs. A summary of the mineral development of that State and the general progress. 2000 w. Min Rept—Aug. 8, 1901.

Colorado. Forbes Rickard. A review of mining conditions during 1903, showing a falling off in the output, due to labor troubles. Reports of various districts are given in detail. 3500 w. Eng & Min Jour—Jan. 7, 1904.

Cuba.—The Industrial Development of Cuba. Information concerning the mining and metal working industries. 1500 w. Ir Age—Aug. 14, 1902.

Düsseldorf Exposition.—See **IRON INDUSTRY.**

Dutch East Indies.—Mining in the Dutch East Indies. S. J. Truscott. The gold mining in Sumatra and Borneo is reported in this first article, with related matter of interest. Serial. 1st part. 3200 w. Aust Min Stand—Feb. 20, 1902.

See also **MINERAL REGION.**

France.—Mining in France. A résumé of information from a recent report of the Minister of Public Works regarding the coal, iron and other mining industries. 1700 w. U S Cons Repts, No. 1386—July 8, 1902.

Government Report on French Mines. Information from the official report on the working of mines in France since July 1, 1899. The present article deals with the general conditions of the industry. Serial. 1st part. 1500 w. Col Guard—July 11, 1902.

German Colonies.—Mineral Products of the German Protectorates (Die Gewinnung Mineralischer Bodenschätze in den Deutschen Schutzgebieten). Hr. Macco. A review, founded on government reports, of the mineral industry of the German possessions in Africa and the Pacific. 1500 w. Glückauf—May 30, 1903.

Government Aid.—Government Aid to Mining. A number of discussions communicated in advance of the meetings of the Canadian Mining Institute. 13,700 w. Can Min Rev—Feb. 28, 1902.

History.—Notes on the History of the Mineral Industry in the Nineteenth Century. Willet G. Miller. An interesting review. 10,000 w. Can Min Rev—Sept. 30, 1903.

Hungary.—The History of Mining in the Máramaros District, Hungary (Zur Entwickelungsgeschichte des Máramaroser Bergbaues). L. v. Schmidt and Ludwig Litschauer. A paper read at the Hungarian Mining Congress, 1901, and printed in "Bányászati és Kohászati Lapok," giving a general review of salt, metal, coal, petroleum and other mining industries. 3500 w. Oesterr Zeitschr u Hüttenwesen—April 26, 1902.

Idaho.—Idaho's Mining Industry. Arthur Stanley Riggs. Historical review and review of the mineral resources of this State. Gives a table showing 25 minerals mined in paying quantities and 23 minerals found but not mined. 3000 w. Min & Met—Dec. 15, 1901.

The Mining and Industrial Development of Central Idaho. Brief reports of the various mining properties, showing progress. 1000 w. Min Rept—Dec. 24, 1903.

India.—Metalliferous Mining in India. John W. Evans. Concerning Peninsular India only, its geology and ores, methods of working, etc. Does not deal with the iron deposits, but briefly considers the copper, lead, silver, zinc, tin, etc., and more fully the deposits and mining of gold. General discussion. 20,900 w. Jour Soc of Arts—Feb. 1, 1901.

Investments.—A Plea for Sane Mining Finance and More Conservative Mining Investments. Harry J. Newton. A discussion of the outlook in mining investment business. 3000 w. Min Wld—July 22, 1905.

Italy.—The Mines and Mineral Industries of Italy. Enrico Bignami. Describing especially the lead and zinc mines of Sardinia, with numerous illustrations. 4000 w. Engineering Magazine—Sept., 1904.

A Survey of the Mines and General Industries of Italy. Enrico Bignami. Describing especially the sulphur deposits of Sicily. 3000 w. Engineering Magazine—Nov., 1904.

Japan.—Japan and Its Mining Industries. H. L. Geissel. Information concerning the products and the recent development. 1600 w. Min & Met—June 1, 1901.

The Japanese Mining Industry, with Special Reference to Iron and Coal (Die Japanische Montanindustrie mit besonderer Berücksichtigung der Eisen- und Kohlenindustrie). E. Davidson. General statistics, with tables, abstracted from an article by A. Keppen, in the Russian "Economic Review." Serial. Part 1. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 10, 1902.

The Mineral Products of Japan. Information concerning gold, coal, iron, copper, etc. 1000 w. Jour Soc of Arts—July 18, 1902.

The Mining Industry of Japan. E. W. Nardin. The present article considers copper mining, this country standing third as a producer of this metal. Ill. Serial. 1st part. 1700 w. Aust Min Stand—Sept. 4, 1902.

A Great Japanese Mining Company. Benjamin Smith Lyman. An illustrated account of the Mitsui Mining Company, which mines coal, silver and other metallic ores and sulphur; but principally coal. 2000 w. Eng & Min Jour—July 28, 1904.

Japanese Industrial Conditions. The first of a series of articles on the recent progress and future prospects of Japan. The present number discusses the coal mining and the development of the mining industry. Also editorial. Serial. 1st part. 3000 w. Ir & Coal Trds Rev—July 28, 1905.

See also **COMMERCE; COPPER; MINING.**

Korea.—Mining and Business Interests in Korea.

S. Herbert Williams. Information concerning the minerals found and methods of mining; also the other industries and products. Ills. 1800 w. Eng & Min Jour—March 3, 1904.

See also MINERAL REGION.

Leadville.—New Life for Leadville. An account of present conditions, the great activity, new companies, gold values, etc. 2000 w. Min Inv—April 29, 1901.

Mexico.—Mexico's Progress in Mining Matters. William M. Courtis. Illustrates and describes a rich region that is being opened, the difficulties of transportation, and some of the work accomplished. 3200 w. Mines & Min—Aug., 1901.

The Mining Industries of Mexico. H. L. Geissel. Illustrated account of a rich mining field, the progress in the mining and metallurgical industries, etc. Gold, silver, copper, quicksilver, lead, iron, asphaltum and other valuable products are found. 3000 w. Min & Met—Nov. 1, 1901.

Notes on the Mines and Minerals of Guanajuato, Mexico. William P. Blake. Brief historical notes with account of the systems of mining and the minerals found. 2800 w. Trans Am Inst of Min Engrs—Nov., 1901.

Mining in Mexico. Jas. W. Malcolmson. A review of the development during the last year. 3200 w. Eng & Min Jour—Jan. 7, 1904.

Mexico. James W. Malcolmson. A review of the districts, showing great prosperity, especially in the production of silver and copper. Map. 3000 w. Eng & Min Jour—Jan. 5, 1905.

The Past and Present of the Mines of Mexico. G. O. Cunningham. A general account of the successful mining operations which have been conducted in Mexico, with information as to the methods of operation. 3000 w. Engineering Magazine—Sept., 1904.

See also GOLD; MINERAL REGION; RAILWAY; SILVER.

Mistakes.—Why Some Mines Are Abandoned and Why Others Should Be Resumed. Arthur Lakes. Discusses the reasons for some mistakes of miners and investors. 2000 w. Mines & Min—June, 1904.

Montana.—Montana. William A. Akers. A review of the mining industry during 1903. 2000 w. Eng & Min Jour—Jan. 7, 1904.

Newfoundland.—The History of Mining in Newfoundland. James P. Hawley. A review showing the slow but steady growth. Ill. 7500 w. Can Min Rev—Sept. 30, 1901.

Mining in Newfoundland. J. P. Howley. From the annual report to the Minister of Agriculture and Mines. 2000 w. Can Min Rev—April 30, 1903.

New Mexico.—New Mexico Mines in 1902. Charles R. Keyes. Review of a very prosperous year, and of the work of the different mines yielding gold, silver, copper, lead, zinc and other minerals. 1800 w. Eng & Min Jour—Jan. 17, 1903.

New Zealand.—Mining in New Zealand: Past and Present. Henry A. Gordon. Abstract of presidential address delivered at meeting of the Australasian Inst. of Min. Engrs. 5500 w. N Z Mines Rec—Feb. 16, 1904.

See also GOLD.

Nova Scotia.—Metalliferous Mining in Nova Scotia as Compared with Mining in Other Countries. J. Owen James. A discussion of the mining laws, mining prospects, operations, etc. Ills. 6500 w. Ind Adv—Aug., 1905.

Ontario.—Mining in Eastern Ontario. Courtenay De Kalb. A review of the condition of the mining industry, reporting the conditions of various mining properties. 6000 w. Can Min Rev—July 31, 1901.

Mining in Ontario. Information from the annual report of the bureau of mines of Ontario, showing the great advancement made during the last few years, the output, value, etc. 1100 w. U S Cons Repts, No. 1119—Aug. 21, 1901.

Eastern Ontario: A Region of Varied Mining Industries. Willet G. Miller. Calling attention to the great variety of mineral deposits which are being worked in the eastern part of the Province. Nickel and copper, gold, iron, arsenic, pyrite, corundum, mica, talc, graphite, feldspar, cement, etc. 7300 w. Can Min Rev—May 31, 1902.

Ontario. Thomas W. Gibson. A review of the progress of the mining industry during 1903. 1800 w. Eng & Min Jour—Jan. 7, 1904.

The Mines of Ontario. W. E. H. Carter. Read before the Can. Min. Inst. A brief review of the present status of the mining industry, especially in Western Ontario. The gold mines, placers, etc., are dealt with in the present article. Serial. 1st part. 3000 w. Can Min Rev—Oct. 31, 1904.

Ontario. Thomas W. Gibson. Reviews the mining industry for 1904 in this province, where nickel, copper, iron, silver, gold, arsenic, mica, corundum, salt, gypsum and petroleum are among the products. 2200 w. Eng & Min Jour—Jan. 5, 1905.

See also GOLD; MINERAL REGION; NICKEL.

Pan-American Exposition.—See MINING.

Peru.—See PERU.

Philippines.—Mining in the Philippines. Information relating to the present condition of mining in the Islands, with notes on the deposits, the transportation facilities, materials needed, etc. 2000 w. Min & Sci Pr—Jan. 19, 1901.

Mining Among he Moros in the Philippines. An account of the mining in this portion of the islands, the metals found, transportation, etc. 1900 w. Eng & Min Jour—June 1, 1901.

See also MINERAL REGION; MINING MACHINERY.

Prescott, Arizona.—The Mines of Prescott, Arizona. A general review of the mining industry of this district, including the United Verde and other copper, gold and silver mines. Ills. 2000 w. Eng & Min Jour—Aug. 11, 1904.

Quebec.—The Mineral Production of Quebec. From the report of J. Obalski, inspector of mines for the Province. 1400 w. Eng & Min Jour—July 20, 1901.

Queensland.—Queensland Mining Industry. Report of the under-secretary of mines, Mr. A. R. Macdonald, reviewing the year 1902. Maps. 20,000 w. Queens Gov Min Jour—March, 1903.

The Queensland Mining Industry. Review of 1903, with maps showing mining leases, tabulated statistics and reports. Gold, copper, tin and coal all show substantial increases. 16,000 w. Queens Gov Min Jour—March 15, 1904.

Roads.—See ROAD—Mines.

Sardinia.—See Italy.

Science.—The Value of Science and Training in the Mining Industry. E. J. Babcock. Read before the International Min. Cong. at Boise, Idaho. On the importance of government recognition of the mining and metallurgic industries. 3000 w. Mines & Min—Dec., 1901.

South Africa.—Mining in South Africa. I.—The Transvaal Gold Production. J. H. Curle. Considers it certain that this region will stand first in production, and begins a study of the mining industry of South Africa, and the conditions to be met. Serial. 1st part. 1800 w. Eng & Min Jour—July 11, 1903.

South Africa Mining Progress. Ralph Stokes. Discusses the progress since the close of the war, explaining conditions in the gold fields, and the rise of the diamond industry. Brief notes are also given on other minerals found. 2800 w. Min Wld—Sept. 16, 1905.

See also Transvaal.

South America.—See Chile; MINING AND METALLURGY—Chile; and under main and subheads of South American countries.

Spain.—The Mineral Production of Spain. On the increase in production and development, especially of iron, coal, copper and salt. 1800 w. Engng—April 19, 1901.

The Mining Industries of Spain. H. L. Geissel. An illustrated description of works recently visited by the writer, with information obtained. 2500 w. Min & Met—Oct. 1, 1901.

Tasmania.—Mining in Eastern Tasmania. Begins a discussion of the mining industry and the methods of prospecting and mining, which have proved so disastrous. Serial. 1st part. 2000 w. Aust Min Stand—Oct. 30, 1902.

Transvaal.—Mining and Metallurgy on the Rand. E. M. Weston. Gives a record of recent progress. Serial. 1st part. 2800 w. Aust Min Stand—Oct. 6, 1904.

The Transvaal Mining Industry in 1904. A report of a very successful year. 3000 w. Engr, Lond—Feb. 3, 1905.

See also South Africa; GOLD; GOLD MINING; MINERAL REGION.

United States.—The Mineral and Metal Output of the United States in 1900. A preliminary estimate of the production of the more important minerals and metals. 3800 w. Eng & Min Jour—Jan. 5, 1901.

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Our Mining Interests. Prof. J. A. Holmes. Read before the International Mining Congress. Discusses some of the factors contributing to and influencing American mining development. Serial. 1st part. 3700 w. Mines & Min—Dec., 1902.

The Production of Minerals and Metals in the United States During 1902. Joseph Struthers. General review, with table of statistics. 4400 w. Eng & Min Jour—Jan. 3, 1903.

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Mining, Past and Future. John A. Church. Reviews the history of the progress in mining copper, silver, gold, etc., in the United States, with comments on the future outlook. Ills. 2200 w. Min Mag—July, 1904.

The Non-Metallic Mineral Products of the United States. Edwin C. Eckel. Gives facts relative to the geographic distribution and commercial development of the various non-metallic mineral products. Ills. and maps. 2500 w. Min Mag—Sept., 1904.

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Ore Deposits and Industrial Supremacy. John L. Steward. Considers the influence of economic geology on the industrial stability of the country. 2800 w. Ec Geol—Dec., 1905.

See also **MINING LAW.**

U. S. Government Relations.—The Relation of the Federal Government to the Mining Industry. C. N. Hays. Read at the El Paso meeting of the Am. Min. Cong. Endeavors to show what the Federal Government is now doing for this industry, and the directions in which it may safely expand its activities. 5000 w. Min Rept—Nov. 30, 1905.

U. S., Southern.—Southern Mining Impressions. An account of the development going on and improvements visible in the mining regions of the South. 4000 w. Mines & Min—June, 1903.

U. S., Southwest.—Mining in the Southwest. William P. Blake. A brief review of mining development in Arizona, Nevada and Southern California, restricted to the precious metals and other ordinary metals with the exception of copper. 2400 w. Eng & Min Jour—Jan. 7, 1904.

U. S., Western.—See **RAILWAY.**

Utah.—Jas. W. Neill. An account of the mining progress during 1903, with reports of various camps. Ill. 2200 w. Eng & Min Jour—Jan. 7, 1904.

Victoria.—The Victorian Mining Industry. H. C. Jenkins. Explains the conditions under which mining is carried on, indicating the writer's opinion of steps desirable with a view to the amelioration of the present position. Serial. 2 parts. 5000 w. Aust & Min Stand—Dec. 11 and 18, 1902.

Western Australia.—Mining in Western Australia. A. G. Charleton. A report of steady progress during 1903, with important deep level developments and discoveries. 2700 w. Eng & Min Jour—Jan. 7, 1904.

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MINING LABORATORY.

See also **EDUCATION; LABORATORY.**

The Equipment of Mining Laboratories. Henry S. Munroe. Discusses the equipment of laboratories at schools of engineering for mining instruction. 2500 w. Eng & Min Jour—April 7, 1904.

McGill University.—Notes on Some Work Recently Done in the Mining Laboratories of McGill University. J. B. Porter. Read before the Canadian Min. Inst. An exposition of the methods of teaching. 2500 w. Can Min Rev—Oct. 31, 1901.

Pless Mines, Silesia.—The Material Testing Laboratory of the Pless Mines at Waldenburg in Silesia (Die Untersuchung von Verbrauchsmaterialien im Laboratorium der Fürstlich Pless'schen Bergwerke zu Waldenburg in Schiesien). Fr. Schreiber. With results of tests of lubricants, belting, packing and general supplies. Two articles. 7000 w. Glückauf—April 29, May 6, 1905.

MINING LAMP.

See also **SAFETY LAMP.**

Acetylene.—See **ACETYLENE—Mining Lamp.**

MINING LAW.

See also **MINERAL REGION; MINING INDUSTRY.**

The Principles of Mining Law. Charles J. Alvord. Abstract of a paper read before the Inst. of Min. & Met., in London. Reviews briefly the law of the more important countries of the world. 3200 w. Eng & Min Jour—Nov. 17, 1900.

American.—See **United States.**

Apex.—The Law of the Apex. Max Boehmer. Presents a proposition to simplify the apex law. 1300 w. Eng & Min Jour—July 14, 1904.

Australia.—Review of West Australia Mining Laws: A Comparison. George Hope. Written in the belief that helpful suggestions may be found to assist in the revision of American laws. 2100 w. Min & Sci Pr—Dec. 15, 1900.

Bituminous Coal Mining.—Safeguards in Bituminous Coal Mining. W. E. Fohl. Considers that the laws regulating the mining of bituminous coal need regulating, and offers some suggestions, urging particularly the need of uniformity. Discussion. 11,000 w. Pro Engrs' Soc of W Penn—July, 1904.

British Columbia.—Placer Gold Mining Claims in British Columbia. A brief statement of the laws governing the locating and working of placer claims. 1300 w. U S Cons Repts, No. 956—Feb. 8, 1901.

China.—Mining Regulations for the Jehol Region, China. A portion of the regulations covering mining in this district as suggestive of conditions in China. 1000 w. Eng & Min Jour—March 17, 1904.

Colorado.—The Colorado Central Lode, a Paradox of the Mining Law. Ernest Le Neve Foster. Read before the Colorado Sci. Soc. Begins an account of the litigation over this mine. Serial. 1st part. 1200 w. Min Rept—April 24, 1902.

Dutch East Indies.—Dutch East Indian Mining Law. A translation of the mining law of the Netherlands East Indies. Serial. 1st part. 4000 w. Aust Min Stand—Feb. 14, 1901.

French Guiana.—See **GOLD; GOLD MINING—"Marauding."**

German East Africa.—Mining Regulations of German East Africa. Translation of the mining regulations and rules, with general information. 3300 w. U S Cons Repts, No. 1607—March 30, 1903.

Grass Valley, Calif.—See **GOLD MINE.**

Kearns.—Senator Kearns's New Mining Law. R. W. Raymond. Discussion of a bill to come before the U. S. Congress at the next session. 1700 w. Eng & Min Jour—Sept. 6, 1902.

"Marauding," French Guiana.—See **GOLD MINING.**

Mexico.—A Synopsis of the Mining Laws of Mexico. Richard E. Chism. A digest of the more important laws. 19,300 w. Trans Am Inst of Min Engrs—Nov., 1901.

Historical Sketch of Mining Legislation in Mexico. Eduardo Martinez Baca. 18,000 w. Trans Am Inst of Min Engrs—Oct., 1903.

Mining Laws of Mexico. Gives the most important sections of the mining law, which is considered very just, especially to foreigners. 9500 w. U S Cons Repts—June, 1904.

Montana Decision.—The Latest Montana Mining Decision. Dr. R. W. Raymond. Discusses the change in the Supreme Court's decision in the Pennsylvania case, giving the portion covering the modification. 4000 w. Eng & Min Jour—May 9, 1903.

Patents.—The Cost of Mine Patents. Theodore F. Van Wagenen. A discussion of the mine patenting system, as now operated, the improvements needed and the benefits that would follow. 3800 w. Min & Sci Pr—Jan. 4, 1902.

Pennsylvania Anthracite.—The Pennsylvania Anthracite Law. R. W. Raymond. Quotes this law, showing that its purpose is to put the anthracite operators at the mercy of the labor unions, and suggests measures that would remove the objectionable features. 1800 w. Eng & Min Jour—Oct. 7, 1905.

Quarry vs. Mine.—The Legal Distinction Between a Mine and a Quarry. Gives a few cases illustrating the distinction recognized by British law. 1400 w. Col Guard—April 19, 1901.

Queensland.—The New Queensland Mining Bill. Gives an outline of the bill before the Legislative Assembly, which aims to remedy certain defects and supply shortcomings in the present Mining Act. 7500 w. Queens Gov Min Jour—Dec. 15, 1905.

Rarus-Pennsylvania.—The Rarus-Pennsylvania Case. R. W. Raymond. A reply to a criticism of an earlier article, discussing points in this recent decision. 1800 w. Eng & Min Jour—June 6, 1903.

Russian Gold.—The Russian Law of Gold Mining. C. W. Purington and J. B. Landfield, Jr. A digest of the Russian law, explaining and commenting upon the text. 2500 w. Engineering Magazine—Jan., 1902.

United States.—Mining Engineering and Mining Law. James D. Hague. Read at St. Louis, before the Int. Cong. of Arts and Sciences. Shows the important relations of the United States mining law to the vocation of the American mining engineer. 4500 w. Eng & Min Jour—Oct. 20, 1904.

United States Mining Laws. C. W. Goodale. Abstract of a paper read before the Montana Soc. of Engrs. Gives opinions of various men of experience, and reviews briefly some of the conditions in laws of other countries, with an account of the copper trust location. 2800 w. Eng & Min Jour—Feb. 2, 1905.

A Proposed Amendment of the Mineral Land Laws. George A. Packard. Gives the amendment suggested, discussing the advantages of the change. 4500 w. Eng & Min Jour—April 27, 1905.

The American Law Relating to Minerals. Charles H. Shamel. An exposition of that part of American mining law that deals with the definitions and the legal conception of the terms mineral, ore, etc., as used in law. 10,800 w. Sch of Mines Qr—Nov., 1905.

Veins.—Identity and Continuity of Veins. Some extracts from the work of C. H. Lindley on mines, discussing mining laws bearing upon veins, with comments. Serial. 1st part. 2000 w. Min & Sci Pr—Oct. 10, 1903.

See also **ORE DEPOSIT.**

Western Australia.—See **Australia.**

MINING MACHINERY.

See also **COAL-MINING MACHINERY; ELECTRIC EQUIPMENT; MINING; ORE TREATMENT; PUMP; QUARRY; ROCK DRILL; STAMP MILL**; and under the various metals and minerals.

The Development of Power-Driven Machinery in the Mine. H. H. Roberton. Discussing winding machinery, pumps, ventilating machinery, haulage systems, drills, coal cutters, etc. 3500 w. Engineering Magazine—March, 1904.

British Columbia.—Notes on Machinery Constituting a Mining Plant. Alfred C. Garde. Notes written with a particular view to conditions in British Columbia, but useful to mine investors and engineers in charge of any mining properties. 2000 w. Can Min Rev—Sept. 30, 1902.

Buss Slimer.—See **GOLD METALLURGY—Slimes.**

Canvas Tables.—See **GOLD METALLURGY; ORE TREATMENT.**

Drill.—See **COAL-MINING MACHINERY; DRILLING; ROCK DRILL.**

Düsseldorf Exposition.—See **Steam Driven; MINING.**

Electric.—See also **COAL-MINING MACHINERY; ELECTRIC EQUIPMENT; HOISTING.**

Electric, British.—Electrical Mining Machinery. Illustrates and describes various types of machines now in use in British mines. Also their use at Acton Hall Colliery. 15,500 w. Engr, Lond—June 24, 1904.

Electric, Tests.—See **Power Consumption.**

Gold.—Choice of Gold Mining Machinery. Donald Clark. Suggestions for the selection of suitable machinery, and related subjects. Serial. 1st part. 2500 w. Aust Min Stand—Feb. 18, 1904.

See also **GOLD MINING.**

Gold Mine, South Africa.—See **ELECTRIC EQUIPMENT.**

Hoisting Drums.—See **HOISTING DRUMS.**

Jig.—See **ORE TREATMENT.**

Kalgoorlie.—See **GOLD METALLURGY.**

Paris Exposition.—Mining Material at the Exposition of 1900 (Exposition Universelle de Paris 1900. Le Matériel des Mines). A. Habets. The first instalment of a description of boring, drilling, cutting, hoisting, and other mining appliances exhibited at Paris. Serial. Part I. 7000 w. 8 plates. Rev Univ des Mines—Feb., 1901.

See also **MINING.**

Philippines.—Mining Machinery in the Philippines. G. D. Rice. Illustrates and describes some of the native mining devices. 1000 w. Eng & Min Jour—Dec. 15, 1900.

Mining Machinery for the Philippines. On the demand for American machinery and equipments, with brief account of Spanish and native forms in use. 2200 w. Eng & Min Jour—Jan. 19, 1901.

The Uses of Native Woods in Mining in the Philippines. Describes improvements in rope-haulage, introduced in the mines newly equipped by foreign capitalists, the wheels being constructed of "bullet" wood of the islands. Also other uses to which the wood is adapted, and information concerning the native workmen and their methods. Ill. 1700 w. Eng & Min Jour—April 6, 1901.

See also **MINERAL REGION; MINING INDUSTRY.**

Power Consumption.—Power Consumption for Mining Machinery (Kraftbedarf von Bergwerksmaschinen). H. Huber. Data and results of tests of electrically driven mining machinery, with fac-simile reproductions of the records of the registering apparatus. 2500 w. 11 plates. Glückauf—Dec. 12, 1903.

The Power Required for Mining Machinery (Kraftbedarf von Bergwerksmaschinen). J. L. Huber. Results of electric power measurements showing the amount and distribution of power. from observations in coal and salt mines. 1200 w. Glückauf—Oct. 1, 1904.

Pulp Distributor.—See **GOLD METALLURGY.**

Purchase.—The Purchase of Mining Machinery. Frederick T. Snyder. Discusses the technical and commercial aspects. 2500 w. Min & Sci Pr—Oct. 5, 1901.

Quartz.—See **GOLD MINING.**

South Africa.—See **GOLD MINING—Transvaal; MINING INDUSTRY; SOUTH AFRICA.**

South Sea Islands.—Mining Machinery of the South Sea Islands. Brief illustrated descriptions of odd types of mining devices used by natives. 1800 w. Min Rept—June 12, 1902.

Steam Driven.—Steam Driven Mining Machinery (Berg und Hüttenwerkemaschinen mit Dampfbetrieb). H. Dubbel. A review of the motive power machinery for mining and metallurgical uses shown at the Düsseldorf exposition. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—June 7, 1902.

Steam Shovel.—See **STEAM SHOVEL.**

Wolverhampton Exhibition.—Mining Machinery at the Wolverhampton Exhibition. Illustrates and describes interesting exhibits. Serial. 1st part. 1400 w. Col Guard—July 25, 1902.

Wooden.—See **Philippines.**

MINING SCHOOL.

See also **EDUCATION—Mining; MINING LABORATORY.**

McGill University.—See **MINING LABORATORY.**

MINT.

Philadelphia.—See **COINAGE; ELECTRIC EQUIPMENT; HEATING AND VENTILATION; MECHANICAL PLANT.**

MINTING.

See **COINAGE.**

MISPICKEL.

See **GOLD METALLURGY—Mispickel.**

MIXER.

See **IRON-METALLURGY—Mixer; STEEL METALLURGY—Mixer Patent.**

MODEL.

Framed Structures.—See **EDUCATION—Laboratory Work.**

Locomotive.—See **LOCOMOTIVE OPERATION—Oscillations.**

Marine Engine.—See **MARINE ENGINE—Model.**

Mine.—See **GOLD MINE—California; MINE MODEL.**

River Regulation.—See **RIVER REGULATION—Models.**

MODEL BASIN.

See also **NAVAL ARCHITECTURE; PROPELLER—Model Experiments; SHIP PROPULSION.**

Berlin.—Experiment Station for Hydraulics and Shipbuilding, in Berlin (Versuchsanstalt für Wasserbau und Schiffbau in Berlin). Hr. Eger. An illustrated description of a basin for experimenting with ship models, and other features of a plant for making experiments in hydraulic and shipbuilding work. 2800 w. Zentralblatt d Bauverwaltung—April 18, 1903.

British National.—A National Experimental Tank. Sir William H. White. Read before the Inst. of Naval Archts. A proposal for the establishment of a national experimental tank, to be chiefly devoted to research work in connection with fluid resistance and ship-propulsion. 6500 w. Engng—April 1, 1904.

Cornell.—The Equipment of the Canal of the Hydraulic Laboratory of Cornell University for Experimental Work on the Resistance and Propulsion of Ships. Dr. William F. Durand. Describes this canal and the equipment thus far installed. Ill. 2000 w. Sib Jour of Engng—Jan., 1902.

Equipment for Experimental Work on Resistance and Propulsion of Ships Installed at the Hydraulic Laboratory of Cornell University. W. F. Durand. Illustrates and describes the equipment thus far installed, stating its purpose. 2800 w. Marine Engng—June, 1902.

Denny.—The Ship-Model Testing Tank in Use at the Denny Shipyard in England. Extract from an article in the "N. Y. Herald," by J. D. Jerrold-Kelley, giving an account of the new system of testing ships' models in this private testing tank. 2000 w. Naut Gaz—Aug. 8, 1901.

Electric Equipment.—See **Washington.**

North German Lloyd.—The North German Lloyd Testing Tank at Bremerhaven (Die Schiffbau-Technische Versuchsstation des Norddeutschen Lloyd in Bremerhaven). A. Schromm. With views of the tank and model rooms and diagrams of the recording apparatus. 2000 w. Oesterr Wochenschr f d Oeffent Baudienst—Oct. 4, 1902.

Experimental Laboratory of the North German Lloyd. Condensed translation of a paper by Herr A. Schromm, in the "Austrian Weekly of Public Works," describing the station at Bremerhaven. 1000 w. Eng Rec—Nov. 29, 1902.

Spezia Experiments.—Experiments upon the Propulsion of Models of Ships (Esperienze di Propulsione con Modelli di Navi). Nino Pecoraro. A discussion of experiments in the testing tank at the Arsenal at Spezia, with especial reference to the use of electrically operated propellers on the models. 6000 w. 2 plates. Rivista Marittima—Dec., 1901.

Washington.—The United States Experimental Model Basin. D. W. Taylor. A description of the basin and its appliances, fully illustrated. 7000 w. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

The United States Experimental Model Basin. Illustrated description of this method of determining the resistance of a ship. 1100 w. Sci Am—June 1, 1901.

The Electrical Equipment of the Experimental Model Basin at Washington Navy Yard. J. Adger McCrary. An illustrated detailed description of the machinery and apparatus employed, particularly the electrical devices used. 1500 w. Elec Wld & Engr—May 10, 1902.

The Machinery of the Model Testing Tank of the U. S. Navy Department. Waldon Fawcett. An illustrated detailed description of this interesting machinery. 3000 w. Mod Mach—June, 1902.

The Proposed Experimental Tank for Testing Ship Models for Resistance. Gives an outline of the method of investigation by models, as devised by Mr. William Froude, and brief illustrated description of the tank at Washington. 2200 w. Nature—June 5, 1902.

See also **PROPELLER—Model Experiments.**

MOISTENER.

See **HUMIDITY.**

MOISTURE.

Hygrometer.—See **HYGROMETER.**

MOLASSES.

Fuel.—See **FUEL—Molasses.**

MOLD.

See **CASTING; FOUNDRY; MOLDING.**

MOLDING.

See also **CASTING; FOUNDRY; MOLDING MACHINE; PATTERN.**

Molding Materials in the Foundry. E. L. Rhead. Considers the points of importance in selecting suitable materials for making molds. 3000 w. Mech Engr—Nov. 25, 1905.

Air Chambers.—Molding Air Chambers without Using Chaplets. J. Temple MacCartney. Illustrates and describes the method followed at the foundry of the Scranton Steam Pump Co. 1000 w. Foundry—March, 1903.

Beckwith Process.—A New Multiple Molding Process for Relatively Deep Work. E. H. Mumford. Address before the New England Found. Assn. Illustrated description of the process developed by A. K. Beckwith. 1000 w. Met Work—Sept. 23, 1905.

Bell Cranks.—See **CASTINGS—Chilled.**

Bosses.—Molding Bosses on Castings. John M. Richardson. Illustrated description of different methods employed. 800 w. Am Mach—Aug. 7, 1902.

Brass Castings.—See **BRASS FOUNDRY—Railroad.**

Column.—Molding a Thin Building Column. R. H. Palmer. Illustrated article describing the work. 1200 w. Am Mach—Oct. 1, 1903.

Complicated Pieces.—See **MOLDING MACHINE—Difficult Work.**

Cone Pulley.—See **MOLDING MACHINE.**

Core.—Cores and Core Arbors. Edward B. Gilmour. Discusses the making of cores and core arbors, the best practice, kind of material, etc. Ill. 2000 w. Jour Am Found Assn—June, 1902.

A Responsible Job for the Coremaker. R. H. Palmer. Illustrates and describes the making of a difficult core. 1000 w. Am Mach—Oct. 15, 1903.

Core Practice and Sands Used for Cores in Various Parts of the Country. R. H. Palmer. Describes sands used in various parts of the United States, the construction of cores, and discusses core compounds. 1800 w. Am Mach—Vol. 28, No. 40.

Molding in Cores. H. J. McCaslin. Illustrates and describes methods of making a variety of castings. 1700 w. Foundry—Sept., 1904.

Molding in Cores. Vincent Colajezzi. An illustrated article giving examples showing that molds composed of dry sand cores can be constructed frequently cheaper and better than is possible with green sand molds. 1200 w. Foundry—Feb., 1905.

Core Bench.—The Core Bench. Benjamin D. Fuller. Read before the Am. Found. Assn. Discusses the management of the core bench. 800 w. Ir Trd Rev—June 9, 1904.

The Core Bench. Benjamin D. Fuller. Discusses the essentials of good core castings. 700 w. Am Found Assn—June, 1904.

Core Boxes.—Core Boxes for Globe Valves. Robert Wagner. Illustrates and describes a method in which only two core boxes are used and two cores give one complete valve. 400 w. Foundry—May, 1903.

Core Covering.—The Use of Covering Cores. H. J. McCaslin. Gives illustrations covering the principal uses of this class of cores, with explanatory notes. 700 w. Foundry—Sept., 1905.

Coremaker.—A Plea for the Coremaker. Alex. T. Neil. Considers some of the troubles in coremaking. Ills. 1000 w. Am Found Assn—June, 1904.

Coremaking Machine.—Core-Making Machine. Illustrated description of a machine intended for producing complicated cores. 800 w. Engng—April 24, 1903.

Core-Making Machines (Kernformmaschinen). Oskar Leyde. Illustrating a number of machines, mainly of German design. 1500 w. Zeitschr d Ver Deutscher Ing—July 9, 1904.

Mechanically Made Cores. George H. Wadsworth. Read before the Found. Assn. Describes the three methods of producing cores by mechanical means, illustrating Wadsworth's core-making machine. 2000 w. Ir Trd Rev—Sept. 15, 1904.

Core Oven.—Automatic Core Ovens Using Oil as Fuel. S. E. Barnes. Read before the Phila. Found. Assn. Describes a system for burning oil which has been found safe, economical and convenient. Short discussion. 1800 w. Foundry—March, 1905.

Core Room Costs.—See **COST-KEEPING.**

Core Sand.—The Use of Old Core Sand. Charles A. Smith. An explanation of the writer's practice of using old core sand in new core mixtures. 800 w. Foundry—Dec., 1904.

Core Sands. J. S. Robeson. Read before the A. F. A. Convention. Gives photo-micrographs, showing the variations in the sands used in core making, and that failures are often due to the sand used rather than to the binder. States the requirements for a good binder. 2200 w. Foundry—Aug., 1905.

See also **Green Sand; Sand.**

Core Sand Binders.—Core Sand Binders. J. S. Robeson. Read before the Pittsburg Found. Assn. Setting forth the claims of gluetrin, discussing difference in sand structure, solid and liquid binders, etc. 4500 w. Ir Age—Feb. 9, 1905.

Core Sand Binders. J. S. Robeson. Read before the Pittsburg Found. Assn. Considers the work required of a binder, the usual methods of preparing the mixture, and matters related. 4000 w. Foundry—April, 1905.

Core Venting.—Venting of Cores. Jas. A. Murphy. Read before the Am. Found. Assn. Describes a machine for making the wax wire used for venting, with speed and economy. Ils. 900 w. Ir Trd Rev—June 8, 1905.

Venting Difficult Cores. Walter J. May. Suggestions for making vents or gas passages in unusual shapes. Ils. 600 w. Prac Engr—Nov. 3, 1905.

Crane Base.—Molding a Crane Base. Joseph Horner. Illustrates and describes methods of making a casting without a complete pattern. 1300 w. Am Mach—April 7, 1904.

Crane Girder.—Molding a Slewing Crane Girder. Joseph G. Horner. Illustrates and describes the making of a large casting. 1500 w. Am Mach—Jan. 7, 1904.

Crayons and Balls.—Mold Construction for Crayons and Lead Balls. Joseph V. Woodworth. Illustrated description. 1400 w. Am Mach—Nov. 15, 1900.

Crosshead Guide.—Molding a Crosshead Guide with a Pattern Which Makes Its Own Core. R. H. Palmer. Illustrated description of the method. 1200 w. Am Mach—June 20, 1901.

Cross Pipe.—Molding a Large Cross Pipe. Illustrated description of the method used. 1000 w. Am Mach—Dec. 5, 1901.

Crush.—Crush of the Mold. William Leary. Considers the causes and remedies. 1000 w. Foundry—June, 1904.

Cylinder, Steam Feed.—Molding and Core Making for a Long Steam Feed Cylinder. R. H. Palmer. Illustrated detailed description. 800 w. Am Mach—Vol. 27, No. 48.

Drum Sweeping.—Sweeping a Cylindrical and Conical Drum. H. J. McCaslin. Explains the use of these drums, describing the device employed in producing them, the method of sweeping the mold, building the core, etc. Fully illustrated. 2000 w. Foundry—Aug., 1905.

Drying Molds.—Drying Molds. Henry Hess. Remarks on methods, with description of a combination of small stove, small blower, and small electric motor to drive the blower. 1000 w. Foundry—Nov., 1903.

The Lochner Drying Apparatus (Das Lochnersche Trocknungsverfahren). O. Wedemeyer. Describing an apparatus for drying molds by utilizing the heat from cooling castings. 1800 w. Stahl u Eisen—Jan. 15, 1905.

New Method of Drying Large Molds. Henry Biegel. Illustrates and describes a method of drying with stoves. 700 w. Am Mach—Vol. 28, No. 19.

Mold Drying. Illustrates and describes several systems of drying molds. The Shedden mold-dryer, the Littleton, and the Lochner. 2200 w. Ir & Coal Trds Rev—Sept. 1, 1905.

Education.—Making a Molder. H. M. Lane. Read before the Am. Found. Assn. Discusses present conditions and the training needed to make good molders. 2400 w. Foundry—July, 1905.

See also **APPRENTICE; EDUCATION; FOUNDRY.**

Facing.—Facing Molds for the Production of Fine Surface Castings. Directions for preparing the molds for finely finished castings. 1200 w. Prac Engr—Feb. 17, 1905.

See also **FOUNDRY.**

Flasks.—Combination Iron Flasks. R. H. Palmer. Discusses how to make flasks so that they can be easily altered to take in patterns of different styles. Ill. 1300 w. Am Mach—Aug. 7, 1902.

See also **MOLDING MACHINE.**

Floor.—Floor Molding Without Patterns. Henry Hess. An illustrated description of improvements introduced in a foundry in Berlin, Germany. 1800 w. Foundry—Oct., 1903.

See also **Machine and Floor Plate.**

Floor Bedding.—Molding a Casting by Bedding in the Floor. R. H. Palmer. An illustrated description of this method and a statement of some of the advantages. 1800 w. Am Mach—Dec. 6, 1900.

Flywheel.—Molding a Flywheel. Illustrated description of the method used. 800 w. Am Mach—Dec. 27, 1900.

Molding a Rope Drive Flywheel. R. H. Palmer. Illustrates and describes the method used. 900 w. Am Mach—Vol. 28, No. 11.

Molding Flywheels with Segments. Paul R. Ramp. Describes the manner in which the writer has successfully molded and cast many large wheels. Ils. 1200 w. Foundry—March, 1904.

Molding a Flywheel with Wrought-Iron Spokes. R. H. Palmer. Illustrates and describes the methods used in making a casting about 8 feet in diameter, weighing 5,000 pounds. 1000 w. Am Mach—Vol. 27, No. 45.

Molding (in One Piece) a 15-Foot Flywheel in Dry Sand Cores. S. B. Ryder. Illustrates and describes the methods used. 800 w. Am Mach—Vol. 28. No. 42.

Flywheel, Split.—Sweeping a Mold for a Split Flywheel. R. H. Palmer. Illustrated detailed description of method. 1600 w. Am Mach—Vol. 27, No. 52.

Gaggers.—Gaggers. James A. Murphy. On the usefulness of gaggers in the foundry, with an illustrated description of a machine for making them. 1200 w. Foundry—May, 1903.

Gas-Engine Bed.—Molding a Gas-Engine Bed in a Three-Part Flask. R. H. Palmer. Illustrated description of the method used. 1200 w. Am Mach—Dec. 13, 1900.

Gas-Engine Cylinders.—See **CASTING.**

Gates and Sprues.—Gates and Sprues. B. D. Fuller. Gives some examples of improper gating, and discusses forms of gates and their uses. 1900 w. Ir Trd Rev—Feb. 5, 1903.

See also **Skimming Gates.**

Gating.—See also **CASTING.**

Gear.—Molding a Compound Gear on a Stripping-Plate Machine. Illustrates and describes this method of molding. 2000 w. Am Mach—Vol. 27, No. 44.

Machine Molding a Special Gear—Fitting the Pattern. W. O. Smythe. Illustrates and describes the work. 2000 w. Am Mach—Vol. 27, No. 47.

See also **MOLDING MACHINE.**

Green Sand.—Green Sand Cores. P. R. Ramp. On the advantages of the green sand cores, and directions for making them. 1500 w. Jour Am Found Assn—June, 1901.

Standard and Systematic Methods for Making Beds. Thomas D. West. An illustrated article giving the results of the writer's experience and investigations in making green sand beds. 5000 w. Am Found Assn—June, 1904.

The Bottom of a Green Sand Mold. Thomas D. West. Read before New England Found. Assn. A discussion of the principles involved in making green sand castings, illustrating methods commonly practiced. 3000 w. Ir Trd Rev—Nov. 12, 1903.

The Top of a Green Sand Mold. Thomas D. West. Read at meeting of New England Found. Assn. Considers points of importance, and methods of securing desired results. 4000 w. Ir Trd Rev—Nov. 19, 1903.

Standard Methods for Green Sand Beds. Thomas D. West. Read before the Am. Found. Assn. Discusses leveling straight edges to make a bed, making soft beds, method of testing the hardness of beds, how to designate kinds of beds, making hard beds and semi-hard beds for prickered plates. 6000 w. Ir Trd Rev—June 16, 1904.

Green Sand Bottoms and Sound Castings. Suggestions and opinions in regard to molding. 1400 w. Foundry—May, 1904.

See also Pulleys.

Grinder Bed.—Molding a Grinder Bed. An illustrated account of a novel and interesting molding operation. 1000 w. Am Mach—Feb. 21, 1901.

Instruction.—See Education; **FOUNDRY.**

Jet Condenser.—Molding a Jet Condenser. Joseph Horner. Illustrates and describes the method used. 800 w. Am Mach—Vol. 28, No. 16.

See also **CASTING.**

Land Rollers.—Molding Land Rollers. George Buchanan. The method of molding cylinder rollers is illustrated and described. 600 w. Am Mach—Nov. 14, 1901.

Lathe Bed.—Molding Gap Lathe Beds. George Buchanan. Illustrates and describes the method used. 800 w. Am Mach—Aug. 29, 1901.

Lifting Pockets.—Lifting Pockets with Cores Instead of Grids or Bars. R. H. Palmer. Illustrates and describes methods used in molding. 1400 w. Am Mach—Oct. 29, 1903.

Limitation of Output.—Limitation of Output by Molders. James A. Murphy. Discusses the restriction of output, and the attitude of the Molders' Union. 1700 w. Ir Trd Rev—Dec. 4, 1902.

See also **LABOR—Output Restriction; MOLDING MACHINE—Labor Unions.**

Machine and Floor Plate.—Machine and Floor Plate Molding. C. Neil. An illustrated description of this type of molding. 1700 w. Am Mach—Sept. 17, 1903.

Machine Methods.—See **MOLDING MACHINE.**

Niles Tools Works.—See **FOUNDRY.**

Patterns.—See **PATTERN; PATTERNMAKING.**

Pattern Troubles.—See **PATTERN—Molding Troubles.**

Permanent Molds.—Permanent Molds. James A. Murphy. Remarks on loam molding, with suggestions and illustrations. 800 w. Jour Am Found Assn—June, 1903.

Pipe.—See **PIPE MANUFACTURE—Molding; Rotary Molds.**

Power Press.—See **PATTERN MAKING.**

Printing Machine Frame.—Molding a Printing Machine Frame. George Buchanan. Illustrates and describes the method of molding in one piece. 800 w. Foundry—April, 1904.

Pulleys.—Molding Pulleys with Green Sand Arm Cores. Richard Barnett. Describes the method. Ill. 1300 w. Foundry—May, 1901.

The Molding of Double-Arm Pulleys (Das Formen einer Riemenscheibe mit Doppelten Armen). W. Emrich. Describing two methods of sweeping the rim and molding the arms. 1800 w. Stahl u Eisen—Oct. 15, 1904.

Risers.—Should a Riser be Open or Shut? James A. Murphy. Discusses when the riser should be left open and when closed, and gives suggestions of interest to molders. 1500 w. Foundry—Jan., 1903.

Rollers.—See Land Rollers.

Rotary.—See **PIPE MANUFACTURE.**

Sand.—Molding Sand. F. J. H. Merrill. Where it is obtained, its quality, etc. 900 w. Eng & Min Jour—Sept. 1, 1904.

Local Sands for Foundry Use. Walter J. May. Remarks on sand fit for foundry use, and their preparation. 900 w. Prac Engr—Nov. 11, 1904.

See Core; Core Sand; Green Sand.

Sand Binders.—See Core Sand Binders.

Sand Carving.—Molding with Some Carving of Sand. R. H. Palmer. Describes the casting and the method used. 600 w. Am Mach—July 2, 1903.

Sand Specifications.—See **FOUNDRY—Specifications.**

Sawmill Bed.—Molding a Sawmill Bed. R. H. Palmer. Illustrated description. 1000 w. Am Mach—Jan. 16, 1902.

Screw Press.—Making the Pattern and Mold for the Side of a Power Screw Press. R. H. Palmer. Illustrated description of the methods usel. 1500 w. Am Mach—Vol. 28, No. 36.

Sheave.—Molding Sheaves. Joseph Horner. Illustrated description of the method adopted. 1200 w. Am Mach—Vol. 27, No. 26.

Molding a Sheave With Sweep and Cores. R. H. Palmer. Illustrates the appliances and describes the method. 600 w. Am Mach—Vol. 28, No. 7.

Sheave Wheel Molding. R. Davis. Considers the webbed wheel with plain groove, the spoke wheel with plain groove, and the wheel with toothed groove for chain, explaining how each should be prepared for molding. Ills. 2000 w. Am Mach—Vol. 28, No. 40.

Skimming Gates.—Some Skimming Gates. A. E. Fay. Illustrates some forms that have been used or suggested for the purpose of obtaining cleaner metal for the mold, with brief descriptions. 1500 w. Foundry—March, 1902.

Slag Vessel.—Molding a Slag Vessel. Robert Jones. Illustrates and describes method employed. 600 w. Am Mach—Vol. 27, No. 38.

Special Casting.—Molding a Special Casting. George Buchanan. Illustrates and describes the work. 600 w. Am Mach—Sept. 26, 1901.

Spiral Drum.—Making a Spiral Drum in Loam. Joseph Horner. An illustrated detailed description of the molding of a large spiral drum, or screw barrel, for a powerful Titan crane. 2500 w. Foundry—March, 1905.

Stripping Plates.—Stripping Plates. P. R. Ramp. An illustrated article describing method of greatly reducing the cost of molding work. 800 w. Foundry—Jan., 1904.

See also Gear.

Telephone Receiver.—Making Molds for Telephone Receiver Work. Joseph V. Woodworth. Illustrates and describes molds used in manufacturing imitation rubber or composition goods for various purposes. 900 w. Am Mach—Oct. 24, 1901.

Three-Way Cock.—Molding a Three-Way Cock. H. J. McCaslin. Gives method used in molding a rather difficult casting. Ills. 500 w. Foundry—Nov., 1905.

Warping.—Molding Crooked to Make Straight Castings. Thomas Mack. Describes method used to overcome warping. Ills. 800 w. Am Mach—Vol. 28, No. 10.

See also **CASTING.**

Weights.—Weights for Holding Down. Thomas D. West. States rules that can be applied to figuring the weight necessary to hold down the cope and core of the mold. 1500 w. Foundry—March, 1904.

MOLDING MACHINE.

See also **FOUNDRY; MOLDING.**

Machine Molding. I. L. McCord. Read at meeting of the Foundrymen's Assn. Discusses some of these machines, their advantages and disadvantages, cost, etc. 4800 w. Ir Age—Nov. 8, 1900.

Machine Molding. I. L. McCord. Read at a meeting of the Foundrymen's Assn. Considers the application of molding machines to foundry work, the saving in cost, the various machines, etc. 4500 w. Foundry—Jan., 1901.

The Molding Machine. S. H. Stupakoff. Considers the subject of molding and the labor-saving devices used. Ill. 3000 w. Jour Am Found Assn—Jan., 1902.

The Molding Machine. S. H. Stupakoff. An illustrated discussion of these machines and what they are designed to accomplish. 4000 w. Jour Am Found Assn—June, 1903.

Molding Machines. Edward B. Gilmour. Remarks on the advantages and disadvantages of these machines, with an illustrated description of a stripping plate drop pattern machine and the castings made with it. 900 w. Jour Am Found Assn—June, 1903.

Molding Machines. George C. Neilsen. From a paper before the Chicago Foundry Foremen's Assn. On the advantages and economy of these machines. 1400 w. Am Mach—June 9, 1904.

Molding Machines and Their Use. E. H. Mumford. Read before the A. F. A. Calls attention to a few of these machines, with general remarks on their use. 1500 w. Ir Trd Rev—June 16, 1904.

Molding Machines and Their Use. E. H. Mumford. Abridged paper, read before the Am. Found. Assn. Remarks on some of the simpler machines. 1200 w. Am Mach—July 7, 1904.

Molding Machines and Their Uses. E. H. Mumford. Read before A. F. A. Calls attention to some of the simpler machines and their use. 2000 w. Foundry—Jan., 1905.

Molding Machines of To-Day. Herbert M. Ramp. Read before the A. F. A. Discusses the developments in molding machines over those of a decade ago. 1600 w. Foundry—Jan., 1905.

Bryan Vacuum.—Bryan Vacuum Molding Machine. H. M. Baldwin. Brief description of the machine and its operation. 1600 w. Ir Age—Nov. 14, 1901.

Clutch Coupling.—Making a Clutch Coupling on the Molding Machine. George Buchanan. An illustrated description of the method employed. 700 w. Am Mach—Vol. 28, No. 45.

Cone Pulley.—Selecting a Molding Machine—Molding a Cone Pulley. R. A. Bull. Suggestions for the selection of the right machine, and an illustrated description of method of making a special cone pulley. 2800 w. Am Mach—Vol. 28, No. 38.

Difficult Work.—Making Complicated Pieces in Molding Machines (Herstellung Komplizierter Gegenstände auf Formmaschinen). F. Wüst. Giving examples of molding flanged pulleys, bevel gears, etc., by machinery. 1200 w. Stahl u Eisen—Feb. 1, 1904.

Difficult Molding Machine Work. R. Adams. Illustrates and describes a difficult case of three-parted work. 2000 w. Am Mach—Vol. 28, No. 38.

Equipment.—Molding Machine Equipment. T. E. Vanderslice. Illustrates and describes special devices for use on molding machines, their use, etc. 3800 w. Am Mach—Vol. 28. No. 45.

Flasks.—The Molding Machine Flasks. S. H. Stupakoff. The importance of good flasks and flask pins is discussed. 1400 w. Jour Am Found Assn—June, 1902.

Machine Molding. G. P. Campbell. The present article discusses flasks. Ills. Serial. 1st part. 1800 w. Am Mach—July 28, 1904.

See also **MOLDING.**

Gear.—Gear Molding Machine. An illustrated description of a superior gear molding machine. Its most striking feature is the method of inverting the functions of its leading parts in order to adapt it to the making of either small or large gears. 1000 w. Am Mach—May 9, 1901.

Molding a Large Gear Wheel. Samuel Groves. An illustrated detailed description of the Groves' Portable Gear Molding Machine and its operation. 3000 w. Can Engr—Nov., 1905.

See also **MOLDING.**

German.—Modern Molding Machines (Moderne Formmaschinen). H. Baur. A very fully illustrated account of the development of the modern molding machine, with especial reference to German practice. Two articles. 5000 w. Stahl u Eisen—Nov. 15, 1905.

Groves.—See **Gear.**

Improvements.—The Advances in Molding Machinery. Harris Tabor. On the improvements and the future of molding machines. Ill. 1600 w. Ir Age—Jan. 1, 1903.

Jig.—See **JIG—Molding Machine.**

Labor Unions.—The Relation of the Molding Machine to Foundry Labor. C. H. Mumford. Address before the New England Foundrymen's Assn. Discusses the relation of the molding machine to union foundry labor. 3800 w. Ir Age—Nov. 20, 1902.

See also **LABOR—Machinery Opposed; Output Restriction; MOLDING—Limitation of Output.**

Match Plate Method.—Molding Machine Practice. Fred W. Hall. An illustrated article treating of the match plate method of machine molding. 2200 w. Foundry—July, 1904.

Pattern Mounting.—Mounting a Shuttle-Box Pattern on a Molding Machine. John Weaver. Illustrates and describes a method of mounting patterns. 1600 w. Am Mach—Vol. 28, No. 21.

Practice.—Molding Machine Practice. F. W. Hall. Illustrates and describes the molding of a cone pulley 5 inches in diameter. 2500 w. Foundry—Jan., 1905.

Molding Machine Practice. F. W. Hall, in "The Patternmaker." Remarks on recent molding machines, and their operation, with a description of the mounting of a casting. Ills. 2500 w. Foundry—Sept., 1905.

Up-to-Date Method of Molding. J. K. King. Discusses the introduction of molding machines into a foundry, the preparation of the machines and the points demanding attention. Ills. 2200 w. Am Mach—Vol. 28, No. 36.

Molding Machine Practice. F. W. Hall, in "The Patternmaker." Shows a special casting mounted on different types of machines, and discusses the advantages and disadvantages of one type compared with the other. 2500 w. Foundry—Nov., 1905.

Molding Machine Practice. F. W. Hall, in "The Patternmaker." Illustrates and describes work that required the getting up of a special device. 1500 w. Foundry—Dec., 1905.

Ratchet Wheel.—Molding Machine Practice. F. W. Hall. Illustrated description of the arranging of a ratchet wheel on a molding machine. 1800 w. Foundry—Oct., 1904.

MOLDING SAND.

See **MOLDING.**

MOLECULE.

See **ATOM; CHEMISTRY; ELECTRON; ELECTRO-PHYSICS; MATTER; PHYSICS; RADIO-ACTIVITY; RADIOGRAPHY.**

MOLYBDENITE.

Molybdenite—Its Occurrence, Concentration and Uses. J. Walter Wells. Gives results of experimental work to determine the different methods of concentrating the ores. Also its occurrence in Canada is reported, and its industrial uses considered. Ill. 5800 w. Can Min Rev—May 30, 1903.

Molybdenite, Its Determination, Detection and Uses. Dr. J. Ohly. Information concerning this rare metal, and the means of detecting it, its uses, &c. 1700 w. Min Rept—July 7, 1904.

British Columbia.—Molybdenite in British Columbia. Horace F. Evans. Describes its occurrence and the area. But little development work has been done. 1800 w. Min Wld—Oct. 21, 1905.

Queensland.—See **WOLFRAM.**

Treatment.—Molybdenite and the Commercial Products Derived Therefrom. Dr. J. Ohly. Concerning this mineral, recently applied to the improvement of carbon steel, and the treatment it requires. Serial. 1st part. 1200 w. Min Rept—July 16, 1903.

Steel.—See **STEEL ALLOY—Molybdenum.**

Steel Analysis.—See **STEEL ANALYSIS.**

MOMENT OF INERTIA.

See also **MATERIALS' STRENGTH.**

A New Method of Calculating the Moment of Resistance and the Moment of Inertia (Nouvelle Méthode pour le Calcul du Moment de Résistance et du Moment d'Inertie). M. Lathuillière. Deriving a method especially applicable to built-up beams and girders, materially reducing the labor of computation. 2500 w. Revue Technique—Dec. 10, 1902.

A Study of Section Moments (Studie über Querschnitts Momente). Dr. Ludwig Hess. Developing equations for the determination of centrifugal moments and moments of inertia for structural shapes of various cross sections. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 2, 1903.

Moments of Inertia. R. M. Neilson. The first of a series of articles aiming to render the question of moments of inertia clear to those who have been perplexed. Serial. 1st part. 800 w. Prac Engr—Nov. 28, 1902.

Determination of the Moment of Inertia of Parallel Forces in One Plane (Die Bestimmung des Trägheitsmomentes Paralleler, in derselben Ebene, Liegender Krafte). Nikolaus von Szüts. Showing the application of the graphical method to the solution of the problem. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 23, 1904.

Moments of Inertia. Shows how they may be deduced by methods which require a merely elementary mathematical knowledge. 3500 w. Mech Engr—Sept. 30, 1905.

Beams.—See **BEAM—Variable Moment of Inertia.**

Corrugated Metal.—See **CORRUGATED METAL.**

Polar.—The Polar Moment of Inertia, and Its Graphical Application to Riveted Joints. C. F. Blake and R. W. Runge. Mathematical discussion. 2500 w. Eng News—May 21, 1903.

Problems in Beams and Planes Severally Supported and Eccentrically Loaded. C. F. Blake. Remarks on the principles of the polar moment of inertia method and its applications to these problems. 1200 w. Mach, N Y—July, 1904.

Rotating Bodies.—The Determination of the Moment of Inertia of Rotating Bodies (Bestimmung der Trägheitsmomente von Umdrehungskörpern). Sigmund Wellisch. A graphical and analytical study, with practical applications to bodies of various forms in rotary motion. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 24, 1905.

MONAZITE.

See also **INCANDESCENT GAS LIGHTING; THORIUM.**

Brazil.—A Visit to the Monazite Sand Deposits of Brazil. Joseph Tysoe. An account of a recent visit to Brazil in the interests of the gas industry. 2300 w. Jour Gas Lgt—July 28, 1903.

Gas Industry.—The Fight of the Gas Industry for a Controlling Hand Over Monazite. On the importance of the monazite sand and thorium question to the gas industry, and Mr. J. Tysoe's mission to Brazil. 3000 w. Jour Gas Lgt—July 21, 1903.

Queensland Beach Sands.—Monazite in the Beach-Sands of Queensland. B. Dunstan. Describes the deposits and the mineral, giving localities where it has been found. 1100 w. N Z Mines Rec—Aug. 16, 1905.

See also **MINERAL REGION.**

MONITOR.

See also **NAVY.**

"Arkansas."—"Arkansas" Class—The Monitor "Arkansas." Illustrated description, with comments. 1200 w. Sci Am—Dec. 14, 1901.

Description and Trials of the U. S. Monitor Arkansas. C. K. Mallory. 2900 w. Jour Am Soc of Nav Engrs—Nov., 1902.

British.—Early British Double-Turreted Monitors. Illustration, with an account of how these vessels, intended for the Confederate States during the Civil War, became the property of the British Government. 500 w. Sci Am—June 14, 1902.

"Florida."—The Official Trial of the U. S. S. "Florida." Lieut. Com. Albert Moritz. An illustrated detailed description of the vessel and its equipment, with report of trial. 7800 w. Jour Am Soc of Nav Engrs—May, 1903.

Performance.—A Comparison of the Performances of the Monitors "Arkansas," "Florida," "Nevada," and "Wyoming.' R. E. Carney. The chief points of difference in these vessels are in the character of boilers installed and the design of propellers fitted to the shafts. 2500 w. Jour Am Soc of Nav Engrs—Aug., 1903.

U. S. Trials.—A Comparison of the Trials of the New Monitors of the United States Navy. A summary from detailed reports of the four monitors recently authorized by Congress. The results are a valuable contribution to the subject of propeller design. 900 w. Marine Engng—May, 1903.

"Wyoming."—Contract Trial of the U. S. S. "Wyoming." W. W. Bush. Illustration and description of the vessel with report of trial. 6000 w. Jour Am Soc of Nav Engrs—Feb., 1903.

See also **PROPELLER.**

MONO-RAIL.

See **SINGLE RAIL; SUSPENDED RAILWAY.**

MORTAR.

See also **BUILDING MATERIAL; CEMENT; CONCRETE; MASONRY.**

Cement.—Effect of Clay and Loam on Cement Mortar. O. B. Sherman. An account of bridge construction in Yellowstone National Park, describing the material used, and giving results of tests made. 2000 w. Eng News—Nov. 19, 1903.

Cement and Pozzuolano.—See also **CEMENT—Pozzuolano.**

Consolidation.—Note on the Consolidation of Mortar. George W. Rafter. A record of tests made by the writer. 500 w. Pro Am Soc of Civ Engrs—Oct., 1901.

Decomposition.—The Decomposition of Mortar (Décomposition des Mortiers). J. Bied. An examination of the decomposing action of water charged with sulphate of lime upon mortar, citing important examples. 5000 w. Ann des Ponts et Chaussées—3 Trimestre, 1902.

Hardening.—See **CEMENT.**

Manhattan Power Station.—See **CONCRETE.**

Portland Cement.—See **CONCRETE.**

Sand.—See **SAND.**

Testing.—Tests of Special Properties of Mortar. Brief report of the results of extensive experiments made to determine the permeability and strength of mortars made of the natural and Portland cement mixed with varying proportions of coarse and fine sands. 700 w. Eng Rec—Aug. 16, 1902.

See also **CEMENT TEST.**

Testing Machine.—See **CEMENT TEST—Time of Set.**

MOSAIC.

Methods of Mosaic Construction. W. L. H. Hamilton. An illustrated article on the revival of mosaic as an architectural adjunct, describing the old and new methods of construction. Discussion. 9300 w. Jour Soc of Arts—Feb. 6, 1903.

MOSELY COMMISSION.

See **EDUCATION; INDUSTRIAL COMMISSION.**

MOSQUITOES.

A Review of the Anti-Mosquito Campaign. Edward S. Rankin. Read before the Am. Soc. of Munic. Imp. Principally an account of the work in New Jersey. 2000 w. Munic Engng—Oct., 1905.

MOTION.

See also **KINEMATICS; MECHANICS; PHYSICS.**

Vehicles.—See **CAR—Vibration; VEHICLE—Vibration.**

MOTIVE POWER.

See **LOCOMOTIVE; MOTOR; RAILWAY MOTIVE POWER.**

MOTOR.

See also **AUTOMOBILE; BINARY ENGINE; CARBON BISULPHIDE; ELECTRIC MOTOR; GAS ENGINE; GASOLINE ENGINE; GAS TURBINE; OIL ENGINE ROTARY ENGINE; STEAM ENGINE; STEAM TURBINE; TURBINE; WATER WHEEL.**

The Prime Mover Situation. Dr. Louis Bell. Considers the reciprocating engine, the steam turbine, and the gas engine, discussing recent improvements. 2300 w. Elec Rev, N Y—Sept. 17, 1904.

American Census.—Census Report on Motor-Power Appliances. Edward H. Sanborn. Re-print of U. S. Census Report of statistics relating to the manufacture of appliances used for the generation of power, excluding locomotives and motor vehicles. 7800 w. Power—Feb., 1903.

Analysis.—A Method of Cyclic Analysis of Heat Engines. Charles E. Lucke. Outlines various cycles and considers them, causing one pound of air to pass through each under ideal conditions. Mathematical. Serial. 1st part. 4000 w. Sch of Mines Quar—Jan., 1901.

The Heat-Engine Problem. Charles E. Lucke. Gives a review of the cycles in which heat engines may work, and decides that only the Brayton and the Otto are available in practice. Gives the requirements of a proper apparatus and the results of a series of experiments to devise such an one. Ill. 1500 w. Trans Am Soc of Mech Engrs, No. 923—Dec., 1901.

Angular Displacement.—See SPEED VARIATION.

Athermic.—The Athermic Motor (Moteur Athermique). Leo Dex. A description of a machine operating by the utilisation of extremely low temperatures, employing liquid carbonic acid. Serial. Part I. 7000 w. Revue Technique—Dec. 10, 1904.

Caloric.—See Svea.

Carbon Bisulphide.—See CARBON BISULPHIDE—Heat Engine.

Combustion.—Lines of Progress in the Efficiency of the Combustion Motor. E. C. Warren. A discussion of the practicability of the constant pressure generator, and its applicability for driving rotary and other motors. 3500 w. Engineering Magazine—Feb., 1904.

See also GAS ENGINE; GASOLINE ENGINE; OIL ENGINE; ROTARY ENGINE.

Construction.—Recent Progress in Machine Construction (Neuere Fortschritte im Maschinenbau). Hugo Seidler. A rapid review of the latest improvements in prime movers, including steam engines, hydraulic motors, and gas engines. Two articles. 6000 w. Zeitschr f Elektrotechnik—Sept. 20, 27, 1903.

Diesel.—See OIL ENGINE.

Efficiency.—The Efficiency of Prime Movers and of Machines. An explanation of Prof. Rankine's method of determining efficiency. 1000 w. Engr, Lond—Jan. 23, 1903.

The Potential Efficiency of Prime Movers. C. V. Kerr. A discussion of water-wheels, steam engines, and steam turbines, reporting tests. 2500 w. Trans Am Soc of Mech Engrs, No. 080—June, 1904.

The Economics of Power Engines. Bernhard A. Sinn. Deals principally with explosive engines, but also considers steam engine efficiency and describes the marine gas suction generator. 2500 w. Marine Engng—Sept., 1904.

See also EFFICIENCY; and under specific machines and processes.

Electric.—See ELECTRIC MOTOR.

Electric Generation.—Prime Movers for Generators. W. H. Wakeman. An illustrated article calling attention to all kinds of prime movers available for this purpose. Serial. 1st part. Elec, N Y—Dec. 27, 1905.

See also London Exhibition.

Explosive Mixtures.—Some New Work on Properties of Explosive Mixtures. Charles E. Lucke. An illustrated account of experimental studies of explosive mixtures for heat engines. 5000 w. School of Mines Quar—Nov., 1902.

See also GAS ENGINE; GASOLINE.

Formula.—A Proposed Modification of the Perfect Heat-Engine Formula. Louis Illmer, Jr. Suggestions regarding the improvement of the isolation factor indicating the lines along which increase in the economy of internal combustion motors is to be sought. 6000 w. Jour Fr Inst—Nov., 1904.

Friedenthal.—See STEAM ENGINE.

Hoffman.—See STEAM GENERATION.

Jet Actions.—A New Type of Heat Motor (Sur un Nouveau Genre d'Appareils Thermiques). H. Royer. A mathematical investigation of the application of the jet principle to combustion motors for the production of fluid pressure for action upon a turbine or similar machine. Serial. Part I. 7500 w. Revue de Mécanique—Nov. 30, 1904.

Josse.—See BINARY ENGINE.

Josse Review.—The Recent Development of Heat Motors (Ueberblick über die Gegenwärtige Entwickelung der Wärmemotoren und Kraftwerke). E. Josse. A general review of the development of steam and gas engines since the Paris exposition of 1900; including turbines and binary vapor engines. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—June 18, 1904.

Junge.—The Junge Heat Engine System. H. Diederichs. Examines the deficiencies of present gas engines and Mr. Junge's proposal to use a two-cycle engine with independent auxiliary machinery. Also compares thermal efficiency of gas and steam engines. 5700 w. Power—May, 1905.

Liége Exposition.—See GAS ENGINE.

London Exhibition.—Prime Movers and Auxiliary Plant at Olympia. E. G. Beaumont. A review of the exhibits of this class shown at the electrical exhibition. Serial. 1st part. 1800 w. Elec Engr, Lond—Sept. 29, 1905.

Longridge Lecture.—Gas, Oil and Steam for Power. Michael Longridge. Lecture delivered before the British Assn. of Mgrs. of Textile Works. Restricts the paper to the consideration of steam, gas and oil engines as heat engines. Serial. 1st part. 3500 w. Engr, Lond—Oct. 14, 1904.

Longridge Report.—Prime Movers and Their Ailments. Editorial review of the report of Mr. Michael Longridge of failures and accidents and their causes. 2000 w. Engng—Oct. 17, 1902.

Trials of a Boiler and Pair of Compound Engines. Michael Longridge. States the object of the trials and gives results. Serial. 1st part. 900 w. Mech Engr—Nov. 8, 1902.

Engine Breakdowns. Michael Longridge. Particulars of steam, gas, and oil engine breakdowns, with the lessons they teach, taken from the annual report of the chief engineer of the Engine, Boiler & Employers' Liability Ins. Co. 5800 w. Mech Engrs—Sept. 26, 1903.

Machinery Defects and Their Causes. A review of the report of Mr. Michael Longridge, on engine, boiler and motor breakdowns for the previous twelve months. 1800 w. Engng—Oct. 9, 1903.

Engine Breakdowns and Their Lessons. Michael Longridge. From the annual report of Michael Longridge, chief engineer of the British Engine, Boiler and Electrical Insurance Company, Ltd. Ills. 6000 w. Mech Engr—Aug. 27, 1904.

Breakdowns of Machinery in 1904. Interesting extracts from the report of Michael Longridge, which deals with mishaps in connection with engines, boilers, dynamos and motors. 1500 w. Elec Rev, Lond—Sept. 29, 1905.

Prime Movers and Their Accessories in 1904. Editorial review of some features of Mr. Longridge's report for 1904 to the British Engine, Boiler and Electrical Insurance Company, Ltd. 2000 w. Engng—Oct. 20, 1905.

See also INSPECTION—Electric Machinery.

Paris Exposition.—See GAS ENGINE.

Power Cost.—See POWER COST.

Spring.—See SPRING MOTOR.

Svea.—Svea Caloric Engine. G. Emil Hesse. An illustrated article explaining the working of this engine. 1400 w. Sci Am Sup—April 29, 1905.

Town Premises.—The Choice of Prime Movers for Town Premises. W. H. Y. Webber. Discusses briefly the case of the power user in any town which is not given wholly to manufacturers. 2200 w. Gas Wld—July 15, 1905.

MOTOR BOAT.

See BOAT; BOAT, ELECTRIC; BOAT, GASOLINE; BOAT, GAS POWER; BOAT RACE; BOAT, STEAM.

MOTOR-BOAT RACE.

See BOAT RACE.

MOTOR CAR.

See AUTOMOBILE; CAR, MOTOR-DRIVEN.

MOTOR CYCLE.

See also AUTOMOBILE.

Motor Bicycles. Reviews some of the peculiar characteristics of the bicycle, and considers the application of a motor, and points of construction. 2300 w. Auto Jour—Feb., 1901.

Motor Bicycle Design. Douglas Leechman. Deals with the adaptation of the safety bicycle to motor driving, considering the position of the motor, steering, side-slip, etc. Ill. 3500 w. Autocar—July 27, 1901.

Reflections on Motor Cycles. Albert L. Clough. Conclusions of the writer after a 60-mile trip on a motor tricycle. 2000 w. Horseless Age—Aug., 7, 1901.

The Future of the Motor Bicycle. J. Lewis Strahan claims that an efficient reliable motor is now available, and calls attention to points in the design of the frames of bicycles that need correcting. 1700 w. Horseless Age—Nov. 6, 1901.

An Expert's View of the Motor Cycle. Discusses the advantages and disadvantages, with conclusions in its favor. 2000 w. Automobile—April 11, 1903.

Benzine.—Benzine Motor Cycle. Illustrates and describes a machine made in Munich, Bavaria, and its action. 1200 w. Sci Am Sup—Feb. 1, 1902.

of a series of articles aiming to render the question of moments of inertia clear to those who have been perplexed. Serial. 1st part. 800 w. Prac Engr—Nov. 28, 1902.

Determination of the Moment of Inertia of Parallel Forces in One Plane (Die Bestimmung des Trägheitsmomentes Paralleler, in derselben Ebene, Liegender Krafte). Nikolaus von Szüts. Showing the application of the graphical method to the solution of the problem. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 23, 1904.

Moments of Inertia. Shows how they may be deduced by methods which require a merely elementary mathematical knowledge. 3500 w. Mech Engr—Sept. 30, 1905.

Beams.—See **BEAM—Variable Moment of Inertia.**

Corrugated Metal.—See **CORRUGATED METAL.**

Polar.—The Polar Moment of Inertia, and Its Graphical Application to Riveted Joints. C. F. Blake and R. W. Runge. Mathematical discussion. 2500 w. Eng News—May 21, 1903.

Problems in Beams and Planes Severally Supported and Eccentrically Loaded. C. F. Blake. Remarks on the principles of the polar moment of inertia method and its applications to these problems. 1200 w. Mach, N Y—July, 1904.

Rotating Bodies.—The Determination of the Moment of Inertia of Rotating Bodies (Bestimmung der Trägheitsmomente von Umdrehungskörpern). Sigmund Wellisch. A graphical and analytical study, with practical applications to bodies of various forms in rotary motion. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 24, 1905.

MONAZITE.

See also **INCANDESCENT GAS LIGHTING; THORIUM.**

Brazil.—A Visit to the Monazite Sand Deposits of Brazil. Joseph Tysoe. An account of a recent visit to Brazil in the interests of the gas industry. 2300 w. Jour Gas Lgt—July 28, 1903.

Gas Industry.—The Fight of the Gas Industry for a Controlling Hand Over Monazite. On the importance of the monazite sand and thorium question to the gas industry, and Mr. J. Tysoe's mission to Brazil. 3000 w. Jour Gas Lgt—July 21, 1903.

Queensland Beach Sands.—Monazite in the Beach-Sands of Queensland. B. Dunstan. Describes the deposits and the mineral, giving localities where it has been found. 1100 w. N Z Mines Rec—Aug. 16, 1905.

See also **MINERAL REGION.**

MONITOR.

See also **NAVY.**

"Arkansas."—"Arkansas" Class—The Monitor "Arkansas." Illustrated description, with comments. 1200 w. Sci Am—Dec. 14, 1901.

Description and Trials of the U. S. Monitor Arkansas. C. K. Mallory. 2800 w. Jour Am Soc of Nav Engrs—Nov., 1902.

British.—Early British Double-Turreted Monitors. Illustration, with an account of how these vessels, intended for the Confederate States during the Civil War, became the property of the British Government. 500 w. Sci Am—June 14, 1902.

"Florida."—The Official Trial of the U. S. S. "Florida." Lieut. Com. Albert Moritz. An illustrated detailed description of the vessel and its equipment, with report of trial. 7800 w. Jour Am Soc of Nav Engrs—May, 1903.

Performance.—A Comparison of the Performances of the Monitors "Arkansas," "Florida," "Nevada," and "Wyoming." R. E. Carney. The chief points of difference in these vessels are in the character of boilers installed and the design of propellers fitted to the shafts. 2500 w. Jour Am Soc of Nav Engrs—Aug., 1903.

U. S. Trials.—A Comparison of the Trials of the New Monitors of the United States Navy. A summary from detailed reports of the four monitors recently authorised by Congress. The results are a valuable contribution to the subject of propeller design. 900 w. Marine Engng—May, 1903.

"Wyoming."—Contract Trial of the U. S. S. "Wyoming." W. W. Bush. Illustration and description of the vessel with report of trial. 6000 w. Jour Am Soc of Nav Engrs—Feb., 1903.

See also **PROPELLER.**

MONO-RAIL.

See **SINGLE RAIL; SUSPENDED RAILWAY.**

MORTAR.

See also **BUILDING MATERIAL; CEMENT; CONCRETE; MASONRY.**

Cement.—Effect of Clay and Loam on Cement Mortar. C. E. Sherman. An account of bridge construction in Yellowstone National Park, describing the material used, and giving results of tests made. 2000 w. Eng News—Nov. 19, 1903.

Cement and Pozzuolano.—See also **CEMENT—Pozzuolano.**

Consolidation.—Note on the Consolidation of Mortar. George W. Rafter. A record of tests made by the writer. 500 w. Pro Am Soc of Civ Engrs—Oct., 1901.

Decomposition.—The Decomposition of Mortar (Décomposition des Mortiers). J. Bied. An examination of the decomposing action of water charged with sulphate of lime upon mortar, citing important examples. 5000 w. Ann des Ponts et Chausseés—3 Trimestre, 1902.

Hardening.—See **CEMENT.**

Manhattan Power Station.—See **CONCRETE.**

Portland Cement.—See **CONCRETE.**

Sand.—See **SAND.**

Testing.—Tests of Special Properties of Mortar. Brief report of the results of extensive experiments made to determine the permeability and strength of mortars made of the natural and Portland cement mixed with varying proportions of coarse and fine sands. 700 w. Eng Rec—Aug. 16, 1902.

See also **CEMENT TEST.**

Testing Machine.—See **CEMENT TEST—Time of Set.**

MOSAIC.

Methods of Mosaic Construction. W. L. H. Hamilton. An illustrated article on the revival of mosaic as an architectural adjunct, describing the old and new methods of construction. Discussion. 9300 w. Jour Soc of Arts—Feb. 6, 1903.

MOSELY COMMISSION.

See **EDUCATION; INDUSTRIAL COMMISSION.**

MOSQUITOES.

A Review of the Anti-Mosquito Campaign. Edward S. Rankin. Read before the Am. Soc. of Munic. Imp. Principally an account of the work in New Jersey. 2000 w. Munic Engng—Oct., 1905.

MOTION.

See also **KINEMATICS; MECHANICS; PHYSICS.**

Vehicles.—See **CAR—Vibration; VEHICLE—Vibration.**

MOTIVE POWER.

See **LOCOMOTIVE; MOTOR; RAILWAY MOTIVE POWER.**

MOTOR.

See also **AUTOMOBILE; BINARY ENGINE; CARBON BISULPHIDE; ELECTRIC MOTOR; GAS ENGINE; GASOLINE ENGINE; GAS TURBINE; OIL ENGINE ROTARY ENGINE; STEAM ENGINE; STEAM TURBINE; TURBINE; WATER WHEEL.**

The Prime Mover Situation. Dr. Louis Bell. Considers the reciprocating engine, the steam turbine, and the gas engine, discussing recent improvements. 2300 w. Elec Rev, N Y—Sept. 17, 1904.

American Census.—Census Report on Motor-Power Appliances. Edward H. Sanborn. Re-print of U. S. Census Report of statistics relating to the manufacture of appliances used for the generation of power, excluding locomotives and motor vehicles. 7800 w. Power—Feb., 1903.

Analysis.—A Method of Cyclic Analysis of Heat Engines. Charles E. Lucke. Outlines various cycles and considers them, causing one pound of air to pass through each under ideal conditions. Mathematical. Serial. 1st part. 4000 w. Sch of Mines Quar—Jan., 1901.

The Heat-Engine Problem. Charles E. Lucke. Gives a review of the cycles in which heat engines may work, and decides that only the Brayton and the Otto are available in practice. Gives the requirements of a proper apparatus and the results of a series of experiments to devise such an one. Ill. 1500 w. Trans Am Soc of Mech Engrs, No. 923—Dec., 1901.

Angular Displacement.—See **SPEED VARIATION.**

Athermic.—The Athermic Motor (Moteur Athermique). Leo Dex. A description of a machine operating by the utilisation of extremely low temperatures, employing liquid carbonic acid. Serial. Part I. 7000 w. Revue Technique—Dec. 10, 1904.

Caloric.—See **Svea.**

Carbon Bisulphide.—See **CARBON BISULPHIDE—Heat Engine.**

Combustion.—Lines of Progress in the Efficiency of the Combustion Motor. E. C. Warren. A discussion of the practicability of the constant pressure generator, and its applicability for driving rotary and other motors. 3500 w. Engineering Magazine—Feb., 1904.

See also **GAS ENGINE; GASOLINE ENGINE; OIL ENGINE; ROTARY ENGINE.**

Construction.—Recent Progress in Machine Construction (Neuere Fortschritte im Maschinenbau). Hugo Seidler. A rapid review of the latest improvements in prime movers, including steam engines, hydraulic motors, and gas engines. Two articles. 6000 w. Zeitschr f Elektrotechnik—Sept. 20, 27, 1903.

Diesel.—See **OIL ENGINE.**

Efficiency.—The Efficiency of Prime Movers and of Machines. An explanation of Prof. Rankine's method of determining efficiency. 1000 w. Engr, Lond—Jan. 23, 1903.

The Potential Efficiency of Prime Movers. C. V. Kerr. A discussion of water-wheels, steam engines, and steam turbines, reporting tests. 2500 w. Trans Am Soc of Mech Engrs, No. 030—June, 1904.

The Economics of Power Engines. Bernhard A. Sinn. Deals principally with explosive engines, but also considers steam engine efficiency and describes the marine gas suction generator. 2500 w. Marine Engng—Sept., 1904.

See also **EFFICIENCY;** and under specific machines and processes.

Electric.—See **ELECTRIC MOTOR.**

Electric Generation.—Prime Movers for Generators. W. H. Wakeman. An illustrated article calling attention to all kinds of prime movers available for this purpose. Serial. 1st part. Elec, N Y—Dec. 27, 1905.

See also **London Exhibition.**

Explosive Mixtures.—Some New Work on Properties of Explosive Mixtures. Charles E. Lucke. An illustrated account of experimental studies of explosive mixtures for heat engines. 5000 w. School of Mines Quar—Nov., 1902.

See also **GAS ENGINE; GASOLINE.**

Formula.—A Proposed Modification of the Perfect Heat-Engine Formula. Louis Illmer, Jr. Suggestions regarding the improvement of the isolation factor indicating the lines along which increase in the economy of internal combustion motors is to be sought. 6000 w. Jour Fr Inst—Nov., 1904.

Friedenthal.—See **STEAM ENGINE.**

Hoffman.—See **STEAM GENERATION.**

Jet Actions.—A New Type of Heat Motor (Sur un Nouveau Genre d'Appareils Thermiques). H. Royer. A mathematical investigation of the application of the jet principle to combustion motors for the production of fluid pressure for action upon a turbine or similar machine. Serial. Part I. 7500 w. Revue de Mécanique—Nov. 30, 1904.

Josse.—See **BINARY ENGINE.**

Josse Review.—The Recent Development of Heat Motors (Ueberblick über die Gegenwärtige Entwickelung der Wärmemotoren und Kraftwerke). E. Josse. A general review of the development of steam and gas engines since the Paris exposition of 1900; including turbines and binary vapor engines. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—June 18, 1904.

Junge.—The Junge Heat Engine System. H. Diederichs. Examines the deficiencies of present gas engines and Mr. Junge's proposal to use a two-cycle engine with independent auxiliary machinery. Also compares thermal efficiency of gas and steam engines. 5700 w. Power—May, 1905.

Liége Exposition.—See **GAS ENGINE.**

London Exhibition.—Prime Movers and Auxiliary Plant at Olympia. E. G. Beaumont. A review of the exhibits of this class shown at the electrical exhibition. Serial. 1st part. 1800 w. Elec Engr, Lond—Sept. 29, 1905.

Longridge Lecture.—Gas, Oil and Steam for Power. Michael Longridge. Lecture delivered before the British Assn. of Mgrs. of Textile Works. Restricts the paper to the consideration of steam, gas and oil engines as heat engines. Serial. 1st part. 3500 w. Engr, Lond—Oct. 14, 1904.

Longridge Report.—Prime Movers and Their Ailments. Editorial review of the report of Mr. Michael Longridge of failures and accidents and their causes. 2000 w. Engng—Oct. 17, 1902.

Trials of a Boiler and Pair of Compound Engines. Michael Longridge. States the object of the trials and gives results. Serial. 1st part. 900 w. Mech Engr—Nov. 8, 1902.

Engine Breakdowns. Michael Longridge. Particulars of steam, gas, and oil engine breakdowns, with the lessons they teach, taken from the annual report of the chief engineer of the Engine, Boiler & Employers' Liability Ins. Co. 5800 w. Mech Engrs—Sept. 26, 1903.

Machinery Defects and Their Causes. A review of the report of Mr. Michael Longridge, on engine, boiler and motor breakdowns for the previous twelve months. 1800 w. Engng—Oct. 9, 1903.

Engine Breakdowns and Their Lessons. Michael Longridge. From the annual report of Michael Longridge, chief engineer of the British Engine, Boiler and Electrical Insurance Company, Ltd. Ills. 6000 w. Mech Engr—Aug. 27, 1904.

Breakdowns of Machinery in 1904. Interesting extracts from the report of Michael Longridge, which deals with mishaps in connection with engines, boilers, dynamos and motors. 1500 w. Elec Rev, Lond—Sept. 29, 1905.

Prime Movers and Their Accessories in 1904. Editorial review of some features of Mr. Longridge's report for 1904 to the British Engine, Boiler and Electrical Insurance Company, Ltd. 2000 w. Engng—Oct. 20, 1905.

See also **INSPECTION—Electric Machinery.**

Paris Exposition.—See **GAS ENGINE.**

Power Cost.—See **POWER COST.**

Spring.—See **SPRING MOTOR.**

Svea.—Svea Caloric Engine. G. Emil Hesse. An illustrated article explaining the working of this engine. 1400 w. Sci Am Sup—April 29, 1905.

Town Premises.—The Choice of Prime Movers for Town Premises. W. H. Y. Webber. Discusses briefly the case of the power user in any town which is not given wholly to manufacturers. 2200 w. Gas Wld—July 15, 1905.

MOTOR BOAT.

See **BOAT; BOAT, ELECTRIC; BOAT, GASOLINE; BOAT, GAS POWER; BOAT RACE; BOAT, STEAM.**

MOTOR-BOAT RACE.

See **BOAT RACE.**

MOTOR CAR.

See **AUTOMOBILE; CAR, MOTOR-DRIVEN.**

MOTOR CYCLE.

See also **AUTOMOBILE.**

Motor Bicycles. Reviews some of the peculiar characteristics of the bicycle, and considers the application of a motor, and points of construction. 2300 w. Auto Jour—Feb., 1901.

Motor Bicycle Design. Douglas Leechman. Deals with the adaptation of the safety bicycle to motor driving, considering the position of the motor, steering, side-slip, etc. Ill. 3500 w. Autocar—July 27, 1901.

Reflections on Motor Cycles. Albert L. Clough. Conclusions of the writer after a 60-mile trip on a motor tricycle. 2000 w. Horseless Age—Aug., 7, 1901.

The Future of the Motor Bicycle. J. Lewis Strahan claims that an efficient reliable motor is now available, and calls attention to points in the design of the frames of bicycles that need correcting. 1700 w. Horseless Age—Nov. 6, 1901.

An Expert's View of the Motor Cycle. Discusses the advantages and disadvantages, with conclusions in its favor. 2000 w. Automobile—April 11, 1903.

Benzine.—Benzine Motor Cycle. Illustrates and describes a machine made in Munich, Bavaria, and its action. 1200 w. Sci Am Sup—Feb. 1, 1902.

See also **ALCOHOL MOTOR—Tests; BENZINE LOCOMOTIVE.**

Berlin Exhibition.—Motor Cycles at the German Automobile Exhibition (Motor-Zweiräder auf der Deutschen Automobil Ausstellung). Julius Küster. An illustrated description of various motor cycles exhibited at the Berlin show, in March, 1903. 1600 w. Zeitschr d Mitteleuropäischen Motorwagen-Ver—No. 7, 1903.

Boston-N. Y. Run.—The Motor Bicycle Endurance Contest. C. C. Bramwell. An account of the run from Boston to New York on July 4th. Ill. 800 w. Horseless Age—July 9, 1902.

British.—The Motor-Cycle Trade in Great Britain. Information concerning the popularity of these machines, the types in demand, desirable features, etc. Brief illustrated descriptions of popular machines. 2000 w. U S Cons Repts, No. 1504—Nov. 25, 1902.

Carburetter.—See **CARBURETTER—Prunel.**

Electric.—Design for an Electric Motor Cycle. J. C. Brocksmith. Illustrated detailed description of a design for use particularly in cities. The present article describes the frame. Serial. 1st part. 2300 w. Am Elect'n—March, 1902.

Evolution.—The Evolution of the Motor Cycle. Hrolf Wisby. Illustrates and describes developments of this machine. 1800 w. Sci Am—Dec. 21, 1901.

Holden.—Colonel Holden's Motor Bicycle. Detailed drawings and description of the most recent form of this machine. 2400 w. Auto Jour—Dec., 1901.

Holden's Motor Bicycle. Illustrates and describes an ingenious invention exhibited at the Crystal Palace Motor Car Show. 1000 w. Engr, Lond—April 4, 1902.

Improvements.—Desirable Improvements on Motor Bicycles. Merwyn O'Gorman. From a paper read before the Auto. Club of Gt. Britain & Ireland. Suggestions for increasing speed, fuel efficiency, noiselessness, &c., are discussed. Serial. 1st part. 2000 w. Automobile—March 12, 1904.

London Exhibition.—Some Motor Cycles at the Crystal Palace. A. J. Wilson. Illustrations and brief descriptions of interesting exhibits. 3000 w. Autocar—Feb. 22, 1902.

Motor Cycle Matters. A. J. Wilson. Remarks on the exhibits at the Stanley and National Cycle shows, and the features of interest in the designs. 2200 w. Autocar—Nov. 29, 1902.
See also **AUTOMOBILE EXHIBITION.**

Military.—Motor Cycles for Military Purposes. Lieut. H. G. de Watteville. A discussion of the advantages and disadvantages of motor cycles for scouting purposes, examining details of construction rendering them applicable for military service. 3500 w. Jour Unit Serv Inst—March 15, 1904.

Pennell Experiences.—Some Experiences of Motor Bicycles. Joseph Pennell. An account of the writer's experiences in making an extended trip through Europe. General discussion. 10,000 w. Jour Soc of Arts—Feb. 8, 1901.

Perks and Birch.—A New Motor Cycle. Illustrated description of an English invention, in which the motor is embraced by the back wheel. 1200 w. Sci Am—Sept. 28, 1901.

Starley.—The Starley Motor Bicycle. An illustrated description of a motor bicycle having many interesting features. 1800 w. Auto Jour—Oct. 10, 1903.

Transportation.—What the Motor Cycle Offers. Henry Norman. Considers it the cheapest method of transportation as yet discovered, and destined to have an important effect on industrial and social conditions. 2000 w. World's Work—July, 1903.

Trial.—The Tourist Motor Cycle 1,000 Miles Reliability Trials. An illustrated account of these trials in England. 800 w. Auto Jour—Aug. 22, 1903.

MOTOR GENERATOR.

See also **DYNAMOTOR; ELECTRIC MACHINERY; ROTARY CONVERTER.**

A. I. E. E. Discussion.—See **ROTARY CONVERTER.**

Electrolytic Rectifier Compared.—Some Tests Conducted With an Electrolytic Rectifier and Motor-Generator. Horace Boot. An illustrated account of comparative tests of the electrolytic rectifier vs. an alternating current motor driving a direct current dynamo, for the purpose of charging the accumulators of a large electric car. 1500 w. Elec Rev, Lond—Feb. 10, 1905.

Germany.—See also **ROTARY CONVERTER.**

Oerlikon Tests.—Tests of Synchronous and Asynchronous Converters (Essais de Convertisseurs Synchrones et Asynchrones). Giving data and diagrams of trials of both types as built by the Oerlikon works in Switzerland. 1000 w. Génie Civil—Sept. 21, 1901.

Power Supply.—Power Supply from Alternating Current Stations. Shows the advantages of using motor-generators. 2500 w. Elec Rev, Lond—May 31, 1901.

Rieter.—Motor-Generator Set of 150 Horse Power (Drehstrom-Gleichstrom Umformer Gruppe von 150 P. S.) An illustrated description of a motor-generator built by Rieter of Winterthur for the palace at Madrid. A single induction motor drives two continuous current generators. 1500 w. Schweiz Bauzeitung—Nov. 8, 1902.

Rotary Converters Compared.—Motor Generators and Rotary Converters. H. M. Hobart. Examines the properties of these two types of apparatus, favoring the use of motor generators because of their superiority in convenience of operation. Serial. 1st part. 1500 w. Elec Rev, Lond—Sept. 25, 1903.

The Motor Generator Sets of the Stockholm Electric Station (Motor Generator Gruppen des Elektrizitätswerkes Stockholm). A description of the 500 kw motor-generator converters built by the Oerlikon works with data and results of tests. 3000 w. Schweiz Bauzeitung—Oct. 3, 1903.

MOTORMAN.

See **STREET RAILWAY MANAGEMENT—Employee; Instruction.**

MOULDING.

See **MOLDING.**

MOUNTAIN RAILWAY.

See also **CABLE RAILWAY; ELECTRIC CAR—Rack and Adhesion; ELECTRIC RAILWAY; LIGHT RAILWAY; LOCOMOTIVE—Rack; Rack and Adhesion; RAILWAY; SUSPENDED RAILWAY.**

Light Mountain Railways. George B. Francis. A compilation of references and facts covering the location of the information, together with a statement regarding the gauge, grade, curvature and weight of rail on quite a number of existing railroads. 2500 w. Jour Assn of Engng Socs—May, 1902.

Mountain Climbing Railways. George E. Walsh. Briefly considers the railways of Mt. Washington, Pike's Peak, Mt. Pilatus, and the Jungfrau. 2400 w. Elec Rev, N Y—Dec. 26, 1903.

Aigle-Leysin.—See **Bex-Gryon-Villars.**

Alamogardo & Sacramento, N. M.—See **RAILWAY.**

Alps.—The Service of Electricity in Climbing the Alps. Frank C. Perkins. Brief illustrated description of the Jungfrau and other mountain railways. 900 w. Sci Am Sup—Oct. 31, 1903.

See also **Appenzell; Bex; Brunnen; Davos; Jungfrau; Mont Blanc; Stansstad; RAILWAY CONSTRUCTION.**

Antonio, Cuba.—A Gravity Incline at the Antonio Mine in Cuba. E. M. Holmes. Illustrates and describes this new incline and its working. It seems to prove large cars superior to small ones in such work. 600 w. Eng News—May 12, 1904.

Appenzell, Switz.—The Prolongation of the Appenzell Railway from Gais to Appenzell (Die Verlängerung der Appenzeller Strassenbahn von Gais nach Appenzell). L. Kürsteiner. With profile and topographical map of the route and details of the combined adhesion and rack locomotives. 1800 w. Schweiz Bauzeitung—June 17, 1905.

Barmen.—The Barmen Mountain Railway (Die Barmer Bergbahn). Direktor Daubner. A well illustrated description of this electric railway, partly rack and partly adhesion, between Barmen and some of the neighboring places in Rhenish-Prussia. The power house is also described and load curves given. 3000 w. Zeitschr d Ver Deutscher Ing—Jan. 4, 1902.

Bex-Gryon-Villars.—Electrical Distribution of the Bex-Gryon-Villars Railway (Distribution d'Energie Electrique et Chemin de Fer de Bex-Gryon-Villars). K. A. Breuer. With a description of the Sublin hydro-electric station of 1600 H. P., and the distribution of current for traction and power among villages in the Rhone valley. Serial. Part I. 3000 w. 1 plate. Génie Civil—Aug. 10, 1901.

Two Swiss Mountain Railways (Zwei-Westschweizerische Bergbahnen mit Abt'scher Zahnstange). K. A. Breuer. An illustrated description of electric railways partly adhesion and partly on the Abt rack-system, one between Bex, Gryon and Villars and the other from Aigle to Leysin. Maps. Serial. 2 parts. 3500 w. Schweiz Bauzeitung—June 21, 28, 1902.

The Electric Rack-Railway of Bex-Gryon-Villars, in Switzerland. From "Le Génie Civil." Brief illustrated description of this new line. 800 w. Eng News—July 17, 1902.

Mountain Electric Road in Switzerland and the Sublin Hydraulic Plant. C. L. Durand. An illustrated description of the Bex-Gryon-Villars line, equipped on the Thury direct-current system. 3300 w. Elec Rev, N Y—Oct. 10, 1903.

Bourboule, France.—The Funicular Railway of Bourboule (Le Funiculaire de la Bourboule). A. Dumas. Describing a cable incline railway from the village of Bourboule, Auvergne, to a plateau of the hydroelectric station. 2000 w. 1 plate. Génie Civil—Sept. 17, 1904.

Electric Railway with Central Friction Rail (Tramway Electrique avec Mécanisme d'Adherence a Roues Horizontale et Rail Central). A. Dumas. Describing the railway at La Bourboule, Puy de Dôme, France, using the Fell system of a central double-head rail gripped between the horizontal driving wheels. 1500 w. 1 plate. Génie Civil—Oct. 22, 1904.

Brunnen-Morschach.—The Electric Rack Railway from Brunnen to Morschach (Die Elektrische Zahnradbahn Brunnen-Morschach). Well illustrated description of a three-phase rack railway near the Lake of Lucerne. Serial. 2 parts. 4000 w. Schweiz Bauzeitung—Sept. 2 and 9, 1905.

Burgenstock.—See **ELEVATOR, ELECTRIC.**

Davos-Schatzalp.—The Davos-Schatzalp Railway (Die Davos-Platz-Schatzalp Bahn). C. Wetzel. Describing the electrically operated cable road from Davos, Switzerland, 300 metres above. Serial. Part 1. 1000 w. Schweizerische Bauzeitung—Aug. 17, 1901.

Garesfield and Derwenthaugh.—The Machinery for the Consett Iron Company's Garesfield and Derwenthaugh Inclined Railway. An illustrated description of the drum-house, drums, bed plate and brake gear. 1200 w. Ir & Coal Trds Rev—Dec. 26, 1902.

Great Orme, Wales.—The Great Orme Tramways. Illustrated description of a mountain railway in Wales, having steep gradients and sharp curves, worked by cable. 2100 w. Tram & Ry Wld—Oct. 9, 1902.

Halford.—See **GRADIENT RAILWAY.**

Hohensyburg, Germany.—The Cable Incline Railway at Hohensyburg (Die Drahtseil-Bergbahn nach der Hohensyburg. Otto Armknecht. Description of electrically driven incline cable road, 445 metres long, with a rise of 93 metres, near Hörde, Westphalia. Serial. Part I. 2500 w. Elektrotech Zeitschr—May 12, 1904.

Inclined Cable Road Up to the Hohensyburg, Westfalen Province, Germany. Franz Koester. Illustrated detailed description. 1500 w. Elec Rev, N Y—Oct. 8, 1904.

Jungfrau.—The Jungfrau Polyphase Electric Railway. Illustrates and describes some details of the electrical equipment. 1500 w. Elec Rev, N Y—Feb. 2, 1901.

The Jungfrau Railway. An illustrated article showing the progress of this engineering work, and giving information concerning it. 2300 w. Sci Am—Nov. 21, 1903.

The Jungfrau Railway. Points of interest in regard to this unique railway of Europe, which is to be carried 4,093 metres above sea level. Ills. 1800 w. St Ry Rev—March 20, 1904.

The Jungfrau Railway (Le Chemin de Fer de la Jungfrau). L. J. Sidler. An account of the portion of the line already completed and in operation with especial reference to the design of the polyphase electric locomotives. Two articles, two plates. 5000 w. Génie Civil—June 18, 25, 1904.

The Jungfrau Railway and Tunnels (Die Jungfraubahn und der Bau ihres Tunnels). Paul Möller). With numerous illustrations showing the construction of the railways thus far completed, and the plans for the continuation to the summit. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—Nov. 12, 26, 1904.

The Jungfrau Railroad. Reginald Gordon. Explains the difficult construction of this line, the progress made, and the portion now open to the public. 1200 w. R R Gaz—Vol. XXXIX. No. 11.

See also **ELECTRIC LOCOMOTIVE.**

Lauterbrunnen Grütschalp.—Rebuilding of the Lauterbrunnen-Grütschalp Cable Incline (Umbau der Seilbahn Lauterbrunnen-Grütschalp). Siegfried Abt. The road has a grade of 55.47 per cent., with a difference of level of 670 metres between terminals. 2000 w. Schweiz Bauzeitung—March 4, 1905.

Lauterbrunnen-Mürren.—The Mürren Cable Railroad in the Swiss Alps. Brief discussion of the road connecting Lauterbrunnen and Mürren. 1000 w. Sci Am—Nov. 12, 1904.

Locomotive.—See **Appenzell; LOCOMOTIVE—Rack; Rack and Adhesion; Tank, Henschel.**

Los Angeles.—A Unique Railway. C. E. Price. Brief description with illustrations of the "Angel's Flight" in Los Angeles, Cal. It is 350 feet in length and rises 100 feet. It is built on the three-rail automatic turnout system. 500 w. Sci Am—Aug. 9, 1902.

See also **Mt. Lowe.**

Loschwitz, Saxony.—See **SUSPENDED RAILWAY.**

Mahanoy, Pa.—The Mahanoy Coal Plane. Illustrates and describes the machinery used, and the method of hauling loaded railroad cars over the mountain from Mahanoy Valley. 1100 w. Mines & Min—Oct., 1905.

Malberg, Ems, Germany.—The Malberg Railway at Ems (Die Malbergbahn bei Ems). R. Schaar. Illustrated account of this double cable road, operating up grades of 54 per cent., on the Malberg, near the watering place of Ems. 1800 w. Ill. Zeitschr f Klein u Strassenbahnen—Nov. 1, 1900.

Mendel, Tyrol.—The Mendel Railway (Die Mendelbahn). E. Strub. An account of the cable traction railway up the Mendel Pass in the Southern Tyrol. An altitude of 852 metres is surmounted with grades of 64 per cent. Serial. Three articles. 5000 w. Schweizerische Bauzeitung—Nov. 14, 21, Dec. 5, 1903.

The Mendel Railway (Die Mendelbahn). Oskar Meltzer. A fully illustrated account of the electric and cable railway from Bozen to the summit of the Mendel Pass in the Tyrol. Two articles. 8000 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—March 26, April 2, 1904.

The Mendel Railway (Die Mendelbahn). K. Jordan. An illustrated description of the combined adhesion and cable railway over the Mendel Pass in the Austrian Tyrol. The cable and part of the adhesion line are electric driven. Two articles. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—July 29, Aug. 5, 1904.

See also **RAILWAY SIGNAL.**

Mining Transport.—See **MINING—Mountain Transport.**

Mont Blanc.—The Mont Blanc Electric Railway (Le Tramway Electrique du Mont-Blanc). Lieut.-Col. G. Espitallier. An account of the proposed electric railway to the summit of Mont Blanc, with especial reference to the first section from Le Fayet to l'Aiguille du Gouter. 4000 w. 1 plate. Génie Civil—Sept. 3, 1904.

Electric Railway Up Mont Blanc. Brief description of proposed line, with profile. 800 w. Ry Age—Dec. 30, 1904.

The Mont Blanc Electric Railway (Die Elektrische Bahn auf dem Mont Blanc). An illustrated account of the proposed electric railway to the summit of Mount Blanc, with profiles and views of the route, and sections of the tunnels. Two articles. 3500 w. Ill Zeitsch f Klein u Strassenbahnen—Nov. 16, Dec. 7, 1904.

See also **ELECTRIC RAILWAY—Chamonix.**

Montmartre, Paris.—The Mortmartre Inclined Railway. From "La Nature." Illustrated description of a railway in Paris constructed to save people the tiresome climb of 200 steps necessary to reach the cathedral. 1000 w. Sci Am Sup—June 1, 1901.

Mount Beacon, N. Y.—Mount Beacon Incline Railway. Illustration, with brief description of a recently built railway up the steep face of one of the Fishkill mountains, near Matteawan, N. Y. 1000 w. Sci Am Sup—July 25, 1903.

Electric Incline Railway at Mt. Beacon-on-the-Hudson. Frank C. Perkins. Brief illustrated description of a line 2,200 ft. long and having a vertical height of 1,200 ft. 1000 w. Elec, N Y —Nov. 11, 1903.

Mount Lowe, Cal.—An Electric Mountain Railway in Southern California. An illustrated description of the interesting railway from Los Angeles to the summit of Mount Lowe. 1200 w. Tram & Ry Wld—June 11, 1903.

Palermo-Monreale.—Palermo-Monreale Electric Incline. Illustrated description of this recently completed and novel road. 1200 w. Sci Am—Aug. 31, 1901.

The Palermo-Monreale, Italy, Incline System. C. L. Durand. Illustrates and describes a line operated by electricity having some interesting features. 1700 w. Elec Rev, N Y—Aug. 6, 1904.

Pilatus.—The Mount Pilatus Railway, Switzerland. Emile Guarini. An illustrated account of this road and the combined locomotive and car which is used to climb to an altitude of 6,800 feet, on a track 15,150 feet in length. 2000 w. Sci Am—Aug. 13, 1904.

Stansstad-Engelberg.—The Stansstad-Engelberg Electric Railway. Emile Guarini. An illustrated detailed description of a narrow-gauge, mountain electric railway in Switzerland. 2000 w. R R Gaz—Vol. XXXVII., No. 18.

Sumatra.—A Rack Railway on the Island of Sumatra. Illustrated description of a line used almost exclusively for the transportation of bituminous coal. 400 w. Sci Am—Nov. 3, 1900.

Switzerland.—See also **Alps; Appenzell; Bex; Brunnen; Davos; Jungfrau; Lauterbrunnen; Pilatus; Stansstad; Vevey; RAILWAY CONSTRUCTION.**

United States.—The Steepest Railways in the United States. Waldon Fawcett. Illustrated descriptions of the Mt. Washington Rack Railway, and the Pike's Peak Rack Railway. 1600 w. Sci Am—Feb. 2, 1901.

Vesuvius.—The Vesuvius Railway (Die Vesuvbahn). E. Strub. A well illustrated description of a combined adhesion, rack and cable railway up Mount Vesuvius, Italy, operated by electric current which is generated in a station with gas-engines and direct-current generators. Serial. 4 parts. 12,000 w. Schweiz Bauzeitung—April 18, 25. May 9, 16, 1903.

The Vesuvius Railway (Die Vesuvbahn). H. Morgenthaler. Describing the electrical equipment of the new railway up Mount Vesuvius. 1800 w. Schweizerische Bauzeitung—July 25, 1903.

The Vesuvius Railway (Le Chemin de Fer du Vésuve). A general description based on an article in the "Schweizerische Bauzeitung" of the new railway partly rack and partly adhesion from Naples to the funicular railway at the crater of Vesuvius. 5000 w. Rev Gen des Chemins de Fer—Oct., 1903.

Electric Railroad Up Mt. Vesuvius. Abstract translation from "Revue Generale des Chemins de Fer." Illustrates and describes a rack rail line. 1100 w. R R Gaz—Nov. 27, 1903.

The New Mt. Vesuvius Electric Railway. Illustrated detailed description of the new railway from Naples to the base of the cable railway. The plans embrace the employment of ordinary and rack sections to be operated by electricity. 2000 w. St Ry Jour—May 7, 1904.

The Plant of the New Electric Railroad Up Mount Vesuvius. Illustrated detailed description. 1500 w. Sci Am Sup—May 13, 1905.

Vevey-Mont Pèlerin.—The Vevey-Mont Pèlerin Funicular Electric Railway. E. Bignami. An illustrated account of the application of gas power to the generation of electricity for the operation of a mountain cable railway near Vevey in Switzerland. 3000 w. Engineering Magazine—June, 1902.

Washington.—See **United States; AUTOMOBILE COMPETITION—Hill Climbing.**

Weehawken, N. J.—The Weehawken Inclined Railway. Charles L. Duenkel. An illustrated description of a road which runs from the lowlands to the Mountain Road at the top of the Palisades, opposite New York. 4500 w. Eng News—Oct. 16, 1902.

The Inclined Elevator at Weehawken, New Jersey. Illustrated description of an electrically operated elevator, designed primarily to lift loaded wagons from the shore roads along the Hudson River to the heights above. 2800 w. Eng Rec—April 30, 1904.

Wetterhorn.—See **SUSPENDED RAILWAY.**

MOVING BUILDING.

See **BUILDING MOVING.**

MOVING PLATFORM.

See **MOVING ROADWAY; MOVING SIDEWALK.**

MOVING ROADWAY.

Cleveland, O.—A New Rolling Road at Cleveland, Ohio. D. A. Willey. Illustrated description of the application of the electric current in connection with a rolling roadway of pulling loaded vehicles up a high grade. 900 w. Elec Rev, N Y —April 8, 1905.

MOVING SIDEWALK.

New York.—Proposed Moving Platforms Under Thirty-fourth Street, New York. Illustrations showing the location and plans for this proposed subway to be used as a feeder to other lines. 600 w. R R Gaz—Vol. XXXVII, No. 28.

The Moving Platform for Local Passenger Travel. An illustrated description of the modern moving platform and its operation, with especial reference to the proposed construction in a subway of New York City under 34th st., or 35th st. 2300 w. Ry Age—Dec. 23, 1904.

Moving Platform Subway for New York. Discusses the project, and the decision of the Rapid Transit Commission to reserve 34th St. for a four-track subway. Also editorial discussing the economies of the moving platform, and full-page illustration. 2000 w. Sci Am—May 13, 1905.

Paris.—A Subterranean Electric Moving Platform for Paris (Nouvelles Applications des Plates-Formes Roulantes Souterraines à Traction Electrique). D. A. Casalonga. An illustrated description of a proposed moving platform under the boulevards of Paris from the Place de la Concorde to the Place de la Bastille. 2000 w. Mem d l Soc Ing Civils de France—Jan., 1902.

Paris Exposition.—Operating Data of the Moving Sidewalk and Electric Railway at the Paris Exposition. Diagrams showing power supplied to the electric railroad and to the moving platform, with comments. 900 w. Elec Wld & Engr—Dec. 15, 1900.

MOVING STAIRWAY.

The Escalator. Charles D. Seeberger. Illustrated description of a moving stairway. Cassier's Mag—March, 1904.

Biarritz, France.—Electric Traveling Incline (Rampe Mobile Electrique). René Weil. A description of the double incline escalator between the beach and the bluffs at the watering place of Biarritz, France. 1800 w. 1 plate. Génie Civil—Dec. 12, 1903.

Link Belt.—A New Moving Stairway. Illustrated detailed description of the link-belt moving stairway, invented by J. M. Dodge. 700 w. Eng News —Oct. 18, 1900.

Macy's Store, N. Y.—The Escalator. An illustrated description of a notable installation of moving stairways in Macy's new store in New York city. 900 w. Eng Rec—Nov. 8, 1902.

N. Y. Elevated Ry.—Traveling Stairways for the Elevated Railways, New York. Illustrates and describes details of a moving stairway being erected at the 23d St. Station of the 6th Ave. branch of the Manhattan Elevated system. 500 w. Sci Am—Nov. 17, 1900.

Paris Exposition.—The "Escalator," or Continuous Elevator. Illustrates and describes this device, as shown at the Paris Exhibition. 1200 w. Engng —Nov. 30, 1900.

MOWING MACHINE.

See **AGRICULTURAL MACHINERY.**

MUFFLE FURNACE.

See **ASSAYING; FURNACE.**

MULE.

Mines.—See **MINE HAULAGE—Animal; Compressed Air vs. Animal.**

MULTIPHASE.

See **ELECTRIC CURRENT, ALTERNATING; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MOTOR—Polyphase.**

MUNICIPAL ACCOUNTING.

Municipal Accounting. A discussion at the meeting of the National Conference for Good City Government, and the National Municipal League, concerning the need of uniformity, that statistics may be made of greater value. 2800 w. Eng Rec—May 2, 1903.

MUNICIPAL ART.

See also **MUNICIPAL IMPROVEMENT; LANDSCAPE ARCHITECTURE.**

New York Water Gate.—A Water Gate for New York. A description of the design prepared by Ernest Flagg, for a memorial to be erected in Battery Park. Also editorial. 2000 w. Stone—March, 1901.

Washington, D. C.—Washington as a Work of Civic Art. Charles Moore. Illustrates and describes the proposed improvements for beautifying this city at a cost of many millions. 3600 w. Munic Jour & Engr—July, 1902.

See also **BRIDGE; CITY PLAN; LANDSCAPE ARCHITECTURE.**

MUNICIPAL CONTROL.

See **GOVERNMENT OWNERSHIP; MUNICIPAL OWNERSHIP.**

MUNICIPAL ELECTRICIAN.

The Growing Duties and Responsibilities of the Municipal Electrician. Capt. William Brophy. An account of the work performed formerly by insurance inspectors, and now being assumed by municipal authorities, discussing its evils. 2000 w. Elec Wld & Engr—Sept. 10, 1904.

MUNICIPAL ENGINEER.

The Position of the Engineer in Municipal Service. Alex. Dow. Presidential address before the Detroit Engng. Soc. How to divorce public business from politics. 5800 w. Jour Assn of Engng Soc—Sept., 1901.

MUNICIPAL ENGINEERING.

See also **ENGINEERING WORKS; MUNICIPAL IMPROVEMENT; PAVEMENT; PUBLIC WORKS; REFUSE DISPOSAL; SANITATION; SEWERAGE; STREET; STREET IMPROVEMENT; WATERWORKS.**

City Engineering Problems. John M. Goodell. Reviews the improvements in surveying, paving, road construction, street clearing, etc. 2800 w. Eng Rec—Jan. 3, 1903.

Administration.—Public Works Administration. John A. Fairlie. Gives the leading features of public works administration in some of the leading cities of the United States. 3000 w. Munic Engng—April, 1902.

See also **New York.**

Aldershot.—Recent Municipal Works at Aldershot, England. Nelson F. Dennis. Abstract of paper before the Assoc. of Municipal and County Engineers, describing the sewage works, refuse destructor, electric works, etc., of this great military camp. 2000 w. Eng Rec—Dec. 27, 1902.

Cincinnati.—Municipal Notes at Cincinnati. Concerning the bridges, sewers, streets, grade crossings, canals, &c. 2200 w. Eng News—July 11, 1901.

Day Labor vs. Contract.—See **LABOR—Municipal vs. Contract.**

Dresden.—The Public Works of Dresden. Dr. Karl Leutemann. An illustrated description of the city and its public works. 4500 w. Public Works—Jan., 1905.

Europe.—Municipal Engineering on the Continent. W. H. Lindley. Summary of the presidential address to the Junior Inst. of Engrs. Considers waterworks, electric lighting and other works. 2700 w. Mech Engr—Nov. 26, 1904.

Florence.—The Public Works of Florence. Cav. A. G. Linari. A brief review of municipal engineering in Florence, where great improvements have been made in recent years. 4000 w. Public Works—April, 1905.

Havana.—Engineering Work in the City of Havana. Engravings showing changes in sanitary conditions, with abstract of report of Gen. Ludlow, giving details of interest. 2500 w. Eng News—Feb. 7, 1901.

See also **PAVEMENT; SEWERAGE.**

Manila.—The Engineering Development of Manila Under American Dominion. Robt. G. Dieck. An account of the many improvements since the city has been under American control. Also discussion. 4000 w. Pro Engrs' Club of Phila—July, 1905.

Municipal Improvements in Progress and Projected at Manila, P. I. J. F. Case. Information concerning the scheme of improvements comprising the expenditure of about $6,000,000 within the next four years. Includes a sewer system, gravity water supply, bridges, &c. Explains the conditions to be met. 1500 w. Eng News—Oct. 19, 1905.

New York.—Changes in the Management of Public Works, New York City. N. P. Lewis. An outline of the administration of public works under the charter taking effect Jan. 1, 1902. 1000 w. Engng Rec—Oct. 26, 1901.

See also **ENGINEERING WORKS.**

Philadelphia.—Recent Municipal Work in Philadelphia. From the report of George S. Webster. Briefly considers improved sanitation, parks and parkways, laboratory work, etc. Ills. 2200 w. Eng Rec—Aug. 19, 1905.

Rotterdam.—Municipal Rotterdam. Descriptions, with illustrations, of sewerage, water supply, street cleaning and other features. 1000 w. Public Works—Aug. 15, 1904.

Street Repairs.—See **STREET—Repairs, Brooklyn.**

Sydney.—Municipal Engineering. J. M. Small. An address before the Engng. Sec. of the Royal Soc. of N. S. W. Reviews the development of municipal engineering in Sydney, discusses its general bearing on the interests of the ratepayer, and outlines an ideal municipal government in relation to engineering. Serial. 1st part. 2000 w. Aust Min Stand—July 18, 1901.

Waterworks.—See **WATER WORKS.**

MUNICIPAL IMPROVEMENT.

See also **CITY PLAN; ENGINEERING WORKS; MUNICIPAL ART; MUNICIPAL ENGINEERING; PUBLIC WORKS; STREET; STREET IMPROVEMENT.**

Baltimore.—Progress of Plans and Work for Rebuilding Baltimore. Daniel J. Hauer. Gives a general synopsis of the lines on which the city is to be rebuilt, showing the progress. Map. 2400 w. Eng News—June 2, 1904.

Chattanooga, Tenn.—Municipal Improvements at Chattanooga, Tenn. An account of improvements in the sewerage system, pavements, garbage disposal, etc. Ill. 2600 w. Eng News—March 7, 1901.

Galveston.—See **SHORE PROTECTION.**

New York.—The Development of the City. An illustrated account of the proposed improvements recommended by the commission appointed by Mayor McClellan. 4000 w. Munic Jour & Engr—Feb., 1905.

Vienna.—Project for a Jubilee Place in Vienna (Project zur Schaffung eines Kaiser Franz Josef Jubiläums Platzes in Wien). A. Lotz. With plans showing the possibility of making many street improvements in Vienna and the creation of a place in commemoration of the Jubilee of the Emperor Francis Joseph. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 11, 1901.

Drainage and Improvement Works at Vienna (Travaux d'Assainissement et d'Embellissement de la Ville de Vienne). R. Phillippe. A full account of the improvements made in the past ten years, including the river and sewer regulation, and the metropolitan railway. 3000 w. 1 plate. Génie Civil—Sept. 7, 1901.

MUNICIPAL LABORATORY.

See **LABORATORY—Municipal.**

MUNICIPAL OWNERSHIP.

See also **FRANCHISE; GOVERNMENT OWNERSHIP.**

Municipal Ownership vs. Private Corporations. Thomas D. Miller. Read at meeting of the Southwestern Gas, Electric and Street Ry. Assn. Discussion of the subject, unfavorable to municipal ownership. 2500 w. Am Gas Lgt Jour—May 6, 1901.

Contrasts Between Company and Municipal Ownership and Management of Public Utilities. H. W. Blake. Read before the Street Ry. Assn. of the State of N. Y. Discusses the general plans for maintaining public utilities, especially as practiced in America, favoring private companies rather than municipal ownership. 4500 w. St Ry Jour—July, 1905.

American vs. European.—See **European vs. American.**

British.—Municipal Socialism in Great Britain. Discussing the ownership and operation of certain undertakings and enterprises by the municipality, supposedly for the public good, and the increasing development of such enterprises in Great Britain. 4200 w. U S Cons Repts, No. 1345—May 19, 1902.

Failure of Municipal Ownership in England. Hon. Robert P. Porter. Gives a brief history of the movement in England in opposition to municipal trading, as it is termed. Serial. 1st part. 7500 w. St Ry Jour—Aug. 2, 1902.

Municipal Trading. Robert P. Porter. Read at Belfast meeting of the Brit. Assn. for the Adv. of Science. Discusses this subject as related to English methods, giving the history of the same industries as carried on in the United States, and considering the objections to municipal trading as carried on in England. 6000 w. Engng—Sept. 19, 1902.

Does Municipal Trading Pay? Hon. Robert P. Porter. A discussion of the advantages and disadvantages, reviewing the history of such undertakings in various countries, and especially discussing British affairs. 5000 w. Trac & Trans—April, 1903.

Success of Municipal Ownership in Great Britain. Robert Donald. A criticism of statements made by Mr. Robert P. Porter, and presentation of statistics to show the success of the present municipal ownership movement in Great Britain. Serial. 2 parts. 12,000 w. St Ry Jour—Jan. 3 and 10, 1903.

Recent Attacks on Municipal Ownership in Great Britain. Robert Donald. Abstract of paper read at Nat. Con. on Munic. Ownership & Pub. Franchises. A review of municipal and engineering enterprise in England. 2000 w. St Ry Jour—March 7, 1903.

Municipal Trading and Local Rates. Robert Donald. A criticism of an article in the April number, by Hon. Robert P. Porter. 4000 w. Trac & Trans—June, 1903.

The Cost of Municipal Trading. Dixon H. Davies. A detailed discussion of the advantages and disadvantages claimed, with suggestions, also discussion. 15,600 w. Jour Soc of Arts—Jan. 30, 1903.

Municipal Socialism: Latest Development in Great Britain. Reprint of an article from the Liverpool "Daily Post," giving a report of the development of "municipal trading" in Great Britain. 2000 w. U S Cons Repts, No. 1638—May 5, 1903.

Electric Lighting.—See **ELECTRIC LIGHTING—Chicago Municipal.**

Electric Railway.—See **ELECTRIC RAILWAY; STREET RAILWAY MANAGEMENT.**

Electric Stations.—See **ELECTRIC STATION; ELECTRIC STATION MANAGEMENT.**

European vs. American.—European and American Methods and Results Compared. Robert P. Porter. Abstract of a paper at the Nat. Con. on Munic. Ownership & Pub. Franchises. Reviews the conditions briefly, but thinks a comparison hardly possible, as the laws and needs so differ. 2800 w. St Ry Jour—March 7, 1903.

Municipal Trading. Robert P. Porter. The views of an advocate of private ownership for all public utilities. Compares European and American methods and results. Serial. 3500 w. Munic Jour & Engr—May, 1903.

Gas.—See **GAS INDUSTRY—Municipal Ownership.**

Street Railways.—See **STREET RAILWAY MANAGEMENT—Municipal Ownership.**

Water Supply.—See **WATER SUPPLY—Municipal; WATERWORKS.**

MUNICIPAL WORKS.

See **ENGINEERING WORKS; MUNICIPAL ENGINEERING; MUNICIPAL IMPROVEMENT; PUBLIC WORKS.**

MUSIC CONSERVATORY.

Boston.—See **BUILDING CONSTRUCTION—Music Conservatory.**

MUSIC HALL.

Pan American Exposition.—See **PAN-AMERICAN EXPOSITION.**

Strasburg.—See **CONCRETE REINFORCED—Music Hall.**

N

NAIL.

See also **TACK.**

A New Form of Nail (Un Nouveau Clou). R. Wittebolle. A comparison of the weak features of various forms of nails, showing the advantages of a special form of chisel point. 2500 w. Revue Technique—May 25, 1904.

Machine.—Wire Nail Machines. Illustrated description of two recent machines, which prevent waste and greatly increase the output. 2000 w. Ir & Coal Trds Rev—Jan. 16, 1903.

Walloon Industry.—The Walloon Nail Industry (Die Nagelschmieden der Wallonen). C. Ritter von Schwarz. An illustrated account of primitive nail manufacturing carried on in some districts of Belgium. Serial. 2 parts. 7000 w. Stahl u Eisen—Jan. 1 and 15, 1902.

NAIL WORKS.

See **NAIL; WIRE MANUFACTURE.**

NAME PLATE.

Name Plates. Edmund S. Sperry, in the "Aluminum World." Describes methods of making and attaching such plates. 1400 w. Foundry—June, 1901.

NAPHTHA.

Gas Machine in Fire.—Remarkable Behavior of a Naphtha Gas Machine in a Fire. E. P. Reichhelm. An illustrated description and explanation of the machine which withstood a fierce conflagration without exploding. 800 w. Am Mach—June 13, 1901.

Rubber Works.—See **RUBBER—Naphtha Recovery.**

NAPHTHA BOAT.

See **BOAT—Naphtha.**

NAPHTHALINE.

See **GAS MANUFACTURE—Naphthaline.**

NARROW-GAUGE RAILWAY.

See also **ELECTRIC RAILWAY; LIGHT RAILWAY; LOCOMOTIVE; MOUNTAIN RAILWAY; RAILWAY.**

Austria.—See **LIGHT RAILWAY.**

Egypt.—See **LOCOMOTIVE.**

Harz, Germany.—See **ELECTRIC RAILWAY.**

Locomotive.—See **LOCOMOTIVE—Narrow Gauge.**

Military.—See **TRAIN—Narrow Gauge Stability.**

St. Georges, France.—See **ELECTRIC RAILWAY.**

Transporter Car.—See **CAR.**

NATURAL GAS.

See **GAS, NATURAL; PETROLEUM; PETROLEUM WELL.**

NATURE'S STORES.

See also **HEAT—Earth's Interior; MINERAL REGION; POWER—Natural Sources;** and under specific metals and minerals.

The Coming Exhaustion of Nature's Stores. Editorial on the economics and industrial changes to be anticipated in the coming century, reviewing some of the points needing the careful study of the engineer. 3300 w. Eng News—Jan. 31, 1901.

NAVAL ACADEMY.

Progress of Work at the United States Naval Academy. J. P. Carlin. Illustrated description of the new Naval Academy buildings at Annapolis and the methods of constructing them; the notes on the carrying power of piles, methods of handling heavy masonry, and the construction of concrete sea walls are especially full. 4000 w. Eng Rec—May 11, 1901.

NAVAL ARCHITECTURE.

See also **MARINE ENGINEERING; NAVY; SHIP;**

SHIPBUILDING; SHIP PROPULSION; SHIP RESISTANCE; SHIP STABILITY; SHIPYARD; STEAMSHIP.

Design of Ocean tSeamers. Theodore Lucas. Discussion of the designing of ships for particular uses, giving diagrams. 2000 w. Naut Gas —Jan. 2, 1902.

An Investigation of the Best Relations of the Depth and Draft of a Merchant Vessel to Its Beam (Ricerca dei Rapporti piu Convenienti dell' Altezza e dell' Immersione alla Larghezza di un Bastimento Mercantile). Ettore Mengoli. A discussion, partly mathematical, of the relations between the dimensions of ships, to secure minimum weight and resistance. 1200 w. Rivista Marittima—Feb., 1903.

Steamship Design. Carl C. Thomas. General account of the operations involved in designing vessels and their machinery, with cross section and construction data of a steamship. 3500 w. Cal Jour of Tech—May, 1904.

Approximate Formulae.—Approximate Formulae in Ship Construction (Annäherungs-Formeln im Schiffbau). M. H. Bauer. An examination of the working formulae used in ship construction, showing the limits within which approximations may be safely used. Serial. Part I. 2000 w. Schiffbau—Jan. 28, 1903.

Approximate Integration.—New Rules for Approximate Integration. George R. McDermott. Gives a résumé of results of a study of existent rules for various spacings of ordinates, and explains a rule independently derived for the solution of a stated problem. 1500 w. Sib Jour of Engng—June, 1904.

Bending Moments.—Longitudinal Bending Stress on Damaged Ships. George Crouse Cook. An investigation of this stress, which is the most severe to which a vessel in normal circumstances is subjected. Gives illustrations of vessels when floating intact and with various compartments bilged. 21 plates. 7500 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 6—Nov., 1902.

Bending Moments of Ships. F. H. Alexander. Read before the Inst. of Naval Archts. A study of the influence of the proportions and form of ships upon their longitudinal bending moments among the waves. Diagrams. 3800 w. Engng—June 9, 1905.

Longitudinal Bending Moments of Certain Lake Steamers. W. I. Babcock. Describes the very large ships recently put on the Lakes to meet new conditions, and the lengthening of the "Victory." Investigates the changes in the longitudinal bending moments in a seaway in this ship, caused by this increase in length, and compares them with the largest ships now in lake service. 13 plates. 2800 w. (No. 9.) Soc Nav Archts & Marine Engrs—Nov. 16, 1905.

See also **Stresses.**

British.—Naval Architecture. Sir William H. White. Read before the Int. Engng. Cong. at St. Louis. Indicates the principal advances made in methods of ship construction and propulsion during the last ten years in Great Britain. Serial. 1st part. 6000 w. Marine Engng—Nov., 1904.

Centre of Gravity.—The Determination of the Position of the Centre of Gravity by Dock Trials (Bestimmung der Höhenlage des Systemsschwerpunktes durch einen Dockversuch). Alexander Dietzius. The height of the centre of gravity is determined by observing the depth of water in the dock at the moment when the stability becomes zero. 1200 w. Schiffbau—Sept. 28, 1904.

On the Determination of the Vertical Position of the Center of Gravity of a Ship by Means of a Dock Trial. Translated from "Schiffbau." Describes a purely theoretical method, not yet put in practice. 1200 w. Prac Engr—Nov. 11, 1904.

Cruiser.—See **CRUISER—Lines.**

Curves of Form.—See **Form.**

Depth of Immersion.—See **SHIP RESISTANCE.**

Displacement.—See **Weight; Weight Distribution; SHIP.**

Form.—Form Calculations from Lines of Ships. Theodore Lucas. The first of a series of articles dealing with the lines of ships. Serial. 1st part. 1500 w. Naut Gaz—Aug. 8, 1901.

Hull Design. George Crouse Cook. Considers the efficiency as determined by the form of the under-water body. 1400 w. Marine Rev—Sept. 26, 1901.

Curves of Form of the Initial Condition. George Crouse Cook. A simple method of calculating and recording (by curves) the data and form useful in designing vessels. 10,500 w. Trans Am Soc Nav Archts & Marine Engrs, No. 8—Nov., 1903.

On Ships' Forms Derived by Formulae. D. W. Taylor. Derives formulae for waterlines, sections, etc., explaining their value in the designing of vessels. Tables, diagrams, etc. 6000 w. Trans Am Soc Nav Archts & Marine Engrs, No. 12—Nov., 1903.

The Geometry of the Form of Ships (Beitrag zur Geometrie der Schiffsform). O. Richter. A mathematical analysis of the lines of a ship's hull, with numerous tables and diagrams to aid in the practical application of the theory. Four articles. 8000 w. Schiffbau—April 26, May 10, 24, June 14, 1905.

Framing.—The Computation of Statistically Indeterminate Systems in Shipbuilding (Berechnung Statischer Unbestimmter Systeme im Schiffbau). Franz Kretschmar. A mathematical study of the statics of framed structures applied to the design of ship framings. Serial. Part .I 2000 w. Schiffbau—July 23, 1901.

See also **SHIPBUILDING.**

Freeboard.—See **SHIP.**

Gasoline Boat.—See **BOAT, GASOLINE—Design.**

German Convention.—The Third Convention of the Society of Marine Architects (Die Dritte Hauptversammlung der Schiffbautechnischen Gesellschaft). A report of the meeting of German Marine Architects held at Charlottenburg, November, 1901. 2500 w. Zeitschr d Ver Deutscher Ing—Nov. 30, 1901.

Hull Weights.—See **Weight.**

Integraph.—See **INTEGRAPH.**

Japanese College.—See **MARINE ENGINEERING.**

Lateral Resistance.—The Position of the Center of Lateral Resistance. L. E. Bertin. Considers the point of application of all the forces tending to resist the lateral motion of a vessel, discussing its experimental determination. 800 w. Soc of Naval Archts & Marine Engrs, No. 5—Nov., 1904.

Lines.—See **Form; Transferring Machine.**

Load Line.—See **SHIP.**

Massachusetts Inst. of Tech.—Technical Training for Shipbuilders. Henry S. Pritchett. Gives the conclusions of those in charge of the teaching of naval architecture and ship design at the Massachusetts Inst. of Technology regarding the instruction desirable. 3200 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 1—Nov., 1902.

Metallography. — See **METALLOGRAPHY — Naval Construction.**

Model Basin.—See **MODEL BASIN.**

Model Experiments.—See **MODEL BASIN; SHIP RESISTANCE.**

Motor Boat.—See **BOAT, GASOLINE.**

Plate Stresses.—Stresses on Ships' Plates. Ivan G. Boobnoff. Read before the Inst. of Naval Archts. An illustrated study of the stresses in a ship's bottom plating due to water pressure, giving a system of construction that the writer recommends. 4600 w. Engng—March 21, 1902.

Rolling.—See **SHIP STABILITY.**

Stability.—See **SHIP STABILITY.**

Strength.—The Transverse Strength of Ships (Querfestigkeit von Schiffen). J. Bruhn. An elaborate and fully illustrated discussion of the transverse stresses acting upon the hulls of vessels and the principles of structural design involved. 5 articles. 5000 w. Schiffbau—Nov. 23, Dec. 14, 1904; Jan. 11, 25, Feb. 22, 1905.

Methods of Estimating the Strength of Ships. Dr. J. Bruhn. Discusses methods of making strength calculations. 12,400 w. Trans Inst of Engrs & Shipbuilders of Scot—Feb. 21, 1905.

The Transverse Strength of Ships. J. Bruhn. Read bfeore the Inst. of Naval Archts. Discusses methods of estimating, considering frames, floors, deck beams, stringers, bulkheads and wide-spaced beams. 8500 w. Engng—July 5, 1901.

The Transverse Strength of Ships. J. Bruhn. Read before the Inst. of Naval Archts. Applies the method of least work to show the effect on the strength, of variations in the method of construction, or in the arrangement of the support and loading of ordinary cargo vessels. Ills. 4700 w. Engng—April 22, 1904.

On the Strength of High-Speed Vessels. M. J. A. Normand. Considers some of the causes producing fatigue that are often overlooked. 2200 w. Engng—Sept. 12, 1902.

Deformation and Resistance of the Hulls of Vessels with Transverse Forces (Déformation et Resistance des Coques de Navire à la Flexion Transversale). H. Chaigneau. A mathematical discussion of the transverse stresses and strains of hulls under various circumstances. Serial. 1st part. 4000 w. Rev Technique—Feb. 25, 1902.

Stresses.—The Effect of Variation of Dimensions upon the Stresses in a Ship's Structure. Herbert C. Sadler. Discusses this subject, considering the forces which tend to strain the vessel as a whole, and those which tend to strain it locally. Plates. 4400 w. Soc Nav Archts & Marine Engrs, No. 2.—Nov., 1901.

The Flexure of Ships (Sul Varo delle Navi). Adolfo Webmeyer. A graphical study of the pressures upon a ship's hull under varying conditions, with the corresponding flexures produced. Serial. Part I. 6000 w. 2 plates. Rivista Marittima—Oct., 1902.

See also Bending Moments; Plate Stresses; Strength; SHIP STABILITY—Rolling.

Torpedo Boat.—See TORPEDO BOAT—Construction.

Transferring Machine.—A Transferring Machine for Ship's Lines, etc. Herman Jonson. Illustrates and describes a machine, designed by the writer, for work in the shipbuilding trade. 1400 w. Am Mach—Vol. 28, No. 23.

Trim.—See SHIP STABILITY—Ballast.

Weight.—Weights of Ships. Theodore Lucas. On systems of weight classifications and calculations. 2500 w. Naut Gaz—May 2, 1901.

Hull Weights. George Crouse Cook. A practical scientific method of classifying and recording this all-important item of ship design, by which the weights of a proposed vessel may be estimated quickly and accurately. 1500 w. Naut Gaz—Oct. 17, 1901.

The Weight of Ships (Il Peso delle Navi). Edwin Cerio. An examination of the computation and distribution of weights in a vessel, including hull, machinery, fuel, armament, etc. 6000 w. 2 plates. Rivista Marittima—Feb., 1905.

See also SHIP—Displacement.

Weight Distribution.—Distribution of Displacements of Ships. Theodore Lucas. A discussion of the qualities that are affected by variations in the distribution of the bulk of the displacement, resistance, etc. 1800 w. Naut Gaz—Feb. 6, 1902.

Subdivision of Weights in Ships' Displacement. Nabor Soliani. Aims to induce some step to be taken toward the avoidance of the vagueness in relation to the distribution of the weights of various parts of a vessel. 4500 w. Soc of Naval Archts & Marine Engrs, No. 10—Nov., 1904.

Weight, Machinery.—Weights of Machinery. W. F. Sicard. A discussion of machinery weights in relation to shipbuilding, limited to what is commonly included in the term. 9200 w. Jour Am Soc of Naval Engrs—Nov., 1905.

NAVAL BATTERY.

Globuloid.—The Semi-Globular Naval Battery. Anson Phelps Stokes. An illustrated explanation of the designs for a vessel invented by the writer. It is considered an impregnable coast defense ship, and a powerful battleship. 4800 w. Soc of Naval Archts & Marine Engrs, No. 2—Nov., 1904.

The Ultima—A Globuloid Naval Battery. Anson Phelps Stokes. Describes this proposed new naval battery, comparing with an earlier model, and giving report of experiments with a model in the Government Model Basin. 13 plates. 3000 w. (No. 7.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

NAVAL BATTLE.

See NAVAL WARFARE; NAVY.

NAVAL ENGINEER.

See also MARINE ENGINEER; NAVAL ENGINEERING; NAVAL OFFICER; NAVY.

The Engineer's Branch of the Navy. Lieut. Carlyon Bellairs. Facts concerning the position of the officers and chief petty officers, the growth in numbers, and other information given in tabular and graphical form. 1800 w. Engr, Lond—Nov. 7, 1902.

American.—Naval Engineers. Editorial on the report of Rear-Admiral Melville, of the United States Bureau of Steam Engineering. 2500 w. Engng—Dec. 7, 190.

The Naval Engineer of the Future. W. M. McFarland. A review of conditions in the United States navy, showing the necessity for all officers to be trained engineers. 3000 w. Engineering Magazine—Sept., 1902.

The Naval Personnel Act and Its Results. J. Snowden Bell. Gives the provisions of the act, and the conditions leading up to it, discussing its purpose, advantages, etc. 6000 w. Am Mach—Vol. 28, No. 42.

The Engineering Personnel of the United States Navy. William Ledyard Cathcart. A critical discussion of the disaster on the U. S. Gunboat "Bennington," and the effect of the Personnel Act upon the efficiency of the engineering service in the navy. 2500 w. Cassier's Mag—Oct., 1905.

British.—The Engineering Crisis in the Navy. D. B. Morison. Read before the Inst. of Engs. and Shipbuilders in Scotland. A supplementary paper to one read last March on "The British Naval Engineer." Calls attention to recent developments, and the broader aspects of the question. Serial. 1st part. Engng—Jan. 4, 1901.

Naval Engineers. D. B. Morison. Read before the N. E. Coast Inst. of Engrs. and Shipbuilders. Report on memorandums submitted to the First Lord of the Admiralty on July 16, 1901, with reference to the unsatisfactory condition of the engineer branch of His Majesty's Navy. Also editorial. Serial. 1st part. 10,400 w. Engng—Feb. 14, 1902.

Naval Engineers. D. B. Morison, with editorial. An important letter dealing with the question of engineering "personnel," with editorial discussion. 5000 w. Engng—July 25, 1902.

The Position of Naval Engineers. Report of the arguments submitted to the First Lord of the Admiralty in England, by a deputation representing the N. E. Coast Inst. of Engrs. & Shipbuilders, the Inst. of Marine Engrs., London, and Inst. of Marine Engrs. (South Wales). 8000 w. Engr, Lond—July 26, 1901.

Engineering in the Royal Navy. The first of a series of articles, considering the true position of machinery and those employed in working and tending it on board men-of-war. 1800 w. Engr, Lond—Aug. 30, 1901.

Engineer Officers for the Fleet. Rollo Appleyard. Discusses the question of obtaining sufficient number of men qualified for the engineering duties. 2500 w. Elec Rev, Lond—Feb. 21, 1902.

The Status of the Naval Engineer. Charles M. Johnson. A strong presentation of the dangers of the existing status of the engineering branch in the British navy, showing the urgent necessity of reform. 5000 w. Engineering Magazine—May, 1902.

The Doom of the British Naval Engineer. Charles M. Johnson. A discussion of the persistent official injustice to the engineers of the Royal navy, showing the disastrous results which must follow. 4000 w. Engineering Magazine—Sept., 1902.

The British Naval Engineer Under the New Scheme. Charles M. Johnson. A review of the recent memorandum of the First Lord of the Admiralty regarding the new arrangements of the personnel. 4000 w. Engineering Magazine—March, 1903.

The Engineering Branch of the Royal Navy. Editorial review of a printed statement of the causes of dissatisfaction and proposed remedies. 3700 w. Engng—Aug. 29, 1902.

Education.—The Training of Engineers in the United States. Prof. W. E. Dalby. Read before the Inst. of Naval Archts. A statement of facts obtained during a recent visit. 5000 w. Engng—April 10, 1903.

The Education of Naval Engineers for Future Needs. Charles H. Manning. Showing that changed conditions have made necessary changes in methods of training, giving suggestions of some needed reforms. 2800 w. Jour Am Soc of Nav Engrs—Aug., 1903.

Is Amalgamation a Failure? L. H. Chandler. A very full exposition of the engineering training given at the Naval Academy in Annapolis. Ills. 3600 w. Pro U S Naval Inst—Dec., 1905.

The New Scheme of Training Naval Officers. A short account of the training given in the Royal Naval College, at Osborne; and abstracts from a recent "Statement of Admiralty Policy," referring principally to the training of engineer officers for the navy. 6500 w. Engr, Lond—Dec. 8, 1905.

See also **EDUCATION—Nautical, Japan; NAVAL ACADEMY; NAVAL OFFICER; SCHOOL SHIP; TRAINING SHIP.**

Melville.—See **MELVILLE; NAVAL ENGINEERING—American.**

Organization.—Organization of the Engineer Division on Board a Man-of-War. C. W. Dyson. Gives the writer's ideas as to the proper organization. Also general discussion. 8000 w. Jour Am Soc of Nav Engrs—Nov., 1901.

NAVAL ENGINEERING.

See also **BOILER, MARINE; MARINE ENGINEERING; NAVAL ENGINEER; STEAM ENGINEERING.**

Naval Engineering Advance. Its Influence upon Sea Power. George W. Melville. Considers the engineering advance along maritime and naval lines, discussing important achievements. 4800 w. Am Mach—Nov. 6, 1902.

American.—Naval Lessons from America. Editorial on the report of Admiral Melville, Chief of the United States Bureau of Steam Engineering. 3000 w. Engng—Feb. 8, 1901.

Admiral Melville's Report. Advance abstract, the notable features being the statement concerning the failure of the personnel bill, and recommendations in favor of Government participation in a series of important engineering experiments. 3000 w. I Age—Oct. 24, 1901.

The United States Naval Engineering Report. Editorial review of the report of Admiral Melville. 2400 w. Engng—Nov. 21, 1902.

Steam Engineering in the Navy. Extracts from the report of Admiral Rae, in which the needs of the principal navy yards are pointed out. 3800 w. Ir Age—Nov. 5, 1903.

Steam Engineering in the Navy. Advance abstract of the annual report of Chief Engineer Rae, outlining important plans for experimental work of interest to engineers and builders of ships and engines. 1000 w. Ir Age—Nov. 17, 1904.

Experiments.—The Military Importance of Naval Engineering Experiments. George W. Melville. Emphasizes the importance of the work; discusses the establishment and equipment of the national experimental laboratory, and the advantages. General discussion. 12,000 w. Pro Engrs' Club of Phila—July, 1903.

Naval Engineering Research. Editorial on the United States' new naval engineering laboratory and its work. 2200 w. Engng—Aug. 14, 1903.

See also **BOILER, MARINE; BOILER TEST; LIQUID FUEL.**

Japan.—See **MARINE ENGINEERING.**

NAVAL MANOEUVRES.

French.—The French Naval Manoeuvres. An account of the manoeuvres carried out by the French fleets in the Mediterranean during the past month, which were of more than usual interest. 4000 w. Engr, Lond—Aug. 22, 1902.

The French Naval Manoeuvres. Editorial review of this year's manoeuvres, which were on an exceptionally large basis. Serial. 1st part. 2800 w. Engng—Sept. 12, 1902.

NAVAL OFFICER.

See also **NAVAL ENGINEER.**

British.—Naval Officers. An editorial review of the proposed changes in the personnel of the British navy, by which executive engineering and marine officers will all receive the same education and training as cadets, and engineers will receive official rank. 2200 w. Engng—Dec. 12, 1902.

The New Admiralty Scheme. Carlyon Bellairs. A discussion of the coming changes in the Royal Navy and Royal Marines. 2000 w. Engr, Lond—Jan. 2, 1903.

Naval Officers. Memorandum dealing with the entry, training and employment of officers and men of the Royal Navy and of the Royal Marines. Also editorial. 15,500 w. Engng—Jan. 2, 1903.

Science and the Navy. Discusses favorably the new scheme of entry, education and training of officers. 3500 w. Nature—Jan. 29, 1903.

Education.—See **NAVAL ACADEMY; NAVAL ENGINEER; SCHOOL SHIP; TRAINING SHIP.**

French.—The Recruiting of Naval Officers and Engineer Officers (Le Recrutement des Officiers de Marine et des Officiers Mécaniciens). Eugene Gras. A discussion of the question of training and appointing naval officers in France, and of the amalgamation of the line and engineer officers. 1500 w. Le Yacht—March 28, 1903.

Japan.—See **EDUCATION—Nautical, Japan.**

NAVAL PROVING GROUND.

Indian Head, Md.—United States Naval Proving Ground, Indian Head. Jos. Strauss. Illustrates and describes the grounds and the testing work. 1800 w. Sci Am—Dec. 29, 1900.

NAVAL STATION.

See also **COALING STATION; NAVY YARD.**

Dover, Eng.—The New Admiralty Works at Dover. Illustrated description of a future British naval station. 800 w. Page's Mag—Feb., 1904.

French.—French Naval Stations. Discusses the proposed improvements providing for the accommodation of the vessels of the new navy and creating naval stations for the defense of the colonies. 2400 w. Engr, Lond—March 29, 1901.

NAVAL WARFARE.

See also **NAVAL MANOEUVRES; NAVAL STATION; NAVY.**

Future.—Recent Scientific Developments and the Future of Naval Warfare. William Laird Clowes. Read before the Inst. of Naval Archts. An appeal for greater official interest in recent inventions, and education for those who are to use the tools. 2800 w. Engr, Lond—March 28, 1902.

Recent Scientific Developments and the Future of Naval Warfare. William Laird Clowes. An address before the Inst. of Nav. Archts. Discusses submarines, water-tube boilers, gunnery, etc., and the importance of the trained "personnel." 2800 w. Sci Am Sup—June 7, 1902.

Globuloid Battery.—See **NAVAL BATTERY.**

Offensive-Defensive.—See **NAVY.**

Russo-Japanese.—Naval Aspects of the War in the Far East. Archibald S. Hurd. Discusses the methods adopted by Japan and Russia, and the lessons to be learned. 8500 w. Cassier's Mag—Dec., 1904.

Torpedo and Mine Protection.—See **TORPEDO—Protection.**

Trafalgar.—Naval Strategy and Tactics at the Time of Trafalgar. Admiral Sir Cyprian Bridge. Read before the Inst. of Naval Archts. Outlines the general plans and considers points which may furnish guidance of value at the present day. 5000 w. Engng—July 21, 1905.

Naval Ships at the Time of Trafalgar. Sir Philip Watts. Read before the Inst. of Naval Archts. Enumerates and classifies the types of ships forming the Royal Navy at that time, describing briefly the design, construction, armament, etc., of some of the more important. Ills. 4000 w. Engng—July 28, 1905.

NAVIGATION.

See also **CANAL; COMPASS; FOG SIGNAL; LIFE SAVING APPARATUS; NAVIGATION CONGRESS; SALVAGE; SEA SIGNAL; SHIPPING; SUBMARINE SIGNAL; TRANSPORTATION; WATERWAY; WRECK.**

Aerial.—See **AERONAUTICS.**

Aids.—Aids to Navigation. Col. William P. Anderson. From an address in Ottawa. Reviews the development of lighthouses, buoys, lightships, etc., on the Canadian shores. 4500 w. Marine Rev—Jan. 29, 1903.

Canal.—See **CANAL—Navigation.**

Collision.—See **WRECK—Grand Traverse—Livingston.**

Compass.—See **COMPASS.**

Electric Dead Reckoner.—See **LOG.**

Fog Signal.—See **FOG SIGNAL.**

Great Circle.—A Geometric Solution of the Problem of Great-Circle Sailing (Soluzione Geometrica del Problema della Navigazione per Cerchio Massimo). Prof. Luigi Masnara. Developing graphical methods for determining a number of points on the arc of a great circle. 5000 w. Rivista Marittima—Oct., 1904.

Gyroscope.—See **GYROSCOPE; SHIP STABILITY.**

Inland.—See **CANAL; HARBOR; RIVER REGULATION; WATERWAY.**

Lake.—Problems of Lake Transportation. Lieut. W. H. Frost. Shows the need of improvement on present methods and considers some subjects in navigation which all masters of vessels should understand, and suggests ways of instituting changes. 5000 w. Marine Rev—Aug. 6, 1903.

Lights.—Running Lights and Tell-Tale Devices. George McQuilkin, Jr. Illustrates and describes devices to avoid the necessity of attention and to afford a means of detecting when one lamp is extinguished, and to restore the lighting as quickly as possible. 1500 w. Marine Engng—Jan., 1903.

Log.—See LOG.

Marshall Islands, Pacific.—See **MARSHALL ISLANDS.**

New York-Milwaukee.—From Sea Coast to Lakes. C. A. McAllister. An interesting account of an all-water trip from New York to Milwaukee, Wis. Illustrated. 4500 w. Marine Engng—Feb., 1904.

Nile.—The Navigation of the Nile. Sir William H. Preece. Deals principally with the navigation from Aswan to the sea, the regulation of the currents, depth of water, channels and banks, so that boats may pass up and down stream in all seasons. Discussion. 7000 w. Jour Soc of Arts—Feb. 3, 1905.

Sir William Preece and "The Navigation of the Nile." Sir Hanbury Brown. A review of a paper read 1st of February, 1905, before the Society of Arts, in London, with a defense of the writer of it. 3300 w. Engr, Lond—July 14, 1905.

See also **DAM—Assuan; IRRIGATION—Egypt; RIVER REGULATION.**

Ocean Current.—See **OCEAN CURRENT.**

Polar.—About Some Important Polar Navigations to High Latitudes. Dr. Arnaldo Faustini. An account of journeys to very high latitudes in the 17th and 18th centuries, with comments on their value. 3900 w. Jour Fr Inst—June, 1903.

See also **STEAMSHIP**—"Discovery;" "Gauss;" "Roosevelt."

River Plate.—Navigation of the River de la Plata. Information concerning the type of vessels needed, and the points of difficulty on the river. 600 w. U S Cons Repts, No. 1530—Dec. 27, 1902.

Rivers.—Note on the Passage of Vessels in a Tidal River of Great Length. H. Crahay de Franchimont. Considers conditions needing study in planning the improvement of the depth of a navigable channel, and the preparation of route charts. 1100 w. Vol. CLX., page 364, No. 3579. Inst of Civ Engrs.

Artificial Limitations of Commerce on Our Rivers. John F. Dravo. Considers the best conditions demanded by river commerce as it now exists, especially the towing system, and bridge construction. 2300 w. Pro Engrs' Soc of W Penn—Oct., 1902.

See also **Susquehanna River; RIVER; RIVER REGULATION.**

Rivers, Pacific Northwest.—Navigation on the Rivers of the Pacific Northwest. The work of the government in improving the Columbia, Snake and other rivers of Oregon, Washington and Idaho, with illustrations of the type of steamboats employed on these streams. 1500 w. Naut Gaz—Sept. 8, 1904.

Steamboat Rules and Regulations.—See **STEAMBOAT INSPECTION.**

Steering.—See **STEERING GEAR.**

Stranding.—Why Vessels Lose Their Bearings and Strand. John Maurice. On errors due to the use of the floating or patent log near land. 1000 w. Marine Rev—Aug. 20, 1903.

Submarine Signal.—See **SUBMARINE SIGNAL.**

Susquehanna River.—The Navigation of the Susquehanna River, and the Beginnings of the Reading Railroad. Williard T. Block. Reviews the early attempts to navigate this river, and the disaster that led to the construction of a canal; and the first railroads of Pennsylvania. 1000 w. R R Gaz—Aug. 7, 1903.

Waterway.—See **WATERWAY—Navigable.**

NAVIGATION CONGRESS.

Düsseldorf.—International Navigation Congress at Düsseldorf. Begins a report of the proceedings, dealing very briefly with the subjects presented. Serial. 1st part. 5000 w. Engng—July 4, 1902.

The International Navigation Congress at Düsseldorf, 1902 (Die Verhandlungen des IX. Internationalen Schiffarts-Kongresses in Düsseldorf, 1902). A. Schromm. Opening address, outlining in general the work of the congress. Two articles. 15,000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 2, 9, 1903.

The Ninth International Navigation Congress (IX. Congrès International de Navigation). Report of the French delegates to the congress held at Düsseldorf in 1902, with the general reports upon the various questions submited to the congress. 40,000 w. Ann des Ponts et Chaussées—1 Trimestre, 1903.

The Ninth International Navigation Congress (IX. Congrès International de Navigation). Additional reports of the French delegates. 50,000 w. 14 plates. Ann des Ponts et Chaussées—2 Trimestre, 1903.

NAVIPENDULUM.

See **SHIP STABILITY.**

NAVY.

See also under specific types of naval vessels.

The World's Navies. Information from the government annual showing progress made in vessel construction and armament. 3000 w. Naut Gaz—Sept. 5, 1901.

Warships (La Marine Militaire). Hector Pouleur. An illustrated general review of naval architecture, warship construction and armament, types of warships, and also brief account of latest ocean liners. 2 plates. 14,000 w. Rev Univ d Mines—Feb., 1902.

American.—Recent Design of Battleships and Cruisers for the United States Navy. Philip Hichborn. A description of the latest naval designs, supplemented by data and outline plans, without discussion of the merits or special features. 4300 w. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

Ten Years' Naval Construction. J. H. Biles. Address before a recent meeting of the Inst. of Naval Architects, in London. Condensed. Reviews the progress of the navy in the United States, giving a comparison of types. 4800 w. Marine Rev—May 9, 1901.

Our Naval Development Since the War With Spain. Description and illustrations of ships commissioned, completed or under construction since the war. Also editorial. 1500 w. Sci Am—Dec. 14, 1901.

Report on Naval Construction. Abstract of the report of Admiral F. T. Bowles concerning work on new vessels, repairs, improvement in plants, etc. 2000 w. Ir Age—Oct. 16, 1902.

America's Bid for Naval Supremacy. Archibald S. Hurd. Reviews briefly the history of the American navy, and the causes of the present lack of officers and men to serve all the ships built or in course of construction. 5000 w. Nineteenth Cent—Dec., 1902.

Our Actual Naval Strength. George W. Melville. Discusses the resources of the United States that strengthen the power of the navy, and shows the wisdom of providing for a strong and efficient navy. 6500 w. N Am Rev—March, 1905.

The Naval Strength of the United States. George W. Melville. Considers some of the factors that have been given too little consideration in the past in estimating the relative strength of navies, and related matters of interest. 8400 w. Jour Fr Inst—Sept., 1904.

See also Contract Price; **MELVILLE**; and under specific types of naval vessels.

American Congress.—See **BATTLESHIP.**

American, Old.—Ships of the Old Navy. Illustrates types of naval construction prevailing during the first three-quarters of the past century, giving a summary of their careers. 2000 w. Marine Engng—Oct., 1903.

American Sanitation.—Review of the Sanitary Condition of the Navy. John C. Wise. A review showing the great changes and advances made during the last twenty years. 4000 w. San—Aug., 1902.

Armament.—The Admiralty Policy as to Armament. Editorial discussing the need of rearmament of the British fleet. 1500 w. Engng—May 16, 1902.

Armor.—The Protection of Warships in the Nineteenth Century (La Protegione delle Navi da Guerra nel Secolo xix). A. Ruggieri. A general study of armored protection of vessels at the close of the century. 8000 w. Rivista Marittima—Aug.-Sept., 1901.

See also Classification; **ARMORED CRUISER; ARMOR PLATE; BATTLESHIP; MONITOR.**

Armorclads.—Early Armorclads. Major C. Field. An illustrated review of early work in this field. 2700 w. Sci Am—Feb. 27, 1904.

See also **ARMORED CRUISER; BATTLESHIP.**

Auxiliaries.—Mercantile Auxiliaries. Lord Brassey. Read before the Inst. of Naval Archts. Reviews the history of the question and discusses the steps practicable in furtherance of a more vigorous policy. 3500 w. Engng—June 28, 1901.

The Merchant Marine as an Auxiliary to the Navy. Report of Admiral George Dewey, President-General Board, Navy Department, to the Secretary of the Navy. 2000 w. Naut Gaz—Dec. 28, 1905.

See also British; **SHIPPING; STEAMSHIP.**

Belleisle Experiments.—The Recent Belleisle Experiment. A description of experiments made (1) to ascertain the effect of lyddite on a conning tower; (2) to ascertain the effect of the same shell on torpedo nets. Ill. 3300 w. Engr, Lond—Aug. 8, 1902.

British.—Warship Construction in 1900. Facts relating to British naval activity. Serial. 1st part. 2500 w. Engng—Dec. 21, 1900.

Progress of Warships and Machinery Building in England. Supplementary to an article published June 29. The present article gives a résumé of progress during the latter half of the expiring year. 3500 w. Engr, Lond—Dec. 28, 1900.

Progress of Warships and Machinery Building in England. Résumé of progress during the past half year with the work for British and foreign navies. 2500 w. Engr, Lond—June 28, 1901.

Warship Building in 1901. A review of the additions during the year to the British navy. Serial. 1st part. 2500 w. Engng—Dec. 20, 1901.

Progress of Warships and Machinery Building in England. A résumé of the progress made in naval construction during the last six months. 1700 w. Engr, Lond—Dec. 27, 1901.

Progress of Warships and Machinery Building in England. A résumé of progress made in naval construction during the last six months. 2200 w. Engr, Lond—June 27, 1902.

Warship Building in 1902. A review of the work of the British navy for the year just ended. Serial. 2 parts. 5200 w. Engng—Dec. 19 and 26, 1902.

Great Britain's Naval Supremacy. Archibald S. Hurd. Reviews the changed conditions which have required a change in policy, and gives a table showing the forces ready for defense and the growth which has taken place. Ill. 4000 w. Cassier's Mag—March, 1903.

Auxiliaries of a War Fleet, with Special Reference to Recent Additions to the British Navy. Archibald S. Hurd. Shows the necessity of providing for this service and gives particulars of the more important recent types added to the British Navy. 5000 w. Cassier's Mag—Oct., 1904.

Great Britain's Naval Supremacy. Sir Charles W. Dilke. An illustrated article giving conclusions from the recent British naval debates. 3000 w. Cassier's Mag—June, 1903.

Warship Construction. A review of warship construction during 1905 in Great Britain. 3800 w. Engng—Dec. 29, 1905.

See also **SHIPBUILDING.**

British Conversion.—Conversions and Rearmament of Ships on the Effective List. Lord Brassey. Read before the Inst. of Naval Archts. Urges reenforcing the navy by making improvements in seaworthy ships. 1800 w. Engng—June 28, 1901.

British, Trafalgar.—See **NAVAL WARFARE—Trafalgar.**

Cellular Construction.—See **WATERTIGHT COMPARTMENT.**

Classification.—Warships and Mathematics. Explains method of classification based upon armor protected gunfire. 1900 w. Engr, Lond—Oct. 18, 1901.

Clyde.—See **SHIPBUILDING.**

Coal Endurance.—Methods of Estimating the Coal Endurance of a Naval Vessel. D. W. Taylor. Discusses the factors affecting coal consumption and considers the principal methods of obtaining approximate results. 5000 w. Eng News—July 14, 1904.

See also **Steaming Radius; SHIP PROPULSION—Speed.**

Coast Defense, France.—See **BATTLESHIP—Requin.**

Contract Prices.—A Comparison of the Contract Prices of Our Naval Vessels. Harrison S. Taft. Presents data concerning the relative cost of the vessels of each of the seven classes, the prices between different firms, the relative prices of different classes, and the tendeucy of prices. 3500 w. Trans Am Inst of Nav Archts & Marine Engs—Nov., 1900.

Conversion.—See **British Conversion.**

Cost.—Warships of the Great Powers. Archibald S. Hurd. A study of relative costs. 5800 w. Cassier's Mag—Nov., 1904.

Design.—Simple Methods in Warship Design a Necessity. George W. Dickie. A discussion of the importance of this subject, presenting plans showing the application of methods proposed to secure the results aimed at in a modern armored cruiser. 11,200 w. Soc of Naval Archts & Marine Engrs, No. 1—Nov., 1904.

See also **Japanese Design; NAVAL ARCHITECTURE; SHIPBUILDING.**

Development.—Naval Development During the Next Decade. George W. Melville. Discusses reasons why the United Staes should have her navy increased, and improvements needed. 3300 w. Sci Am Sup—Feb. 22, 1902.

Modern Warships. W. H. Whiting. Read before the Inst. of Naval Archts. On the effect of features introduced during the last twenty years, which are not necessary to the main object of a warship, on the size and cost of these vessels. 5200 w. Engng—April 3, 1903.

Fashions.—Naval Fashions. Archibald S. Hurd. Discusses the experiments in the construction of war vessels. 4900 w. Nineteenth Cent—Nov., 1901.

French.—The French Navy in 1901 (La Marine Française en 1901). P. Le Roll. A general review, with review of the construction being carried on in the various shipyards. 1800 w. Yacht—Jan. 4, 1902.

The French Naval Programme. An editorial review of the proceedings of the French government in regard to naval affairs. 2500 w. Engng—Nov. 28, 1902.

New Vessels of the French Navy. Translated from "Illustrirte Zeitung." Brief illustrated description of a recent battleship, cruiser and torpedo boat destroyer. 1000 w. Sci Am Sup—Dec. 20, 1902.

The French Navy. Summary from "Le Yacht," with comments. 1400 w. Engr, Lond—Jan. 18, 1901.

See also **NAVAL MANOEUVRES.**

German.—The Construction of Warships (Ueber den Bau von Kriegschiffen). H. Hüllman. A discussion of the general problems of design, equipment, armament, etc., based on the development of the German navy. 6000 w. Zeitschr d Ver Deutscher Ing—Aug. 17, 1901.

The Kaiser's Fleet. Archibald S. Hurd. Discusses the naval policy of Germany, the German Naval Bill of 1900, which authorizes the expenditure of 73,000,000 l. on new men-of-war and 18,000,000 l. on dockyards, and related matters of interest. 4500 w. Nineteenth Cent—July, 1902.

The Imperial German Navy. Archibald S. Hurd. Reviews the recent naval expansion, giving illustrations. 3000 w. Cassier's Mag—Nov., 1903.

The Development of the German Navy (Die Enwickelung der Deutschen Kriegsmarine). H. Haekel. A review of the influence of the development of the German navy upon the progress of German shipbuilding. Serial. Part I. 2000 w. Schiffbau—June 14, 1905.
See also **SHIPBUILDING.**

Globuloid Battery.—See **NAVAL BATTERY.**

Great Lakes.—The Problem of Building Warships on the Great Lakes. H. C. Sadler. Discusses the possibilities of the lake shipyards and engine works with regard to governmental work, showing that in workmanship, cost of production and speed in building there is nothing to hinder. The two obstacles being the agreement with Great Britain with regard to building warships on the

Lakes, and the difficulty in getting vessels to the coast. Ill. 3300 w. Jour Am Soc of Nav Engrs—May, 1903.

See also **SHIPBUILDING.**

Gun Power.—See **Classification; GUN—Naval.**

Japan.—Japan's Magnificent Navy. Dr. William Elliott Griffis, in Boston "Transcript." An interesting outline of the growth of one of the largest and most powerful among the world's nations. 2000 w. Naut Gaz—May 2, 1901.

The Navy of Japan. Samuel E. Moffett. An illustrated account of the growth and present condition of the navy, which is unquestionably the first naval power in the far East. 2500 w. Rev of Revs—May, 1901.

The Growing Naval Power of Japan. Archibald S. Hurd. An interesting account of the development of the navy, and the people who control the vessels. 3300 w. N Am Rev—Oct., 1903.

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See also **Russia.**

Japanese Design.—A Note from Japan. George W. Dickie. A note from a Japanese naval constructor is quoted, and the points named as of importance to gain a victory are discussed. 2 plates. 3000 w. (No. 8.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

Japan vs. Russia.—See **Russia vs. Japan.**

"Mayflower."—See **STEAM YACHT.**

Melville's Influence.—See **MELVILLE.**

1901.—The World's Navies in 1901 (Les Marines Etrangères en 1901). A general review of the warships built and building, outside of France, in 1901. 2 articles. 3000 w. Yacht—Jan. 11, 18, 1902.

Offensive-Defensive.—The Relative Importance of Offensive and Defensive Qualities of Men-of-War. Sir William Laird Clowes. A criticism of present tendencies in battleship construction, with views at various stages of the work. 6500 w. Page's Mag—May, 1903.

Repair Ship.—See **REPAIR SHIP—"Vulcan."**

Russia.—Russia's Readiness for War. Charles Johnston. A statement of the relations between Russia, China and Japan, with a comparison of the fleets of Russia and Japan, and also the armies. Ill. 3700 w. Rev of Revs—May, 1901.

The Russian Volunteer Fleet. Herbert Rowell. Read before the Inst. of Naval Archts. The present article explains the objects of the Russian Volunteer Fleet Assn. and describes the ships. Ills. Serial. 1st part. 3500 w. Engng—April 28, 1905.

The Russian Navy. Gives the leading particulars of Russia's battleships and armored cruisers so far as known, illustrating many of them. 2700 w. Sci Am—Feb. 20, 1904.

Russian at Port Arthur.—Story of the Operations of the Russian Fleet at Pt. Arthur as Told by One of the Commanders. Facts obtained in an interview with Capt. N. O. von Essen, who was in command of the battleship "Sevastopol," explaining a method of making repairs by means of caissons. Ills. 3500 w. Sci Am—March 11, 1905.

The Damaged Russian Warships at Port Arthur. Gives a detailed report of the damage, with comments. 3000 w. Engng—Oct. 20, 1905.

Russian Baltic.—See **BATTLESHIP.**

Russia vs. Japan.—The War Fleets of Japan and Russia. Archibald S. Hurd. An illustrated review, giving much information of interest. 8400 w. Cassier's Mag—Feb., 1904.

The Japanese and Russian Fleets. Reviews the naval strength of the two countries. 1800 w. Engr, Lond—Feb. 12, 1904.

A Comparison of the Russian and Japanese Fleets (Vergleich der Russischen und Japanischen Seestreitkräfte). A tabulated comparison of the respective fighting strengths at the beginning of the war. 3000 w. Schiffbau—Feb. 24, 1904.

Steaming Powers of the Russian and Japanese Fleets. Gives interesting particulars in regard to the vessels of both fleets, their present condition, how they have fared, etc. 1500 w. Engr, Lond—July 15, 1904.

Scout.—See **CRUISER.**

Steaming Power.—See **Russia vs. Japan.**

Steaming Radius.—The Steaming Radius of United States Naval Vessels. B. C. Bryan. Gives tabulated information showing steaming radius of U. S. naval vessels, compiled from data of actual runs, as shown by steam logs, with comments. 3800 w. Jour Am Soc of Nav Engrs—Feb., 1901.

A Method of Calculating the Coal Endurance and Steaming Radius of War Vessels under Various Conditions. B. C. Bryan. Presents a method of tabulating and using data collected. 2200 w. Jour Am Soc of Nav Engrs—Aug., 1905.

See also **Coal Endurance; SHIP PROPULSION—Speed.**

Tender.—Class "A" Tender of the German Navy (Dampf-Beiboot Kl. A. der Kaiserlichen Marine). Giving the lines, sections and powering of the standard German naval tender. 2000 w. Schiffbau—Nov. 23, 1900.

Turkey.—The Reconstruction of the Turkish Fleet. Dagnino Attillo. Some information in regard to the rebuilding of the largest ship in the Turkish navy, the "Mess'oudijeh," and the construction of torpedo boats. Ills. 1400 w. Marine Engng—May, 1905.

United States.—See **American.**

Ventilation.—See **VENTILATION—Warship.**

Wastage.—See **WRECK.**

Watertight Compartments.—See **WATERTIGHT COMPARTMENT.**

Wooden.—See **American, Old.**

World.—The World's Naval Strength. Alfred Smith. A review of British naval strength as compared with other powers. 3500 w. Cassier's Mag—March, 1904.

NAVY YARD.

See also **DRY DOCK; SHIPYARD.**

Bombay.—Equipment and Methods of the Indian Dockyards. A. C. Bowden. Discussing especially the Bombay dockyard, and showing the successful operation of European methods in India. 3000 w. Engineering Magazine—March, 1901.

Devenport, Eng.—Developing a British War Post. Archibald S. Hurd. A well-illustrated account of the construction of basins. dry-docks, etc., in the Keyham dockyard, at Devonport, England. 2500 w. Cassier's Mag—Jan., 1903.

Portsmouth, England.—The Royal Dockyard at Portsmouth. W. Price. An illustrated description of the navy yard at Portsmouth, England, and a criticism of its engineering facilities and administration. 2400 w. Page's Mag—Dec., 1902.

Power Plant.—See **POWER PLANT—Navy Yard.**

Puget Sound.—The Puget Sound Navy Yard. A. B. Wyckoff. An illustrated article explaining the natural advantages and the present development. 1400 w. Sci Am—Nov. 23, 1901.

NEEDLE PLATE.

See **SEWING MACHINE.**

NEGRO LABOR.

See **LABOR—Negro.**

NERNST LAMP.

See also **ELECTRIC ENGINEERING—Europe; ELECTRIC LIGHTING; ELECTRIC PLANT—Bank, Pittsburg.**

The Nernst Lamp. An illustrated description of the improved lamp, with remarks on changes made. 1700 w. Elect'n, Lond—Dec. 7, 1900.

The Behavior of Incandescent Electrolytic Bodies (Einiges über das Verhalten Elektrolytischer Glühkörper). W. Nernst and W. Wild. With especial reference to material for the incandescent rod for the Nernst lamp. 1800 w. Zeitschr f Elektrochemie—Dec. 20, 1900.

The Nernst Lamp. Illustrates and describes this lamp as commercially developed. 1100 w. Sci Am—Jan. 11, 1902.

Practical Value of Nernst Lamps. Alton D.

Adams. Discusses to what extent the qualities of the Nernst lamp fit it to displace the arc and incandescent types. 1300 w. Sci Am—Feb. 8, 1902.

The Nernst Lamp. Murray C. Beebe. Abstract of a paper read before the New England Cotton Mfrs. Assn. Describes the commercial and automatic lamp as recently developed. 1200 w. Ir Age—May 29, 1902.

A Recent Advance in Electric Lighting. A study of the Nernst lamp. 3500 w. Elec Rev, N Y—Nov. 15, 1902.

Light and Illumination. E. Leavenworth Elliott. An illustrated article explaining the principle and tracing the development of the Nernst lamp. 2500 w. Cent Sta—Sept., 1903.

The Nernst Lamp. An illustrated review of the development of this lamp, with account of its efficiency, regulation, etc. 5400 w. Elec Wld & Engr—May 21, 1904.

Improved Forms of the Nernst Lamp (Neue Ausführungsformen der Nernst Lampe). Dr. Salomon. Illustrating a variety of mountings as well as the so-called "express lamp, combining the Nernst and incandescent systems. 2000 w. Elektrotech Zeitschr—July 21, 1904.

The Nernst Lamp. E. R. Roberts. Explains the principle of this lamp, giving information concerning its recent development. General discussion. 4000 w. Pro Engrs' Soc of W Penn—Jan., 1905.

A. E. G.—The Nernst Lamp (Die Nernstlampe). Oskar Bussman. A paper before the "Elektrotechnischer Verein," giving an illustrated account of the Nernst lamp as developed by the Allgemeine Elektricitäts-Gesellschaft, with results of tests. The author is one of the chief developers of the Nernst lamp. 4000 w. Elektrotech Zeitschr—April 9, 1903.

America.—Development of the Nernst Lamp in America. Alexander Jay Wurts. Gives the results of the work, and names of those who have been connected with it, reviewing the subject in detail, and pronouncing the lamp a commercial success. Ill. 6200 w. Trans Am Inst of Elec Engrs—June & July, 1901.

Development of the Nernst Lamp in America. Alexander Jay Wurts. Gives the results of the work, and names of those who have been connected with it, reviewing the subject in detail, and pronouncing the lamp a commercial success. Ill. 6200 w. Trans Am Inst of Elec Engrs—June & July, 1901.

Development of the Nernst Lamp in America. Alexander Jay Wurts. Discussion at Buffalo, Aug. 23, 1901. 6800 w. Trans Am Inst of Elec Engrs—March, 1902.

The Nernst Lamp as a Factor in Commercial Lighting. E. R. Roberts. Reviews the history of this form of electric lighting, its development in America, its efficiency, applications and progress. 4200 w. Cent Sta—Nov., 1904.

See also **MERCURY VAPOR LAMP.**

Arc Lamp Compared.—See **Test.**

Ballast and Glower.—Inter-Relation of Ballast and Glower in the Nernst Lamp. Lewis A. Terven. An outline study of the problems presented by the glower and the ballast showing how they combine to make the lamp. 2500 w. Elec Wld & Engr—Aug. 19, 1905.

Bank, Pittsburgh.—See **ELECTRIC PLANT.**

Germany.—The Nernst Lamp (Die Nernst-lampe). Dr. Ernst Salomon. An address before the Electrotechnical Society of Vienna, reviewing the development of the Nernst lamp in Germany. 3000 w. Zeitschr f Elektrotechnik—Feb. 26, 1905.

N. E. L. A. Convention.—Experience with the Nernst Lamp. Extracts from the discussion at the recent Cincinnati convention of the National Electric Light Asociation in May, 1902. 4300 w. Am Elect'n—Sept., 1902.

See also **Test.**

1902 Model.—Nernst Lamp, 1902 Model (Nernstlampe Model 1902). Illustrated description of details of the latest Nernst lamps manufactured by the Allgemeine Elektrizitäts-Gesellschaft, of Berlin. 600 w. Elektrizität—Jan. 18, 1902.

Photometry.—See **Test; PHOTOMETRY.**

Rare Earths.—Notes on the Use of Rare Earths in Electric Illuminants. Murray C. Beebe. Information of interest concerning the mixtures used as glowers in lamps of the Nernst type. 4500 w. Pro Engrs' Soc of W Penn—April, 1905.

Some Results of Late Mineral Research in Llano County, Texas. William E. Hidden. An illustrated article describing the development of the noted gadolinite locality, known as Barringer-Hill. 2500 w. Am Jour of Sci—June, 1905.

Street Lighting.—The Nernst Lamp. Abstract of a paper by J. Stöttner, and of the discussion. Also gives an abstract of a report of tests made of Nernst lamps for street lighting. 5000 w. Elect'n, Lond—March 6, 1903.

Street Lighting by Nernst Lamps. Henry Joseph. Aims to show that, under favorable conditions, with the use of Nernst lamps, it is possible to produce a better light than that given by incandescent mantles at a smaller annual cost and profit. 3000 w. Elec Rev, Lond—May 13, 1904.

Street Lighting in New England. Illustrates and describes the successful adaptation of Nernst lamps at West Hartford, Conn. 1000 w. Elec Rev, N Y—May 20, 1905.

City Street Lighting at Sewickley, Pa., a Successful Six-Glower Nernst Lamp System. Brief illustrated description of the first installation of its kind in the United States. 700 w. Elec Rev, N Y—Jan. 21, 1905.

See also **LIGHTING—Nernst Lamp vs. Incandescent Gas.**

Test.—Investigations on the Nernst Lamp (Untersuchungen über die Nernst Lampe). Dr. W. Wedding. Giving details of photometric tests of various models, with numerous diagrams. 3500 w. Elektrotech Zeitschr—Aug. 1, 1901.

Tests of Nernst Lamps. Translation of an article by Prof. W. Wedding, in a recent number of "Elektrotechnische Zeitschrift," giving results of some experiments with Nernst lamps of different models, manufactured by the Allgemeine Electricitäts-Gesellschaft. Serial. 1st part. 1200 w. Elec Engr, Lond—Nov. 22, 1901.

Recent Experiments with Nernst Lamps (Neuere Untersuchungen über die Nernst-lampe). Dr. W. Wedding. Paper before the Elektrotechnischer Verein, giving an illustrated account of duration tests of Nernst lamps, the latest model of Nernst lamp, and a comparison between Nernst and arc lamps for small currents. Diagrams and tables. 3000 w. Elektrotech Zeitschr—June 4, 1903.

Tests on the Nernst Lamp. R. P. Hulse. Read before the Birmingham Sec. of the Inst. of Elec. Engrs. Reports tests made of the 1902 model. 2800 w. Mech Engr—April 5, 1902.

Tests on the Nernst Lamp. R. P. Hulse. Paper read at Birmingham, Eng., March 19, 1902. Describes the tests made of the 1902 model, giving diagrams. Serial. 1st part. 1800 w. Elec Rev, Lond—April 18, 1902.

Photometric Test of the Nernst Lamp. From the fourth progress report of the N. E. L. A. Committee for Investigating the Photometric Values of Arc Lamps. 1500 w. Elec Wld & Engr—Oct. 24, 1903.

Test, Globes.—Some Tests on Lamp Globes. Maurice Solomon. A discussion of results obtained in the course of some experiments on the mean spherical candle-power and distribution of light with Nernst lamps. Also editorial. 3300 w. Elect'n, Lond—Nov. 3, 1905.

Tests, Hamburg.—Tests of the Nernst Lamp by the Electric-Light Inspector of Hamburg (Untersuchungen an Nernstlampen seitens des Inspektorats der Elektrischen Beleuchtung in Hamburg). H. v. Gaisberg. With tables showing the life, current consumption, and illuminating power of the lamps tested. 1200 w. Elektrotech Zeitschr—Oct. 13, 1904.

NIAGARA.

See **ELECTRIC INDUSTRY; ELECTRO-CHEMISTRY; HYDRO-ELECTRIC PLANT; TURBINE; WATER POWER.**

NICARAGUA CANAL.

See **CANAL—Nicaragua.**

NICKEL.

See also **MAGNETIC SEPARATION; MINERAL REGION.**

Alloys.—See **ALLOY; NICKEL STEEL.**

Canada.—Nickel Industries of Canada. Information concerning the deposits, working, etc. 800 w. U S Cons Repts, No. 932—Jan. 11, 1901.

The Canadian Nickel Industry. An editorial discussing the general situation of the nickel industry, especially in Canada. 2000 w. Engng—Jan. 9, 1903.

See also **Metallurgy; Ontario; Sudbury.**

Electrical Properties.—Note on Nickel at High Temperatures. Albert Campbell. Gives results of some experiments in connection with a hot wire current regulator. 800 w. Elec Rev, Lond—June 14, 1901.

See also **MAGNETISM—Heat Effects; NICKEL STEEL—Magnetic Properties.**

Electrolytic Refining.—History and Present Development of Electrolytic Nickel Refining. Titus Ulke: Describes the Vivian, Balbach, Cleveland, Hamilton, and Papenburg electrolytic nickel works, and discusses the proposed copper and nickel refinery at Sault Ste. Marie. Ill. 4000 w. Elec Chem Ind—Feb., 1903.

See also **ELECTRO-METALLURGY.**

Metallurgy.—Development in the Nickel Industry at Sault Ste. Marie, Ontario, Canada. E. A. Sjostedt. Gives results obtained at Sault Ste. Marie in the roasting of mono-sulphides without the aid of auxiliary heat. 1200 w. Eng & Min Jour—April 25, 1903.

Progress in the Metallurgy of Nickel During 1902. Titus Ulke. Reviews the development in various districts and the processes used. 2800 w. Eng & Min Jour—April 25, 1903.

The Metallurgy of Nickel and Cobalt. Dr. J. Ohly. Concerning the applications, deposits, mode of treatment, etc. 2500 w. Min Rept—Aug. 4, 1904.

Mond Process.—The Mond Process for the Extraction of Nickel (Le Procédé Mond pour l'Extraction du Nickel). Léon Guillet. A general account of the process with details of the apparatus. 2000 w. Génie Civil—May 31, 1902.

New Caledonia.—Nickel Deposits in New Caledonia. Major R. G. Leckie. Information in regard to the deposits found on this island of the Southern Pacific, analysis, methods of mining, and related matters. 2000 w. Can Min Rev—June 30, 1903.

Norway.—The Nickel Deposits of Norway. Major R. G. Leckie. Read before the Can. Min. Inst. Describes the geological formations of Norway, the ore deposits and particularly the nickel mines in the southern part. 2500 w. Can Min Rev—Aug. 31, 1904.

Ontario.—Copper-Nickel Mining in Ontario. Abstract of a review by T. W. Gibson of the nickel and copper mining industries. 3000 w. Can Min Rev—Oct. 31, 1902.

See also **Canada; Sjöstedt; Sudbury; COPPER.**

Oregon.—Notes on the Oregon Nickel Prospects. Dr. A. R. Ledoux. Read before the Can. Min. Inst. An account of these deposits, their location, type, extent, geology, etc. Ill. 2000 w. Can Min Rev—April 30, 1901.

Orford, Bayonne, N. J.—See **COPPER METALLURGY.**

Pyrrhotite.—See **Sjöstedt Process.**

Sjöstedt Process.—Ferronickel Direct from Pyrrhotite. Ernest A. Sjöstedt. Reviews the manner of manufacturing ferronickel direct from the Sudbury nickelferous pyrrhotite, illustrating the roasting furnace invented by the writer. 2500 w. Ir Age—Feb. 18, 1904.

Acid Making from Pyrrhotite. Ernest A. Sjöstedt. Read before the Can. Min. Inst. Information and facts concerning the work done in treating the Sudbury pyrrhotite so as to recover the nickel, cobalt and copper, and to utilize the sulphur and iron contents. Ills. 4800 w. Can Min Rev—April 30, 1904.

Steel.—See **NICKEL STEEL.**

Sudbury, Ont.—The Sudbury Nickel Mines. A. McCharles. Some points in relation to prospecting with a favorable report of progress in nickel mining. 700 w. Eng & Min Jour—Dec. 7, 1901.

The Sudbury Nickel Mines. A. McCharles. Reviews events affecting the nickel mining industry. 1700 w. Eng & Min Jour—Jan. 3, 1903.

The Sulphide Ore Bodies of the Sudbury Region. L. P. Silver. Describes these deposits which are the source of over forty-five per cent. of the present production of the world. Ill. 5600 w. Can Min Rev—Aug. 30, 1902.

The Ore Deposits of Sudbury, Ontario. Charles W. Dickson. This district is one of the two great sources of nickel. Considers the relation of nickel to pyrrhotite, and the genesis of the ores. Ill. 21500 w. Trans Am Inst of Min Engrs—Feb., 1903.

See also **Canada; Ontario; Sjöstedt; COPPER METALLURGY—Canadian Co.; Orford; PLATINUM.**

Sulphide Ores.—Treatment of Nickel Ores. Alfred Ernest Barlow. Excerpt from report of the Geological Survey of Canada. Discusses the production of nickel and copper from a sulphide ore. 2500 w. Min Wld—April 15, 1905.

See also **Pyrrhotite; ORE TREATMENT.**

NICKEL STEEL.

See also **ARMOR PLATE.**

Nickel Steel (L'Acier au Nickel). Discussing the toughness and ductility imparted to steel by various proportions of nickel. 2000 w. Revue Technique—Nov. 25, 1901.

Nickel Steel. Much information concerning this valuable alloy, which is growing in use. Ill. 1200 w. R R Gaz—Aug. 8, 1902.

Investigations on Nickel Steel (Recherches sur les Aciers au Nickel. A. Pourcel. A note upon investigations of Dumas regarding the bearing of the high tension nickel steels upon the solution theory. 1000 w. Génie Civil—Dec. 27, 1902.

The Reversible and Irreversible Transformations of Nickel Steel. L. Dumas. Abstract of a paper read before the Ir. & Steel Inst. Discusses the remarkable properties of nickel steels which have not undergone the irreversible transformation, and the effects produced by adding nickel to steel. 1500 w. Ir & Coal Trds Rev—Sept. 29, 1905.

The Influence of Nickel and Carbon on Iron. G. B. Waterhouse. Read before the Ir. & Steel Inst. A report of research work, considering a series of steels of constant nickel with varying carbon percentages. 1500 w. Ir & Coal Trds Rev—Sept. 29, 1905.

Allotropic Transformations.—The Allotropic Transformations of Nickel Steels (Les Transformations Allotropiques des Aciers au Nickel. O. Boudouard. Tabulated results of tests of steels with 0.12 and 0.80 per cent. of carbon, and gradually increasing contents of nickel. 1200 w. Comptes Rendus—Feb. 8, 1904.

Allotropic Transformations of Nickel Steels. L. Dumas. Gives results of experiments at the steel works of Imply, France, in studying the influence of the allotropic condition on the properties of nickel steels. 5000 w. Ir & Steel Mag—Sept., 1904.

Analysis.—The Determination of Nickel in Steel. (Dosamento del Nichelio nell' Acciaio). Luigi Zambelli. Describing a laboratory method for the quantitative determination of the percentage of nickel in a nickel-steel alloy. 1800 w. Revista Marittima—Jan., 1904.

Awaruite.—On the Natural Iron-Nickel Alloy, Awaruite. George S. Jamieson. Describes two iron-nickel alloys from adjoining locations. 1000 w. Am Jour of Sci—June, 1905.

Boiler Tubes.—See **BOILER TUBE—Nickel Steel.**

Carbon Steel Compared.—Nickel Steel; Its Properties and Applications. Albert Ladd Colby. Extract from a paper read at meeting of Am. Soc. for Test. Materials. Compares its physical properties with carbon steel, and gives information and general review. 4200 w. R R Gaz—Aug. 14, 1903.

Expansion.—Recent Investigations upon the Expansion of Nickel Steel (Nouvelles Recherches sur la Dilatation des Aciers au Nickel). C. E. Guillaume. Determinations of expansion coefficients of minimum-expansion alloys, with discussion of the influence of carbon silicon, and manganese upon the expansion. 1200 w. Comptes Rendus—Feb. 2, 1903.

Temporary and Permanent Changes in Nickel Steels (Changements passagers et Permanents des Aciers au Nickel. C. E. Guillaume. A report upon the behavior of bars of nickel steel under observation for six years, with respect to their suitability for standards of length. 1200 w. Comptes Rendus—Feb. 9, 1903.

Guillaume.—The Industrial Applications of Nickel Steel. Charles Edouard Guillaume. Gives results of the author's original work and predictions of their future extended applications. 3800 w. The Engineering Magazine—Oct., 1901.

The Theory of Nickel Steel (Sur la Theorie des Aciers au Nickel). C. E. Guillaume. A classification of the thermal and magnetic properties of nickel-steel alloys with a view of establishing a theory for the observed phenomena. 1200 w. Comptes Rendus—June 29, 1903.

Consequences of the Theory of Nickel Steels (Conséquences de la Théorie des Aciers au Nickel). C. E. Guillaume. A discussion of the possible relations of the peculiarities of nickel-steel alloys to the transformations in the state of the iron. 1000 w. Comptes Rendus—July 6, 1903.

The Theory of Nickel Steels (La Theorie des Aciers au Nickel). C. E. Guillaume. An exhaustive review of nickel-steel alloys, with especial reference to the magnetic and thermal properties, including the experiments of the author, as well as of Curie, Osmond, Le Chatelier, and others. Two articles. 10,000 w. Rev Gen des Sciences—July 15, 30, 1903.

The Theory of Nickel Steels (A Propos de la Théorie des Aciers au Nickel). L. Dumas. A review of the theory recently set forth by Guillaume, showing its incompleteness and suggesting further extension of the allotropic theory to alloys of nickel and steel. 2000 w. Rev Gen des Sciences—Aug. 15, 1903.

The Theory of Nickel Steels (Contribution à la Theorie des Aciers au Nickel). F. Osmond. A rievw of the theory of Guillanme, agreeing in general with the application of the allotropic theory to the phenomena exhibited by nickel steels, and adding the results of further experiments upon the magnetic properties of the various alloys. 8000 w. Rev Gen des Sciences—Aug. 30, 1903.

Guillet.—Researches in Nickel Steel (Recherches sur les Aciers au Nickel). Léon Guillet. A micrographic and mechanical study of nickel steel and its properties, with micrographs, diagrams and tables. Serial. 3 parts. 9000 w. Génie Civil—May 2, 9 and 16, 1903.

Recent Researches in Nickel Steel (Nouvelles Recherches sur les Aciers au Nickel). Dr. Leon Guillet. An account of micrographic and other reascarch work, with tables and diagram. 1600 w. Génie Civil—June 27, 1903.

Recent Researches on Nickel Steels (Nouvelles Recherches sur les Aciers au Nickel). Léon Guillet. Developing a diagram from which the properties of a steel may be predicted from a knowledge of the nickel and carbon content. 2500 w. Bull Soc d'Encour—Aug., 1903.

See also **Metallography.**

High Grade.—High Grade Nickel Steels. The last chapter of a lengthy article by Mr. Dumas in the "Annales des Mines," in which the author indicates the possible applications of the special steels. 6800 w. Bul International Ry Cong—July, 1903.

Magnetic Properties.—Nickel Steel and Magnetic Observation. Crittenden Marriott. Concerning the very peculiar magnetic properties possessed by nickel steel alloys. 800 w. Elec Wld & Engr—May 10, 1902.

See also **MAGNETISM—Heat Effects; NICKEL—Electrical Properties.**

Metallography.—The Metallography of Nickel Steel (La Metallographie des Aciers au Nickel). Dr. Léon Guillet. A micrographic study of the constitution and properties of nickel steel, in various proportions, with many illustrations. 6000 w. Bull Soc d'Encour—May 31, 1903.

The Micrography of Nickel Steel (Sur la Micrographie des Aciers au Nickel). Léon Guillet. A discussion of the structure of various nickel steels as revealed by the methods of metallography. 1200 w. Comptes Rendus—Jan. 26, 1903.

The Metallography of Nickel Steel. Léon Guillet. Translated from the "Bulletin de la Société d'Encouragement." A study of the microstructure of various steels containing nickel from zero to 30 per cent. Ill. 6000 w. Metallographist—Oct., 1903.

See also **Guillet.**

Natural Alloy.—See Awaruite.

Properties.—The Properties of Nickel-Iron and Nickel-Iron-Carbon Alloys (Die Eigenschaften von Nickel-Eisen und Nickel-Eisen-Kohlenstoff Legirungen). Data and results of tests made by the "Verein zur Beförderung des Gewerbfleisses. 2500 w. Stahl u Eisen—Dec. 1, 1902.

Pyromagnetic Properties.—See **Magnetic Properties; MAGNETISM—Temperature Changes; NICKEL—Electrical Properties.**

Surveyor's Levels.—Nickel-Steel. Crittenden Marriott. On the very peculiar qualities of this alloy, being nearly if not quite exempt from expansion and contraction through heat and cold, and also showing curious phenomena relating to magnetism, and the advantage in constructing surveying levels. 1600 w. Sci Am—July 11, 1903.

Tests.—Nickel Steel for Purposes of Construction. Ralph H. Watson. Considers the properties that recommend this material, the uses to which it is applied, and gives tabulated results of tests. 2400 w. Pro Engrs' Soc of W Penn—June, 1903. See also **Allotropic Transformations.**

Theory.—See Guillaume.

NILE.

See **DAM—Assuan; IRRIGATION—Egypt; NAVIGATION; RIVER REGULATION.**

NITRATE.

See also **ELECTRO-CHEMISTRY; NITROGEN.**

Chile.—The Nitrate of Soda Industry. Illustrates and describes the nitrate beds in Chile, and the methods employed in opening them and preparing the product for the market. 1100 w. Eng & Min Jour—Feb. 23, 1901.

NITRIC ACID.

See **ELECTRO-CHEMISTRY; NITRATE; NITROGEN.**

NITROGEN.

Fixation.—The Fixation of Atmospheric Nitrogen. Illustrated article regarding the producing artificially nitrates and nitric acid on a commercial scale. Also editorial comment. 2000 w. Elec Wld & Engr—Aug. 2, 1902.

Fixing Nitrogen from the Atmosphere. T. C. Martin. A description of the apparatus of Bradley, in operation at Niagara Falls by which atmospheric nitrogen is converted into nitric acid by the action of electric arcs, for the manufacture of nitrates. 2300 w. Rev of Revs—Sept., 1902.

The Electric Nitrification of the Atmosphere. William Hand Browne, Jr. An illustrated description of the apparatus employed for the fixation of atmospheric nitrogen, and the chemical reaction under the electric arc. 3800 w. Elec Rev, N Y—Oct. 18, 1902.

Electrical Extraction of Nitrogen from the Air. J. Sigfrid Edstrom. Reviews the methods proposed for extracting the nitrogen from the air, especially describing the new process by Prof. C. Birkeland and S. S. Eyde, of Christiana. Ills. 2800 w. Int Elec Cong of St. Louis—Sept., 1904.

Utilization of Atmospheric Nitrogen (Utilisation de l'Azote Atmosphérique). A. Boileau. Description, with illustrations of electrical methods and apparatus for obtaining nitrogen and nitrogen compounds from the air. 4000 w. Génie Civ—Sept. 2, 1905.

See also **ELECTRO-CHEMISTRY—Nitric Acid.**

Iron and Steel.—See IRON.

Liquid Air.—See LIQUID AIR—Oxygen.

Oxide.—Experiments on the Production of Oxides of Nitrogen by Means of High Voltage. Discharges in Air (Versuche über die Darstellung von Oxyden des Stickstoffs durch Hochspannungsentladungen in Luft). Otto Scheuer. Description of apparatus and results of experiments at the Darmstadt Technische Hochschule, with curves, diagrams and tables. 4500 w. Zeitschr f Elektrochemie—Sept. 1, 1905.

NITRO-GLYCERINE.

See **EXPLOSIVE.**

NODULATING.

Iron Ores.—See **BRIQUETTING; IRON METALLURGY.**

NOTATION.

See **ELECTRIC SYMBOL; ELECTRIC UNIT.**

NOTCHING MACHINE.

Armature Disk.—An Armature Disk Notching Attachment. H. B. M'Cabe. Illustrated detailed description of the attachment and its working. 900 w. Am Mach—Vol. 28, No. 10.

Cross Ties.—A Machine for Cutting Notches in Railroad Ties (Machine à Saboter les Traverses de Chemins de Fer). An illustrated description of a machine for quickly cutting notches in wooden cross ties for the rails to rest in. 1 plate. 1500 w. Génie Civil—March 21, 1903.

NOZZLE.

De Laval.—See STEAM FLOW—Nozzle.

Divergent.—See STEAM FLOW—Nozzle.

Gas Flow.—See STEAM FLOW—Nozzle.

High Head.—Discharge Nozzles for High Head. W. Stuart Smith. Discusses improperly shaped nozzles and their effects. Ill. 2800 w. Jour of Elec—Aug., 1902.

Needle.—HYDRO-ELECTRIC PLANT — California Southern.

Steam Turbine.—See STEAM FLOW—Nozzle.

Turbine.—See High Head; HYDRO-ELECTRIC PLANT; TURBINE; WATER WHEEL.

NUT.

Casting Threads.—See CASTING—Threads.

Locomotive and Car.—See BOLT.

Machines.—See MACHINE TOOL—Nut.

Rusty.—Removing Rusty Nuts and Bolts. Walter J. May. Suggestions. 900 w. Prac Engr—Dec. 2, 1904.

Tightening Strains.—Strains Produced by Excessive Tightening of Nuts. A. Bement. Calls attention to the fact that materials are frequently unduly strained during the process of assembling, by the excessive tightening of nuts, giving an example. 800 w. Trans Am Soc of Mech Engrs—June, 1903.

O

OBSERVATORY.

Chicago University.—The Yerkes Observatory. Illustrates and describes this observatory, given the Univ. of Chicago, and located near William's Bay, Wisconsin. Deals with the mechanical details connected with the mounting and accessories. Serial. 1st part. 2700 w. Engng—April 29, 1904.

Magnetic.—See MAGNETIC OBSERVATORY.

Yerkes.—See Chicago University.

OBSTRUCTION.

See STRIKE—Italian Railway.

OCEAN CURRENTS.

Ocean Currents. Explains the character of the trade winds, the gulf stream, &c., and the construction of current charts. 2500 w. Marine Engng—Jan., 1903.

OFFICE BUILDING.

See also BUILDING; BUILDING CONSTRUCTION; STEEL CONSTRUCTION.

Mechanical Plant.—See MECHANICAL PLANT.

Paris Exposition.—See BUILDING CONSTRUCTION—Broadway Chambers, N. Y.

OIL.

See also LIQUID FUEL; LUBRICATION; PETROLEUM.

Burning.—See LIQUID FUEL; LOCOMOTIVE—Oil Burning.

Carburetting.—See CARBURETTER—Heavy Oils.

Chemical Extraction.—Extraction of Oil by Chemical Process. Information concerning the mechanical arrangements and the process used so successfully in France. 1200 w. U S Cons Repts, No. 1311—April 9, 1902.

Determination.—The Way in Which the Qualities of Oil Are Determined. Dr. Julius Ohly. The determining the specific gravities, and conclusions drawn from observations. 1100 w. Mines & Min—March, 1902.

Electric Resistance.—See INSULATION—Oils; LUBRICATION.

Filter.—See LUBRICATION—Waste Purification; OIL SEPARATOR.

Fuel.—See LIQUID FUEL.

Gas.—See GAS, OIL.

Insulation.—See ELECTRIC SWITCH; INSULATION; TRANSFORMER.

Java.—See PETROLEUM.

Purification.—See LUBRICATION—Waste Purification; OIL SEPARATOR.

Road Sprinkling.—See ROAD—Oil Sprinkling.

Safety Lamp.—Notes on Safety-Lamp Oils. Dr. G. P. Lishman. Read before the N. of Eng. Inst. of Min. & Mech. Engrs Considers of what a good safety lamp oil consists and what it ought to cost. 1200 w. Col Guard—Dec. 30, 1904.

See also SAFETY LAMP.

Shale.—See SHALE OIL.

Switch.—See Transformer; ELECTRIC SWITCH.

Test.—Practical Testing of Oils for Gas and Fuel Purposes. L. P. Lowe. Read before the Pacific Coast Gas Assn. Also discussion. Concerning practical means of determining the degree of purity, and the importance of systematic inspection. 4700 w. Am Gas Lgt Jour—Sept. 9, 1901.

See also LUBRICATION.

Testing Still.—See TAR.

Transformer.—Oil for Transformers, Switches, etc. E. Kilburn Scott. On the treatment of oil for transformers, and its proper use. 700 w. Elec Rev, Lond—Dec. 2, 1904.

Some Hints About Transformer Oil. C. E. Skinner. Directions for filling transformer cases with oil. 1500 w. Elec Club Jour—Feb., 1905.

Oil for Insulating Purposes. Abstracted from a pamphlet published by the Westinghouse Elec. & Mfg. Co., of Pittsburg, written by C. E. Skinner. On methods of testing, and the quality of oil for transformer and oil switch work. 2500 w. Elec Rev, N Y—March 18, 1905.

Valve.—See LUBRICATION.

OIL BURNER.

See LIQUID FUEL—Burner; LOCOMOTIVE—Oil Burning.

OIL CONCENTRATION.

See ORE TREATMENT.

OIL ENGINE.

See also AUTOMOBILE; AUTOMOBILE, GASOLINE; GAS ENGINE; GASOLINE ENGINE; MOTOR.

A Simple Kerosene Engine. Illustrated description of a new type having the merit of simplicity. 1400 w. Sci Am—May 23, 1903.

Oil Engines. H. B. Maxwell. Illustrates and describes some of the main types of the various oil engines. 1600 w. Marine Engng—Aug., 1904.

Oil Engines. Gustave Ey. Read before the Engng. Assn. of N. S. W An explanation of the Otto cycle, two-stroke cycle, carburetter and vaporizer, and igniters. Ills. 8000 w. Aust Min Stand—Sept. 1, 1904.

Allsop.—The Allsop Smokeless Petroleum Engine. Illustrates and describes an engine which uses common petroleum as a source of energy; runs without smoke or smell, and leaves no carbonaceous deposit in the cylinder. 1200 w. Autocar—Oct. 1, 1904.

American Design.—See GAS ENGINE.

Britannia.—See Nicholson.

Cardiff Trials.—Oil-Engine Trials at Cardiff. Particulars of the oil engines to take part in the trials of the Royal Agricultural Society of England. 4000 w. Engng—June 21, 1901.

Oil Engine Trials at Cardiff. An account of the trials made by the Royal Agri. Soc. of Eng., showing the oil engine to have been wonderfully improved during the past few years. Ill. 3200 w. Engng—June 28, 1901.

Agricultural Oil Engines and Automobilism. A brief study of data published in regard to these engines, exhibited at the Cardiff Exhibition. 1600 w. Auto Jour—July, 1901.

The Royal Agricultural Society's Show. Illustrated descriptions of a number of oil engines exhibited, and one or two other machines of interest. 4400 w. Engr, Lond—July 5, 1901.

Central Station.—An Oil Engine Central Station. Howard S. Knowlton. Illustrates and describes the new electric light plant at Jewett City, Conn., the first central station in he United States to adopt the Diesel oil-burning engine as its source of motive power. 1800 w. Am Elect'n—Aug., 1903.

Development.—See **GAS ENGINE; POWER STATION—Internal Combustion Engine.**

Diagonal.—20-Horse-Power Diagonal Oil Engines for Launch. Illustrated description. 800 w. Engng —June 3, 1904.

Diesel.—Diesel's Motor at Paris. Extracts from a paper on recent tests of his engine, read by Mr. Diesel, giving comparisons of how it worked with various kinds of fuel. 900 w. Am Mfr & Ir Wld—Nov. 22, 1900.

The Diesel Thermic Motor (Le Moteur Thermique Diesel). R. Diesel. A paper presented by the inventor at the International Congress of Mechanics at Paris, giving the most recent results and experiences with the Diesel motor. 6000 w. Revue de Mécanique—Oct. 31, 1900.

The Diesel Thermal Motor (Mittheilungen über den Thermischen Motor, System Diesel). R. Diesel. An address repiewing the progress of the Diesel motor, showing especially its advantages in an oil producing country as to commercial as well as thermal economy. Two articles. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 6, 13, 1901.

The Present Status of the Heat Engine (Der Heutige Stand der Wärmekraftmaschinen). Rudolf Diesel. · A discussion of the availability of liquid fuel in internal-combustion engines, with especial reference to the Diesel Motor. 4000 w. Zeitschr d Ver Deutscher Ing—Sept. 19, 1903.

The Diesel Motor. Report of the Committee on Science and the Arts on the invention of Rudolf Diesel, of Munich, Bavaria. Awarding the Elliott-Cresson gold medal. Ill. 3400 w. Jour Fr Inst —Nov., 1901.

The New Diesel Engine. Illustrated description of a new 30-B. H. P. Diesel oil engine and its operation. Serial. 1st part. 3500 w. Engr, Lond —May 30, 1902

The New Diesel Oil Engine. An illustrated description of the improved engine which is capable of consuming petroleum refuse, so that it may be operated on the crudest of oils. 2300 w. Am Elect'n—Oct., 1902.

The Diesel Oil Engine. Arnold G. Hansard. Illustrates and describes the principal characteristics of this engine and discusses the cost of working. Serial. 1st part. 1500 w. Elec Times —Oct. 16, 1902.

The American Type Diesel Engine. An illustrated explanation of this form of engine. 1200 w. Elec Rev, N Y—Dec. 6, 1902.

The Diesel Engine. Gives an illustrated description of the latest type of this engine, calling attention to its distinctive characteristics. 1600 w. Power—April, 1903.

The Diesel Motor (Diesel Motoren). O. Kritzler. A comparison of the economical performance of the Diesel motor with other internal-combustion engines, showing its high efficiency. 2500 w. De Ingenieur—Sept. 19, 1903.

Internal Combustion Engines and the Diesel Principle. W. H. Booth. A study of the system of compression in the Diesel engine, showing its advantages. 1000 w. Elec Rev, Lond—June 10, 1904.

The Diesel Engine in Practice. James D. Macpherson. Describes this form of internal combustion engine as used in America; the operation, types, regulation, &c. Discussion. 2700 w. Pro Engrs' Club of Phila—Oct., 1904.

The Diesel Engine. A. W. Oppenheimer. Describes and illustrates the Diesel engine, explaining the principles upon which it is based, its operation, &c. 3300 w. Sci Am Sup—Nov. 5, 1904.

The American Diesel Engine. Norman M'Carty. Brief description of the principle on which the engine works. Ills. 1800 w. Engr, U S A—Jan. 1, 1905 (Special.)

The Diesel Engine in Electricity Generating Stations. A. J. Lawson. Abstract of a paper read before the Glasgow Tech. College Sci. Soc. Gives the results of actual experience of the working of such engines over a considerable period. 2000 w. Elect'n, Lond—Jan. 13, 1905.

The Diesel Oil Engine. Illustrated description of British-built Diesel engines, with account of their development. 1200 w. Engr, Lond—March 31, 1905.

500-Horse-Power Diesel Engine at the Liége Exhibition. Illustrations, principal dimensions and description. 1100 w. Engng—June 9, 1905.

The American Diesel Engine. E. D. Meier. An explanation of the working of this engine, with illustrations, and a comparison with the thermal efficiencies of a steam engine. 3000 w. Harvard Engng Jour—June, 1905.

500-Horse-Power Diesel Motor, with Three Cylinders, at the Liége Exposition (Moteur Diesel de 500 Chevaux à Trois Cylindres, Installé à l'Exposition de Liége). Illustrated description. 1 plate. 1000 w. Génie Civ—Sept. 9, 1905.

See also Central Station; Marine; **ALCOHOL MOTOR — Tests; ELECTRIC PLANT — Gas vs. Steam; ENGINE—Munich-Augsburg; GAS ENGINE—Paris Exposition; Speed Variations; GASOLINE ENGINE—Banki; POWER COST—Steam Engine vs. Diesel Motor.**

Diesel in England.—The Diesel Oil Engine. Illustrates a British built engine, explaining the mechanical details, and method of working. 1800 w. Engng—March 29, 1901.

The Diesel Oil Engine. An illustrated description of the first Diesel engine made in England, which has several improvements over types made abroad. 2300 w. Elec Engr, Lond—March 29, 1901.

The Diesel Engine in England. Illustrated description of the English made engine recently exhibited and its operation. Drawings have been prepared for Diesel motors of special design to be used on automobiles of the heavier type. 2200 w. Auto Jour—April, 1901.

The Diesel Oil Engine. Remarks on the engine recently exhibited at Messrs. Scott & Hodgson's works, England. Ill. 1400 w. Elec Rev, Lond—April 5, 1901.

Diesel, Rothesay.—Diesel Engine at Rothesay. Illustrations, with brief description of the engine at work at the power-station of the Rothesay Tramways. 1400 w. Tram & Ry Wld—Dec. 8, 1904.

Diesel-Sulzer.—Notes on the Diesel Motor (Mitteilungen über den Dieselmotor). Illustrating very fully the later improved form of Diesel motor as constructed by Sulzer Bros., of Winterthur, Switzerland. A thermal efficiency of 35 per cent. on the brake horse power is attained. 3000 w. Schweiz Bauzeitung—Nov. 26, 1904.

Diesel Test.—The Diesel Engine. W. H. Booth. An account of a commercial test made of a Diesel engine when driving electric generators. 2800 w. Engr, U S A—July 15, 1904.

Test of a Diesel Oil Engine. H. Ade Clark. Describes an interesting test made by the writer, giving tabulated results. Ill. 2000 w. Engr, Lond—Aug. 22, 1902.

Some Recent Tests of the Diesel Oil Engine. Bryan Donkin. (Summarised from Prof. Eugene Meyer's report). On experiments made in Sept., 1900, on two vertical single-acting Diesel engines, to test them for efficiency and steadiness. 1500 w. Engr, Lond—April 26, 1901.

The Diesel Engine. H. Ade Clark. A statement of principles and development, with account of performance of a motor at Harrogate in comparison with the steam engine. 6300 w. Inst Mech Engrs—July, 1903.

Trial of a Diesel Oil Engine and Riedler Pump. Report of a trial made to ascertain whether the guarantees given by the makers had been fulfilled. 2300 w. Prac Engr—Sept. 25, 1903.

The Diesel Engine. W. H. Booth. Reports results of a test recently carried out on a Diesel engine of 150 b. h. p. 2800 w. Elec Mag—April 25, 1905.

Trial of a 240-H. P. Diesel Oil Engine. Michael Longridge. An account of the trials made at the maker's works in Ghent, showing 42 per cent. efficiency. 2500 w. Mech Engr—Sept. 17, 1904.

Trials of a 500 B. H. P. Diesel Oil Engine. Michael Longridge. Describes trials and gives results in tables and diagrams. Serial. 1st part. 1500 w. Mech Engr—Oct. 14, 1905.

Exhibition, London.—See **GAS ENGINE.**

Fuel.—See **OIL—Automobile Fuel.**

Gardner.—Petroleum and Petrol Engines. Illustrates and describes the high-speed vertical engines manufactured by L. Gardner & Sons, Ltd., near Manchester, England. Describes a portable plant. 1500 w. Engr, Lond—Jan. 13, 1905.

Gas Working.—See **GAS ENGINE—Oil Working.**

Governing.—See **GAS ENGINE.**

Griffin.—See **Marine.**

Hornsby.—The Hornsby Vertical Oil-Engine. Illustrated detailed description, with summaries of trials. 1400 w. Engng—March 31, 1905.

Ignition.—See **IGNITION.**

Kerosene and Gasoline.—Performance of an Internal Combustion Engine Using Kerosene and Gasoline as Fuel. H. F. Halladay and G. O. Hodge. Reports a series of investigations made to determine the economic performance of a standard engine of the Otto type. 5200 w. Trans Am Soc of Mech Engrs—June, 1903.

Kynoch-Forward.—The Kynoch-Forward Oil Engine. Illustrated description of a new design, with report of trial. 1600 w. Engng—June 19, 1903.

Launch.—See **Diagonal; Marine.**

Longridge's Lecture.—See **MOTOR.**

Lucke.—Kerosene in Exploding Engines. Charles E. Lucke. The operation of the explosive kerosene engine is discussed, the importance of the maintenance of proportion in the mixture, and the effects of changes, and typical means proposed and used for obtaining mixtures of kerosene and air. 2800 w. Horseless Age—May 28, 1902.

Marine.—The Application of Oil Engines to Light Marine Work. C. C. Longridge. Discusses the advantages and defects of oil motors for marine work, reversing motors, gears and propellers, binmial propellers, range of horse-power, etc. 2500 w. Engng—May 23, 1902.

The Application of Oil Engines to Light Marine Work. Capt. C. C. Longridge. Considers the advantages and defects of these motors for marine work, and describes methods of reversing. 2200 w. Naut Gaz—Sept. 11, 1902.

The Griffin Marine Type Hydro-Oil Engines. Illustrated, detailed description of two marine oil engines having features of special interest. 1600 w. Engng—July 24, 1903.

Gas and Oil Engines for Marine Propulsion. John E. Thornycroft. Read at meeting of the Inst. of Nav. Archts. Considers the different systems and the way in which they work. Ills. 2800 w. Mech Engr—April 2, 1904.

The Design of a Launch Motor. Edward Butler. Illustrated detailed description of a compound kerosene oil motor. Serial. 1st part. 2700 w. Mech Engr—Sept. 24, 1904.

Marine Oil-Engines Consuming Creosote or Other Heavy Oils. Illustrates and describes two medium speed, marine oil engines recently built by the Griffin Engng. Co., with notes of trials. 2500 w. Engng—May 19, 1905.

The Application of Combustion Motors to War Ships (Verwendbarkeit von Verbrennungsmotoren zur Fortbewegung Moderner Kriegsschiffe). Lieut. Philippow. A translation from the Russian, showing the practicability and advantages of combustion motors for marine service, with special reference to the Diesel motor. Serial. Part I. 3500 w. Schiffbau—Oct. 11, 1905.

See also **Diagonal; BOAT—Motor; BOAT, GASOLINE.**

Mietz & Weiss.—The Mietz & Weiss Two-Cylinder Marine Kerosene Engine. Illustrated detailed description. 1400 w. Am Ship—March 24, 1904.

Tests of an Oil Engine with Steam Injection. Gives an abstract of the results obtained by Messrs. Charles Wineburgh and S. J. Goldwater in testing for oil consumption, a 15-H. P. engine of unusual type placed on the market by Mietz & Weiss, of New York. 4200 w. Eng News—Sept. 15, 1904.

Mine Haulage.—See **MINE HAULAGE.**

Mining and Milling.—Oil Engines in Mining and Milling. A. W. Warwick. Discusses the points needing attention for the economical working of such engines. 4500 w. Min & Sci Pr—March 30, 1901.

Nicholson.—The Britannia Oil Engine. Illustrated description of the Nicholson engine, in which no external source of heat is used in vaporizing the oil, but which is capable of running for long periods under light load. 900 w. Engng—June 19, 1903.

Ostergren.—A Fuel Oil or Kerosene Engine. Marius C. Krarup. Problems in the construction of stationary and automobile motors studied in the Ostergren two-cycle engine, with liquid fuel injection, high compression and gradual combustion. Ill. 3500 w. Automobile—March 21, 1903.

The Ostergren Fuel Oil Engine. Illustrates a 50-H. P. stationary engine, explaining its operation, and stating the general merits of the invention. 1200 w. Sci Am—June 6, 1903.

Paraffin.—A Successful Paraffin Motor. An illustrated description of an internal combustion motor using paraffin oil as fuel and running without smoke or smell. 1500 w. Autocar—April 16, 1904.

See also **CARBURETTER.**

Paris Exposition.—See **Diesel; GAS ENGINE.**

Portable.—See **Gardner.**

Practice.—See **GAS ENGINE.**

Priestman.—Test of a Priestman Safety Oil Engine. S. P. Howe and C. Waterbury. Describes the engine and method of testing, giving results. Ill. 3200 w. Sib Jour of Engng—Oct., 1902.

Pumping.—See **PUMPING STATION.**

Secor.—The Secor Internal Combustion Engine. Illustrated description of a single cylinder kerosene oil engine directly connected to a generator, all being mounted on a common base. 1100 w. Ir Age—Nov. 1, 1900.

The Secor Internal Combustion Engine. John A. Secor. States the present position of gas engines and gives illustrated description of engine named. 3300 w. Eng News—March 28, 1901.

See also **CARBURETTER—Paraffin.**

Speed Variations.—See **GAS ENGINE.**

Steam Injection.—See **Mietz & Weiss.**

Sutton.—The Sutton "Heavy" Oil Engine. An illustrated detailed description of the Sutton system and its use on motor cars. 3300 w. Auto Jour—June 4, 1904.

Test.—See also **Cardiff Trials; Diesel Test; Mietz & Weiss; Priestman; GASOLINE ENGINE—Kerosene Compared.**

Vaporizer.—Some Features in the Design of Oil Engines. Edward Butler. The present article considers engines working with an exhaust heated vaporizer. Serial. 1st part. 1200 w. Mech Engr—April 8, 1905.

OIL FILTER.

See **BOILER ACCESSORIES; FEED-WATER PURIFICATION; LUBRICATION; OIL SEPARATOR.**

OIL FIRE.

See **LIQUID FUEL; PETROLEUM WELL—Fire.**

OIL FUEL.

See **LIQUID FUEL; LOCOMOTIVE—Oil Burning.**

OIL GAS.

See **GAS, OIL.**

OIL HOUSE.

Railway.—See **OIL STORAGE.**

OILING.

See **LUBRICATION.**

OIL PIPE LINE.

See **PETROLEUM PIPE LINE.**

OIL REGION.

See **PETROLEUM.**

OIL ROOM.

Fire Protection.—Specifications for the Construction of Inside Oil Rooms. Report to the Nat. Fire Pro. Assn. concerning rooms for holding the daily supply of oils, paints, varnishes, etc. 1200 w. Eng News—June 1, 1905.

OIL SEPARATOR.

See also **COOLING TOWER—Oil Removal; FEED-WATER PURIFICATION; LUBRICATION; STEAM SEPARATOR.**

Filters for Removing Oil and Mud from Boiler Feed-Water. Illustrated description of a filter used both in land and marine boiler plants. 700 w. Eng News—June 13, 1901.

Separation of Oil from Condensed Steam. J. R. Bibbins. A detailed account of experimental work to evolve a method of freeing engine condensation of entrained oil. Ill. 6200 w. Jour Assn of Engng Socs—March, 1902.

Oil Separators for Exhaust and Condensed Steam (Oelabscheider für Abdampf und Kondensationswasser). H. Kühl. Illustrating and describing various forms of filters and diaphragm separators for the removal of lubricating oil from discharge steam. 2000 w. Zeitschr d Ver Deutscher Ing—April 16, 1904.

Improvements in Steam-Boiler Operation (Neuerungen im Dampfkesselbetriebe). Describing especially a filter for removing oil from feed water; also boiler cleaning appliances. 1200 w. Glückauf—Oct. 21, 1905.

Baker.—Oil-Separators at Shepherd's Bush Power-Station; C. L. Railway. Illustrated description of the improved Baker separators installed at the Central London Railway Co.'s power station. 900 w. Engng—Oct. 20, 1905.

Cooling Tower.—See **COOLING TOWER—Oil Removal.**

Hot Well.—The Hot Well as an Oil Extractor. A. H. Eldredge. A brief illustrated description of the details and action of the hot-well and its use for the separation of oil from the water from the cylinder which passes through it. 4500 w. Trans Am Soc of Mech Engrs—June, 1903.

Tests.—The Relation of the Efficiency of an Oil Separator to the Quality of Oil Used (Abhängigkeit der Wirksamkeit des Oelabschneiders von der Beschaffenheit des den Dampfzylindern Zugeführten Oeles). C. Bach. A brief account of tests upon a separator showing the variations in results obtained by feeding different oils into the steam cylinder. 1000 w. Zeitschr d Ver Deutscher Ing—Feb. 7, 1903.

OIL STORAGE.

See also **OIL ROOM.**

Clinton, Iowa.—A Model Oil House—Chicago and Northwestern Railway. Illustrated detailed description of this part of the plant at Clinton, Iowa. 600 w. Ry Mas Mech—March, 1901.

Hoosac Tunnel.—Oil-Storage Station. Illustrated description of the oil-storage station of the Hoosac tunnel on the Boston & Maine R. R. 1500 w. Am Engr & R R Jour—Sept., 1902.

OIL SPRINKLING.

See **ROAD—Oil Sprinkling.**

OIL STOVE.

Combustion Products.—See **GAS STOVE.**

OIL WELL.

See **PETROLEUM WELL.**

OMNIMETER.

See also **SLIDE RULE.**

The Omnimeter Annex. W. A. Warman. Illustration and suggestions showing a few of the possibilities of this device as a time saver. 350 w. Am Mach—April 10, 1902.

ONDOGRAPH.

See also **ELECTRIC CURRENT, ALTERNATING—Wave Indicator; ELECTRIC INSTRUMENT; OSCILLOGRAPH; SPEED VARIATION.**

Hospitalier.—M. Hospitalier's Ondograph. Illustrated detailed description of an apparatus which registers the curves representing periodically and rapidly changing phenomena. Serial. 1st part. 1800 w. Elec Rev, Lond—June 13, 1902.

Observing and Recording Rapidly Varying Periodical Phenomena (Sur l'Observation et l'Enregistrement de Phénomènes Périodiquement et Rapidement Variables). E. Hospitalier. An illustrated paper discussing modern methods and devices for observing and recording phenomena in engineering work, with special reference to rapid and periodical variations. 7500 w. Mem Soc Ing Civils de France—Feb., 1903.

Differential Ondograph (Ondographe Différentiel). E. Hospitalier. A description of an improvement in the author's apparatus for recording rapidly varying periodic electric phenomena, particularly alternating current waves. 800 w. Bull Soc Internat des Elect—May, 1903.

The Slow Registration of Rapid Phenomena by Strobographic Methods. E. Hospitalier. Read before the Inst. of Elec. Engrs. Describes wave-recorder and power-recorder instruments, referring to applications. Ill. 7500 w. Elect'n, Lond—Dec. 11, 1903.

The Hospitalier Ondograph. Illustrated description of this instrument for tracing directly the wave forms of variable currents. 1200 w. Sci Am Sup—April 23, 1904.

See also **ELECTRIC WAVE—Three-Phase Transformer.**

ONDOMETER.

Telefunken. — See **SPACE TELEGRAPHY — Wave Meter.**

OPAL.

See also **PRECIOUS STONE.**

Australia.—Australian Opal and Opal Mining. John Plummer. Concerning the difficulties of prospecting, the value and points determining it. 1000 w. Min Rept—July 18, 1901.

Queensland.—The Opal-Mining Industry and the Distribution of Opal Deposits in Queensland. C. F. V. Jackson. An illustrated article reviewing the history of the development of opal mining, the geology, extent of prospecting, mode of occurrence, varieties, quality, etc., with the progress of the industry. Serial. 1st part. 6500 w. Queensland Gov Min Jour—Oct. 15, 1902.

The Queensland Opal Mining Industry. C. F. V. Jackson. Report for 1902. The conditions were unfavorable owing to the failure of the rainfall for the sixth year in succession. Gives information of the principal districts, and thinks the future prospects encouraging. 2600 w. Queens Gov Min Jour—May 15, 1903.

OPEN-HEARTH PROCESS.

See also **CHARGING MACHINE; STEEL; STEEL METALLURGY; STEEL WORKS.**

Notes on the Open Hearth Furnace (Notes sur le Four Martin). M. Clausel de Coussergues. A review of the improvements which have been made in the open hearth furnace in the past ten years, especially with regard to capacity and economy. 3000 w. Mem Soc Ing Civ de France—March, 1901.

A Summary of Development in Open-Hearth Steel. An illustrated review of the various open-hearth furnaces and the changes made in them. 5500 w. Ir Trd Rev—Nov. 14, 1901.

Modern Developments in the Production of Open-Hearth Steel. James Christie. Reviews the modern developments in the open-hearth process, stating the advantages claimed and the objections, and describing briefly specific processes. 8300 w. Pro Engrs' Club of Phila—July, 1902.

Various Processes for the Production of Low Steel in the Open Hearth Furnace (Ueber Verschiedene Verfahren zur Erzeugung von Flusseisen im Herdofen). R. M. Daelen. A review of recent improvements in open-hearth steel making, presented at the Düsseldorf Convention of the Verein Deutscher Eisenhüttenleute. 3000 w. Stahl u Eisen—May 1, 1904.

The Open-Hearth Process of Making Steel from Cast-Iron (Die Herdofenstahlerzeugung aus Flüssigem Roheisen). Oskar Simmersbach. A review of the development of the open-hearth process, and its modifications and the extent to which it is superseding the Bessemer process. Two articles. 4000 w. Stahl u Eisen—June 15, July 1, 1905.

Acid Manipulation.—Acid Open-Hearth Manipulation. Andrew McWilliam and William H. Hatfield. Investigations made by the writers, showing the chemical composition of the slag, particularly with regard to its acidity, is the factor which determines whether the percentage of silicon in the molten steel shall increase or decrease. 1700 w. Iron & Steel Inst—Oct., 1904.

The Elimination of Silicon in the Acid Open-Hearth. Andrew M'William and William H. Hatfield. An account of investigations made of "sand boils" and other similar matters as to their effect on steel. 2000 w. Ir & Coal Trds Rev—May 9, 1902.

Alabama Company.—See **STEEL WORKS.**

Alliance, O.—Open-Hearth Steel Plant of the American Steel Casting Co., at Alliance, O. From a description prepared by L. L. Knox. Gives general features, construction of furnaces, etc. Ill. 2500 w. Foundry—Jan., 1903.

American History.—The Early History of Open Hearth Steel Manufacture in the United States. Samuel T. Wellman. Presidential address before the American Society of Mechanical Engineers. 6500 w. Ir Age—Dec. 5, 1901.

American Plants.—American Open-Hearth Steel Plants (Amerikanische Siemens-Martin-Anlagen). Hermann Jilles. A well illustrated account of the Carnegie plants at Homestead and Duquesne, the Pencoyd and the Sharon plants. Two parts. Three plates. 2000 w. Stahl u Eisen—June 15, July 1, 1902.

Basic.—See **Bertrand-Thiel; Blast—Furnace Direct.**

Basic Ingots.—See **STEEL INGOT.**

Basic vs. Acid.—Basic or Acid Open-Hearth Steel (Thomas oder Martin Flusseisen). F. Grassman.

A discussion of the comparative commercial advantages of the basic and acid open-hearth processes for the manufacture of low steel. 1500 w. Stahl und Eisen—Oct. 1, 1901.

Bertrand-Thiel.—The Bertrand-Thiel Process. John W. Cabot. Observations from a recent study of the process at the works where it originated, with conclusions. 2800 w. Ir Age—May 2, 1901.

Notes on the Bertrand-Thiel Process (Betrachtungen über das Bertrand-Thiel Verfahren). A. Ledebur. With tables and diagrams showing the action at successive stages of this open-hearth process. 2500 w. Stahl u Eisen—Jan. 1, 1903.

Recent Developments of the Bertrand-Thiel Process in the Manufacture of Steel. John H. Darby. Read before the Iron & Steel Inst. A résumé of recent developments. Ills. 1800 w. Ir & Coal Trds Rev—May 12, 1905.

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See also **Preliminary Refining.**

Bertrand-Thiel vs. Thomas.—Basic or Bertrand-Thiel Process (Thomas oder Bertrand-Thiel Process). O. Thiel. A comparison between the two processes, with tabulated analyses of products, showing that the open-hearth process is to be that of the future. 3000 w. Stahl u Eisen—Dec. 1, 1901.

Bessemer Combined.—See **STEEL METALLURGY.**

Bessemer Compared.—Notes on Processes for Producing Open-Hearth Steel. R. M. Dallen. An illustrated article written chiefly for the purpose of making a comparison between the basic-Bessemer and the open-hearth processes. 3600 w. Ir & Coal Trds Rev—June 24. 1904.

The Bessemer vs. the Open-Hearth System. John Parry. A comparison, discussing the advantages and disadvantages of the two systems. 2000 w. Ir & Coal Trds Rev—Sept. 1, 1905.

Blast Furnace Direct.—New Open-Hearth Steel Processes. P. Ackers. Read before the Min. & Met. Cong. at Liége. Considers the progress made by the open-hearth process, discussing recent improvements, especially the charging open-hearth furnaces with liquid pig-iron. 2200 w. Ir & Coal Trds Rev—July 11, 1905.

Open Hearth Molten Metal Processes. Oskar Simmersbach, in "Stahl und Eisen." Describes and compares the various methods which have been worked to use molten iron in open hearth practice. 5000 w. Ir Age—Sept. 7, 1905.

The Direct Charging of the Open-Hearth Basic Furnace from the Blast Furnace (Ueber die Verarbeitung Flüssigen Roheisens im Basisch Zugestellten Martinofen). C. Dichmann. A discussion of the practicability of using direct melted charges of raw iron into the basic open-hearth furnace. Serial. Part I. Stahl u Eisen, Dec. 1, 1905.

See also **BLAST FURNACE—Open Hearth Combined.**

Blast-Furnace Gas.—The Use of Blast-Furnace Gas for the Reduction of Iron Ore in Modern Open-Hearth Steel Processes (Hochofengase zum Reduzieren von Eiseners für die Neueren Herdofenstahlprozesse). Oskar Simmersbach. Giving the chemical equations and thermal reactions involved in the reduction of various ores by carbon monoxide. 1200 w. Stahl u Eisen—Oct. 15, 1905. See also **BLAST-FURNACE GAS—Open-Hearth Steel.**

Campbell Furnace.—See **Talbot.**

Castings.—See **STEEL CASTING—Open Hearth.**

Charging Machines.—Machines for Charging Ingots and Scrap into Open-Hearth Furnaces (Machines à Charger les Lingots et les Riblons dans les Fours à Réchauffer). Describing electric and steam charging machines of recent German designs. 1800 w. 1 plate. Génie Civil—Feb. 11, 1905.

See also **CHARGING MACHINE; MECHANICAL HANDLING—Steel Works.**

Chemical Changes.—Chemical Changes in the Open-Hearth Furnace. W. M. Carr. Gives diagrams showing the changes of composition occurring in a bath of molten metal treated under the open-hearth process when producing steel to enter into ordinary castings, with explanatory notes. 700 w. Ir & Steel Mag—July, 1905.

Cold-Blast Iron.—The Use of Cold-Blast Iron for Making Mild Steel (Verwendung von Kalt-Erblasenem Roheisen zur Flusseisendarstellung). Dr. Geilenkirchen. An examination of the relative suitability of hot and cold blast iron for use in the open-hearth steel process. Serial. Part I. 4000 w. Stahl u Eisen—March 15, 1905.

Continuous.—See **Surzycki; Talbot.**

Electric Charging.—See **Charging Machines; CHARGING MACHINE.**

Furnace.—Open-Hearth Furnaces. G. L. Luetscher. An illustrated description of the open-hearth furnace. General discussion. 6000 w. Pro Engrs' Soc of W Penn—March, 1905.

Furnace Comparisons.—Open-Hearth Furnace Comparisons. A. D. Williams, Jr. Gives a table showing hearth dimensions for 18 furnaces and the ratio between hearth area and capacity and the length and width, discussing matters related. 1700 w. Ir Age—Sept. 21, 1905.

Gas Analysis.—The Dissociation of Carbonic Oxide in the Regenerator of Siemens-Martin Furnaces (Zersetzung des Kohlenxydgases im Wärmespeicher des Martinofens). Franz Würtenberger. Analyses of gases made at the steel works of the Soc. Lig. Metallurgica, Italy, by Dr. Mambrini, and discussion of the results and their causes. 1200 w. Stahl u Eisen—April 1, 1903.

Gas and Tar Fuel.—By-Product Oven Gas and Tar as Fuels for the Open-Hearth Furnace. David Baker. Gives the experiences at the work of the Dominion Iron & Steel Co., Sydney, Cape Breton. 1200 w. Ir & Steel Met—Jan., 1904.

Gas Losses.—Gas Losses in Open-Hearth Furnaces (Die Gasverlusteder Siemensöfen). Fr. Schraml. An examination of the various sources of leakage and losses of fuel gas in supplying open-hearth furnaces, with suggestions for improvements in the valves. 1800 w. Stahl u Eisen—March 15, 1904.

Gorlainof.—A Variation in the Ore Process (Une Variation du Procédé au Mineral). E. de Loisy. A description of the Gorlainof open hearth steel process, used in the Ural district, Russia. 6000 w. Bull Soc d'Encour—Nov., 1901 .

See also **Ural.**

Guérigny, France.—See **STEEL WORKS.**

Ingot.—On New Designs of Open-Hearth Furnaces for the Manufacture of Ingot Iron. R. M. Daelen and L. Pszesolka. Comments on various designs and investigates the merits of the Talbot process. 3300 w. Ir & Coal Trds Rev—Jan. 11, 1901.

See also **STEEL INGOT.**

Kernohan.—See **STEEL METALLURGY.**

Liquid Fuel.—Naphtha Fuel for Open-Hearth Furnaces (Naphthafeuerung für Martinöfen). Adrian Byström. From "Jernkontorets Annaler." An illustrated description of methods of using oil fuel in metallurgical work in Russia. 1000 w. Glückauf—Nov. 23, 1901.

Russian Open-Hearth Furnaces with Oil Fuel (Der Russische Martinofen mit Erdölfeuerung). Adrian Byström. From "Jernkontorets Annaler." Illustrated description of apparatus for using liquid fuel in Martin open-hearth furnaces. 900 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 18, 1902.

See also **LIQUID FUEL—Russia.**

Manganese Desulphurizing.—Manganese Ore as a Desulphurizing Material in the Basic Open-Hearth Process (Manganerz als Entschwefelungsmittel beim Basischen Martinverfahren. A. Riemer. Data and results of experience at the Pastuchoff Iron Works. Sulina, Russia, showing the extent to which the use of manganese ore carried the sulphur into the slag. 2000 w. Stahl u Eisen—Dec. 15, 1902.

Manganese Ore as a Desulphurizing Agent in Basic Open Hearth Practice. A. Riemer, in "Stahl und Eisen." Gives results of experiments showing the influence of manganese ore and its value as a desulphurizing agent, and giving related facts and tests of importance. 1600 w. Ir Age—Jan. 29, 1903.

Petroleum Refuse.—See **FUEL; LIQUID FUEL—Russia.**

Preliminary Refining.—Preliminary Refining in Connection with the Bertrand-Thiel and Thomas Processes (Ein Neues Vorfrischverfahren in seiner Anwendung auf den Bertrand-Thiel und Thomas Prozess). O. Thiel. Showing the advantages of the use of a preliminary furnace or converter in steel making. 2000 w. Stahl u Eisen—March 1, 1903.

Rendsburg.—See **STEEL WORKS.**

Siemens.—Siemens Open Hearth Steel Furnace. Basil Turner. Describes the Siemens process, the furnace and its operation, dealing mainly with the Lithgow furnace. Serial. 3 parts. Ill. 7500 w. Aust Min Stand—Sept. 26, Oct. 3, 10, 1901.

Siemens-Martin.—The Production of Low Steel in the Open Hearth Furnace (Mitteilungen über die Flusseisendarstellung im Siemens-Martinofen). H. Gensmer. A review of recent progress in the production of open-hearth steel, showing the developments of the past ten years. 6000 w. Stahl u Eisen—Dec. 15, 1904.

See also **Gas Analysis.**

Silicon Elimination.—See **Acid Manipulation.**

Steel Castings.—See also **STEEL CASTINGS—Basic Open Hearth.**

Surzycki.—The Continuous Steel Process in Fixed Furnaces. S. Surzycki. Read before the Iron & Steel Inst. Describes this process, based on the Talbot process, which can be carried out in any fixed furnace of not less than 25 tons capacity. 2500 w. Ir & Coal Trds Rev—May 12, 1905.

Talbot.—The Development of the Continuous Open-Hearth Process. Benjamin Talbot. Paper read before the Iron and Steel Inst., with discussion. On recent progress and results obtained at furnaces in Pennsylvania. 7200 w. Ir & Coal Trds Rev—May 8, 1903.

The Development of the Continuous Open-Hearth Process. Benjamin Talbot. Read before the Iron and Steel Inst. A report of recent progress and results obtained in the continuous process of steel making, based on recent visits to Pittsburgh plants, and the Pencoyd plant. 5000 w. Ir Age—May 14, 1903.

The Productions of Open-Hearth Steel from Molten Blast-Furnace Metal. Benjamin Talbot. Read before the Engng. Con. of the Inst. of Civ. Engrs. An outline of the continuous process, with some results obtained. 1100 w. Ir & Coal Trds Rev—June 26, 1903.

The Refining of Cast Iron by the Talbot Process (Affinage de la Fonte par le Procédé Talbot). A description of an open-hearth steel-making plant at Frodingham, England, including an oscillating furnace on the Campbell system, with other modern imrovements, and its method of operation. 3000 w. Génie Civil—March 21, 1903.

See also **Ingot; STEEL METALLURGY—Bessemer—Open-Hearth.**

Temperature and Oxygen Balance.—The Open-Hearth Process. Lieut.-Col. Leandro Cubillo. A study of the balance of the furnace, of the temperatures and of the oxygen in the bath, etc. 3800 w. Ir & Coal Trds Rev—May 8, 1903.

Ural.—A Special Open-Hearth Steel Process (Eine Besondere Art des Erzprocesses im Martinofen). W. Schmidhammer. A description, with tables and diagrams, of charges for open-hearth furnaces consisting principally of pig iron and ore with no scrap, as used in the Ural and elsewhere. 1500 w. Stahl u Eisen—June 15, 1902.

See also **Gorlainof; LIQUID FUEL—Russia.**

Water Cooled Parts.—Water Cooled Parts for Open Hearth Furnaces. Illustrates and describes a device invented by George L. Davison and David R. Mathias. 1000 w. Ir Age—May 4, 1905.

Wellman Furnaces.—Open-Hearth Steel Melting Furnaces. Brief illustrated description of the Wellman rolling open-hearth furnaces. 900 w. Sci Am Sup—Aug. 3, 1901.

See also **Charging Machines; CHARGING MACHINE.**

OPTICAL INSTRUMENT.

See also **INSTRUMENTS OF PRECISION; MEASUREMENT.**

Porro Prism Field-Glass.—See **FIELD-GLASS—Porro Prism.**

OPTICAL EXAMINATION.

See **MATERIALS' STRENGTH; TESTING.**

ORDNANCE.

See **AMMUNITION WORKS; ARMORED CRUISER; ARMOR PLATE; BATTLESHIP; COAST DEFENSE; GUN; GUN WORKS; NAVY; RIFLE; PROJECTILE; SHELL.**

ORE.

See also **GEOLOGY; GOLD; GOLD GEOLOGY; IRON ORE; MINERAL; MINERAL REGION; MINE VALUATION; ORE DEPOSIT; ORE TREATMENT;** and under specific metals and minerals.

Buying.—Ore Buying. F. Danvers Power. Abstract of a paper read before the N. S. W. Chamber of Mines. Points on estimating, assaying and methods in common practice. 1200 w. Ir & Coal Trds Rev—Nov. 2, 1900.

Colorado.—See **GOLD; MINERAL REGION; ORE DEPOSIT; VOLCANO.**

Conveyors.—See **CONVEYOR—Ore; IRON-ORE HANDLING.**

Cross-Vein Ore Shoots.—See **ORE DEPOSIT.**

Estimates.—See **Buying; MINE VALUATION.**

Handling.—See **CONVEYOR; IRON ORE HANDLING.**

Mexico Values.—The Values of Ores in Mexico. N. H. Emmons. An explanation of the peculiar conditions in Mexico which determine the value of a given ore to the miner. 2300 w. Trans Am Inst of Min Engrs—Nov., 1901.

Salting.—See **MINE VALUATION.**

Sampling.—See **SAMPLING.**

Schedule.—The New Silver-Lead Ore Schedule of the American Smelting and Refining Company. Editorial discussion of the new schedule of payment. 2100 w. Eng & Min Jour—May 11, 1901.

Sulphide.—See **ORE TREATMENT.**

Telluride.—See **GOLD—Australia; Telluride; GOLD GEOLOGY.**

ORE CONCENTRATION.

See **ORE TREATMENT.**

ORE CRUSHING.

See **CRUSHING; CYANIDE PROCESS—Crushing; GOLD MILLING; ORE TREATMENT; STAMP MILL.**

ORE DEPOSIT.

See also **GEOLOGY; GOLD GEOLOGY; MINERAL REGION; MINE; MINING; MINING INDUSTRY; ORE;** and under specific metals and minerals.

Recent Progress in the Study of Ore Deposits. T. A. Rickard. Concerning recent progress in the study of ore deposits, and the assistance geology has given to mining. 1700 w. Eng & Min Jour—Jan. 18, 1902.

Ore Deposits. F. Danvers-Power. The present article reviews the "nebular hypothesis" as explanatory of the origin of ores. Serial. 1st part. 3000 w. Aust Min Stand—Jan. 16, 1902.

Ore Deposits. F. Danvers-Power. Read at meeting of the N. S. W. Chamber of Mines. A general talk on the world's debt to the mineral kingdom and geology, followed by a review of accepted opinions on the origin of ores, their deposition, etc. 6500 w. N Z Mines Rec—Feb. 17, 1902.

Ore in Rocks of All Geological Periods. Arthur Lakes. Shows that ore depositions may be found in all rocks providing certain circumstances or conditions are present. Illustrates by examples. 1400 w. Min Rept—May 26, 1904.

Alabandite.—A Nevada Ore Deposit. Samuel C. Will. Describes a deposit of alabandite, the sulphide of manganese, carrying silver. 1100 w. Min & Sci Pr—May 14, 1904.

Anticlinals.—Ore in Anticlinals, as at Bendigo, Australia, and Tombstone, Arizona. Arthur Lakes. Illustrates and describes the geology of ore deposits in anticlinals. 1400 w. Min & Sci Pr—March 19, 1904.

Arizona.—The Caliche of Southern Arizona: An Example of Deposition by the Vadose Circulation. William P. Blake. Describes the caliche, a deposit of carbonate of lime, and explains its origin. 2200 w. Trans Am Inst of Min Engrs—June, 1901.

Boulder and Kalgoorlie.—The Veins of Boulder and Kalgoorlie. T. A. Rickard. An illustrated description of the veins of Boulder Co., Colorado, and the lodes of Kalgoorlie, West Australia, showing their geological unlikeness. 2000 w. Trans Am Inst of Min Engrs—Oct., 1902.

See also **Veins.**

Butte, Mont.—Certain Conditions in Veins and Faults in Butte, Mont. William Braden. Briefly outlines the geology of this district, noting some characteristic features of a region containing one of the most wonderful vein systems known. Ill. 2000 w. Can Min Rev—June 31, 1902.

Ore Deposits at Butte, Montana. Walter Harvey Weed. Abstract from Bul. of the U. S. Geol. Survey. An outline of the main features. Ill. 3000 w. Eng & Min Jour—April 18, 1903.

Carriers.—Schists and Slates as Ore Carriers. Arthur Lakes. An illustrated article giving information from the writer's experiences in Colorado, Wyoming, Nevada, Arizona and North Carolina. 2000 w. Min & Sci Pr—March 5, 1904.

Chemistry.—The Chemistry of Ore-Deposition. Walter P. Jenney. A study of the action of carbon and hydrocarbons, their combinations, and the relative reducing power of minerals. 17,700 w. Trans Am Inst of Min Engrs—Oct., 1902.

The Chemistry of Ore-Deposition. John A. Church. Discusion of the paper of Walter P. Jenney at the New Haven meeting. 2000 w. Trans Am Inst of Min Engrs—Oct., 1902.

The Chemistry of Ore-Deposition—Precipitation of Copper by Natural Silicates. Eugene C. Sullivan. A report of experimental work. 2000 w. Ec Geol—Oct., 1905.

Classification.—The Genetic Classification of Ore-Bodies. Gives a classification proposed by W. H. Weed, and report of the discussion. 4800 w. Eng & Min Jour—Feb. 14, 1903.

Colorado.—Peculiar Mines and Ore Deposits. Arthur Lakes. Illustrated description of the "contact deposits" of the La Plata Mountains, Colorado, and other deposits of interest. 2200 w. Mines & Min—Dec., 1900.

Geology Along the Animas River, with Description of Coal and Metal Mines Along Its Course, Including a Sketch of the Silver Lake Mine. Arthur Lakes. Ill. 2200 w. Mines & Min—April, 1902.

See also **Boulder; Veins; GOLD; MINERAL REGION; VOLCANO.**

Colorado Caves.—Cave Ore Deposits. Arthur Lakes. Illustrated description of peculiar deposits of silver and copper ores in caves at the Red Mountain mines, Colorado. 2200 w. Mines & Min—Feb., 1901.

Contact Deposits.—The Character and Genesis of Certain Contact-Deposits. Waldemar Lindgren. Describes the character of these deposits and discusses their origin. Also discussion by S. F. Emmons. 6500 w. Trans Am Inst of Min Engrs—June, 1901.

See also **Igneous Contacts.**

Copper Precipitation.—See **Chemistry.**

Cripple Creek, Colo.—See **GOLD GEOLOGY.**

Cross-Vein Ore Shoots.—Cross-Vein Ore-Shoots and Fractures. W. H. Weed. Describes and explains the manner of formation. 900 w. Eng & Min Jour—Aug. 8, 1903.

Deep Mining.—Ore Deposition and Deep Mining. Waldemar Lindgren. A review of what has been accomplished in determining the mode of disposition of ores, and the probabilities of finding workable ores in depths. 5000 w. Ec Geol—Oct., 1905.
See also **New Mexico; MINE SHAFT; MINING.**

Dikes.—Dikes and Intrusive Sheets. Explains these terms and the means of distinguishing, giving information of interest because of their frequent connections with ore deposits. 1200 w. Min Rept—Oct. 29, 1903.

Faults.—See **GEOLOGY.**

Fissure Veins.—Fissure Veins and Ore Deposits as Waterways. Arthur Lakes. An illustrated article explaining some of the evidences that these veins are, or have been, water carriers. 1800 w. Min Wld—June 24, 1905.

Genesis.—See **Origin.**

Gold.—See **GOLD.**

Great Salt Lake Basin.—The Mineral Crest, or the Hydraulic Level Attained by the Ore-Depositing Solutions, in Certain Mining Districts of the Great Salt Lake Basin. Walter P. Jenney. Describes observed phenomena, considering conditions attending their formation. 1600 w. Trans Am Soc of Min Engrs—Feb. and May, 1902.

Igneous.—Igneous Rocks in Ore Deposition. A. Lakes. Discusses some peculiarities of ore deposition, showing that all igneous rocks are not necessarily ore generators. 1500 w. Eng & Min Jour—Aug. 5, 1905.

See also **Origin.**

Igneous Contacts.—Ore Deposits Near Igneous Contacts. Walter Harvey Weed. Deals with ore deposits whose structural features or mineral contents result, directly or indirectly, from igneous intrusions and their after-effects. 12000 w. Trans Am Inst of Min Engrs—Oct., 1902.

Ore Deposits Near Igneous Contacts. W. L. Austin. A discussion of the paper of Walter Harvey Weed, at the New Haven meeting. 2800 w. Trans Am Inst of Min Engrs—Oct., 1902.

Igneous Magmas.—On the Differentiation of Igneous Magmas and the Formation of Ores. Jas. F. Kemp. A discussion of interest to mining engineers. 2000 w. Eng & Min Jour—Nov. 28, 1903.

See also **Origin; Phase Rule.**

Iron.—See **IRON ORE.**

Lead.—See **LEAD.**

Metasomatic Replacement.—Metasomatic Replacement. James Park. Explains this term as defined by geologists and discusses the probability of its playing an important part in the formation of mineral veins and ore bodies. 1500 w. Eng & Min Jour—April 27, 1905.

Nevada.—See **Alabandite; GOLD; MINERAL REGION; SILVER.**

New Mexico.—The Ore Deposits of the San Pedro District, New Mexico. Morrison B. Yung and Richard S. McCaffery. Maps and illustrations showing the general geology of the region, with description of the deposits of copper lead-silver and gold. 3500 w. Trans Am Inst of Min Engrs—Oct., 1902.

Deep Mining Will Bring Success—Something About Geological Formations in New Mexico. C. H. Laidlaw. A study of the geology, giving reasons for believing valuable minerals may be found at great depths. 1000 w. Min Rept—Feb. 5, 1903.

See also **MINERAL REGION.**

Organic Remains.—Organic Remains in Ore Deposits. Arthur Lakes. Interesting descriptions of animal and vegetable remains found in various mines. 2000 w. Eng & Min Jour—June 29, 1905.

Origin.—The Genesis of Ore Deposits. Continued discussions of the papers of Messrs. Van Hise, Emmons and Weed, etc., read at the Washington meeting. 4 parts. 7000 w. Trans Am Inst of Min Engrs—April, 1901.

Some Principles Controlling the Deposition of Ores. C. R. Van Hise. Concluding contribution of Prof. Van Hise to the discussion of his paper. 7400 w. Trans Am Inst of Min Engrs—Feb., 1901.

Problems in the Geology of Ore-Deposits. Prof. J. H. L. Vogt. Considers the original source, the relation between eruptive processes and the formation of ore deposits, ore solutions, etc. 15,900 w. Trans Am Inst of Min Engs—April, 1901.

Problems in the Geology of Ore Deposits. Prof. J. H. L. Vogt. Discussion by Walter Harvey Weed, criticizing views in this paper which was presented at the Richmond meeting. 1200 w. Trans Am Inst of Min Engrs—Feb., 1901.

Genesis of Ore Deposits. Matt. W. Alderson. Outlines conclusions reached, and maintains that all mineral deposits were formed by streams flowing on the surface of the earth at the time the deposits were made. Serial. 1st part. 3000 w. Min & Sci Pr—July 6, 1901.

The Genesis of Ore-Deposits. J. Malcolm Maclaren. From the "Mining Journal," London. An outline of the modern theory of ore deposition, as given in recent papers by American and German geologists. 5300 w. N Z Mines Rec—Nov. 17, 1902.

A Consideration of Igneous Rocks and Their Segregation or Differentiation as Related to the Occurrence of Ores. J. E. Spurr. A study of principles involving the connection of igneous rocks with ore deposition. 18,800 w. Trans Am Inst of Min Engrs—Feb. & May, 1902.

Igneous Rocks and Circulating Waters as Factors in Ore-Deposition. J. F. Kemp. Discusses the views of Prof. Van Hise and other writers, and gives reasons for differing in some of the conclusions, especially in regard to deep mines. 6000 w. Trans Am Inst of Min Engrs—Oct., 1902.

Some Practical Suggestions Concerning the Genesis of Ore Deposits. Max Boehmer. A study of the action of underground waters, their source of supply, etc. 2000 w. Trans Am Inst of Min Engrs—July, 1903.

Theories of Ore Deposition Historically Considered. S. F. Emmons. Presidential address before the Geological Society of America. A review of the theories advanced to explain the occurrence and origin of ores. 3000 w. Eng & Min Jour—Jan. 21, 1904.

Theories of Ore Deposition Historically Considered. S. F. Emmons. Address before the Geol. Soc. of America, at St. Louis. Gives the opinions held on this subject which have most impressed the minds of geologists. Serial. 1st part. 3500 w. Sci Am Sup—Dec. 16, 1905.

The Genesis and Character of Ore Deposits. W. H. Storms. On the various forms of ore deposit, and the importance to miners of a knowledge of their occurrence. 2000 w. Min & Sci Pr—March 10, 1904.

On the Formation of Certain Ore Deposits. F. Klockmann. Translated from the "Zeitschrift für praktische Geologie." A discussion of ore deposits and their origin, the theories advanced, and current views. 2000 w. Eng & Min Jour—June 16, 1904.

See also **Igneous; Phase Rule; Veins.**

Osmosis.—Osmosis as a Factor in Ore Formation. Halbert Powers Gillette. Aims to show that "osmosis" supplemented by convection-currents have been the principal agencies that have gathered the scattered particles of rare materials into the larger masses called ore. 1600 w. Trans Am Inst of Min Engrs—Oct., 1904.

Phase Rule.—The Phase Rule and Conceptions of Igneous Magmas—Their Bearing on Ore Deposition. Thomas Thornton Read. Presents some considerations relating to rock magmas, and the laws which govern them, in relation to their bearing on the formation of ores. 6000 w. Ec Geol—Nov., 1905. See also **IRON.**

Pisolitic and Concretionary.—Pisolitic and Concretionary Ores. A. Selwyn Brown. Describes the peculiarities of these ores of iron, aluminum, nickel, manganese, etc., and gives explanations of their origin; gives also brief descriptions of deposits at various places. Serial. 2 parts. 3500 w. Aust Min Stand—June 18 & 25, 1903.

Sardinia.—The Ore Deposits of the Iglesias District, Sardinia. Abstract from a paper by Bergreferendar Duenkel, in "Zeitschrift f. d. Berg. Hutten u. Salinenwesen." The deposits are chiefly argentiferous galena, but also blende and calamine. 1800 w. Eng & Min Jour—March 14, 1903. See also **MINING INDUSTRY—Italy.**

Secondary Enrichment.—The Secondary Enrichment of Ore-Deposits. Arthur L. Collins. Discussion of the papers of Messrs. Emmons and Weed. 700 w. Trans Am Inst of Min Engs—Feb., 1901.

Secondary Enrichment of Ore Deposits. Prof. Arthur Lakes. Discusses the causes and effects of secondary deposits, with especial reference to the copper deposits at Cripple Creek and at Butte, giving briefly the conclusions of various authorities. 1200 w. Mines & Min—March, 1903.

The Secondary Enrichment of Ore Deposits. George Smith. Discussion of the paper of S. F. Emmons, presented at the Washington meeting, Feb., 1900. 1500 w. Trans Am Inst of Min Engrs—Oct., 1902.

Secondary Enrichment of Mineral Veins in Regions of Small Erosion. C. L. Herrick. Presents views of the writer, based on wide observation and study explaining the cause of the wide difference in the reliability of gold-bearing veins found in two parts of the same range. 2000 w. Min & Sci Pr—Aug. 15, 1903.

See also **COPPER; GOLD GEOLOGY.**

Shoots.—Ore Shoots and Veins That Do Not Come to the Surface. A. Lakes. Illustrates and describes unusual deposits. 1200 w. Min Rept—July 21, 1904.

Field Notes. Prof. Arthur Lakes. Concerning ore shoots and the influence of down-hill pressure on the outcrop of veins. Ills. 2400 w. Mines & Min—Sept., 1904.

See also **Cross Vein.**

Slocan, B. C.—See **ORE TREATMENT.**

Syncline.—The Syncline as a Structural Type. T. A. Rickard. A consideration of this class of ore deposits. Ill. 1000 w. Eng & Min Jour—May 16, 1903.

Transvaal.—See **GOLD GEOLOGY.**

U. S. Southern.—Peculiar Geological Formations of the Southern States. Arthur Lakes. Considers the circumstances which cause them, and their relation to vein formation and mining. 1600 w. Mines & Min—April 1, 1901.

Variation in Depth.—Variation of Ores in Depth. Dr. J. W. Gregory. Lecture on the factors that control the variation. Serial. 1st part. 4800 w. Aust Min Stand—Dec. 19, 1901.

Vein Cavities.—The Origin of Vein Cavities. Frank L. Nason. The present article considers fissure veins, discussing their peculiarities, causes, etc. Serial. 1st part. 2500 w. Eng & Min Jour—Feb. 9, 1901.

Vein Enrichment.—See **COPPER GEOLOGY—Butte, Montana.**

Vein Outcrops.—Vein Outcrops. Gives sketches of a number of characteristic outcrops, with a diversity of geological conditions. 1400 w. Min Sci Pr—July 22, 1905.

Veins.—Mineral Vein Formation at Boulder Hot Springs. Walter Harvey Wood. An explanation of the writer's theory as to the genesis of the silver-gold veins of Lump Gulch and other mining districts in Montana. Ill. 2500 w. W Min Wld—May 25, 1901.

The Role of the Igneous Rocks in the Formation of Veins. J. F. Kemp. Shows the competence of the igneous rocks to supply both the contents of veins and the solutions which are the common carriers of the minerals, and considers the phenomena and the current conceptions of the ground water. 12,000 w. Trans Am Inst of Min Engrs—June, 1901.

The Formation of Veins. J. F. Kemp. A brief statement of general principles, reviewing the views of noted geologists. 2500 w. Min Mag—Aug., 1904.

The Problem of the Metalliferous Veins. James Furman Kemp. Presidential address to the N. Y. Academy of Sciences. An interesting discussion of metalliferous deposits, their origin and matters of related interest. 8500 w. Ec Geol—Dec., 1905.

Vein Definition. A summary of the definitions and opinions submitted by Ross E. Browne in the course of testimony in a recent trial. Ill. 4000 w. Min & Sci Pr—Aug. 17, 1901.

Vein Structure. O. H. Howarth. Observations in regard to the manner of vein formation and the forces causing them. Ills. 3000 w. Mines & Min—March, 1905.

A Lost Orebody. Harold J. Read. Illustrates a peculiar break in a rich vein caused by a series of faults. 250 w. Eng & Min Jour—May 4, 1905.

The Occurrence of Pebbles, Concretions and Conglomerate in Metalliferous Veins. Edward Halse. Discusses the four causes to which these occurrences are attributed. 6000 w. Ills. Am Inst of Min Engrs—July, 1905.

The Magmatic Origin of Vein-Forming Waters in Southeastern Alaska. Arthur C. Spencer. A study of the source of the vein-forming waters of this region, describing the geology. 2800 w. Am Inst of Min Engrs—Sept., 1905.

The Origin of Vein-Filled Openings in Southeastern Alaska. Arthur C. Spencer. To account for certain features observed in the Juneau gold belt in Alaska, the paper indicates in detail certain conditions in which deformation of rocks under their own weight might lead to the production of fractures in which veins could be deposited. Ills. 1500 w. Am Inst of Min Engrs—Nov., 1905.

Fissure Veins. R. W. Raymond. A contribution to a discussion of the question, What is a fissure vein? 1200 w. Eng & Min Jour—Nov. 25, 1905.

See also **Cross Vein; Fissure Vein; Origin; GOLD GEOLOGY; MINING LAW.**

Veins, Colo.—Ore Horizons in the Veins of the San Juan Mountains, Colorado. Chester Wells Purington. Considers an occurrence in Southwest

Colorado, where nearly vertical metalliferous veins traverse horizontally bedded lavas and underlying sediments. 1800 w. Ec Geol—Nov., 1905.

Veins, Country Rock.—Influence of Country Rock on Mineral Veins. Walter Harvey Weed. Notes and facts seeming to show a relation between the country rock and the universal contents of veins. Ill. 6000 w. Trans Am Inst of Min Engrs—Nov., 1901.

Veins, Mexico.—Notes on the Structure of Ore-Bearing Veins in Mexico. Edward Halse. Illustrates and describes some of the characteristics of these veins. 2800 w. Trans Am Inst of Min Engrs—Nov., 1901.

Washington.—Ore Deposits of Monte Cristo, Washington. An abstract monograph, by J. E. Spurr, published by the U. S. Geol. Survey. Ill. 2500 w. Mines & Min—Dec, 1902.

Water Deposited.—Ores Which Are Deposited by Underground Waters. J. M. Maclaren. Reviews the history of the work done by these waters. 2000 w. Min & Sci Pr—Nov. 15, 1902.

Water Flow.—See also **WATER FLOW—Gold Metallurgy.**

Water Zone.—See **GROUND WATER—Veins.**

Zinc.—See **ZINC.**

ORE DRESSING.

See **COPPER METALLURGY; GOLD METALLURGY; LEAD METALLURGY; ORE TREATMENT; SILVER METALLURGY; TIN METALLURGY; ZINC METALLURGY.**

ORE HANDLING.

See also **COAL HANDLING; IRON ORE HANDLING; MECHANICAL HANDLING.**

ORE MILLING.

See **CRUSHING; GOLD MILLING; ORE TREATMENT; STAMP MILL.**

ORE ROASTING.

See **ORE TREATMENT—Roasting.**

ORE SAMPLING.

See **SAMPLING.**

ORE SCREENING.

See **ORE TREATMENT.**

ORE SEPARATION.

See also **ORE TREATMENT.**

Electric.—See **ELECTRIC SEPARATION; ELECTRO-METALLURGY.**

Magnetic.—See **MAGNETIC SEPARATION.**

Pneumatic.—See **GOLD METALLURGY—Edison; Freid.**

ORE TESTING.

See also **ASSAYING; PROSPECTING; SAMPLING.**

Preliminary.—See **ORE TREATMENT.**

Small Scale.—Place and Value of Small Scale Ore Tests. Ernest H. Simonds, in Trans. Cal. Min. Assn. Considers the advantages and disadvantages of each of the three general methods of making ore tests, especially discussing the method of making small scale tests in the laboratory, followed by the erection of one complete unit. Serial. 1st part. 2200 w. Min & Sci Pr—April 22, 1905.

Vanning.—Testing Ores by Vanning. Richard Pearce. Illustrates and describes various experiments in concentration by vanning, showing the usefulness of the vanning shovel. 1800 w. Eng & Min Jour—Dec. 24, 1903.

ORE TRANSPORTATION.

See also **IRON-ORE TRANSPORTATION; MINE HAULAGE; ROAD—Mines; TRANSPORTATION.**

Bingham, Utah.—Different Methods of Hauling Ore at Bingham, Utah. W. P. Hardesty. Brief illustrated descriptions of recent improvements in transportation from the mines to the railroad. 3000 w. Eng News—July 24, 1902.

ORE TREATMENT.

See also **COPPER METALLURGY; CYANIDE PROCESS; ELECTRO-METALLURGY; GOLD METALLURGY; LEAD METALLURGY; METALLURGY; SILVER METALLURGY; SMELTING; TIN METALLURGY; ZINC METALLURGY.**

Some Unsolved Questions of Ore Treatment. O. H. Howarth. Considers some of the mechanical and other imperfections in milling processes. 4400 w. Mines & Min—March, 1902.

Problems in Ore Dressing. A. W. Warwick. Considers some difficult separations of refractory ores, and the methods being tried. 1800 w. Min Rept—May 8, 1902.

Africa and Australia.—Metallurgical Progress in Africa and Australia. Alfred James. Reports concerning the stimulus to regrinding due to H. S. Denny's work, residue treatment, etc. 2800 w. Eng & Min Jour—Jan. 5, 1905.

Arizona.—The Pride of the West Mill and Smelter, Washington Camp, Arizona. Jesse Scobey. Illustrated description of this property. The ore is complex, carrying chalcopyrite, pyrite, zinc blende, galena, garnet, quartz, limestone and calcite. 1500 w. Eng & Min Jour—July 27, 1901.

The Pride of the West M. & M. Co., Washington, Ariz. Jesse Scobey. An illustrated description of a milling plant and process where a complex ore, producing zinc, lead and copper, is treated in one milling operation that comprises dry crushing, roasting, magnetic separation, wet concentration, drying and smelting. 2200 w. Min & Sci Pr—Dec. 13, 1902.

Arsenical Ores.—See **SMELTING.**

British.—Concentration of Ores in Great Britain. James Tonge. Describes the general practice, giving the principal features of a number of the most modern plants. 3500 w. Mines & Min—Dec., 1904.

British Columbia.—Plant for the Handling and Treatment of Ores, at the Silver Cup and Nettie L. Mines, British Columbia. George Attwood. Describes the scheme for the transportation of the ore and extraction of the metals on the spot in a mountainous district where the climate is severe. 5000 w. Ills. (No. 3486.) Inst of Civ Engrs.

See also **Slocan; Trail.**

Broken Hill, N. S. W.—See **SILVER; SILVER METALLURGY—Concentration.**

Callow Settling Tank.—The Callow Settling Tank. W. S. Zehring. Illustrates and describes this tank for settling the dilute overflows found in every concentrating mill. 1500 w. Min Wld—July 15, 1905.

Canvas Table.—See **Garnet, Montana.**

Carnotite.—See **CARNOTITE.**

Chile.—See **Patio Process; MINING AND METALLURGY.**

Chlorination.—Chlorine Smelting, with Electrolysis. James Swinburne. A discussion of a new process covering a wide domain in metallurgy, particularly applicable to sulphide ores, comparing with present processes, and considering cost, etc. Serial. 1st part. 2800 w. Elect'n, Lond—July 10, 1903.

Chlorine in Metallurgy. James Swinburne. Describes a process depending on the action of chlorine. The principle is the treating of sulphide ores, without previous roasting, with chlorine, so as to form chlorides of the metals, the sulphur being liberated as such. The chlorides are then electrolyzed, yielding metals and recovering the chlorine. 1600 w. Int Elec Cong of St. Louis—Sept., 1904.

Chloro-Electrolytic Smelting. Abstract of a paper by Prof. W. Morley Cobeldick, read before the Chemical Society of London, which discussed the application of the Swinburne-Ashcroft process to the treatment of Broken Hill ore. 4000 w. Elec-Chem & Met Ind—Feb., 1905.

See also **Sulphide Ores; GOLD METALLURGY; LIQUID FUEL.**

Chlorination and Cyanidation.—The New Chlorination. William E. Greenwalt. A comparison of chlorination and cyanidation, reporting tests made, and giving interesting information of recent development. Ills. 2200 w. Eng & Min Jour—Dec. 1, 1904.

Clancy-Marsland Sulphide Process.—The Sulphide Problem. Describes the leading features of the Clancy-Marsland process, with report by the recent government geologist of New South Wales. 3700 w. Aust Min Stand—May 2, 1901.

Clifton, Arizona.—See **COPPER METALLURGY—Concentration.**

Concentrates.—Realizing on Concentrates When Shipping is Impracticable. E. A. H. Tays. An account of treatment given some concentrates in

Mexico and the results. Ill. 1400 w. Min & Sci Pr—Feb. 8, 1902.

Concentrating Mills.—Notes on Concentrating Mills. Alfred Harvey. Illustrates and describes a typical arrangement of samplers, crushing and sizing machinery in a modern gold and silver concentrating mill. 1800 w. Mines & Min—April, 1905.

Concentrating Tables.—Concentrating Tables. Chas. W. Comstock. With a discussion of the principles of concentration and their application in practice. 4000 w. Mines & Min—March, 1905.

Concentration.—Concentrating Systems. Editorial remarks on methods to meet the requirements of different districts and special ores. 1500 w. Eng & Min Jour—Sept. 14, 1901.

See also Elmore; Oil Concentration; Pneumatic Concentration; Sizing; Slocan, B. C.; COPPER METALLURGY; CRUSHING—Blake; ELECTRIC SEPARATION; GOLD METALLURGY; MAGNETIC SEPARATION.

Concentration and Dressing.—Ore Dressing and Concentration. A. W. Warwick. Discusses the methods of separation of various kinds of ores. 1700 w. Min Rept—July 11, 1901.

Ore Dressing and Concentration. A. W. Warwick. These terms are explained and their distinction shown, though often used synonymously. 1400 w. Min Rept—July 4, 1901.

Concentration, B. C.—See British Columbia; COPPER—British Columbia.

Concentration, Mexico.—See Mexico; Plannillas.

Concentration, Oil.—See Elmore; Oil Concentration; Van Meter-Boss.

Cornwall.—The Treatment of Ore Dumps in Cornwall. Edward Skewes. Describes the present conditions of the tin mining districts of Great Britain, and the working of the dumps for the lead and silver, and the various other products formerly considered valueless. 800 w. Eng & Min Jour—Sept. 14, 1901.

See also Tin-Wolfram; TIN METALLURGY.

Cripple Creek.—Current Practice at Cripple Creek. G. E. Wolcott. Describes the methods in use and the difficulties of concentration, ore sorting, washing, etc. 2000 w. Eng & Min Jour—Dec. 8, 1904.

Crushing.—See CRUSHING; GOLD MILLING; STAMP MILL.

Cyanide Process.—See CYANIDE PROCESS—Crushing.

Delprat Salt Cake.—The Delprat or Salt Cake Process for Mixed Sulphides. Donald Clark. Explains several processes for the recovery of sulphides from their ores. 800 w. Eng & Min Jour—Jan. 21, 1904.

Diehl Process.—See GOLD METALLURGY—Sulpho-Telluride Ores.

Düsseldorf Exposition.—See MAGNETIC SEPARATION.

Electric Separation.—See ELECTRIC SEPARATION.

Elmore Oil Process.—The Elmore Process for Concentrating Minerals (Procédé Elmore pour la Concentration des Minerais). J. Dupont. A description of the Elmore process for using oil for the concentration of gold, silver and copper. 1000 w. Génie Civil—May 18, 1901.

The Concentration of Ores by Oil. Illustrated description of an Elmore plant for this work. 900 w. Engr, Lond—Aug. 27, 1902.

The Elmore Process of Concentration by Oil. W. H. Booth. Describes this method adapted for saving finely divided floating particles of ore or metal. 2000 w. Mines & Min—Feb., 1903.

The Concentration of Ores by Oil. Walter McDermott. A description of the Elmore process. Ill. Serial. 1st part. 1500 w. Eng & Min Jour—Feb. 14, 1903.

Concentration of Ores in Rossland District. Description of the Elmore oil process. Ills. 3200 w. B C Min Rec—July, 1904.

See also Oil Concentration; COPPER METALLURGY.

Ferraris Screen.—The Ferraris Waving Screen. Charles Will Wright. Explains the principle of the Ferraris system of sizing ores, which is practically unknown in the United States, but can be introduced at small expense. Ills. 1400 w. Min Mag—April, 1905.

Garnet, Montana.—The Canvas Table Plant of the Mitchell & Mussigbrod Mill at Garnet, Montana. Dr. Peter S. Mussigbrod. Illustrated description of the construction and operation of this table and an account of what it accomplishes. 1100 w. Eng & Min Jour—July 6, 1901.

Hedburg Simplex.—Separating and Concentrating Complex Ores. Robert T. Clegg. Briefly reviews methods of concentration practiced, and describes the Simplex system of ore dressing, invented by Eric Hedburg. 1500 w. Min Wld—March 11, 1905.

Idaho Springs, Colo.—The Jackson Concentrating Works, Idaho Springs, Colorado. C. M. Rath and R. L. Grider. Describes the mill and the treatment of the ore. 1500 w. Min Rept—June 1, 1905.

Jig.—The Hancock Jig. F. Danvers Power. Illustrated description of a jig of the reciprocating screen type, which has been largely used for treating ores of copper and lead in Australia. 1000 w. Eng & Min Jour—May 19, 1904.

The Hancock Jig at Penn Wyoming Co.'s Mill. R. B. Lamb. Illustration, with brief description of a very successful machine installed at Encampment, Wyoming. 1000 w. Min & Sci Pr—Aug. 12, 1905.

Jig, Hand.—A Hand Jig. William S. Thyng. Brief illustrated description of a hand jig which was used to good advantage in concentrating crude tungsten ore for the market. 700 w. Eng & Min Jour—Sept. 16, 1905.

Kentucky.—Concentrating in the Western Kentucky District. Abstract of a paper read by F. Julius Fohs, at Marion, Ky., in regard to the problem of separating fluor spar from lead and zinc ores. 1500 w. Mines & Min—Nov., 1905.

Lagos, West Africa.—See SMELTING.

Launders.—Sand Launders. Thomas T. Read. Information regarding the use of launders for the movement of solid material in water currents. 900 w. Eng & Min Jour—Dec. 16, 1905.

Laurium, Greece.—Ore Treatment in Laurium, Greece. Henry F. Collins. Brief description of the methods of a French company and a Greek company engaged in smelting the output of the ancient mines. 2000 w. Eng & Min Jour—Feb. 23, 1905.

Leaching.—See also GOLD METALLURGY.

Mechanical Preparation.—The Mechanical Preparation of Minerals (La Préparation Mécanique des Minerais). Paul Machavoine. A discussion of methods of separation and concentration of ores, based not only upon the physical properties, but also upon the local conditions of labor, transport, etc. 4000 w. Mem Soc Ing Civ de France—Aug., 1903.

Mexico.—Ancient and Modern Mexican Metallurgy. A. W. Warwick. The present article considers the patio process, and the results. Serial. 1st part. 700 w. Min Rept—Nov. 12, 1903.

Mexican Metallurgical Methods. A. W. Warwick. The present article gives an illustrated description of the patio process. Serial. 1st part. 1400 w. Min Rept—Dec. 17, 1903.

See also Patio; Plannillas; Santa Barbara; Santa Fe; GOLD METALLURGY; MINERAL REGION; SILVER METALLURGY.

Mispickel.—See GOLD METALLURGY.

Missouri.—Concentration Practice in Southeast Missouri. R. B. Brinsmade. An illustrated description of the plants of the St. Joe, the Central, and the National Concentrating mills. The gangue of the ore concentrated is limestone, while the minerals are galena, iron pyrites and nickel-cobalt sulphides. 4500 w. Mines & Min—Jan., 1902.

See also LEAD METALLURGY; ZINC METALLURGY.

Oil Concentration.—The Concentration of Ores by Means of Oil. H. E. T. Haultain. Shows the need of the process and discusses its use, considering also several processes in which oil was used. 2800 w. B C Min Rec—Aug., 1902.

An Automatic Process of Oil Concentration in Successful Use in Peru and Bolivia. J. W. Van Meter. An illustrated description of an ore-concentrating plant at Yauli, Peru. It has a capacity of 40 tons daily. 1500 w. Pacific Coast Min—May 30, 1903.

See also Elmore; Van Meter-Boss.

Pan Amalgamation.—Treating Concentrates by Pan Amalgamation at the Minas del Tajo, Mexico. A. E. Drucker. Describes a process for working fresh or oxidized concentrates. 2700 w. Min & Sci Pr—April 15, 1905.

Park City, Utah.—The Silver King Concentrating Mill, Park City, Utah. James H. Steele. Describes the process of concentration of the lower grade ores as carried out at this mill, which has a capacity of about 100 tons in ten hours, and at present is running 19 hours out of every 24. Ill. 1600 w. Min & Sci Pr—Oct. 11, 1902.

Patio Process.—The Modern Patio Process. Arthur H. Halloran. Describes the primitive method used in Mexico, Peru, and Chili, and recent improvements introduced which even further simplifies and cheapens this method. 1500 w. Illus. Min & Sci Pr—Oct. 29, 1904.

See also **GOLD METALLURGY—Amalgamation; SILVER METALLURGY.**

Peru.—See **Patio Process; MINERAL REGION.**

Plannillas.—Mexican Plannillas. Ernest E. Payne. Illustrates and describes a primitive method of concentration which has been in use in Mexico since ancient times. 1000 w. Mines & Min—Oct., 1902.

Pneumatic Concentration.—Pneumatic Concentration. E. B. Wilson. Describes the process, and the method of construction and operation of the Hooper concentrator. 1500 w. Mines & Min—Nov., 1901. See also **GOLD METALLURGY—Edison; Freid.**

Pneumatic Processes.—Pneumatic Processes for Leaching and Cyaniding. J. Ohly. A study of processes covered by patents, of importance in the extraction of copper and of gold because of the increased output, and the saving of time. 2300 w. Min & Sci Pr—April 27, 1901.

Pneumatic Separation.—See **GOLD METALLURGY—Edison; Freid.**

Preliminary.—Preliminary Examining of Milling Ores. Alfred Harvey. On the importance of testing ores to minimize the risk in designing a mill to treat an ore satisfactorily. 1200 w. Min & Sci Pr—Oct. 29, 1904.

Pride of the West, Ariz.—See **Arizona.**

Pulp Mixers.—See **GOLD METALLURGY.**

Pyrrhotite.—See **NICKEL—Sjöstedt Process.**

Queensland.—Ore Treatment in Queensland. W. A. McLeod. Discusses the methods of treatment in detail, the cost, etc. Serial. 1st part. 3000 w. Aust Min Stand—May 30, 1901.

Regrinding Machine.—Notes on Some Re-grinding Machines. Martin Schwerin. Gives results of a series of tests on four types of regrinding machines, with observations on this feature of ore dressing. 2800 w. Eng & Min Jour—March 10, 1904.

Roasting.—Pyrometallurgical-Chemical Operations in Oxidizing Roasting (Pyrometallurgisch-Chemische Prozesse bei Oxydierendem Rösten). F. Janda. Reviewing the process of roasting as applied to iron, copper, lead, zinc and other ores. Two articles. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 29, May 6, 1905.

Air in Roasting. William E. Greenawalt. Gives results of tests made to determine the effects of time and air on roasting and extraction, with remarks. 1000 w. Eng & Min Jour—Aug. 19, 1905.

The Theory and Practice of Roasting. A. W. Warwick. A discussion of the scientific principles of roasting, based on practical experience and a large number of pyrometric observations and analyses. Ills. 4000 w. Min Mag—Sept., 1905.

Roasting, Sulphur.—Sulphur in Roasting. William E. Greenawalt. Discusses the elimination of sulphur in roasting ores, and the determination of the sulphur that will give the best results. 1900 w. Eng & Min Jour—Dec. 23, 1905.

Roasting, Tyee.—Roatsing at the Tyee Smelter. E. Jacobs. Describes the treatment of the ore before it reaches the furnace, particularly the arrangement, appointments and operating methods of the roasting yard. The ore is principally chalcopyrite carrying gold, silver and zinc as well as copper. Ills. 1500 w. Eng & Min Jour—Nov. 10, 1904.

St. Louis Exposition.—Ore Mills at the Louisiana Purchase Exposition. Brief, illustrated descriptions of the working mills and models exhibited by California, Utah, and South Dakota. 2200 w. Mines & Min—Oct., 1904.

Sampling.—See **SAMPLING.**

Santa Barbara, Mex.—Two Notable Concentrating Plants. G. A. Burr. Illustrates and describes two plants within a quarter of a mile of each other, Santa Barbara Parral, State of Chihuahua, treating nearly identical ores with very different methods. The ores contain silver, gold, lead, zinc, iron, copper and silica. 1200 w. Eng & Min Jour—Sept. 12, 1903.

Santa Fe, Mexico.—Ore Dressing and Smelting at Santa Fe, Mexico. Henry F. Collins. Abstract of a paper presented before the Inst. of Min. & Met. Describes the system of concentration practiced, the smelting, etc. 3300 w. Eng & Min Jour—Nov. 15, 1902.

Screen Analysis.—Standard Screens for Screen Analysis. Courtenay de Kalb. Describes a set of screens based upon an arithmetical progression of successive differences between the differences in diameters of openings in successive screens. 1000 w. Eng & Min Jour—July 29, 1905.

Screen Capacity.—Capacity of Revolving Screens. J. M. Callow. Gives results of experiments showing the comparative capacities of different size screen cloth, and the different rates of travel of ore for different slopes. 600 w. Min Rept—April 7, 1904.

Screen, Ferraris.—See **Ferraris Screen.**

Sherman System.—Wet Concentration of Ores by the Sherman System. Frederick Wooster Sherman. An illustrated description of this system, with the results obtained. 3000 w. Min & Sci Pr—March 26, 1904.

Wet Concentration. Frederick Wooster Sherman. Describes methods by which minerals susceptible to this process can be recovered to a high percentage. Ills. 2800 w. Mines & Min—Dec., 1904.

Silver-Lead.—Concentrations of Argentiferous Galena as Carried on at Helena Frisco Consolidated Company's Mills, Gem, Idaho, U. S. A. W. Muir Edwards. Describes the ore treatment at a mine in the Coeur d'Alene district, which is celebrated for its lead and silver mining. 5000 w. Can Min Rev—May 31, 1901.

Treatment of Oxidized Silver-Lead Ores of Aspen, Colo. S. I. Hallett. Gives results of laboratory tests that look very promising and seem worth further experimenting. 1500 w. Min & Sci Pr—May 2, 1903.

See also **Sulphide Ores; LEAD METALLURGY; SILVER METALLURGY.**

Simplex System.—See **Concentration; Hedburg.**

Sizing.—The Plotting of Sizing-Tests. W. Spencer Hutchinson. Describes experiments undertaken primarily for the purpose of measuring the quality of work done in screening and sorting in American concentrating mills. 6000 w. Trans Am Inst of Min Engrs—Feb., 1904.

Screen vs. Hydraulic Sizing. S. I. Hallett. On the use of vibrating screens and their advantage over hydraulic apparatus. 2000 w. Min & Sci Pr—March 1, 1902.

See also **Ferraris Screen; Screen.**

Slimes.—Saving Slimes. W. C. Clark. An account of experiments in the recovery of values which have gone to waste in tailings from concentrators of lead-silver ores. 1800 w. Mines & Min—March, 1901.

Treatment of Slime in Tanks with Conical Bottoms. Illustration of plant with description of its operation. 1100 w. Eng & Min Jour—March 28, 1903.

The Desulphurization of Slimes by Heap Roasting at Broken Hill. E. J. Horwood. Abstract from Trans. of the Australian Inst. of Min. Engrs. Describes the ores and the treatment given. 2700 w. Eng & Min Jour—Aug. 22, 1903.

What Constitutes a Slime? W. J. Sharwood. Calls attention to some of the definitions suggested as applied to certain classes of tailings, or crushed ore, in connection with lixiviation and concentration processes. 1400 w. Eng & Min Jour—Oct. 10, 1903.

See also **Trail; CYANIDE PROCESS; GOLD METALLURGY.**

Sliming Tables.—A Discussion of Sliming Tables. J. C. Bailar. Read before the West. Assn. of Tech. Chem. & Met. Also a discussion of Hand Sampling in Small Stamp Mills, by A. W. Warwick, and a general discussion. 3500 w. Min Wld—Oct. 21, 1905.

Slocan, B. C.—The Dry Ores of the Slocan, B. C. R. C. Campbell-Johnston. Describes this area and the experiences of those mining its ores, the attempts to treat the ore on a paying basis, and gives suggestions for other treatments that may be applicable. 1800 w. Can Min Rev—Nov. 30, 1901.

The Dry Ores of Slocan, B. C. Ronald C. Campbell-Johnston. Describes these deposits, the characteristics of the ores, and the treatment they require. Gold is carried in arsenides and sulphides of iron; the silver occurs native, or as sulphides, or alloyed. 800 w. Min & Sci Pr—Jan. 24, 1903.

The Development of Coarse Concentration in the Slocan District, B. C. Samuel S. Fowler. Considers the silver-lead mining industry of the Slocan, discussing what has been done toward working the deposits economically, giving brief description of the methods. 5000 w. Can Min Rev—Oct. 31, 1902.

Development of Coarse Concentration in the Slocan District. Samuel S. Fowler. From the Canadian Min. Inst. Considers what has been done toward working these deposits economically. 5300 w. B C Min Rec—Dec., 1902.

Smelting.—See **SMELTING.**

Sorting.—Ore Sorting. A. W. Warwick. Calculations showing an increase in profit when the ore is sorted. 1200 w. Min Rept—June 4, 1903.

See also **Sizing.**

Sperry Vanning-Buddle.—The Sperry Vanning-Buddle. Edwin A. Sperry. An illustrated description of the machines, with statement of some of the results obtained. 3000 w. Trans Am Inst of Min Engrs—Oct., 1903.

Sulman-Picard Process.—Treatment of Complex Sulphides. Paper read before the Inst. of Min. & Met. (London). A description of the Sulman-Picard process for treating complex sulphide ores. Serial. 1st part. 2300 w. Aust Min Stand—Sept. 25, 1902.

A Dry Process for the Treatment of Complex Sulphide Ores. H. L. Sulman and H. K. Picard. A paper read before the Inst. of Mining and Metallurgy, London, describing a process for treating ores in which are zinc blende and galena, as well as silver. Present practice in Australia is reviewed. 5400 w. Can Min Rev—Nov. 30, 1902.

A Dry Process for the Treatment of Complex Sulphide Ores. H. Livingstone Sulman and Hugh Kirkpatrick Picard. Read before the Inst. of Min. & Met. Describes the application of the writer's process to these ores, giving just a brief sketch of other processes. 7500 w. Can Min Rev—Oct. 31, 1903.

Sulphide Ores.—Sulphide Ore Treatment. Abstract of a paper read before the Inst. of Min. & Met. An account of experimental work carried out by E. A. Ashcroft and James Swinburne during the past two and a half years. Ill. 1700 w. Elect'n, Lond—July 12, 1901.

Sulphide Ore Treatment. An account of experimental work carried out by E. A. Ashcroft and James Swinburne. Gives an illustrated description of the modified Phoenix process. 1700 w. Aust Min Stand—Aug. 29, 1901.

The Sulphide Ore Problem. Jas. W. Worsey. Begins a discussion of the systems of treatment used with zinciferous lead sulphides. Serial. 1st part. 900 w. Min & Sci Pr—Aug. 3, 1901.

Broken Hill Sulphide Ores. J. C. Moulden. Describes the ores, their preparation for treatment, methods of treatment, web concentration of argentiferous sulphides, etc. Serial. 1st part. 3500 w. Aust Min Stand—Oct. 31, 1901.

Treatment of Mixed Sulphide Ores Containing Zinc by Hydrometallurgical Processes. Walter Renton Ingalls. Treats of the wet processes in which the zinc is brought into solution and precipitated by chemical reagents. 5000 w. Eng & Min Jour—May 3, 1902.

The Thermo Hyperphoric Process. A. S. Firth. A brief account of this process for the treatment of heavy complex sulphide ores containing large quantities of galena and zinc blend, iron and copper, sulphides, and more or less gold, antimony and manganese oxide, with traces of tellurium and free sulphur. 500 w. Jour of Chem & Met Soc of S Africa—Sept., 1902.

The Treatment of Broken Hill Sulphides. Alec A. Beadle. Considers the complex sulphide ores in which lead, zinc and silver constitute the most important ingredients. 1800 w. Eng & Min Jour—Aug. 8, 1903.

A New Process for Treating Silver Sulphide and Gold Ore. M. Vaygouny. An account of experimental investigations with a solution of ferric chloride, common salt and hydrochloric or sulphuric acid. 2500 w. Eng & Min Jour—Dec. 29, 1904.

The Newer Treatment of Broken Hill Sulphides. A. Selwyn-Brown. Describes several processes now successfully employed in the treatment of the immense bodies of tailing, culled zinc ores that have accumulated, awaiting the researches of metallurgists. 1200 w. Eng & Min Jour—Sept. 2, 1905.

See also **Chlorination; Clancy-Marsland; Delprat; Sulman-Picard; LEAD METALLURGY; MAGNETIC SEPARATION—Zinc-Iron Sulphides; SILVER METALLURGY; SMELTING; TIN METALLURGY.**

Sulpho-Telluride Ores.—See **GOLD METALLURGY.**

Tin.—See **Cornwall.**

Tin-Wolfram-Copper.—The Treatment of Tin-Wolfram-Copper Ores at the Clitters United Mines. F. Dietzsch. Read before the Inst. of Min. & Met. An illustrated account of the reopening of these old Cornish mines and the modern methods introduced. Serial. 1st part. 4000 w. Min Jour—Oct. 21, 1905.

Trail, B. C.—Electrolytic Refining of Lead and the Treatment of Slimes Resulting Therefrom at the Canadian Smelting Works at Trail, British Columbia. Robert L. Whitehead. Ill. 4500 w. Mines & Min—Jan., 1905.

Tube Mills.—See **GOLD MILLING.**

Tungsten.—See **Jig, Hand.**

Van Meter-Boss-Oil.—A System of Continuous Concentration of Ores by Oil. J. W. Van Meter. Illustrated description of the Van Meter-Boss system. 1400 w. Min & Sci Pr—Nov. 7, 1903.

Water Supply.—Economy in Mill Water. Jesse Scobey. Read before the Colorado Sci. Soc. An illustrated article reviewing a plant at Washington, Arizona, where a saving of 97 per cent. of the water in circulation was made. 3000 w. Min Rept—Feb. 25, 1904.

Western Australia.—See **GOLD METALLURGY.**

Wet Concentration.—See **Sherman.**

ORTHODIAGRAPH.

See **RADIOGRAPHY.**

OSCILLATING ENGINE.

See also **STEAMSHIP—Ireland.**

The Oscillating Engine of the Connecticut. Illustrates and describes the changes made in an engine of a Long Island Sound Steamboat. 1400 w. Power—Oct., 1901.

Case.—Counterbalancing an Oscillating Engine. Explains the peculiarities in the design of the Case engine, and the experimental work done in investigating the subject of counterbalancing. Ills. 1200 w. Mach, N Y—Aug., 1905.

OSCILLATOR.

Electric.—See **ELECTRO-PHYSICS—Oscillator.**

OSCILLOGRAPH.

See also **ELECTRIC CURRENT, ALTERNATING—Wave Indicator; ELECTRO-PHYSICS—Oscillograms; ONDOGRAPH.**

A Simple Oscillograph (Ein Einfacher Oscillograph). A. Wehnelt. Describing a form of double magnet mirror galvanometer in which the oscillating deflections are proportional to the periodical variations of the current. The record is made on a moving band of photographic paper. 1200 w. Elektrotech Zeitschr—Aug. 27, 1903.

Some Applications of the Oscillograph (Einige Anwendungen des Oscillographen). Prof. Franz Wittman. Describing the use of the instrument for observing electric and magnetic waves and cycles. 4000 w. Elektrotech Zeitschr—Oct. 13, 1904.

Kinematic Representation of Current Curves by Means of the Luminous Discharge Oscillograph (Kinematographische Aufnahmen einiger Stromkurven mittels Glimmlicht-Oscillographen). Ernst Ruhmer. Describing an instrument using the luminous effect in a Geissler tube for showing the phase action of the current. 1800 w. Elektrotech Zeitschr—Feb. 9, 1905.

The Oscillograph and Its Uses. Lewis T. Robinson. Outlines the steps that have led to present methods in use for recording the wave forms of electric currents, describing the devices now employed and the uses to which they may be put. Ills. 3500 w. Am Inst of Elec Engrs—April, 1905.

A New Oscillograph Wave Tracer. Rudolf Goldschmidt. An illustrated description of the apparatus, explaining the principle. 800 w. Elect'n, Lond—April 14, 1905.

Blondel.—Blondel Oscillograph—New 1902 Type. C. L. Durand. Illustrated description of an instrument for observing all kinds of varying electrical phenomena. 2000 w. Elec Rev, N Y—Sept. 13, 1902.

Blondel Oscillograph. Henry Hale. Illustrated description of the latest form of this apparatus, which gives a visual representation of alternating-current waves. 1400 w. Elec Wld & Engr—May 2, 1903.

Cathode Ray.—The Cathode Ray Oscillograph. Robert Rankin. Describes improvements made in a familiar type of oscillograph which have made it an inexpensive and reliable curve tracer. Gives experiments illustrating its use. Ills. 3000 w. Elec Jour—Oct., 1905.

Central Laboratory, France.—Oscillograph Investigations by the Central Laboratory of Electricity (Recherches Oscillographes Effectuées par la Laboratoire Central d'Electricité). Ch. David. An account of experiments conducted on the high tension lines of the company "Energie Electrique du Littoral Mediterranean." 10,000 w. Bull Soc Int d Electriciens—Jan., 1905.

Commutation.—Commutation in a Four-Pole Motor. J. K. Catterson-Smith. A report of investigations with a view to recording by means of the oscillograph the actual manner in which the current is reversed during commutation, giving results. 2000 w. Inst of Elec Engrs—March 15, 1905.

Duddell.—A Portable Oscillograph for Alternating Currents. An illustrated description of the Duddell portable oscillograph, with data relative to its sensibility, and other information of interest. 1500 w. Sci Am—June 20, 1903.

Photographing Alternating-Current Wave-Forms with the New Duddell Oscillograph. Frank C. Perkins. Illustrated description of apparatus and its use. 1800 w. Elec Rev, N Y—Jan. 2, 1904.

Recording Alternating-Current Wave-Forms by Duddell Oscillographs. Illustrates and describes the instrument and its uses. 3000 w. Sci Am Sup—May 28, 1904.

Electrolysis.—See **ELECTROLYSIS—Alternating Current.**

Massachusetts Institute of Technology.—A Convenient Form of Oscillograph. F. A. Laws. Illustrated description of a form of oscillograph which has been developed in the Massachusetts Institute of Technology to meet the requirements of students in the laboratory. 1800 w. Elec Wld & Engr—May 6, 1905.

Resonance.—See **ELECTRO-PHYSICS.**

Siemens & Halske.—The Siemens & Halske Oscillograph (Der Ossillograph der Siemens & Halske Aktiengesellschaft). W. Hornauer. A description of the apparatus with reproductions of the curves produced by various types of generators. Two articles. 5000 w. Zeitschr f Elektrotechnik—July 16, 23, 1905.

Singing Arc.—See **ARC LIGHT—Singing.**

Spencer.—A Method of Photographing Alternating-Curent Wave Forms. C. J. Spencer. Illustrates and describes a modification of an oscillograph of the writer's construction, which employs an alternating current arc lamp as a source of light for the reflected photographing ray. 900 w. Elec Wld & Engr—Jan. 23, 1904.

Surging.—Oscillographic Researches on Surging in High Tension Lines. C. David. Abstracted, with introduction by L. A. Herdt. Deals with the subject of surges on transmission lines, giving the results of experiments. Ills. 2200 w. Can Soc of Civ Engrs—Nov. 2, 1905.

See also **ELECTRIC TRANSMISSION.**

Three-Phase Working.—Notes on Some Effects in Three-Phase Working. W. M. Thornton. Read before the Newcastle Local Sec. of the Inst. of Elec. Engrs. Gives results of investigations with the oscillograph which were undertaken with the object of deciding questions of importance in the working of a polyphase system. 3300 w. Elect'n, Lond—April 14, 1905.

Notes on Some Effects on Three-Phase Working. W. M. Thornton. Read before the Newcastle Local Sec. of the Inst. of Elec. Engrs. Gives results of investigations with the oscillograph undertaken for the purpose of deciding questions of importance in the regular working of the plant. Serial. 2 parts. 3000 w. Elec Engr, Lond—March 10, 17, 1905.

Transformer Curves.—Some Uses of the Oscillograph. D. K. Morris and J. K. Catterson-Smith. Read at Birmingham Sec. of Inst. of Elec. Engrs. Describes a method of recording the magnetization curves of transformers during working, and other methods of measurement. 1000 w. Elect'n, Lond—Feb. 19, 1904.

Wattmeter Corrections.—Determination of Wattmeter Correcting Factors by Means of the Oscillograph. Stanley P. Smith. An account of experiments made with the main object of finding, by the use of the oscillograph, the magnitude of the correcting factor. 1200 w. Elect'n, Lond—June 16, 1905.

OSMIUM LAMP.

See **INCANDESCENT LAMP—Osmium.**

OVEN.

See also **COKE MANUFACTURE; FURNACE; KILN.**

Annealing.—See **FURNACE.**

Coke.—See **COKE MANUFACTURE.**

Core.—See **MOLDING.**

Zinc.—See **ZINC METALLURGY—Cylinder Ovens.**

OVERHEAD TRAMRAIL.

See also **MECHANICAL HANDLING—Overhead Tramrail; TELPHERAGE.**

Bleichert Electric.—See **TELPHERAGE.**

Blocks and Hoists.—See **MECHANICAL HANDLING—Overhead Tramrail.**

OVER PRODUCTION.

See also **PIG IRON—Warrant System.**

The Mischievous Fallacy of Over-Production. George H. Hull. Showing the utter fallacy of the theory of over-production, and establishing the theory of temporary surplus production. The manner in which the fallacy effects trade unions, strikes and fluctuating prices is clearly shown. 3500 w. Engineering Magazine—March, 1902.

OXYGEN.

Compressed.—The Compressed Gas Industries. Editorial discussion of points concerning the manufacture and sale of compressed oxygen and carbonic acid. 1200 w. Engng—Oct. 31, 1902.

Electrolytic Production.—See **ELECTRO-CHEMISTRY—Garuti Process.**

Liquid Air.—See **LIQUID AIR—Oxygen.**

OZOCERITE.

Austria.—Ozocerite, or Mineral Wax, in Austria. An account of these deposits, their mining, cleaning, uses, etc. 1500 w. U S Cons Repts, No. 1059—June 11, 1901.

OZONE.

See also **WATER PURIFICATION.**

The Production and Uses of Ozone. Illustrates and discribes the more important forms of ozoniser which have been devised for the production of ozone in the air by means of the silent electric discharge, comparing the figures for their yield, and giving information concerning the earlier attempts made in Europe to apply this ozonised air to water purification. 3000 w. Engr, Lond—Nov. 20, 1903.

Recent Progress in the Ozone Industry (Les Progrès Récents Réalisés dan l'Industrie de l'Ozone). Marius Otto. A very full account of methods of generating ozone and of its application for sterilizing processes. 8000 w. 2 plates. Mem Soc Ing Civ de France—Nov., 1903.

The Production and Utilization of Ozone. John B. C. Kershaw. Describes and illustrates ozonisers of recent date, and the experimental work carried out in connection with the production and utilization of ozonized air. Serial. 1st part. 1500 w. Elec Rev, Lond—Aug. 19, 1904.

The Production and Utilization of Ozone. Arthur W. Ewell. Explains three methods of producing ozone, referring to a number of ozonizers, and to applications made of ozone. 1800 w. Elec Wld & Engr—Aug. 12, 1905.

Recent Devices for the Production of Ozone (Neue Apparate zur Erzeugung von Ozon). Dr. Kausch. A general review of recent patents, with especial reference to water purification. Serial. Part I. 800 w. Elektrochemische Zeitschr—Dec., 1905.

Electrolysis.—The Production of Ozone Electrically (Die Darstellung des Ozons aus Elektrischem Wege). Dr. O. Kausch. An illustrated historical and descriptive review of electric methods of producing ozone. Serial. Part I. 1500 w. Elektrochem Zeitschr—April, 1903.

Improvements in the Electrical Generation of Ozone (Neuerungen auf dem Gebiete der Erzeugung des Ozons auf Elektrischem Wege). Dr. O. Kausch. A review of recent patents, with illustrations and details of apparatus. Two articles. 3000 w. Elektrochemische Zeitschr—July, Aug., 1905.

Harris Apparatus.—The Purification of the Atmosphere by Ozone. Ernest T. Williams. Describes the apparatus of J. Harris for purifying the vitiated atmosphere of crowded rooms and buildings and for the sterilisation of water, etc., by the use of ozone. Ill. 700 w. Elec Rev, Lond—Nov. 7, 1902.

Water Purification.—See **WATER PURIFICATION.**

P

PACIFIC COAST.

See **PUGET SOUND**; and under various specific headings.

PACKING.

Compressor Piston.—Packing a Compressor Piston. T. R. Wingrove. Discusses the wrong way and the right way of packing a rod. 2200 w. Ice & Refrig—July, 1904.

Flange Joints.—Packing Flange Joints. W. H. Wakeman. Suggestions helpful to the inexperienced. Ills. 1500 w. Power—Nov., 1905.

Gasoline Engine.—An Improved Method of Packing the Cylinder Head of a Gasoline Engine. From the "English Mechanic and World of Science." Directions for successful packing are given. 700 w. Sci Am Sup—Dec. 2, 1905.

Hydraulic Machinery.—Notes on Hydraulic Packings and Stuffing-Box Design. Ulrich Peters. Describes several constructions of hydraulic cylinder and plunger packings and their practical applications, and gives hints for selecting and designing satisfactory packing for parts moving under hydraulic pressure. 1500 w. Ir Age—Dec. 15, 1904.

Journal Box.—Best Method of Preparing Journal Box Packing. J. W. Bunn. Illustrated description of vats for treating packing. 900 w. Ry Mas Mech—April, 1901.

Machinery.—See **MACHINERY—Packing.**

Metallic.—Metallic Packings for Piston and Valve Rods. C. G. Robbins. Describes and illustrates a number of the prominent packings, pointing out the special features and showing the application. 7800 w. Power—April, 1902.

Observations on Metallic Packing. C. G. Robbins. A comparative study of the theories of fibrous and metallic packings and the reasons for the efficiency of the latter. Ill. 2000 w. Marine Engng—July, 1902.

Metallic Packings—Principles of Design Essential for Successful Development. Charles Longstreth. Discusses the purposes and requisites of a successful packing, importance of care in design, etc. 3800 w. Jour Am Soc of Nav Engrs—May, 1903.

The Schwabe Stuffing Box (Die Schwabe-Stopfbüchse). J. Finkle. Description of an improved metallic packing for piston-rod stuffing boxes, with a method of testing the efficiency by use of the indicator. 1200 w. Zeitschr d Ver Deutscher Ing—July 18, 1903.

Maintenance of Metallic Packing on Locomotives. P. A. C. King. Discusses the treatment packings should receive. 2000 w. Am Engr & R R Jour—May, 1904.

Metallic Packings. R. T. Strohm. States the advantages of metallic packings, and illustrates and describes several forms. 3000 w. Am Elect'n—Oct., 1905.

Peat.—See **PEAT—Packing.**

Piston Heads.—See **PISTON RING—Packing.**

Piston Rod.—Piston-Rod Packings. R. T. Strohm. Practical discussion, with illustrations of various types. 2000 w. Am Elect'n—Sept., 1905.

See also **Compressor Piston.**

Ring.—See **PISTON RING—Packing.**

Steam Engine.—Steam Engine Packing. A. McSwiney. Abstract of a paper read before the Birmingham Assn. of Mech. Engrs. Discusses the various classes of packings and their influence on the economy of the engine. Ill. 5500 w. Mech Engr—May 31, 1902.

Waste.—Some Characteristics of Waste Packing. T. H. Symington. An account of investigations, giving a more exact method of determining the value of various wastes for this purpose, with general discussion. Ill. 3200 w. W Ry Club—May, 1901.

PACKING RING.

See also **PISTON—Packing Rings; PISTON RING.**

Gasoline Engines.—See **GASOLINE ENGINE—Cylinder, Piston and Packing Rings.**

PADDLE WHEEL.

See also **STEAMBOAT; STEAMSHIP.**

Balancing Engines.—See **MARINE ENGINE.**

Feathering.—The Construction of Buckets of Feathering Paddle Wheels (Beitrag zur Konstruktion von Radschaufeln für Räder mit Beweglichen Schaufeln). W. Thele. Deriving a geometrical method for laying out the proper bucket shapes. 1500 w. Schiffbau—Feb. 10, 1904.

PAINT.

See also **METAL PROTECTION; PAINTING; PAINT SHOP; WHITE LEAD.**

Paints Suited for Engineering Structures. Gives information concerning the composition, chemical and physical properties of paints in general use. Serial. 1st part. 1700 w. Engr, Lond—May 27, 1904.

Anti-Corrosive.—Anti-Corrosive Paints: Their Qualities and Composition. Discuses the capabilities of many of the so-called anti-corrosive paints in use, and offers suggestions for the production of a perfect painting compound. 4000 w. Engng—June 27, 1902.

Composition and Classification.—The Composition and Classification of Paints and Varnishes. A. H. Sabin. A discussion of these substances, their various kinds and uses, and the considerations that should govern the choice and use. 1200 w. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

Durability.—Results of an Investigation of the Durability of Paints for the Protection of Structural Work. Robert Job. An illustrated report of these investigations, which seem to show that fineness of pigment is of great importance in securing desirability of paint. Also discussion. 6500 w. Jour Fr Inst—July, 1904.

Insulation.—See **INSULATION—Paint.**

Iron and Steel.—Tests of Paint. Extracts from a report by Dr. Charles B. Dudley to the American Society for Testing Materials, on preservative coatings for iron and steel and methods of testing them. 2200 w. Eng Rec—Aug. 20, 1904.

Iron Protection.—Tests of Various Paints on the 155th St. Viaduct, New York City. Reprinted from the N. Y. "Evening Post." A report of the second examination of the paints applied in 1897 with a view of determining their comparative protective qualities. 1000 w. Eng News—Sept. 4, 1902.

A Comparison of Various Tests Applied to Paints Used for the Protection of Iron. Augustus H. Gill and Charles C. Johnson. An account of an investigation of the various methods used to test the value of paints, and a comparison of the paints themselves. 1200 w. Tech Quar—March, 1903.

Paint as a Preservative of Iron from Rust. An explanation of why the paints best suitable for preserving iron from rust are those in which the pigmental base is an oxide. 3300 w. Engr, Lond—May 22, 1903.

Metal.—See Iron Protection; **METAL PROTECTION.**

Submarine.—Anti-Fouling Compositions. From "Farben Zeitung." Gives opinions from various authorities on submarine paints, and gives some new compositions. 2500 w. Sci Am Sup—Aug. 27, 1904.

See also **SHIP—Hull Protection.**

Subway, New York.—New Paint Conditions Existing in the New York Subway. Maximilian Toch, in the "Jour. of the Soc. of Chem. Ind." A report of investigations made of the conditions showing that a pigment compound with linseed oil is not fit for subway work. 1200 w. Eng Rec—Sept. 23, 1905.

Technology.—The Technology of Paint and Varnish. Alvah Horton Sabin. Gives a review of the use of paints and varnishes, giving much information in regard to them. 4500 w. Cassier's Mag—Feb., 1904.

White.—The Value of White Paints on Engineering Structures. Explains why white paint is not a permanent paint, both from a chemical and physical point of view. Considers also attempts that have been made to produce a permanent white lead pigment. 3500 w. Engr, Lond—Sept. 4, 1903.

Zonca.—The Preservation of Structures in Metal, Wood or Stone (Préservations des Constructions en Métal, Bois, au Pierre). L. Kirsch. A description of the protective coating devised by Zonca, of Venice, with accounts of tests. 3000 w. Rev Univ des Mines—Jan., 1901.

PAINTING.

See also **METAL PROTECTION; PAINT.**

Bridges.—See **METAL PROTECTION.**

Locomotives.—Locomotive Painting. Extracts from a paper read at the April meeting of the Northwest Ry. Club, by C. J. Bishop. Gives formulae, and directions for securing protection and durability. 2500 w. R R Gaz—June 19, 1903.

Machine Methods.—See **DECORATION—Sheet Steel.**

Ship.—Redman's System for Cleaning and Painting Ships. Illustrated description of a mechanical process, with statement of advantages. 1200 w. Engng—May 6, 1904.

Steel Cars.—Best Method of Painting and Maintaining Steel Cars. Two papers, by J. D. Wright, and W. O. Quest, read before the Master Car & Loco. Paint. Assn. On the best protective coatings, way of applying, etc. 3800 w. Ry Age—Sept. 11, 1903.

Protection of Metal Parts. H. M. Butts. Report on the advancement that has been made in paints for the protection of metal parts, and particularly steel cars. 1500 w. Pro Cent Ry Club—May 13, 1904.

Test.—Proper Methods in Conducting Painting Tests. Gustave W. Thompson. Read before the Am. Soc. for Test. Materials. A discussion of painting tests made on paints used for the purpose of producing a desired finish of appearance. 3300 w. Eng Rec—July 15, 1905.

Proper Methods in Conducting Painting Tests. Gustave W. Thompson. Abstract of paper before the American Society for Testing Materials. 3000 w. Elec Rev, N Y—Sept. 9, 1905.

PAINT SHOP.

Railway.—The Essentials of a Modern Railway Paint Shop. W. O. Quest. Discusses the necessary capacity, equipment, etc. 2400 w. Pro Ry Club of Pittsburg—Nov. 27, 1903.

PALLADIUM.

Wyoming.—See **COPPER.**

PALLOGRAPH.

Schlick.—See **MARINE ENGINE—Balancing.**

PANAMA.

See also **CANAL—Panama; COLOMBIA.**

Notes on Panama and Colombia. An account giving population, area and general information of each. Ill. 1600 w. Nat Geog Mag—Dec., 1903.

Conditions at Panama as Seen by a Member of the Consulting Board of Engineers. A letter from Mr. Isham Randolph describing the conditions. 1500 w. Eng News—Oct. 26, 1905.

PANAMA CANAL.

See **CANAL—Panama.**

PAN-AMERICAN EXPOSITION.

See also under specific headings of machines, materials, etc.

The Pan-American Exposition at Buffalo, N. Y., in 1901. Brief illustrated description of the plans and scope of this exposition, with statement of the progress made at the present time. 3000 w. Eng News—Nov. 8, 1900.

The Pan-American Exposition. Illustrated notes on the exposition and the engineering exhibits. 8700 w. Mach, N Y—July, 1901.

The Pan-American Exposition. A general description of the grounds, etc., with special reference to the mining and engineering exhibits. Ill. 4800 w. Mines & Min—Aug., 1901.

Mechanical and Electrical Features of the Pan-American Exposition. William S. Aldrich. Illustrates and describes the important appliances displayed, calling attention to the tendencies in recent development. 4800 w. Engineering Magazine—Sept., 1901.

Some Novel Features of the Pan-American Exposition. Herbert Croly. An illustrated article discussing the plan and purpose of the exposition and its features of interest. 4400 w. Archt Rec—Oct., 1901.

Agricultural.—The Agricultural Building at the Pan-American Exposition. Illustrated description of the wooden framing of a 500 x 150 ft. exhibition building; the details of the carpenter work are fully explained. 1200 w. Eng Rec—Jan. 12, 1901.

Building Construction.—The Horticultural, Forestry and Graphic Arts Buildings of the Pan-American Exposition. Elevation and details, with description of methods of construction. 1800 w. Eng Rec—Aug. 24, 1901.

Color.—The Color Treatment of the Pan-American Exposition. Edward Hale Brush. An account of the plans to carry out the color scheme with success. 1800 w. Sci Am—Nov. 10, 1900.

External Color of the Pan-American. Charles H. Coffin. A critical discussion of the color scheme introduced in the buildings. Ill. 1899 w. Br Build—Oct., 1901.

Coloring and Decorating.—Coloring and Decorating the Pan-American Exposition. C. Y. Turner. Read before the Am. Inst. of Archts. Gives an account of the things needing to be considered in working out the color scheme and the need of early consultation of architect, sculptor, colorist and landscape architect. 4500 w. Am Archt—Nov. 16, 1901.

Ethnology Building.—The Ethnology Building at the Pan-American Exposition. Illustrated explanation of the heavy timber framing, including the timber trusses of a dome of nearly 90 ft. diameter. 1800 w. Eng Rec—Sept. 7, 1901.

Music Hall.—The Music Hall of the Pan American Exposition. Illustrated description of a structure 150 ft. square, with a main dome 130 ft. high. The wooden framing, fully described, has many unusual details of heavy carpentry. 2200 w. Eng Rec—Feb. 9, 1901.

PAPER MANUFACTURE.

See also **PAPER MILL.**

Electric.—See **PAPER MILL—Linwood; Millinocket; Turbo-Electric.**

Paris Exposition.—Paper-Making Machinery at the Paris Exhibition. Illustrated description of a few of the exhibits, seen in actual working. Serial. 1st part. 1700 w. Engng—Jan. 18, 1900.

The Paper Industry at the Exposition of 1900 (L'Industrie du Papier à l'Exposition de 1900). H. de la Coux. A general account of the machines for preparing the pulp, as well as those for the manufacture and finishing of paper, as shown at the Exposition. Two articles. 4000 w. Génie Civil—Nov. 17, 24, 1900.

Machinery for the Manufacture of Paper (Die Maschinen für Papier-Fabrikation). A. Pfarr. A general description of the paper-making machinery exhibited at the Paris Exposition of 1900. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—Feb. 16, 1901.

Steam Engineering.—Steam Engineering in Paper and Pulp Mills. W. D. Ennis. A study of steam economy in an important steam-using industry. Engineering Magazine—July, 1901.

Steam Engineering in Paper Mills. E. S. Farwell. Considers the special problems of paper mills which are not common to all steam plants, showing where attention is needed. 2500 w. Cassier's Mag—May, 1905.

PAPER MILL.

See also **PAPER MANUFACTURE.**

Albbruck, Baden.—See **HYDRO-ELECTRIC PLANT.**

Berlin, N. H.—A River-Bed Power House. John M. Bruce. Illustrates and describes a power house and pulp mill at Berlin, N. H., as an interesting example of concrete construction under great natural difficulties. 1200 w. Cement Age—April, 1905.

Fenimore, Sandy Hill, N. Y.—The Fenimore Sulphite Mill. Illustrated detailed description of a new plant of the Union Bag & Paper Company, near Sandy Hill, N. Y. 4500 w. Eng Rec—April 30, 1904.

Linwood, Scotland.—Electrical Power at a Paper Mill. Illustrated description of a complete electrical power installation which has been in operation about a year at the Linwood Paper Mills, Renfrewshire, Scotland. 2000 w. Engr, Lond—July 18, 1902.

Millinocket, Maine.—The Great Northern Paper Company's New Mill. Illustrated description of the Millinocket Mills, having a daily capacity of 400 tons of paper; the works include a large hydraulic power plant, a steam plant, mechanical and sulphite pulp mills, and a paper-making plant. All novel arrangements and fully explained. 4700 w. Eng Rec—Dec. 15, 1900.

Paper Making by Electricity at Millinocket, Maine. Alton D. Adams. Illustrated description of the electric plant of the Great Northern Paper Company. 3500 w. Elec Wld & Engr—June 29, 1901.

Oxford.—The Oxford Paper Mills. Illustrated description of a mill for manufacturing daily 225 tons of soda and sulphite fiber and 200 tons of paper. The hydraulic and steam power plants are described, the various processes of making pulp and paper are explained, and the plant for the purpose is illustrated. 5900 w. Eng Rec—May 3, 1902.

Schuylerville, N. Y.—See **DAM.**

Turbo-Electric Drive.—The Turbo-Electric Drive in Paper Mill Service. J. R. Bibbins. An illustrated account of the experience of the West Virginia Pulp and Paper Co., Piedmont, W. Va., which is reported as successful. 3500 w. Eng Rec—Sept. 2, 1905.

PARAFFIN.

Dielectric Constant.—See **ELECTROSTATIC CAPACITY—Paraffin.**

PARAFFIN MOTOR.

See **CARBURETTER; OIL ENGINE.**

PARALLEL OPERATION.

See **ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; SPEED VARIATION; STEAM ENGINE.**

PARIS EXPOSITION.

See also under specific headings of machines, materials, etc.

Notes on the Paris Exposition, 1900 (Einiges von der Pariser Austellung, 1900). A. Weber. With especial reference to the building construction of various nations. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—April 26, 1901.

Champ de Mars.—The Champ de Mars and the Machinery Hall (Le Champ de Mars et la Galerie des Machines). E. Hénard. A protest against the proposition to devote the former exposition ground to building purposes, and a plea for its retention for public uses. 3000 w. Génie Civil—Feb. 27, 1904.

Engineering Organization.—The Engineering Organization of a Great Exposition. Georges Caye. Considers the services rendered by the engineering profession in the organization and administration of the Paris Exposition. Fully illustrated. 4000 w. Engineering Magazine. Sept., 1901.

Festival Hall.—The Festival Hall of the Exposition (La Salle des Fêtes de l'Exposition). G. Bähr. A very complete account of the structural work of the building constructed within the old Machinery Hall of the Exposition of 1889 for the ceremonial events of the Exposition of 1900. 3000 w. 1 plate. Génie Civil—Nov. 3, 1900.

Machinery and Transportation.—See **MACHINERY—Paris Exposition.**

PARK.

See also **LANDSCAPE ARCHITECTURE; MUNICIPAL IMPROVEMENT; PARKWAY; ROAD.**

American Cities.—Parks and Parkways. Andrew Wright Crawford. Notes on the park systems of various American cities, with maps and illustrations. 2800 w. Pro Engrs' Club of Phila—Jan., 1905.

Boston.—Revere Beach Reservation of the Metropolitan Park System, Boston. H. J. Kellaway. An illustrated article describing the improvements made at a Boston resort. 2000 w. Eng Rec—Oct. 24, 1903.

The Park System of Metropolitan Boston. William T. Pierce. An illustrated article outlining the work of the Metropolitan Park Commission. Also some of the local and district parks are considered. 5800 w. Public Works—April, 1905.

Chicago, Grading.—See **GRADING MACHINE—Grant Park, Chicago.**

Madison, Wis.—See **RIVER IMPROVEMENT.**

Revere Beach.—See **Boston.**

Whalom Lake, Mass.—An Attractive New England Street Railway Park. H. S. Knowlton. Illustrated description of the park at Whalom Lake, belonging to the Fitchburg & Leominster Street Railway Co. 2500 w. St Ry Jour—Feb., 1902.

PARKWAY.

See also **LANDSCAPE ARCHITECTURE; MUNICIPAL IMPROVEMENT; PARK; ROAD.**

Charles River Speedway.—See **ROAD.**

New York.—The Grand Boulevard and Concourse, New York City. Map, cross-section and description of the concourse which will connect Central Park with the park system north of the Harlem River. 1800 w. Eng Rec—Aug. 8, 1903.

Riverside Drive, N. Y.—The Construction of Section 2. Riverside Drive Extension, New York. An illustrated article giving information of this drive between 135th st. and 145th st. 1500 w. Eng Rec—March 25, 1905.

Construction of Sections 3 and 4, Riverside Drive Extension, New York. Illustrated description of the construction of the drive from 145th st. to 158th st. 1000 w. Eng Rec—April 15, 1905.

PATENT.

See also **INVENTION; PATENT OFFICE;** and under specific headings.

General Information Concerning Patents for Inventions (Renseignements Généraux Relatifs aux Brevets d'Invention). A tabulated presentation of the essential requirements for patents in 17 important countries of Europe and America. 1200 w. Revue Technique—Nov. 25, 1901.

American.—The Development and Defects of the American Patent System. C. H. Duell. Extracts from a report by Commissioner of Patents, giving a historical sketch of American practice. 3500 w. Eng Rec—Oct. 26, 1901.

Facts Concerning Patents Not Generally Understood, or of General Interest to Engineers. Frederick W. Winter. An explanation of the patent system in the United States and much information of interest. General discussion. 9500 w. Pro Engrs' Soc of W Penn—Jan., 1905.

Some Phases of Our Patent System. W. R. Wood. Explains some points in the application for patents, and the reasons for them. 2200 w. Am Mach—Vol. 28, No. 49.

American Law.—The United States Patent Laws. Historically and Practically Considered. Cyrus N. Anderson. Reviews briefly early English laws relating to patents, and discusses the laws enacted by the United States Government. 5000 w. Jour Fr Inst—Jan., 1905.

The Patent Law Situation. Ludwig Gutmann. A discussion on the present status of patents, with editorial comment. 3500 w. Elec Wld & Engr—Nov. 18, 1905.

American in Germany.—American Inventors in the German Patent Office. An official statement from Pres. Hauss, of the Imperial Patent Office, dealing with the treatment of American inventors as patentees in Germany. 1500 w. Elec Wld & Engr—Nov. 11, 1905.

American vs. German.—United States vs. German Patent Office Practice. Discusses some of the more obvious differences in the two systems, and the advantage of an understanding to prevent litigation. 2000 w. U S Cons Repts, No. 1150—Oct. 1, 1901.

British.—An Improved Mode of Procedure for the Grant of Letters Patent. G. G. M. Hardingham. Discusses the present system in England and the evils arising from it, proposing a modification. 5500 w. Engng—July 19, 1901.

British Law.—The Government Patent Bill. Editorial discussion of proposed patent law reform in England. 2800 w. Engng—Feb. 28, 1902.

The New Patent Law. A discussion of the British Patents Act of 1902, which attempts to give inventors the benefit of an official search, and to avoid the defects of other countries. 1700 w. Engr, Lond—July 1, 1904.

Compulsory Working.—Compulsory Working of Patented Inventions—A British View. W. Craig Henderson. Discusses the question whether patentees ought to be compelled, on penalty of forfeiture, to work their inventions in the country where a patent has been obtained. The view is adverse to compulsory working. 2800 w. Elec Wld & Engr—Sept. 3, 1904.

Employee.—See **INVENTION.**

German for American Inventors.—See **American in Germany.**

German Law.—Invention and Usage (Gebrauchsmuster und Erfindung). Dr. Scharse). A review of German patent law, showing the extent to which previous usage and the state of the art influences legislation in regard to patented inventions. 4500 w. Zeitschr d Ver Deutscher ng—Dec. 22, 1900.

See also **International Union.**

International Union.—The International Union for the Protection of Industrial Property and the German Empire (Die Internationale Union zum Schutze des Gewerblichen Eigentums und das Deutsche Reich). Dr. F. Damme. A review of the work of the Union, and the effect which it may have upon patent and proprietary legislation in Germany. 4000 w. Zeitschr d Ver Deutscher Ing—Nov. 15, 1902.

Kerosene Burner.—See **LIQUID FUEL—Burners.**

Law.—The Patent Laws. Charles Denton Abel. Reviews the systems in the different countries, discussing their defects, and proposing remedies. Appendices and discussion. 14,000 w. Jour Soc of Arts—Dec. 16, 1904.

Patent Law with Reference to Engineering. C. A. Brown. Considers patentable inventions; the rights of the engineer and his client or employer with reference to inventions made by an engineer during his employment; and the function of the patent expert. 7300 w. Wis Engr—March, 1905.

See also **American Law; British Law; German Law; PATENT OFFICE—French.**

Moulton Adress.—See **INVENTION.**

Obstructive.—Patents Which Obstruct. George W. Dickie. Read before the Tech. Soc. of the Pacific Coast (Condensed). A discussion of patents and the kind of patent business that is objectionable, giving illustrations of cases. 4500 w. Am Mach—Feb. 4, 1904.

Tesla Motor.—See **ELECTRIC MOTOR—Tesla Patent.**

PATENT LAW.

See **INVENTION; PATENT.**

PATENT OFFICE.

British.—The Patent-Office Library. Illustrates the new patent office, Southampton Building, describing the new library recently opened. 1500 w. Engr, Lond—Jan. 10, 1901.

French.—French Patent Legislation (Legislation Industrielle). An official circular giving notice of the establishment of the French patent and trademark office at the "Conservatoire National des Arts et Metiers." 1100 w. Electricien—Nov. 9, 1901.

PATINA.

Patina and Its Chemistry. Dr. Otto N. Witt. Showing that rusting and the formation of patina are closely related from the chemist's point of view, and both are caused by the condition of the atmosphere. 2700 w. Sci Am Sup—April 22, 1905.

PATTERN.

See also **CASTING; FOUNDRY; MOLDING; PATTERN MAKING; PATTERN SHOP.**

The Difference Between Good and Bad Pattern Work. Gives the qualifications of a good pattern maker, and notes some of the failures of a poor one. Ill. 1500 w. Am Mach—Oct. 2, 1902.

Altering.—Common Methods of Altering Old Patterns. An illustrated article suggesting changes that may be made oftentimes in patterns so that they may serve for different castings and so lessen expense. 1500 w. Prac Engr—April 24, 1903.

Aluminum.—The Use of Aluminum for Patterns. Harland Tuttle, in the "Aluminum World." States some of the advantages due to the lightness of aluminum, and gives advice and suggestions in regard to its use. 1200 w. Foundry—Feb., 1903.

Aluminum as a Pattern Metal. H. N. Tuttle. Discusses the advantages of this metal and also the objections. 3500 w. Foundry—June, 1905.

Branches.—Patterns with Branches. I. McKim Chase. Illustrates the application of geometry to practical pattern making. 1500 w. Mach, N Y—July, 1902.

Costs.—See **COST-KEEPING—Patterns.**

Cylinder.—Pattern and Core Boxes for a Water Jacketed Cylinder. W. O. Anthony. Illustrated description of the methods employed in the making of a set of patterns for a water jacketed cylinder and head. Serial. 1st part. 1600 w. Horseless Age—March 6, 1901.

Fire-Boxes.—To Develop Pattern Sheets for Radial Stayed Fire-Boxes. R. C. Young. Directions for developing the pattern. Ills. 1100 w. Boiler Maker—March, 1905.

Insuring.—Insuring Patterns. Frederick Conlin. The object of the paper is to bring before the Am. Found. Assn. the advisability of adopting rules governing questions of insurance. 3500 w. Jour Am Found Assn—June, 1901.

Jet Condenser.—See **CASTING.**

Jig.—See **JIG.**

Metals.—Pattern-Making Metals. H. Malone, in "Pattern Maker." On the making and care of metal patterns. 2000 w. Mech Engr—Feb. 11, 1905.

Metal Foundry Patterns. Walter J. May. Considers when it is worth while to make metal patterns, points of importance in making them, their advantages, cost, and related matters of interest. 3000 w. Sci Am Sup—Nov. 25, 1905.

Mounting.—See **MOLDING MACHINE—Pattern Mounting.**

Pipe Work.—Pipe Work. John M. Richardson. Illustrates examples often needed for special work which must be prepared at a minimum of time and expense, giving one way of accomplishing the result. 700 w. Am Mach—Dec. 13, 1900.

Protection.—See **Storage; FOUNDRY—Pattern: PATTERN SHOP.**

Pulley.—A Cone Pulley Pattern. John M. Richardson. Illustrates and describes a method that requires no core except a stock core through the hub. 800 w. Am Mach—March 6, 1902.

Records.—Pattern Loan Records. R. W. MacDowell. Describes a simple system of pattern records. 1800 w. Foundry—Dec., 1904.

Skeleton.—Skeleton Patterns. H. J. M'Caslin. Illustrated description of the construction of the skeleton and method of making the mold. 1600 w. Foundry, June, 1905.

Storage.—See **PATTERN SHOP.**

Thin Rings.—Thin Rings. John M. Richardson. Illustrated description of different methods of making thin ring patterns. 800 w. Am Mach—Feb. 14, 1901.

Water-Tank Column.—A Water-Tank Column Pattern. Joseph Horner. Illustrated description. 1100 w. Am Mach—July 21, 1904.

PATTERN MAKING.

See also **PATTERN; PATTERN SHOP.**

Stopping Off and Saving Pattern Work. John M. Richardson. Illustrates and describes cases where great expense is saved by this process. 1000 w. Am Mach—May 1, 1902.

Pattern Making. Edward C. Fitz Gerald. Read at meeting of Pitsburg Found. Assn. Considers important points in the constructive side of pattern-making, under the heads of working drawings, selection of material, machining and shaping, assembling and finishing. 2000 w. Ir Age—Dec. 17, 1903.

Pattern Making. R. Watson. Abstract of paper read before the Rugby Engng. Soc. Suggestions of value, especially with regard to the protection of large patterns in the foundry. 4500 w. Elect'n, Lond—Feb. 10, 1905.

Converter Hood.—Developing the Pattern for a Copper Converter Hood Having a Round Top and an Irregular Base. John O. Wyler. Directions for this work, with diagrams. 2000 w. Boiler Maker—May, 1905.

Foundry.—The Foundryman's Patternmaker. Paul R. Ramp. Showing the importance of having the foundry foreman competent to determine the proper method of molding and of having the pattern department under his control. Ills. 1200 w. Foundry—Oct., 1905.

Foundry Costs.—Pattern-Making in Relation to Foundry Costs. W. H. Parry. Read before the Am. Found. Assn. Discusses the methods in use and their shortcomings. 1100 w. Ir Trd Rev—June 23, 1904.

Pattern-Making in Its Relation to Foundry Costs. W. H. Parry. Considers some of the shortcomings incident to the making of patterns. 900 w. Am Found Assn—June, 1904.

Hand Work.—See **PATTERN SHOP—Storage.**

Lathe.—See **LATHE—Patternmaker's.**

Molding Troubles.—The Patternmaker from a Molder's Point of View. William S. McQuillam. Read before the N. Y. Found. Foremen's Assn. Discusses troubles with patterns, and the remedies for some of the defects. 1600 w. Foundry—Feb. 1905.

Pinion.—Making a Herring-Bone Pinion Pattern. G. F. Dodge. Illustrates and describes the method used. 500 w. Am Mach—April 23, 1903.

Power Press.—Making a Pattern and Mold for a Power Press. R. H. Palmer. Illustrates and describes inexpensive method of making a pattern when only one casting is required. 1800 w. Am Mach—Vol. 28. No. 46.

Projection.—Developing a Cylinder Intersecting an Elbow by the Method of Projection. Illustrates and describes the method used in developing the pattern. 1000 w. Boiler Maker—April, 1905.

Screw Press.—See **MOLDING.**

Wood.—Pattern-Making. J. C. Warne. Read at meeting of Pittsburg Found. Assn. Remarks on wood pattern-making, considering materials, machinery, men and patterns. 2700 w. Ir Age—Dec. 17, 1903.

PATTERN SHOP.

See also **DRAWING ROOM; FOUNDRY; MACHINE SHOP; PATTERN; PATTERN-MAKING; WORKS MANAGEMENT.**

The Organisation, Maintenance and Management of a Modern Pattern Shop. Jos. Leon Gobeille. Discusses remedies and improvements needed. Ill. 1800 w. Jour Am Found Assn—June, 1903.

Equipment.—See **DRAWING—Filing.**

Loan Records.—See **PATTERN—Records.**

Standards.—See **FOUNDRY.**

Storage.—Numbering and Storing Patterns. S. A. Worcester. Considers the arrangement of shelves, and describes the system recommended. 1000 w. Am Mach—April 30, 1903.

Some Notes on Molding Patterns for Hand Work. Walter J. May. Suggestions for the making and storing of foundry patterns. 1200 w. Prac Engr—March 11, 1904.

System for Storing and Caring for Patterns. R. S. Chemin. Briefly considers the handling and shipping, accounting, indexing and storage of patterns. 1400 w. Am Mach—July 14, 1904.

Care and Storage of Patterns. H. M. Lane. Read before the Am. Found. Assn. Considers methods of storing metal and wood patterns, the protection against fire, etc. 1500 w. Ir Age—June 22, 1905.

The Care of Patterns. Robert Grimshaw. Considers the classification and storage of foundry patterns, their designation, marking, and care. 2400 w. Ir Age—Dec. 21, 1905.

System.—Pattern Shop System. Oscar E. Perrigo. An explanation of plans and systems of handling the work satisfactorily. 4200 w. Foundry—May, 1905.

PAVEMENT.

See also **ASPHALT PAVEMENT; BRICK PAVEMENT; MUNICIPAL ENGINEERING; MUNICIPAL IMPROVEMENT; ROAD; STREET.**

The Design of Economic Streets and Pavements. Halbert Powers Gillette. Discusses economic pavement design, considering the foundation, subsoil and wearing coat, and criticizes existing designs. 3000 w. Eng News—Sept. 5, 1901.

Streets and Roads. James H. McDonald. Shows the severe usage of the city pavements of the present, discussing the six pavements now generally adopted in large cities, and their construction. General discussion follows. 9500 w. Jour Assn of Engng Socs—April, 1902.

Pavements in General. Charles E. P. Babcock. Notes concerning asphalt pavements principally. 3500 w. Jour Assn of Engng Socs—Aug., 1902.

What Are Paving, Repaving and Repair? Charles Carroll Brown. A discussion of this question giving legal decisions of several states. 2400 w. Munic Engng—Dec., 1902.

Some Observations on Street Pavements. S. Whinery. The present article gives statistics showing the importance from the financial standpoint, and the need of scientific study of the subject, suggesting the lines most profitable, and considering the endurance of pavements, construction, etc. Serial. 1st part. 5500 w. Eng News—Oct. 22, 1903.

The Economic Designing of Pavements. A. W. Dow. Read at Baltimore meeting of the League of Am. Municipalities. Discusses ancient and modern methods, and three methods that the writer thinks desirable. 4200 w. Munic Engng—Jan., 1904.

The Available Paving Material. John W. Alvord. Briefly considers asphalt, wood, brick, bitulithic and stone. 3800 w. Munic Jour & Engr—July, 1904.

Asphalt.—See **Bituminous Macadam; Railway: Retene; ASPHALT PAVEMENT.**

Asphaltene.—See **Retene.**

Asphalt-Macadam.—See **ASPHALT PAVEMENT—Macadam.**

Automobiles.—Automobiles and City Pavements. George E. Walsh. On the saving in wear to city pavements between heavy motor trucks equipped with broad, flat, hard rubber tires, and the ordinary horse truck with flat iron tires. 1200 w. Elec Rev, N Y—Dec. 26, 1900.

See also **AUTOMOBILE—Roads; ROAD—Wear; TRACTION.**

Baltimore.—Interestiug Tests of Pavements in Baltimore. Statement concerning a test of the relative merits of the various materials used, and of the value of old cobble-stones relaid as a subbase. 1600 w. Brick—June, 1902.

Street Paving. B. F. Fendall. Read at meeting of the League of Am. Munic. Gives the experience in Baltimore. Recommends bituminous pavements, and suggests a combine of cities to reduce the price of asphalt. Ill. 2200 w. Munic Jour & Engr—Sept., 1902.

Bithulithic.—See **Bituminous Macadam; TRACK—Street, Cincinnati.**

Bitumen Testing.—The Testing of Bitumen for Paving Purposes. A. W. Dow. Abstract of a paper read before the Am. Soc. for Test. Materials. Briefly describes the construction of one class of asphalt pavement, discussing its properties, and gives tests devised by the writer for the determination of these properies. 2500 w. Eng Rec—July 11, 1903.

Bituminous.—The Development of Bituminous Pavements. Fred. J. Warren. Read before the League of Am. Municipalities. Reviews briefly the history of this form of pavement, with comments on the various practices. 2000 w. Am Gas Lgt Jour—Sept. 16, 1901.

See also **Bituminous Macadam; Retene; Tar; ASPHALT PAVEMENT.**

Bituminous Macadam.—Some Experiments in Laying Bituminous Macadam. Describes some experimental sections of roadway laid in East Cambridge, Mass. 1800 w. Munic Engng—May, 1901.

A Proposed Asphalt-Macadam Pavement. S. Whinery. Proposal to mix the asphalt with broken stone, and then spreading and rolling as in laying ordinary asphalt pavements. 1600 w. Eng News—June 6, 1901.

Bituminous Macadam Pavement. Extracts from a paper by Fred J. Warren, before the Boston Soc. of Civ. Engrs. stating the principles upon which this type of pavement is based; and also a summarized statement of some of the work. 3800 w. Eng Rec—Jan. 25, 1902.

The Development of the Bituminous Macadam Pavement. Fred J. Warren. Abstract of a paper presented to the Am. Soc. of Munic. Imp. Describes a pavement combining the essential principles of both asphalt and macadam, giving the theories on which the construction is based. 2300 w. Eng Rec—Oct. 11, 1902.

Development of Bithulithic Pavement. Frederick J. Warren. Read before the Mass. Highway Assn., at Boston. An explanation of theories and results. Ills. 2800 w. Munic Jour & Engr—Jan., 1905.

Bituminous Macadam Pavements. William H. Burns. Discusses the principles on which this pavement is built, its construction, treatment, etc. 2700 w. Jour Assn of Engng Soc's—May, 1902.

Warren's Biuminous Macadam Pavement. C. A. Kenyon. Abstract of paper before the Indiana Engng Soc. Discusses the virtues and defects of macadam roads, and the improvement introduced by Frederick J. Warren. 2200 w. Munic Engng—Feb., 1903.

Bituminous Macadam Pavement. C. A. Kenyon. Describes this pavement, and considers it has the good qualities of macadam, and the best qualities of asphalt pavement. 3000 w. Munic Jour & Engr—Feb., 1903.

The Bitulithic Pavement. Walter B. Warren. A statement of its advantages, claiming that it possesses the good qualities of macadam without the defects. Ill. 3000 w. Munic Jour & Engr—March, 1903.

Bitulithic Pavement in Nashville. W. W. Southgate. Discusses the principles of its construction and its points of excellence. Ill. 1500 w. Munic Jour & Engr—Aug., 1903.

The Bitulithic Pavement. W. A. Hoyt. From a paper before the Michigan Engng. Soc. Observations and conclusions gathered in superintending the construction of this pavement. 3800 w. Munic Engng—Feb., 1904.

Street Pavements. Louis M. Pfeiffer. From a paper before the Colorado Polytechnical Assn. Reviews the various materials used, their advantages and disadvantages, and claims much for the bitulithic pavement. 3000 w. Munic Engng—April, 1904.

Granite Asphalt Paving (Le Granite Asphalte). Col. G. Espitallier. Describing the use of a mixture of crushed granite and asphalt for surfacing pavements, as used in the Place de l'Opera at Paris. 1500 w. Génie Civil—Oct. 29, 1904.

See also **Tar; Tar Macadam; DUST—Liverpool; TRACK—Street, Cincinnati.**

Block Stone.—See **Brick and Stone Block; Sandstone.**

Boston.—Paving in Boston. F. S. Gore. Describes the kind of paving generaly used at the present time, giving the specifications for laying Sicilian Rock asphalt, and information about car tracks. 1200 w. St Ry Rev—May 15, 1901.

See also **Wood, Boston.**

Brick.—See **BRICK PAVEMENT.**

Brick and Stone Block.—The Cost of Brick and Stone Block Pavements. Halbert Powers Gillette. Information and facts helpful in estimating. 2500 w. Eng News—July 24, 1902.

Brooklyn, N. Y.—See **Sandstone.**

Cement.—See **CEMENT PAVEMENT.**

Chattanooga, Tenn.—See **ASPHALT PAVEMENT—Repair, Chattanooga; MUNICIPAL IMPROVEMENT.**

Chicago.—Problems of Street Paving. Extracts from a report made by John W. Alvord considering various problems and proposed methods of solutions for the city of Chicago. Diagrams and tables, with discussion of materials. 5800 w. Munic Engng—Aug., 1904.

Street Pavements in Chicago. John W. Alvord. Describes past and present conditions of streets, and considers the progress and future outlook. 2000 w. Jour W Soc of Engrs—Dec., 1905.

Coal Tar.—See **Hanover, N. H.; Tar.**

Concrete.—Concrete Paving and Paving Materials. H. L. Weber. From a paper before the Ohio Soc. of Surv. & Civ. Engrs. Directions for the construction of concrete roadways, their foundations, pavement, etc. Ills. 1200 w. Munic Engng—May, 1905.

See also **CEMENT PAVEMENT.**

Convict Labor.—See **Georgia.**

Georgia.—Convict Labor on a Standard Pavement. Describes the construction of a standard smooth pavement with the aid of convict labor in Fulton County, Georgia. Ills. 1800 w. Munic Engng—Oct., 1904.

Granite Asphalt.—See **Bituminous Macadam.**

Guaranties.—Pavement Guaranties. George W. Tillson. Paper read before the Am. Soc. of Munic. Engr. on the different classes of guaranties and the best form of each. 3900 w. Eng Rec—Oct. 12, 1901.

Pavement Guaranties. George W. Tillson. Considers the practice in detail, giving the writer's opinion of the proper requirements and the principles governing in each case. 4000 w. Munic Engng—Nov., 1901.

Hanover, N. H.—Coal-Tar Pavements in Northern New England. Particulars in regard to a pavement laid in Hanover, N. H. Also information furnished by Prof. John V. Hazen in regard to similar pavements in other places. 1500 w. Eng Rec—April 25, 1903.

Havana.—The Renovation of Havana. An illustrated article considering the street work as given in Col. Black's report. Serial. 1st part. 2500 w. Eng Rec—Jan. 10, 1901.

See also **MUNICIPAL ENGINEERING.**

Indianapolis.—See **Kreodone Block.**

Injury, Water.—Pavements Injured by Water. J. W. Howard. Claims that all kinds of pavements are more or less injured and gives a record of experiments to show that the solubility test is needed in all specifications. 2500 w. Munic Jour & Engr—Dec., 1902.

Iowa.—See **ROAD.**

Kreodone Block.—See **Wood, Kreodone.**

La Fayette, Ind.—Pavement History of La Fayette. W. K. Eldridge. Historical review of local progress from the first efforts at street improvement to the present successful condition. 1300 w. Munic Engng—Nov., 1900.

Recent Paving Practice in La Fayette, Ind. W. K. Eldridge. Describes the methods of constructing asphalt pavements, the materials used, and precautions taken. 1200 w. Munic Engng—Dec., 1900.

Liverpool.—See **DUST.**

Macadam.—Pavements for Small Cities. F. F. Rogers. Considers streets and roads where expensive pavements are not warranted, recommending well-constructed macadam. Ill. 1800 w. Munic Jour & Engr—March, 1903.

See also **Bituminous Macadam; Pawtucket, R. I.; Tar Macadam; ASPHALT PAVEMENT; ROAD.**

Macadam, Albion, N. Y.—Some Lessons from the Macadam Pavements of Albion, N. Y. Halbert Powers Gillette. Describes a Medina sandstone macadam pavement, the method of construction, cost of repairs, and details of interest. 3000 w. Eng News—Sept. 19, 1901.

Macadam, Hudson, N. Y.—The Six-Inch Macadam Streets of Hudson, N. Y. H. K. Bishop. An illustrated article giving an account of the street improvements and describing the method of doing the work, giving cost. Also letter and editorial bearing on this subject. 3300 w. Eng News—Oct. 8, 1903.

Nashville, Tenn.—See **Bituminous Macadam.**

New York.—See **Wood.**

Opening.—See **STREET—Opening; Sub-Surface Maps.**

Openings, N. Y.—See **STREET.**

Pawtucket, R. I.—Cost of Maintaining Macadam Streets. Gives some definite figures as to cost, and a statement of the condition of the streets at Pawtucket, R. I. Ills. 1500 w. Munic Engng—March, 1905.

Railway.—The Paving of Permanent Ways for Tramways and Light Railways. From the "Railway Engineer." Gives the laws of England in regard to the requirements, and the kinds of paving used. Discusses the mineral composition of some paving stones, wear, etc. 4500 w. Quarry—Feb. 1, 1903.

Pavements Adjoining Rails. Daniel B. Luten. Notes the hard wear at this point, and recommends the use of brick to reinforce the asphalt at the rails. Ill. 1000 w. St Ry Rev—May 20, 1903.

Asphalt Pavement and Street Railway Tracks. W. Boardman Reed. An illustrated description of the tracks on Third Ave., N. Y., protected by the "Mullen Marginal Protecting Strip," with report of the wear. 1300 w. St Ry Jour—May 23, 1903.

See also **TRACK—Street.**

Retene, Petrolene and Asphaltene.—Concerning Retene, Petrolene and Asphaltene. S. F. Peckham. A protest against the use of these words, with reasons. 4000 w. Jour Fr Inst—Jan., 1901.

Repairs.—Improved Streets and Their Repairs. W. F. Raymond. Discusses repairs to asphalt, brick, granite block, wooden block, bituminous macadam, and pavements generally. 2200 w. Munic Engng—July, 1903.

Roads.—See **ROAD—Paving.**

Robbia.—Robbia Pavement. Allan Marquand. An illustrated article giving information in regard to the Robbia work, both in relation to pavements and sculptural monuments, showing similar designs. Serial. 1st part. 1600 w. Br. Build—March, 1902.

Salt Lake City.—Details of Street Pavements in Salt Lake City, Utah. Drawings and extracts from the specifications used for paving First South street. 1000 w. Eng Rec—March 26, 1904.

Sandstone.—Medina Block Stone Pavements. E. A. Fisher. Gives good points of this pavement and model methods of construction. Ill. 4000 w. Munic Jour & Engr—March, 1903.

Use of Medina Sandstone for Pavements in Brooklyn, New York City. C. D. Pollock. Gives the specifications for blocks and methods of laying. 1200 w. Eng Rec—Dec. 26, 1903.

Sandstone, Belgian.—Employment of Belgian Sandstone for Paving. Discusses the value of this material, methods of testing, wearing qualities, etc. 3500 w. Quarry—Jan. 1, 1903.

Syracuse, N. Y.—See **BRICK PAVEMENT—Asphalt Compound.**

Tar.—Coal Tar for Paving Uses. Fred. J. Warren. Tells what coal tar pitch or cement is, and the uses to which it has been applied. 1700 w. Munic Engng—April, 1901.

The Possibilities of the Use of Coal Tar in Bituminous Pavements. Fred J. Warren. Discusses points to be considered in selecting material, and the conditions on which the life of bituminous pavements depend. 2300 w. Munic Engng—Nov., 1901.

Coal Tar Pavements. Allan Wade Dow. An illustrated article claiming remarkably low cost for repairs, and reporting in regard to pavements over thirty years old, and their methods of construction. 3000 w. Munic Jour & Engr—March, 1903.

See also **Hanover; ROAD.**

Tar Macadam.—Specification for Tarred Macadam Roadways. From a pamphlet issued by the National Coal Tar Co., of New York. Gives proposed specifications for grading, foundation, wearing surface, tar, etc. Also specification of Hamilton, Ont. 3300 w. Pro Age—April 1, 1901.

Tar Macadam as Used in Hamilton, Ontario. Fred. J. Warren. Report from a personal examination. Ill. 1800 w. Munic Engng—June, 1901.

Tar Macadam in Pawtucket. Résumé of ten years' experience with tar and bituminous macadam on streets having moderately heavy traffic. 900 w. Eng Rec—March 8, 1902.

Tar Macadam. George H. Owen. Extracts from a paper presented to the Midland Munic. Officers' Assn. Information concerning this pavement, claiming that its greater first cost is more than offset by its greater durability. 1200 w. Eng Rec—Aug. 9, 1902.

Notes on Trials of Coal Tar Pavements at Saint Nazaire-sur-Loire, in 1904-1905. (Note sur les Essais de Goudronnage Executés à Saint-Nazaire-sur-Loire en 1904-1905). D. Guillou. Account of experience with tar macadam pavement. 1500 w. Rev Tech—June 10, 1905.

See also **Bituminous Macadam; ASPHALT PAVEMENT; ROAD—Buxton, Eng.**

Tests.—The Importance of Preliminary Tests of Paving Materials. J. W. Howard. Read before the Am. Soc. for Munic. Imp. Urges the importance of making scientific tests of materials used and discusses briefly various kinds of pavement. 1500 w. Eng Rec—Oct. 7, 1905.

See also **Wood Test; ROAD MATERIAL.**

Track, Street.—See **Railway; TRACK—Street.**

Warren's.—See **Bituminous Macadam.**

Wood.—Wooden Pavements at Home and Abroad. Extracts from a paper by F. A. Kummer, sketching the history of such pavements and describing the latest types in the United States, France and England. 4000 w. Eng Rec—Oct. 26, 1901.

The Use of Wood Pavements Under Heavy Traffic. F. A. Kummer. Abstract of a paper presented to the Am. Soc. of Munic. Imp., showing that wood blocks laid with a tight joint, with selected wood and latest practice of construction, show a fine record as to wear. 1500 w. Eng Rec—Oct. 18, 1902.

Wood Paving in England and America. F. A. Kummer. Gives information of the classes of wood used, and the methods, serviceability, etc. Ill. 2000 w. Munic Jour & Engr—March, 1903.

See also **BRIDGE—Brooklyn Drawbridge; TIMBER—Australian Hardwood.**

Wood, Boston.—Recent Experience with Wood Pavements. Extracts from a paper by B. T. Wheeler describing pavements in Boston of pine blocks treated by the creo-resinate process. 2800 w. Eng Rec—Oct. 5, 1901.

Wood, Eng.—Wood Paving. T. H. Scott. Information about the use of wood paving in English cities. 2000 w. Munic Jour & Engr—July, 1905.

Wood, Kreodone.—The Development of the Kreodone Block Pavement. P. C. Reilly. Reports experience with wood block pavements in Indianapolis, and the recent improvements in material used, claiming the Kreodone block to wear well, and to be indifferent to wet, dry, heat or cold. 2500 w. Munic Engng—Nov., 1903.

Kreodone Wood-Block Pavements. Frank W. Moulton. Describes the method of treating the block, and claiming remarkable wearing qualities. 1800 w. Munic Jour & Engr—April, 1903.

Wood, London.—Wood Paving in London. Gives the standard specification for laying wood paving, with remarks. 700 w. U S Cons Repts, No. 1021—April 26, 1901.

Wood, N. Y.—Wood Pavement in Greater New York. F. A. Kummer. An illustrated article describing methods of laying. 1500 w. Munic Jour & Engr—Sept., 1903.

Wood Paving Specifications in Greater New York. F. A. Kummer. Gives the specifications for streets, and also for bridge floors. 3800 w. Munic Engng—Nov., 1903.

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The Present Status of the Beaumont Oil Field. Robert T. Hill. An account of the extent of development, the speculation, etc., with a statement concerning the geological conditions. 2800 w. Mfrs' Rec—May 30, 1901.

The Beaumont Oil Field, with Notes on Other Oil Fields of the Texas Region. Robert T. Hill. Gives much information concerning the occurrences of oil, describes the geology of the Texas region, etc. Ill. Serial. 1st part. 5000 w. Jour Fr Inst—Aug., 1902.

The Beaumont Oil Field, with Notes on Other Oil Fields of the Texas Region. Robert T. Hill. Considers the geological interpretation of oil phenomena, describing the geography of this region, the geology, the different fields, composition of the oil, development, etc., offering an explanatory hypothesis. Ill. 15 600 w. Trans Am Inst of Min Engrs—Sept., 1902.

The Great Oil Well Near Beaumont, Tex. Anthony F. Lucas. The history of the well, its control, the oil rock, and oil. Ill. 4000 w. Trans Am Inst of Min Engrs—June, 1901.

The Great Oil Well Near Beaumont, Texas. Anthony F. Lucas. Gives an account of the discovery and method of controlling the well, the hydraulic system of boring, the geology of the region and the product obtained. Ill. 4800 w. Am Mfr—July 11, 1901.

Prospects of the Texas Oil Field. C. F. Z. Caracristi. Considers the actual financial condition of the oil business in Texas, and discusses the scientific side. Ill. and map. 3300 w. Mfrs' Rec—Oct. 3, 1901.

Petroleum from the Beaumont, Texas, Field. Clifford Richardson and E. C. Wallace. Read before the Soc. of Chem. Ind., New York. The extent of the field, with an outline of the methods used in analyzing the product, and general information. 2500 w. Sci Am Sup—Nov. 9, 1901.

Tankage Capacity of Beaumont Oil Field. Concerning the estimated capacity, cost, method of construction and quality of oil stored in the tanks already completed and under construction. 1000 w. Eng & Min Jour—May 10, 1902.

Beaumont Oil Field. H. H. Stock. An illustrated account of the recent fire and the present condition of the field and the development in progress. 2000 w. Mines & Min—June, 1903.

See also **Kansas-Texas; GAS, OIL.**

Texas-Louisiana.—The Texas-Louisiana Oil Field. Information from a report by Dr. C. W. Hayes and Mr. William Kennedy. 1400 w. Sci Am Sup—Nov. 15, 1902.

New Texan Oil Deposits. Day Allen Willey. Information concerning the petroleum deposits of Texas and Louisiana. 1500 w. Ills. Sci Am—Jan. 30, 1904.

Oil Fields of the Texas-Louisiana Coastal Plain. N. M. Fenneman. Discusses the location, present condition and outlook of these fields, their geological structure, the business methods, etc. Ills. 4000 w. Min Mag—April, 1905.

United States.—Petroleum in the United States. J. Ohly. Moissan's theory of the formation of petroleum, analysis of the Denver oil basin, information of the output in the various districts of the United States and other matters. 3800 w. Ores & Metals—March, 1901.

The New Oil Fields of the United States. David T. Day. Discusses the recent developments in the petroleum industry, especially the California fields and Beaumont, Tex. 2700 w. Am Rev of Revs—June, 1901.

American Petroleum Possibilities. George Ethelbert Walsh. An illustrated review of the oil regions of the United States and their productive capacity, with a forecast of their future, and a discussion of the growing importance of petroleum as fuel. 2000 w. Cassier's Mag—Dec., 1902.

The Latest American Petroleum Discoveries. Day Allen Willey. An illustrated article describing the great expansion of the oil industry in the United States, west of the Mississippi River and in the Southwest, and the uses made of the liquid fuel. 4000 w. Cassier's Mag—Sept., 1905.

United States, 1900.—The Production of Petroleum in 1900. F. H. Oliphant. Reviews the features of the production in the United States. 2500 w. Am Mfr—Oct. 31, 1901.

U. S. Southern.—Southern Petroleum and the Fuel Market. C. F. Z. Caracristi. A review of the petroleum development in the South, its values as compared with coal at present prices, and as a fuel. 3800 w. Mfrs Rec—Feb. 20, 1902. Special number.

Import of the Production of Southern Petroleum. F. H. Oliphant. Reviews the production in West Virginia, Texas, Kentucky and Tennessee, describing the character of the oil and giving related information. 3500 w. Mfrs Rec—Feb. 22, 1902. Special number.

The Mounds of the Southern Oil Fields. Lee Hager. Describes the geological structure and the conclusions reached, giving information of interest. Serial. 1st part. 2200 w. Eng & Min Jour—July 28, 1904.

U. S., West.—The Oil Fields of the West. Day Allen Willey. An illustrated account of the development of the oil-bearing sands west of the Mississippi River. 1800 w. Sci Am—Dec. 16, 1905.

Utah.—Oil and Asphaltum on the Shores of Great Salt Lake, Utah. Don Maguire. Information concerning the prospect of finding oil, asphaltum and gas in Utah, as well as in Colorado and Wyoming. Ills. 1400 w. Min & Sci Pr—May 13, 1905.

Volcanic Origin.—The Volcanic Origin of Oil. Eugene Coste. Takes exception to views of other writers, and presents evidence in support of his views that the origin of oil is inorganic and the result of solfataric volcanic emanations. 3500 w. Trans Am Inst of Min Engrs—Feb., 1904.

Volcanic Origin of Oil. Eugene Coste. Discussion of the paper by Robert T. Hill, on "The Beaumont Oil Fields, with Notes on Other Oil Fields of the Texas Region," claiming that it has been proved that the origin of oil is inorganic and the result of solfataric volcanic emanations. 3800 w. Jour Fr Inst—June, 1904.

See also **Origin.**

Western North America.—See **California; Colorado; Kansas; Rocky Mountains; Texas; United States; United States West; Wyoming.**

Wyoming.—The Petroleum Fields of Wyoming. W. C. Knight. This first article of a series reviews the early history, and gives a general statement concerning the occurrence of petroleum in this State. Serial. 1st part. 1800 w. Eng & Min Jour—Sept. 21, 1901.

The Fort Steele Oil Field. J. C. Kennedy. A preliminary report giving information of the oil-bearing rocks of Wyoming. 1600 w. Min Rept—Aug. 7, 1902.

Prospecting for Oil in Wyoming. Prof. Arthur Lakes. A description of the prospects in the country around Medicine Butte and Red Mountain, Uinta Co. 2700 w. Mines & Min—Oct., 1902.

PETROLEUM ENGINE.

See also **GASOLINE ENGINE; OIL ENGINE.**

Compression Ignition.—See **GAS ENGINE—Ignition Compression.**

PETROLEUM FUEL.

See **LIQUID FUEL; LOCOMOTIVE—Oil Burning; PETROLEUM.**

PETROLEUM LAMP.

See **INCANDESCENT GAS LIGHTING; LIGHTING—Petroleum and Electric.**

PETROLEUM PIPE LINE.

Petroleum Oil Pipe Lines. A. S. Cooper. Considers the cases that may arise in constructing an oil line, means of finding the fluidity of the oil and therefore the flow. Ill. 1600 w. Min & Sci Pr—March 9, 1901.

California.—A 100-Mile Oil Pumping Line. A. M. Hunt. A description of a new six-inch line from Coalinga to Monterey, Cal., recently put in operation by the Coalinga Oil and Transportation Co., and the method used in trying to predetermine the resistance to pumping. Ills. 2500 w. Jour of Elec—Jan., 1905.

PETROLEUM REFINING.

See **PETROLEUM.**

PETROLEUM VEHICLE.

See **AUTOMOBILE, GASOLINE; CAR, MOTOR-DRIVEN.**

PETROLEUM WELL.

See also **BORING; PETROLEUM; WELL BORING.**

Boring.—Mechanics of Oil Well Boring. A brief analysis of the arts of well-boring and related matters, describing systems used in America. Ill. 1500 w. Am Gas Lgt Jour—Sept. 23, 1901.

Oil Well Drilling. An illustrated description of a fine drilling outfit and a synopsis of its operations. 3000 w. Met Work—Aug. 8, 1903.

Casing and Tubing.—Casing and Tubing for Oil Wells. Illustrated discussion of types used, and the abuse to which the casing is subject. 1700 w. Am Mfr—Oct. 31, 1901.

Electric Boring.—See **ELECTRIC STATION—Caspian Oil Wells.**

Fire.—Oil Fires in the Southwest. Day Allen Willey. An illustrated account of how oil-well fires are extinguished. 1400 w. Sci Am—Jan. 10, 1903.

Hanover.—Petroleum Boring at Wietze, Hanover (Die Erdölgewinnung bei Wietze, Prov. Hannover). W. Kaemmerer. Illustrated description of derricks and boring apparatus at Wietze-Steinförde, where 41,000 metric tons of petroleum were produced in 1903. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 23, 1905.

Natural Gas.—See **BORING; EARTHQUAKE; GAS, NATURAL.**

Submarine.—The Drilling of Submarine Oil Wells as Performed at Summerland, Cal. Dwight Kempton. Illustrated description of method used. 800 w. Sci Am—Jan. 18, 1902.

Submarine Oil Wells in California. W. G. Young. Brief account of the Summerland Field, where wells are sunk in the bed of the ocean. 1000 w. Eng & Min Jour—Jan. 12. 1901.

Supply Works.—See **WORKS—Oil City, Pa.**

PHASEMETER.

See **ELECTRIC INSTRUMENT; ELECTRIC METER.**

PHASE THEORY.

See **GOLD—Melting Point; IRON—Phase Theory; METAL—Phase Theory; ORE DEPOSIT—Phase Theory.**

PHILIPPINES.

See **LABOR; MILITARY ENGINEERING; MINERAL REGION; PETROLEUM; PUBLIC WORKS; RAILWAY;** and under specific minerals and metals.

PHONOGRAPH.

See also **TELEGRAPHONE.**

Electro-Chemical.—A New Phonographic Principle (Ueber ein Neues Phonographisches Prinsip). W. Nernst & R. v. Lieben. The electro-chemical action of a current upon an endless platinum band or revolving copper disk enables variations in current to be reprodnced in a microphone. 2000 w. Zeitschr f Elektrochemie—April 4, 1901.

An Electrochemical Phonograph. An illustrated account from the "Zeitschrift für Elektrochemie," in which Nernst and V. Lieben describe a minute electrolytic cell, in which voice currents set up imperceptible surface variations on a moving electrode, which may be made to reproduce the vocal sounds. 1500 w. Elec Wld & Engr—April 27, 1901.

A New Phonographic Principle. W. Nernst and R. von Lieben. From the "Zeitschrift für Electrochemie." Explains the principle of a new phonograph, in which the electrochemical action of a current upon an endless platinum band enables variations of current to be reproduced in a microphone. 3500 w. Elect'n, Lond—June 7, 1901.

Photographic.—See **PHOTOGRAPHONE.**

Paulsen.—See **TELEGRAPHONE.**

Records.—Moulded Records for Phonographs. An illustrated article describing fully the making of master records, and the mold from which duplicates are made. 2200 w. Am Mach—July 9, 1903.

Works.—The Edison Phonograph Works, Orange, New Jersey. Remarks on the Edison phonograph display at St. Louis, and plan and description of the factory. 5500 w. Engng—June 24, 1904.

PHOSPHATE.

Sources of Supply and Methods of Manufacture of Phosphates and Potash Salts. Edward B. Voorhees. A brief account of the various sources of supply of natural phosphates, especially in the United States. Also an account of the Stassfurt deposits of potash salts. 1800 w. Jour Fr Inst—Sept., 1905.

New Zealand.—The Phosphate-Rock Discovery in Otago. James Park. Describes the physical and geological features, the deposits, etc. 3500 w. N Z Mines Rec—Aug. 16, 1902.

Phosphate Rock in New Zealand. James Park. A description of the deposits recently discovered and the geology of the district. Serial. 1st part. 2800 w. Aust Min Stand—Sept. 11, 1902.

Tennessee.—Tennessee Phosphate. H. D. Ruhm. Abstract from "The American Fertiliser." Describes the deposits and methods of mining. 1200 w. Eng & Min Jour—Dec. 29, 1904.

Tennessee Phosphate. R. D. O. Johnson. Describes the deposits and methods of mining. Ills. 3500 w. Eng & Min Jour—Aug. 5, 1905.

U. S., Southern.—Progress in the Southern Phosphate Belt. Hugh Wiley. Historical review of the phosphate mining industry, and the location of the Southern deposits. 2000 w. Mfrs Rec—Feb. 20, 1902. Special number.

PHOSPHORUS.

See also **COAL ANALYSIS; IRON ANALYSIS; IRON ORE ANALYSIS; STEEL ANALYSIS.**

Emanation.—On the Effect of Temperature and of Moisture on the Emanation of Phosphorus, and on a Distinction in the Behavior of Nuclei and Ions. C. Barus. Gives experimental investigations made and conclusions reached. 6600 w. Am Jour of Sci—Nov., 1901.

Iron.—See **IRON ANALYSIS; METALLOGRAPHY; STEEL ANALYSIS.**

PHOTOGRAPHONE.

Speaking Photography (Sprechende Photographien). H. Zacharias. Describing the apparatus by which the variations in an electric arc due to articulate sounds may be photographed on a moving film, and subsequently reproduced by means of a selenium cell and telephone. 2000 w. Glasers Annalen—March 15, 1902.

PHOTOGRAPHY.

Architecture.—See SURVEYING—Photographic.

Astronomy.—See SURVEYING—Photographic.

Electric Spark.—See KINEMATOGRAPH.

Surveying.—See SURVEYING—Photographic.

Wave.—See SURVEYING—Photographic, Wave.

PHOTOMETRY.

See also **LIGHT; LIGHTING;** and under specific kinds of lights and lighting.

A Preliminary Study for a New Standard of Light. J. E. Petavel. An illustrated account of investigations carried out, discussing the requirements of a photometric standard and in what manner they may be satisfied. 3000 w. Elect'n, Lond—April 10, 1903.

The Development of Industrial Photometry. Prof. C. P. Matthews. On the improvements made in these measurements, the causes of errors, and the accuracy, methods and results now possible. 1200 w. Elec Wld & Engr—March 5, 1904.

The Various Methods of Measuring Illumination (Die Verschiedenen Methoden der Helligkeitsprüfung). A. Wingen. A description of the various scientific and practical methods of measuring the intensities of artificial lights. 4500 w. Gesundheits-Ingenieur—April 10, 1904.

Principles of Photometry. An explanation of the principles for measuring the intensity of light. Ills. 2200 w. Engr, U S A—June 1, 1904.

Abady Lecture.—Mr. Jacques Abady on "Photometry." A lecture on photometry in relation to gas testing. 8000 w. Jour Gas Lgt—May 3, 1904.

Light Measurement. Jacques Abady. A lecture delivered before the Dutch Assn. of Gas Mgrs. Hints on commercial light-testing. 5000 w. Jour Gas Lgt—July 12, 1904.

See also Color.

Accuracy.—The Commercial Accuracy of Photometrical Measurements. Clayton H. Sharp. Discusses whether the photometrical measurements conform in general to the requirements of commercial accuracy. 2500 w. Trans Am Inst of Elec Engrs—Nov., 1902.

A. I. E. E. Discussion.—See **LIGHTING.**

Arc Light.—Arc-Lamp Standardization. Harold Almert. Read before the Chicago Elec. Assn. Discusses the difficulties in arc-light photometry, and the unsuitability of the candle as a standard for practical use. 2300 w. W Elect'n—Feb. 2, 1901.

An Improved Apparatus for Arc-Light Photometry. Charles P. Steinmetz. Describes an equipment, designed by the writer, for the Photometric Laboratory of Purdue University, which is in satisfactory operation. Ill. 2300 w. Trans Am Inst of Elec Engrs—Aug.-Sept., 1901.

The Maximum Illuminating Power of Continuous-Current Arc Lamps in a Single Direction (Ueber das Relative Maximum Einseitger Lichtausbeute bei Gleichstrom-Bogenlampen). E. Richter. With diagrams showing the variation in light emitted for different angles of inclination of the carbons. 2000 w. Elektrotechnik Zeitschr—Feb. 4, 1904.

Standards for the Illuminating Power of Arc Lamps (Normen für die Lichtstärke von Bogenlampen). Dr. Norden. Suggesting the establishing of standards for photometric comparison, in connection with the work of the German electrical societies. 2500 w. Elektrotech Zeitschr—June 22, 1905.

See also **Matthews; ARC LIGHT.**

Coal Gas.—See **Gas.**

Color.—A Development in Photometry. Brief account of a new instrument which seems to overcome all obstacles in the problem of the measurement of differently colored lights. 1600 w. Gas Wld—April 18, 1903.

The Theory and Practice of "Flicker" or Color Photometry. Jno. F. Simmance. A discussion of this subject with a description of a form of Ritchie photometer—the Simmance-Abady photometer—and an account of its use. 4500 w. Jour Gas Lgt—June 9, 1903.

A Development of the Simmance-Abady "Flicker" Photometer. Illustrates and describes a modification presenting a wider range of utility than the original form. 1500 w. Jour Gas Lgt—Oct. 6, 1903.

Flicker Photometry in its Relation to Sources of Light of Different Colors. Dr. Hugo Krüss. Summary of an address to the Lower Saxon Assn. An account of investigation, with the author's conclusions. 2300 w. Gas Wld—March 26, 1904.

See also **Fleming; Munsell.**

Efficiency Meter.—See ELECTRIC METER.

Electric Station.—Photometry for Central Station Engineers. Lancelot W. Wild. Describes how photometric measurements may be made in a central station both accurately and quickly, and without employing any very expensive apparatus, nor a specially skilled testing staff. 1500 w. Elec Rev, Lond—Jan. 6, 1905.

England.—See History.

English Methods.—Photometry Up to Date. A discussion of means of ascertaining the illuminating power as applied to English methods and gas undertakings. 2200 w. Jour Gas Lgt—July 14, 1903.

Fleming.—Dr. Fleming's Paper on Photometry. Alexander P. Trotter. A critical review. 2800 w. Elec Times—Feb. 5, 1903.

The Photometry of Electric Lamps. Dr. J. A. Fleming. Abstract of a paper before the Institution of Electrical Engineers, considering standards, processes of measurement, heterochromic photometry and international agreements. Ills. Serial. Part I. 5500 w. Elect'n, Lond—Jan. 2, 1903.

Photometry for Electricians—and Others. An abstract of a paper by Dr. J. A. Fleming before the Inst. of Elec. Engrs., and of the discussion that followed. 4000 w. Jour Gas Lgt—Dec. 16, 1902.

See also **Incandescent Lamp Standards.**

Flicker.—See Color.

French.—Some French Views on Photometry and Pyrometry. Abstract translations of several papers presented at a recent meeting of the Société Technique du Gaz en France. Ills. Jour Gas Lgt—July 5, 1904.

French and German Methods.—Relation Between French and German Methods of Photometry. A. Lecomte. Abstract translation of a paper read before the Société Technique du Gaz en France. An explanation of the methods used, with discussion of tests made on the two photometers. Also editorial. 1800 w. Jour Gas Lgt—May 19, 1903.

Gas.—Report of the Committee on Research—To Determine a Useful Working Standard for the Measure of the Illuminating Power of Gas. Describes research work,, and gives short topical discussions by various contributors. 5000 w. Pro Age—Nov. 15, 1900.

A New Table Photometer and Pentane Ten-Candle Lamp. Frank Clowes. On Official gas testing in London, with illustrated descriptions of new apparatus, giving results obtained by its use. 4500 w. Gas Wld—June 15, 1901.

The Table Photometer and the Standard Pentane Lamp. Abstract of description of the lamp and its accessories, and the method of using them as given by Dr. Frank Clowes, with discussion. 4000 w. Jour Gas Lgt—Feb. 11, 1902.

Notes on Candle-Power Determinations. Charles W. Hinman. Read before the New England Association of Gas Engrs. A report of tests and of a novel method of taking candle power. 2700 w. Am Gas Lgt Jour—March 31, 1902.

Notes on Working with an Illumination Photometer. Henry Fowler. Read at Manchester Dist. Inst. of Gas Engrs. Describes methods used by the writer, giving results of tests. 2400 w. Jour Gas Lgt—Dec. 9, 1902.

Measurement of Illumination. Summary of a paper by Dr. Hugo Krüss, published in the "Journal für Gasbeleuchtung." Illustrated discussion of the apparatus invented by Herr Anton Wingen, called an "illumination tester." 1400 w. Gas Wld—Dec. 20, 1902.

Photometry and Testing. Walter Grafton. Read before the Inst. of Gas Engrs. Discusses the "weak spots" in the present system of testing, showing that some existing beliefs, as regards burners, are wrong. General discussion. 10,800 w. Gas Wld—June 13, 1903.

Effect of Varying the Conditions of Combustion on the Illuminating Power of Coal Gas. H. Leicester Greville. Gives tabulated results of investigations of the light of different grades of coal gas under varying conditions to determine the best method of developing the maximum light. 800 w. Jour Gas Lgt—Aug. 19, 1902.

Gas and Gas Testing. H. Leicester Greville. A brief comparison of new with old methods of photometric testing, with comments on recent papers and discussions, and suggestions. 2000 w. Jour Gas Lgt—July 14, 1903.

The Photometrical Valuation of Gas. H. Leicester Greville. Remarks on how photometry as a science can best be combined with gas testing. 1700 w. Jour Gas Lgt—May 24, 1904.

See also **Abady Lecture; French and German; GAS INDUSTRY—Future.**

Globes.—See Reflector.

Heterochromic.—See Color; Fleming.

History, England.—The History of English Photometry. Vivian B. Lewes, in "Il Gas." A sketch of the history during the last 200 years. 6000 w. Gas Wld—Sept. 6, 1902.

Illumination.—Notes on Working with an Illumination Photometer. Henry Fowler. Read before the Manchester Dist. Inst. of Gas Engrs. On types of photometers and methods of using them. 3800 w. Gas Wld—March 14, 1903.

Working an Illumination Photometer. Henry Fowler. Read before the Manchester Dist. Inst. of Gas Engrs. Addendum to a previous paper, giving record of curves of outdoor and indoor lighting. Discussion. 2400 w. Jour Gas Lgt—March 17, 1903.

See also **LIGHTING.**

Incandescent Gas.—See Welsbach; INCANDESCENT GAS LIGHTING—Photometry.

Incandescent Lamp.—Some Methods of Photometry as Applied to Incandescent Lamps. J. T. Marshall. Describes the invention and use of the sliding scale photometer. 1800 w. Trans Am Inst of Elec Engrs—Nov., 1902.

Some Notes on the Incandescent Lamp. A. B. Lambe. Read before the Can. Elec. Assn. Outlines the method of measuring, tabulating and comparing the light from incandescent lamps, and discusses their mechanical features. Ills. 5500 w. Can Elec News—July, 1905.

See also **Matthews; ELECTRIC METER—Efficiency of Lamps; INCANDESCENT LAMP.**

Incandescent Lamp Standards.—On Large Bulb Incandescent Lamps as Secondary Standards of Light. J. A. Fleming. Abstract of a paper read before the British Assn. Gives points of importance in the construction of these lamps, and precautions to be taken in their use with information of interest. 2000 w. Elect'n, Lond—Aug. 26, 1904.

Incandescent Lamp Variations.—See INCANDESCENT LAMP—Variations.

Integrating.—See Matthews; Spherical.

Laboratory.—Note on the Use of White Walls in a Photometric Laboratory. Edward P. Hyde. Aims to show that photometric observations can be made in any room by arrangements described, and corrections measured. Also editorial note. 2500 w. Elec Wld & Engr—June 3, 1905.

See also **LABORATORY.**

Matthews.—An Improved Apparatus for Arc-Light Photometry. Abstract of a paper by Prof. Matthews, read before the Am. Inst of Elec. Engrs., with editorial comment. Describes and illustrates the equipment, explaining its operation. 2200 w. Elec Wld & Engr—Oct. 5, 1901.

Integrating Photometer for Glow Lamps and Sources of Like Intensity. Charles P. Matthews. Illustrates and describes an apparatus for the photometric study of incandescent lamps and other sources of the same order of brightness. 3300 w. Trans Am Inst of Elec Engrs—Nov., 1902.

An Improved Apparatus for Arc Light Photometry. Discussion of a paper by Dr. Matthews at New York, Sept. 27, 1901. 3000 w. Trans Am Inst of Elec Engrs—March, 1902.

Arc Light Photometry. C. P. Matthews. Describes two different equipments for simple or semidirectional arc-light photometry. Ills. 2500 w. Engr, U S A—June 1, 1904.

The Photometry of Arc-Lamps. Paul F. Gaehr. Discusses the advantages of the arc-lamp photometer designed by Prof. C. P. Matthews. 1200 w. Sib Jour of Engng—Jan., 1904.

On the Theory of the Matthews and the Russell-

Léonard Photometers for the Measurement of Mean Spherical and Mean Hemispherical Intensities. Edward P. Hyde. A brief résumé of a theoretical investigation of the Matthews and the more recent Russell-Léonard integrating photometers. 1800 w. Elec Wld & Engr—Oct. 22, 1904.

Mean Spherical Candle Power.—The Calculation of Mean Spherical Candle Power. Lancelot W. Wild. Describes a method of calculating not generally known. 1200 w. Elect'n, Lond—Sept. 29, 1905.

Mercury Vapor Lamp.—Candle-Power Tests of Cooper Hewitt Mercury Vapor Lamp. L. A. Freudenberger. Describes tests made at Delaware College, Newark, Del., on a vapor lamp known commercially as Type H-4. 600 w. Elec Wld & Engr—June 25, 1904.

See also **MERCURY VAPOR LAMP.**

Munsell.—On a Scale of Color-Values and a New Photometer. Arthur H. Munsell. An illustrated description of the Munsell photometer, explaining the principle of the instrument, its calibration, and giving directions for its use in measurements of light and color. 4000 w. Tech Qr—March, 1905.

Nernst Lamp.—See **NERNST LAMP—Test.**

Reflector.—The Diffusing Reflector. E. L. Zalinski. Information, based on measurements, made chiefly at the Electrical Testing Laboratories, in regard to the use of a different coating in connection with a prismed reflector, showing that the more important gain is the better distribution obtained. 2500 w. Elec Rev, N Y—Nov. 4, 1905.

Reflectors, Shades and Globes. J. R. Cravath and V. R. Lansingh. A report of tests which give information on the photometric performance of common types. Ills. Serial. 1st part. 2000 w. Elec Wld & Engr—Nov. 25, 1905.

Russell-Leonard.—See **Matthews.**

Selenium Experiments.—Photometric Experiments with Selenium. FitzHugh Townsend. Describes the use of selenium as a means for measuring light. Also editorial. 3300 w. Elec Rev, N Y—Sept. 10, 1904.

Shades.—See **Reflector.**

Simmance-Abady.—See **Color.**

Spherical.—The Action of the Spherical Photometer (Die Vorgänge im Kugelphotometer). R. Ulbricht. Describing a form of photometer for the direct determination of the mean spherical illuminating power of electric lamps. 4000 w. Elektrotech Zeitschr—June 1, 1905.

The Theory and Practice of the Spherical Photometer (Das Kugelphotometer in Theorie und Praxis). Dr. L. Bloch. A full description of the Ulbricht photometer for the direct measurement of the mean spherical intensity of a source of light, with examples of its application. Two articles. 10,000 w. Elektrotech Zeitschr—Nov. 16, 23, 1905.

See also **Matthews.**

Standard.—The Present Status of the Question of a Standard of Light. Clayton H. Sharp. Discusses progress toward a satisfactory standard. At present photometrists are limited to a choice of either a pentane standard or the Hefner lamp as primary standards. 1000 w. Trans Am Inst of Elec Engrs—Dec., 1901.

Standards of Light. Prof. Edward L. Nichols. Discussion of various standards, principally the amyl-acetate flame and the acetylene flame, with tables and curves. 5000 w. Inst Elec Cong of St. Louis—Sept., 1904.

See also **Arc Light; Gas; Incandescent Lamp Standards.**

Street Lamps.—Photometric Tests of Street Lamps in Teddington. Clifford C. Paterson. Gives results of some photometric measurements of street lamps, with data concerning the amount of gas and electricity taken by the lamps under test. 700 w. Elect'n, Lond—April 28, 1905.

See also **ARC LIGHT; LIGHTING.**

Teddington, Eng.—See **Street Lamps.**

Ulbricht.—See **Spherical.**

Unsymmetrical Light.—The Photometry of Unsymmetrical Sources of Light (Ueber die Photometrie Unsymmetrischer Lichtquellen). L. Bloch. Showing how the observation of a limited number of values will enable a fair average resule to be obtained. 1800 w. Elektrotech Zeitschr—July 13, 1905.

Violle.—Violle on Contemporary Photometry. A summary of the chief points of interest in this report presented at the Elec. Congress at Paris. 1800 w. Jour Gas Lgt—Oct. 30, 1900.

Welsbach Burner.—I. An Improved Photometer for Testing the Illuminating Values of Ordinary and High-Power Welsbach Burners. Charles Carpenter and J. W. Helps. II. Photometry of Incandescent Burners. U. Della Cassa and M. Böhm. Two short papers describing methods. 1500 w. Gas Wld—July 4, 1903.

Candle-Power Tests of Welsbach Burners. Abstract of the fourth progress report of the N. E. L. A. Committee for Investigating the Photometric Value of Arc Lamps, which deals with tests of mantle gas burners and of the naked gas flame. 800 w. Elec Wld & Engr—Oct. 31, 1903.

See also **INCANDESCENT GAS LIGHTING—Photometry.**

Wingen.—See **Gas.**

PHOTO-SURVEYING.

See **SURVEYING—Photographic.**

PHTHISIS.

See **MINERS' PHTHISIS.**

PHYLLOXERA.

Calcium Carbide.—See **CALCIUM CARBIDE—Phylloxera.**

PHYSICS.

See also **CHEMISTRY; ELECTRO-PHYSICS; FOUNDRY; IRON; LOW TEMPERATURES; MAGNETISM; MATTER; MECHANICS; THERMODYNAMICS.**

Biologists and Engineers.—The Misuse of Physics by Biologists and Engineers. W. S. Franklin. Abstract of a paper read before the Am. Physical Soc. Calls attention to some of the precise notions of thermodynamics, pointing out the essential limitations of that subject. 4000 w. Elec Rev, N Y—Dec. 5, 1903.

Constants.—Physical Constants. C. I. T. Haussen. A simplified system of dynamic, caloric, electric, magnetic and other physical and chemical constants and calculations. Mathematical demonstration. 1500 w. Engng—May 9, 1902.

Cast Iron.—See **CAST IRON—Physics.**

Centrifugal Force.—See **CENTRIFUGAL FORCE.**

Education.—See **EDUCATION—Physics.**

Gravitation.—The Mechanical Cause of Gravitation. Robert Stevenson. An experimental study. 1600 w. Elec Wld & Engr—July 11, 1903.

Phosphorus.—See **PHOSPHORUS—Emanation.**

Theories.—Presidential Address before the British Association for the Advancement of Science. Prof. A. W. Rücker. The address deals chiefly with the doubts recently cast on the soundness of the atomic theory, and the accepted theories of science. Serial. 2 parts. 11,800 w. Engr, Lond—Sept. 13 and 20, 1901.

See also **ELECTRO-PHYSICS; MATTER.**

PIANO FACTORY.

A Modern Piano-Forte Factory. Illustrates and describes the plant of John Broadwood and Sons, Limited, at Old Ford. 1200 w. Engr, Lond—Feb. 12, 1904.

PICKLE.

See also **FOUNDRY—Management.**

Acid.—Action of Acids on Iron and the Use of the Acid Pickle. Charles F. Burgess. Explains the term "pickle" as used in the metal-working industries, giving various applications, and describing the difference in practice prevailing among the users of the pickling operation. 4500 w. Elec Chem & Met Ind—Sept., 1905.

PIECE WORK.

See **WAGES; WORKS MANAGEMENT.**

PIER.

See also **BREAKWATER; BRIDGE PIER; BULKHEAD; DOCK; HARBOR; PIER SHED; PILE; WHARF.**

Bridge.—See **BRIDGE PIER.**

Cala Mines, Spain.—See **Guadalquivir.**

Coal.—The Construction and Operation of Coal Piers. Abstract of a committee report prepared for the convention of the Am. Ry. Engng. and Main. of Way Assn. 5000 w. Eng News—March 17, 1904.

See also **Hoboken, Lackawanna; COAL HANDLING; COALING STATION; COAL STORAGE.**

Concrete.—See **Kilbourne, Wis.; Superior Entry, Wis.**

Concrete Reinforced.—See also **Guadalquivir, Spain; CONCRETE REINFORCED.**

Folkstone.—Folkstone New Pier and Harbor Works. Illustrated description of these interesting works, recently completed. 6500 w. Engng—July 8, 1904.

See also **HARBOR.**

Guadalquivir, Spain.—Pier in Reinforced Concrete on the Guadalquivir, Spain (Embarcadero de Hormigon Armado en el Guadalquivir). Juan Manuel de Zafra. Illustrated description of a pier constructed on the Hennebique system, with double track, and unloading derrick. 2000 w. 3 plates. Revista de Obras Publicas—Nov. 15, 1905.

Viaduct and Pier in Reinforced Concrete of the Cala Mines Co., Spain (Viaducs et Appontement en Béton Armé de la Société des Mines de Cala, Espagne). Juan Manuel de Zafra. Illustrating a pier and approaches constructed on the Hennebique system of reinforced concrete, for handling iron ore at a railway terminus on the Guadalquivir, below Seville. 2000 w. 1 plate. Génie Civil—Dec. 23, 1905.

Guatemala.—See **Ocos Railway.**

Hoboken, N. J.—A Timber Steamship Pier and Shed. Illustrated description of a heavy pier at Hoboken, N. J., designed for transatlantic steamship service. 1500 w. Eng Rec—Nov. 3, 1900.

The New Hoboken Terminal of the North German Lloyd Line. Illustrated description of the piers and buildings to be erected on the site of those destroyed in the summer of 1900. The fireproofing and structural steel work contain many unusual features. 2700 w. Eng Rec—Dec. 22, 1900.

Warned by the Conflagration. Illustration of the new terminals and piers to be built for the North German Lloyd Co., in Hoboken, N. J., with brief description. 800 w. Fire & Water—Dec. 22, 1900.

The New Fireproof Piers of the North German Lloyd Steamship Co., at Hoboken, N. J. Illustrated detailed description of important fireproof construction, with editorial. 5500 w. Eng News—Jan. 3, 1901.

The North German Lloyd Pier-Sheds, Hoboken. Illustrated description of the steel work of the three most important piers in America, 860 to 908 feet long, and 80 to 90 feet wide. Serial. 1st part. 2900 w. Eng Rec—June 21, 1902.

Hoboken, Lackawanna.—New Lackawanna Coal Piers. Illustrated description of recently completed piers at Hoboken, N. J., which possess features of novelty and interest. 1800 w. Ry Age—Sept. 15, 1905.

See also **COAL HANDLING.**

Kilbourn, Wis.—Sheet Pile and Canvas Cofferdam for a Large Concrete Pier. J. C. Hain. An illustrated article describing conditions and the methods used. 1400 w. R R Gaz—Vol. XXXVIII., No. 11.

A Large Concrete Pier with a Sheet Pile and Canvas Cofferdam. James C. Hain. States the conditions and gives an illustrated description of work at Kilbourn, Wis. 1200 w. Eng News—March 30, 1905.

Lome, Africa.—The Landing Pier at Lome (Die Landungsbrücke in Lome). K. Preiss. A fully illustrated description of the erection of a steel pier at Lome, on the west coast of Africa, in the German colony of Togo. 3500 w. 2 plates. Zeitschr d Ver Deutscher Ing—Nov. 26, 1904.

The Landing Stage at Lome. Illustrated description of this landing stage on the coast of the Gulf of Guinea, constructed by the German Government. 1700 w. Engr, Lond—Nov. 24, 1905.

New York.—The Proposed Extension of the North River Pier Head Line Near 23d St., New York City. Gives condensed reports of Mr. Whinery in favor of the proposed extension and of the Board of Engrs. opposing it, with editorial comment. 6000 w. Eng News—Dec. 31, 1903.

Pier and Bulkhead Construction in New York Harbor. Sidney W. Hoag. Abstract of a paper before the Munic. Engrs. of N. Y. A review of the methods and work during the past thirty years of the N. Y. Dock Dept. in the construction of wharfage structures. Ills. 2500 w. Eng News—May 18, 1905.

Ocos Railway, Guatemala.—Personal Experiences in the Construction of a Landing Pier for the Ocos Railway, Guatemala, C. A. Charles List. An illustrated account of the history and construction of the pier, some of the experiences and deductions. 3000 w. Jour Assn of Engng Socs—March, 1903.

Philadelphia.—Development of the Delaware River Water Front of Philadelphia, Including Description of Bulkhead, Street and Pier Construction. George S. Webster. An illustrated article giving early history and description. 10,000 w. Pro Engrs Club of Phila—Jan., 1902.

The Delaware Avenue Improvement, Philadelphia. Illustrated description of heavy concrete and timber sea walls about one mile long; the method of making concrete blocks and setting them on pile foundations is described in detail. 3000 w. Eng Rec—April 20, 1901.

Roker.—Completion of Roker Pier. Illustrated description of a pier, begun eighteen years ago, at the mouth of the River Wear, Sunderland, England. 600 w. Engr, Lond—Sept. 25, 1903.

The New Roker Pier, Sunderland. General view, plan and sections of a pier which forms one arm of the harbor at the mouth of the Wear. 700 w. Engng—Oct. 2, 1903.

Sunderland.—See **Roker.**

Superior Entry, Wis.—The Cost of Concrete Deposited in Molds Under Water for a Pier at Superior Entry, Wis. Abstract from the report of the Chief of Engineers, U. S. A., giving the methods and cost of building the concrete south pier, 3023 ft. long. Ill. 2000 w. Eng News—March 2, 1905.

Tyne River, Eng.—The Tyne North Pier Reconstruction. View and description of the work and methods of construction. 1500 w. Engng—Aug. 1, 1902.

PIER SHED.

See also **PIER.**

New York.—A Steel Pier Shed for the Central Railroad of New Jersey. Brief illustrated description. 400 w. Ry Age—June 24, 1904.

PIG IRON.

See also **BLAST FURNACE; CASTING; CASTING MACHINE; FOUNDRY; IRON; IRON INDUSTRY; IRON METALLURGY.**

Manufacture of Pig Iron. Charles Fox. Read before the Can. Assn. of Sta. Engrs. Considers the classifications according to the purpose to which the pig is applied, the constituents, etc. 1500 w. Foundry—Nov., 1902.

Some Examples of Irregular Distribution of Sulphur in Pig Iron. John J. Porter. Read at the A. F. A. convention. Describes some very remarkable cases of segregation of sulphur found in analyzing a large number of pigs of iron. 600 w. Foundry—Sept., 1904.

Pig-Irons and Their Use in the Foundry and Forge. E. Adamson. Abstract of a paper read before the Manchester Assn. of Engrs. Gives table showing the sources of ore supply, and discusses hematite pig-iron, quality, grading, etc. Ir & Coal Trades Rev—March 3, 1905.

American.—See **IRON METALLURGY.**

American Industry.—See **IRON INDUSTRY.**

British.—British Pig Irons for Foundry Use. P. Munnoch. Abstract of a paper read before the Cleveland (Eng.) Inst. of Engrs. Gives typical analyses of pig irons from different districts, and variations in analyses of pig irons, discussing the effect of the various elements, mixing by analysis, etc. 2000 w. Ir Age—Sept. 7, 1905.

Buying.—Buying Pig Iron and Coke. W. G. Scott. Discusses the proper method of buying, and gives the J. J. Case Threshing Machine Co.'s specifications for foundry pig iron and for coke. 4200 w. Foundry—Oct., 1902.

Casting and Conveying.—See **CASTING MACHINE.**

Chemical Specifications.—See **Specifications; FOUNDRY; IRON.**

Classification and Valuation.—See **Grading; Quality; Valuation.**

Commercial Aspect.—Pig-Iron in Its Commercial Aspects. F. M. Thomas. Abstract of a lecture delivered before the Birmingham (Eng.) Metallurgical Society. Considers methods of casting, commercial uses, grading, relative values, selection, testing, etc. 6000 w. Ir & Coal Trds Rev—Sept. 23, 1904.

Comparative Costs.—The Cost of Production of Pig Iron in America, Great Britain and Germany (Die Gestehungskosten des Amerikanischen Roheisens im Vergleich zu Grossbritannien und Deutschland). O. Simmersbach. Comparative tables and statistics. 1600 w. Glückauf—May 16, 1903.

Cost in United States.—See **IRON METALLURGY.**

Desulphurizer.—The Use of Manganese Ore as a Desulphurizer in the Melting of Pig Iron (Ueber die Verwendung von Manganerzen als Entschwefelungsmittel beim Schmelzen von Gusseisen). Dr. Wedemeyer. With analyses from a number of trials, showing the beneficial action of manganese ore in remelting. Two articles. 5000 w. Stahl u Eisen—Nov. 15, Dec. 1, 1904.

Gases.—Gases in Pig Iron (Ueber Gase im Roheisen). E. Nümkes. Describing the method of determining gases contained in melted pig iron; with results of analyses. 2500 w. Stahl u Eisen—Jan. 1, 1904.

German.—The Progress and Manufacture of Pig Iron In Germany since 1888. W. Bruegmann. Read at meeting of the Iron and Steel Inst. The present article discusses the economic aspect of the industry, the development, the localities, etc. Serial. 1st part. 5300 w. Engng—Sept. 5, 1902.

Germany's Progress in the Manufacture of Pig Iron Since 1880. Facts taken from a paper by W. Bruegmann, presented at the Düsseldorf meeting of the British Iron & Steel Inst. 3500 w. Ir Age—Nov. 13, 1902.

German Foundry.—See **FOUNDRY.**

Grading.—Erratic and Systematic Grading of Pig Iron by Analysis. Thomas D. West. A discussion of the methods adopted in grading pig iron by analysis, with suggestions aiming to bring about uniformity. 1600 w. Jour Am Found Assn—March, 1901.

The Sampling and Grading of Pig Iron. Herbert E. Field. Describes method and shows its accuracy. 1500 w. Found—April, 1901.

Discussion on the Grading of Pig Iron. 19,200 w. Jour Am Found Assn—June, 1901.

The Testing and Classification of Pig Iron and Castings (Zur Frage der Prüfung, Beurtheilung und Eintheilung von Giessereiroheisen und Gusseisen). B. Osann. A review of the standard specifications of the American Foundrymens' Association, with comments. 3000 w. Stahl und Eisen—March 15, 1902.

The Classification and Valuation of Pig Iron (Einteilung und Bewerfung des Giessereiroheisens). Oscar Simmersbach. With especial reference to the grading of German pig iron according to the percentage of silicon. 3000 w. Glückauf—Nov. 19. 1904.

A Classification System for Foundry Pig Iron (Klassifikations-Vorschläge für Giessereiroheisen). Dr. Wüst. A discussion of the composition and properties of German irons and a proposition to grade them according to the use to which the castings are to be applied. Three articles. 9000 w. Stahl u Eisen—Feb. 15, March 1, 15, 1905.

Pig Iron Grading by Analysis. Hambden Buel. Abstract of a paper read before the Am. Soc. for Test Materials. Describes the method followed by the Central Iron & Coal Co., Holt, Ala. 1400 w. Ir Age—July 20, 1905.

See also **Quality; Sampling; Valuation; FOUNDRY.**

Machine Cast.—See **Sandless; CASTING MACHINE—Foundry Pig Iron.**

Quality.—The Quality of Pig Iron for Foundry Use as Shown by Fracture and Analysis. S. B. Patterson. Read before the New England Found. Assn. Considers those influences exerted by the ordinary elements to be found in pig iron which are generally accepted as established, and things affecting the quality of castings. 4700 w. Ir Age—May 21, 1903.

How to Determine the Quality of Pig Iron. S. B. Patterson. Read before the New England Found. Assn. Considers the influences exerted by the ordinary elements and treatment. 3500 w. Foundry—Aug., 1903.

See also **Grading; Sampling; Valuation.**

Raw Material Value.—The Calculation of the Value of the Raw Material in Pig Iron Making. A. P. Gaines. Describes the method adopted by the writer for determining the relative value. 2500 w. Ir Age—April 14, 1904.

Refining.—A New Process for Refining Pig Iron. J. B. Nau. Describes a method devised with the aim of applying it to the preliminary and partial refining of pig iron too high in silicon and phosphorus to be treated economically in the open hearth furnace. Treats of refining pig iron by means of iron ores. Serial. 1st part. 3800 w. Ir Age—March 23, 1905.

See also **BESSEMER PROCESS; IRON METALLURGY; OPEN-HEARTH PROCESS; STEEL METALLURGY.**

Sampling.—Sampling Pig Iron. W. G. Scott. Discusses methods of sampling, and mixing by analysis. Serial. 1st part. 2500 w. Foundry—Feb., 1901.

See also **Grading.**

Sandless.—Machine Cast Sandless Pig Iron. Edgar S. Cook. Read before Am. Soc. for Test. Materials. Its relation to the standardizing of pig iron for foundry purposes is discussed, and its advantages stated. 5200 w. Ir Age—July 9, 1903.

See also **CASTING MACHINE.**

Sieg District, Germany.—The Pig Irons of the Sieg District and their Utilization (Das Roheisen des Siegerlandes und seine Verarbeitung). Hr. Münker. An account of the different varieties of pig iron made in this Rhenish-Prussian district, and of their further use in the manufacture of iron and steel. 1400 w. Zeitschr d Ver Deutschr Ing—Dec. 28, 1901.

Specifications.—Buying Pig Iron on Specification. Herbert E. Field. Read at meeting of the Am. Found. Assn. Considers the specification and its use. 2400 w. Foundry—Sept., 1903.

Chemical Specifications for Pig Iron. Edgar S. Cook. On the grading by chemical analysis and the difficulties besetting the accurate determination of the composition of sand-cast pig. Also discussion. 4500 w. Trans Am Inst of Min Engrs—Feb., 1904.

Standard Specifications for Pig Iron and Iron Products. Gives the specifications proposed by a sub-committee of the Am. Soc. for Testing Materials. 7000 w. Trans Am Inst of Min Engrs—Sept., 1904.

Chemical Specifications for Pig Iron. B. F. Fackenthal, Jr. A discussion of the paper by Edgar S. Cook. 1500 w. Trans Am Inst of Min Engrs—Feb., 1904.

See also **Buying; CASTING; FOUNDRY; TESTING.**

Sulphur Loss.—See **IRON ANALYSIS.**

U. S., Southern.—Notes on Southern Pig Iron. Eliot A. Kebler. Read before the Pittsburg Found. Assn. Information of interest. 1200 w. Ir Age—Nov. 17, 1904.

Valuation.—The Valuation of Pig Iron for Foundry Purposes. Dr. Richard Moldenke. Discusses the opinions advanced in regard to the writer's suggestion for standard methods of valuing pig iron. 2000 w. Jour Am Found Assn—March, 1903.

See also **Grading; Quality; FOUNDRY.**

Warrant System.—Scotch Pig Iron Warrants. Editorial discussing the change which seems to be affecting the pig-iron trade in Scotland. Explains the system of storing iron, how it originated, the manner of conducting business, &c. 2800 w. Engng—June 12, 1903.

Pig Iron Warrant System and the Foundry George H. Hull. Read before the Am. Found. Assn. Discusses this question in connection with the proposed letting of a contract for the large amount of castings in connection with the Pennsylvania R. R. Tunnels in New York. 3300 w. Ir Trd Rev—June 23, 1904.

See also **OVER-PRODUCTION.**

PILE.

See also **BREAKWATER; BRIDGE; BULKHEAD; COFFERDAM; DOCK; FOUNDATION; HARBOR; PIER; PILE DRIVING; SEA WALL; WHARF.**

Australian Hardwood.—See **TIMBER.**

Boston Foundation.—See **Worm Eaten; FOUNDATION—Boston.**

Concrete.—Concrete Piling. An illustrated description of the method of utilizing concrete piles in the improvements made at the Washington Barracks. The concrete is rammed into an iron pipe, which is subsequently withdrawn. 600 w. Sci Am—March 26, 1904.

Improved System of Concrete Piling. The report of the Committee on Science and the Arts on the invention of Frank Shuman. 700 w. Ills. Jour Fr Inst—Dec., 1905.

See also **Simplex; Timber Concrete.**

Concrete Corrugated.—See **FOUNDATION—Letterman Building.**

Concrete Reinforced.—Concrete Piles of the Hennebique System. Illustrated abstract of a paper by Leopold Mensch before the Civil Engineers' Club of Cleveland, Ohio, describing solid reinforced piles on the Hennebique system. 600 w. Eng Rec—Dec. 27, 1902.

The Use of Reinforced Concrete Piles for the Foundation of the Berlin Court House (Die Gründung des Amtsgerichtsgebäudes auf dem Wedding in Berlin mit Betoneisen Pfählen). H. Hertel. Describing the construction of the piles and the method of sinking them. 3500 w. Beton u Eisen—4 Heft, 1903.

The Construction and Use of Concrete-Steel Piles in Foundation Work. Illustrated detailed description of the principal forms which have been employed. 4500 w. Eng News—March 10, 1904.

Reinforced Concrete Piles with Enlarged Footings for Underpinning a Building. J. Albert Holmes. A brief description of work in Boston, underpinning exterior walls of a building erected on filled land. Ills. 500 w. Eng News—June 16, 1904.

European Reinforced Concrete Piles. Abstract of a paper by A. R. Galbraith, presented to the Assn. of Munic. & Co. Engrs. The methods of manufacture, the driving, and the various types of molded piles are discussed. 2500 w. Eng Rec—July 22, 1905.

See also **CONCRETE REINFORCED.**

Concrete Sheathing.—See **CONCRETE REINFORCED—Pile Sheathing.**

Concrete, U. S. Naval Academy.—Concrete Piles at the United States Naval Academy. Walter R. Harper. Illustrates and describes foundation work of the academic building at Annapolis, Md. 2400 w. Eng Rec—March 4, 1905.

Dam Foundation.—See **FOUNDATION—Dam, McMechen, W. Va.**

Foundation.—See **FOUNDATION.**

Hennebique.—See **Concrete Reinforced.**

Interlocking Steel.—See **Steel Sheet; COFFERDAM.**

Iron.—Sinking and Testing an Iron Pile. Describes the method of sinking a pile of Hoboken, N. J., at the foot of pier C in the North River. 1600 w. Eng Rec—Aug. 30, 1902.

Metal.—See **Iron; Steel Sheet; DOCK—Lorain, O.**

Pulling and Blasting.—Methods and Costs of Pile Pulling and Pile Blasting. Describes methods used, a sweep pile puller, a tripod pile puller, and the blasting out piles. Ill. 2200 w. Eng News—April 16, 1903.

Ring-Braced Sheet.—Ring-Braced Sheet Piling for Reservoir Construction, Kinston, N. C. George A. Rogers. Illustrates and describes the method of using ring-bracing for holding sheet-piling in place while building a circular reservoir. 500 w. Eng News—June 15, 1905.

Screw.—See **PILE DRIVING.**

Simplex, Concrete.—The Simplex System of Concrete Piling. Constantine Shuman. An illustrated detailed description of this method of constructing foundations, the apparatus used and the process of producing a concrete pile. Also reviews the development, the uses, &c., and gives a general discussion. 7000 w. Pro Engrs Club of Phila—Oct., 1905.

Steel Sheet.—American Steel Sheet Piling. Illustrated descriptions of a number of designs used for cofferdams, mine shafts, wells for foundation piers, and general foundation work. 1100 w. Engr, Lond—Nov. 3, 1905.

Steel Sheet Piling. Describes recent work where this material has been used. 1700 w. Eng News—Nov. 23, 1905.

See also **COFFERDAM; FOUNDATION—Tribune Building, N. Y.; RESERVOIR—New Milford, N. J.**

Strength.—Strength of Piles. C. S. Bihler. Read before the Pacific Northwest Soc. of Engrs. Gives results of some recent tests concerning the strength of long timber columns. Tabulated results, with explanatory notes. 4500 w. Ry & Engng Rev—March 12, 1904.

Supporting Power.—The Supporting Power of Piles. Ernest P. Goodrich. A discussion of the use of the common, tapering, round, wooden pile, driven by the ordinary gravity hammer, and held simply by the contact of the surrounding soil. Ill. 7500 w. Pro Am Soc of Civ Engrs—Dec., 1901.

The Supporting Power of Piles. Letters by E. P. Goodrich and C. Baillairge discussing the supporting power of a pile and its carrying power considered as a column. 1500 w. Eng Rec—Feb. 22, 1902.

The Supporting Power of Piles. Discussion by E. Sherman Gould of paper by Ernest P. Goodrich. 900 w. Pro Am Soc of Civ Engrs—Feb., 1902.

The Supporting Power of Piles. George F. Cotterill. Describes the failure of a timber wharf in Seattle and many experiments on models to determine the strength of the piling in the structures. 3000 w. Eng Rec—March 8, 1902.

Timber-Concrete.—Adhesion of Timber Piles to Concrete. Translated from an article by M. E. Roussel in the "Annales des Travaux Publics de Belgiques," giving an account, with diagrams, of experiments made on a testing machine, conforming to actual practice. 2000 w. Engr, Lond—Aug. 12, 1904.

Worm-Eaten.—Action of Sea Worms on Foundations in Boston Harbor. F. W. Hodgdon. Brief illustrated description of the destruction of timber from the outside by worms. General discussion. 8200 w. Jour Assn of Engng Socs—Aug., 1903.

PILE DRIVING.

See also **FOUNDATION; PILE.**

Notes on Pile Driving. James C. Haugh. Discussion of experience in pile-driving by the writer and members. 3700 w. Jour Assn of Engng Socs. Sept., 1900.

Modern Pile Drivers. Waldon Fawcett. Considers some of the characteristics of modern pile driving machinery, and the severe requirements to be met. Ill. 1000 w. Sci Am—Oct. 4, 1902.

Atchison, Kan., Bridge.—Driving Difficult Piles for a Bridge Renewal. Describes method of building bents across a long railway bridge without interrupting traffic. 600 w. Eng Rec—Jan. 19, 1901.

Boston & Maine Ry.—A New Pile Driver, Boston & Maine R. R. Illustrated description of an exceedingly strong and serviceable machine showing modern improvements. 1000 w. Ry & Engng Rev—Nov. 9, 1901.

Collapsible.—Improved and Combination Collapsible Pile Drivers for Railroad Work. Illustrated descriptions of various types. 2400 w. Eng Rec—March 19, 1904.

Economy.—Why the Nasmyth Steam Hammer Has Not Displaced the Friction-Clutch Pile Driver. Editorial showing how small a part of the working day is spent in actual driving, and suggesting needed improvements in methods of handling the piles, etc., and other details to secure economy. 1000 w. Eng News—July 2, 1903.

Experiment.—The Calculation of Piling (Zur Berechnung der Bohlwerke). Prof. H. Engels. An illustrated description of experiments with wooden stakes driven into sand, and a mathematical discussion of the results as applied to piling and similar work. 2500 w. Zentralblatt d Bauverwaltung—June 3, 1903.

Hudson River Tunnel.—Driving a Test Pile for the Hudson River Tunnel. Interesting illustrated description of a test pile driven at Weehawken. 800 w. Sci Am—April 23, 1904.

Railway.—Railway Pile Drivers. Abstract of a committee report presented at the Minneapolis meeting of the Assn. of Ry. Supts. of Bridges and Buildings. 4400 w. Eng News—Oct. 30, 1902.

San Francisco.—Observations on Driving Piles with a Steam Hammer. J. J. Welsh. Describes work in San Francisco, explaining the conditions. 1000 w. Jour Assn of Engng Socs—Sept., 1904.

Screw.—Machine for Sinking Screw Piles. An illustrated description of the apparatus which has been designed for sinking the piles upon which the tunnels of Pennsylvania R. R. will rest. 800 w. Ir Age—Nov. 12, 1903.

Steam Hammer.—See **Economy; San Francisco.**

Trinity Building, N. Y.—See **FOUNDATION.**

Water Jet.—The Use of a Novel Water Jet for

Driving Piles for the Sandy Hook Proving Ground Railroad Trestle. Sherman A. Jubb. An illustrated description of the method used in pile sinking. 1200 w. Eng News—May 4, 1905.

PILLAR.

See **COLUMN.**

PILOT BOAT.

Port Philip, Australia.—Pilot Steamer for Port Philip Harbor. Illustration and brief description of a steamer constructed completely in Australia. 300 w. 2-page plate. Engng—June 27, 1902.

PILOT LIGHT.

Gasoline Burner.—See **AUTOMOBILE, STEAM.**

PIN.

Chart of Strength.—See **SHAFT—Strength.**

Safety.—See **DIE.**

Strength.—See **SHAFT.**

PING PONG BALLS.

American Manufacture of Ping Pong Balls. Joseph Misko. An illustrated description of the method. 1200 w. Am Mach—Nov. 20, 1902.

PINTSCH GAS.

See **CAR LIGHTING; GAS FUEL; GAS, OIL—Germany; GAS PRODUCER.**

PIPE.

See also **GAS PIPE; PIPE JOINT; PIPE MANUFACTURE; PIPING; STEAM PIPE; TUBE; WATER PIPE.**

Air.—Air Pipes, Sizes Required for Low Velocities. Considers the pressures required under varying conditions, methods of designing systems of piping, giving table and examples illustrating its use. 3000 w. Heat & Vent Mag—Oct., 1905.

Cast-Iron.—See **PIPE MANUFACTURE; WATER PIPE.**

Cast-Iron Specifications.—See **WATER PIPE.**

Covering.—See **STEAM—PIPE COVERING.**

Flanges.—See **FLANGE; PIPE JOINT.**

Heating.—See **HEATING—Hot-Water; Steam.**

Lead.—See **PIPE MANUFACTURE; PLUMBING.**

Mine Timbering.—See **TIMBERING—Iron Pipe.**

Sewer.—See **SEWER—Pipe.**

Stresses.—See **STEAM PIPE; WATER PIPE.**

Structural Work.—The Use of Iron Pipe in Structural Work. Egbert P. Watson. An illustrated summary of its advantages and ready adaptability to a variety of ordinary structural uses, with some figures showing its comparative cheapness. 1800 w. The Engineering Magazine—July, 1903.

Thickness.—Thickness of Pipes. William Burlingham. Gives diagrams embodying the formulae for the thickness of steam and feed pipes for marine work. The method shown is of general application and saves much time. 1800 w. Marine Engng—April, 1902.

Thread.—See **PIPE THREAD.**

Wrought.—Steel and Iron Wrought Pipe. Frank N. Speller. Read at meeting of the Can. Min. Inst. Reviews the results of investigations made of threading and relative durability. Ills. 3000 w. Ir Ag—March 2, 1905.

PIPE COATING.

See **WATER PIPE—Coating.**

PIPE COVERING.

See **STEAM—PIPE COVERING.**

PIPE FITTING.

See also **PIPE JOINT; PIPING; PLUMBING; STEAM FITTING; STEAM PIPE.**

Pipe Fittings. John H. Ryan. Suggestions with illustrations. Serial. 1st part. 800 w. Engr, U S A—Feb. 2, 1903.

Gas.—See **GAS FITTING.**

Standardization.—See **FLANGE; WATER FITTING.**

PIPE FLANGE.

See **FLANGE; PIPE; PIPE JOINT; PIPING; STEAM PIPE.**

PIPE GALLERY.

See **STREET—Opening; SUBWAY.**

PIPE JOINT.

See also **FLANGE; PIPE; PIPE FITTING; PIPING; PLUMBING; STEAM PIPE.**

Unions and Flanges: Their Construction and Merits. Read before the Assn. of Steam Engrs. Discusses the various constructions of union couplings for steam pipes, with a view to determining the best design. 2300 w. Can Engr—Nov., 1904.

Expansion.—Compensating Pipe Connections (Kompensationsrohre). H. Still. Describing various forms of connections to provide for the expansion and contraction of long lines of pipe. 1800 w. Glückauf—Jan. 14, 1905.

High Pressures.—Pipe Joints for High Pressures. U. Peters. Brief illustrated description of joints adapted for pressures up to 7000 pounds per square inch. 350 w. Am Mach—April 18, 1901.

Pipes and Joints for High Pressures. Franklin Riffle. Discusses the several types of pipes and joints that have recently been used for high pressures in the transmission of water, steam and gas, with especial reference to Pacific Coast practice. Ills. 4200 w. Jour Assn of Engng Socs—Sept., 1904.

See also **FLANGE; STEAM PIPE.**

Leaks.—Troubles with and Remedies for Leaky Pipe Joints. C. A. McAllister. Calls attention to conditions that must be fulfilled in designing flanges, and other things requiring attention to secure tight joints. Especially referring to marine work. 1800 w. Marine Engng—Nov., 1902.

Pipe Joints, Gaskets and Leaks. R. T. Strohm. Suggests a number of ways of securing tight joints. Ills. 2000 w. Am Elect'n—Jan., 1905.

Sewer.—See **SEWER—Joint.**

Sewer, Sulphur.—See **SEWER—Joint, Sulphur.**

Swivelling.—A Swivelling Joint for a Sixteen-Inch High Pressure Steam Main. R. E. Curtis. The swivel joints described are used to connect two 16-inch steam mains, at points where the expansion is such as to make some flexible arrangement imperative. Ill. 600 w. Trans Am Soc of Mech Engrs, No. 0937—May, 1902.

Test.—See **FLANGE.**

PIPE LINE.

See **HYDRO-ELECTRIC PLANT; PETROLEUM PIPE LINE; WATER PIPE; WATERWORKS.**

PIPE MANUFACTURE.

See also **PIPE; TUBE MANUFACTURE; TUBE WORKS; WATER PIPE.**

Bartlett-Kent.—The Bartlett-Kent Process for Rolling Seamless Pipe. An illustrated detailed description. 2000 w. Ir Age—April 25, 1901.

Birmingham, Ala.—Modern Pipe Founding. An illustrated description of the work as carried on at the Dimmick Pipe Foundry of Birmingham, Ala., and the United States Cast-Iron Pipe & Foundry Co., at Chattanooga, Tenn. 2500 w. Am Mach—Vol. 28, No. 36.

Cast-Iron.—Cast-Iron Pipe in the United States. The first of a series of articles proposing to enter fully into the commercial conditions of the industry, the details of the methods of manufacture, and the forms of pipe and pipe joints used for water and gas mains and other purposes. Serial. 1st part. 1600 w. Engr, Lond—Feb. 15, 1901.

French Practice in the Manufacture of Cast-Iron Pipes. A. G. Cloake. Read at meeting of Assn. of W. Wks. Engrs. Describes the practical and workmanlike methods; the pipes are cast vertically. 2000 w. Arch't, Lond—Aug. 10, 1901.

English and French Practice in the Manufacture of Cast-Iron Pipes. I. English Practice. Stephen H. Terry. II. French Practice. A. G. Cloake. Two papers read before the British Assn. of Water-Works Engrs. 3700 w. Ir & Coal Trds Rev—Dec. 20, 1901.

Flanging Machine.—See **FLANGING MACHINE.**

Gas.—The History and Manufacture of Drawn Gas Pipe (Geschichte und Fabrikation Gezogener Gasrohre). Anton Bousse. A review of the earlier processes for making lap-welded pipe, and a description of the machinery and methods of manufacturing drawn tubing. Serial. 2 parts. 4500 w. Stahl u Eisen—Oct. 1, 15, 1905.

See also **GAS PIPE—Wrought Iron.**

Lead.—The Theory and Practice of Compression Machines for Making Lead Pipe (Teoria e Pratica delle Macchine a Compressione per Tubi di Piombo). Ernesto Ascione. A complete study of the flow of metals as applied to the production of lead pipe by forcing the metal through dies. 7 articles. 12,000 w. L'Industria—Nov. 13, 20, 27, Dec. 4, 11, 18, 25, 1904.

The Relative Values of Hydraulic-Drawn and Hand-Made Lead Pipes and Traps. Thomas Daye. Considers the advantages of lead over iron pipes, and the processes of making the drawn and hand-made pipes, concluding that the latter are more likely to be free of impurities, but should be made without a soldered seam. 3500 w. Plumb & Dec—April 1, 1905.

Locking Bar.—The Manufacture of Locking-Bar Pipes in Western Australia. Stafford Ransome. Illustrates and describes the making of the Ferguson locking-bar water pipe at Falkirk, Western Australia. 2400 w. Engr, Lond—Nov. 29, 1901.

Massillon.—Pipe Foundry of the Massillon Iron & Steel Company, Massillon, O. Illustrated detailed description of the plant and its equipment. 1200 w. Foundry—Nov., 1903.

Metal Mixers for Pipe Foundries. J. B. Nau. Read before the Am. Found. Assn. Remarks on European practice in pipe foundries, and the advantages of the heated mixer. 1700 w. Ir Age—June 8, 1905.

Molding Without Patterns.—Molding Pipes Without Patterns. Francis W. Shaw. Explains in detail a method which enables molding operations to be commenced immediately. Ill. 900 w. Am Mach—Oct. 2, 1902.

Rotary Mold.—Casting Pipe in a Rotary Mold. C. B. Stravs. Describes a process of producing pipes and hollow ingots by centrifugal force, giving results obtained. Ills. 1500 w. Ir Age—Sept. 7, 1905.

Seamless.—See **BOILER MANUFACTURE; TUBE MANUFACTURE.**

Steel.—A New Method of Manufacturing Steel Pipe. Illustrates and describes the manufacturing methods used in making the pipe for the long pipe line to carry water to Coolgardie, Australia, the important gold mining district. 1400 w. Sci Am—March 30, 1901.

Welded.—The Manufacture of Welded Pipe. Victor Beutner. Reviews the history of tube manufacture, the material used, the design of pipe mills, the pipe welding furnace, and the bending furnace in the present number. Ill. Serial. 1st part. 4300 w. Ir Age—Feb. 4, 1904.

The Manufacture of Welded Pipe. Victor Beutner. An illustrated article reviewing the development and fully describing the process of manufacture. General discussion. 6500 w. Pro Engrs' Soc of W. Penn—Jan., 1904.

Weldless.—See **Bartlett-Kent; TUBE MANUFACTURE.**

PIPE THREAD.

See also **PIPE—Wrought; SCREW THREAD.**

On Pipes and Pipe Threads. Engravings and remarks on the trouble caused by not following the standard proportions, suggesting that the name of the maker be stamped on the pipe with the quality of the material, and the pressure to which the pipe has been tested. 1800 w. Locomotive—Jan., 1902.

Concerning Pipe Threads. A supplementary article to two others on this subject, giving further facts in relation to pipe threads. Ills. 4000 w. Locomotive—Jan., 1905.

British.—British Pipe Theads. W. H. Booth. An explanation of past and present practice in Great Britain. 2000 w. Am Mach—Vol. 28, No. 30.

Gauge.—See **GAUGE—Pipe Thread, Briggs.**

PIPE WORKS.

See **PIPE MANUFACTURE; TUBE WORKS.**

PIPING.

See also **STEAM PIPE.**

Something About Piping. W. H. Wakeman. Suggestions concerning the location and operation of pipes in steam plants. 1400 w. Power—April, 1904.

Boiler.—Piping a Double Boiler. An illustrated description of a vertical boiler and its attendant piping with an account of the work done. 1400 w. Met Work—Jan. 3, 1903.

See also **STEAM PIPE.**

Electric Station.—Piping and Power Station Systems. William L. Morris. This chapter deals with improper piping, explaining the necessity of better systems, and suggesting methods of securing better work. Ills. 5000 w. St Ry Rev—Nov. 20, 1904.

See also **STEAM PIPE.**

Feed-Water.—Feed-Water Piping. C. G. Robbins. Illustrates and describes many of the arrangements. 1500 w. Power—April, 1902.

Feed-Water Mains and Branches. Illustrates and describes several arrangements, discussing their advantages. 1800 w. Power—June, 1902.

See also **FEED-WATER HEATING; PUMP—Feed Water.**

Feed-Water and Blow-Offs.—Piping for Feed Water and Blow-Offs. C. B. Risley. Discusses methods of feeding, and arrangements for blowing off. 1500 w. Engr, U S A—Dec. 1, 1903.

High Pressure.—See **STEAM PIPE.**

Marine Engineering.—Marine Engineering Design—The Pipe Arrangement. J. Calder. Diagram of water and steam connections for the triple-expansion engine and auxiliary machinery of a modern freight steamer of 1,500 I. H. P. and 10 knots speed is given, with explanatory notes. 1200 w. Marine Engng—Feb., 1903.

See also **STEAM PIPE.**

Pump.—Pump Piping. W. H. Smead. Describes some of the most practical ways of connecting pumps. Ills. Serial. 1st part. 1200 w. Engr, U S A—April 1, 1905.

See also **PUMP.**

Specifications.—Specification for Steam, Exhaust, Water and Condenser Piping for an Electric Power Station. A specification intended to cover the complete installation of steam piping, exhaust piping, injection and discharge piping, drain drip, blow-off and boiler feed piping, water piping, &c. 3600 w. Stevens Ind—Oct., 1901.

Steam.—See **STEAM PIPE.**

Steam Heating.—See **HEATING—Steam, Low Pressure.**

Stresses.—See **STEAM PIPE; WATER PIPE.**

Thickness.—See **PIPE.**

Traps.—See **STEAM TRAP.**

Water.—See also **WATER PIPE.**

PISTOL.

Luger Automatic.—The Luger Automatic Pistol. Grahame H. Powell. An illustrated description of the weapon and its operation. 1000 w. Am Mach—May 16, 1901.

Mars Automatic.—A New Automatic Pistol. Illustrated description of the Mars pistol and its operation. 1200 w. Engr, Lond—Dec. 6, 1901.

PISTON.

See also **PISTON RING; PISTON ROD; STEAM ENGINE.**

The Strength of Pistons (Festigkeit von Scheibenkolben). A mathematical examination of the stresses and strains in steam-engine pistons, especially those of the solid disc form. 1000 w. Zeitschr f Ver Deutscher Ing—Oct. 5, 1901.

Acceleration.—A Graphical Determination of Piston Acceleration. J. N. Le Conte. Presents a method for finding the acceleration of the crosshead for any given angular position of the crank. 1000 w. Trans Am Soc of Mech Engrs, No. 0953—May, 1902.

Centering.—Centering a Piston. H. H. Kelley. Illustrated suggestions for doing this work. 2200 w. Engr, U S A—Aug. 1, 1901.

Centering a Piston. H. H. Kelley. Explains why the piston should occupy a perfectly central position, the tools necessary, and the method of doing the work. Ill. 2100 w. Mod Mach—Dec., 1901.

Gas Engine.—Making Gas-Engine Pistons. R. F. Garland. Illustrates and describes tools and methods for this work. 2400 w. Am Mach—July 14, 1904.

Packing Ring.—See **PISTON RING.**

Speed.—See **STEAM ENGINEERING—Piston Speed.**

Strength.—The Strength of Pistons of Steam Engines (Contribution à l'Etude de la Resistance des Pistons des Machines à Vapeur). Hector Pouleur. A mathematical discussion of the forces acting on pistons and their resistance. 7000 w. Rev Univ d Mines—April, 1902.

The Strength of Pistons of Steam Engines

(Conditions de Résistance des Pistons des Machines à Vapeur). M. Codron. An extensive mathematical discussion of the different stresses and strains in pistons of steam engines. Diagrams. Serial. Part I. 7500 w. Rev de Mécanique—May 31, 1903.

PISTON RING.

See also **PISTON.**

Piston Rings of Steam Engines (Conditions d'Etablissement des Anneaux de Piston des Ma- discussion of the pressures on, and proper di- chines à Vapeur). E. Déthiollas. An illustrated mensions of, piston rings to avoid unnecessary strains. 1300 w. Rev Technique—March 10, 1903.

Cast-Iron. — Cast-Iron for Piston-Rings. C. H. Wingfield. Read before the British Assn. Considers the permanent set in cast-iron due to small stresses, and its bearing on the design of piston-rings, and springs. Ill. 2500 w. Engng—Sept. 18, 1903.

Elastic.—Elastic Piston Rings (Selbstspannende Kolbenringe). K. Reinhardt. A mathematical investigation of the forces acting in elastic spring packing rings for steam engine pistons, with tables for practical use and examples of their application. Two articles. 10,000 w. Zeitschr d Ver Deutschr Ing—Feb. 16, March 16, 1901.

Explosive Engines.—Piston Rings of Explosive Engines—Two Methods of Manufacture. Hugh D. Meier. Describes methods of manufacture that will give perfect piston rings. Ill. 1600 w. Horseless Age—June 18, 1902.

Gas Engines.—Piston Rings in Gas Engine Construction. J. Edward Baldwin. Reports a series of tests made on the effect of various degrees of compression and various mixtures. 900 w. Horseless Age—June 11, 1901.

Gas Engine Piston Rings. James F. Hobart. Discusses the forms of rings, and how to make a nice wearing ring. 2200 w. Am Elect'n—July, 1902.

Packing.—Piston Heads and Packing Rings. J. H. Dunbar. Practical comments on the design and operation of steam engine pistons. Ill. 3000 w. Mach, N Y—July, 1902.

Notes on Packing Rings for Piston Heads. Amos Price. Gives points on this subject brought out in recent discussion. Ill. 900 w. Am Mach —Dec. 24, 1903.

Pistons and Packing Rings. Amos Price. Reports ideas advanced at a recent meeting of an engineer's society when this subject was discussed. Ill. 1700 w. Am Mach—Feb. 4, 1904.

PISTON ROD.

Extension.—Extension Piston Rods and Wear of Locomotive Cylinders. J. L. Doherty. Statements, with illustrations, bearing upon this subject, and the writer's opinion. 1800 w. R R Gaz—June 14, 1901.

See also **LOCOMOTIVE, COMPOUND.**

High Speed Engines.—See **STEAM ENGINE—Piston Rods.**

Packing.—See **PACKING—Piston Rod.**

PITCHBLENDE.

See **CARNOTITE; RADIOACTIVITY; URANIUM.**

PIT HEAD.

See also **COAL MINE; HEAD FRAME; MINE SHAFT.**

Air-Tight.—See **MINE SHAFT.**

PITOT TUBE.

See **GAS FLOW—Pipes; WATER FLOW—Pitot Tube.**

PLACER MINING.

See **GOLD; GOLD DREDGING; GOLD MINING; HYDRAULIC MINING.**

PLANER.

See also **MACHINE SHOP; MACHINE TOOL.**

96-Inch Planer, with Friction Clutches, Operated by Air. Illustrated description of a planer intended for work not exceeding 96 ins. wide, 96 ins. high and 20 ft. long. 1100 w. Ry & Loc Engng—March, 1905.

Berlin Works.—See **MACHINE TOOL.**

Bilgram.—See **GEAR CUTTING.**

Circular Attachment.—Circular Planing Attachment. Illustrated description showing how the steam chest of a laundry mangle was machined to fit the ironing roller. 600 w. Am Mach—May 22, 1902.

Curved Surface.—The Planing of Curved Surfaces. Howard A. Coombs. Illustrates and describes some of the attachments to and modifications of planing machines, to adopt them to the finishing of curved instead of plane surfaces. Serial. 1st part. 1000 w. Am Mach—April 21, 1904.

Cutting Test.—Cutting Test on Metal Planer. J. C. Steen. Describes a cutting test made during the regular progress of the work through the shop, on a casting weighing 8,000 lbs. 700 w. Am Engr & R R Jour—Sept., 1904.

Cycloidal Curves.—Planing Cycloidal Curves. Howard A. Coombs. Illustrates and describes machines for planing the cycloidal surfaces of the "revolvers" of blowers, rotary pumps, etc., which partake of some of the characteristics of both planers and gear cutters. 1200 w. Am Mach—Vol. 27, No. 52.

Design.—Important Improvements in Planer Design. Illustrates and describes some recent planers which show that some very radical changes in design have been made with surprising results. 2000 w. Am Engr & R R Jour —Oct., 1904.

Some Features in the Design and Construction of American Planing Machines. Archibald Kenrick, Jun. Remarks are largely confined to the methods observed in a Cincinnati shop. 1500 w. Ills. Inst of Mech Engrs—Jan. 20, 1905.

Drives.—Planing Machine Drives. C. H. Benjamin. Discusses this subject with special reference to American practice in motor connection, and gives an illustrated description of a method exhibited at the St. Louis Exposition. 2200 w. Cassier's Mag—June, 1905.

See also **Electric Driving; Mechanism; Reversing Gear; MACHINE TOOL.**

Early Inventions.—Some Early Planer Inventions. H. C. Coombs. Illustrates and describes interesting machines of machine tool designs in England. 700 w. Am Mach—Jan. 2, 1902.

Electric Driving.—Driving Planers. J. C. Steen. Remarks on the variable power required as revealed by the individual motor drive. 600 w. Am Engr & R R Jour—May, 1903.

Motor-Driven Machine Tools. Explains the conditions to be considered when arranging for a planing machine drive. Ill. 2200 w. Am Engr & R R Jour—Feb., 1904.

A Test of a Motor Driven Planer. J. C. Steen. An account of an interesting test, with diagrams. 800 w. Am Engr & R R Jour—Aug., 1904.

Electrically Driven Planer with Speed-Changing Countershaft. Illustrated description of Pond planer with Crocker-Wheeler motor. 1000 w. Am Mach—Vol. 27, No. 34.

See also **Reversing Gear; ELECTRIC DRIVING.**

Gear Cutting.—See **GEAR CUTTING—Planer.**

Gleason.—See **GEAR CUTTING—Planer.**

High Speed.—High-Speed Planers. A. L. De Leeuw. Discusses planing machine driving and the adapting of planers to the use of high-speed steel. 10,000 w. Mach, N Y—June, 1905.

Link Fixture.—A Link Planing Fixture. Nicholas B. Miller. Illustrates and describes an attachment used for planing links, link blocks and quadrants. 500 w. Am Mach—June 13, 1901.

Locomotive Frame Plates.—Planing Machine for Locomotive Frame Plates. Brief illustrated description of a fine planing-machine built at Leeds, Eng. 600 w. Engng—July 21, 1905.

Magnetic Clutch.—See **CLUTCH—Magnetic Planer.**

Mechanism.—Some Inventions in Planer Driving and Reversing Mechanisms. Howard A. Coombs. Illustrates and describes some ingenious devices. 2500 w. Am Mach—Jan. 30, 1902.

See also **KINEMATICS—Quick Return.**

Modern.—Modern Planers. Brief, illustrated descriptions of various types, with general remarks. 4500 w. Cassier's Mag—Dec., 1904.

Pit-Type.—Turbine Planing Machine. Illustrated detailed description of a pit-type planing machine for turbine construction. 500 w. Engr, Lond—Oct. 13, 1905.

Possibilities.—The Possibilities of the Planing Tool. W. A. Warman and R. B. Cochrane. An illustrated article on the satisfactory use that may be made of the planing tool in removing stock and machining a true surface. 800 w. Am Mach—May 2, 1901.

Reversing Gear.—New Automatic Reversing Gear for Electrically-Driven Planers. J. William Chubb. Illustrated description of a system devised by Vickers, Sons & Maxim, Ltd., which consists of a variable-speed motor combined with special switches mounted on the planer and worked from the driving gear. 900 w. Am Mach—Vol. 28, No. 40.

Rotary.—New 60-inch Portable Rotary Planing Machine. Emile Guarini. Brief description, with illustration, of an interesting machine manufactured in Philadelphia. 800 w. Prac Engr—June 10, 1904.

Scotch.—Heavy Vertical and Horizontal Planing Machine. Illustration and brief description of a machine made in Scotland. 600 w. Engng—June 2, 1905.

Shop.—Some Points About a Planer Shop. Discusses accurate planing, alignment of uprights, keeping planers leveled, gear testing, etc. Ill. 1800 w. Am Mach—March 5, 1903.

See also **MACHINE SHOP; MACHINE WORKS.**

Special Tools.—Special Tools for Rapid Planer Work. E. E. Wood. Illustrates and describes devices for the rapid planing of lathe beds. 800 w. Am Mach—Jan. 14, 1904.

See also **TOOL.**

Turbine.—See **Pit Type.**

Variable Speeds.—Variable Speeds for the Planing Machine. Frank B. Kleinhans. Illustrates and describes methods of obtaining variable speed. 1200 w. Am Mach—Dec. 17, 1903.

A New Variable Speed Planer with Air-Actuated Friction Clutches. Illustration, with description. 1200 w. Am Mach—Vol. 28, No. 9.

See also **VARIABLE SPEED.**

PLANIMETER.

See also **INDICATOR DIAGRAM; INTEGRAPH; INTEGRATOR.**

The Planimeter, Explained Simply, Without Mathematics. W. J. Tennant. Abstracted from a paper read before the Inst. of Jr. Engrs. Explains the use of this instrument in making calculations. Ill. 2500 w. Engr, Lond—Jan. 16, 1903.

Castings Weight.—See **CASTING—Weight Calculation.**

Coradi.—Description and Theory of Coradi's Rolling Ball Planimeter. J. W. Beardsley. Illustrated description. 3500 w. Jour Assn of Engng Soc—Feb., 1902.

Hatchet.—An Improved Arrangement of the Hatchet Planimeter. Frank B. Kleinhans. Shows the method of using the instrument. Ill. 800 w. Am Mach—July 17, 1902.

Integrating.—A New Integrating Planimeter, with a Proof of the Theory of Planimeters as Applied to the Integrating Pattern. Ill. 2000 w. Feilden's Mag—Aug., 1903.

Theory.—The Theory of Planimeters. G. B. Upton. Aims to show that a theory of planimeters can be developed which shall be simple and general, with a minimum of mathematics. 1500 w. Sib Jour of Engng—Dec., 1905.

PLANT.

See also **BOILER PLANT; ELECTRIC PLANT; HYDRO-ELECTRIC PLANT; MECHANICAL PLANT; POWER PLANT; STEAM PLANT;** etc.

Appraisal.—See **VALUATION.**

PLASTER.

America.—See **CEMENT.**

Hardening.—See **CEMENT.**

PLASTERING.

Winter.—Difficulties and Methods of Plastering in Winter. D. L. Haigh. Considers the causes of trouble and the means of avoiding them. 3000 w. Eng Rec—March 5, 1904.

PLASTER OF PARIS.

See also **GYPSUM.**

Tests for Plaster of Paris. Explains the composition and attending chemical and physical facts, showing a method of testing based on scientific data, and giving results of trials made by the writer. 1500 w. Stone—Feb., 1903.

Plaster-of-Paris (Le Platre). J. Malette. A general discussion of the nature and properties of calcined gypsum as a material of construction. 3000 w. Revue Technique—Oct. 25, 1904.

Brass Founders' Flux.—See **BRASS FOUNDRY—Flux.**

Flux.—See **BRASS FOUNDRY.**

Foundry.—See **FOUNDRY—Plaster of Paris.**

Manufactures.—The Manufacture of Plaster of Paris (Procédé de Fabrication du Platre). Louis Périn. With illustration of the Périn furnace and description of the process of manufacture. 2500 w. Génie Civil—Dec. 31, 1904.

Prisometre.—The Setting of Plaster of Paris (Etude des Conditions de Prise du Platre). Louis Périn. A description of the "Prisometre" devised by the writer to determine the rate of setting of plaster. 1000 w. Génie Civil—June 4, 1904.

PLATE.

See also **ARMOR PLATE; BOILER PLATE; MATERIALS' STRENGTH; TESTING.**

Thickness of Plates Encastré. George E. Barrett. Formulas for calculating the thickness of flat cast plates, such as steam chest and cylinder covers. 700 w. Am Mach—July 25, 1901.

The Strength of Flat Plates. Albert E. Guy. Criticizes an article by George E. Barrett, and compares the formulas given in his article with those of Grashof. Serial. 1st part. 1800 w. Am Mach—Oct. 10, 1901.

The Computation of the Flexure of Rectangular Plates (Le Calcul des Pièces Rectangulaires Fléchies). A. Mesnager. An application of the elastic theory to plates and thin beams, deducing the fundamental equations. 2500 w. Ann des Ponts et Chaussées—2 Trimestre, 1901.

Experiments on Sheet Iron Plates (Expériences sur des Bordages en Tôle). M. Galliot. Data and results of tests on flat and buckled plates of sheet iron under hydraulic pressure, with formulas deduced from the experiments. 3000 w. 1 plate. Ann des Ponts et Chaussées—2 Trimestre, 1902.

Comparative Tests of Plain and Riveted Plates. E. J. McCaustland. Results of tests made to determine the relation existing between plates and shapes of structural steel, and the same properties of plates and shapes used collectively in built-up members. 1500 w. Trans Assn of Civ Engrs of Cornell Univ—1903.

Concrete Reinforced.—See **CONCRETE REINFORCED—Floor; Melan; Test.**

Fatigue.—Note on the Failure of an Iron Plate through "Fatigue." Sidney A. Houghton. Read before the Iron & Steel Inst. Describes a case and investigates the causes. 1700 w. Ir & Coal Trds Rev—May 12, 1905.

Heat Effects.—The Influence of Heat Upon Mild Steel Plates (Versuche über die Festigkeitseigenschaften von Flusseisenblechen bei Gewöhnlicher und Höherer Temperatur). C. Bach. A very complete account of exhaustive experiments, with tables and diagrams. 2 articles. 7000 w. 4 plates. Zeitschr d Ver Deutscher Ing—Aug. 27, Sept. 3, 1904.

Spherical.—See **MATERIALS' STRENGTH.**

Stripping.—See **MOLDING.**

PLATE GIRDER.

See **BRIDGE; BRIDGE DESIGN; GIRDER.**

PLATE GLASS.

See **GLASS.**

PLATE LAYING.

See **RAILWAY CONSTRUCTION; TRACK LAYING.**

PLATEWAY.

See **TRACKWAY.**

PLATINUM.

See also **METAL—Rare; MINERAL REGION; MINING INDUSTRY.**

The Platinum Metals. Notes where deposits are found, and the properties of platinum metals in the present article. Serial. 1st part. 2400 w. Aust Min Stand—Jan. 16, 1902.

Platinum and the Platinum Metals. Dr. J. Ohly. Discusses the commercial importance of platinum and begins a review of its history in the present article. Serial. 1st part. 1200 w. Min Rept—March 27, 1902.

Notes on Platinum and Its Associated Metals. James F. Kemp. Describes its occurrence, where found, its association with other minerals, etc. 2000 w. Eng & Min Jour—April 12, 1902.

Platinum. Remarks on the many uses of this metal, its production, the principal deposits known, etc. 1200 w. Aust Min Stand—Sept. 3, 1903.

Assay.—Assay of the Platinum Metals. From "Oest. Zeit. f. Berg- und Hüttenwesen." A description, by Dr. Nordenskjöld, of some analyses which do not appear to be well known, and which are rapid. 3500 w. Eng & Min Jour—Dec. 2, 1905.

Black Sand Concentration.—Concentrating Pavilion of the United States Geological Survey, at Lewis and Clark Exposition. Waldon Fawcett. Brief illustrated description of a structure for experimental work in saving platinum from black sand. 1000 w. Mines & Min—Sept., 1905.

Investigation of Black Sands by the United States Geological Survey. Gives results from the assaying of 195 specimens for gold and platinum, and an account of field work and concentration experiments. 1400 w. Min Rept—Oct. 5, 1905.

British Columbia.—Platinum in British Columbia. R. W. Brock. An account of the conditions under which platinum is found to occur in British Columbia, found thus far in only small quantities. 1400 w. Eng & Min Jour—Feb. 18, 1904.

Deterioration.—Some Notes on Platinum and Its Deterioration. William Campbell. On its crystalline structure, its occlusion of and permeation of gases, its behavior at high temperatures, &c. Ills. 2800 w. Elec-Chem Ind—July, 1904.

Electrolytic Dissolving.—The Electrolytic Dissolving of Platinum by Means of Alternating Currents (Ueber die Elektrolytische Auflösung von Platin Mittels Wechselströmen). Rudof Ruer. An account of experiments on the solubility of platinum in different electrolytes under the influence of alternating electric currents, and theoretical discussion. 2500 w. Zeitschr f Elektrochemie—March 19, 1903.

Galice, Oregon.—See **GOLD METALLURGY.**

Oregon.—Mining Platinum in Southern Oregon. D. H. Stovall. Brief account of the methods for mining and saving platinum recently introduced. 700 w. Min Rept—Nov. 12, 1903.

Queensland Beach Sands.—See **MINERAL REGION.**

Stress Effects.—Microscopic Effects of Stress on Platinum. Thomas Andrews and Charles Reginald Andrews. Experiments are described, with illustrations, showing the behavior of this metal. 800 w. Engng—July 25, 1902.

Structure.—Micro-Crystalline Structure of Platinum. Thomas Andrews. Read before the Royal Soc. An interesting illustrated study. 1000 w. Engng—June 27, 1902.

Sudbury, Canada.—Note of the Condition of Platinum in the Nickel-Copper Ores from Sudbury. Charles W. Dickson. Gives results of experimental investigations. 1100 w. Am Jour of Sci—Feb., 1903.

Test.—Test for Platinum (Die Platinprobe). Dr. Nordenskjöld. Reprint from "Tekinsk Tidskrift," giving chemical processes for determining platinum, iridium, etc. 1800 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 9, 1905.

Ural, Russia.—The Occurrence of Platinum in the Ural Mountains. Chester W. Purington. Gives citations from Russian authors, and recent papers on platinum, with translation from the "Bul. of Gold Min. Ind.," St. Petersburg. "Concerning the Iss Platinum-bearing Region and the Distribution of Platinum in the Ural in General." Maps. 2000 w. Eng & Min Jour—May 5, 1904. Serial. 1st part.

Working.—The Working of Platinum. John G. Niederer. Interesting facts regarding the peculiarities of this valuable metal. 900 w. Am Mach—Nov. 15, 1900.

Wyoming.—The Discovery of Platinum in Wyoming. Wilbur C. Knight. An account of the discovery, with assays made from samples. 800 w. Eng & Min Jour—Dec. 28, 1901.

See also **COPPER.**

PLOW.

See **AGRICULTURAL MACHINERY.**

PLUMBER.

See also **PLUMBING.**

Sanitary Expert.—The Plumber as a Sanitary Expert. James Allison. Explains why legislation is needed to control this industry, and the importance of education. 2500 w. Dom Engng—Aug. 15, 1901.

PLUMBING.

See also **BATH; DRAINAGE; HEATING; HEATING AND VENTILATION; HOT WATER; MECHANICAL PLANT; PLUMBER; SANITATION; SEWER; SEWERAGE; SEWAGE DISPOSAL; SOLDERING.**

The Drainage of a House. William Paul Gerhard. Discusses progress made in house sanitation; the essential points of sanitary plumbing; the construction and fundamental requirements. 3500 w. Dom Engng—Nov. 15, 1900.

Essential Features of House Drainage. Rudolph Hering. Considers in detail the requirements of a perfect system of house drainage. 4900 w. Dom Engng—Dec. 20, 1900.

Sanitary Fittings and Plumbing. The introduction to a series of articles discussing modern practice. Serial. 1st part. 2000 w. Builder—Jan. 5, 1901.

Sanitary Appliances. W. C. Tyndale. Illustrated discussion of the fittings used in the house mainly. 4300 w. Jour San Inst—April, 1901.

House Drainage. W. C. Tyndale. Illustrated discussion of methods. 5000 w. Jour San Inst—April, 1901.

The Theory and Practice of Plumbing. Charles L. Hubbard. The first of a series of illustrated articles designed to be helpful to both the apprentice and skilled mechanic. Serial. 1st part. 1000 w. Dom Engng—Oct. 25, 1902.

House Drainage. A. B. Raymond. Read before the Mich. Engng. Soc. On the proper manner of constructing the drains and pipes. 2000 w. Munic Engng—July, 1902.

House Drainage. A. B. Raymond. From a paper read before the Mich. Engng. Soc. Shows where the danger lies in present practice and the forms of construction employed to prevent danger. 2200 w. Dom Engng—June 25, 1903.

The Inefficiency of Modern House Drainage. William R. Purchase. Discusses the defects of stone-ware pipe, and considers needed improvements. 1400 w. Builder—Sept. 19, 1903.

Modern Plumbing. R. M. Starbuck. A practical review of the requirements of good plumbing. Ills. Serial. 1st part. 2000 w. Archts & Bldrs Mag—Nov., 1904.

Ansonia Hotel.—Water Supply Systems in the Ansonia Apartment Hotel. Illustrated description of the supply for a very large 17-story steel and iron building in New York, with housekeeping and family hotel apartments for 1300 tenants. 3000 w. Eng Rec—Nov. 1, 1902.

See also **MECHANICAL PLANT.**

Butterick Building, N. Y.—Plumbing in the Butterick Building, New York. Illustrated detailed description of the water supply and drainage system in a large mercantile and office building. 2000 w. Met Work—Dec. 9, 1905.

Carnegie Residence.—Water Supply in the Carnegie Residence, New York. Illustrated description of the remarkably complete work in a 70x130 ft. 4-story residence. 3000 w. Eng Rec—July 5, 1902.

Plumbing in the Carnegie Residence, New York. Illustrates and describes the arrangement of the piping, valves, etc., for the pump and filter supplies, the cold-water distribution and the hot-water heating supply and return. 3000 w. Eng Rec—Aug. 2, 1902.

Connections.—See **SEWER.**

Corn Exchange Bldg., New York.—Water Supply and Distribution in the Corn Exchange Bank Building, New York. Describes the general arrangement, giving details of pumps, tanks and drains. Ill. 1200 w. Eng Rec—April 4, 1903.

Drains.—See **SEWER—House Drainage.**

Dunham Residence.—Plumbing Details in the Residence of Dr. E. H. Dunham. Illustrated description of the numerous special features in a large New York residence; these include details of the water-supply apparatus as well as the drainage system. 2200 w. Eng Rec—Dec. 22, 1900.

Durham System.—The Durham System of Plumbing. A serial, in three parts, illustrating and describing this system. Serial. 1st part. 1300 w. Met Work—Nov. 4, 1905.

Farms.—See **WELL BORING.**

Flanges.—See **FLANGE.**

Flat Iron Building, N. Y.—Plumbing in the Flat-Iron Building, New York. Illustrated description of the work in a building of triangular plan, rising 285 feet above the street and exposed on its three sides. 2500 w. Eng Rec—Oct. 4, 1902.

Freezing.—Freezing of Soil and Vent Pipes. A copy of inquiries sent out relating to this subject, and the replies received. 1800 w. Dom Engng—Dec. 20, 1900.

See also **THAWING.**

Hospital, New York.—Plumbing in the Lying-In Hospital, New York. Illustrated description of the special features of plumbing work in a hospital where unusual precautions were taken to have no seams or corners in which dust can collect. 1800 w. Eng Rec—Sept. 7, 1901.

Hotel Manhattan.—Plumbing in the Manhattan Hotel, New York. Illustrated description of the water supply system of a large New York hotel having a filter plant of 600 gallons' capacity per minute. Serial. 1st part. 2000 w. Eng Rec—March 16, 1901.

Hotel, N. Y.—Plumbing in the Park-Realty Building, New York. Illustrates and describes the work in an 80x100-ft. 12-story family hotel. 1300 w. Eng Rec—Dec. 7, 1901.

Plumbing in the Hotel Wellington, New York. Illustrated description of hotel equipment, including 130 private bath and toilet rooms. 2700 w. Eng Rec—Feb. 1, 1902.

Water Supply and Drainage Systems in the Lorraine Hotel, New York. Illustrates and describes interesting details of systems used in a thirteen-story apartment hotel. 2500 w. Eng Rec—Jan. 9, 1904.

Joint Wiping.—Difficult Joint Wiping. An illustrated article describing methods of making wiped joints in difficult positions. 2000 w. Met Work—Sept. 16, 1905.

Laws.—See **Regulations.**

Lead Burning.—The Art and Practice of Lead Burning by Aero-Hydrogen and Coal Gas. Arthur R. Baldwin. (Second Prize Essay). Considers what lead burning is, where necessary, advantages and disadvantages, and the work. Ill. 2400 w. Plumb & Dec—Sept. 1, 1903.

I. The Art and Practice of Lead Burning by Aero-Hydrogen and Coal Gas. Charles Henry Mills. II. The Various Details of Work that Plumbers Have to Execute in and on a Large Size Dwelling-House. A. E. Edwards. Two prize essays which received the silver and bronze medals at the Regent-Street Polytechnic, London. Ill. 4000 w. Plumb & Dec—Aug. 1, 1903.

Materials.—Improvements in Plumbing Materials. David Whiteford. Comments on recent changes, and plumbing developments. 1800 w. Dom Engng—Nov. 15, 1900.

New Orleans.—See **SEWER; SEWERAGE.**

New York Stock Exchange.—Water Supply and Distribution in the New York Stock Exchange. Illustrated description of the principal features of this installation. 2100 w. Eng Rec—Feb. 14, 1903.

Office Building, Brooklyn.—Plumbing in the Temple Bar Building, Brooklyn. Illustrated description of the work in a 14-story office building, having closed pressure tanks in the top story from which the building is supplied, through reducers where the pressure is too great. 1500 w. Eng Rec—May 11, 1901.

Office Building, Hartford.—Plumbing in the Connecticut Mutual Life Building, Hartford. Illustrated description of a system in which unusual care has been taken to utilize all waste heat for the warming of water. 1800 w. Eng Rec—Oct. 5, 1901.

Office Building, Newark, N. J.—Plumbing in the Prudential Buildings, Newark, N. J. Illustrated detailed description of the plumbing for four large twelve-story buildings occupying adjacent corners. 2700 w. Eng Rec—July 6, 1901.

Office Building, N. Y.—Plumbing in the Broad Exchange Building. Illustrated description of the work in a 20-story office building, where the distribution of the water to different floors requires numerous reducing valves and air chambers. 2000 w. Eng Rec—June 15, 1901.

Practical.—Practical Plumbing. An address on the proper installation of sewer, waste, soil and ventilation pipes. 3200 w. Dom Engng—Dec. 20, 1900.

Range Boiler.—See **Water Front.**

Regulations.—Plumbing Regulations Criticised. Extract from a paper by Paul Gerhard, read before the health officers at Burlington, Vt. 2000 w. Dom Engng—June 25, 1902.

Sanitary Plumbing and the Plumbing Laws. J. Pickering Putnam. Read before the Boston Soc of Arts. An examination of the plumbing laws, with suggestions for amendments. Ills. Serial. 1st part. 3800 w. Am Archt—Dec. 24, 1904.

Regulations, Boston.—Sanitary Plumbing and Our Plumbing Laws, with Suggestions for Their Revision and Simplification. J. Pickering Putnam. An examination of the plumbing ordinances of Boston, which are similar to the majority of large cities in the United States, and the explanation of a system embodying most of the amendments advocated. Ills. 6000 w. Tech Qr —Dec., 1904.

Rollins House, N. Y.—Plumbing in a New York Residence. Illustrated description of a job with an unusually simple arrangement of water piping and no kitchen and laundry boilers. 800 w. Eng Rec—Aug. 3, 1901.

Sailors' Snug Harbor.—Plumbing at the Sailors' Snug Harbor, Staten Island. Illustrated description of special work in hospital wards, a laundry, and a power house. 2600 w. Eng Rec—April 5, 1902.

Sanitary.—Sanitary Plumbing and the Plumbers' Craft in Relation to the Dwelling-House. A. E. Hudson. Gives examples of unsanitary conditions and discusses the main principles of modern house drainage and sanitary plumbing. 6500 w. Plumb & Dec—Sept. 1, 1905.

School, N. Y.—Details of New York School Plumbing. Illustrated description of standard details for shower baths, drinking fountains, drains and laboratory fittings. 2300 w. Eng Rec—May 3, 1902.

Siphon.—See **SIPHON—Plumbing.**

Siphoning.—Experiments Bearing on the Siphoning of Closet Traps. An illustrated record of the results of experiments carried out on the apparatus fitted in the Parkes Museum. 1500 w. Jour San Inst—April, 1901.

Soil and Vent Pipe Freezing.—See **Freezing.**

Tenements, N. Y.—Water Supply in a Block of New York Tenements. Illustrated description of the work done in tenements designed for very low rental, yet providing far better sanitary surroundings than usual. 1600 w. Eng Rec—Nov. 2, 1901.

Tombs Prison.—Plumbing in the Tombs Prison, New York. Illustrates and describes the hot and cold water supply and drainage system of the new part of the Tombs prison. 2200 w. Eng Rec—Jan. 4, 1902.

Waste Pipes.—Standards for Waste Pipes (Normalien für Abflussröhren). Standard sizes, materials, construction, etc., of waste pipes for house drainage, recommended by the Austrian Engineers and Architects' Society. Diagrams and tables. 2 plates. 1500 w. Zeitschr d Oesterr Ing u Arch Vereines (Supplement)—April 10, 1903.

Water Closet History.—A History of Water Closets. Glenn Brown. Read before the Am. Inst. of Archts. Reviews the history and describes early types. Ill. Serial. 1st part. 1600 w. Dom Engng—Dec. 20, 1900.

Water Front.—The Range Boiler and Water Front. M. L. Kaiser. An illustrated article discussing the right and wrong ways of setting and connecting of the range boiler and water front. 4500 w. Met Work—Sept. 20, 1902.

Water Service.—Water Service in a Suburban Residence. Illustrated description of a piece of plumbing work which has given excellent satisfaction. 1300 w. Met Work—Dec. 1, 1900.

PLUMB LINE.

See also **SURVEYING; SURVEYING INSTRUMENT.**

Magnetic Deflection.—Magnetic Deflection of Long Steel-Wire Plumb-Lines. Dr. William Hallock. A report of experiments made and evidence found, which support the conclusion that iron or steel wire ought not to be used for plumb-lines where accuracy is needed. 700 w. Elec Wld & Engr—Feb. 8, 1902.

Tamarack Mine.—The Divergence of Long Plumb Lines at the Tamarack Mine. Prof. F. W. McNair. An account of experiments made in the shafts of this mine, and a discussion of the cause of divergence. Ill. 3000 w. Eng & Min Jour—April 26, 1902.

Plumbing Deep Shafts of the Tamarack Mine. H. M. Lane. Describes the methods employed and gives an account of some interesting phenomena observed. 4400 w. Mines & Min—Jan., 1902.

PNEUMATIC HUB.

See **AUTOMOBILE—Pneumatic Hub; AUTOMOBILE, GASOLINE—Twombly.**

PNEUMATIC MACHINERY.

See also **COMPRESSED AIR; COAL MINING MACHINERY; COMPRESSED-AIR PLANT; MINING MACHINERY; PNEUMATIC TOOL; ROCK DRILL.**

Grain Handling.—See **GRAIN HANDLING—Compressed Air.**

Redfield Engine.—See **COMPRESSED AIR—Sawing.**

PNEUMATIC RAILWAY.

See **RAILWAY—London.**

PNEUMATIC TOOL.

See also **COMPRESSED AIR; RIVETING.**

Pneumatic Tools and Appliances. Ewart C. Amos. Abstract of a paper before the Manchester Assn. of Engrs. Considers hammers and riveters, drilling machines, screen shaker, rock drill, etc. Ill. 2500 w. Mech Engr—March 21, 1903.

Arns Hammer.—Experiments on an Air Hammer (Versuche mit einem Lufthammer). Prof. A. Lüdicke. A report upon researches made with the indicator and dynamometer upon an Arns pneumatic hammer, used for riveting railway tires upon the wheels. 2000 w. Zeitschr d Ver Deutscher Ing—Dec. 29, 1900.

Boyer Hammer.—The Boyer Long-Stroke Pneumatic Hammer. Illustrated detailed description. 2000 w. Engng—Dec. 14, 1900.

Principles, Care and Operation of Pneumatic Hammers and Tools. Refers more particularly to the construction and operation of the Boyer and Keller pneumatic hammers, and gives suggestions for the care of tools. 2800 w. Mod Mach—Dec., 1902.

Costs.—Operative Costs of Pneumatic Tools (Betriebskosten der Pressluftwerkzeuge). H. Cordes. Data of the cost of using pneumatic hammers, riveters, drills and other tools in Germany. 2000 w. Glasers Annalen—Aug. 15, 1904.

Foundry Service.—See **COMPRESSED AIR; FOUNDRY.**

Keller.—See Boyer.

Railway Use.—See **COMPRESSED AIR; RAILWAY SHOP.**

Riveting.—Pneumatic Riveting and Other Useful Applications of Pneumatic Tools. J. C. Taite. An illustrated article confined principally to the work of riveting. 2200 w. Inst of Mech Engrs—Glasgow Congress, 1901.

See also **RIVETING.**

Shipbuilding.—Pneumatic Tools as Applied to Ship Construction and Their Advantages to Shipbuilders and Engineers. C. Schofield. Explains methods adopted in American shipyards as to the application of pneumatic tools in ship construction, and makes comparison between these costs and the British piece-work hand rates. Also discussion. Plates. Tables. 8000 w. Trans N E Coast Inst of Engrs and Shipbuilders—Nov. 24, 1905.

Pneumatic Tools as Applied to Ship Construction. C. Schofield. Abstract of a paper read before the N.-E. Coast Inst. of Engrs. & Shipbuilders. An explanation of the methods adopted in the American shipyards as to the application of pneumatic tools in ship construction. Ills. 2500 w. Mech Engr—Dec. 9, 1905.

See also **SHIPBUILDING.**

Structural Work.—Applications of Compressed Air in Workshops (Emploi de l'Air Comprimé dans les Chantiers de Construction). A. Abraham. Describing compressing plant, reheaters and various forms of pneumatic tools, especially as used in the erection of structural work. Two articles. 4500 w. Génie Civil—Dec. 20, 27, 1902.

Testing Apparatus.—Air Motors and Air Hammers. Max H. Wickhorst. Illustrates and describes apparatus and methods used in extensive tests of air-drill motors and air hammers, to determine the air consumption, horse-power, stalling load of motors, number and force of hammer blows, etc. 1600 w. Trans Am Soc of Mech Engrs, No. 02—Dec., 1903.

PNEUMATIC TUBE.

Boston.—A Pneumatic Tube System of Parcel Distribution in Boston. Edward D. Sabine. Illustrated description of this recently constructed line and its operation. 1200 w. Eng News—Dec. 5, 1901.

The Boston Pneumatic Tube Service. E. D. Sabine. Describes and illustrates the system for parcel delivery and its mode of operation. 1100 w. R R Gaz—Aug. 22, 1902.

Dinspel-Stoetzel.—See Vacuum Transmission.

Mail.—See **MAIL TRANSPORTATION.**

St. Louis.—The Pneumatic Tube System of St. Louis. Edward D. Sabine. A description of the system of the Post Office Department and its successful working. 2500 w. Compressed Air—May, 1905.

Stock Exchange.—Pneumatic Tube System of the New York Stock Exchange. Edmund A. Fordyce. Brief illustrated description of the installation, with remarks on the importance of the service. 1000 w. Compressed Air—Nov., 1903.

Store.—The Pneumatic Tube System of a Modern Department Store. Day Allen Willey. Illustrates and describes interesting features of this system. 2000 w. Sci Am—March 21, 1903.

Vacuum Transmission.—A New Vacuum System for Pneumatic Transmission. Illustrates and describes the system based on the Dinspel-Stoetzel patents. 2500 w. Ir Age—Feb. 11, 1904.

PNEUMATOPHORE.

See **RESCUE APPARATUS.**

POLARIZATION.

See **ELECTRIC CURRENT RECTIFIER; ELECTRO-CHEMISTRY.**

POLE.

See also **ELECTRIC LINE; ELECTRIC RAILWAY—Overhead Construction; ELECTRIC TRANSMISSION; POST; TELEGRAPH LINE; TELEPHONE LINE; TIMBER PRESERVATION.**

Anchor.—Holding Capacity of Anchors for Electric Wiring Poles. R. C. Carpenter. An illustrated account of tests of the Stonebaugh Guy Anchor, and data as to the holding power. 700 w. Sib Jour of Engng—April, 1901.

Artistic.—See **ELECTRIC RAILWAY—Overhead Construction.**

Austrian Telegraph.—See Telegraph; **TIMBER PRESERVATION.**

Cedar.—The Outlook of the Cedar Pole Supply. C. H. Worcester. An illustrated account of the work of preparing these poles for market and the comparatively limited supply. 2800 w. Telephony—April, 1901.

Cement Feet.—Cement Feet for Wooden Poles (Zementfüsse für Holzmasten). S. Herzog. Describing a system for protecting the bases of wooden poles from moisture and consequent decay. 1200 w. Zeitschr f Elektrotechnik—Sept. 24, 1905.

Creosoting.—See **TIMBER PRESERVATION—Electric Poles.**

Deflection.—The Deflection of Pole Supports for Line Wires (Durchbiegung von Leitungsmasten). K. Otto. Discussing especially the stiffness of latticed poles and masts and their resistance to deflection; deriving a formula for taper masts. 1500 w. Elektrotech Zeitschr—April 20, 1905.

Electric Railway.—Side Poles for Electric Tramways. George G. Braid. Gives calculations relating to the strength and stiffness of side poles used for supporting the overhead construction work of electric railways. Mathematical. 1800 w. Elec Engr, Lond—Feb. 27, 1903.

See also **ELECTRIC RAILWAY—Overhead Construction.**

Iron.—The Manufacture of Iron Masts (Fortschritte in der Herstellung Eiserner Rohrmaste). Emil Bock. A discussion of the stresses and strains upon tubular masts used for trolley and electric light wires, with description of improved machinery for making poles. 1800 w. Zeitschr d Ver Deutscher Ing—Jan. 3, 1903.

Iron and Wood.—Conductor Poles of Iron and Wood (Leitungsmasten aus Eisen und Holz). J. Herzog and C. Feldmann. Illustrating several forms of combination poles constructed with base of structural iron and mast of wood. 2000 w. Zeitschr d Ver Deutscher Ing—May 11, 1901.

Telegraph.—Some Causes of the Unequal Durability of Telegraph Poles (Ueber einige Ursachen Ungleicher Dauerhaftigkeit der Telegraphstangen). Karl Havelik. Showing the influence of the character of the wood, the method of preparation, and the system of construction, upon the durability of telegraph poles. 5000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Aug. 20, 1904.

See also **TELEGRAPH LINE; TIMBER PRESERVATION.**

Telephone, New York.—The Passing of Telephone Poles. Thomas F. Gilroy. An illustrated article on the changes in New York City resulting from abolishing aerial wires. 1400 w. Am Tel Jour—Jan. 11, 1902.

POLICE.

Railway.—See **RAILWAY EMPLOYEE.**

POLICE BOAT.

"Triton."—See **FIRE BOAT.**

Vera Cruz.—See **STEAMBOAT.**

POLISHING.

Jewelry.—A Polishing Arrangement for Gold and Silver, and the Collecting of the Dust. Describes a system used in polishing jewelry. 600 w. Am Mach—Dec. 26, 1901.

Metallic Surfaces.—The Scientific Development of the Art of Polishing (Les Enseignements Scientifiques du Polissage). MM. F. Osmond & G. Cartaud. A discussion of modern methods of producing a high polish upon metallic surfaces in connection with researches into the physical structure of materials. 5000 w. Rev Gen des Sciences—Jan. 30, 1905.

POLYPHASE CURRENT.

See **ELECTRIC CURRENT, ALTERNATING; ELECTRIC DISTRIBUTION; ELECTRIC RAILWAY; ELECTRIC TRANSMISSION.**

POLYPHASE DYNAMO.

See **ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; ELECTRIC MACHINERY; ELECTRIC STATION; HYDRO-ELECTRIC PLANT.**

POLYPHASE MOTOR.

See **ELECTRIC MACHINERY; ELECTRIC MOTOR; ELECTRIC RAILWAY.**

PONTOON BRIDGE.

See **BRIDGE—Military; Northwich, Eng.**

POPULATION.

Estimating.—Methods of Estimating Population. Abstract of a paper by Walter F. Wilcox. Discusses the relative accuracy of different methods of estimating population of cities in the United States, as demonstrated by comparisons of the methods with the results of Federal censuses. 3700 w. Eng Rec—March 22, 1902.

PORCELAIN.

Composition.—See **Electric Uses.**

Electric Uses.—The Application of Porcelain in Electrotechnics (Die Herstellung des Porzellans für die Elektrotechnic). J. Herzog and C. Feldmann. An account of the uses of porcelain in electrical work and a discussion of its properties and preparation. 10,000 w. Elektrotech Zeitschr—Nov. 1, 1900.

Electric Uses.—The Composition of Porcelains for Electrical Purposes. Abstract of a paper by Arthur S. Watts, in the Transactions of the American Ceramic Society. Gives results of exhaustive tests on electrical insulating porcelain. 3500 w. Elec Wld & Engr—Nov. 15, 1902.

See also **INSULATOR.**

Furnace.—See **SMOKE PREVENTION—Porcelain Furnace.**

PORT.

See also **DOCK; HARBOR; MECHANICAL HANDLING; SHIPPING.**

Antwerp vs. London.—The Ports of Antwerp and London. A comparison of the rival attractions of these ports, based on information from three recent reports. 1800 w. Engr, Lond—Oct. 27, 1905.

Liverpool.—Liverpool and Her Rival Ports. From the presidential address of T. Reney Smith, before the Liverpool Engng. Soc. Discusses improvements whereby the city trade and progress may be advanced, especially questions connected with the shipping facilities. 2000 w. Engr, Lond—Nov. 10, 1905.

PORTABLE ENGINE.

See **STEAM ENGINE—Portable.**

PORTABLE STRUCTURES.

Dismountable and Portable Structures (Un Système de Constructions Démontables). J. J. Pillet. An illustrated description of a system of construction for portable and semi-portable buildings of many kinds, for military and civil use, invented by Lieut. Col. Espitallier. 2000 w. Bull Soc d'Encour—April 30, 1903.

PORTABLE TOOL.

See **ELECTRIC DRIVING; MACHINE TOOL.**

PORTLAND CEMENT.

See **CEMENT.**

PORTLAND CEMENT WORKS.

See **CEMENT KILN; CEMENT WORKS.**

PORTLAND EXPOSITION.

See also **EXPOSITION**; and under specific headings.

Electrical Features.—Electrical Features of the Portland Exposition. An illustrated article describing the electrical service. 700 w. Elec Wld & Engr—July 22, 1905.

POST.

See also **POLE.**

Cement.—Cement Posts. J. A. Mitchell. Read before the Nat. Assn. of Cement Users. Gives the writer's views of cement posts, which are based on an experience of over three years in the manufacture of them. 1500 w. Munic Engng—Feb., 1905.

Cement Posts. C. L. Catherman. Read before the Iowa Cement Users' Convention. Discusses the proper making and reinforcing of cement posts and problems arising in their use. 2000 w. Munic Engng—April, 1905.

Concrete Reinforced.—Reinforced Concrete Fence Posts Molded in the Ground. Describes the materials used in the construction of this form of post. Ills. 1000 w. Eng News—July 20, 1905.

Hardy Catalpa.—The Hardy Catalpa for Posts and Ties. Gives interesting facts in regard to the culture of these trees and their value. 2000 w. Eng Rec—April 18, 1903.

POTASSIUM SALT.

See also **ELECTRO-CHEMISTRY; NITRATE.**

Germany.—The Bleicherode-Sondershausen Potassium Salt Deposit. E. C. Mackay-Heriot. A description of this salt formation, giving profile near Munchen-Lohre, Germany. 900 w. Eng & Min Jour—Nov. 3, 1900.

The Potassium Salts Industry of Germany. E. Mackay-Heriot. Considers the mining laws, types of occurrences, etc. 2400 w. Eng & Min Jour—Oct. 12, 1901.

POTENTIOMETER.

See **ELECTRIC INSTRUMENTS; ELECTRIC MEASUREMENT.**

POTTER'S CLAY.

See **CLAY.**

POTTERY.

Embrach.—See **GAS POWER PLANT.**

POWDERED COAL.

See also **FUEL.**

Pulverized Fuel. R. A. Douglass. On the preparation of this fuel and methods of burning, the advantages claimed, etc. 2400 w. Am Elect'n—Sept., 1901.

Two Recent Systems for Burning Powdered Coal. Illustrates and describes the cyclone pulveriser system and the aero-pulveriser system. 1500 w. Eng News—Nov. 28, 1901.

Pulverized Fuel for Power Plants. F. G. Gasche. Stating the advantages of pulverizing low-grade fuels, and giving experimental results. 2500 w. R R Gas—June 20, 1902.

Coal-Dust Burning Process. C. O. Bartlett. Read at meeting of Engrs.' Club of Cleveland. Considers things necessary to obtain satisfactory results, the advantages to be gained and the obstacles to be met. 2000 w. Ry & Engng Rev—July 25, 1903.

The Burning of Pulverized Coal. C. O. Bartlett. Considers the requisites of success and the cost of securing them, and the advantages. 1800 w. Jour Assn of Engng Socs—July, 1903.

Burning Powdered Coal. H. J. Travis. Illustrates and describes apparatus designed for this purpose, pointing out facts brought out in an extensive investigation of various types. 3000 w. Power—March, 1904.

The Use of Pulverized Coal for Fuel Under Steam Boilers. J. M. Sweeney. Reviews the attempts made to use this fuel, discussing the degree of success, and concluding that it has not been proved satisfactory. General discussion. Ills. 9500 w. Jour W Soc of Engrs—April, 1904.

Coal-Dust Firing. Eustace Carey. Abstract of a paper read at Liverpool before the Soc. of Chem. Ind. Reports the results that have been obtained with coal-dust firing, and the advantages. 1800 w. Eng & Min Jour—Dec. 16, 1905.

Alpha Cement Co.—Powdered Fuel for Boiler Furnaces at the Alpha Cement Co.'s Works, Alpha, N. J. Illustrates and describes the apparatus and its operation for preparing the powdered fuel. 1400 w. Eng News—June 20, 1901.

Annealing Furnace.—Powdered Coal for Steel Annealing. H. J. Travis. Describes the pulverising apparatus and gives the results of observations and tests of an annealing furnace using pulserised coal as fuel. Ills. 900 w. Am Mach—June 16, 1904.

Coal-Dust Firing as Applied to Annealing Furnaces. Illustrates and describes annealing furnaces fitted with the Schwartzkopff system of coal-dust firing, and states results. 1000 w. Ir & Coal Trds Rev—June 23, 1905.

Brooklyn Shop.—Burning Powdered Coal in Stationary Boilers. Illustrated description of apparatus in a Brooklyn machine shop, with tests of its operation. 1000 w. Eng Rec—Dec. 29, 1900.

Coke Breeze.—See **COKE BREEZE—Fuel.**

Hesselmeyer-Schwartzkopf.—A Rotary Brush System of Feeding Pulverized Fuel to Furnaces. Brief illustrated description of the Hesselmeyer & Schwartzkopff system. 1000 w. Eng News—Feb. 20, 1902.

Lean Coal.—The Combustion of Lean Coal Dust (Ueber Verfeuerung von Magerfein-Kohlen). H. Schäfer. A discussion of grates and methods of firing for very small sizes of lean coal. 1000 w. Glückauf—June 20, 1903.

Rowe.—The Rowe System of Burning Pulverized Coal. An illustrated description of a system using bituminous slack under the boilers in the works of the C. O. Bartlett & Snow Co., of Cleveland, Ohio. 500 w. Eng Rec—Dec. 20, 1902.

Schwartzkopf.—See **Annealing Furnaces; Hesselmeyer-Schwartzkopf.**

Westlake System.—A New Method of Burning Powdered Fuel. Illustrates and describes the system of William Westlake, which provides a grate upon which a small fire of ordinary coal is maintained. 1500 w. Eng News—March 14, 1901.

POWER.

See also **ELECTRIC POWER; GAS POWER; MOTOR; POWER COST; POWER PLANT; POWER TRANSMISSION; WATER POWER.**

Central Station.—See **ELECTRIC STATION; HEATING.**

Chart.—See **HORSE-POWER.**

Coal Economy.—Economy in the Use of Coal for the Production of Power. Prof. Ira N. Hollis. Discusses this subject, showing what engineers are trying to accomplish, and the elements of efficiency. General discussion. 6000 w. Jour N Eng W-Wks Assn—March, 1903.

Conversion.—The Conversion of Electrical Energy to Other Forms. Arthur L. Rice. Read before the James Watt Assn. Considers briefly the conversion into heat, light and mechanical motion. 1500 w. Engr, U S A—March 2, 1903.

Conversion and Transmission.—The Economical Conversion and Transmission of Energy. William C. L. Eglin. A study of economical methods under the heads of generators or converters, transmission systems, motors or consumption devices, and load factors. 5200 w. Pro Engrs' Club of Phila—Jan., 1902.

Earth's Interior.—See **HEAT; NATURE'S STORES; THERMODYNAMICS—Terrestrial Heat.**

Fuel Utilization.—See **Coal Economy; FUEL; POWER COST; THERMODYNAMICS.**

Gas.—See **GAS FUEL; GAS ENGINE; GAS POWER; GAS POWER PLANT; GAS PRODUCER.**

Machine Tools.—See **DRILLING MACHINE—Power Consumption; ELECTRIC DRIVING—Du Bois, Pa.; MACHINE TOOL—Power Consumption; PUNCHING;**

Modern Practice.—Modern Tendencies in the Development and Transmission of Power. John Joseph Flather. Slightly condensed from an address at the Washington meeting of the Am. Assn. for the Adv. of Science. Discusses useless waste of power, electric power distribution in shops, speed variation with electric motors, efficiency of electric power transmission, power development with gas engines, steam turbines, etc. 4500 w. Eng News—Jan. 1, 1903.

Natural Sources.—Natural Sources of Energy. Dr. Louis Bell. Reviews the fuel situation, discussing other sources of power, and the probable extensive development of solar power in the future. 4500 w. Cassier's Mag—Aug., 1903.

See also **HEAT—Earth's Interior; NATURE'S STORES; WATER POWER; WINDMILL.**

Steam vs. Gas.—See **FUEL TEST; POWER COST.**

Stream.—See **WATER POWER.**

Torsion Meter.—See **DYNAMOMETER; TORSION METER.**

U. S. Statistics.—See **MOTOR.**

POWER BOAT.

See **BOAT; BOAT, GASOLINE.**

POWER COST.

See also **ELECTRIC DRIVING; ELECTRIC PLANT; ELECTRIC POWER; ELECTRIC TRANSMISSION; GAS POWER; POWER TRANSMISSION; STEAM POWER.**

An Investigation of the Cost of Power. Clyde D. Gray. An investigation undertaken to get a collection of reliable data on the production, cost and utilisation of power by different methods. Serial. 1st part. 4800 w. Jour Fr Inst—Oct., 1901.

Steam, Gas and Oil Engines: Cost of Fuel per Brake Horse-Power per Hour and Their Efficiencies. Bryan Donkin. Paper prepared for meeting of Inst. of Gas Engrs. Discusses the fuel required to produce power by means of these various engines. 2200 w. Gas Wld—May 3, 1902.

Cost of Production of Power from Fuel. T. L. Miller. Abstracts from the presidential address before the Liverpool Engng. Soc. Gives details of cost per h. p. of steam power plants. 1500 w. Mech Engr—Dec. 12, 1903.

Steam Costs in Industrial Combinations. William D. Ennis. A study of a systematic method of computing the cost of steam power from its various elements. 3000 w. Engineering Magazine—Oct., 1904.

Notes on Power Production. William McClellan. Discusses the reliability and cost of steam engines, steam turbines and gas engines, and the outlook. 5400 w. Eng News—Dec. 29, 1904.

The Cost of Installation and Operation of Various Sources of Power (Spese di Implanto e di Esercizio di Diversi Sistemi per la Produzione dell' Energia). A comparison of the costs of motive power derived from steam engines, steam turbines, Diesel motors and gas engines. 3000 w. L'Ingegneria e l'Industria—Feb. 15, 1905. 1905.

Coal Mine.—What Is the Cost of a Horse-Power at a Colliery? Sidney F. Walker. Condensed from the "Jour. of the British Soc. of Min. Students." Thinks the best method is to make a first approximation by calculation and then correct it by means of electric motors. 4200 w. Ir & Coal Trds Rev—March 15, 1901.

Gas.—See **GAS POWER.**

Iron Works.—The Cost of Power in a Large Iron Works (Krafterzeugungskosten für ein Grosses Hüttenwerk). Karl Iffland. Giving an elaborate tabulation of the various elements of power cost for steam, gas and electric driving. 10,000 w. Stahl u Eisen—June 15, 1904.

Lancashire Works.—Actual Cost of Energy Used in Driving a Small Engineering Works. Gives particulars supplied by a firm of engineers in Lancashire. 500 w. Elec Rev, Lond—Sept. 1, 1905.

Small Plants.—The Cost of Power for Small Plants. W. H. Wakeman. Discusses the conditions that affect cost and gives data that will enable those interested to make comparisons of fuel costs. 2000 w. Mod Mach—Dec., 1901.

Steam Engine vs. Diesel Motor.—Steam and Internal Combustion Engines Compared for Central Station Work. Norman McCarty. Gives a statement showing the itemized cost of operation of light internal combustion engine plants, of the Diesel type, comparing with the cost of operation when steam engines are used. 1800 w. Elec Rev, N Y—Jan. 30, 1904.

POWER FACTOR.

See **ELECTRIC CURRENT, ALTERNATING**—Power Factor; **ELECTRIC MOTOR**—Regulating Line Currents.

POWER GAS.

See **BLAST-FURNACE GAS; COKE-OVEN GAS; GAS FUEL; GAS POWER; GAS POWER PLANT; GAS PRODUCER; PEAT**—Gas.

POWER HOUSE.

See **ELECTRIC PLANT; ELECTRIC STATION.**

POWER PLANT.

See also **ELECTRIC DRIVING; ELECTRIC EQUIPMENT; ELECTRIC PLANT; ELECTRIC STATION; HYDRO-ELECTRIC PLANT; MECHANICAL DRAFT**—Economy; **MECHANICAL PLANT; STEAM ENGINE; STEAM PLANT; WATER POWER.**

The Power Plant. Charles H. Benjamin. The first of a series of papers considering the location, construction, equipment, arrangement, cost and operation of power plants. Serial. 1st part. 3500 w. Engr, U S A—Nov. 15, 1902.

Accounting.—Power Plant Accounts. Considers useful data that should be registered in the accounts of the engineer or superintendent of power plants. 3500 w. Engr, U S A—Nov. 1, 1902.

Aguascalientes, Mexico.—See **RAILWAY SHOP**—Mexican Central.

Atha, Newark.—See Gas.

Auxiliary Machinery.—See **ELECTRIC STATION.**

Baltimore Co.—See **MECHANICAL PLANT**—Combination.

Bank, Pittsburg.—See **ELECTRIC PLANT**—Gas Engine; **MECHANICAL PLANT.**

Beverly, Mass.—The Power Plant of the United Shoe Machinery Co. Howard S. Knowlton. Illustrated detailed description of the power plant of these shops at Beverly, Mass. 4300 w. Eng Rec—Aug. 19, 1905.

Central Lard Co.—Power Plant of the Central Lard Company, Jersey City, N. J. Illustrates and describes a plant particularly interesting as regards power production and transmission. The heating is by steam, the cooling by brine, the lighting and pumping mostly by electricity, and the water supply by means of the air lift. 2000 w. Eng Rec—Aug. 9, 1902.

Chicago & Western Ind. R. R.—The Chicago and Western Indiana Power House. Illustrated description of aplant for furnishing steam heat, compressed air and water supply to the coach yards and adjacent buildings, and for generating electricity for lighting passenger stations, freight houses, yard, subways, etc. 2000 w. Ry Age—Feb. 24, 1905.

Chicago Terminal.—Power Plant of the Rock Island-Lake Shore Terminal Station, Chicago. Illustrates and describes the power plant which serves the station and terminal yards, furnishing electricity for power, lighting, switching and elevator service; compressed air for various uses; steam for heating, and water needed. 2400 w. Eng Rec—Sept. 19, 1903.

Coal Mine.—Economy in the Operation of Coal-Mine Power Plants. F. C. Weber. A discussion of the superiority of the Corliss type of engine over other forms for use in mining power plants. 1200 w. Air Power—April, 1905.

Color Works.—See **MACHINERY.**

Creamery, Denver.—The Power Plant of the Littleton Creamery, Denver. Howard S. Knowlton. Describes an interesting plant for an establishment for the manufacture of butter, and the cold storage of butter, eggs, milk, cream and cheese. 2000 w. Eng Rec—Aug. 6, 1904.

Darmstadt Technical Institute.—See **EDUCATION.**

Dayton, O.—See **Nat'l Cash Register Co.**

Design.—The Designing of Steam Power Plants. Walter C. Kerr. Aims to point out some of the ways and means by which the engineer may deal first with the general and then with the specific questions involved, and to indicate something of the service that may be expected of the engineer in making determinations underlying large expenditures. 3600 w. St Ry Jour—Oct. 4, 1902.

Points in the Design of a Power Plant. W. H. Booth. The present article discusses briefly boilers, steam engines and condensing plants, generators and accumulators, with the general design. 2500 w. Elec Rev, Lond—April 17, 1903.

Power Plant Design. R. W. Stovel. Calls attention to details of plants, considering the requirements, and the apparatus usually installed. 5000 w. Pro Engrs' Soc of W Penn—June, 1902.

Detroit.—Power Department of Park, Davis & Co., Detroit, Mich. Illustrates and describes their steam and electric generating plant recently enlarged and improved. 3200 w. Steam Engng—April 10, 1903.

Development.—The Development of Power Plants. Fred R. Low. A review of improvements during the last quarter of a century, and the causes of the great advance in power-producing apparatus. 3500 w. Am Mach—Nov. 6, 1902.

Economy.—Practical Economy in the Power Plant. W. H. Booth. Discussing the importance of taking all factors into account in the maintenance of economy in a power plant, instead of concentrating attention upon the more conspicuous portions. 2500 w. Engineering Magazine—April, 1903.

See also **BOILER PLANT; COAL**—Small Size; **STEAM HEATING; STEAM PLANT.**

Economy, Mines.—Economy in Operation of Coal Mine Power Plants. F. C. Weber. Presents the advantages claimed by the Corliss engine over other types of slow-speed engines for air compressors. 800 w. Mines & Min—May, 1905.

Elizabethport, N. J.—The Power Plant at the Elizabethport Shops of the Central Railroad of New Jersey. Illustrated description of an electric and compressed air station to furnish power to shops for repairing locomotives and cars. 2400 w. Eng Rec—June 21, 1902.

See also **RAILWAY SHOP.**

Fiberloid Works.—See **FIBERLOID WORKS.**

Gas.—The Gas Power and Heating Plant of the Atha Tool Co. J. R. Bibbins. Illustrated detailed description of a recently completed plant in Newark, N. J. 1800 w. Eng Rec—July 15, 1905.

See also **GAS ENGINE; GAS POWER; GAS POWER PLANT; GAS PRODUCER; MINE.**

Gas Producer.—See **GAS POWER; GAS POWER PLANT; GAS PRODUCER**—Power Plant.

General Electric, Lynn.—See **MACHINE SHOP.**

Glasgow Exhibition.—Steam Electric Generating Plant at the Glasgow Exhibition. Review of the exhibit of boilers, engines and electric generators. Serial. 1st part. 3700 w. Engng—June 14, 1901.

Glen Cove, N. Y.—Power Plant at the Factory of

Edward R. Ladew. Paul H. Grimm. Illustrated detailed description of the plant in the new factory at Glen Cove, N. Y., with report of one of the tests made periodically. 2400 w. Power —Aug., 1905.

Hamilton, O.—Power Plant of the Champion Coated Paper Co., Hamilton, O. Fred W. Ballard. Illustrates and describes a plant of about 4000 h. p., in which almost complete use will be made of the exhaust steam. 4200 w. Engr, U S A—July 15, 1902.

Ingersoll-Sergeant.—The Power Plant of the Ingersoll-Sergeant Drill Company's Works at Phillipsburg, N. J. Illustrated detailed description of a plant where the power is generated in a central power station and distributed by electricity and compressed air to the various points at which it is required. 2200 w. Power—June, 1905.

Kimberley.—See **ELECTRIC EQUIPMENT.**

Leather Factory.—See **Glen Cove.**

McCormick Twine Mills.—See **ELECTRIC PLANT.**

Marine-Engine Works.—Power Required to Drive a Marine Engine Works. James Crighton and W. G. Riddell. Illustrated description of some recent improvements and report of results. 2400 w. Inst of Mech Engrs—Glasgow Congress, 1901.

Test of an Industrial Power Plant. Gives the results of experiments on the power plant of engine-building works before and after improvement. Taken from paper of James Crighton and W. G. Riddell, presented at the Glasgow Congress. 900 w. Eng Rec—Oct. 12, 1901.

Middlesbrough Docks.—See **ELECTRIC EQUIPMENT—Docks, Middlesbrough.**

Nat'l Cash Register Co.—New Power Plant of the National Cash Register Co., Dayton, Ohio. Fred W. Ballard. Illustrated detailed description of a new plant under construction. 5000 w. Engr, U S A—March 1, 1902.

Navy Yards.—The Character of the Power Plants in the U. S. Navy Yards. A review of the report of civilian engineers retained to make an examination of the plants. 2500 w. Eng Rec—Dec. 3, 1904.

See also **ELECTRIC EQUIPMENT.**

Pan-American Exposition.—The Power Plants of the Pan-American Exposition. Illustrated detailed description of the sources of power for the exposition. 3300 w. Power Qr—Sept., 1901.

The Power Plants of the Pan-American Exposition. A description of the steam and gas engines and electric power apparatus. 2800 w. Eng Rec—May 25, 1901.

Pittsburg.—See also **BUILDING CONSTRUCTION—Power Plant, Pittsburg.**

Pittsburg R. R. Station.—See **RAILWAY STATION; RAILWAY TERMINAL.**

Portable.—See **AUTOMOBILE, STEAM—Industrial.**

Pumps.—See **PUMP—Central Stations.**

Railway Shop.—See **RAILWAY SHOP.**

Railway Shop, East Moline, Iowa.—The Power Plant of the Rock Island Railway Shops at East Moline. Illustrates and describes a plant which includes steam, pneumatic, hydraulic and electric machinery. 3500 w. Eng Rec—July 30, 1904.

Power Generation and Distribution at a Large Railroad Shop. Illustrated description of the plant of the large locomotive shop at East Moline, Ill. 2400 w. Elec Wld & Engr—July 30, 1904.

Railway Shops, Milwaukee.—Enlarged Power Plant of the Chicago, Milwaukee & St. Paul Railway, at West Milwaukee. Especially describes the power plant for the enlarged shops. The machinery is electrically driven, the yards and shops lighted with arc and incandescent lamps. Exhaust steam is used for heating, and compressed air furnished. 2000 w. Eng Rec—Nov. 14, 1903.

Repairs.—Repairs in a Power Plant. William J. Kaup. The present article deals with conditions essential to be understood by the workman. Ills. Serial. 1st part. 900 w. Engr, U S A—April 1, 1904.

St. Louis Exposition.—Some Details of the Louisiana Purchase Exposition Service Power Plant. Illustrates some of the more interesting details of this plant, discussing the novel features. 4000 w. Eng Rec—Feb. 27, 1904.

The Steam Plant of the St. Louis Exposition. Remarks on the Exposition, with illustrated description of the power plant. 5000 w. Power—July, 1904.

See also **ELECTRIC PLANT; ELECTRIC STATION; ST. LOUIS EXPOSITION.**

St. Louis Terminal.—The Power Plant of a Modern Railroad Terminal. J. R. Bibbins. Illustrated description of an exemplary plant placed in operation at St. Louis embracing a service for electric lighting, electric power, compressed air, steam and water. 5400 w. Eng Rec—Jan. 28, 1905.

San Francisco.—Power Plant for the New Government Building at San Francisco. Illustrates and describes the plant for a building which is to serve the combined purposes of a court house and post-office, furnishing light, heat and power. 3000 w. Eng Rec—April 18, 1903.

Speed Control.—Relative Advantages of Electrical and Mechanical Methods of Variable Speed Control for General Power Service. William Cooper. Read at Convention of Nat. Elec. Lgt. Assn. Discusses the advantages and disadvantages of both systems. 5500 w. Am Elect'n—July, 1903.

See also **ELECTRIC DRIVING; MACHINE TOOL.**

Stamford, Conn.—See **STEAM TURBINE—Yale and Towne Mfg. Co.**

Starting.—Starting of a New Power Plant. I. H. Sherwood. Discusses the methods to be observed in putting in operation an installation of steam and electric machinery. 2300 w. Engr, U S A—May 1, 1901.

Steam Turbine.—See **STEAM TURBINE—Power Plant; Power Station.**

Studebaker, South Bend.—Remodeled Studebaker Power Plant at South Bend, Indiana. Brief illustrated description of the changes made. 1800 w. Eng Rec—June 25, 1904.

Sulphite Mill.—Power Plant of a New Sulphite Mill. Illustrated description of a recent installation of steam power equipment in a sulphite mill at Lockport, N. Y. 3000 w. Engr, U S A—Dec. 1, 1901.

See also **PAPER MILL.**

Telephone.—See **TELEPHONE EXCHANGE—Power Plant.**

Test.—See **BOILER TEST; ELECTRIC GENERATOR TEST; STEAM ENGINE TEST; STEAM PLANT.**

Textile Mill.—A Textile Mill Power Plant. Eugene B. Whipple. Considers a plant designed to take the place of one that had become overloaded by the increase in buildings and machinery. Ills. 2000 w. Jour Worcester Poly Inst—March, 1904.

Theatre.—See **ELECTRIC EQUIPMENT; MECHANICAL PLANT; THEATRE.**

POWER STATION.

See **ELECTRIC PLANT; ELECTRIC RAILWAY; ELECTRIC STATION; HYDRO-ELECTRIC PLANT; POWER PLANT; STEAM PLANT; WATER POWER.**

POWER TRANSMISSION.

See also **AIR COMPRESSOR—Electric; BELTING; COMPRESSED AIR; ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC EQUIPMENT; ELECTRIC TRANSMISSION; GEAR; POWER; PULLEY; ROPE TRANSMISSION; SHAFTING; VARIABLE SPEED; WIRE ROPE.**

Belting.—See **BELTING.**

Bull Wheels.—Bull Wheels and Tangent Arms. W. Osborne. Explains why the arms in bull wheels are put on at a tangent to the shaft instead of radially. Ills. 700 w. Am Mach—Vol. 28, No. 32.

Chain.—See **CHAIN GEAR.**

Compressed Air.—See **COMPRESSED AIR—Power Transmission; MINE DRAINAGE.**

Electric vs. Mechanical.—Electrical Compared with Mechanical Transmission in Factories. H. H. Holding. A comparison, showing that electrical transmission has many advantages. 1400 w. Engr, U S A—Jan. 1, 1901.

A Comparison Between Electrical and Mechanical Transmission. H. H. Holding. From a paper read before the Asso. Tech. Club of Cleveland, Ohio. Gives results showing that there is no reason why a factory cannot be driven more cheaply and advantageously by electricity than by direct mechanical means. 1600 w. Am Mach —April 25, 1901.

The Adaptability of Electrical Driving. B.

Longbottom. Abstract of a paper read before the Manchester Assn. of Engrs. Considers the mechanical forms of power distribution, giving tabulated results of tests, and furnishing means of comparison between mechanical and electrical distribution, and information concerning the advantages. 3000 w. Elect'n, Lond—April 8, 1904.

The Adaptability of Electrical Driving. B. Longbottom. Extract from a paper read before the Manchester Assn. of Engrs. Shows what efficiencies can be expected with electrical driving, comparing the results with actual tests of mechanical distribution. 3300 w. Mech Engr—April 16, 1904.

Power Transmission in Works. W. E. Buck. A discussion of the respective merits of electrical and mechanical methods for transmitting power to the machines. Two articles. 4000 w. Engr, Lond—June 3, 10, 1904.

See also **ELECTRIC DRIVING; MACHINE SHOP; MACHINE TOOL.**

Friction.—See **AUTOMOBILE—Friction Drive.**

Gas vs. Electric.—Power Transmission. Alton D. Adams. A comparison of long distance electric transmission and gas transmission, the latter being piped to the place used. 3000 w. Min & Sci Pr—Jan. 5, 1901.

Gas-Pipe vs. Copper. C. Alfred Smith. Outlines a scheme for the generation and transmission of power gas, comparing costs, and discussing details. 2000 w. Elec Rev, Lond—Oct. 30, 1903.

Gas-Pipe vs. Copper—A Defense. C. Alfred Smith. A reply written to an article by E. Kilburn Scott, written in criticism of a previous paper by Mr. Smith. 2000 w. Elec Rev, Lond—Dec. 4, 1903.

See also **ELECTRIC DISTRIBUTION; ELECTRIC TRANSMISSION; GAS DISTRIBUTION.**

Gearing.—See **GEAR.**

Line Shafting.—See **SHAFTING.**

Link Belts.—The Transmission of Power by Means of Link Belts. A. B. Morrison, Jr. An illustrated explanation of the action of block chains, roller chains, and silent chains, with suggestions on the selection for any particular installation. 4000 w. Engr, U S A—March 1, 1905.

See also **CONVEYOR.**

Losses.—Power and Its Economical Transmission. Extracts from a lecture by Henry Souther, delivered in the Board of Trade Building, Toronto, comparing the losses in gearing and belt transmission with the advantages of electric driving. 3500 w. Can Elec News—Feb., 1902.

Power Loss by Friction and Transmission. Henry Souther. Read before the Canadian Mfr. Assn. Discusses this subject, giving Prof. Benjamin's rules to save friction losses in manufacturing establishments. 1600 w. Sta Engr—March, 1902.

Power and Its Economical Transmission. Henry Souther. Lecture before the Canadian Mfrs. Assn. Considers sources of power, distribution, transmission, losses, belts and ropes, shafting and hangers in this issue. Serial. 1st part. 4000 w. Brick—April, 1902.

Mills.—Power and Power Transmission for Mills. Henry James Lamborn. The first of a series of articles on the supply of energy in the most efficient and economical manner. 1200 w. Mod Mach—Nov., 1900.

Mines.—The Distribution of Power in Mines. Sydney F. Walker. The first of a series of articles proposing to discuss the whole question of the distribution of power in and about mines, and also the distribution of air for ventilating purposes. Serial. 1st part. 2000 w. Mines & Min—March, 1902.

Various Methods of Conveying Power to the Interior of Mines. T. Lindsay Galloway. Read before the Glasgow Univ. Engng. Soc. Describes briefly some of the systems which have been applied in mines, indicating why different methods have found suitable spheres of application. Serial. 1st part. 3200 w. Col Guard—Jan. 9, 1903.

Transmission of Power. R. W. Chapman. Read before the Aust. Inst. of Min. Engrs. The present article discusses compressed air as a means of transmitting power from the surface to the workings. Serial. 1st part. 2700 w. Aust Min Stand—July 7, 1904.

Power Generation and Transmission in a Modern Mine. E. H. Roberton. A discussion of the peculiar limitations and requirements involved in the installation of power generating and transmitting installations in mines. 3000 w. Engineering Magazine—Jan., 1905.

Electricity vs. Compressed Air for Mine Operations. Two papers on this subject are given. W. R. Halbert discusses it from the electrical point of view and Edward F. Schaefer from the compressed air point of view. 2800 w. Compressed Air—Dec., 1905.

See also **AIR COMPRESSOR; COMPRESSED AIR; COMPRESSED AIR PLANT; ELECTRIC EQUIPMENT; MINE HAULAGE; MINE MANAGEMENT—Working Costs.**

Newman Gear.—See **VARIABLE SPEED.**

Pope's Spring Sprocket.—See **VARIABLE SPEED—Newman Gear.**

Roller Chains.—See **CHAIN GEAR—Roller.**

Rope.—See **ROPE TRANSMISSION; WIRE ROPE.**

Worm Gearing.—See **GEAR—Worm; WORM GEAR—Electric.**

POZZUOLANA.

See **CEMENT; MORTAR.**

PRECIOUS METAL.

See also **ASSAYING; COINAGE; GOLD; MINERAL REGION; ORE DEPOSIT; PLATINUM; SILVER.**

An Inquiry Into the Money Metals. Abstracted from reports by William Jacobs. Concerning the consumption of the precious metals in the world before the reign of the Emperor Augustus of Rome. Serial. 1st part. 2000 w. Min Rept—May 30, 1901.

PRECIOUS STONE.

See also **DIAMOND; EMERALD; MINERAL; OPAL; RUBY; SAPPHIRE; TURQUOISE.**

Identification.—How to Identify Precious Stones. Describes methods of testing. 2000 w. Min & Sci Pr—Aug. 23, 1902.

Mexico.—Gems and Precious Stones of Mexico. George Frederick Kuntz. A review of the gems known to have been found, and description of the mines, giving much interesting information. 15,400 w. Trans Am Inst of Min Engrs—Nov., 1901.

Semi, Canada.—"Rare Minerals" in Canada. A report of the movement with a view to search for and mine the rarer minerals, such as radium, white mica, tourmaline, garnet, beryl and others. 1200 w. Can Min Rev—June, 1905.

Semi, United States.—The Semi-Precious Stones of the United States. E. A. Reed. Information concerning agates, moss agates, agatized wood, tourmaline, amazon stone, bloodstone, chrysoprase, and others. 3500 w. Min & Sci Pr—June 3, 1905.

Tool Making.—See **TOOL—Precious Stones.**

United States.—The Precious Stone Industry of the United States. Elizabeth A. Reed. Information in regard to the precious stones found and the localities. 2500 w. Sci Am Sup—April 8, 1905.

PREMIUM PLAN.

See **WAGES; WORKS MANAGEMENT.**

PRESS.

See also **BRIQUETTING; DIE; HYDRAULIC MACHINERY; METAL WORKING; PUNCHING; SHEET METAL; STAMPING; SWAGING MACHINE.**

Adriance.—See **Drawing.**

Agricultural Machine Work.—The Power Press in Agricultural Machine Work. William Doran. Illustrated account of work done by the power press, especially in punching heavy stock. 1900 w. Am Mach—Sept. 12, 1901.

Briquetting.—See **BRIQUETTING.**

Crank.—A Machine-Shop Crank-Press. Illustrates and describes a machine reinvented and redesigned by William A. Box. 600 w. Am Mach—Vol. 28, No. 42.

Cutting Capacity.—The Cutting Capacity of Power Presses. E. W. Zeh. Treats only power presses driven direct by the flywheel without the aid of gearing, in the present article, developing formulas. 1400 w. Am Mach—Vol. 28, No. 41.

Drawing.—The Adriance New Style Drawing Press. Illustrated description of features of this machine, intended for general drawing work. 1800 w. Ir Age—Jan. 21, 1904.

Embossing.—See **Feed.**

Feed.—Automatic Feed for Embossing Press. Illustrates and describes an automatic rack feed and its operation. 1200 w. Am Mach—April 23, 1903.

Hydraulic.—See **HYDRAULIC MACHINERY.**

Power.—See **Cutting Capacity.**

Punch.—See **PUNCHING.**

Ram Pressure Testing.—Testing Ram Pressures in Presses. Oberlin Smith. Describes the system used by the writer, based upon crushing disks and measuring increased area. 1300 w. Am Mach—June 20, 1901.

Schorr Briquette.—See **BRIQUETTING—Schorr.**

Sub-Press.—See **PUNCHING; SHEET METAL.**

Swaging.—See **SWAGING MACHINE.**

PRESSED STEEL.

See **CAR—Steel; STEEL CASTING—Hydraulic; PRESS; STEEL METALLURGY.**

PRESSURE GAUGE.

See **GAUGE—Pressure; INDICATOR; MANOGRAPH; STEAM GAUGE.**

PRESSURE REGULATOR.

See also **VALVE.**

Water.—See **VALVE—Regulating; WATERWORKS.**

PRICES.

See **COMMERCE; INDUSTRIAL ENGINEERING.**

PRIMARY BATTERY.

See **ELECTRIC CELL; ELECTRO-CHEMISTRY.**

PRIME MOVER.

See **BINARY ENGINE; GAS ENGINE; GASOLINE ENGINE; GAS TURBINE; MOTOR; OIL ENGINE; STEAM ENGINE; STEAM TURBINE; TURBINE; WATER WHEEL.**

PRINTING.

See also **PRINTING OFFICE; PRINTING PRESS.**

Electric Driving.—See **ELECTRIC DRIVING; ELECTRIC EQUIPMENT;**

Type-Setting Machine.—See **TYPE-SETTING MACHINE.**

PRINTING OFFICE.

Sackett & Wilhelms.—Mechanical and Electrical Equipment of the Sackett & Wilhelms Lithographing and Printing Company. An illustrated description of the building and plant, which shows many unique features. Serial. 1st part. 2000 w. Elec Rev, N Y—Feb. 6, 1904.

U. S. Government.—See **ELECTRIC EQUIPMENT—Printing Office.**

PRINTING PRESS.

Factory, Germany.—The Printing-Press Factory of Koenig & Bauer, near Würzburg, Germany (Die Schnellpressenfabrik von Koenig & Bauer in Kloster Oberzell bei Würzburg). An illustrated description of the new works of this old firm, which has manufactured high-speed printing presses for nearly 100 years. 5500 w. Zeitschr d Ver Deutscher Ing—April 18, 1903.

Storage Battery Operation.—See **STORAGE BATTERY—Printing Press Operation.**

PRISMOIDAL FORMULA.

A Simple Demonstration of the Prismoidal Formula. Gives a geometrical demonstration of this formula, showing its application. 700 w. Eng News—April 6, 1905.

PRISOMETER.

Périne.—See **PLASTER OF PARIS—Prisometer.**

PRISON.

Boston Navy Yard.—Concrete and Steel Prison Cell Construction, Boston Navy Yard. Illustrates and describes the cell construction in the prison at the Charlestown Navy Yard. 600 w. Eng News—Nov. 28, 1901.

N. Y. Tombs.—Cell Construction in the Tombs Prison, New York. Illustrated description of the steel work of the cells recently installed in the municipal prison. 1900 w. Eng Rec—Feb. 15, 1902.

See also **PLUMBING—Tombs.**

PRIZE.

See also **COMPETITION.**

French Academy.—Prizes Awarded by the French Academy for 1901 (Prix Décernés Année 1901). A list of prizes and sketches of the recipients. Also prizes offered for 1902, 1903, 1904, 1905 and 1906. 20,000 w. Comptes Rendus—Dec. 16, 1901.

The Prizes Awarded by the French Academy for 1904 (Prix Décernés Année 1904). The reports of the various committees of the "Académie des Sciences," announcing the awards of the prizes. 20,000 w. Comptes Rendus—Dec. 19, 1904.

PRODUCER GAS.

See also **GAS FUEL; GAS POWER; GAS POWER PLANT; GAS PRODUCER.**

Testing.—See **FUEL TEST—St. Louis; GAS PRODUCER—Suction Trials.**

PROFIT SHARING.

See **WAGES; WORKS MANAGEMENT—Capitalized Labor; Pittsburg Coal Co.; U. S. Steel Corporation.**

PROJECTILE.

See **AMMUNITION WORKS; EXPLOSIVE; GUN; GUNNERY; SHELL.**

PROJECTION APPARATUS.

See also **SEARCHLIGHT.**

Electric.—Some New German Electric Projection Apparatus. C. J. Smith. Illustrates and describes devices for electrical projection of transparent and opaque bodies, as well as for colored projection, combined with searchlight and lantern effects. 1000 w. Elec Wld & Engr—Oct. 28, 1905.

PROJECTOR.

See **SEARCHLIGHT.**

PRONY BRAKE.

See **DYNAMOMETER.**

PROPELLER.

See also **MARINE ENGINEERING; NAVAL ARCHITECTURE; SHIP PROPULSION.**

Screw Propellers. McKim Chase. Suggestions for the construction of small screw propellers. Ill. 1500 w. Mach, N Y—July, 1901.

Propellers for Power Boats. Ernest W. Graef. Some ideas concerning propellers and their proportions relative to the motor, hull, etc. 1800 w. Rudder—Oct., 1901.

An Inquiry Regarding the Marine Propeller. J. Millen Adam. Continued discussion. 2000 w. Trans Inst of Engrs & Shipbuilders of Scotland—Feb. 23, 1904.

The Problem of the Screw Propeller. John Lowe. An explanation of the writer's theory and calculations, testing by example. 2000 w. Sci Am Sup—May 28, 1904.

The Size of Screw Propeller Blades (La Grossezza delle Pale d'Elica). N. Pecoraro. An examination of the efficiency of screw propellers in connection with the effective portion of the surface of the blades. 4000 w. 6 plates. Rivista Marittima—Nov., 1904.

Practical Points About the Screw Propeller. W. F. Durand. Discusses the design, construction and operation of screw propellers for marine propulsion. Ills. Serial. 1st part. 2800 w. Marine Engng—Jan., 1905.

The Screw Propeller. R. de Villamil. The present article reviews the explanations that have been offered to explain how the screw propeller derives its thrust, and in a second article aims to show there is no solid foundation of truth in them. Serial. 1st part. 3500 w. Engr, Lond—March 3, 1905.

Aerial.—See **AERONAUTICS—Screw Propeller.**

Air.—Employment of the Air Propeller for Motor Boat Propulsion. Considers that, under normal conditions, the use of the air propeller could not be justified. 1500 w. Automobile—June 13, 1903.

Cavitation.—Cavitation in Screw Propellers (Sur la Cavitation dans les Navires à Hélices). J. A. Normand. A study of the action of screw propellers, deducing the conditions of maximum efficiency. 1800 w. Comptes Rendus—Oct. 27, 1902.

Cavitation with Screw Ships. J. A. Normand. Translated from "Comptes Rendus." A study of the action of screw propellers. 1500 w. Marine Engng—Aug., 1903.

Computer.—See **CALCULATING MACHINE—Screw Propeller.**

Design.—Propeller Design. Theodore Lucas. An illustrated discussion of the important factors. 1400 w. Naut Gaz—Nov. 7, 1901.

Experience in the Design of Screw Propellers. Horace See. Read before the Milan meeting of the International Navigation Congress. A discussion of points in propeller design, giving the more desirable formations, and information of tests and conclusions. 1200 w. Eng News—Nov. 2, 1905.

Efficiency.—Efficiency of Propellers and Rudders. George H. Wilson. Discusses the changes in the location of the rudder and the altered position of the propellers proposed by some authorities, aiming to effect an improvement in the steering qualities and to increase the propulsive coefficient. 2700 w. Marine Engng—April, 1903.

Experiments.—See **Model Experiments; Tests.**

History.—The Evolution of the Screw Steamer. Benjamin Taylor. Gives Col. John Stevens the credit of being the first to apply steam as a motive power to screw propellers, and discusses the origin and development. Ill. 2800 w. Marine Rev—Aug. 15, 1901.

Housing.—See **CRUISER—Mercantile.**

Machining.—Propeller Blade Inaccuracies: Proposed Method of Machining and Finishing. W. Strother Smith. An official report to the Bureau of Steam Engineering. Describes a method of securing accurate finish of the driving face of a propeller-blade to the true designed pitch by means of a machine. 1200 w. Jour Am Soc of Nav Engrs—Aug., 1904.

Model Experiments.—Some Recent Experiments at the U. S. Model Basin. D. W. Taylor. An account of experiments, the primary object being the determination of the power and efficiency of model propellers of the ordinary three-bladed type throughout the range of pitch ratio and blade area likely to be encountered in practice. Ills. and diagrams. 4500 w. Soc of Naval Archts & Marine Engrs, No. 6—Nov., 1904.

Experimental Researches on the Performance of Screw Propellers. W. F. Durand. A report of investigations carried on in the canal of the hydraulic laboratory of Cornell University, covering in effect the performance of 49 model propellers. 36 plates. 4800 w. (No. 3.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

Some Results of Tests of Model Propellers. A. V. Curtis and L. F. Hewins. Presents results of experiments in two, four and six-bladed propellers, at the U. S. Ex. Model Basin. 15 plates. 2000 w. (No. 4.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

See also **MODEL BASIN; SHIP PROPULSION.**

Negative Slip.—Screw Propellers and Negative Slip. Robert M. Neilson. The writer's opinions on this subject, discussing several forms of propellers, and their action. 1800 w. Prac Engr—June 20, 1902.

Non-Reversible Engines.—Marine Propellers with Non-Reversible Engines and Internal Combustion Engines. Rankin Kennedy. Calls attention to other propellers than the screw, and considers various methods of employing the screw propeller. Ill. 4700 w. Trans Inst of Engrs and Shipbuilders—Nov. 24, 1903.

Marine Propellers with Non-Reversible Engines and Internal Combustion Engines. Discussion of Mr. Rankin Kennedy's paper on this subject. Ill. 4300 w. Trans Inst of Engrs & Shipbldrs in Scotland—Vol. 47, Part III.

Marine Propellers with Non-Reversible Engines and Internal Combustion Engines. Rankin Kennedy. Discussion of this paper. 3400 w. Trans Inst of Engrs & Shipbuilders of Scotland—Feb. 23, 1904.

Plane Sections.—Plane Sections of the Blades of Screw Propellers (Le Sezioni Piane delle Pale d'Elica). A. Scribanti. A mathematical discussion of screw propellers, with diagrams and tables. 800 w. Rivista Marittima—March, 1903.

Pressure.—Pressure in Submerged Moving Plates. C. Humphrey Wingfield. Read before the Brit. Inst. of Naval Archts. Instead of considering actual propellers, the more simple case of a plane is taken for the study of the influence of depth of immersion in the distribution of pressure. Ill. 1500 w. Engng—March 29, 1901.

Problems.—A Problem Connected with the Screw Propeller. W. F. Durand. Gives a mathematical solution of the problem of determining the speed when the ship and propeller and turning moment on the shaft are given. Other problems are also considered. 3000 w. Jour Am Soc of Nav Engrs—Aug., 1903.

Rotary Direction.—Direction of Rotation of Screw Propellers (Intorno al Senso della Rotazione dell Eliche). Nino Pecoraro. A discussion of trials in the Italian navy concerning the influence of direction of rotation of propellers on the speed of twin-screw vessels. 8000 w. 6 plates. Rivista Marittima—Aug.-Sept., 1903.

Direction of Rotation of Propellers. Nino Pecoraro. Translated from "Rivista Marittima." A report of experimental investigations of propulsive efficiency, discussing also the experiments of R. E. Froude. 7500 w. Jour Am Soc of Nav Engrs—Nov., 1903.

Note on the Direction of Rotation of Propellers on Twin-Screw War Vessels. M. Laubeuf. Trans. from "Bulletin de L'Association Technique Maritime." A discussion of the most efficient arrangement. 2700 w. Jour Am Soc of Nav Engrs—Nov., 1903.

On the Influence of Inward and Outward-Rotating Propellers on the Manoeuvering Quality of Twin-Screw Vessels. Translated from "Mitteilungen aus dem Gebiete des Seewesens," by Rear Admiral C. H. Roelker. 3700 w. Jour Am Soc of Nav Engrs—Feb., 1904.

Shaft.—See **SHAFT.**

Shallow Draft.—See **SHIP PROPULSION.**

Slip.—The Slip of Screw Propellers (Ueber den Rücklauf der Schiffsschraube). H. Hügli. A general discussion with diagram and formulae. 1000 w. Schiffbau—Dec. 23, 1901.

Small Boats.—See **BOAT—Powering.**

Tests.—Tests of Various Types of Propellers (Proeven met Schroeven van Verschillend Type). Murk Leis, Jr. With curves plotted from tests of screw propellers with blades bent back at various angles. 1200 w. De Ingenieur—Sept. 17, 1904.

Contract Trials of Ships as Experiments Upon Propellers. John Lowe. Showing that the data given furnish complete experiments upon the screw propeller of great value. 1400 w. Jour Am Soc of Nav Engrs—Feb., 1905.

See also **Model Experiments.**

Test, U. S. Navy.—Screw Propellers of U. S. Naval Vessels. Lieut. Charles W. Dyson. Criticisms based on the findings of the efficiences of performance of the different screws as shown by applying of Froude's formulae, using as data the actual data of the trials of the vessels. 14000 w. Plates and tables. Jour Am Soc of Nav Engrs—May, 1903.

Theory.—An Inquiry Regarding the Marine Propeller. J. Millen Adam. An endeavor to concentrate the attention on the propeller and the fluid which passes through it, as a conservative system in the sense indicated by an illustration from the art of rope-making. Ills. 5400 w. Trans Inst of Engrs & Shipbldrs in Scotland—Vol. 47, Part III.

Triple.—See **SHIP PROPULSION.**

Tunnel.—The Screw as a Means of Propulsion for Shallow-Draught Vessels. A. F. Yarrow. Read before the Inst. of Nav. Archts. Describes and illustrates a set of experiments carried out to test the towing efficiency of the screw working in a tunnel. 2500 w. Engng—April 10, 1903.

See also **STEAMBOAT—Yarrow.**

"Wyoming."—A Comparison of the Performances of Propellers, U. S. S. Wyoming. Gives a comparison of the performances of the vessel with the original propellers and with a spare set built to conform to specifications furnished by the Bureau. Ills. 1300 w. Jour Am Soc of Nav Engrs—Aug., 1905.

PROPELLER SHAFT.

See **SHAFT.**

PROSPECTING.

See also **GOLD; GOLD DREDGING; GOLD GEOLOGY; GOLD MINE; GOLD MINING; MINERAL REGION; MINING—Development; MINING ENGINEER; MINING LAW; ORE DEPOSIT.**

Hints to Prospectors. W. J. Adams. Showing that deposits of value are often overlooked, and urging the saving of unknown crystals, with data of their locality. 1200 w. Min & Sci Pr—Aug. 2, 1902.

Sizing Up a Prospect. Arthur Lakes. Some of the points to be considered in determining the value when only a small amount of work has been done. Ill. 2000 w. Mines & Min—Nov., 1902.

Sizing Up Prospects. Arthur Lakes. Examining untried country to determine whether or not it is advisable to prospect thoroughly. Ills. 1500 w. Mines & Min—May, 1904.

Sizing Pp Prospects. Prof. Arthur Lakes. Remarks on the misleading assays of samples, and on things which should be regarded as indications as to value. 1800 w. Mines & Min—Aug., 1904.

The Theory of Ore Deposits Applied to Prospecting. E. B. Wilson. Gives illustrations of manner of ore formation from crystallisation of solutions. Serial. 1st part. 2500 w. Mines & Min—March, 1904.

China.—Prospecting in China. Auguste Mathez. Describes the country north of Peking, and its inhabitants. Ill. 2700 w. Mines & Min—April, 1901.

Churn Drill.—Prospecting with Churn Drills. George C. McFarlane. Illustrates and describes two arrangements devised by the writer which have worked successfully, describing methods used. 1800 w. Eng & Min Jour—July 29, 1905.

Churn-Drill Prospecting. George C. McFarlane. Illustrates and describes a gas-pipe churn-drill, cutting a 2 or 2½-in. hole, useful in prospecting to moderate depths, where the country rock is not especially hard. 2000 w. Eng & Min Jour—Nov. 18, 1905.

Coal.—See **COAL PROSPECTING; COAL REGION—France.**

Diamond Drillling.—See **DRILLING—Diamond.**

Electric.—The Daft and Williams System of Electrical Prospecting for Mineral Ores. Brief illustrated description of this system of locating bodies of metallic ore beneath the earth's surface. 900 w. Elec Engr, Lond—Feb. 20, 1903.

The Daft and Williams Electrical Prospecting System. Illustrated description of prospecting trials made with this system for predetermining the position of mineral ores. 1000 w. Elec Engr, Lond—April 3, 1903.

Electric Ore-Finding System. Edward Skewes. A discussion of the Daft and Williams electrical prospecting system. Thinks the system has possibilities, but at present its claims are "not proven." 3000 w. Eng & Min Jour—May 23, 1903.

Ore Finding by Electric Waves. Extracts from a paper by Alfred Williams explaining the application of the Daft and Williams process. Ills. 2400 w. Elec-Chem & Met—Dec., 1904.

Gold.—See **GOLD; GOLD MINING.**

Gold Dredge.—See **Oroville; GOLD DREDGING.**

Mesabi Iron Range.—See **DRILLING.**

Mexico.—Prospecting in the Mexican Mineral Country. Theodore S. DeLay. An entertaining account of the life of a prospector in Mexico, with much useful and practical information. 5000 w. Engineering Magazine—Nov., 1901.

Oroville, Cal.—Prospecting and Valuing Dredging Ground with a Well Driller at Oroville, Cal. Newton Booth Knox. Slightly condensed from a paper read before the Inst. of Min. & Met. Gives briefly the history of this region and describes the operation of drilling, treatment, and calculating the values. 2500 w. Eng News—July 30, 1903.

See also **GOLD DREDGING.**

Panning.—See **GOLD METALLURGY.**

Petroleum.—See **PETROLEUM.**

Veins.—What Veins to Choose. Prof. Arthur Lakes. Discusses indications likely to be found when prospecting in a region of crystalline rocks. 1800 w. Mines and Min—Oct., 1905.

See also **ORE DEPOSIT.**

PROTECTIVE APPARATUS.

See also **ELECTRIC PROTECTIVE APPARATUS; LIFE SAVING APPLIANCE; RESCUE APPARATUS; SAFETY APPLIANCE**; and under specific main headings.

Electric Railway.—See **ELECTRIC RAILWAY—Overhead Construction.**

PROVING GROUND.

See **NAVAL PROVING GROUND; STEEL WORKS—Krupp.**

PRUSSIAN BLUE.

Gas Manufacture.—See **GAS MANUFACTURE—Prussian Blue.**

PUBLIC WORKS.

See also **ENGINEERING WORKS; MUNICIPAL ENGINEERING; MUNICIPAL IMPROVEMENT.**

Time Required for the Construction of Large Public Works. Gives records of the Massachusetts Metropolitan waterworks, the New Croton system for the supply of New York City, the Boston subway, the New York Rapid Transit Railroad, the Massachusetts Metropolitan sewerage systems, and the Philadelphia filtration plants. 3000 w. Eng Rec—Feb. 4, 1905.

Administration.—See **MUNICIPAL ENGINEERING.**

Australia.—Public Works in Australia (Les Grands Travaux Publics de l'Allemagne). M. de Dar- With especial reference to Western Australia, including the harbour of Fremantle and the works in connection with the mines of Kalgoorlie. 2500 w. Revue Technique—April 10, 1901.

Dresden.—See **MUNICIPAL ENGINEERING.**

Florence.—See **MUNICIPAL ENGINEERING.**

Germany.—The Public Works of Germany (Les Travaux Publics de l'Allemagne). M. de Dar tein. A review of the important engineering works in progress and under discussion in Germany as shown by the exhibits at the Paris exposition. 20000 w. Ann des Ponts et Chaussées—I Trimestre, 1901.

Pennsylvania.—See **ENGINEERING WORKS.**

Philippines.—Public Engineering Work in the Philippines. Information from the report of the Philippine Commission concerning the public works in the provinces. Ills. 4000 w. Eng Rec—Sept. 23, 1905.

See also **MILITARY ENGINEERING; MUNICIPAL ENGINEERING—Manila**; and under specific main headings.

Porto Rico.—See **ROAD.**

PUDDLING.

See **IRON—Wrought; IRON METALLURGY—Puddling.**

PUGET SOUND.

The Coming Industrial Empire of Puget Sound. D. B. Bogle. An examination of the great advantages of the harbors of the Northern Pacific Coast of the United States, and the conditions which may insure ther development. 5000 w. Engineering Magazine—March, 1901.

PULLEY.

See also **BELTING; FLYWHEEL; POWER TRANSMISSION; SHAFTING.**

Auxiliary.—A Contact Roller for Belts (L'Enrouleur de Courroies). J. Teisset. A discussion of the advantages of auxiliary pulleys for increasing the arc of contact of belts with pulleys. 7000 w. Mem Soc Ing Civ de France—Sept., 1905.

Chart.—See **BELTING—Diagram.**

Cone.—The Design of Speed Cones and Change Gearing. Alfred Wildgoose. Investigates the relation existing between any speed cone and the corresponding gearing used in conjunction with it. 2000 w. Prac Engr—July 25, 1902.

The Design of Speed Cones, Gears, etc., for Machine Tools. W. Owen. Shows how to give speeds in geometrical progression. Gives diagram for calculations, explaining its use. 1800 w. Mech Engr—Jan. 9, 1904.

Laying Out Cone Pulleys. H. F. Moore. Describes method, giving diagrams and tests. 1200 w. Am Mach—Feb. 26, 1903.

The Layout of Cone Pulleys. C. M. Sames. Mathematical demonstration. 500 w. Am Mach—May 19, 1904.

Cone-Pulley Design. John Edgar. Gives as simple a method as possible for so designing cone pulleys that their ratios shall advance in geometrical progression. 1400 w. Am Mach—Vol. 28, No. 50.

Cone Diagram.—A Diagram for Cone Pulley and

Back Gear Problems. Gives diagram, with directions for use. 500 w. Am Mach—Vol. 27, No. 49.

Cone Machining.—Machining Cone Pulleys. Illustrates and describes the methods used at the works of the Lodge & Shipley Machine Tool Company. 600 w. Am Mach—May 12, 1904.

Cone Molding Machine.—See **MOLDING MACHINE —Cone Pulley.**

Cone, Open Belt.—A Graphic Solution of the Open-Belt Cone-Pulley Problem. Lucien E. Picolet. Presents graphical solution. 1000 w. Am Mach —Feb. 18, 1904.

Cone Radii.—Cone Pulley Radii. John J. Harman. Explains the method presented by Dr. L. Burmester, which is entirely graphical, and simple in application. 1200 w. Mach, N Y—Sept., 1905.

Cone Speed.—A Method of Calculating the Range of Speed to be Obtained from a Pair of Equal Cones. Frank B. Kleinhans. 600 w. Eng News —March 26, 1903.

Method of Calculating Cone-Pulley and Back-Gear Speeds. E. J. Lees. Gives table, with explanation of method. 900 w. Am Mach—Vol. 28, No. 23.

See also **SLIDE RULE—Speed Changes.**

Horse Power.—See **BELTING.**

Idler.—Determining the Position of Idler Pulley for the General Care of Belt Transmission. R. N. Macallister. Explains the method of finding the position of idler pulleys in belt drives for transmitting power between shafts whose axes are not parallel. 900 w. Am Mach—Vol. 28, No. 34.

Leneveu.—See **Tightening.**

Pneumatic.—See **Tests.**

Rim Tension.—See **CENTRIFUGAL FORCE.**

Testing Machine.—See **TESTING MACHINE—Belt and Pulley.**

Tests.—Comparative Tests of Plain and Para Pneumatic Pulleys. H. Diederichs. Reports a series of tests made in the mechanical laboratory of Sibley College. 700 w. Sib Jour of Engng—June, 1902.

See also **Wooden.**

Tightening.—The Leneveu Tightening Pulley for Belting (Rapport sur le Système de Commande Breveté par le Galet Enrouleur Débrayeur de M. le Capitaine Leneveu). G. Richard. An illustrated description of a balanced tightening pulley which is close to the driven pulley and increases the arc of contact of the belt up to 300 degrees. 700 w. Bull Soc d'Encouragement—March 31, 1903.

Transmission of Motion by Belts or Cables by Means of the Leneveu Tightening Pulley (Transmissions de Mouvement par Courroies ou Cables. Enrouleru-Debrayeur du Capitaine Leneveu). Ch. Dantin. An illustrated description of power transmission in general, and particularly of the Leneveu balanced tightening pulley, which greatly increases the arc of contact of belt or rope. 3500 w. Génie Civil—June 20, 1903.

Tools.—See **TOOL—Pulleys.**

Wooden.—The Bursting Strength of Wooden Pulleys. C. H. Benjamin. An illustrated article giving results of a series of experiments carried on in the laboratories of the Case School, Cleveland, Ohio. 1800 w. Mach, N Y—Aug., 1905.

PULP MACHINERY.

See **PAPER MANUFACTURE; PAPER MILL.**

PULSOMETER.

See **PUMP—Pulsometer.**

PULVERIZED FUEL.

See **POWDERED COAL.**

PULVERIZER.

See **CRUSHING; GOLD MILLING; ORE TREATMENT; STAMP MILL.**

PUMP.

See also **AIR LIFT; MINE DRAINAGE; PUMPING ENGINE; PUMPING ENGINE TEST; PUMPING STATION; WATER RAISING; WATERWORKS.**

Notes on the Construction and Working of Pumps. Edward C. R. Marks. Part first considers certain laws and conditions applicable to the working of pumping machinery in general. Ill. Serial. 1st part. 2000 w. Prac Engr—Dec. 7, 1900.

Varieties and Principles of Pumps. T. W. Shelton. Briefly describes many varieties, explaining their advantages. 1400 w. Engr, U S A—March 1, 1902.

Air.—See **Compressed Air; AIR LIFT; AIR PUMP; COMPRESSED AIR.**

Air Chambers.—Comparative Value of Different Arrangements of Suction Air Chambers on Pumps. F. Meriam Wheeler. An illustrated article showing the importance of properly locating a suction air chamber on a pump. 1500 w. Trans Am Soc of Mech Engrs—Dec., 1900.

Air Driven.—See **Compressed Air; COMPRESSED AIR—Pump Operation.**

Air Lift.—See **AIR LIFT.**

Ashley.—Hydraulically Balanced Ashley Pump. Illustrated description of a new system of hydraulically balancing the load on the engine with the result that however the water level in the well may vary, the engine does exactly the same amount of work on successive up and down strokes. 2000 w. Engng—May 16, 1902.

Aussig Exposition.—See **High Speed, German.**

Automobile.—Water Circulating Pumps. F. Strickland. Describes the types used at different times in automobiles, suggesting improvements. Ills. 1000 w. Autocar—June 25, 1904.

See also **AUTOMOBILE, GASOLINE; TIRE—Pump.**

Belt-Driven.—Boiler Makers' Hydraulic Machinery. The present article gives an illustrated description of pumps, the type shown being a set of three-throw horizontal belt-driven pumps. Serial. 1st part. 1400 w. Prac Engr—June 2, 1904.
See also **Dunham.**

Bergmans.—The Bergmans Pump (Die Bergmanspumpe). R. Goetze. Description of an improved form of mining plunger pump, especially adapted for electric driving. 1200 w. Glückauf—July 6, 1901.

The Bergmans Electric Mine Pump. R. Goetze, in "Glückauf." Illustrated description of a pump growing in favor in Germany. 1200 w. Col Guard—July 12, 1901.

Bridgeport Wheel.—See **Wheel.**

Catlettsburg, Ky.—An Unusual Pump. Illustrated description of an installation for the water supply of Catlettsburg and Ashland, Ky., the pump being rope-driven, and drawing from a pit connected with the Ohio River. 1800 w. Eng Rec—Nov. 25, 1905.

Central Stations.—Pumps in Central Stations. W. T. Edwards. Discusses the importance of the pump as a factor in the economical operation of a power plant. 2200 w. Am Elect'n—Nov., 1904.

Pumps in Central Stations. W. T. Edwards. Suggestions for the care and management of these pumps; the power required, size, etc., are also considered. 1500 w. Am Elect'n—Dec., 1904.

See also **Electric; ELECTRIC STATION.**

Centrifugal.—Ventilators and Centrifugal Pumps for High Pressures Driven by Steam Turbines or Electric Motors (Ventilateurs et Pompes Centrifuges pour Hautes Pressions, Mus pas Turbines à Vapeur ou par Moteurs Electriques). A. Rateau. An elaborate and well illustrated record of investigations showing the superiority of the steam turbine for driving high pressure ventilating fans and centrifugal pumps. 11,000 w. Bull Soc d'Encour—Dec., 1901.

High Pressure Ventilators Driven by Steam Turbines (Ventilateurs pour Hautes Pressions Mus par Turbines à Vapeur). A. Rateau. An illustrated account of the advantages of steam turbines for driving centrifugal blowers and pumps, with results of tests. 2500 w. Génie Civil—Feb. 8, 1902.

High Pressure Centrifugal Pumps Driven by Electric Motors or Steam Turbines (Pompes Centrifuges à Haute Pression avec Moteurs Electriques et Turbines à Vapeur). A. Rateau. Illustrated description, with results of tests. 3000 w. Génie Civil—Feb. 15, 1902.

High-Speed Centrifugal Fans and Pumps. Summary of a paper by A. Rateau, published recently in the "Bulletin de la Société de l'Industrie

Minérale." Describes fans and pumps driven by steam turbines and electric motors for high-pressures. Serial. 1st part. 800 w. Engr, Lond—March 7, 1902.

Fans and Centrifugal Pumps for High Pressures Driven by Steam Turbines or Electro-Motors. Summary of a paper by Prof. A. Rateau, in the "Bulletin de la Société de l'Industrie Minerale." Ill. Serial. 1st part. 2300 w. Prac Engr—Nov. 6, 1903.

The Rateau High Pressure Centrifugal Pumps and Blowers (Hochdruck Kreiselpumpen und Hochdruckventilatoren. System A. Rateu). Julius Divis. Describing the series arrangement of runners designed for direct connection to the steam turbine for pumping or blowing against high pressures. Three articles. 1 plate. 6000 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 25, July 2, 9, 1904.

The Latest Developments of the Rateau High-Pressure Centrifugal Pump (Die Neuesten Ausführungstypen der Hochdruck Kreiselpumpe. System Rateau). Julius Divis. Data concerning recent performances of multiple centrifugal pumps. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 16, 1905.

The Rateau Multicellular Centrifugal Pump for High Heads (Les Pompes Centrifuges Multicellulaires à Grande Élévation du Système Rateau). M. Rey. A fully illustrated account of the Rateau system, using a number of pumps in series, operated by electric motors, steam turbine, or hydraulic turbine. 8000 w. Bull Soc d'Encour—June, 1904.

The Development of High-Pressure Centrifugal Pumps. John Richards. Explains the extensive use of these pumps on the Pacific Coast, their evolution and efficiency. Ill. 1200 w. Min & Sci Pr—Feb. 21, 1903.

Phenomena of Machine Operation. John Richards. Considers the evolution of apparatus to impel fluids, especially liquids, by centrifugal force, as illustrated by centrifugal pumping turbines, &c., showing that development has often been by studying the conditions of use. 3300 w. Jour Assn of Engng Socs—March, 1905.

Theory of Centrifugal Pumps and Fans. Analysis of their action with suggestions for designs. Elmo G. Harris. A study. Ill. 16,500 w. Pro Am Soc of Civ Engrs—May, 1903.

Theory of Centrifugal Pumps and Fans: Analysis of Their Action, with Suggestions for Designs. Continued discussion on paper by Elmo G. Harris. 7200 w. Pro Am Soc of Civ Engrs—Oct., 1903.

High-Lift Centrifugal Pumps. Cecil West Darley. Read at the Engng. Con. of the Inst. of Civ. Engrs. Describes and gives test of steam-turbine-driven centrifugal pumps for high lifts, designed for special conditions in New South Wales. 2400 w. Engng—July 3, 1903.

An Improved Centrifugal Dredging Pump. Capt. Mason M. Patrick. An interesting account of trouble experienced in the wear of pumps used in improving the Mississippi River, with illustrations and description of a design aiming to reduce this wear to a minimum. 1700 w. Eng News—July 9, 1903.

Experiments on the Efficiency of Centrifugal Pumps. Thomas E. Stanton. Reviews a previous experimental work and describes the apparatus used and experiments made, stating the conclusions reached. Ill. 4800 w. Inst of Mech Engrs—Nov. 20, 1903.

Test of Centrifugal Pump. P. P. Bird. Description and illustrations of the method recently used in testing a pump for the armored cruiser "West Virginia." 1300 w. Marine Engng—April, 1904.

Centrifugal Pump Tests. Report of a series of exhaustive tests made by Professors William Kent and J. E. Denton, at the works of the De Laval Steam Turbine Co., Trenton, N. J., upon some of the smaller sizes of their principal types of centrifugal pumps. 8000 w. Ills. Jour Am Soc of Nav Engrs—May, 1904.

Tests of De Laval Centrifugal Pumps. Account of tests made by Prof. J. E. Denton and Prof. William Kent, at the works of the De Laval Steam Turbine Co., Trenton, N. J. 1800 w. Eng Rec—Aug. 20, 1904.

Some Tests of High-Speed Centrifugal Pumps. Condensed report of three tests made of different types of De Laval pumps. 8000 w. Eng News—June 2, 1904.

High-Pressure Centrifugal Pumps (Pompe Centrifuge à Haute Pression). K. Sosnowski. A description of the de Laval system, using small runners connected directly to a steam turbine. 2500 w. Mem Soc Ing Civ de France—Feb., 1904.

The De Laval High-Pressure Centrifugal Pumps (Pompes Centrifuges de Laval à Haute Pression). K. Sonsnowski. A fully illustrated report upon the combination system of centrifugal pumps arranged for direct connection with the de Laval steam turbine. 7000 w. Bull Soc d'Encour—June, 1904.

High-Lift Turbine Pumps. Illustrates and describes an electrically driven pump of this type, of very good efficiency. 900 w. Engng—June 24, 1904.

High-Pressure Centrifugal Pumps (Hochdruck Kreiselpumpen). H. Dubbel. Illustrating and describing centrifugal pumps arranged to operate in series at high rotative speeds to pump against heads of several hundred metres. 2000 w. Zeitschr d Ver Deutscher Ing—July 2, 1904.

A System of Regulating Centrifugal Fans and Pumps. Aegidius Elling. An illustrated article explaining the system of regulation, and a contrivance for removing the worst drawbacks. Serial. 1st part. 2000 w. Prac Engr—April 7, 1905.

Some Types of Centrifugal Pumps. William O. Webber. Reviews briefly the development of centrifugal pumping, giving illustrations of types, and especially describing designs of the writer, and the development of the multiple-stage centrifugal pump. 3000 w. Trans Am Soc of Mech Engrs, No. 062—June, 1905.

Types of Centrifugal Pumps. William O. Webber. Considers recent improvements in these pumps, methods of balancing compound pumps, etc. Illustrates types. 1500 w. Cassier's Mag—June, 1905.

The Efficiency of Centrifugal Pumps (Die Kreisel und Ihre Leistungen). H. Hagens. Giving details of construction of several centrifugal and turbine pumps, with tabulated tests of their performance. 4000 w. Zeitschr d Ver Deutscher Ing—May 20, 1905.

The Efficiency of Centrifugal Pumps (Die Kreisel und ihre Leistungen). H. Hagens. An appendix to a previous paper giving a mathematical examination of the tests previously recorded. 2000 w. Zeitschr. d Ver Deutscher Ing—Oct. 28, 1905.

Centrifugal Pumps for High and Low Heads (Hoog en Laagdruk Centrifugaalpompen). Chr. Beuwens. With sections and details of a number of recently designed pumps, including direct-driven multiple-stage pumps for high-pressure service. 4000 w. 2 plates. De Ingenieur—June 17, 1905.

Results of Tests of a Forced Vortex Centrifugal Pump. Prof. A. Inokuty. Abstract from the Jour. of the College of Engng., Tokio, Japan. Gives results of tests made of a 7-in. forced vortex centrifugal pump. 700 w. Ills. Prac Engr—Sept. 29, 1905.

See also Condensing Water; Electrical Irrigation; Rotary; Turbine; DRY DOCK; HYDRAULIC MINING; PUMPING STATION—Dry Dock; Wattenscheid; TURBINE — Pump; WATER FLOW—Turbines and Pumps.

Centrifugal Compound.—The Efficiency of Compound Centrifugal Pumps. F. G. Hesse. Develops a formula for the efficiency of a compound pump, which indicates that, for a given head the efficiency will increase with the number of stages or pumps in series. Ill. 1000 w. Jour Assn of Engng Soc—Dec., 1901.

Centrifugal Dredging.—See DREDGE—Centrifugal Pump.

Centrifugal, Electric.—Electric Motors for Centrifugal Pumps and Fans. Aug. J. Bowie, Jr. Study of the problem of determining the proper capacity of a motor in the case of centrifugal pumps and fans. 2300 w. Trans Am Inst of Elec Engrs—Sept., 1903.

See also Electric.

Centrifugal Mine.—The Pumping Plant of the Compania Minera y Metalúrgica del Horcajo (Wesserhaltung der Compania Minera y Metalurgica del Horcajo). F. Heerwagen. An illustrated account of the centrifugal pumps at the Horcajo Mine in the province of Ciudad Real, Spain. 4000 w. Zeitschr d Ver Deutscher Ing—Nov. 2, 1901.

A Mine-Pumping Plant with Electrically-Driven Centrifugal Pumps. Illustrated description of the plant installed in the silver mine of Horcajo, in Spain, stating the conditions to be met. 2000 w. Eng News—Jan. 23, 1902.

Electrically-Driven Centrifugal Pumps in the Horcajo Mines, Spain. Illustrates and describes a pumping plant in the lead mines of Spain. 4000 w. Engng—July 18, 1902.

Centrifugal Pumps for Mine Work. W. R. Crane. Discusses the service for which they are adapted, and methods and principles of construction. Ill. 3800 w. Mines & Min—June, 1902.
See also Electric, Mine; Mine.

Centrifugal Schabaver.—The Schabaver Centrifugal Pump (Pompe Centrifuge Schabaver). Gérard Lavergne. An illustrated description of pumps for lifting water to great heights, with account of tests. 2400 w. Génie Civil—April 19, 1902.

Centrifugal Testing.—Tests of Centrifugal Pumps. W. B. Gregory. Illustrations and description of two centrifugal pumps. 2000 w. Trans Am Soc of Mech Engs, No. 869—Dec., 1900.

The Testing of Centrifugal Pumps (Beproeving van Kreiselpumpen). M. C. E. Bongaerts. A description of the Neukirch method, maintaining a constant level of head against the pump, the latter being driven by an electric motor. 1200 w. De Ingenieur—Aug. 10, 1901.

Reports on Tests of a Centrifugal Pump and a "Sirocco" Blower Driven by De Laval Steam Turbines. Illustrates and describes apparatus used, and methods of testing, giving results. 4500 w. Jour Am Soc of Nav Engrs—Feb., 1905.

Test of a Three-Stage, Direct-Connected, Centrifugal Pumping Unit. Philip E. Harroun. Notes illustrating test, presented to draw out a general discussion at next meeting. Also short discussion. Ills. 4000 w. Pro Am Soc of Civ Engrs—Dec., 1905.

See also Centrifugal; STEAM TURBINE; WATER FLOW—Pump Test.

Centrifugal Theory.—Theory of Centrifugal Pumps and Fans. Analysis of their action, with suggestions for designs. Discussion of the paper by Elmo G. Harris. 2500 w. Pro Am Soc of Civ Engrs—Sept., 1903.

See also Centrifugal.

Color Works.—See MECHANICAL PLANT.

Compound.—See Westinghouse; PUMPING ENGINE.

Compressed Air.—A New Method of Pumping Sand by Means of Compressed Air at the Plant of the United States Silica Co. Lucius I. Wightman. Illustrated description of an installation at Ottawa, Ill., especially adapted for this work. 1200 w. Eng News—Dec. 7, 1905.

See also COMPRESSED AIR—Pump; AIR LIFT; MINE DRAINAGE.

Condensing Water.—Pumping Plant for Condensing Water. Charles Hopkinson. Describes the centrifugal pump and turbine arrangement adopted. 3 plates. 700 w. Inst of Mech Engrs—July 29, 1902.

See also CONDENSER.

Cornish.—Cornish Pumps. Prof. W. R. Crane. Considers their construction and method of operation as illustrated in the Galena-Joplin District, Missouri. Ill. 2500 w. Mines & Min—Aug., 1902.

See also Duplex; PUMPING ENGINE—Cleveland; Waihi Mines.

Daubron Regulator.—Automatic Regulator for Pumps (Pompe à Régulateurs Automatiques de Debit). A description of the Daubron system, especially adapted for maintaining a supply to filters under constant pressure. 600 w. Génie Civil—Sept. 10, 1904.

De Laval.—See Centrifugal; STEAM TURBINE.

Deep Shaft.—See Suspended; PUMPING ENGINE.

Design.—Pumps and Pumping Machinery. G. A. F. Ahlberg. Considers general rules in designing pumps, different types, duty and efficiency, etc. Pro Engrs' Soc of W. Penn—Jan., 1904.

See also Formulae.

Direct Acting.—The Use and Abuse of Direct Acting Steam Pumps. W. H. Wakeman. An illustrated article giving suggestions. 1700 w. Power—May, 1904.

Dunham.—A Compact Belt-Driven Pump. Illustrated description of a pump designed by H. F. Dunham for moderate capacities, which combines steam economy with simplicity of structure and accessibility of parts. 1200 w. Eng News—May 4, 1905.

Duplex.—Cornish and Direct-Acting Duplex Pumps. J. Renshaw. Comparison of these pumps in reference to permanent pumping plants in mines in which the water is below the temperature of about 70 or 75 degrees Fahr. 1400 w. Min & Sci Pr—Feb. 2, 1901.

See also Cornish; Types; PUMPING ENGINE.

Düsseldorf Exposition.—The Pumping Machinery at the Düsseldorf Exposition (Die Wasserhaltungsmaschinen auf der Düsseldorfer Ausstellung). Dr. H. Hoffmann. Describing especially the exhibits of mining pumps and draining machinery. 3000 w. 8 plates. Glückauf—May 31, 1902.

Earthenware.—See EARTHENWARE.

Edwards.—See Central Station; CONDENSER—Practice.

Efficiency.—See Centrifugal Compound; Design.

Ehrhard and Sehmer.—See Schleifmühle.

Electric.—A Study in Electro-Hydraulics. Frank A. Pattison. On the application of the electric motor to pumping, hydraulic elevator service, fire-fighting in high buildings, etc. Ill. 2200 w. Eng News—July 4, 1901.

Electrically Operated Pumps. Frank C. Perkins. Illustrates and describes various types of centrifugal pumps operated electrically, and states the purposes for which they are especially suited. 1600 w. Sci Am Sup—Sept. 14, 1901.

Electric Pumping Plants. Frank C. Perkins. Illustrated description of a number of electrically driven pumping plants in Germany, England and America. 3500 w. Mines & Min—Feb., 1905.

Possibilities and Limitations of Electric Pumping. Lewis A. Hicks. Presented at convention of the Pacific Coast Elec. Trans. Assn. Sketches briefly the more important uses of electric power in this connection in California, making comparative statements as to efficiency of performance. Also discussion. 6000 w. Jour of Elec—Sept., 1901.

Electric Feed Pumps. A. Johnston. Discusses methods of regulating the amount of water. 1500 w. Elec Rev, Lond—Jan. 10, 1902.

Improvements in Electric Pumping Machinery (Neuere Ausführungen Elektrischer Wasserhaltungen). W. Philippi. Describing especially the electrically driven high speed pumps of the Riedler and Bergman type. 2500 w. 2 plates. Glückauf—June 7, 1902.

Electric Pumping for Irrigation. Aug. J. Bowie. Jr. A discussion of the problems where irrigation is needed, especially where pumps not for deep wells, that are placed where all parts are readily accessible, are used. Also editorial notes. 6300 w. Elec Wld & Engr—Aug. 9, 1902.

Motor-Driven Pumps. W. H. Wakeman. Illustrates and describes pumps driven by electricity. Serial. 1st part. 900 w. Elec, N Y—Oct. 12, 1904.

The Operation of Pumps by Electric Motors (Allgemeine Betrachtungen über die Pumpen mit Elektrischen Antrieb). H. Koch. Describing applications of electric motors to centrifugal pumps and to Riedler express pumps for mining service. 2500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—April 15, 1905.

See also Centrifugal; Electric Mine; Riedler; Schleifmühle; Sinclair; ELECTRIC EQUIPMENT; ELECTRIC MOTOR—"Bull" Pump; IRRIGATION—Bakersfield, Cal.; Pumps; MINE DRAINAGE; PUMPING STATION.

Electric Mine.—An Electric Underground Pumping Plant of 800 Horse-Power. States the advantages claimed for electric working of underground pumps, and gives illustrated description of the plant. 1200 w. Ir & Coal Trds Rev—June 14, 1901.

Electrically Driven Pumping Machinery (Elektrisch Betriebene Wasserhaltungen). H. Hoffman. Especially discussing the application of electric driving to underground pumping machinery. 2500 w. Zeitschr d Ver Deutschr Ing—June 29, 1901.

Mine Drainage. On the various systems of pumping, especially emphasizing the advantages of the electric pump. Ill. 2000 w. Min Rept—July 4, 1901.

The Electrically Driven Pumping Plant at the

Kaiserstuhl Shaft No. II. at Dortmund (Elektrisch Betriebene Wasserhaltung der Zeche Kaiserstuhl II, bei Dortmund). K. Weitzenmiller. Describing the generators, motors and pumps used in the deepening of a coal shaft, the capacity being 5 cubic metres per minute against 400 metres head. 2000 w. Glückauf—July 20, 1901.

Electrically Driven Pumping Machinery (Elektrisch Betriebene Wasserhaltungen). Hr. Hansen. A paper giving an account of various electric pumping plants for mine drainage and particularly of the Riedler express pump, with discussion. 1500 w. Zeitschr d Ver Deutschr Ing—Jan. 4, 1902.

Electric Pumping from a 1300-Foot Level. Donald H. Fry. Read before the Pacific Coast Elec. Trans. Assn. A brief description, with illustration, of an electrically driven pump recently installed at the Oneida mine, Amador Co., Cal. Also a comparison of electric power costs with fuel oil. 1000 w. Jour of Elec—June, 1902.

Electric Mine-Draining Plant at the Düsseldorf Exhibition. Illustrated description of an electric generating installation for working a draining pump. 800 w. Engng—July 11, 1902.

Electrically Driven Pumping Machinery (Elektrisch Betriebene Wasserhaltung). H. Koch. Discussing the applications of electric motors to centrifugal and express reciprocating pumps, with especial reference to mining service. 5000 w. Elektrotech Zeitschr—May 4, 1905.

Electric Pumping at Collieries. Gerald Hooghwinkel. Abstract of a paper read before the Manchester Geol. & Min Soc. Considers the types of pumps, the electric motors, efficiency, and electric sinking pumps. 4000 w. Col Guard—Nov. 17, 1905.

See also **Bergmans; Centrifugal Mine; Electric; Riedler; ELECTRIC EQUIPMENT—Coal Mine; Mine; MINE DRAINAGE—Electric Pumping; PUMPING STATION.**

Electric Station.—See **Central Station.**

Electric, Turbine, Sinking.—Electrically-Driven Turbine Sinking-Pump. Illustrated description of a mine pump of English manufacture. 800 w. Engng—May 26, 1905.

Electric vs. Steam.—See **ELECTRIC STATION—Auxiliary Plant.**

Electric, Well.—Electrically Driven Well Pumps. Illustrated description of a plant installed in London to pump a private well. 1200 w. Engr, Lond—Dec. 18, 1903.

Proposed Electric Pumping for Stock Wells. A. J. Bowie, Jr. Read before the Pacific Coast Elec. Trans. Assn. Map and description of a proposed installation, stating the present conditions. 2200 w. Jour of Elec—June, 1902.

Engine.—See **ENGINE—Pump; PUMPING ENGINE.**

Experiments.—See **Plunger; Tests; PUMPING ENGINE TEST.**

Express.—See **High Speed; Klein; Riedler; Schleifmühle; Steuer.**

Farm Rig.—A Farm Pump Rig. F. A. Stanley. Brief illustrated description of a simple arrangement for pumping water on a farm near Allentown, Pa. 400 w. Am Mach—Sept. 5, 1901.

Feed.—Boiler Feed Pump Operation in Isolated Plants. J. N. Cravath. A discussion of methods. 1000 w. Am Elect'n—Jan., 1902.

Air Chambers on the Water Supply Inlets of Boiler Feed Pumps. Walter T. Ray. An illustrated description of an investigation into the cause of excessive hammering of three boiler-feed pumps in the Harrison street station of the Chicago Edison Co. 2000 w. Technograph, No. 18—1903-4.

Some Notes on High-Speed Feed Pumps and the Reasons of Their Inefficiency. E. O. Barton. Read before the Queensland Inst. Gives calculations made in comparing the relative advantages of a Worthington and a Weir pump. 1700 w. Elec Engr—Jan. 13, 1905.

An Automatic Boiler Feed Pump. Henry F. Schmidt. The advantages of motor-driven or turbine-driven centrifugal pumps, with diagram. 900 w. Am Elect'n—Sept., 1905.

See also **Electric; ELECTRIC STATION—Auxiliary Plant; FEED WATER; VALVE—Slip.**

Fire.—Specifications for Fire Pumps. Abstracts of three committee reports presented at the meeting of the Nat. Fire Protective Assn. 1800 w. Eng News—June 20. 1901.

See also **Electric; FIRE ENGINE; WATER-WORKS—Fire Service.**

Formulas.—Rules and Formulas for Steam Pumps and Water Pipes. C. A. Collett. Reviews the rules for finding the velocity of flowing water, the weight and pressure of columns of water of various heights, and deduces formulae, illustrating by examples. 3500 w. Engr, U S A—Sept. 1, 1903.

See also **WATER FLOW.**

Heisler.—See **PUMPING ENGINE.**

Hesse.—See **Jet.**

High Lift.—See **Centrifugal.**

High Speed.—High-Speed Pumps (Pompes à Grand Vitesse). M. Lecuir. A discussion of the action of valves and mechanism of high-speed power pumps by means of which shock may be minimised, with examples of recent construction. 6000 w. Revue de Mécanique—Nov. 30, 1902.

See also **Feed-Water; Klein; Riedler; Schleifmühle; Steuer.**

High Speed, German.—The Pumps at the Aussig Industrial Exposition, 1903 (Die Pumpwerke auf der Deutschen Gewerbe und Industrieausstellung in Aussig, 1903). Alexander Fieber. Illustrating especially recent German designs of high-speed pumps. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—March 19, 1904.

History.—A History of Pumps, Ancient and Modern. John A. Drew. A lecture delivered before the Brooklyn Engrs.' Club. Historical review with illustrations. 6000 w. Engr, U S A—Nov. 16, 1903.

Hydraulic.—Hydraulically-Driven Pumps (Hydraulisch Betriebene Wasserhaltungsmaschinen). Fr. Frölich. Describing the use of hydraulic motors for operating mine pumps, with especial reference to the Kaselowsky system. 3500 w. Zeitsch d Ver Deutscher Ing—Dec. 15, 1900.

Hydraulic Pumping Machinery. Fr. Frölich. Abstract of a paper read before the Society of German Engineers, at Witten. States the advantages of hydraulic pumping plants, giving illustrated descriptions of plants built by Berliner Maschinenbau Actien-Gesellschaft. Serial. 1st part. 2400 w. Engng—Dec. 6, 1901.

Hydraulic Mine Pumps (Machines d'Epuisement Hydrauliques). M. Seurat. A description of underground hydraulic transmission for the operation of mine pumps, with especial reference to German practice. 2500 w. 1 plate. Génie Civil—Nov. 2, 1901.

See also **Kaselowsky-Prott; HYDRAULIC ENGINE; HYDRAULIC RAM; MINE DRAINAGE.**

Hydraulic Mining.—See **HYDRAULIC MINING.**

Irrigation.—See **Centrifugal; Electric; IRRIGATION—Pumps.**

Jet.—The Jet Pump as an Hydraulic Apparatus. F. G. Hesse. Considers the jet pump as an hydraulic apparatus in which the jet and the liquid to be raised are both non-compressible and of the same density. 1000 w. Jour Assn of Engng Socs—Sept., 1904.

The Hesse Jet Pump. Otto Goldman. Illustrates and describes the invention of Prof. James Thompson, giving calculations of efficiency. 1700 w. Cal Jour of Tech—Nov., 1904.

Kaselowsky.—See also **Hydraulic.**

Kaselowsky-Prott.—The Kaselowsky-Prott Hydraulic Pump. Fr. Frölich. Translated from "Glückauf." An illustrated detailed description of improvements in the hydraulic pump which greatly increase its efficiency. 1500 w. Ir & Coal Trds Rev—Feb. 22, 1901.

Klein.—The Klein High-Speed Pump (Pompé Express à Grande Puissance Système Klein). O. Diemer. With illustrations showing the arrangement of valves and differential plunger, permitting speeds of 200 strokes per minute without shock. 1000 w. Revue Technique—Nov. 25, 1902.

Leadville, Colo.—Leadville Pumping Practice. A. W. Warwick. An account of the large volume of water to be handled and the expense and methods. Ill. 2200 w. Min & Sci Pr—June 15, 1901.

Mine.—Mining Machinery (Les Machines de Mines). Henri Deschamps. An illustrated review of mining machinery at the Paris Exposition of 1900.

The present part treats of pumping machinery. Serial. 1st part. 5 plates. 18,000 w. Rev Univ d Mines—Jan., 1902.

Underground Mine Pump of 1000 Horse Power (Unterirdische Wasserhaltungsmaschine von 1000 PS.) S. Steuer. Description of powerful mining pump installed in the Czeladz mine at Sosnowice, in Russian Poland. 1000 w. 1 plate. Zeitschr d ver Deutscher Ing—March 29, 1902.

The Advantages and Disadvantages of Different Mine-Pumping Systems (Vorzüge und Nachteile Verschiedener Wasserhaltungs-Systeme). F. Schulte. A comparative discussion of the costs of steam and electric pumping for mines. Tables. 1800 w. Glückauf—June 21, 1902.

Mine-Draining Pump. Illustrations with description of a large pump exhibited in the mining section of the Düsseldorf exhibition. It is capable of lifting 5500 gallons per minute against a head of 1640 feet. 700 w. Engng—July 25, 1902.

See also **Bergmans; Centrifugal Mine; Electric, Mine; Hydraulic; Riedler; Steuer; GOLD MINING—Water Problem; HYDRAULIC ENGINE; MINE DRAINAGE; PUMPING STATION.**

Mine, California.—Some Pumping Data. R. Gilman Brown. Gives figures collected from records kept at the Brunswick mine, Grass Valley, Cal., during the fall and winter of 1903-4. 1500 w. Eng & Min Jour—May 18, 1905.

Oil.—Oil Pumps. A. L. Millar. Brief illustrated descriptions of types used in lubrication. 700 w. Am Mach—Vol. 28, No. 32.

Papin.—Papin's Direct-Acting Steam Pump (Papin's Direktwirkende Dampfpumpe). Conrad Matschoss. With a reproduction of Papin's early design of 1707, and a brief discussion of its historical position. 1000 w. Zeitschr d Ver Deutscher Ing—Oct. 14, 1905.

Paris Exposition.—Pumps at the Paris Exposition, 1900 (Die Weltausstellung in Paris, 1900. Pumpen). M. F. Gutermuth. A general review of the pumping machinery at Paris, with comments on points of novelty and interest. 3000 w. Zeitschr d Ver Deutscher Ing—Oct. 12, 1901.

Pearn's Compound.—Pearn's Compound Single-Acting Ram Pump. Brief illustrated description. 400 w. Engng—Sept. 13, 1901.

Penrhyn Quarry.—See **QUARRY—Penrhyn.**

Piping.—See **Formulae; PIPING.**

Placer Mining.—The Pump in Placer Mining. J. A. Yeatman. An illustrated description of a placer mine using artificial pressure head produced by step pressure pumps. 1200 w. Min & Sci Pr—April 2, 1904.

See also **GOLD MINING; HYDRAULIC MINING.**

Plunger.—Hydraulic Experiments on a Plunger Pump. Prof. John Goodman. Describes a series of experiments made on a small plunger pump, for the purpose of solving some of its actions, and gives results obtained. Ill. 8500 w. Inst of Mech Engrs—Feb. 20, 1903.

Pneumatic.—See **AIR LIFT.**

Power.—The Development of Power Pumping Machinery. W. M. Barr. Modern methods of overcoming high lifts and heavy service, with latest improved forms of pumping machinery. 2500 w. Engineering Magazine—Jan., 1905.

Pulsometer.—The Pulsometer Steam Pump. Joseph C. Riley. Describes the pulsometer and its operation and gives indicator diagrams, and report of tests. 3800 w. Tech Qr—Sept., 1901.

The Pulsometer Steam Pump on Public Works. P. E. Hodgkin. Illustrated descriptions of this pump raising water in foundation and sewage work, baths, locomotive tanks and other purposes. 2500 w. Public Works—Aug. 15, 1904.

Quimby Screw.—See **Electric.**

Rateau.—See **Centrifugal.**

Riedler.—The Riedler Express Pumps (Les Pompes Express Riedler). M. Rony. With especial reference to high-speed electrically driven pumps with the Riedler mechanically moved valves. 2500 w. Revue de Mécanique—Dec. 31, 1900.

Modern Pumping Machinery (Neuere Pumpmaschinen). G. ter Meer. Especially discussing improved forms of Riedler express-pumps driven direct by electric motors. Serial. 2 parts. 10,000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Jan. 5, 12, 1901.

The Riedler Pumping Engine. An account of an inspection of two pumps at work. Ill. 1600 w. Col Guard—Aug. 16, 1901.

The Riedler "Express" Pump. Illustrated description of high-speed pumps. 1600 w. Engng—March 7, 1902.

Riedler High-Speed Pumps (Riedler Expresspumpen.) H. Lehmann. Describing pumps recently installed at the Engelsburg mine near Bochum. The pumps run at 150 revolutions per minute and deliver 3.72 cubic metres per second against a head of 580 metres. 2000 w. Zeitschr d Ver Deutscher Ing—Sept. 19, 1903.

New Motor Pumps on the Riedler Express System. L. Ramakers. Illustrates and describes a new pump which may be driven by electro-motors, and by benzine, gas, spirit, or petroleum motors, or by belting and transmission shafting. 1200 w. Prac Engr—Jan. 13, 1905.

See also **Electric; COAL MINE—Pumping and Spraying; OIL ENGINE—Diesel Test; PUMPING STATION; VALVE—Pump.**

Rotary.—Rotative Pumping. John Richards. A review of the development of this class of machinery, especially describing the Sulzer pumps, and the principles of the turbine type. Ill. and discussion. 8000 w. Jour Assn of Engng Socs—Aug., 1902.

Rotary Pumps. John T. Wilkin. Description is given of the construction and action of rotary pumps, particularly of a two-lobe cycloidal pump, and its advantages shown. 2800 w. Trans Am Soc of Mech Engrs, No. 0970—Dec., 1902.

A New Type of Rotary Pump. Emile Guarini. Illustrates and describes a pump which is reversible, and yet gives a true piston stroke like an ordinary pump. 600 w. Sci Am Sup—Jan. 28, 1905.

See also **Centrifugal; Tests; Turbine.**

St. Louis Exposition.—Pumping and Air Compressing Machinery at the St. Louis Exposition. An illustrated review of exhibits showing the latest achievements in these and allied branches of engineering. Serial. 1st part. 4000 w. Ir Age—July 21, 1904.

See also **ST. LOUIS EXPOSITION.**

Schabaver.—See **Centrifugal, Schabaver.**

Schleifmühle.—The Schleifmühle Electric Express Pump. J. Divis, in "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Illustrates and describes a pump designed for use with an electromotor, but which can also be driven by high-speed steam engines. 1000 w. Col Guard—April 12, 1901.

The Ehrhard and Sehmer Express Pump (Die Expresspumpe "Schleifmühle" der Maschinenfabrik Ehrhard und Sehmer in Saarbrücken. J. Divis. An improved high-speed mining plunger pump, operating at 200-250 revolutions per minute. 1800 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 6, 1901.

The Schleifmühle High Speed Pump (Die Expresspumpe Schleifmühle). H. Ehrhardt. An account of the performance of this improved electrically driven deep mine pump. The valves are not mechanically operated. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 16, 1901.

Sewage.—See **PUMPING ENGINE—Boston Sewage; PUMPING STATION; SEWAGE DISPOSAL—Fond du Lac; Pittsfield.**

Sinclair.—Variable-Stroke Pump. Illustrates and describes an electrically-driven variable-stroke pump designed by G. W. Sinclair to meet the needs of electrical generating stations, but applicable to other purposes. 1300 w. Engng—Sept. 1, 1905.

Slimes and Sand.—The Pumping of Slimes and Sands. L. J. Charles. Illustrations of various sand pumping devices, with figures in regard to the capacities, power used and limitations or conditions, under which each gives the best satisfaction. Serial. 1st part. 1200 w. Min Rept—Oct. 9, 1902.

See also **Compressed Air.**

Steam Turbine.—See **Centrifugal; Turbine; STEAM TURBINE.**

Steuer Express.—Improved Pumps (Neue Pumpen). Illustrated description of the Steuer express pump, showing its arrangement for underground service with electric driving. 1800 w. Zeitschr d Ver Deutscher Ing—April 2, 1904.

See also **Mine.**

Stock Wells.—See Electric, Well.

Stuffing Boxes. — See STEAM ENGINE; STUFFING BOX.

Suction.—The Suction of Pumps (Die Vorgänge beim Ansaugen der Pumpen). H. Hagens. Discussing especially the suction action of high-speed pumps and the influence of air chambers. 3500 w. Zeitschr d Ver Deutschr Ing—Oct. 26, 1901.

Sulzer.—See Rotary.

Suspended.—Suspended Pumps in Deep Shafts. W. Price Abell. Read before the Inst. of Waterworks Engrs. An illustrated outline of modern practice of using slung pumps for sinking purposes. 1800 w. Col Guard—Oct. 31, 1902.

Tailings.—See ELEVATOR.

Test, Centrifugal.—See Centrifugal Testing; WATER FLOW—Pump Test.

Tests.—Test of a High-Speed Rotary Pump (Versuche mit Einer Schnellaufenden Kapselpumpe). O. Kammerer. The pump was of the rotary piston type, directly driven by an electric motor, and the results of the test are given in graphic and tabular forms. 2000 w. Zeitschr d Ver Deutscher Ing—June 24, 1905.

See also PUMPING ENGINE TEST.

Tire.—See TIRE—Pump.

Troubles.—Some Pump Troubles, Their Causes and Remedies. L. S. Brainard. Considers troubles with steam pumps. Ill. 1800 w. Power—Sept., 1903.

Turbine.—High-Pressure Multi-Stage Turbine Pumps with Special Balancing Device. Illustrated description. 1500 w. Eng News—April 7, 1904.

Turbine Pumps for Irrigation and Drainage. J. J. Brown. Read before the Nat. Ir. Cong. at El Paso, Texas. Information concerning the cost of pump irrigation, giving brief reports from a number of places, and discussing various types of pumps. 2800 w. Jour of Elec—Aug., 1905.

Modern Turbine Pumps. Otto H. Mueller. Translation from "Zeitschrift des Vereines Deutscher Ingenieure. Discusses the operation, efficiency, design, &c., comparing types, and giving results of tests. Ills. 3000 w. Ir Age—Sept. 21, 1905.

See also Centrifugal; Rotary; Types; TURBINE—Pump; WELL—Peoria, Ill.

Types.—Modern Duplex, Flywheel and Turbine Pumps (Neuere Duplex-Pumpmaschinen, Schwungrad-Pumpmaschinen, und Turbinenpumpen). Otto H. Mueller. A critical comparison of modern large pumping machines of the several types, with details of construction and data of performances. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—June 17, 1905.

See also Design.

Vacuum.—See VACUUM PUMP.

Valve.—The Valve Motions in Reciprocating Pumps (Etude du Mouvement des Clapets dans les Pompes a Mouvement Alternatif). C. Enquehard. A study of the action of the valves of high-speed reciprocating pumps, with diagrams. 600 w. Rev de Mécanique—April 30, 1903.

See also VALVE—Long-Stroke; Pump.

Valve Area Experiments.—See PUMPING STATION—Winchester, Ind.

Valve Slip.—See VALVE—Slip.

Wear.—See Centrifugal.

Well, London.—See Electric, Well.

Westinghouse.—Westinghouse Compound Pump. F. H. Parke. Illustrated description of the design and operation. 1600 w. R R Gaz—Vol. XXXVIII., No. 26.

Westinghouse Compound Pumps. F. H. Parke. Illustrates and describes a new design consisting of three cylinders placed vertically in tandem, explaining its working. 1700 w. Am Engr & R R Jour—Aug., 1905.

Wheel.—The Bridgeport Wheel Pumps. Ossian Guthrie. Describes the construction of two wheel pumps used between 1848 and 1871 for supplying the Illinois and Michigan Canal with a flow from the river. They proved an economical and efficient device and their advantages are urged for the purpose of elevating sewage and storm water into the big cross-town tunnels in Chicago. Plate. 1500 w. Jour W Soc of Engs—Feb., 1901.

Worthington, Hydraulic.—See PUMP WORKS.

PUMPING.

See also PUMP; PUMPING ENGINE; PUMPING STATION.

Dry Dock.—See DRY DOCK—Pumping Machinery.

Gas.—See GAS DISTRIBUTION—Pumping Station.

Gas Engine.—See GAS ENGINE—Pumping.

Natural Gas.—See GAS, NATURAL—Pumping.

PUMPING ENGINE.

See also MINE DRAINAGE; PUMP; PUMPING ENGINE TEST; PUMPING STATION; WATERWORKS.

Pumping Engines and Pumping Machinery. Oscar F. Rabbe. Read before the Ohio Soc. of Mech., Elec. & Steam Engrs. Discussing some of the sources of trouble, the data that should be included in specifications, &c. 1500 w. Engr, U S A—Dec. 1, 1905.

America.—Waterworks Pumping Engines in the United States and Canada. John Barr. Brief descriptions, with illustrations, of twelve stations visited, with general remarks. 4000 w. Inst of Mech Engrs—Jan. 20, 1905.

Andover, Mass.—See Boston Sewerage.

Barr.—See Washington, D. C.

Beam.—Old Pumping Engine at the New York Navy Yard Dry Dock. Illustrates and describes an engine of the double-acting beam type, built when large engines were few, which has recently been replaced by two centrifugal pumps which drain the dock in half the time, and occupy about one-tenth the space. 1800 w. Power—March, 1903.

Boston Sewerage.—Pumping Machinery at Boston and Andover, Mass. (Amerikanische Maschinen und Maschinenanlagen). C. Regenbogen. An illustrated description of the pumping machinery of the Boston Sewerage Works and of the Andover Water Works. 1800 w. Zeitschr d Ver Deutscher Ing—April 13, 1901.

72,000,000-Gallon Pumping Engine at Boston, Mass. Illustrated detailed description of a pumping engine believed to be the largest reciprocating pump in the world, recently installed for the Boston Main Drainage Works, of the Sewer Division. 2000 w. Eng News—July 6, 1905.

See also SEWAGE DISPOSAL.

Boston Water Works.—See PUMPING ENGINE TEST; PUMPING STATION.

Budapest.—Pumping Engines of the Budapest Water Works. Illustrates and describes the fly-wheel engines installed to meet the great differences in the consumption of water occurring several times a day. 2200 w. Engr, Lond—Sept. 22, 1905.

Chatham Dock Yard.—See PUMPING STATION.

Cleveland, O.—An Accident to a Faithful Servant. Illustrated description of a Cornish pumping engine in use since 1857 at the Cleveland waterworks, with notes concerning its efficiency. 1500 w. Eng Rec—Dec. 29, 1900.

See also PUMPING STATION.

Coal Mine, Bohemia.—The Pumping Machinery of the Bruch Colliery (Wasserwirthschaft der Gewerkschaft Brucher Kohlenwerke). A. Padour. Illustrated description of horizontal, underground pumping machinery in the colliery at Bruch, in northwestern Bohemia. 3500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 9, 1901.

Compound Duplex.—Tables for Computing Compound Duplex Steam Pumps. C. J. Mitchell. Gives tables useful in determining the principal proportions of these pumps, illustrating the method of using them. 1500 w. Eng News—Nov. 17, 1904.

See also PUMP—Duplex.

Coolgardie Pipe Line.—Pumping Engines for the Coolgardie Pipe Line. Illustrated description of one of the six-cylinder, triple-expansion engines to be furnished for this pipe line in West Australia. The purpose is to supply water to the mining district, a distance of 325 miles. 1400 w. Eng News—Oct. 18, 1900.

See also WATER PIPE; WATERWORKS.

Corliss.—Corliss First Compound Pumping Engine. An account of this engine as given in a recent paper by George R. Phillips, with illustrations. 600 w. Power—May, 1903.

Costs.—Working Costs of Water-Works Pumping-Engines. A. H. Meysey-Thompson and H. Lupton.

Abstract of a paper before the British Assn. of Water-Works Engrs., and of the discussion. Considers four main types of pumping-engine. 3000 w. Jour Gas Lgt—June 21, 1904.

Deep Well.—Deep-Well Pumping Machinery. W. Percy Guarani. Read before the Graduates' Sec. of the Inst. of Mech. Engrs. Considers the rotative and non-rotative engines used for deep-well pumping. Ills. 4000 w. Mech Engr—June 18, 1904.

See also **PUMP—Suspended.**

Dinnendahl.—Franz Dinnendahl. A Steam Engine Centennial (Franz Dinnendahl. Ein Hundertjähriges Dampfmaschinen-Jubiläum). Conrad Matschoss. An illustrated biographical sketch of Franz Dinnendahl, about the first steam-engine builder in western Germany, and descriptions of his early pumping engines for mines. 6000 w. Zeitschr d Ver Deutscher Ing—April 25, 1901.

Duluth.—Duluth's Municipal Pumping Plant. Illustrates and describes the pumping engines of this plant. 800 w. Power—Jan., 1901.

Duty.—Maximum Duty of a Pumping Engine with 1,000 Pounds of Steam. A. F. Nagle. A calculation of the duty of an ideal engine under practical conditions. 1700 w. Engr, U S A—Feb. 2, 1903.

Failures.—Steam Pumps and Their Failures. M. Powis Bale. Considers some of the principal causes of pumps failing. 2000 w. Prac Engr—Aug. 4, 1905.

Floating Dock, Japan.—Pumping Engine for a Floating Dock. Illustrated description of the engines, and pumps for the Kobe floating dock, Japan. 900 w. Engr, Lond—July 22, 1904.

See also **DRY DOCK—Pumping Machinery.**

Governor.—See **GOVERNOR—Nordberg.**

Hampton, Eng.—Pumping Engines at Hampton. Two-page supplement and drawings of details with description. 2500 w. Engr, Lond—Nov. 1, 1901.

Pumping Engines at Hampton. Detailed description of these engines, which are fully illustrated. 900 w. Engr, Lond—Aug. 2, 1901.

Heisler.—A New High-Duty Pumping Engine of the Compensating Type. Illustrated description of a pumping engine built by the Heisler Pumping Engine Co., Erie, Pa., in which the end stroke of one piston rod is reinforced from the other rod by means of a conecting link. 1100 w. Eng Rec—May 10, 1902.

Heisler Compensating Gear.—The Heisler Compensating Gear for Direct-Acting Pumping Engines. Notes briefly the methods of compensating used in various pumps, and gives an illustrated detailed description of the method devised by Chas. L. Heisler. It comprises essentially a link connection between the two piston rods of a duplex or a compound pump. 3800 w. Eng News—June 4, 1903.

Hinksford, Eng.—Pumping Engines at Hinksford. Illustrated description of vertical compound pumping engines at South Staffordshire water works, with results of official tests. 1800 w. Engr, Lond—July 8, 1904.

History.—See **STEAM ENGINE.**

Holland.—Large Water Works Pumping Engines in Holland (Groote Pompwerktuigen voor Waterleidingen in Nederland). J. C. Dijxhoorn. Describing the water works pumps at The Hague, Utrecht, Rotterdam and Amsterdam. 6000 w. 5 plates. De Ingenieur—Nov. 15, 1902.

Hydraulic.—See **HYDRAULIC ENGINE—Mine Drainage; PUMP.**

Kuhn.—Improved Steam Pumping Machinery (Einige Neuere Pumpmaschinen mit Dampfbetrieb). H. Becher. Data and results of tests of recent water works pumping engines built by Kuhn of Stuttgart. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 23, 1902.

Mine.—See **Coal Mine; PUMP; PUMPING ENGINE TEST.**

Molasses.—A Molasses Pumping Plant in Boston. An account of the plant designed for discharging molasses from tank steamers into tanks in the storehouses. Ills. 3000 w. Eng Rec—Sept. 17, 1904.

New York Navy Yard.—See **Beam.**

Rosario Water Works.—Pumping Engine, Rosario Water Works. Illustrated description of a vertical triple-expansion pumping engine, working with high-pressure steam, moderately superheated. Describes also the arrangement and the advantages claimed, and gives report of test. 2000 w. Engr, Lond—Aug. 18, 1905.

Sewage, Boston.—See **Boston.**

Sewage Melbourne.—Sewage Pumping Plant. Illustrated description of a triple-expansion, vertical sewage pumping engine, built for the Melbourne and Metropolitan Board of Works. 1600 w. Engr, Lond—Aug. 21, 1903.

Superheated Steam.—Improvements in Economy of Pumping Engines. F. W. Dean. Discusses methods of superheating, and the use of superheaters as a means of promoting economy. 2500 w. Jour New Eng W Works Assn—March, 1904.

Superheated Steam in Pumping Engines. E. H. Foster. Reviews the results of various tests made, and gives information of interest showing the advantages of superheating. Ills. 3500 w. Jour N Eng W. Wks Assn—March, 1905.

See also **SUPERHEATED STEAM.**

Utrecht Water Works.—See **PUMPING STATION.**

Waihi Mines, New Zealand. — Compound Cornish Cycle Pumping Engine. Illustrated description of a very large pumping-engine at the Waihi Mines, in New Zealand. 1000 w. Engng—March 18, 1904.

Washington, D. C.—Barr Pumping Engine at Washington, D. C. Illustrated description, with extract from the report of the official test. 1000 w. Power—Nov., 1900.

Water Hammer.—See **WATER HAMMER—Waltham, Mass.**

PUMPING ENGINE TEST.

See also **PUMP; PUMPING ENGINE; PUMPING STATION.**

Boston Waterworks.—A Report on Trial of 30,000,000-Gallon Pumping Engine at the Chestnut Hill High-Service Station of the Metropolitan Waterworks, Made May 1 and 2, 1900. Will J. Sands. Gives a description of the plant and method of conducting the trial, with general data. 3400 w. Jour N E Water-Wks Assn—March, 1901.

Tests of High-Duty Holly Pumping Engines for the Boston Water Supply. An illustrated description of the plant with report of tests. 4000 w. Eng News—Nov. 14, 1901.

Duty Trials of Four Holly Pumping Engines, Metropolitan Water-Works. Slightly condensed official report of the duty trials of three 35,000,000-gallon pumping engines at Chestnut Hill, and one 20,000,000-gallon engine at Spot Pond. Ill. 3800 w. Eng Rec—Nov. 16, 1901.

Chicago.—Some Recent Pumping Engine Tests. Frank A. Whitten. Brief description of the recent addition to the water supply of Chicago, with report of tests. 3000 w. Eng News—May 26, 1904.

Colorado Mine.—Test of the Corliss Engine at the Saratoga Mine, Central City—Some Pumping Data. Thomas L. Wilkinson. Abstracts of a paper read before the Colorado Scientific Society. Remarks on the importance of engine testing, with report of the test named. Serial. 1st part. 1500 w. Min Rept—June 20, 1901.

Haverhill, Mass.—Duty Test of a 6,000,000-Gallon Pumping Engine, Haverhill, Mass. Reviews a test, made under service conditions, of a horizontal cross-compound flywheel pump. 1200 w. Eng Rec—July 12, 1902.

PUMPING PLANT.

See **PUMP; PUMPING ENGINE; PUMPING STATION.**

PUMPING STATION.

See also **PUMP; PUMPING ENGINE; PUMPING ENGINE TEST; WATERWORKS.**

How to Obtain the Best Results in Small Pumping Stations. Harry F. Gibbs. How to get the best of the existing conditions is discussed, considering points of importance. 2400 w. Jour N E W Wks Assn—Sept., 1902.

American.—Some American Figures on the Operation of Pumping Stations. Items from information relating to a number of large water-works pumping plants in the United States, collected by Will J. Sands. 2200 w. Eng Rec—Aug. 6, 1904.

Arizona.—See **WATERWORKS—Arizona**

Boston Waterworks—Metropolitan Waterworks Pumping Machinery. Will J. Sando. Illustrations, data, cost of operating, etc., of the present equipment. 1700 w. Jour N E Water-Wks Assn—June, 1901

Past and Present Pumping Methods in the Metropolitan District of Massachusetts. A. O. Doane. Showing the marked reduction in pumping expenses made possible by the introduction of the Metropolitan supply. 1500 w. Eng Rec—June 20, 1903.

See also **PUMPING ENGINE TEST.**

Buffalo Waterworks.—The Turbine Pumping Plant of the Buffalo Waterworks. An account of extensive improvements, including the installation of eight 25,000,000-gal. vertical two-stage turbine pumps, each connected to an electric motor. 1300 w. Eng Rec—Oct. 28, 1905.

Charlottenburg.—The Steam Pumping Plant of the Charlottenburg Waterworks (Die Dampfpumpanlage für das Förderwerk der Charlottenburger Wasserwerke). E. Alberts. Illustrated description of compound horizontal pumping engines, with data and results of tests. 2000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Sept. 20, 1902.

Chatham Dock.—Pumping Machinery for the New Dock at Chatham. Gives illustrations showing the general arrangements of the plant, which is provided with both centrifugal and suction pumps. These are described in detail. 1200 w. Engng—Feb. 26, 1904.

Pumping Plant at Chatham Dock Yard. Illustrates and describes two sets of high-duty pumping engines and their operation. 600 w. Engr, Lond—Nov. 18, 1904.

Cleveland, O.—Kirtland Street Pumping Station of the Cleveland Waterworks. Charles Goffing. Illustrated detailed description of the buildings and their equipment. 3800 w. Eng Rec—March 19, 1904.

Coal Mine, Japan.—Pumping Plant at the Miike Collieries, Japan. Illustrates and describes probably the largest pumping plant ever erected on one shaft. 900 w. Engng—Jan. 29, 1904.

Coolgardie, Australia.—See **PUMPING ENGINE; WATERWORKS.**

Croton Aqueduct, N Y.—See **AIR LIFT.**

De Kalb, Ill.—The De Kalb Electrical Pumping Plant. D. W. Mead. Illustrated description of a municipal plant in Illinois which has been in successful operation since February, 1895. 3000 w. Munic Engng—Dec., 1901.

Dock, Cardiff.—Pumping Plant for the New South Dock, Cardiff. Illustrated description of a large plant. 1000 w. Engr, Lond—Dec. 9, 1904.

Dortmund Mine—See **Electric, Mine.**

Dry Dock.—Pumping Plant of the Skinner Dry Dock, Baltimore, Md. Illustrated description of the centrifugal pumping plant with a capacity of 150,000 gallons per minute. 2800 w. Eng Rec—March 22, 1902.

See also **Chatham Dock; DRY DOCK; PUMPING ENGINE—Floating Dock.**

Elderslie, Clyde.—See **GAS-POWER PLANT.**

Electric.—Economic Operation of Electric Irrigation Pumps. Aug. J. Bowie, Jr. A discussion of electric pumping stations for irrigation systems, and of irrigation systems in general. 3500 w. Elec Wld & Engr—Dec. 27, 1902.

Electric Pumping Plant at the Bridgeport Station, Chicago, for the Illinois & Michigan Canal. Outlines the history of this station established for the purpose of supplying water in time of drought, giving illustrated description of the present plant. 800 w. Eng News—Feb. 19, 1903.

Electrical Equipment of the New Orleans Drainage System. William Mayor Venable. Illustrated description of pumping stations driven by electric power. A very large equipment of three-phase machinery. 1200 w. Elec Rev, N Y—July 4, 1903.

See also **Olten, Switzerland; PUMP.**

Electric, Cal.—See **ELECTRIC TRANSMISSION—California.**

Electric, Hammersmith.—Single-Phase Pumping Plant, Hammersmith. Illustrates and describes a plant installed to pump Thames water for condensing purposes to an elevated cast-iron tank some 700 yards distant. 2000 w. Elec Rev, Lond—Sept. 26, 1902.

Electric, Mine.—Electric Drainage Plants (Installations Electriques a Epuisement). J. Loubat. A discussion of the applicability of electric power to the operation of mine pumps. 4000 w. Revue Technique—Oct. 25, 1902.

Electric Pumping Plant (Installations Electriques d'Epuisement). J. Loubat. Describing the pumping plant of the Monterrad shaft of the Roche-la-Molière and Firminy Company, with illustrations of the surface electric plant and the subterranean pumps. 2000 w. Revue Technique —Dec. 25, 1902.

Electric Mine Pumping at the Montreal Shaft of the Roche-la Molière and Firminy Mining Company. Frank C. Perkins. Illustrated description of the plant and its operation. 2000 w. Min Rept—Nov. 6, 1902

Electric Pumping Plant at Kaiserstuhl II Shaft, Dortmund, Germany. Frank C. Perkins. An illustrated description of the steam plant and electric machinery. 2500 w. Mines & Min—Feb., 1903.

Alternating and Direct Current Mining Pumps. Frank C. Perkins. Describes successful types of electric pumping plants, giving information of interest. Ill. 2000 w. Min Rept—May 14, 1903.

A French Electrically-Operated Mine—Pumping Installation. Frank C. Perkins. An illustrated description of a recently installed plant in Belgium. 700 w. Min Rept—Sept. 22, 1904.

Electric Mine Pumping at the Gneisenau Shaft (Elektrische Wasserhaltungsanlage auf Zeche Gneisenau). K. Nowak. A description of the 640 H. P. electric pumping plant, with induction motor, at the Gneisenau mine near Dortmund. 1500 w. Glückauf—Feb. 28, 1903.

Electric Pumping Plant for De Beers Consolidated Mines, Kimberley. Illustrated description. 900 w. Elec Rev, Lond—Nov. 13, 1903.

The Electric Pumping Plant of the Neu-Iserlohn II Mine (Die Elektrische Wasserhaltungsanlage auf Zeche Neu-Iserlohn II). H. Schulte. Data and results of tests of 500 H. P. electric pumping plant operating with a total head of 377 metres. 2000 w. Glückauf—Jan. 16, 1904.

See also **PUMP.**

Electric, Montreal.—Pumping by Electricity. F. H. Pitcher. Gives a brief description of Montreal Water and Power Company's system and growth, and of the electric pumps installed Ill. 7000 w. Jour N E Water-Wks Assn—Dec., 1903.

Electric, Sewage.—Electric Pumping Station for Sewage Disposal. Illustrated description of a fine plant at Pittsfield, Mass., which is probably the first electrically-driven pumping station for sewage disposal in the United States. 900 w. Elec Wld & Engr—Oct. 18, 1902.

See also **Sewage; PUMP; SEWAGE DISPOSAL—Pittsfield, Mass.**

Gainsborough, Eng.—Gainsborough Waterworks. Description of this interesting plant with illustrated details of the pumping station. 1600 w. Engr, Lond—July 29, 1904.

Gas Distribution.—See **GAS DISTRIBUTION—Pumping Station.**

Gas Engine.—See **Madeley, Eng.; Pittsburg Glass Co.; Tremblay; Winchester.**

Gas Engine, Philadelphia.—See **WATERWORKS—Fire Service.**

Gneisenau Mine.—See **Electric Mine.**

Hanau, Germany.—The Drainage Plant of the City of Hanau (Die Entwässerungs Anlage der Stadt Hanau). Ad. Mertz. Illustrating and describing the arrangement of centrifugal pumps driven by direct-connected electric motors. 1000 w. Zeitschr d Ver Deutscher Ing—May 11, 1901.

Illinois Steel Co.—Pumping Station at the South Works of the Illinois Steel Company. Illustrated description of one of the most extensive pumping stations in the United States connected with an industrial works. 1400 w. Ir Age—Oct. 3, 1901.

Lake Copais.—See **HYDRO-ELECTRIC PLANT—Greece.**

Lardner's Point.—See **Philadelphia.**

Little Falls, N. Y.—See **FILTRATION.**

Machinery Selection.—The Selection of Waterworks Pumping Machinery. Nicholas S. Hill, Jr. A discussion of this subject from the standpoint of the purchaser. The present number gives an outline indicating the essential features to be covered by a specification. Serial. 1st part. 5000 w. Eng Rec—July 8, 1905.

Madeley, Eng.—Madeley Water Supply. An illustrated description of a plant notable as being the largest pumping plant in England operated by gas engines and producer gas. 1400 w. Engr, Lond—Feb. 6, 1903.

Management, Brooklyn.—See WATERWORKS MANAGEMENT—Brooklyn.

Mines.—The Latest Development of Pumping Systems (Die Neueste Entwicklung der Wasserhaltung Sowie Versuche mit Verschiedenen Pumpensystemen). H. Baum. An exhaustive review of the present status of mine pumping, with illustrations of the various machines and systems. Serial. Part I. 3000 w. Glückauf—Aug. 20, 1904.

A Study of Pumping Machinery (Versuche an Wasserhaltungen). Prof. Baum and Dr. H. Hoffmann. A comparison of the performances of steam, hydraulic, and electrical mine pumping plans in actual service, with data and results of tests. Serial. Part I. 5000 w. Zeitschr d Ver Deutscher Ing—Dec. 3, 1904.

See also Electric; MINE DRAINAGE; PUMP.

Montreal.—See Electric.

Nashua, N. H.—The New Pumping Plant of the Pennichuck Waterworks, Uashua, N. H. F. W. Dean. States the conditions and the objects to be accomplished, with illustrated description of the plant. 1700 w. Eng News—June 6, 1901.

New Pumping Plant of the Pennichuck Waterworks, Nashua, N. H. Illustrated description of a very heavy 6,000,000-gal. pump driven from a turbine making 400 revolutions per minute. 1600 w. Eng Rec—June 8, 1901.

Natural Gas. — See GAS, NATURAL — Pumping Plant.

New Orleans.—See Electric; Sewage, New Orleans; SEWERAGE—New Orleans.

Newton, Mass.—A Small Concrete-Steel Sewage Pumping Station, at Newton, Mass. Illustrated description of an interesting plant for a suburb of Boston. 1500 w. Eng Rec—June 11, 1904.

Nome, Alaska.—See Riedler.

Oil Engine.—Small Pumping Engines. Topical discussion by William F. Codd and D. N. Tower of plants equipped with oil-engines. Ill. 1000 w. Jour N E W Wks Assn—Sept., 1902.

Olten, Switzerland.—The Pumping Station of the Waterworks of Olten, Switzerland (Das Pumpwerk für die Wasserversorgung der Stadt Olten). Louis Giroud. An illustrated description of an electric pumping plant for raising water from wells to a reservoir for the water supply of a small town. 4000 w. Schweiz Bauzeitung—April 11, 1903.

Peoria, Ill.—The New Well and Hydraulic Pumping Plant at Peoria, Ill. Dabney H. Maury. Read before the Illinois Soc. of Engrs. & Surveyors. Illustrates and describes the construction work and the plant. 2000 w. Eng Rec—Feb. 4, 1905.

Philadelphia.—The New Lardner's Point Pumping Station, Philadelphia. Illustrated detailed description of the buildings, boilers, flues and chimneys, coal supply, piping system, pumping engines, conduits, etc. 4000 w. Eng Rec—Sept. 16, 1905.

See also FILTRATION; WATER PIPE; WATER WORKS—Fire Service.

Pittsburg Glass Co.—A Gas Engine Pumping Station. An illustrated description of the plant of the Pittsburg Glass Company, at Ford City, Pa. 1800 w. Eng Rec—May 23, 1903.

A Gas Engine Pumping Station. Illustrates and describes the application of gas engines to pumping in the plant of the Pittsburg Plate Glass Co. 2200 w. Power—Dec., 1903.

Producer.—See Madeley; Tremblay.

Quittacas.—See WATERWORKS—New Bedford.

Rhine-Marne Canal.—The Pumping Plant for Feeding the Rhine-Marne Canal (Pumpwerk zur Speisung des Rhein-Marne-Kanales). J. Hermanues. Showing the arrangement of turbines and electrically-driven centrifugal pumps. 2500 w. Zeitschr d Ver Deutscher Ing—Feb. 2, 1901.

Riedler.—A Riedler Pumping Plant for Hydraulic Mining in Alaska. An illustrated account of the Wild Goose Mining and Trading Co.'s plant at Nome. 1400 w. Eng & Min Jour—March 7, 1903.

See also PUMP.

Rio Grande Valley.—See IRRIGATION.

St. Louis, Mich.—See ELECTRIC STATION.

Santiago, Cuba.—A Sewage Pumping Station at Santiago, Cuba. Brief illustrated description of the plant. 1200 w. Eng Rec—April 25, 1903.

Sewage.—See Electric; Santiago, Cuba; PUMPING ENGINE—Boston Sewage; Sewage; SEWAGE DISPOSAL; SEWERAGE.

Sewage, Chicago.—Sewage Pumping Plant for the Jackson Park Ave. Sewage District at Chicago. Illustrated detailed description. 2500 w. Eng News—March 31, 1904.

The Thirty-ninth Street Sewage Pumping Station, Chicago. Illustrated detailed description of a station having a rated capacity of 900,000 gal. a minute. 4500 w. Eng Rec—Nov. 18, 1905.

Sewage, Hampton Institute.—The Sewage Pumping Station at the Hampton Institute. An illustrated detailed description of a sewerage system designed to serve about 1000 people, living and working in separate buildings over a considerable area. 2500 w. Eng Rec—Nov. 18, 1905.

Sewage, Karachi, India.—Notes on the Working of the Shone System of Sewerage at Karachi. James Forrest Brunton. An account of trials, made with a view to ascertain the cause of the unsatisfactory working of the installation, with results. 3300 w. Tables and diagrams. (No. 3436.) Inst of Civ Engrs.

Sewage, New Orleans.—Power and Pumping Stations of the New Orleans Drainage System. W. M. Venable. Gives the general outlines of the drainage problems presented by the district and the plan adopted, and describes specifically the installations and operation of the pumping stations completed and the central station from which all are furnished with electric power. Illustrated. 4800 w. The Engineering Magazine—June, 1903.

See also Electric; SEWERAGE—New Orleans.

Shrewsbury, Eng.—Shrewsbury Water Supply. A brief illustrated account of a recently installed pumping plant of novel description. 1100 w. Engr, Lond—June 19, 1903.

Single-Phase.—See Electric, Hammersmith.

Taunton, Mass.—The Direct Pumping Method of Water Supply in Use at Taunton, Mass. George A. King. Gives an account of the reasons for installing this system, and describes its features; also its operation and cost of working. 2000 w. Jour N Eng W-Wks Assn—March, 1905.

Tremblay Race Course.—Pumping Plant for Sprinkler Supply (Usine Elévatoire pour l'Arrosage). Describing suction producer gas pumping plant for raising water for sprinkling the Tremblay race course. 1500 w. 1 plate. Génie Civil—Oct. 7, 1905.

Turbine.—Turbine Pumping Plants at Waterworks. Abstracts of three papers presented at meeting of the Brit. Assn. of W. Wks. Engrs., describing different water turbine-driven plants at waterworks. 2500 w. Jour Gas Lgt—Aug. 12, 1902.

See also Buffalo Waterworks; PUMP; TURBINE.

Utrecht Waterworks.—The Pumping Plant of the Utrecht Waterworks (De Pompwerktuigen van de Utrechtsche Waterleiding). J. C. Dijxhoorn. Details of the performance of simple and compound engines, by Carels, of Ghent, and Sulzer, of Winterthur, with steam and water indicator diagrams. 3000 w. De Ingenieur—Sept. 17, 1904.

Wallasey Dock.—Centrifugal Pumping Plant for Wallasey Dock. Illustrated description of one of the largest plants of its kind erected and working in Great Britain. 800 w. Engr, Lond—Jan. 10, 1902.

Wattenscheid.—Turbine Power Station and Centrifugal Pumping Plant at the Holland Mine at Wattenscheid (Dampfturbinen-Zentrale und Zentrifugal-Wasserhaltung auf Zeche Holland, Schacht I, II, bei Wattenscheid). H. Weitzenmiller. A Rateau steam turbine is directly connected to the dynamo, and the pumping is done by multiple centrifugal pumps driven by electric motors. 2500 w. Glückauf—Sept. 16, 1905.

Winchester, Ind.—A Gas Engine Driven Direct Pressure Pumping Plant, with Some Experiments on Pump Valve Area. D. W. Mead. An illustrated outline of a plant installed at Winchester, Indiana, with account of experiments made. 6000 w. Jour W Soc of Engrs—Feb., 1902.

PUMP VALVE.

See **PUMP; VALVE.**

PUMP WORKS.

Morris.—See **MACHINE WORKS**—Port Richmond.

Worthington.—The New Worthington Hydraulic Works at Harrison, N. J. Explains considerations that led to the removal of this plant from Brooklyn, and gives an illustrated detailed description of the new works. 2000 w. Eng News—Dec. 31, 1903.

The New Henry R. Worthington Hydraulic Works at Harrison, N .J. The present article gives an illustrated description of foundations, power plant, transportation and machine erecting shops. Serial. 1st part. 5000 w. Eng Rec—Feb. 6, 1904.

The Henry R. Worthington Hydraulic Works. Illustrated detailed description of the new plant at Harrison, N. J. 5000 w. Ir Age—Oct. 12, 1905.

PUNCH.

See **PUNCHING.**

PUNCHING.

See also **DIE; METAL TOOL; METAL WORKING; PRESS; SHEET METAL; STAMPING MACHINE; TWISTING.**

Armature.—See **STAMPING MACHINE.**

Bent-Up.—See **DIE**—Forming.

Clock Gears.—Punching Brass Clock Gears—Movable Stripping Devices. William Doran. Illustrations of punch and die, with descriptions of their use. 1000 w. Am Mach—Oct. 30, 1902.

Expansion.—An Expansion Punch. Jos. V. Woodworth. Illustrates and describes a punch used for producing a bead on the outside of a straight drawn shell, and its operation. 1400 w. Am Mach—Sept. 5, 1901.

Flow of Metal.—See **METAL**—Flow.

Forming.—Gain by Changing a Punching and Forming Operation. William H. Brooks. Illustrates a case of sheet metal stamping and the economy realised by a change in the method of production. 800 w. Am Mach—May 15, 1902.

See also **DIE.**

Frame Design.—See **RIVETER.**

Half Balls.—Drawing and Punching Continuous Strips of Half Balls. Joseph V. Woodworth. Illustrates the punch and die used, and describes the work. 900 w. Am Mach—Jan. 24, 1901.

Hardening.—Hardening and Tempering Punches. E. R. Markham. Describes methods used. 800 w. Am Mach—March 3, 1904.

Hundhausen Ratchet.—The Hundhausen Ratchet System (Encliquetage Hundhausen). O. Arendt. Describing a combination of cams and ratchets applied to the feeding of dynamo discs under the punching press. Two articles. 4000 w. L'Electricien—Sept. 19, 26, 1903.

Hydraulic.—See **HYDRAULIC MACHINERY**—Punching and Shearing.

Power Consumption.—Experiments on the Work of Machine Tools (Expériences sur le Travail des Machines-Outils). M. Codron. Another installment, this time dealing with punching machinery, of the author's important series of articles. Illustrations and diagrams. 8000 w. Bull Soc d'Encouragement—Jan., 1902.

Press.—A Special Punch Press. Joseph V. Woodworth. Illustrated detailed description. 1600 w. Am Mach—Jan. 3, 1901.

See also **PRESS.**

Sheet Metal.—See **METAL WORKING; SHEET METAL.**

Slitting Rolls.—Combined Punching Machine and Slitting Rolls. W. H. Eisenbeis. Illustrated description of a machine for the production of sheet-iron stampings for transformers. 700 w. Am Mach—March 31, 1904.

Small Holes.—See Tool Steel.

Sub Press.—The Sub-Press. F. C. Fladd. Illustrated detailed description of a tool for punching very accurate work. 1000 w. Am Mach—Feb. 5, 1903.

See also **SHEET METAL.**

Tempering.—See Hardening.

Tool Steel.—Punching Small Holes in Tool Steel Blanks. Joseph V. Woodworth. Illustrates and describes tools used for punching holes 0.050 inch in diameter through steel 1-16 inch thick. 700 w. Mach, N Y—April, 1905.

Treatment.—Treatment of Punches. E. R. Markham. Suggestions for the making and use of punches, material best suited; etc. 1200 w. Am Mach—March 10, 1904.

PUNCHING MACHINE.

See **PUNCHING.**

PUZZOLANA.

See **CEMENT; MORTAR.**

PYRITES.

See also **GOLD METALLURGY; IRON ORE; IRON INDUSTRY; ORE TREATMENT**—Sulphides.

Georgia.—See **GOLD.**

Roasting.—See **IRON METALLURGY.**

St. Lawrence, N. Y.—See **IRON MINE.**

Virginia.—See **IRON INDUSTRY.**

PYROGAS.

See **GAS**—Smoke.

PYROMETRY.

See also **CALORIMETRY**—Corrections; **TEMPERATURE**—Measurement; **THERMOMETER.**

The Measurement of High Temperatures. S. Geijsbeek. Begins an outline of the principal apparatus in use and a review of the methods employed. Serial. 1st part. Ill. 1100 w. Min Rept—Aug. 8, 1901.

Notes on Pyrometry. M. E. J. Gheury. Read before the Arc Works Engng. Soc., Chelmsford, Eng. Reviews briefly the different methods used in measuring high temperatures, paying special attention to those adapted to industrial requirements. Serial. 1st part. 5200 w. Engng—May 6, 1904.

Alloys.—See **ALLOY**—Experimental Study.

Ash Fusibility.—See **ASH**—Fusibility.

Autographic.—New Autographic Method to Ascertain the Critical Points of Steel and Steel Alloys. E. Saladin. Describes the method and apparatus used, and the applications. Ills. 2500 w. Ir & Steel Met—March, 1904.

Blast Furnace.—The Pyrometer in Blast Furnace Practice. S. H. Stupakoff. Read before the Pittsburg Found. Assn. Brief illustrated descriptions of the principal instruments used. 2200 w. Ir Trd Rev—Jan. 5, 1905.

The Pyrometer in Blast-Furnace Practice. S. H. Stupakoff. Read before the Pittsburg Found. Assn. Gives details of interest in regard to the application of the thermo-electric pyrometer to blast-furnaces, with brief remarks on other pyrometers. 3800 w. Am Mfr & Ir Wld—Nov. 17, 1904.

Blue Glass.—A Blue Glass Pyrometer. E. H. Earnshaw. Read at meeting of the Am. Gas Lgt. Assn. Illustrates and describes the apparatus, which aims to furnish a means of determining temperatures attained in the fixing chambers of water gas apparatus. 1200 w. Am Gas Lgt Jour—Nov. 19, 1900.

Bristol Recording.—A New Recording Air Pyrometer. William H. Bristol. Describes an instrument designed to measure temperature of high ranges, and to give continuous record of changes. 900 w. Trans Am Soc of Mech Engs, No. 883—Dec., 1900.

Electric.—Electrical Measurement of Furnace Temperatures. Leonard Waldo. Describes methods used. 1700 w. Elec Rev, N Y—Jan. 12, 1901.

Electric Pyrometers. W. Rosenhain. Discusses the subject of the accurate measurement of high temperatures, and gives an illustrated description of some of the Griffith-Callendar instruments. Serial. 1st part. 2500 w. Elec-Chem & Met—June, 1901.

Féry Radiation.—An Optical Thermo-Electric Pyrometer (Lunette Pyrométrique à Réticule Thermo-Electrique). Ch. Féry. An illustrated description of a pyrometer, consisting of a telescope containing a thermo-electric couple, which is directed toward the hot body or to an opening in the furnace whose temperature is to be measured. 1500 w. Génie Civil—May 30, 1903.

The Application of the Laws of Radiation to Pyrometery (L'Application des Lois du Rayonnement à la Pyrometrie). Ch. Féry. Describing a form of optical pyrometer, by means of which high temperatures may be measured from the radiant heat emitted. 2000 w. Rev Gen des Sciences—Sept. 15, 1903.

The Law of Stéfan and the Measurement of High Temperatures (La Mesure des Températures Elevées et la Loi de Stéfan). M. Féry. Describing a method of determining high temperatures by the elevation in temperature of a body exposed to radiant heat. 1200 w. Comptes Rendus—April 28, 1902.

The Féry Radiation Pyrometer. Illustrates and describes an instrument intended for the measurement of the temperature of furnaces of all kinds. 1500 w. Am Mach—Vol. 28, No. 46.

French.—See **Féry**; **Le Chatelier**; **PHOTOMETRY.**

Gantt.—See **Morse Heat Gauge.**

Griffith-Callendar.—See **Electric.**

Le Chatelier.—The Le Chatelier Experiments on Hardening (Le Chatelier's Härteversuche). H. Haedicke. An account of the use of the Le Chatelier pyrometer for the measurement of temperatures during hardening processes. 2500 w. Stahl u Eisen—Nov. 1, 1904.

The Electrical Measurement of High Temperatures. H. S. Knowlton. Explains the merits of the Le Chatelier pyrometer. 900 w. Cassier's Mag—Aug., 1905.

See also **ASH**; **HARDENING.**

Magnetic Selector.—The Detection of the Finishing Temperature of Steel Rails by the Thermo-Magnetic Selector. Albert Sauveur and Jasper Whiting. Describes a method of testing to prevent the rolling of coarsely crystalline rails, illustrating a magnetic apparatus for determining the "critical" temperature at which steel loses and regains its magnetism. 1400 w. R R Gaz—Aug. 14, 1903.

The Detection of the Finishing Temperatures of Steel Rails by the Thermo-Magnetic Selector. Albert Sauveur and Jasper Whiting. Describes a method seeming to fulfill all the requirements of efficiency in preventing the rolling of coarsely crystalline rails. Ills. 1600 w. Ir & Steel Mag—May, 1904.

Manganese Melting Point.—See **MANGANESE.**

Metallurgical Works.—Pyrometers Suitable for Metallurgical Works. Abstract of a report prepared by a committee appointed by the Iron & Steel Inst. Ills. 4000 w. Elect'n, Lond—July 22, 1904.

On the Measuring of High Temperatures in Connection with Metallurgical Work. Dr. Alfred Gradenwitz. Considers some of the fields of application of pyrometers. Ills. 1200 w. Min Rept—Feb. 9, 1905.

Methods.—Methods of Pyrometry. C. W. Waidner. A brief treatment of the various pyrometric methods that are most widely used, with remarks on the importance of temperature control. Ills. 24,600 w. Pro Engrs Soc of W Penn—Sept., 1904.

Morse Heat Gauge.—The Heat Gauge in Twist Drill Work. Illustrated description of the device patented by Everett F. Morse for absorbing and regulating the temperatures in the manufacture of tools. The colors of a source of light and the heating bath are compared. 1800 w. Ir Trd Rev—Oct. 1, 1903.

The Morse Thermo Gauge. Illustrated description of an apparatus for gauging the temperature to which steel is heated in the process of hardening or annealing. 500 w. Am Mach—Oct. 29, 1903.

The Morse Heat Gauge. Report of the Committee on Science and the Arts on the invention of Everett F. Morse. Ill. 1400 w. Jour Fr Inst—Jan., 1904.

Optical.—See **Féry**; **Wanner.**

Recent Forms.—Recent Progress in High Temperature Measurement (Die Neuesten Fortschritte in der Messung Hoher Temperaturen). Dr. Ludwig Harald Schütz. A fully illustrated account of the most recent forms of pyrometers, including metallic, electric and optical varieties. 3500 w. Zeitschr d Ver Deutscher Ing—Jan. 30, 1904.

Siemens & Halske.—Modern Thermometric Apparatus for High Temperatures. L. Ramakers. An illustrated account of a type of apparatus recently introduced by the Siemens & Halske Company, of Berlin. 1100 w. Sci Am—May 27, 1905.

Steel Manufacture.—See **Magnetic Selector**; **Metallurgical Works**; **Morse Heat Gauge**; **STEEL METALLURGY—Microscope and Pyrometer.**

Stéfan's Law.—See **Féry Radiation.**

Taylor.—See **Morse Heat Gauge.**

Thermo-Electric.—See **Blast Furnace**; **Bristol**; **Electric**; **Le Chatelier.**

Vapor Pressure.—See **THERMOMETER.**

Wanner.—The Wanner Pyrometer. Illustrates and describes this apparatus for measuring high temperatures. 1500 w. Ir Age—Feb. 18, 1904.

The Wanner Optical Pyrometer (Das Optische Pyrometer von Wanner). A general description of the instrument and its use, showing a high degree of accuracy in measuring temperatures above 900 degrees by the light emitted. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 6, 1904.

Whipple.—See **TEMPERATURE—Measurement.**

PYRHOTITE.

See **NICKEL—Sjöstedt Process.**

Q

QUARRYING.

See also **BLASTING**; **CRUSHING**; **MINING**; **STONE**; and under specific kinds of stone.

America.—Quarrying in the United States (L'Exploitation des Carrières aux Etats-Unis). A. de Gennes. An illustrated account of methods of working marble and other quarries in the United States. 1 plate. 2500 w. Mem Soc Ing Civils de France—March, 1903.

Blasting.—See **BLASTING—Passgrub Quarry.**

British Columbia.—Stone Quarries on the Coast. Report of H. Carmichael concerning the large quantities of good building stone along the coast and islands of British Columbia. 2000 w. B C Min Rec—May, 1905.

British Columbia Ore.—See **COPPER.**

Carrara.—Important Quarry Developments in the Carrara District. An illustrated article relating to the Equi valley scheme, the quantity and quality of the marble, the methods of quarrying, transportation, etc. 2500 w. Quarry—Jan. 1, 1903.

Compressed Air.—Air Power in the Quarry. Lucius I. Wightman. Describes a successful installation of a compressed-air plant at the Gray Cañon, showing that low economy is the result of careless management. Serial. 1st part. 2200 w. Eng & Min Jour—May 4, 1905.

See also **COMPRESSED AIR—Quarrying**; **COMPRESSED AIR PLANT—Quarrying.**

Derwent Valley, Eng.—See **WATERWORKS.**

Dimension Stone.—See **Rubble.**

Excavating Machinery.—See **STEAM SHOVEL.**

Explosives.—Economic Points in Quarry Practice. O. H. Howarth. Remarks on the action of explosives, and methods of estimating the direction and amount of rock pressure. 5000 w. Mines & Min—Sept., 1904.

See also **BLASTING**; **EXPLOSIVE.**

Granite.—See **Scotland**; **GRANITE**; **RAILWAY—Quincy Granite.**

Granite Columns.—See **COLUMN—Granite.**

Greece.—See **STONE.**

Havana.—The Quarrying Industry in Havana. C. E. McDowell. Information relating to the quarries in the vicinity of Havana. 2700 w. Stone—Aug., 1902.

Quarries and Stone Working in Havana. Information based largely on the report prepared by Mrs. Harriet Connor Brown. 2500 w. Stone—July, 1903.

Helicoidal Wire.—Quarrying by the Helicoidal Wire. N. Pellati. From a paper prepared for the Congress at Paris. Explains this method of cutting and its advantages. 1000 w. Stone—Oct., 1900.

The Helicoidal Wire and Penetrating Pulley for Quarrying Operations. Illustrated description of the penetrating pulley and its operation, giving a statement of the advantages claimed. 1700 w. Stone—May, 1901.

On the Use of the Wire Saw for Quarrying Slate. G. J. Williams. Reprinted from Dr. C. Le Neve Foster's report. Illustrated general description of the wire-saw and its operation. Serial. 1st part. 3300 w. Quarry—Oct. 1, 1901.

Stone Cutting with the Helicoidal Wire (Le Sciage des Roches par le Fil Héliçoïdal). A brief illustrated description of this method of sawing rock and quarrying stone with a helicoidal steel wire. 900 w. Génie Civil—March 28, 1903.

Cutting Rocks with the Helicoidal Wire. From the "Bul. de la Soc. d'Encour. Pour l'Ind." Briefly reviews the history of this method of sawing stone, describing the plant and the success. Ills. 1500 w. Quarry—July, 1904.

Huyeapam, Mex.—A Modern Quarry Plant in Mexico. Illustrated description of the equipment of the Hueyapam quarries, and the methods of quarrying. 1200 w. Compressed Air—Jan., 1905.

Ireland.—Irish Stone Quarries. A review of the quarries of limestone, marble and building stones. 3000 w. Quarry—Feb. 1, 1902.

Liguria.—See **SLATE.**

Marble.—Marble Quarrying at Gouverneur, N. Y. Robert B. Brinsmade. An illustrated description of the marble and methods of quarrying. 2000 w. Eng & Min Jour—Oct. 21, 1905.
See also Carrara; **MARBLE.**

Modern Methods.—Modern Quarry Methods. Extracts from a circular issued by the Ingersoll-Sergeant Drill Co., describing machine work. Ill. 1200 w. Stone—Oct., 1901.

Paris.—The Ancient Stone Quarries Beneath Paris. Information translated from the "Annales des Mines," concerning the extensive underground quarries which greatly impaired the stability of the surface in Paris. Ills. 1000 w. Quarry—May, 1904.

Penetrating Pulley.—See **Helicoidal Wire.**

Penrhyn Pumping.—Pumping Arrangements at the Penrhyn Quarries. Illustrations and explanations showing the conditions under which pumping has to be carried on at these great slate quarries in Wales, and how it is done. 1200 w. Quarry—Nov. 1, 1902.

Rubble.—The Cost of Quarrying Rubble and Dimension Stone for the Buffalo (N. Y.). Stone Breakwater. Emile Low. Briefly describes the method of quarrying, and gives figures of cost for 1903, from May to September, inclusive. Ills. 600 w. Eng News—Oct. 20, 1904.

Sandstone.—The Sandstone Quarries of Saxony and Silesia. An illustrated description of these quarries, methods of working, geology, etc. 3000 w. Quarry—Sept. 1, 1902.
See also **SANDSTONE.**

Scotland.—The Caledonian Granite Company's Quarries, Kippford, near Dalbeattie. Illustrated description of these quarries in Scotland. 1800 w. Quarry—May 1, 1903.

Slate.—See **Helicoidal Wire; SLATE.**

Slope-Walls.—The Design and Cost of Slope-Walls, Including Cost of Quarrying. Describes slope-wall work, the materials used; cost of laying and of quarrying are also discussed, and data given for calculating cost. Ill. 3400 w. Eng News—June 11, 1903.

Steam Shovel.—See **STEAM SHOVEL.**

Stripping.—Stripping. Frank W. Hoyt. Some general suggestions based upon experience. Ill. 2500 w. Quarry—July 1, 1901.

Sweden.—See **GRANITE.**

Wales.—See **BLASTING—Slate Quarries; GRANITE.**

Wire Saw.—See **Helicoidal Wire.**

QUARTZ.

See also **GOLD; GOLD GEOLOGY; GOLD MINING; ORE DEPOSIT.**

Fusion.—See **ELECTRIC FURNACE—Quartz Fusion.**

QUARTZ MILLING.

See **GOLD MILLING; STAMP MILL.**

QUARTZ MINING.

See **GOLD; GOLD MINING.**

QUAY.

See **DOCK; HARBOR; PIER; WHARF; SEA WALL.**

QUAY WALL.

See also **DOCK; PIER; SEA WALL.**

Delfzijl, Holland.—See **WHARF.**

QUICKSAND.

See **EXCAVATION; FOUNDATION; SHAFT SINKING; TUNNEL.**

QUICKSILVER.

See **MERCURY.**

R

RACE TRACK.

See also **GRAND STAND.**

Belmont Park, Long Island.—Planning a Modern Race Track: Belmont Park, at Queens, L. I. Describes the conditions of the topography, and the plan and location of tracks, buildings, etc. Ills. 4500 w. Eng News—Feb. 23, 1905.

Engineering Features of Belmont Park. General plan and description of interesting engineering features of a fine race course near New York. Ills. 3300 w. Eng Rec—March 11, 1905.

RACK RAILWAY.

See also **ELECTRIC LOCOMOTIVE; LOCOMOTIVE; MOUNTAIN RAILWAY.**

Lyons-St. Just, France.—See **ELECTRIC LOCOMOTIVE—Rack and Adhesion.**

Stansstad-Engelberg.—See **ELECTRIC CAR—Rack and Adhesion; MOUNTAIN RAILWAY.**

RADIATION.

See also **ELECTRO-PHYSICS; HEAT RADIATION; LIGHT; PHYSICS; RADIOACTIVITY; RADIOGRAPHY.**

Modern Radiation Investigations (Ergebnisse der Neueren Strahlungsmessungen). Dr. Clemens Schaefer. Modern theories of radiation, the relation between wave length and temperature of light and heat rays, etc., with figures and tables. 4500 w. Zeitschr d Ver Deutscher Ing—Jan. 4, 1902.

The Laws of Radiation of Heat and Light. Summary giving the leading points of a series of papers by Rudolph Mewes, in the "Zeitschrift für Beleuchtungswesen." 1200 w. Gas Wld—March 22, 1902.

The Practical Uses of Radiant Energy. Discusses the theories of light and heat, and their practical applications. 2500 w. Jour Gas Lgt—April 12, 1904.

Heat.—See **HEAT RADIATION.**

Pyrometry.—See **PYROMETRY—Féry Radiation.**

RADIATOR.

See also **HEATING; HEATING AND VENTILATION.**

Efficiency.—See **AUTOMOBILE, GASOLINE—Radiator.**

Steam Heating.—See **HEATING—Radiators.**

Superheated Steam.—See **HEATING—Steam, Superheated.**

RADIOACTIVITY.

See also **CARNOTITE; ELECTRO-PHYSICS; MATTER; PHYSICS; RADIOGRAPHY; URANIUM.**

Radio-Active Substances and Their Radiations.

George B. Pegram, in "Science." A review of the recent work in this field. 4800 w. Elec Rev, N Y—July 27, 1901.

Self Radiant Materials (Die Selbstthätig Strahlende Materie). S. Saubermann. A study of the various self-radiant substances and the phenomena which they exhibit, including the researches of Becquerel, Curie, Giesel, Schmidt, and others. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 10, 1902.

Radium and Other Radioactive Substances, with a Consideration of Phosphorescent and Fluorescent Substances. The Properties and Applications of Selenium and the Treatment of Disease by the Ultra-Violet Light. William J. Hammer. 21,000 w. Trans Am Inst of Elec Engrs—April 17, 1903.

The New Radiations—Cathode Rays and Roentgen Rays. A. Dastre. Translated from the "Revue des Deux Mondes" for the Smithsonian Report. An examination of recent views on the radioactivity of matter. 8000 w. Sci Am Sup—July 4, 1903.

Radioactivity. Edward A. Partridge and Robert H. Bradbury. Reviews the work of the Curies and other investigators, discussing the effects of emanations from radioactive bodies. 3500 w. Jour Fr Inst—Nov., 1903.

Experiments in Radioactivity. H. Stanley Allen. Read before the Royal Philosophical Soc. of Glasgow. An account of facts observed and experiments carried out, showing some of the properties, with an outline of the history and preparation of radium. 4700 w. Engng—Dec. 4, 1903.

The New Discoveries in Electricity. Antonia Zimmern. Reviews recent work tending to prove that electricity and light are essentially one, and the discoveries in the field of radioactivity. 4500 w. Nineteenth Cent—Jan., 1904.

Radioactivity and Radiation. Dr. Louis Bell. Calls attention to the imperfect knowledge as yet of some of the essential factors in the phenomena. 1200 w. Elec Wld & Engr—Jan. 23, 1904.

Recent Discoveries in Radiation and Their Significance. R. A. Millikan. Reviews recent discoveries of new rays, and their relation to the question of the nature and constitution of matter. 7500 w. Pop Sci M—April, 1904.

Radioactive Substances (Ueber Radioaktive Stoffe). W. Marckwald. An address before the Elektrotechnische Verein, giving a general account of the present knowledge of radioactive materials. 7500 w. Elektrotech Zeitschr—April 2, 1904.

The Phenomena of Radioactivity (Ueber die Erscheinungen der Radioaktivität). Dr. Gottfried Diemer. A review of radioactive emanations and the methods employed for observation and study. Two articles. 4000 w. Zeitschr f Elektrotechnik—Sept. 25, Oct. 4, 1904.

The Electrical Nature of Matter and Radioactivity. Harry C. Jones. The first of a series of articles giving an account of the recent developments in physical science. 2000 w. Serial. 1st part. Elec Rev, N Y—Sept. 9, 1905.

Actinium.—The Production of Radioactivity Induced by Actinium (Sur la Production de la Radioactivité Induite par l'Actinium). A. Debierne. An illustrated description of radiation which takes place in the vicinity of actinium and which possesses the property of rendering bodies which it strikes temporarily radioactive. The radiating corpuscles are positively charged. 400 w. Comptes Rendus—March 16, 1903.

Atmosphere.—Atmospheric Radioactivity. H. A. Bustead. Describes experimental investigations. 3500 w. Am Jour of Sci—July, 1904.

Concerning Natural Radioactivity of the Atmosphere and the Earth. J. Elster and H. Geitel. A short review of investigations in this field and remarks on the importance of the discoveries. 2000 w. Int Elec Cong of St. Louis—Sept., 1904.

See also **Gases**; **Water**.

Atomic Theory Related.—The Radioactive Atom (Das Radioaktiv Atom). A. Reuterdahl. A brief examination of the relation of radioactivity to the atomic theory of matter. 2500 w. Elektrochemische Zeitschr—Sept., 1904.

See also **Theory**.

Becquerel.—Some Properties of the Rays from Radioactive Bodies (Sur Quelques Propriétes du Rayonnement des Corps Radioactifs). Henri Becquerel. Notes on experiments with uranium, radium, etc. 900 w. Comptes Rendus—Jan. 27, 1902.

On the Radioactivity of Matter. Henri Becquerel. Facts in regard to obscure radiations which traverse opaque bodies, and other phenomena. An interesting report of experimental investigations. 4800 w. Sci Am Sup—June 7, 1902.

The Radioactivity of Matter (La Radio-Activité de la Matière). Henri Becquerel. A lecture before the Royal Institution, London, giving a well-illustrated account of radioactive substances and phenomena. 4500 w. Rev Gén des Sciences—July 15, 1902.

Becquerel Ray.—The Wonderful Becquerel Ray. Edward Booth. Reviews the history of the discovery of these rays, states their characteristics, and gives general information. 2000 w. Min & Sci Pr—May 4, 1901.

Becquerel Rays and Radioactive Substances (Ueber Becquerelstrahlen und die Radioaktiven Substanzen). Dr. F. Giesel. A review of the discoveries which have been made in radioactivity, with theories as to the source of the emitted energy. 2500 w. Zeitschr f Electrochemie—Aug. 14, 1902.

The Magnetic Deviability of Certain Rays Emitted by Radium and Polonium (Sur la Déviabilité et la Nature de Certains Rayons Emis par le Radium et le Polonium). H. Becquerel. A discussion of experiments confirming those of Rutherford as to the influence of a magnetic field upon Becqueral rays. 1500 w. Comptes Rendus—Jan. 26, 1903.

Blondlot Ray.—A New Kind of Light (Sur une Nouvelle Espèce de Lumière). R. Blondlot. An account of experiments with rays from a tube, which can be reflected, refracted and polarised. 700 w. Comptes Rendus—March 23, 1903.

Rays Emitted by a Welsbach Burner, which Pass Through Metals, Wood, etc. (Sur l'Existence, dans les Radiations Emises par un Bec Auer, de Rayons Traversant les Metaux, le Bois, etc.). R. Blondlot. Account of experiments, with radiographs. 700 w. Comptes Rendus—May 11, 1903.

Boys Address.—Charles Vernon Boys' Presidential Address to the Mathematical and Physical Section of the British Association. Outlines the properties of radium and points out the resemblance between radioactive phenomena and the origin and behavior of comets' tails. 8500 w. Engng—Sept. 18, 1903.

Curie.—On Radioactive Bodies (Sur les Corps Radioactifs). P. and C. Curie. On the nature of the emission from these bodies and of its duration. 600 w. Comptes Rendus—Jan. 13, 1902.

Radioactivity and Chemistry. George F. Barker. An address delivered before the Chem. Soc. of Columbia Univ. An interesting review of investigations of radioactive substances, especially the recent work of Prof. and Madame Curie. Also the effects of the chemical action of these rays. Ill. 7500 w. Sch of Mines Qr—April, 1903.

Radioactive Substances. Mme. Sklodowska Curie—Condensed by Dr. J. Ohly. A report of the researches of Mme. Curie. Serial. 1st part. 1500 w. Min Rept—Nov. 26, 1903.

The Properties of Radium. Abstract of a lecture at the Royal Inst., London, by M. Curie, the discoverer of radium. 1800 w. Mech Engr—June 27, 1903.

Radium and Radioactivity. Madame Sklodowska Curie. An account of the discovery of this substance, and its properties. 3800 w. Century Mag—Jan., 1904.

Dielectric Conductivity.—Conductivity of Dielectric Liquids Under the Influence of the radium rays and of the Roentgen rays. M. P. Curie. Paper presented to the Academy of Sciences. A report of researches. 700 w. Sci Am Sup—March 5, 1904.

Earth.—See **Atmosphere.**

Electron Theory.—Radioactivity and the Electron Theory. Sir William Crookes. Read before the Royal Soc. An illustrated account of experimental investigations. 2700 w. Nature—Feb. 27, 1902.

The Theory of Electrons and Radioactivity (Elektrorientheorie und Radioaktivität). Dr. Clemens Schaefer. A discussion of the emanations of radioactive substances, and their influence upon the theories of physics and chemistry. 4000 w. Zeitschr d Ver Deutscher Ing—July 2, 1904.

See also **ELECTRO-PHYSICS.**

Electroscope.—See ELECTRIC INSTRUMENT—Electroscope, Radioactivity.

Gases.—The Radioactivity of Gases Disengaged from Waters of Mineral Springs (Sur la Radio-activité des Gaz qui se Dégagent de l'Eau des Sources Thermales). P. Curie and A. Laborde. Giving results of tests from a number of springs, showing a perceptible and variable amount of radioactivity. 1500 w. Comptes Rendus—May 9, 1904.

See also **Atmosphere; Minerals and Mineral Waters; Water.**

Gases and Oils.—On the Radioactivity of Mineral Oils and Natural Gases. Prof. J. C. McLennan. Record of experiments, with tables and diagrams. Ills. 6000 w. Int Elec Cong of St. Louis—Sept., 1904.

Gas, New Haven, Conn.—On the Properties of a Radioactive Gas Found in the Soil and Water Near New Haven. H. A. Bumstead and L. P. Wheeler. A report of investigations of these natural radioactive gases, concluding that they are apparently identical with the emanations from radium. 3600 w. Am Jour of Sci—Feb., 1904.

Helium.—Experiments in Radioactivity, and the Production of Helium from Radium. Sir William Ramsay and Mr. Frederic Soddy. Report of experimental investigations. 1500 w. Nature—Aug. 13, 1903.

The Properties and Changes in the Emanation from Radium (Emanation du Radium, ses Propriêtes et ses Changements). Sir William Ramsay. An authoritative account of the experiment, showing the change of radium emanation into helium. 3500 w. Camptes Rendus—June 6, 1904. See also **Soddy.**

Lead Minerals.—A New Radioactive Mineral (Sur un Nouveau Minéral Radifère). J. Danne. Describing radioactive minerals containing no uracovered near Issy-l'Evêque, in France, the principal one being pyromorphite, containing no uranium. 800 w. Comptes Rendus—Jan. 23, 1905.

The Radioactive Deposits at Issy l'Evêque (Les Gisements Radifères d'Issy l'Evêque). Jacques Danne. Describing deposits of argile, permatite and pyromorphite, minerals containing lead and no uranium, but having a marked radioactivity. 1500 w. Génie Civil—Jan. 21, 1905.

Magnetic Deviability.—See Becquerel Ray.

Maxim.—Radioactivity. The Secret of Radium's Light and Heat. Hudson Maxim. Explains the writer's theory. 2000 w. Sci Am Sup—Oct. 3, 1903.

Metals.—The New Metals, Polonium, Radium and Actinium (Les Nouveaux Métaux Polonium, Radium et Actinium). Paul Besson. A general review of the phenomena of the emission of Becquerel rays by certain metals. 3000 w. Soc Ing Civ de France—March, 1901.

The Optical and Electrical Properties of Metals (Die Optischen und Elektrischen Eigenschaften der Metalle). Dr. H. Rubens. A study of the relation of the optical and electrical properties of metals in connection with the reflection and absorption of luminous and Becquerel rays. 7500 w. Zeitschr d Ver Deutscher Ing—Sept. 12, 1903. See also **Rare Elements.**

Minerals.—Radioactive Minerals. R. W. Brock. A record of results of tests of a number of minerals. 1500 w. Eng & Min Jour—June 2, 1904.

Minerals and Mineral Waters.—A Study of the Radio-Activity of Certain Minerals and Mineral Waters. R. J. Strutt. Read before the Royal Society. Gives results of an examination of certain radioactive materials, explaining method. 2500 w. Nature—March 17, 1904.

Radioactivity of Certain Minerals and Mineral Waters. R. J. Strutt. Read before the Royal Soc. Gives results of an examination of certain radioactive materials, describing method used. 3000 w. April 1, 1904.

Mineral Springs.—See Gases; Minerals and Mineral Waters; Water.

Pitchblende.—See CARNOTITE; URANIUM.

Pitchblende Emanations.—On the "Emanation Substance" from Pitchblende, and on Radium. F. Giesel. An account of researches. 2000 w. Sci Am Sup—May 16, 1903.

Polonium.—The Radiation from Polonium and the Secondary Radiation which it Produces (Sur le Rayonnement du Polonium et sur le Rayonnement Secondaire qu'il Produit).. Henri Becquerel. An account of experiments with radioactive substances. 1200 w. Comptes Rendus—April 27, 1903.

On Polonium and the Inducing Character of Radium. F. Giesel, in "Berichte d. Deutsch. Chem. Gesell." An account of experimental investigations. 1000 w. Sci Am Sup—Aug. 29, 1903.

Polonium and Radium.—The Radiations of Polonium and Radium (Sur la Rayonnoment du Polonium et du Radium). H. Becquerel. An examination of the experiments of Rutherford as to the deviability of the rays from radiant metals; with an account of the writer's experiments. 1800 w. Comptes Rendus—Feb. 16, 1903.

Pyromorphite.—See Lead Minerals.

Radium.—Studies Upon Radium (Etudes sur le Radium). M. Berthelot. With especial reference to the chemical properties of the new element, radium. A paper before the French Academy. 1800 w. Comptes Rendus—Dec. 9, 1901.

Radium—Its Extraordinary Properties. C. W. Kanolt. An interesting account of the discovery, the properties, cost and action. 1800 w. Sci Am—Feb. 28, 1903.

The Emanations of Radium. Sir William Crookes. Read before the Royal Soc. A report of experimental investigations. 1900 w. Elect'n, Lond—April 3, 1903.

Radium and Its Position in Nature. William Ackroyd. Gives a brief account of the discovery of this element, its rarity, properties, etc., discussing its scientific value. 4500 w. Nineteenth Cent—May, 1903.

Radium and Its Lessons. Sir Oliver Lodge. Summarizes the facts established thus far in regard to this substance, discussing how they are to be accounted for, and giving suggestions for investigations. 3500 w. Nineteenth Cent—July, 1903.

Radium and Its Recent Development. From the French of Prof. Cyr. Wattles, in "L'Industrie Textile." A review of what is known of this substance and its peculiar properties. 2800 w. Sci Am Sup—July 25, 1903.

On the Intensely Penetrating Rays of Radium. Hon. R. J. Strutt. A report of results of investigations made. 600 w. Nature—Aug. 13, 1903.

On the Intensely Penetrating Rays of Radium. R. J. Strutt. Communicated to the Royal Soc. A report of investigations. 600 w. Sci Am Sup—Nov. 7, 1903.

A Simple Method of Showing the Great Penetrating Powers of Certain Radium Rays. T. P. Black. An account of experimental investigations, with results. 900 w. Elect'n, Lond—Aug. 21, 1903.

The Radium Emanations. An editorial review of what has thus far been learned in regard to radium and like substances, and the investigations in progress. 3300 w. Engng—Aug 28, 1903.

Radium and Its Wonders. George F. Kunz. An interesting review of the history of this remarkable substance, its source, properties, action on organic bodies, value, etc. 6500 w. Rev of Revs—Nov., 1903.

The New Element, Radium. Ernest Merritt. An explanation of radioactivity, and account of investigations which have thus far been made, with report of the discovery of radium and its importance. 5000 w. Century Mag—Jan., 1904.

Sir Oliver Lodge on Radium. Abstract of a lecture on "Radium and Its Meaning." 2800 w. Elec Engr, Lond—Jan. 8, 1904.

The Preparation and Properties of Radium (Le Radium. Preparation et Proprietes). Jacques Danne. An illustrated account, describing very fully the methods of detecting the presence of radium in minerals, and the complete chemical process of extraction. 3 articles. 7000 w. Génie Civil—Jan. 16, 23, 30, 1904.

Radium. Translated from the French of Jacques Danne, in "Le Génie Civil." An account of the discovery and description of methods of research. Ills. Serial. 1st part. 4500 w. Sci Am Sup—April 9, 1904.

Radium and Radioactivity (Le Radium et la Radioactivite). André Debierne. A description of the process of preparing radium from the ore, and an account of the phenomena which it displays. Two articles. 10.000 w. Rev Gen des Sciences—Jan. 15, 30, 1904.

Radium. Prof. R. A. Milliken. Lecture at the convention of the Northwestern Electrical Assn. Reviews the earlier discoveries that led to the study of radioactive substances, and so to the discovery of radium, explaining its properties, etc. Serial. 1st part. 1400 w. Elec, N Y—Feb. 3, 1904.

A Résumé of Recent Progress in the Study of Radium and Radioactivity. Information from recent articles in the technical press. 1800 w. Sci Am Sup—Feb. 20, 1904.

A Note on Mineral Containing Radium in the Province of Quebec. J. Obalski. An illustrated description of an ore specimen taken from a white mica mine. 700 w. Eng & Min Jour—March 17, 1904.

The Wonderful New Element, Radium. E. Booth. The substance of a popular lecture delivered at the Univ. of California. 3600 w. Cal Jour of Tech—April, 1904.

Radium and Radioactivity in General. Robert H. Bradbury. The atomic theory; radium rays; the radioactive process in comparison with ordinary chemical changes, etc. 4000 w. Jour Fr Inst—March, 1905.

Radium and Radioactivity (Le Radium et la Radioactivité). Paul Besson. A description of the preparation of radium salts, and a review of the investigations which have been made during the past two years. 10,000 w. Mem Soc Ing Civ de France—Feb., 1905.

Recent Study of Radium. Editorial review of recent papers appearing in the "Philosophical Mag.," giving results of experimental research of much value. 2000 w. Engng—Oct. 20, 1905.

See also **Curie; Helium; Pitchblende Emanation; Polonium; Rutherford Theory; Soddy; CARNOTITE; URANIUM.**

Radium-Barium.—Contributions to Our Knowledge of Radium. W. Marckwald. Trans. from "Berichte der Deutsch. Chem. Gesell." Considers the separation of radium from barium, the phosphorescence of the anhydrous radium-barium chloride, and induced radioactivity. 1200 w. Sci Am Sup—April 23, 1904.

Radium Manufacture.—To Manufacture Radium. An account of a company formed to extract the rare metal, radium, from uranium ores obtained from Utah beds. 600 w. Ir Age—Aug. 27, 1903.

Radium Salts.—The Radioactivity Induced by the Salts of Radium (Sur la Radio-Activité Induite Provoqué par des Sels de Radium). P. Curie and A. Debierne. Describing the latest experiments showing the power of the salts of radium to induce fluorescence and phosphorescence. 1200 w. Comptes Rendus—Dec. 2, 1901.

The Spontaneous Disengagement of Heat by the Salts of Radium (Sur la Chaleur Dégagée Spontanément par les Sels de Radium). P. Curie and A. Laborde. An account of experiments which prove that radium salts emit heat continuously, these salts maintaining a temperature about 1.5 deg. C. above surrounding objects. 600 w. Comptes Rendus—March 16, 1903.

On the Heat Developed Spontaneously by the Salts of Radium. P. Curie and A. Laborde. Abstract translation of paper read before the Académie des Sciences. An investigation of the heat-producing power of radium. 1500 w. Elect'n, Lond—April 3, 1903.

Radium-Uranium.—The Production of Radium from Uranium. Bertram B. Boltwood. Discusses the experiments described by Mr. Soddy in three different papers, and describes experiments by the writer. 1800 w. Am Jour of Sci—Sept., 1905.

Rare Elements.—The Rare Elements. Victor Lenher. Considers the new radioactive elements and their actions, and also other elements and their characteristics. Serial. 1st part. 3000 w. Elec-Chem Ind—Jan., 1904.

See also **Metal.**

Reflection.—On the Existence of Rays which Undergo Reflection in the Radiation Emitted by a Mixture of Chlorides of Radium and of Barium (Sur l'Existence de Rayons qui Subissent la Réflexion dans le Rayonnement Emis par un Mélange de Chlorures de Radium et de Baryum). Th. Tommasina. A record of experiments proving the existence of such rays. 500 w. Comptes Rendus—Dec. 30, 1901.

Rutherford and Soddy.—Some Recent Advances in Radioactivity. Frederick Soddy. An account of the researches of Professor Rutherford and his co-workers at McGill University. 6000 w. Contemporary Rev—May, 1903.

Radioactivity. Editorial review of the recent paper by Prof. Rutherford and Mr. Soddy, and the work of other experimenters. 2500 w. Engng—Sept. 25, 1903.

Rutherford Theory.—Concerning Induced Radioactivity and the Emanations from Radium (Sur la Radioactivité Induite et sur l'Emanation du Radium). P. Curie. A communication to the French Academy, discussing the theories of Rutherford. 1500 w. Comptes Rendus—Jan. 26, 1903.

Selenium Resistance.—The Effect of Radioactive Substances on the Conductivity of Selenium (Action des Corps Radioactifs sur la Conductibilité Electrique du Selenium). Edmond van Aubel. An account of experiments showing that peroxide of hydrogen and essence of turpentine emit radiations which slowly change the resistance of selenium. 800 w. Comptes Rendus—April 14, 1903.

Soddy.—Radioactivity. Frederick Soddy. The first of a series of articles based on lectures being delivered in London, to be revised and amplified and issued in book form. Serial. 1st part. 3800 w. Elect'n, Lond—Oct. 23, 1903.

Researches Relating to Radium. Frederick Soddy. Considers features of radium which need further inquiry, especially the atomic weight. 2500 w. Nature—Jan. 28, 1904.

See also **Helium; Rutherford and Soddy.**

Theory.—Radium, Radioactivity and Hypotheses (Le Radium—la Radioactivité—Hypothèses). Paul Besson. A review of radioactive phenomena, and hypotheses of the constitution of matter and the propagation of light. 4000 w. Mem Soc Ing Civils de France—March, 1903.

Radium. Prof. J. J. Thomson. The radioactivity of radium is explained by the hypothesis that some of the atoms of radium are in an unstable condition and that in passing into other configurations they give out a large amount of energy. 1400 w. Nature—April 30, 1903.

See also **Atomic Theory; Rutherford Theory; ELECTRO-PHYSICS; MATTER; PHYSICS; RADIOGRAPHY.**

Thorium.—Radioactivity of Thorium Minerals. George F. Barker. A review of recent investigations and the conclusions reached. 2800 w. Am Jour of Sci—Aug., 1903.

Thorium: A Radioactive Substance with Therapeutical Possibilities. Samuel G. Tracy. From the "Medical Record." Gives photographs taken with varying degrees of exposure, and much information concerning this substance. Reports its use in treating tuberculosis. 1500 w. Sci Am Sup—March 5, 1904.

See also **THORIUM.**

Uranium.—The Radioactivity of Uranium (Sur la Radioactivité de l'Uranium). A review of the observation which led to the discovery of the radioactive properties of uranium, with data as to the most recent experiments. 1500 w. Comptes Rendus—Dec. 9, 1901.

Some Experiments Upon the Radioactivity of Uranium (Sur quelques Expériences Relatives à l'Activation par l'Uranium). Henri Becquerel. Results of experiments with uranium salts under various conditions of temperature. 1800 w. Comptes Rendus—July 10, 1905.

See also **URANIUM.**

Water.—On the Radioactivity of Natural Waters. Bertram B. Boltwood. Describes a method for the quantitative determination of the radioactive gas contained in a water and a convenient standard for measurement and comparison. Ills. 4000 w. Am Jour of Sci—Nov., 1904.

See also **Gases; Minerals and Mineral Springs.**

Waterfalls.—Induced Radioactivity Excited in Air at the Foot of Waterfalls. J. C. McLennan. Read before the Am. Phys. Soc. An account of experimental investigations made of Niagara Falls, describing apparatus, experiments, etc. 3800 w. Sci Am Sup—Nov. 4, 1904.

Welsbach Burner.—See **Blondlot Ray.**

RADIOCONDUCTOR.

See **COHERER; SPACE TELEGRAPHY.**

RADIOGRAPHY.

See also **ELECTRO-PHYSICS; RADIOACTIVITY; VACUUM TUBE.**

Cathode Rays. P. Villard. Abstract of lecture delivered before the Congress of Electricity, in Paris. Describes investigations and gives results of experimental study. 1800 w. Sci Am—Nov. 10, 1900.

The Present State of X-Ray Work. William O. Peckham. Concerning the satisfactory work now possible, and the changes made in the static machine. 1200 w. Sci Am—April 20, 1901.

Origin and Uses of the X-Rays. Dr. W. R. Fox. Digest of a lecture delivered before the Insurance Institute of Victoria, N. S. W., with descriptions of demonstrations given to illustrate the principles. 2800 w. Aust Min Stand—July 25, 1901.

A Personal Experience in Radiography, Together with the Technique of Stereoscopic Radiography. Alexander B. Johnson. Explains the important details and methods. 3500 w. Sci Am Sup—April 11, 1903.

On the Present Status of the X-Rays. M. I. Wilbert. Reviews the history of these rays and the applications made of the discovery, showing how they have added to scientific knowledge. 6000 w. Jour Fr Inst—June, 1903.

Anode Rays.—On Anode Rays. W. Hibbert. Observations noted during a series of experiments on the absorption of X-roys by various salts and metals. Ill. 900 w. Elec Rev, Lond—June 7, 1901.

Apparatus.—New Roentgen Ray Apparatus. Illustrated description of outfit. 1400 w. Sci Am Sup—Dec. 5, 1903.

Crookes Tube.—On the Properties of the Field Surrounding a Crookes Tube. Arthur W. Goodspeed. Reprinted from "Pro. Am. Phil. Soc." An account of investigations suggested by radiographic records below the plate. 2800 w. Sci Am Sup—June 27, 1903.

Gundelach-Dessauer.—See **VACUUM TUBE.**

History.—A Brief History of the X-Ray. Eugene W. Caldwell. 2200 w. Elec Rev, N Y—Jan. 12, 1901.

Long Distance.—New Process of Pelvimetry and Long Distance Radiography. From "La Nature." An illustrated account of investigations made by Dr. Varnier, the results of which promise to be of value to physicians. 900 w. Sci Am Sup—May 11, 1901.

Metroradioscope.—See **Radiophotometer.**

Orthodiagraph.—The Orthodiagraph, an Apparatus for Determining the True Shape and Size of Internal Organs. Illustrates and describes the apparatus and its operation. 900 w. Sci Am—Jan. 16, 1904.

Phosphorus.—See **PHOSPHORUS.**

Radiochromometer.—The Experimental Classification of Different Kinds of X-Rays by Means of the Radiochromometer (Definition Expérimentale des Diverses Sortes de Rayons X, par le Radiochromomètre). L. Benoist. A description of an instrument which classifies the degree of penetration of different kinds of X-rays, and applications. 500 w. Comptes Rendus—Jan. 27, 1902.

Radiophotometer.—Apparatus for Measuring the Quantity and Penetration of X-Rays (Appareils de Mesure des Facteurs Pénétration et Quantité de Rayons X). G. Contremoulins. Describing the metroradioscope and the radiophotometer, for quantitative work with X-rays. 1500 w. Comptes Rendus—July 3, 1905.

Stereoscopic.—A New Method of Obtaining Stereoscopic Effects in the Fluoroscope. Eugene W. Caldwell. Describes and illustrates improved systems for X-ray work by which stereoscopic X-ray vision may be obtained. 2000 w. Elec Rev, N Y—Nov. 16, 1901.

Stereoscopic Röntgen Ray Pictures. Frank C. Perkins. Reviews some of the stereoscopic methods of locating foreign substances buried in the tissues of the body. Ill. 1400 w. Elec Wld & Engr—Jan. 18, 1902.

Stereoscopic Radioscopy (Procédé de Radioscopie Stéréoscopique). Th. Guillos. Description of an arrangement of Roentgen-ray apparatus which gives good stereoscopic vision in examinations of the human body. 600 w. Comptes Rendus—March 9, 1903.

Stereoscopic Radiography (La Radioscopie Stéréoscopique). P. Villard. An illustrated study of Röntgen-ray apparatus, particularly those for securing stereoscopic views. 3000 w. Bull Soc d'Encour—June 30, 1903.

The Stereoscopic Radioscope (La Radioscopie Stéréoscopique). Describing the Villard apparatus, using a Ruhmkorff coil and stroboscope for obtaining stereoscopic effects. 1800 w. Génie Civil—Oct. 3, 1903.

See also **Walter's Apparatus.**

Theory.—The Cathode Stream and X-Light. William Rollins. Considers the ether theory, and the material particle theory, offering suggestions in regard to each. 5000 w. Am Jour of Sci—Nov., 1900.

See also **ELECTRO-PHYSICS; MATTER; PHYSICS; RADIOACTIVITY.**

Tungstate of Calcium.—Edison's Tungstate of Calcium Lamp. William J. Hammer. Especially discusses investigations made of the properties of radium. 3400 w. Trans Am Inst of Elec Engrs—April, 1902.

Velocity.—The Velocity of Propagation of X-Rays (Sur la Vitesse de Propagation des Rayons X). R. Blondlot. Recording experiments similar to those used for determining the velocity of light. 2000 w. Comptes Rendus—Oct. 27, 1902.

The Equality of the Velocity of X-Rays with that of Light (Sur l'Egalité de la Vitesse de Propagation des Rayons X et de la Vitesse de la Lumière dans l'Aair). R. Blondlot. A record of further experiments, showing the velocity of X-rays to be the same as Hertzian waves and of light in air. 1600 w. Comptes Rendus—Nov. 3, 1902.

The Determination of the Velocity of X-Rays (Observations et Expériences Complémentaires Relatives à la Determination de la Vitesse des Rayons X). R. Blondlot. A continuation of the author's experiments upon the velocity of X-rays, together with a discussion of their nature. 1200 w. Comptes Rendus—Nov. 10, 1902.

Velocity of Propagation of X-Rays. R. Blondlot. Translated from the "Comptes Rendus." An account of researches and experiments, giving results. 2500 w. Elect'n, Lond—Nov. 21, 1902.

Speed of X-Rays Determined by M. Blondlot. C. L. Durand. Gives a method proving that the X-rays are propagated with the same velocity as those of light. 1800 w. Elec Rev, N Y—Oct. 17, 1903.

Walter's Apparatus.—Walter's Roentgen Ray Apparatus. An illustrated description of the practical construction and method of working the apparatus devised by Dr. Walter, of Hamburg. 1700 w. Elec Rev, Lond—May 9, 1902.

A Stereoscope for Röntgen Ray Photographs. Describes an ingenious direct-vision stereoscope, devised by Dr. Walter, of Hamburg, capable of viewing photographs of any size. Ill. 1400 w. Elec Rev, Lond—April 24, 1903.

RADIUM.

See **CARNOTITE; RADIOACTIVITY; URANIUM.**

RAFT.

Cluchagne Military.—See **BRIDGE—Military, Cluchagne.**

RAIL.

See also **RAIL BOND; RAIL JOINT; RAILWAY PERMANENT WAY; TRACK; TRACKLAYING.**

Notes on Some of the Recent Discussions on Rails. Editorial on points brought out in recent papers, with a list of articles on rails which have appeared in this paper during the last 14 months. 1200 w. R R Gaz—March 8, 1901.

Rail. Report of American Railway Engineering and Maintenance of Way Association, with discussion. 10,000 w. Ry Age, Special No—March 21, 1902.

A Few Remarks Concerning Steel Rails. Albert Sauveur. Remarks on paper by Sir Lowthian Bell concerning strength of rails. 1100 w. R R Gaz—June 6, 1902.

Steel Rails; Relation between Structure and Durability. Robert Job. A report of investigations made to determine qualities which resulted in fractures, or in rapid wear in service, and to find the means of reducing these to a minimum. Plates. Serial. 1st part. 3900 w. Jour Fr Inst—July, 1902.

All-Flanged Tire Effect.—See **TIRE.**

American Fast Trains.—See **Fast Trains.**

RAIL BOND.

See also **ELECTRIC RAILWAY; RAIL JOINT; STRAY CURRENTS; TRACK—Street.**

Bonds, Bonding and Bond Testing Methods. Albert B. Herrick. A discussion of methods and types of bonding and testing. 3300 w. St Ry Rev—May 15, 1901.

Concerning Rail-Bonds. Samuel Sheldon. Outlines the common methods employed, and remarks on the importance of perfect work and frequent inspection. 1400 w. St Ry Jour—June 1, 1901.

Track Bonding. Alfred Green. Read before the N. Y. State St. Ry. Assn. Does not think the joints of the rail can be so bonded as to be a perfect success. Discusses the difficulties and the remedy. 1400 w. St Ry Jour—Sept. 14, 1901.

Rail Bonding. W. A. Neff. On the importance of proper rail bonding, calling attention to some points often neglected. 1200 w. Tram & Ry Wld—Nov. 14, 1901.

Rail Bonds. W. B. Harrington. Calls attention to interesting features, bonds and methods employed recently, testing, and conclusions based on experience. Ill. 2000 w. Jour Fr Inst—Jan., 1904.

Rail Bonding. A. Henrick Jackson. An illustrated article based on information from the paper by Percy S. Sheardown, with amplifications and variations. 3200 w. Aust Min Stand—Oct. 20, 1904.

On Track Bonding. C. W. Ricker. Considers in detail the various kinds of bonding, and the conditions governing the material form and structure of bonds; the importance of good contacts, &c. 4400 w. Am Inst of Elec Engrs—March, 1905.

B. & O. Belt Line.—Strange Behavior of Flexible Copper Bonds on the Baltimore & Ohio Belt Line. Describes the care used in track construction and gives illustrated description of the behavior of the bonds. Also gives recommendations of Chas. M. Hobbs for applying bonds of the protected type on steam road tracks. 1400 w. St Ry Jour—Nov. 2, 1901.

Brooklyn Elevated.—Rail Bonding on the Brooklyn Heights Railroad. Howard C. Forbes. Illustrated description of heavy bonding where not only the track but the longitudinal girders of an elevated structure were used to carry the return current. 1600 w. St Ry Rev—April 15, 1905.

See also **ELEVATED RAILWAY—Brooklyn Bonding.**

Conductivity.—Apparatus for Determining the Conductivity of Rail Bonds (Appareil pour Déterminer la Conductance des Joints de Rails). J. A. Montpellier. A description of the Siemens & Halske device, by which the conductivity of the joint is compared with that of the solid rail. 1200 w. Electricien—Feb. 16, 1901.

Conditions Which Affect the Resistance of a Bonded Rail Joint. Charles R. Sturdevant. Discusses the four distinct resistances which makes up the total ohmic resistance. 2000 w. St Ry Rev—Dec. 20, 1903.

See also **ELECTRIC RAILWAY—Return Circuit; ELECTRIC RESISTANCE—Rail; STRAY CURRENTS.**

Return Cables Compared.—Return Cables vs. Rail Bonding. Alton D. Adams. Discusses these two systems showing the bonded system cheaper in first cost, but so much more expensive in maintenance as to make it soon exceed the cable system. 2400 w. Marine Engng—June, 1901.

See also **ELECTRIC RAILWAY—Return Circuit.**

St. Gothard Railway.—Protected Electric Earth Connections for Rails (Ueber einen Geschützten Erdleitungsanschluss an Eisenbahnschienen). A. Frey. Illustrating a covered bonding of the rails with a continuous earthing wire for steam railway signal and telegraph purposes. 1000 w. Elektrotech Zeitschr—March 17, 1904.

RAIL CONTACT.

See **THIRD RAIL.**

RAIL CREEPING.

See **RAIL—Creeping.**

RAIL FASTENING.

See also **CROSS TIE; RAIL; RAIL JOINT; TRACK.**

Gouchet.—See **CROSS TIE—Steel, Gouchet.**

Improvements.—See **CROSS TIE—Timber.**

Treenail.—Concerning Hard-Wood Plugs to Hold Spikes in Soft Wood Ties. Quotes views of O. P. Sandberg, the well known European consulting engineer on rails and railways, and gives editorial suggestion. 1000 w. Eng News—April 30, 1903.

Increased Resistance of Spikes to Drawing, Produced by Means of Hard-Wood Bushes. W. Fridericia. Report of a section at Stockholm. Explains experimental investigations which seem successful. 2800 w. Bul Internat Ry Cong—Oct., 1903.

The Use of Screwed Wood Bushes (Treenails) in Wooden Sleepers for Increasing the Resistance of Spikes. Mr. Schwabach, in "Glasers Annalen für Gewerbe und Bauwesen." Describes methods employed by the "Dubelwerke" Company, for fixing rails more securely. Ills. 1500 w. Bul Int Ry Cong—May, 1904.

The Fastening of Rails to Cross-Ties by Means of the Collet Wooden Treenails (Sicherung und Befestigung der Schienen auf Holzschwellen durch der Schienen and Holzschwellen durch Verdübelung nach System Albert Collet). George Schwabach. Well illustrated description and records of experience. Serial. 1st part. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 8, 1905.

RAIL JOINT.

See also **ALUMINOTHERMY; ELECTRIC WELDING; RAIL; RAIL BOND; RAILWAY CURVE; TRACK.**

Track Construction with Special Reference to Rail Joints. F. H. Davies. Discusses the track construction of the presnt, gauge, composition of rails, etc., especially jointing of rails and bonds. 3300 w. Elec Engr, Lond—July 10, 1903.

The Treatment of Rail-Joints. A series of papers assembled and edited by Fred G. Simmons, describing the practice of the electric street and interurban railways of America. Ills. Presented before the Am. Ry., Mech. & Elec. Assn. 10,500 w. St Ry Jour—Sept. 30, 1905.

Aluminothermy.—See **ALUMINOTHERMY.**

Berlin Street.—New Rail Joints for Street Railways and their Installation on the Berlin Street Railway System (Neue Schienenstossverbindungen für Strassenbahnen und deren Einbau bei der Grossen Berliner Strassenbahn). Article from the "Elektrotechnische Anzeiger," giving illustrated description of the Melaun and other rail joints. 2000 w. Mitt d Ver f d Förderung d Lokal u Strassenbahnwesens—Aug., 1905.

Bochum.—The Bochum Rail Joint (Bochumer Schienenstoss-Verbindung). J. Grimme. Describing and illustrating a form of bridge rail joint especially adapted for tramway service. 1000 w. Schweizerische Bauzeitung—May 11, 1901.

Broken vs. Square.—Broken and Square Rail Joints for Railway Track. Expressions of opinion concerning the use of the two methods, and the reasons for and against them. 1400 w. Eng News—Nov. 15, 1900.

Are the Best Results Obtained From the Use of Broken or Square Joints? L. Bradley and F. J. Allen. From a report of a committee presented before the Roadmasters' and Maintenance of Way Assn. 1200 w. Ry & Engng Rev—Oct. 12, 1901.

Electric Welding.—See **ELECTRIC WELDING—Rail Joint.**

Europe.—New Solutions for the Rail-Joint Problem (Die Neuen Vorschläge zur Lösung der Schienenstossfrage). Fritz Steiner. With numerous illustrations of the joints used on Continental railways. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—April 14, 1905.

Falk Cast-Welded.—The Falk Cast-Welded Rail Joint on European Street Railways. Concerning the advantages of the cast-joint over the electrically welded joint, and the use as reported by tramway companies. 800 w. Eng News—Nov. 15, 1900.

Instability.—The Chief Causes of Instability in Railway and Tramway Line Joints. A. Roberto Pullen. Discusses the difficulties due to joints in rails, and whether the joints are really objectionable, suggesting the adoption of some means of absolutely locking nuts on all lines. 1800 w. Tram & Ry Wld—Nov. 13, 1902.

International Ry. Congress.—Rail Joints. Extracts from the "Bulletin" of the International Railway gations showing the extent of segregation of combined carbon and other elements, the effect, giving typical examples. 5000 w. Ir & Coal Trds Rev—Nov. 7, 1902.

See also **STEEL.**

Sorbitic.—Sorbitic Steel Rails. J. E. Stead and Arthur W. Richards. Read before the Iron & Steel Inst. Gives a description of experiments in making sorbitic rails, and their relative wear. 8500 w. Engng—Sept. 4, 1903.

Specifications.—Specifications for Steel Rails. W. R. Webster. Gives the proposed standard specifications for steel rails, recommended by the American Branch of Committee No. 1 of the International Assn. for Testing Materials, and submitted for discussion, with remarks. 2500 w. Trans Am Inst of Min Engs—Feb., 1901.

Specifications for Steel Rails. Continued discussion of Mr. Webster's paper. 2400 w. Trans Am Inst of Mine Engrs—June, 1901.

Specifications for Steel Rails. William R. Webster. Abstract of a paper presented at meeting of the Am. Soc. of Min. Engrs. States the present situation of rail specifications and the importance of discussion of the proposed modifications. 1100 w. Eng & Min Jour—May 17, 1902.

The Present Situation as to Specifications for Steel Rails. William R. Webster. A detailed statement of the present situation, showing the work thus far done. 1800 w. Trans Am Inst of Min Engrs—May, 1902.

Steel Rails. William R. Webster. Gives the full specifications of the Am. Ry. Engng. & Main. of Way Assn. adopted last year. 2200 w. R R Gaz—Vol. XXXVIII., No. 18.

Specification for Steel Rails. P. H. Dudley. Discusses the conclusions adopted by the British Board of Trade, and the conditions and practice in the United States. 2000 w. R R Gaz—March 8, 1901.

Some Suggestions as to Specifications for Steel Rails. E. F. Kenney. Gives suggestions concerning the composition, blooming, segregation, finishing, straightening and testing. Ill. 2700 w. Eng News—Oct. 3, 1901.

Steel Rails: Specifications. Robert Job. Gives the Philadelphia & Reading Railway Company's Specifications, and information gained by careful investigations and experience. 2700 w. Am Engr & R R Jour—Oct., 1902.

Results Observed Upon the Philadelphia & Reading Ry. in Connection with Inspection of Steel Rails. Robert Job. Presented at meeting of the Am. Soc. for Test. Materials in discussion of report on Specifications for Steel Rails. Ill. 1000 w. Eng News—July 16, 1903.

Specifications for Bessemer Steel Rails. Gives the specifications adopted by Am. Ry. Engng. & Main. of Way Assn. at the Chicago meeting. 900 w. Eng News—March 24, 1904.

See also **STEEL—Rail; STEEL SPECIFICATIONS.**

Steel.—See **METALLOGRAPHY — Rail; STEEL — Rail.**

Steel Substructure.—See **CROSS TIE; TRACK.**

Street Railway.—The Life of Tramway Rails. R. P. Wilson. Considers facts learned by experience in regard to prolonging the life of rails. Ill. 800 w. Tram & Ry Wld—April 9, 1903.

See also **TRACK—Street.**

Stremmatograph.—See **Stresses.**

Stresses.—Fiber Stresses in Rails Under Moving Trains. Extracts from a paper by P. H. Dudley, presented at the Sept. meeting of the Pacific Coast Ry. Club, discussing the subject of rail sections and their relations to the permanent way and railway operations. 1400 w. Eng News—Nov. 14, 1901.

Tests of Unit Fiber Strains in the Base of Rails. P. H. Dudley. Presented before the Am. Soc. for Test. Materials. Gives tabulated stremmatograph tests, and an interesting discussion of track construction and related subjects. 5000 w. Ry Age—July 24, 1903.

Stremmatograph Tests of Unit Fiber Strains and Their Distribution in the Base of Rails under Moving Locomotives, Cars and Trains. P. H. Dudley. Read before the Am. Soc. of the Internat. Soc. for Test. Materials, with revision and additions. Explains the functions of the stremmatograph and gives a record of the tests. 6800 w. Ills. Bul Int Ry Cong—June, 1904.

Researches on the Bending of Rails. A. Flamache. A study of this problem both under static and rolling loads. Mathematical. 8000 w. Bul Int Ry Cong—Jan., 1904.

The Rail Section on Flexible Supports Under Rolling Loads a "Constrained Beam." P. H. Dudley. Reviews the researches of Mr. A. Flamache on the bending of rails, and gives other important data obtained by instrumental observations of precision of a different character, for the purpose of acquiring information of the strains in rails under moving loads. 4600 w. Bul Int Ry Cong—June, 1904.

Bending Moments in Rails. Dr. P. H. Dudley. Read before the Am. Soc. of Test. Materials. Considers some of the relations of the problems of the rail section as a girder in carrying and distributing the load of passing locomotives to the foundation or sub-grade, as indicated by the bending moments. 2300 w. Ry & Engng Rev—July 2, 1904.

Structure.—See **METALLOGRAPHY—Rail.**

Switzerland.—See **RAILWAY PERMANENT WAY.**

Testing.—See **Stresses; TESTING—Rails.**

Thermo-Magnetic Selector.—See **PYROMETRY—Magnetic Selector.**

Unloading.—Unloading Rails, Chicago, Milwaukee & St. Paul Ry. Illustrated description of the method used on this road. 900 w. Ry Engng Rev—Aug. 24, 1901.

Wear.—How to Study the History of a Rail. Stephen W. Baldwin. Suggests a method for measuring wear of rails and of reports to be required of inspectors. 800 w. R R Gaz—March 8, 1901.

The Wave-Like Wear of Rail Heads (Ueber die Wellenförmige Abnutzungerscheinung am Kopfe der Schienen). R. Scheibe. With photographs showing the nature of the wear on the rail; suggesting that the action may be due to unequal hardness caused in the rolling process. 1200 w. Glasers Annalen—March 1, 1905.

Wheel Flange and Rail Wear. H. M. Perry. Discusses the cause and thinks the remedy is in finding a suitable anti-friction side bearing which will allow the truck to swing freely within proper limits and to have sufficient bearing surface to support any load it may be called upon to carry. 700 w. R R Gaz—Feb. 6, 1903.

Roaring Rails. H. L. Wilkinson. An account of an investigation into the cause of the rail surface being worn into a series of ridges which produce a deafening noise as the train passes over them. 2000 w. Ills. Engr, Lond—Dec. 2, 1904.

A Railway Rail and Its Relation to the Wheel and Tie. W. F. Gould. Discusses the changes in rails by wear, and the creeping of rails, and the movements the rail has to resist. General discussion. 8500 w. Pro Iowa Ry Club—March 13, 1905.

See also **TIRE; TRACK.**

Wear, Bridges.—Wear of Steel Rails on Bridges. Thomas Andrews. Read before the Ir. & Steel Inst. Report of investigations made of the fractured portion of a steel rail which had broken in main line service on a bridge, to determine, if possible, some of the causes of the breakage. Ills. 3500 w. Ir & Coal Trds Rev—Sept. 29, 1905.

Wear, Tunnels.—The Wear of Rails in Tunnels. Thomas Andrews. Read before the Inst. of Civ. Engs. Reports results of an examination of a rail which had done service in such a situation, and discusses the subject generally. 3000 w. R R Gaz—Dec. 28, 1900.

Welding.—See **ALUMINOTHERMY; RAIL JOINT; TRACK.**

RAIL BEARER.

See also **BRIDGE FLOOR; RAIL.**

Strength of Rail Bearers. Editorial discussion of past and present practice, calling attention to cases of interest. 1800 w. Engr, Lond—Feb. 8, 1901.

The Deflection of Continuous Rail-Bearers. Max am Ende. Begins a mathematical discussion of rail-bearers having a uniform support. Continuous rail-bearers are used in railway bridges for the distribution of pressure from a rolling load upon several cross-girders. Serial. 1st part. 1700 w. Engng—July 21, 1905.

opment. Extracts from an address by George H. Daniels, before the Chautauqua Assembly, showing the achievements of American railways. 2400 w. Ry & Engng Rev—Aug. 16, 1902.

The Railroad System of the United States. An illustrated article showing the magnitude of the properties and operations. 1700 w. Sci Am—Dec. 13, 1902.

The Progress of American Railroads in the Last Quarter Century. S. Whinery. Considers the features of progress in the period from 1878 to 1903. 3500 w. R R Gaz—Vol. XXXVIII., No. 20.

See also **Constable Report; Ownership; Yorke Report.**

American Western.—Western Railroad Extensions and Mining. Gives map, indicating the completed and projected transcontinental lines in the United States, Canada and Mexico, discussing their influence on mining in the important mineral districts which they traverse. 1700 w. Min Wld—March 11, 1905.

Appenzell, Switzerland.—See **MOUNTAIN RAILWAY.**

Arctic.—See **Alaska; Norway; White Pass and Yukon.**

Argentine.—The Argentine Railroads. Reviews the statistics of railroads as given in a recent volume issued by the Minister of Public Works. Maps. 1200 w. R R Gaz—Nov. 6, 1903.

Argentine Railway Progress. Charles M. Pepper. An account of the activity in railway enterprises, with map showing lines built and projected. 1500 w. Ry Age—Nov. 11, 1904.

Arkansas.—New Railroad Work in Arkansas. Information concerning work building and projected. 1700 w. R R Gaz—Nov. 9, 1900.

Asia.—Russo-American Railways in Asia. Alexander Hume Ford. A review of the situation, the roads constructed and proposed, machinery needed, &c. 3200 w. Ir Age—Oct. 31, 1901.

Railroad Development in Asia. Compiled by O. T. Mason. Information of what has already been done, and what it is proposed to accomplish in India, Asiatic Russia, Asia Minor, China, and Indo-China. 1700 w. Sci Am Sup—June 21, 1902.

Railway Strategy in the Orient. George Ethelbert Walsh. Brief discussion of the importance of railways in the commerce of the Orient, and also for war purposes. 2000 w. Ry Age—Aug. 18, 1905.

See also **Bagdad; Europe-Pacific; China; India; Japan; Korea; Russia-Asia; Siam; Siberia.**

Asia Central.—See also **Russia-Asia.**

Atlanta & Birmingham.—The Atlanta & Birmingham Air Line. Illustrations, line drawings and interesting data in regard to this road. 1500 w. R R Gaz—July 1, 1904.

Australia.—A Trans-Australian Railway. An account of a projected line connecting the extreme west with the extreme east. 900 w. Sci Am Sup—May 11, 1901.

Australian Railways. W. C. Kernot. Abstract of a paper read before the Glasgow Congress. A report of the railway system and their condition, with map. 1000 w. Ir & Coal Trds Rev—Sept. 6, 1901.

The Trans-Australian Railway Scheme. Stafford Ransome. Map, with account of a proposed plan to connect the capitals of the various states by means of one line of railway reaching from the east to the west coast. 2000 w. Engr, Lond—Dec. 27, 1901.

The Trans-Australian Railway. A review of the report of Mr. John Muir, the engineer who has been making a preliminary survey of the ground on which the projected line is to run. Map. 3000 w. Engr, Lond—May 2, 1902.

South Australia's Land-Grant Railway. Hon. J. H. Gordon. Discusses this scheme for the construction of a railway across Australia. Map. 2400 w. Rev of Revs—April, 1903.

Queensland Railways and Colonial Development. Editorial discussion of the working of the State Railways, and the conditions they must meet. 1800 w. Engng—June 5, 1903.

The Transcontinental Railway. W. H. James. A statement of reasons which justify the construction of a railway from Kalgoorlie (W. A.) to Port Augusta (S. A.). Serial. 2 parts. 2800 w. Aust Min Stand—Sept. 10 & 17, 1903.

Western Union Railway of Australia. Information concerning Australian railways, and the proposed construction of a line connecting the systems of Western and Southern Australia. 1400 w. Engr, Lond—Oct. 14, 1904.

Austria.—New Railways in the Austrian Alps (Oesterreichs Neue Alpenbahnen). K. Imhof. A description of the new government railway in Bohemia, Galicia and Styria, including difficult grades and tunnels in the Austrian Alps. 2500 w. Schweizerische Bauzeitung—March 22, 1902.

New Railway Construction in Austria (Die Eisenbahnenbauten in Oesterreich). A description, with map and profiles, of new railways under construction in different parts of Austria. Serial. Part I. 1200 w. Zentralblatt d Bauverwaltung—July 11, 1903.

The Tauern Railroad from Schwarzach to Bad Gastein. Emil S. Fischer. Illustrated description of this recently opened road which passes through some of the highest and most picturesque parts of the Eastern Alps. 1800 w. Ry & Engng Rev—Oct. 21, 1905.

See also **Tyrol.**

Austro-Balkan.—The Railways of Dalmatia, Bosnia and Herzegovina (Die Eisenbahnen von Dalmatien, Bosnien und Herzgowina). J. R. V. Wenusch. A general descriptive account of the railway systems of these Austro-Balkan states, based on a tour of observation. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 18, 1903.

Auto Car.—See **CAR, MOTOR DRIVEN.**

Automobile.—See **CAR, MOTOR-DRIVEN.**

Bagdad.—The Bagdad Railway. Comment on the project known as the German Bagdad Railway, which is already under way, and the changes it will work. 1400 w. Engr, Lond—April 26, 1901.

The Bagdad Railway Project. Information relating to the line under construction by German capitalists, and the proposed branches. Ill. and map. 1200 w. Rev of Revs—Dec., 1901.

The Bagdad Railroad. D. G. Hogarth. Extract from an article in the "National Review," London, giving the history of this project. 1800 w. R R Gaz—Aug. 8, 1902.

The Bagdad Railway. Map and account of the projected railway, recalling the history of the region through which it passes, the ancient system of irrigation, and the disaster that destroyed these works, the possibility of reconstructing them, cost, etc. 3700 w. Engng—Sept. 18, 1903.

Details of the New Constantinople-Bagdad Railway. Information concerning this new line, which, with its branches, will have a length of 1500 miles. 900 w. Sci Am Sup—March 5, 1904.

See also **Persion Gulf; RAILWAY CONSTRUCTION—Anatolia.**

Baikal.—See **Siberia, Baikal.**

Barry, Wales.—The Rhymney Branch of the Barry Railway. Illustrates and describes an important new coal line which connects the Barry dock with the coal fields of South Wales. 1800 w. Transport—Sept. 6, 1901.

Behr.—See **SINGLE RAIL.**

Belfast, Ireland.—The Belfast and Northern Counties Railway. Reviews the history of this line, soon to be amalgamated with the Midland Railway Company. Ill. 3000 w. Transport—Oct. 10, 1902.

Bern-Neufchatel.—The Bern-Neufchatel Railway (Die Bern-Neuenburg Bahn). Albin Beyeler. An illustrated general account of the new direct line between these Swiss cities, with descriptions of bridges and construction work. Serial. 2 parts. 5000 w. Schweiz Bauzeitung—Jan. 4, 11, 1902.

Borneo.—Railway Enterprise in British North Borneo. Map with illustrated description of a recently opened line anu account of the scheme for a trans-Borneo line tc terminate at Cowie Harbor. 1000 w. Engr, Lond—May 30, 1902.

The British North Borneo Railway. An illustrated account of conditions and the power of the railway, the rules enforced, &c. 1200 w. Loc Engng—June, 1904.

The British North Borneo Railway. George Cecil. An illustrated description of the line and its working, with a brief report of the commercial and civilizing results. 1000 w. Eng News—May 4, 1905.

See also **Dutch East Indies.**

Bosnia.—See **Austro-Balkan.**

Brazil.—The Railroad Around the Falls of the Madeira River, Brazil. O. F. Nichols. Historical review of earlier atempts to open this rich district, and the project now under consideration. Map. 2500 w. R R Gaz—Jan. 1, 1904.

British.—The Railway Situation in Great Britain. J. W. Root. A discussion of railway conditions, and the problems to be solved, with suggestions for reforms. 6000 w. Ry Age—April 12, 1901.

The Real Railway Position. Introduction to a series of articles intending to make plain the real position of the railway system of Great Britain, what it is, what it does, its difficulties, etc. Serial. 1st part. 3000 w. Transport—Jan. 2, 1903.

A German Impression of British Railroads. Wilhelm Cauer. An account of the features that impressed a railroad engineer from the Continent. while traveling for instruction. 5000 w. R R Gaz—Vol. XXXIX, No. 7.

Government Control of British Railways. A brief study of the relations between the British Board of Trade and the railways of the United Kingdom. 2800 w. Ry Age—Sept. 15, 1905.

Notes on British Railways. Angus Sinclair. An explanation of how circumstances influenced the growth of railways. 1400 w. Ry & Loc Engng—Oct., 1905.

See also **ELECTRIC RAILWAY; RAILWAY OPERATION.**

British Columbia.—Proposed Railroads in British Columbia. Concerning a proposed road to be known as the Victoria-Vancouver and Eastern Railway and Navigation Company. 700 w. U S Cons Repts, No. 940—Jan. 21, 1901.

The Railway Situation in British Columbia. S. J. McLean. An account of railways and proposed lines, with map. 2000 w. Ry Age—April 11, 1902.

British vs. American.—Railways: British and American. A. H. Tatlow, in the "Railway Official Gazette." A comparison of cost, mileages, construction and equipment, traffic returns, &c., giving much information of interest. 2000 w. Ry & Engng Rev—Feb. 15, 1902.
See also **RAILWAY MANAGEMENT.**

Broad Gauge.—See **BRUNEL.**

California-Utah.—See **Utah-California.**

Canada.—The Railways of Canada. Interesting statistics showing great progress. 1400 w. U S Cons Repts, No. 1001—April 3, 1901.

How Canada is Solving Her Transportation Problem. Lawrence J. Burfee. Describes the natural features of Canada, its numerous waterways, and the climatic conditions which lead to the population settling largely in the southern part; explains the recent rapid growth and development, showing the importance of transportation facilities, and giving an account of completed and proposed work. 4500 w. Pop Sci M—Sept., 1905.

A Government Railroad. Editorial on the present condition of the Intercolonial Railway of Canada, as stated by Mr. Emmerson, Minister of Railways and Canals. 2000 w. R R Gaz—Vol. XXXIX. No. 11.

See also **British Columbia; Great Lakes & Hudson Bay.**

Canada Great Northern.—The Construction of the Great Northern Railway of Canada, 1899-1900. J. M. Shanly. Interesting account of the undertaking with description of the work. 3 plates. 4800 w. Can Soc of Civ Engrs—Adv. proof—Feb., 1902.

Canada Transcontinental.—The Trans-Canada Railway. E. T. D. Chambers. A discussion of this projected line, the directness of the route, its military importance, high altitudes, &c. Map. 2000 w. Rev of Revs—April, 1903.

The Grand Trunk Pacific Railway. Map and information relating to a proposed transcontinental railway from Quebec to the Pacific Coast. 1300 w. Ry Age—May 22, 1903.

The New Canadian Transcontinental Railway. An account of this important railway project, with maps. 9800 w. Eng News—Oct. 22, 1903.

The New Canadian Transcontinental Railway. Extracts from a statement of the views of Sir Sandford Fleming on the subject of this new line. 1000 w. Eng News—Nov. 5, 1903.

Notes on Early Canadian Trans-Continental Railway Projects. Briefly reviews projects dating back nearly fifty years. 1800 w. Eng News—Jan. 21, 1904.

The Grand Trunk Pacific. A reprint, almost in full, of an article by W. L. Mackenzie King, in the "Quarterly Journal of Economics," which analyizes in detail the agreement made by the Canadian Government, and comments on the policy to be tried. 4500 w. R R Gaz—Vol. XXXVII, No. 24.

See also **RAILWAY LEGISLATION—Grand Trunk Pacific.**

Cape to Cairo.—The Cape-to-Cairo Railway. Information concerning railroad development in South Africa. 800 w. U S Cons Repts, No. 1393—July 16, 1902.

The Cape to Cairo Railway. An interesting account of the progress and present condition of this railway, the rolling stock, business, etc. Serial. 1st part. 1200 w. Engr, Lond—Aug. 1, 1902.

Recent Progress on the Cape-to-Cairo Railway. J. Hartley Knight. Well illustrated account of the present state of the main line and branches to the coast, with map. 4000 w. Engineering Magazine—Oct., 1905.

See also **Africa; South Africa.**

Car Heating.—See **CAR HEATING.**

Car Lighting.—See **CAR LIGHTING.**

Car Vibration.—See **CAR—Vibration; VEHICLE—Vibration.**

Castle Cary & Langport, Eng.—The Great Western Company's New Route to the West. Illustrated description of the route known as the Castle Cary and Langport Railway. 1800 w. Engr, Lond—Dec. 9, 1904.

Centrifugal.—See **CENTRIFUGAL RAILWAY.**

Chicago & Eastern Ill.—The New Chicago-St. Louis Line of the Chicago & Eastern Illinois Ry. Describes a new line opened for traffic Sept. 1, 1904. 2300 w. Eng News—April 6, 1905.

Chicago & Northwestern.—The Northwestern's New Line to Milwaukee. Map and description of a line under construction for relief of the existing lines of the Chicago & Northwestern. 1500 w. R R Gaz—Vol. XXXIX., No. 6.

Chicago, Burlington & Quincy.—The Old Monroe-Mexico Branch of the Burlington. An illustrated description of a cut-off, requiring only the construction of 63 miles of new line to shorten the distance between St. Louis and Kansis City. 2000 w. R R Gaz—Vol. XXXVII, No. 25.

Relocation of the Chicago, Burlington & Quincy in Western Iowa. An illustrated article, showing changes made to eliminate short radius curves and steep grades. 1300 w. Ry Age—March 20, 1903.

New Line of the Burlington in Iowa. An illustrated description of the work being done on the revision of the alignment of the tracks, especially describing the portion between Murray and Creston, Iowa. 1600 w. Ry Age—Nov. 22, 1901.

Chicago-Cincinnati.—A New Railway Between Chicago and Cincinnati. Illustrated description of a nearly completed line about 30 miles shorter than existing routes. 1600 w. Eng News—June 19, 1902.

Chicago, Rock Island & Pacific.—See **Rock Island.**

Chile.—See **Transandine.**

China.—The German Railway in Shantung, China. H. L. Geissel. Brief description of the line now in process of construction. 600 w. Eng News—Nov. 29, 1900.

The Eastern Terminus of the Chinese Eastern Railroad. Jasper Whiting. Information concerning the southern terminus of the Chinese Eastern (Manchurian) Railroad, at Dalnie, near Port Arthur. 2000 w. R R Gaz—May 10, 1901.

The China Railway Blue Book. Editorial discussion of railway affairs in China, and the attitude of Russia. 3200 w. Engng—Aug. 30, 1901.

Chinese Railway Development. An account of what has been accomplished in railway building. 1200 w. Transport—Oct. 3, 1902.

Railways in South China. An interesting account of some engineering experiences in the construction of the Yuen Han Ry. 2200 w. Wisconsin Engr—Dec., 1903.

The Railways of China. Arthur Judson Brown.

An illustrated account of roads built and under construction, the difficulties met, and related matters of interest. 3500 w. Rev of Revs—Feb., 1904.

The Location of the First Division of the Hankow-Canton Ry. Jesse W. Miller. An interesting account of this survey and information concerning the country and its inhabitants. 3000 w. Eng News—March 17, 1904.

Revised Regulations for Railway Construction in China. Translation of regulations in general. 8000 w. U S Cons Repts—April, 1904.

The Construction of the Lu Pao Section of the Lu-Han Railway. From a paper by T. J. Bourne presented to the Inst. of Civ. Engrs. Describes the construction of about 90 miles of this line. 2200 w. Eng Rec—July 23, 1904.

The Railways of Southern China (Eisenbahnen in Südchina). N. Post. A review of the development of railway construction in the vicinity of Canton, with maps. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 9, 1904.

Railway Construction in North China. Edward Hulme Rigby and William Orr Leitch, Jr. A description of the Chinchou-Yingkow section, 97 miles in length. Ills. 18,000 w. (No. 3509.) Inst of Civ Engrs.

Railway Construction in North China. E. H. Rigby and W. O. Leitch, Jr. Extract from a paper read before the Inst. of Civ. Engrs. Principally a description of the Chinchou-Yingkow section. with map. 4000 w. R R Gaz—Vol. XXXIX., No. 11.

Railroad Development in China. John Foord. Discusses the importance of Japan's victory over Russia in its effect upon China, and reviews the history of railroad building, and the present attitude of China toward the construction of railroads. Map. 4000 w. Ir Age—Nov. 23, 1905.

See also **Manchuria; MINING INDUSTRY; RAILWAY CONSTRUCTION; RAILWAY TRANSPORTATION—Russo-Japanese Military; TRANSPORTATION.**

Cincinnati Southern.—The Cincinnati Southern Ry. and Its Improvements. History, with general description of the original combination of this municipally owned line, its recent improvements, operation, equipment, &c. Ill. 6500 w. Eng News—Feb. 20, 1902.

Colombia.—Colombian Railway Concession to Americans. Report of a concession granted for the construction of a railroad connecting the capital, Medellin, with the lower reach of the Magdalena River and with the Department of the Cauca. 800 w. U S Cons Repts, No. 1772—Oct. 12, 1903.

Colorado Mountain.—A Unique Colorado Mountain Railway. An interesting description, with map, of this very remarkable railway which reaches an elevation of 10,000 feet. 1200 w. Ry Age—Aug. 18, 1905.

See also **Denver-Salt Lake.**

Congo.—Railways from the Upper Congo to the Great African Lakes (Chemins de Fer du Congo Supérieur aux Grands Lacs Africains). An account of a Belgian company formed to construct railways between the upper part of the Congo River and Lakes Albert Nyanza and Tanganyika, with extracts from the charter. 2000 w. Moniteur Industriel—Jan. 11, 1902.

See also **Africa.**

Connecticut.—See **ELECTRIC RAILWAY.**

Connell Ferry, Scotland.—The Connell Ferry and Ballachulish Railway. An account of a new railway in Scotland that will open a country of great beauty, as well as develop the resources of this region. 3000 w. Engr, Lond—Nov. 16, 1900.

Constable Report.—Some Notes Suggested by Colonel Constable's Report on American Railways. Colonel G. Boughey. A review of the report named. 3300 w. Transport—Jan. 17, 1902.

Cuba.—Railroads in Cuba. Editorial on the importance of railroad facilities for the island, and discussion of the legal situation, and the plan in progress. 900 w. R R Gaz—Jan. 25, 1901.

Cuban Railroads. From "The Economist." A review of existing railroads, their financial standing, &c. 1000 w. R R Gaz—Feb. 28, 1902.

Railroads in Cuba. Waldon Fawcett. An illustrated account of the existing and prospective lines. 1500 w. Sci Am—May 31, 1902.

The New Cuban Railroad. Waldon Fawcett. An illustrated account of the project now being carried out for the construction of a complete railroad system throughout the length of the island. 1200 w. Loc Engng—June, 1902.

The New Railroad System in Cuba. Illustrated description of the recently completed line between Santiago, on the east, and Santa Clara, in the centre of the island, with a through connection to Havana. 1600 w. R R Gaz—Nov. 28, 1902.

The Trunk Line Railway of Cuba Completed. An illustrated article describing the country and the construction of this railway. 1700 w. Ry Age—Jan. 9, 1903.

Railroad Development in Cuba. I. W. Davies. Map, illustrations and general information in regard to the recently completed trunk line. 1000 w. Sci Am—Jan. 24, 1903.

Opening of New Railroad in Cuba. I. W. Davies. An illustrated historical account of the road connecting Santa Clara with Santiago de Cuba, thus opening the whole island, and conferring great benefits. 1700 w. Gunton's Mag—March, 1903.

See also **RAILWAY LEGISLATION.**

Cyprus.—Cyprus Government Railway. Outlines the history of this island of the Mediterranean and gives a map and description of the railway under construction, with illustrations of the interesting features. 1800 w. Engr, Lond—Nov. 17, 1905.

Dalmatia.—See **Austro-Balkan.**

Danish.—See **TIRE—Locomotive Wear.**

Del., Lack. & Western.—Early History of the Delaware, Lackawanna & Western Railroad and Its Locomotives. Herbert T. Walker. This road is a consolidation of a number of short railroads, and it is proposed to take up each separately, showing the growth of the system from the smallest beginnings, and also the development of the locomotives. Ill. Serial. 1st part. 5200 w. R R Gaz—May 30, 1902.

Denver & Rio Grande.—Plans of the Western Pacific. An account from the annual report of the Denver & Rio Grande, of the financial and other plans embodied in the creation of the line from Salt Lake City to San Francisco. 1600 w. Ry Age—Sept. 15, 1905.

Denver, N. W. & Pacific.—The Denver, Northwestern & Pacific Road. Illustrated description of a line betwen Denver, Colo., and Salt Lake, Utah, recently completed as far as Arrowhead. 2200 w. R R Gaz—Vol. XXXVIII., No. 11.

Denver-Salt Lake.—Geology and Economics Along the Line of the New Moffat Railway to be Built from Denver to Salt Lake City. Prof. Arthur Lakes. Map and brief description of an interesting region both geologically and economically. 1500 w. Mines & Min—April, 1903.

A Feat in Railroad Building. Lawrence Lewis. An illustrated account of the "air line" from Denver to Salt Lake City, being built by D. H. Moffat, of Denver, Colo. It has 29 tunnels in 11 miles, with wonderful engineering work. 3400 w. World's Work—Nov., 1905.

See also **Colorado Mountain.**

Depew.—Address of Senator Chauncey M. Depew on Railroad Day at the Pan-American Exposition. Extracts relating to the number of men employed, the amounts paid in wages, for expenses, and for dividends, the change in rates, extent of service, and matters of interest. 2500 w. Ry & Engng Rev—Oct. 5, 1901.

Dutch East Indies.—Some Difficulties with the Railways of Java (En Zijne Bemoeilingen met de Spoorwegen op Java). J. P. de Bordes. A review of the work upon the railway of Java and the difficulties encountered in their construction by the late chief engineer. 10,000 w. Tidschr v h Kijk Inst van Ing—Feb. 9, 1901.

Increase in Capacity of the Mountain Railways in the Dutch East Indies (Verhooging van de Capaciteit van Bergspoorwegen in Nederlandsch-Indië). A. Snethlage. With map of the road between Buitenzorg and Bandong, and data of the traffic. 4000 w. De Ingenieur—Aug. 3, 1901.

Railways and Steam Tramways of the Dutch East Indies. A report on the railways of Java and Sumatra by J. W. Post, formerly engineer of the State Railways of the Dutch East Indies. 3000 w. Engr, Lond—Dec. 27, 1901.

The Railways of the Dutch East Indies (Les

Chemins de Fer aux Indes Nerlandaises). Auguste Moreau. A comprehensive account of the railways and tramways of Java, Madura and Sumatra and their construction and operation. Maps. 9000 w. Mem d l Soc d Ing Civils de France—Dec., 1901.

Railways in Southern Sumatra (Spoorwegen in Zuid-Sumatra). J. L. Cluysenaer. With map showing the connections, and some account of the traffic; the entire system includes 1,355 kilometres of track. 7500 w. De Ingenieur—Dec. 17, 1904.

Economics.—See **RAILWAY FINANCE; RAILWAY TRAFFIC; RAILWAY TRANSPORTATION; TRANSPORTATION—London.**

Ecuador.—Railway Development in Ecuador. An account of very important work of railway extension now being carried to completion. 1300 w. Transport—May 10, 1901.

The Guayaquil & Quito Railway of Ecuador. An illustrated historical account of this interesting piece of railway construction, with information concerning elevation and the character and number of bridge structures. 1500 w. Ry Age—Aug. 8, 1902.

Some Features of the Guayaquil and Quito Railway, Ecuador. William D. Beatty. An illustrated article describing the construction of this railway in equatorial regions, the country, labor available, etc. 4000 w. Pro Engrs' Club of Phila—Jan., 1901.

The Guayaquil & Quito Ry., in Ecuador, South America. John A. Harman. Illustrated description of the construction of a railway from the seacoast to the Andean plateau through very difficult country. 3500 w. 1 plate. Eng News—Aug. 11, 1904.

Egypt.—Egyptian Railway Administration Works at Cairo. An illustrated detailed description of the works and their equipment. 5300 w. Ry & Engng Rev—Aug. 6, 1904.

See also **Africa; Cape to Cairo; Suakim; Sudan.**

Electric Competition.—See **ELECTRIC RAILWAY—Connecticut; Massachusetts; Steam Competition.**

Electric Traction.—See **ELECTRIC RAILWAY.**

Electric vs. Steam.—See **ELECTRIC RAILWAY—Steam Compared.**

Engadine.—See **Albula, Switzerland.**

Estimates.—See **RAILWAY CONSTRUCTION.**

Europe.—Some Observations on European Railways. Tipton S. Blish. Descriptive of rolling stock, and customs. 2000 w. St Louis Ry Club—Feb. 14, 1902.

European Railway Notes. Angus Sinclair. Principally discussing customs in Great Britain. 1800 w. Loc Engng—Sept., 1902.

See also **LOCOMOTIVE.**

European Tunnels.—See **TUNNEL—Alpine.**

Europe-Pacific.—New Railway Between Europe and the Pacific. Dr. Convall Spatsier. Summary of an article in the Austrian magazine, "Die Reform." Favors the construction of a new line to compete with the Russian line, showing the advantages. Map. 2000 w. Bul Int Ry Cong—Jan., 1904.

Fencing.—See **RAILWAY FENCING.**

Field Columbian Museum.—See **LOCOMOTIVE—History.**

Fire Risks.—See **FIRE HAZARD—Railways.**

Florida Everglades—See **RAILWAY LOCATION.**

Florida Keys.—Steamboat Travels Over Proposed Site for Railroad to Key West. Russell B. Smith, in the "N. Y. Herald." An account of a trip which gives some idea of this great undertaking. 1000 w. Naut Gaz—Aug. 31, 1905.

The Florida East Coast Extension to Key West. An illustrated account of this projected extension, now under construction, which will afford greatly improved facilities for communication between Cuba and the mainland. 1000 w. R R Gaz—Vol. XXXIX., No. 14.

France.—The Railway Situation in France. L. J. Carlier. Describes briefly the system of operation by companies under franchise, indicating how the companies are constituted, their relations with the state, and their prerogatives in commercial affairs. 2500 w. Ry Age—April 28, 1905.

France Eastern.—The Railway from Toul to Pont Saint-Vincent (Ligne de Toul à Pont Saint-Vincent). M. Descubes. A general description of the construction of a new branch line of the Eastern Railway of France. Serial. Part I. 7500 w. 1 plate. Rev Gen des Chem de Fer—May, 1901.

See also **RAILWAY EXHIBITION—Paris.**

Genoa Connections.—New Connections to the Harbor of Génoa (Neue Abfuhrlinien des Hafens von Genua). E. Bavier. A discussion of the existing railway connections between Switzerland and Northern Italy and the port of Genoa, with suggestions for their extension. Three articles. 4000 w. Schweis Bauzeitung—Sept. 26, Oct. 3, 10, 1903.

The Proposition for a New Apennine Railway from Genoa to Tortona (Die Erstellung einer Neuen Apenninbahn von Genua nach Tortona). E. Bavier. With profile and plan of the route, which includes a tunnel 20 kilometres in length at Rigorobo. Two articles. 4000 w. Schweis Bauzeitung—Sept. 17, 24, 1904.

The Proposed New Railway Lines for the Development of the Port of Genoa, Italy. Charles R. King. Describes existing lines and the new projects for providing easier and cheaper transit inland. Ills. 2000 w. Eng News—March 24, 1904.

Gerardmer-Honeck.—See **LIGHT RAILWAY.**

German Union.—Recent Technical Progress on the Railways Belonging to the German Railway Union. Translated from "Zeitung des Vereins." A summary of the important conclusions in the report of the Technical Committee. 7500 w. Bul Int Ry Cong—March, 1904.

Government Ownership.—Government Ownership of Railroads. Hon. Martin A. Knapp. Extracts from an article in the "Annals of the American Academy, &c." Outlines some of the arguments for and against the public ownership of railroads. 3000 w. Ry & Engng Rev—Feb. 15, 1902.

Should the Government Own or Control the Railroads? E. C. Nettels. Also, E. Wentworth. Two papers discussing this subject, especially in its bearing on American conditions. 7000 w. Pro Iowa Ry Club—June 16, 1903.

See also **British; Ownership; Prussia; GOVERNMENT OWNERSHIP; RAILWAY MANAGEMENT; TRUST.**

"Gradient."—See **GRADIENT RAILWAY.**

Grand Trunk Pacific.—See **Canada, Transcontinental; RAILWAY LEGISLATION.**

Great Lakes & Hudson Bay.—Great Lakes & Hudson Bay Railway. An account of the line under construction, starting at Sault Ste. Marie, and expected to require three years to complete. 500 w. U S Cons Repts, No. 902—Dec. 4, 1900.

Great Salt Lake.—See **Salt Lake.**

Great Western, England.—See **BRUNEL.**

Great Western & Great Central.—The Great Western and Great Central New Railways. Describes new lines in England, giving a description of the construction, the difficulties and information of interest. Ills. 3000 w. Engr, Lond—May 27, 1904.

Greece.—Railway Construction in Greece. H. L. Geissel. Describes proposed extensions delayed by the South African War. 700 w. Eng News—Jan. 10, 1901.

Railway Project in Greece. Information concerning the organization of the Piraeus-Larissa R. R. Co. Gives particulars of this important project. 800 w. U S Cons Repts, No. 1318—April 17, 1902.

The Transhellenic Railway (Le Chemin de Fer Transhellénique). A discussion of the proposed railway connecting central Europe with the Piraeus, and giving a closer connection with Port Said than the present route via Brindisi; with maps. 2000 w. Génie Civil—March 26, 1904.

Guatemala.—Guatemalan Railway Contract. Translation of a contract between the Government of Guatemala and the Central American Improvement Company, summarizing the principal articles. 900 w. U S Cons Repts, No. 940—Jan. 21, 1901.

See also **RAILWAY CONSTRUCTION.**

Halford Gradient.—See **GRADIENT RAILWAY.**

Herzegovina.—See **Austro-Balkan.**

High-Speed.—High-Speed Railways (Ueber Eisenbahn-Schnellverkehr). Ludwig Ritter vs. Stockert. An illustrated paper giving a general discussion of high-speed railways, including steam, electric, suspended, etc. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 14, 1902.

See also ELECTRIC RAILWAY; LOCOMOTIVE; LOCOMOTIVE PERFORMANCE; TRAIN, FAST.

Hill Address.—See **RAILWAY ECONOMICS; TRUST—Railway.**

History.—See **Hudson River; Ireland; Midland; Missouri; Missouri Pacific; New Jersey; N. Y., N. H. & H.; Northeastern, Eng.; Pennsylvania; Plymouth & Dartmouth; Quincy Granite Road; Russia; Siberia; Stratford-Moreton; Wooden; LIGHT RAILWAY, Austria; LOCOMOTIVE; MAIL TRANSPORTATION; RAILWAY INVENTION; WAGONWAY.**

History, United States.—Development of Transportation in the United States. Angus Sinclair. Extracts from paper prepared for the Year Book of the Agricultural Department of the United States. A review of the early history of railroading and locomotive building. Ill. 3500 w. Loc Engng—Jan., 1902.

Hudson River.—The Hudson River Railroad. Herbert T. Walker. Reviews the interesting early history of this road, and gives an illustrated description of the "Croton," one of the early locomotives. 1500 w. R R Gaz—Feb. 15, 1901.

India.—The Shortening of the Main Routes in India. Stafford Ransome. Concerning changes to be made on the Calcutta and Bombay route. Ill. 500 w. Engr, Lond—Aug. 16, 1901.

Railways in India. Information concerning the present condition, the volume of traffic during the last two years, working expenses, and net earnings. 1000 w. U S Cons Repts, No. 1525—Dec. 20, 1902.

Indian Railways. Reviews the report of Mr. Thos. Robertson, appointed as a special commissioner to inquire into the working of the system. 1600 w. Engr, Lond—June 12, 1903.

Railways in British India. Information of interest relating to the railways of India. Serial. 1st part. 2500 w. Ry Age—Oct. 7, 1904.

India Famines.—Railways and Famine. Horace Bell. Questions whether railways, making accessible foreign markets, do not lead to too large exportation of products in time of plenty, and so in some measure cause famines. Considers conditions in India, but applicable to other countries. Discussion. 12,000 w. Jour Soc of Arts—March 15, 1901.

Inspection.—See **CAR—Inspection; INSPECTION; SAFETY APPLIANCE.**

Ireland.—Some Early Irish Railroads. W. B. Paley. Brief historical review. 1500 w. R R Gaz—Sept. 11, 1903.

See also **Belfast; RAILWAY CONSTRUCTION.**

Iron Industry.—See **IRON INDUSTRY—Railway Influence.**

Italy.—Convention of the Provincial Administration of Milan, etc. (Convenzioni Stipulate coll' Amministrazione Provinciale di Milano, etc.). A report of the discussion of the joint convention of the provinces of Milan, Turin, and the Italian Mediterranean railways. Two articles. 4000 w. Riv Gen delle Ferrovie—Jan. 5, 12, 1902.

See also **Genoa Connections.**

Japan.—Railways in Japan. Information concerning the railway situation at the end of 1899. 600 w. U S Cons Repts, No. 1057—June 8, 1901.

Progress of Japanese Railway Enterprise. Reviews briefly Japanese railway affairs. 1000 w. U S Cons Repts, No. 1512—Dec. 5, 1902.

Japanese Railways. A. R. Bell. An illustrated article giving information of interest in regard to the railway development and service. 2000 w. Ry & Loc Engng—April, 1905.

Railroad Development in Japan. George E. Walsh. An account of present development and future outlook which seem to indicate a great awakening. 1500 w. R R Gaz—Vol. XXXIX., No. 23.

See also **RAILWAY TRANSPORTATION—Russo-Japanese, Military.**

Java.—See **Dutch East Indies.**

Kansas City-Mexico.—Kansas City, Mexico & Orient Railway. Albert Phenis. An illustrated account of Arthur E. Stilwell's project connecting the southwest and Mexico's Pacific coast, what has already been accomplished, and the advantages of the route. 2200 w. Mfrs Rec—Nov. 13, 1902.

The Kansas City, Mexico & Orient Ry. Brief account, with map, of a line 1600 miles long, with provision for steamship connections to Oriental and South American ports. 1200 w. Eng News—Jan. 8, 1903.

The Kansas City, Mexico & Orient Railway Enterprise. Map and description of new line that will connect at Port Stilwell with steamships for the Orient. 3800 w. Ry Age—March 20, 1903.

Kenton and Coxlodge.—See **WAGONWAY.**

Korea.—New Korean Railway. A statement extracted from the "Japan Daily Mail," concerning the proposed Seoul-Fusan Railway, which is now being surveyed. 1000 w. U S Cons Repts, No. 1096—July 25, 1901.

Opening Korea by Rail. Homer B. Hulbert. An illustrated account of the building of the Seoul-Fusan line, and the difficulties encountered. 3000 w. World's Work—Nov., 1905.

Kumasi, Africa.—The Kumasi Railway. Information and illustrations of this road under construction. 800 w. Engng—May 31, 1901.

Lagos, Africa.—Lagos Government Railway. The terminal station is located on Iddo Island, and the connection with the main land and Lagos is made by bridges. Particulars of the Carter bridge, which is over 2200-ft. in length, are given. Ill. 2200 w. Engr, Lond—June 28, 1901.

Lake Michigan & Danville.—Recent Work on the Indiana Harbor R. R. Begins an illustrated detailed description of the construction of an extension from Lake Michigan to Danville, Ill. Serial. 1st part. 3500 w. Eng Rec—Sept. 30, 1905.

Lapland.—See **Norway.**

Latin-American Stability.—The Influence of Railroads on Latin-American Stability. Edward P. North. Historical review showing the influence of frequent intercommunication brought about by railroads, and the tendency to develop stable governments. 1500 w. R R Gaz—March 4, 1904.

Lemmer-Jaure, Friesland.—See **STEAM TRAMWAY.**

Light.—See **ELECTRIC RAILWAY; LIGHT RAILWAY.**

Liskeard and Looe, Cornwall.—The Liskeard and Looe Railway. An account of a line just opened, joining this line with the Great Western Railway. 1200 w. Transport—June 7, 1901.

Los Angeles & Salt Lake.—See **Salt Lake-Los Angeles.**

Lötschberg, Switzerland.—The Lötschberg Railway (Die Lötschbergbahn). An account of the topography and route of the proposed railway and tunnel, over the Lötschberg, Switzerland. The tunnel will be 8 1-2 miles long. Serial. Part I. 2000 w. Schweizerische Bauzeitung—Aug. 9, 1902.

See also **Simplon Connections; Switzerland.**

London.—An Early London Railway. Gives the history of a short line on which the atmospheric system was given a trial in 1837, but proved a failure. The line was opened for traffic in 1844 and its various experiences are narrated. 2800 w. Engr, Lond—Dec. 27, 1901.

See also **ELECTRIC RAILWAY; TRANSPORTATION; UNDERGROUND RAILWAY.**

Louisville & Nashville.—See **RAILWAY LOCATION—Knoxville.**

Lubrication.—See **LUBRICATION.**

Lucin Cut-Off.—See **Salt Lake.**

Madagascar.—See **ROAD.**

Madeira River, Brazil.—See **Brazil.**

"Madison Incline," Ind.—See **LOCOMOTIVE.**

Manchuria.—The Chinese Eastern (Manchurian) Railway. Alfred Stead. An illustrated description of the Manchurian railway based upon notes personally made during a tour of inspection. 2300 w. Page's Mag—July, 1903.

The Eastern Railway of China (Die Chinesische Ostbahn), with map of the Manchurian Section of the Trans-Siberian Railway, showing its branches and the development of the country traversed. 1000 w. Glasers Annalen—April 15, 1904.

See also **HARBOR—Port Arthur.**

Marine.—See **MARINE RAILWAY.**

Mendel, Tyrol.—See **MOUNTAIN RAILWAY.**

Mexico.—Railroad Building in Mexico. A review of roads building or under contract showing activity. 1800 w. R R Gaz—Nov. 9, 1900.

The Mexican Railroad System. Victor M. Braschi. Gives a historical summary of the railroads, their present condition, and a description of a railroad journey on lines of the Mexican railways. 6400 w. Trans Am Inst of Min Engrs—Nov., 1901.

Mexican Railroads for Mine Development. George E. Walsh. An interesting article showing the intimate connection between the railroads and the mining industries, which are being rapidly developed. 2400 w. Ry Age—June 23, 1905.

Mexico-Orient.—See **Kansas City-Mexico.**

Midland, Eng.—The Diamond Jubilee of the Midland Railway. A condensed review of the history of this English railway. 1600 w. Engr, Lond—May 20, 1904.

Diamond Jubilee of the Midland Railway. W. B. Paley. A brief review of the history. 2300 w. R R Gaz—June 3, 1904.

Missouri.—Early History of Railroads in Missouri. W. J. Thornton. A general review of railroad development in the United States, and detailed history of the roads in the state named. 6800 w. St Louis Ry Club—Feb. 13, 1903.

Missouri, Oklahoma & Gulf.—The Missouri, Oklahoma & Gulf Railway. Illustrates and describes a road under construction, discussing its traffic possibilities, ownership of real estate and the changed conditions, &c. 2400 w. Ry Age—Dec. 15, 1905.

Missouri Pacific.—The Growth of the Missouri Pacific. Reviews the history of this road and its development. Serial. 1st part. 2000 w. R R Gaz—July 29, 1904.

Morenci, Southern.—The Morenci Southern Ry.—A Line With Five Loops. Brief illustrated description of a railway 18 miles long between Guthrie and Morenci, Arizona. 800 w. Ry & Engng Rev—April 26, 1902.

Moffat, Colorado. — See **Colorado Mountain; Denver—Salt Lake.**

Motor Car.—See **CAR, MOTOR-DRIVEN.**

Mountain.—See **Alamogordo; Colorado; Mt. Tamalpais; Switzerland; MOUNTAIN RAILWAY; RAILWAY CONSTRUCTION.**

Mt. Tamalpais, Cal.—Remarkable Engineering Feats in Railroad Work. Charles F. Holder. Brief illustrated description of the road at Mt. Tamalpais, north of San Francisco, and the bridge across Cañon Diablo. 700 w. Sci Am—Aug. 30, 1902.

Narrow Gauge.—See **LIGHT RAILWAY; LOCOMOTIVE; MOUNTAIN RAILWAY.**

Narrow Gauge Compared.—Narrow Gauge Railways (Ueber Schmalspurbahnen). H. Schwabe. An examination of the relative construction and operation costs of standard and narrow-gauge railways, with especial reference to lines in the German African colonies. 3500 w. Glasers Annalen—March 15, 1905.

Narrow-Gauge History.—See **LIGHT RAILWAY—Austria.**

Natal.—The Growing Railway System of Natal. J. Hartley Knight. An interview with the general manager, Sir David Hunter, showing the development of the system; with many illustrations. 4000 w. Engineering Magazine—Nov. 1, 1902.

The Railways of Natal. J. F. Gairns. Illustrated description of their characteristics, trains and train service, traffic, etc. 6000 w. Cassier's Mag—Dec., 1904.

See also **Africa; South Africa.**

New Jersey History.—New Jersey Had the First Railroad Charter in the World. An account of an act passed in the New Jersey legislature, Feb. 6, 1815, creating a company to erect a railroad from the River Delaware to the River Raritan. The road was never built. 1600 w. Ry & Loc Engng—Aug., 1905.

New South Wales.—New South Wales Railways. Editorial review of the report of the Commissioners for the year ending in June, 1905, which shows an increase in nearly every department of traffic. 2000 w. Engng—Oct. 20, 1905.

Early Railway Construction in New South Wales. Joseph Brady. Brief account of work from 1850 to 1857. 1800 w. (No. 3467.) Inst of Civ Engrs.

N. Y., N. H. & H.—The Upbuilding of a Railroad System. Clarence Deming. Begins an interesting review of the history of the New York, New Haven and Hartford Railroad. Serial. 1st part. 5500 w. R R Gaz—April 29, 1904.

New Zealand.—New Zealand Government Railways. Information from the railways statement for the year ending March 31, 1902, with map. Serial. 1st part. 1200 w. Transport—Sept. 19, 1902.

New Zealand Railways. Editorial review of the annual report of these railways. 1800 w. Engng—Oct. 2, 1903.

Nicaragua.—Railway Contract in Nicaragua. Summary of the contract to construct a railroad from Managua to La Paz. 1000 w. U S Cons Repts, No. 928—Jan. 7, 1901.

The Central Railway of Nicaragua. Emil Mueller. Map, with brief description of the new division connecting the previously built railways, thus making a continuous line from Corinto, on the Pacific, to Granada, on Lake Nicaragua. 700 w. Eng News—Feb. 12, 1903.

Nile-Red Sea.—See **Egypt; Suakim-Berber.**

Nineteenth Century.—The World's Railways in the Nineteenth Century (Die Eisenbahnen der Erde im 19. Jahrhundert). Abstracted from the "Archiv für Eisenbahnwesen." A historical and statistical review of the railways of the world, with tables. 2500 w. Stahl u Eisen—July 15, 1902.

Norfolk & Western.—The Norfolk & Western Railroad. George L. Fowler. The present physical condition and its operation is discussed in the present article. Serial. 1st part. 3000 w. Ill. R R Gaz—July 3, 1903.

North-Eastern, Eng.—The New Seaham and Hartlepool Line. Brief illustrated description of a line 9 1-2 miles in length, which gives much easier gradients, and opens a new coal field. An important addition to the North-Eastern Railway System of England. 2200 w. Transport—April 3, 1903.

Jubilee on the Northeastern Railway. W. B. Paley. Outlines the history of this English road which has just completed its first half century. 2000 w. R R Gaz—Vol. XXXVII. No. 12.

Norway.—Notes on Norwegian Railways. From an article by W. E. Curtis, in the "Chicago Record-Herald." Information concerning the government railroads in a country where many difficulties must be overcome. 1300 w. Ry & Engng Rev—Aug. 31, 1901.

The Northernmost Railway in the World (Die Nördlichste Eisenbahn der Erde). H. Claus. A description, with maps, of the railway from the iron-ore deposits of Gellivara to Narvik on the Ofoten-Fiord. 2000 w. Glasers Annalen—Dec. 1, 1903.

The Northernmost Railway of the Earth (Die Nördlichste Eisenbahn der Erde). F. Thiess. An account of the railway from Lulea to Narvik, opening up the iron ore deposits of northern Sweden, and its proposed connection with the railway system of Finland. 2000 w. Glasers Annalen—Sept. 15, 1904.

Oklahoma.—The Eastern Oklahoma Railway Line and Bridges. F. R. Patten. An illustrated description of the line and its construction. 3500 w. Ry Age—June 17, 1904.

Orenburg-Tashkent.—See **Asia; Russia-Asia.**

Oroya.—See **Peru.**

Ownership.—See **Government Ownership; RAILWAY FINANCE; RAILWAY MANAGEMENT.**

Panama.—The Panama Railroad. E. W. Gregory. An illustrated article describing this railroad. 1000 w. Loc Engng—April, 1902.

The Panama Railroad. Reviews the history of this road, giving report of the earnings of the last year, and remarks on its relation to the isthmian canal project. 1500 w. Engr, Lond—Oct. 10, 1902.

Maintenance of Way on the Panama Railroad. Track, water tank with posts imbedded in concrete, and other features, with profile of road and illustrations. 1200 w. Ry Age—Aug. 19, 1904.

Panama Jubilee.—Jubilee of the First Inter-Oceanic Railway. An interesting review of the building of the Panama Railway, completed in 1855. 2000 w. Engr, Lond—June 9, 1905.

Paris-Lyons.—Some Notes on the Paris, Lyons and Mediterranean Railroad. General description, some of the locomotives and their performances, etc. 2200 w. R R Gaz—Dec. 12, 1902.

Paris-Versailles.—The New Railway from Paris to Versailles (Novelle Ligne de Paris à Versailles). A. Dumas. With map and profile of the road, and many views of stations and bridges on the section from Issy-les-Moulineaux to Meudon-Val-Fleury. 4000 w. 1 plate. Génie Civil—July 6, 1901.

The New Line from Paris to Versailles (Nouvelle Ligne de Paris à Versailles). A. Dumas. A description of this new section of the Western Railway of France, with especial reference to the construction of the Meudon tunnel. 4000 w. 1 plate. Génie Civil—June 7, 1902.

See also ELECTRIC RAILWAY.

Parry Address.—See LABOR.

Pennsylvania.—The Beginnings of Railroading in Pennsylvania. From notes by Col. A. K. McClure, in the "Philadelphia Press." Interesting facts from the early history of railroading. 2500 w. R R Gaz—April 8, 1904.

See also RAILWAY CONSTRUCTION; RAILWAY FINANCE.

Persian Gulf.—The Persian Gulf Railway. A brief account of the alternative routes from the Syrian coast to the Persian Gulf which have been from time to time put forward, and their engineering merits and demerits. Route from Alexandretta to Bagdad is described in this part. Map. Serial. 1st part. 2400 w. Engng—June 6, 1902. See also Bagdad.

Peru.—The Famous Oroya Railroad of Peru, Which Climbs Higher Than Any Other on the Globe. E. C. Rost. A brief account of a road which is at one point 15,665 ft. above the starting point. Ill. 1300 w. Sci Am—July 12, 1902.

Railway Projects in Peru. An account of a proposed railway by American capitalists to connect the two oceans, crossing the Andes at their lowest point, and reaching navigable waters emptying into the Amazon. 900 w. U S Cons Repts, No. 1499—Nov. 19, 1902.

Railway Construction in Peru. Copy of an important project submitted to Congress. 1000 w. U S Cons Repts—April, 1904.

Railway Development in Peru. C. Reginald Enock. A brief account of extensions which will be of great advantage to the country. 1000 w. Eng News—May 4, 1905.

See PERU.

Philippines.—Railroad-Building as a Mode of Warfare. John McAuley Palmer. Considers the civilizing effect of railroads as an argument for using a system of insular railways in the Philippines. 3200 w. N Am Rev—Dec., 1902.

Proposed Railways for the Philippines. Map, with description of the routes of railways surveyed on the island of Luzon. 4000 w. Ry Age—Nov. 13, 1903.

Railroads in the Philippines. An account of the improvements and new lines recommended by United States engineers. 1200 w. R R Gaz—Nov. 27, 1903.

See also MILITARY ENGINEERING.

Pittsburg, Bessemer & Lake Erie.—The Bessemer Heavy Traffic Freight Route. Gives a profile of the Pittsburg, Bessemer & Lake Erie, also speed diagram, with an account of the method of operation and the economical effect. 2800 w. R R Gaz—Dec. 21, 1900.

A Novel Ore-Carrying Railroad. Waldon Fawcett. Notes on the interesting features of the Pittsburg, Bessemer & Lake Erie Railroad. 1100 w. Sci Am—July 27, 1901.

Plymouth and Dartmouth, Eng.—The Oldest Railroad Company in the World. W. B. Paley. An account of the Plymouth and Dartmouth Railway, England, incorporated on July 2, 1819. 1600 w. R R Gaz—Dec. 19, 1902.

Progress.—Notes on Railway Progress (Mittheilungen über Fortschritte auf Einigen Gebieten im Eisenbahnwesen). H. Diesel. A comparison of early and modern railway carriages, track, etc. Serial. Part I. Glasers Annalen—Nov. 1, 1901.

Prussia.—The Development of the Prussian Railway System (Die Entwicklung des Preussischen Eisenbahnwesens). An abstract of an interesting debate in the Prussian House of Deputies on the management and equipment of the state railways, and also interviews with prominent technical men on the same subject. 9000 w. Zeitschr d Ver Deutscher Ing—April 13, 1901.

The Development of the Railways of Prussia from 1890 to 1900 (Die Entwickelung des Eisenbahnwesens in Preussen 1890 bis 1900). Statistical data from the report of the Department of Public Works. 1800 w. Glückauf—May 18, 1901.

The Administration of the Railway Service for the Year 1904 (Etat der Eisenbahn-Verwaltung für das Etatsjahr 1904). The official establishment of the Prussian railway system for 1904; tabulating the officials, expenditures and general outline of work for the year. Three articles. 10,000 w. Glasers Annalen—Feb. 15, March 1, 15, 1904.

Pyrenean.—Trans-Pyrenean Railways. Outlines schemes for constructing three lines, two of which will include long international tunnels. Map. 700 w. Engng—Sept. 9, 1904.

Quincy Granite Road.—The Quincy Granite Road. S. Harry Ferris, in "Four Track News." Information of the road, three miles long, built to convey the granite for the Bunker Hill monument, and said to be the first American railroad. Ills. 1100 w. Ry & Loc Engng—Aug., 1905.

Reading.—See NAVIGATION—Susquehanna.

Reservoir, Boston Waterworks.—See RESERVOIR—Boston Waterworks.

Rhaetikon.—See Albula; RAILWAY CONSTRUCTION—Switzerland.

Rhodesia.—See Africa; Cape to Cairo; South Africa.

Rock Island.—Rock Island Company. An outline of the various lines composing this system with information from recent reports concerning the operation, earnings, &c. 2800 w. R R Gaz—Vol. XXXIX., No. 22.

Ruhr, Germany.—The Development of Railways in the Ruhr District from 1840 to the Present (Entwicklung der Eisenbahnen im Ruhr-Industriegebiet Während der Zeit von 1840 bis Jetzt). L. Koch. With tables and diagrams showing the growth of the railway systems of the iron and steel district of Germany. 4000 w. Glasers Annalen—Dec. 1, 1904.

Russia.—Railroads in Russia. Interesting information of the roads furnishing direct connection between St. Petersburg and Port Arthur. 1300 w. U S Cons Rept, No. 1218—Dec. 3, 1901.

Russia's Oldest Main Railroad. An account of the Nicolas line, which has just passed its fiftieth anniversary. 1300 w. Engr, Lond—Dec. 6, 1901.

Russian Railway Building in 1904 (Russlands Eisenbahnbauten im 1904). Brief tabulated statement of the amount to be expended and its distribution. 800 w. Glasers Annalen—Feb. 15, 1904.

See also Asia; Russia-Asia; Siberia.

Russia-Asia.—Russia and America in the Near East. Alexander Hume Ford. Discusses railroad building for commercial purposes, and other measures for securing trade. 4000 w. Ir Age—March 20, 1902.

The Connection of the Central Railway of Asia with the European Russian System (Die Verbindung der Mittel-Asiatischen Eisenbahn mit dem Russisch-Europäischen Eisenbahnnets). An account of the new line to connect Tashkent and Orenburg and unite the Trans-Caspian system with Europe. 1000 w. Glasers Annalen—June 1, 1902.

The Railways of Central Asia (Die Mittelasiatische Eisenbahn). P. Romanow. A general description of Russian railway developments between the Caspian Sea and the frontiers of Afghanistan, India and China; with map. 5000 w. Zeitschr d Ver Deutscher Ing—Feb. 13, 1904.

Russia's New Great Railroad in Asia. From the London "Times." An account of the Orenburg-Tashkent Railway, with information of interest in regard to the country traversed. 2000 w. Sci Am Sup—Dec. 3, 1904.

See also Asia.

Russia-Siberia.—The Connection of the Russian Railway System with the Siberian Railway (Die Verbindungslinie des Russischen Schiennetzes mit der Sibirischen Eisenbahn). F. Theiss. A description of the Samara-Slatoust Railway, connecting the railways of European Russia with Asia. 2000 w. Glasers Annalen—Sept. 1, 1901.

Rutland-Canadian.—The Rutland-Canadian Railway and Its Structures. John W. Burke. Illustrated description of this section of the Rutland R. R., its bridges, culverts, lake embankments, etc. 2800 w. Eng News—Jan. 15, 1903.

Safety Appliance.—See **CAR COUPLER; INTERLOCKING; RAILWAY ACCIDENT; RAILWAY SAFETY APPLIANCE; RAILWAY SIGNAL; RAILWAY SWITCH; SAFETY APPLIANCE.**

St. Petersburg.—The Projected Metropolitan Railway for St. Petersburg. A summary of the project taken from the "Gazette du Commerce et de l'Industrie." It is proposed to construct a "Ring Railway," and also several lines in different quarters, with a large union station as a general junction. 1100 w. Engr, Lond—March 15, 1901.

Salt Lake.—A Railroad Through Great Salt Lake. Kenneth C. Kerr. An illustrated account of a proposed change on the Southern Pacific, building a line across the lake from Ogden to Lucin, thus eliminating long, expensive grades, and reducing the distance and curvature. 1200 w. Ry Age (Spe. No.)—March 15, 1901.

The Railroad Through Salt Lake. Illustrations and description of novel methods used in the construction of the Ogden-Lucin cut-off of the Southern Pacific. The present article deals with the construction in shallow water. 1800 w. Ry Age—Aug. 15, 1902.

Ogden-Lucin Cut-Off—Central Pacific Ry. An account of progress of this work, which crosses the Great Salt Lake, and the interesting methods of construction. Ill. 2000 w. R R Gaz—Oct. 24, 1902.

Ogden and Lucin Railway Cut-Off. Don Maguire. An account of the inception of this work and a short descriptive sketch of the cut-off construction, with illustrations. 2500 w. Min & Sci Pr—Nov. 8, 1902.

Driving Last Spike on the Ogden-Lucin Cut-Off. An illustrated account of the completion of this great engineering work, with facts concerning it. Map. 2000 w. Ry Age—Dec. 11, 1903.

Construction Work on the Southern Pacific Cut-Off Across the Great Salt Lake, Utah. C. W. Arthur. An account of this interesting work, the difficulties met in the construction, etc. Ill. 1500 w. Eng News—Nov. 27, 1902.

Railroading Across Great Salt Lake. Herbert I. Bennett. An illustrated article on the Ogden-Lucin cut-off on the Central Pacific division of the Southern Pacific. The most noteworthy achievement in bridge-and-fill work ever accomplished. 1500 w. Sci Am Sup—May 21, 1904.

Salt Lake-Los Angeles.—Railroads Between Los Angeles and Salt Lake City. An account of two lines claiming the same right of way, giving an outline of the history of the contest. 1200 w. R R Gaz—April 26, 1901.

The Struggle for the Line from Salt Lake to Los Angeles and San Diego. An account of the progress of work on these contested lines from Utah to Southern California, and the injunction which has interrupted the building. Map. 2200 w. R R Gaz—Sept. 13, 1901.

Permanent Way and Structures of the San Pedro, Los Angeles & Salt Lake. General description, with illustrations of stations, viaduct, etc. 600 w. R R Gaz—Vol. XXXVII., No. 9.

San Pedro, Los Angeles & Salt Lake Railroad. An illustrated account describing the new line from Salt Lake to the Pacific, including new and reconstructed lines. 3000 w. Ry Age—Feb. 10, 1905.

The San Pedro, Los Angeles & Salt Lake Ry. Reviews the history of the undertaking, recently completed, and gives information concerning the road. Map and cross-sections are given. 1500 w. Eng News—June 22, 1905.

San Pedro.—See **Salt Lake-Los Angeles.**

Ship.—See **MARINE RAILWAY; SHIP RAILWAY.**

Siam.—The Railroads of Siam. An illustrated account of the roads, their construction and importance. 1200 w. Ry Age—April 12, 1901.

Railways in Siam. Gives briefly the history of railroads in this country, and their present condition. 1400 w. U S Cons Repts, No. 1272—Feb. 21, 1902.

Siamese Railway Tenders. Gives copies of specifications and conditions for tender on rolling stock and accessories for the royal Siamese state railways. 2800 w. U S Cons Reports—June, 1904.

Siberia.—Siberian Competition. An editorial discussion of Siberian conditions, with extracts from a series of articles by Dr. Kurt Widenfeld, in the "Archiv. für Eisenbahnwessen." 2000 w. R R Gaz—Nov. 2, 1900.

The Trans-Siberian Railway (Le Chemin-de-Fer Trans-Siberien). G. dé Krivochapkine. Especially devoted to the economic influence of the railway upon the mineral industries of Siberia and upon international commerce. Two articles. 6000 w. Génie Civil—Dec. 15, 22, 1900.

Historical Account of the Trans-Siberian Railway. G. de Krivochapkine. Abstract translation of article in "Le Genie Civil." Discusses the economic influence of this railway upon the mineral industries of Siberia. Ill. 2100 w. Eng News—March 28, 1901.

Review of Progress on the Trans-Siberian. L. Lodian. Illustrated notes taken on a 366-day inspection tour. Serial. 1st part. 3000 w. Loc Engng—April, 1901.

The Trans-Siberian Railway. Reviews the history of this great undertaking, giving map, and tabulated summary of costs, details and other matters of interest. Serial. 1st part. 3500 w. Engng—May 3, 1901.

From Pekin to St. Petersburg by Rail. Alfred Stead. An interesting account of a journey from Japan via Manchuria and Siberia to London. 1800 w. Rev of Revs—Dec., 1901.

Siberia and the Trans-Siberian Railway. Some interesting information in regard to this road and its construction. 700 w. U S Cons Repts, No. 1802—Nov. 16, 1903.

The Siberian Railway and Its Results. Discusses this railway in connection with its influence on trade, and its effect on the present war, features of construction, etc. 3000 w. Engng—March 18, 1904.

The Siberian Railway and its Tributary Territory in Eastern Asia (Die Sibirische Eisenbahn und ihr Anschlussgebiet in Ostasien). Lieutenant Taubert. A general description of the journey from Berlin to Port Arthur, with a discussion of the country to be developed by the commercial operation of the line. 5000 w. Glasers Annalen—March 1. 1904.

Military Aspects of the Trans-Siberian Railway. Illustrations and discussion of the value of this road in the present war with Japan. 1800 w. Sci Am—April 16, 1904.

The Trans-Siberian Railway (Le Chemin de Fer Transsiberién). E. Lemaire. A fully illustrated account of the history of the road and of the details of its commercial operation. Serial. Part I. 2500 w. 1 plate. Génie Civil—May 7, 1904.

See also **Manchuria; Russia-Siberia.**

Siberia, Baikal.—The Lake Baikal Railway., Particulars from the report of a Russian engineer in regard to this recently completed section of the great Siberian Railway. 2000 w. Engng—Nov. 18, 1904.

The Circum-Baikalien Railway (Die Baikal-Umgehungsbahn). A description of the difficulties, cost and construction of the section of the Siberian Railway around Lake Baikal. 1000 w. Glasers Annalen—Nov. 15, 1904.

Sierra Leone.—Sierra Leone Government Railway. History and illustrated description of this narrow gauge railway, and its rolling stock. 2500 w. Engr, Lond—Aug. 25, 1905.

A West-African Railway: The Sierra Leone Line. J. Hartley Knight. Describing the construction of a British pioneer railway connecting the interior with the West Coast and aiding in developing commerce. 2000 w. Engineering Magazine—Nov., 1905.

Simplon Connections.—Connections to the Simplon Railway (Simplon et Faucille). Louis Lafitte. A discussion of the relation of the Simplon tunnel to the French railways, advocating a short connection of the Paris, Lyons & Mediterranean Railway to the Jura-Simplon line by way of the

Col de la Faucille. Two articles. 8000 w. Génie Civil—Aug. 29, Sept. 5, 1903.

The Western Railway Connections to the Simplon Tunnel (Die Westlichen Zufahrtslinien zum Simplon Tunnel). H. Elskes. A comparison of existing routes, together with an examination of the possible modifications in railway systems of Switzerland and France, due to the opening of the tunnel. 2500 w. Schweiz Bauzeitung—Jan. 9, 1904.

The Western Feeders of the Simplon Railway. Mr. Elskes, in "Schweizerische Bauzeitung." 1700 w. 3 tables and fig. Bul Int Ry Cong—Nov., 1904.

The Northern Lines of Access to the Simplon (Per gli Accessi Nord al Sempione). N. Sacerdoti. A discussion of the railway connections of the Swiss side of the Simplon tunnel, including the Lotschberg, Stockalper, and Wildstrubel routes. 4000 w. Il Monitore Technico—Jan. 20, 1905.

Connecting Routes to the Simplon (Les Voies d'Access au Simplon). Paul Olivier. With map showing existing lines and proposed new railway connections on the Swiss and French side of the Simplon tunnel. 2000 w. Revue Technique—March 25, 1905.

See also **TUNNEL.**

South Africa.—The Railway Reorganization of the Transvaal. A. Cooper Key. A review of the former railway systems, and a critical examination of the conditions under which operations may be successfully re-established. 2500 w. Engineering Magazine—March, 1902.

Railway Development in Federated South Africa. A. Cooper Key. A discussion of the conditions involved in the reorganization of the South African railways, with especial reference to the needs of the Transvaal and Orange River colonies. 4000 w. Engineering Magazine—May, 1902.

South African Railways. Editorial review of the new railway about to be undertaken and the development of the lines already constructed. 1700 w. Engng—Jan. 23, 1903.

The Railways in Our New South African Colonies. A review of the report of T. R. Price, on the working of the Central South African Railway. 3300 w. Engr, Lond—Oct. 9, 1903.

Railroading in South Africa. George E. Walsh. An interesting account of the progress of railroad building, describing the country traversed, and the change being wrought by railroad transportation. 2000 w. Loc Engng—May, 1905.

The Central South African Railways. A review of the work accomplished and projected. 1500 w. Engr, Lond—July 7, 1905.

The Rhodesia Railways, Limited. An illustrated description of the railway from Vryburg to the Zambesi and beyond. Serial. 1st part. 2800 w. Eng Rec—Aug. 26, 1905.

The Cape Government Railways. Abstract of a paper by A. M. Tippett, read before the British Assn. at Cape Town, which gives information in regard to the working of these lines. Ills. 1800 w. R R Gaz—Vol. XXXIX., No. 20.

See also **Africa; Cape to Cairo; Natal.**

South America.—South American Railway Building. Charles M. Pepper. Information concerning lines under construction and projected in the different countries. 2500 w. Ry Age—June 3, 1904.

See also under the different South American countries.

Spain.—The Northern Spanish Railway. Col. L. Cubillo. Illustrated description of the railway across and along the Pajares pass. 800 w. Ry Age—May 26, 1905.

See also **Pyrenean.**

State Ownership.—See **Government Ownership; Ownership; Prussia; GOVERNMENT OWNERSHIP; RAILWAY MANAGEMENT; TRUST.**

Stratford-Moreton, Eng.—The Old Stratford and Moreton Railway. Describes. Gives a descriptive account of a tramroad opened for traffic in 1826. It was designed originally for the taking up of coals, lime, etc., from the canal and river navigation at Stratford for a prosperous agricultural district, and bringing down its produce. 1500 w. Engr, Lond—Sept. 20, 1901.

Suakim-Berber.—The Nile-Red Sea Railway. Map and information concerning the line generally known as the Suakim-Berber Railway. 900 w. Engr, Lond—July 21, 1905.

Sudan.—Sudan Government Military Railways. C. B. Macaulay. Abstract of a paper read before the Glasgow Congress. Gives details of the Khartoum and Kerma lines, and their equipment. 1600 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Sumatra.—See **Dutch East Indies.**

Suspended.—See **SUSPENDED RAILWAY.**

Swakopmund-Windhuk.—See **Africa, South-West.**

Sweden.—See **Norway.**

Switzerland.—New Railway Projects in Switzerland (Neue Schweizerische Eisenbahnprojekte). Robert Moser. Discussing matters of costs and concessions for new railways in Switzerland. 2000 w. Schweizerische Bauzeitung—Dec. 7, 1901.

The Ricken Railway (Neue Schweizerische Eisenbahnprojekte. III. Die Rickenbahn). Robert Moser. A discussion of various routes for a projected railway in the Canton of St. Gall. Maps. Serial. 2 parts. 4500 w. Schweiz Bauzeitung—July 5 and 12, 1902.

Projects for Railway Lines Across the Bernese Alps (Wildstrubel et Lötschberg. Etude de la Traversée des Alpes Bernoises). E. de Stockalper. Plans, with map and diagrams, for railways, including long tunel at Wildstrubel and Lötschberg. Serial. Bull Tech d lSuisse Romande—June 25, 1903.

The Railway from Erlenbach to Zweisimmen, Switzerland (Die Lokalbahn Erlenbach-Zweisimmen). K. Becker. An illustrated description of a railway in the Simmenthal, forming a link of a direct line between Lakes Thun and Geneva, and its construction. Map and profile. 2500 w. Schweiz Bauzeitung—May 2, 1903.

The Wildstrubel and Lötschberg Railways (Die Wildstrubel- und die Lötschbergbahn). A discussion of the proposed railways for the connection of the Bernese Oberland with the Simplon. 1800 w. Schweiz Bauzeitung—Sept. 19, 1903.

The Nationalization of Swiss Railways. A. Achard. Reviews the circumstances which made it seem desirable for the State to acquire the principal lines of railway, the measures by which the work of purchase was carried out, and the results thus far. Serial. 1st part. 7000 w. Trac & Trans—Aug., 1904.

See also **Albula; Bern; Genoa; Lötschberg; RAILWAY CONSTRUCTION; TUNNEL.**

Syria.—Railways in Syria. Information concerning railways building and recently completed. 1200 w. U S Cons Repts—April, 1904.

See also **Persian Gulf.**

Tamalpais.—See **Mt. Tamalpais.**

Tasmania.—The Great Western Railway of Tasmania. An account of the proposed construction of a railway for the development of a portion of this island. Map. 2000 w. Transport—May 29, 1901.

Tehuantepec.—The Tehuantepec Railroad vs. the Isthmian Canal. An illustrated account of the rebuilding of this interesting road, which, it is thought, will prove a serious competitor of the Isthmian canal. 2200 w. Sci Am—July 26, 1902.

The Tehuantepec Route. E. L. Corthell. An account of the fulfillment of the project for a traffic route across this isthmus, the difficulties overcome, the advantages and value of this route. Ills. 5000 w. R R Gaz—July 15, 1904.

See also **SHIP RAILWAY.**

Texas & Oklahoma.—See **RAILWAY CONSTRUCTION.**

Transandine.—Buenos Ayres and Valparaiso Transandine Railway. Arthur H. Sleigh. An account of an important road in South America, the progress of the work, the portion completed, and related matter of interest. Ill. 2000 w. R R Gaz—Oct. 11, 1901.

The Transandine Railway. An illustrated description of the finished portion of the Argentine side of this interesting new line which will connect with the State railways of Chile. 1500 w. Ry & Engng Rev—April 11, 1903.

The Trans-Andine Railway. Gives a synopsis of the Trans-Andine Railway bill recently passed by the Chilean Congress. 1500 w. U S Cons Repts, No. 1636—May 2, 1903.

The Transandine Railway. Charles M. Pepper. Discusses the probability of connecting Valparaiso and Buenos Ayres by rail, the conditions, what has been done, and matters related. 2000 w. Ry Age—Dec. 11, 1903.

Transcaucasia.—See **Russia-Asia.**

Trust, U. S.—See **TRUST—Railway.**

Transvaal.—See **South Africa.**

Turkey.—Railways in Turkey. A brief summary of the conditions of the railways in the Ottoman Empire, showing their extent, amount of traffic, etc. 1700 w. U S Cons Repts, No. 1815—April 14, 1902.

See also **Bagdad; Persian Gulf; Syria; RAILWAY CONSTRUCTION—Anatolia.**

Tyrol.—The Railway Question in the Northern Tyrol (Die Nordtiroliesche Eisenbahnfrage). Victor Witasek. A review of present and projected railways in the northern Tyrol, showing the necessity for improvement. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—May 16, 1902.

See also **Austria.**

Uganda.—The Railways of Africa (Afrikanische Eisenbahnen). Col. Gerding. An address before the Berlin Railway Association, describing the progress of the Uganda railway as seen by the writer during a recent visit. 2500 w. Glasers Annalen—May 15, 1901.

Physical and Economic Features of the Uganda Railway. F. W. Emett. A fully illustrated account of this forerunner of civilization and traffic into the heart of Africa. 3500 w. Engineering Magazine—July, 1901.

The Meridional Rift on the Uganda Railway. Illustrations and description of the temporary inclines on the Kikuyu escarpment of this railway. 700 w. Engng—Sept. 27, 1901.

To the Victoria Nyanza by the Uganda Railway. Commander B. Whitehouse. A paper containing much information of the railway, the survey of the future port, etc. Also discussion. 9800 w. Jour Soc of Arts—Feb. 14, 1902.

The Uganda Railway. The present article describes Mombasa, and the conditions found there; also Kilindini Station, Maseras, and other stations, the country and some of the railway works. Ill. Serial. 1st part. 2500 w. Engr, Lond—Nov. 21, 1902.

The Uganda Railroad. Review of the final report of the committee appointed to supervise the building of this road from Mombasa, on the east coast of Africa, 584 miles to Victoria Nyansa, giving general account of the construction and the present traffic returns. 1200 w. R R Gaz—Vol. XXXVII., No. 11.

The Uganda Railway Report. Information from this report concerning the railway and steamboat service on Lake Victoria. 1800 w. Engr, Lond—April 14, 1905.

See also **Africa.**

Union Pacific.—Union Pacific. Maps and review of the annual statement of this road, with editorial on the policy of main line development and the extension of branch lines. 5500 w. R R Gaz—Vol. XXXIX., No. 24.

See also **RAILWAY CONSTRUCTION.**

U. S. Southern.—Phases of Southern Railroad Development, 1881-1901. John P. Meany. Historical review. 5400 w. Mfrs Rec—Feb. 20, 1902. Special number.

The Southern Roads and the Territory They Serve. W. D. Taylor. Describes the conditions which have been the cause of slow railroad development in the South, and the present conditions, with information concerning the lines which control most of the Southern traffic. 4200 w. Ry Age—Dec. 8, 1905.

Vienna Metropolitan.—The Metropolitan Railway of Vienna (Le Chemin de Fer Métropolitain de Vienne). René Philippe. A very full account of the municipal railway, elevated, surface and tunnel, and its suburban connections, in Vienna. Serial. Part I. 9000 w. 4 plates. Rev Gen des Chem de Fer—June, 1901.

The Vienna Metropolitan Railway. Emile Guarini. The first of a series of articles giving an illustrated detailed description. Serial. 1st part. 800 w. Sci Am Sup—Nov. 28, 1903.

See also **ELECTRIC RAILWAY.**

Virginia.—The "Deepwater-Tidewater" Railroads. George W. Harris. Map and account of a system to extend from the head of navigation on the Kanawha River to tidewater at Hampton Roads. 1200 w. Eng & Min Jour—Nov. 4, 1905.

Wabash.—A Wabash Cut-Off. An illustrated account of a new line under construction between Montpelier and Maumee, O. 1000 w. Ry Age—July 19, 1901.

The Greater Wabash. An illustrated general account of the new construction extending the Wabash railroad to Pittsburg and the coast. 2500 w. Ry Age—April 24, 1903.

See also **RAILWAY CONSTRUCTION.**

White Pass and Yukon.—A Railroad in the Far North. J. R. Van Cleve. An interesting illustrated account of the construction and equipment of the White Pass and Yukon Railway. 3000 w. Pro Pacific Coast Ry Club—Dec. 20, 1902.

Arctic Railroading. A. S. Atkinson. Describes the conditions that must be met in railroad construction and operation, and some of the benefits already evident from the construction of the White Pass & Yukon Ry. 1700 w. R R Gaz—Nov. 13, 1903.

See also **Alaska.**

Wooden.—Wooden Railways. W. B. Paley. Description, with illustrations, of some of the wooden railways built and their service. 1900 w. Sci Am Sup—April 6, 1901.

World Statistics.—See **RAILWAY STATISTICS.**

Yazoo Delta.—The Yazoo Delta of Mississippi and Location and Construction of Its Railroads. J. N. Darling. An illustrated description of the country and the methods of railroad construction. Discussion. Map. 4700 w. Jour W Soc of Engrs—Dec., 1902.

See also **RIVER REGULATION.**

Yorke Report.—Traffic Problems in England and America. R. H. Scotter. An analysis of Col. Yorke's report to the British Board of Trade upon his recent visit to America. 3000 w. Elec Times—March 12, 1903.

American and British Railway Methods. Editorial review of Col. Yorke's report to the British Board of Trade on a visit to the United States, made with a view to investigate railway methods. The present article deals with steam railway practice only. 3000 w. Mech Engr—March 14, 1903.

Colonel Yorke's Report on American Railroads. Extracts from the report of Col. H. A. Yorke to the British Board of Trade. 2000 w. R R Gaz—March 20, 1903.

Railway Traffic. An editorial review of the "Report on a Visit to America," by Lieut-Col. H. A. Yorke. Considers steam railroads, tramways, subways and elevated lines, and high-speed interurban railways. 4200 w. Builder—April 25, 1903.

See also **RAILWAY SIGNAL.**

Zossen.—See **ELECTRIC RAILWAY; TRAIN, FAST.**

RAILWAY ACCIDENT.

See also **LOCOMOTIVE EXPLOSION; RAILWAY EMPLOYEE; STREET RAILWAY ACCIDENT.**

American.—See also **Causes; United States.**

American vs. British.—Truth is Better Than Comfortable Error. Editorial discussion of railway accidents, and the comparison between America and England as made by Mr. Slason Thompson. 1800 w. Loc Engng—April, 1904.

American and British Reports on Railway Accidents. Slason Thompson. A criticism of the reports of the Interstate Commerce Commission, and a comparison with the British reports, and a discussion of other topics bearing upon safe transportation. General discussion. 14,400 w. Pro W Ry Club—Dec. 20, 1904.

American vs. European.—Heavy Sacrifice of Life on American Railways: Is It Necessary? Day Allen Willey. A discussion of the Casualties on American railways, and a comparison with European roads. 3000 w. Gunton's Mag—Dec., 1904.

British Board of Trade.—The Board of Trade Inspectors. Editorial review of the important points of report in the last Bluebook of the British Board of Trade. 2000 w. R R Gaz—Nov. 5, 1903.

Causes.—The Causes of Accidents on American Railways. F. W. Haskell. Attributing the frequency of disasters to official connivance in the habitual disregard of rules. 4000 w. Engineering Magazine—Dec., 1904.

Injuries to Passengers. Calls attention to the causes of many accidents, showing how they could be prevented. 4000 w. R R Gaz—Vol. XXXIX., No. 24.

Collisions.—The Superintendent, the Conductor, and the Engineman. A summary of the essential points presented in letters criticising an article by this title inquiring into the cause of butting collisions, which appeared in the issue of July 8. 5000 w. R R Gaz—Nov. 14, 1902.

See also Oil Car Collisions; **RAILWAY OPERATION; STREET RAILWAY ACCIDENT.**

Derailments.—Derailments and Conclusions to be Drawn Therefrom. W. H. Elliott. Condensed paper read before the Ry. Sig. Club, at Chicago. 2000 w. R R Gaz—Jan. 11, 1901.

Car Trucks, Car Wheels and Derailments. Editorial discussion of certain features in connection with the design of rolling stock. 1700 w. Eng News—June 20, 1901.

Unexplained Derailments. G. H. List. Gives an account of some experiences gained during 13 years service, which offer explanations for some accidents. 1500 w. Engr, Lond—Nov. 3, 1905.

Emergency Service.—Prompt Aid in Railway Accidents (Des Prompts Secours dans les Accidents de Chemins de Fer). P. Redard. An illustrated description of hospital cars and accident service maintained by some Continental railways. 3000 w. Génie Civil—June 6, 1903.

See also **CAR—Hospital.**

Employees.—See **RAILWAY EMPLOYEE—Accidents.**

France, 1900.—Accidents on French Railways in 1900 (Les Accidents sur les Chemins de Fer Français en 1900). Statistics of railway accidents in France, and also general railway statistics of the world. 1000 w. Rev Technique—April 25, 1903.

French Sud Express.—The Accident to the Sud Express. Charles Rous-Marten. Explains the requirements of this train, and discusses the probabilities that might furnish an explanation of the accident between Bayonne and Dax, giving the writer's opinion that it was due to a "washout." 3500 w. Engr, Lond—Nov. 23, 1900.

See also **TRAIN, FAST—British.**

Glasgow.—The Glasgow Train Disaster. Information from the report of Col. H. A. Yorke, in regard to the accident on July 27th. Also editorial. 2500 w. R R Gaz—Nov. 13, 1903.

Great Western, Eng.—The Derailment on the Great Western Railway. A report of the Board of Trade inquiry into an accident on Oct. 4th last in Wales. 4800 w. Engr, Lond—Feb. 17, 1905.

Interstate Commerce Report.—See **United States; RAILWAY SAFETY APPLIANCE.**

Leven Viaduct, Eng.—The Leven Viaduct Accident. An account of a railway accident in which a train was blown bodily over on its side, giving anemometer records made during the night of the accident. 900 w. Engr, Lond—July 3, 1903.

Liverpool Elevated.—The Disaster on the Liverpool Overhead Railway. An account of the fire which resulted in the loss of six lives and much damage to the Dingle Station and rolling stock. 2000 w. Elec Rev, Lond—Jan. 3, 1902.

Liverpool Overhead Electric Railway. Abstract of the report on the accident at the Dingle station. 1200 w. Engr, Lond—March 28, 1902.

Liverpool-Southport.—The Liverpool-Southport Railway Accident. Brief illustrated account of the accident of July 27, explaining the results of the collision. 700 w. Engr, Lond—Aug. 4, 1905.

New York.—The Park Avenue Tunnel Disaster. Editorial discussion. 3000 w. Eng News—Jan. 16, 1902.

The Fourth Avenue Tunnel Collision. Remarks on the cause of the disaster, with editorial discussion. 5000 w. R R Gaz—Jan. 17, 1902.

The New York Central Tunnel Tragedy. Editorial comments with illustration of the wrecked engine. 800 w. Sci Am—Jan. 18, 1902.

The Testimony Concerning the Tunnel Collision. Gives the essential parts of the testimony brought out at the Coroner's inquest thus far, with editorial comment on the false impressions formed from the manner of conducting the investigation. 2000 w. R R Gaz—Jan. 24, 1902.

Investigation of the Park Ave. Tunnel Collision. Report of testimony. 3000 w. Eng News—Jan. 30, 1902.

The New York Tunnel Collision. Editorial discussion of this recent disaster. 1200 w. Loc Engng—Feb., 1902.

Report of the New York State Railroad Commission on the Park Avenue Tunnel Collision. Extracts from the report dealing with methods of improvement, with editorial discussion of the problem of tunnel ventilation. 7400 w. Eng News—Feb. 13, 1902.

The Safety of Trains in the Fourth Avenue Tunnel—The Commissioners' Preliminary Order. Editorial discussion of the recommendations, and of the conditions. Also discusses the report on the collision. 3000 w. R R Gaz—Feb. 4, 1902.

See also Responsibility; **ELECTRIC RAILWAY—Danger; RAILWAY TERMINAL.**

New York Elevated.—The Elevated Railroad Wreck in New York. Brief illustrated description of the recent fatal accident at the 53d St. curve. 700 w. Sci Am—Sept. 23, 1905.

Offenbach, Germany.—An Accident at Offenbach, Germany. Official translation of a report of the officers of the Prussian State Railroad Administration concerning an accident that caused loss of life. 1800 w. R R Gaz——Feb. 8, 1901.

Oil-Car Collisions.—Oil-Car Collisions. Editorial discussion of recent collisions with oil trains. 1100 w. R R Gaz—June 21, 1901.

Responsibility.—Should Executive Officers Be Held Criminally Responsible for Accidents? Editorial discussion of Park Avenue tunnel disaster and the indictment of the Grand Jury. 2000 w. Eng News—March 13, 1902.

Santa Fe.—See **FLOOD.**

Slanelly.—The Slanelly Disaster. Editorial on Col. Yorke's report of this accident, which occurred in Oct., 1904, discussing the cause. 1200 w. Engng—Feb. 24, 1905.

United States.—Train Accidents in 1900. A tabulated statement of train accidents for 28 years, their nature and cause; also of casualties to passengers and employees during 1900, with remarks on the accidents. 1500 w. R R Gaz—Feb. 15, 1901.

Some Recent Notable Train Wrecks. Reports briefly some recent wrecks, showing the strength of steel cars, and reporting strange accidents. 700 w. Eng News—March 14, 1901.

Progress Toward Safer Railway Operation. Editorial discussion of the record of casualty in the United States for the last 13 years as given in the annual report of the Interstate Commerce Commission. 1600 w. Eng News—June 19, 1902.

Railroad Accidents in the United States. Edward A. Moseley. Comments on the increase in railroad accidents, discussing the causes, and suggesting remedies. 4200 w. Rev of Revs—Nov., 1904.

Railroad Disasters in the United States. Egbert P. Watson. Discusses the causes of railroad disasters in the present day, attitude of the upblic, the best remedies available, etc. 2800 w. Ir Age—Dec. 29, 1904.
See also American; Causes.

U. S., 1901.—Railroad Accidents for the Last Quarter of 1901. A summary from the recently issued report of the Interstate Commerce Commission. 1700 w. R R Gaz—June 27, 1902.

U. S., 1901, 1902.—Forty-one Rear Collisions. Editorial discussing the Government reports, Bulletins No. 2 and No. 3, and the causes of the collisions. 1500 w. R R Gaz—Aug. 22, 1902.

Railroad Accidents—Year Ending June 30, 1902. Main portions of the fourth quarterly bulletin of the Interstate Commerce Commission. Also editorial. 3500 w. R R Gaz—Oct. 31, 1902.

U. S., 1902-1903.—Railroad Accidents—Year Ending June 30, 1903. Reviews the last bulletin of the Interstate Commerce Commission. 2800 w. R R Gaz—Nov. 20, 1903.

U. S., 1903.—Government Accident Bulletin No. 6. Reviews the sixth quarterly bulletin of the Interstate Commerce Commission. The total number of casualties is 12,811. 3200 w. R R Gaz—May 8, 1903.

Train Accidents in the Quarter Ending Sept. 30, 1903. Information of interest from the last bulletin of the Interstate Commerce Commission. 1200 w. Eng News—March 3, 1904.

Accident Bulletin No. 10. Information from the last bulletin, for Oct., Nov. and Dec., 1903, issued by the Interstate Commerce Commission, with editorial comment. 4200 w. R R Gaz—April 29, 1904.

Government Accident Bulletin No. 7. Substance of the seventh quarterly accident report of the Interstate Commerce Commission, with editorial. 2800 w. R R Gaz—July 31, 1903.

U. S., October, 1900.—Train Accidents in the United States in October. Detailed list and classified summary. 5000 w. R R Gaz—Nov. 23, 1900.

U. S., November, 1900.—Train Accidents in the United States in November. Detailed list and classified summary. 4800 w. R R Gaz—Jan. 4, 1901.

U. S., December, 1900.—Train Accidents in the United States in December. Detailed list and classified summary for the month. 3000 w. R R Gaz—Feb. 1, 1901.

U. S., January, 1901.—Train Accidents in the United States in January. Detailed list and classified summary. 5000 w. R R Gaz—March 1, 1901.

U. S., February, 1901.—Train Accidents in the United States in February. Detailed list and classified summary. 3900 w. R R Gaz—April 5, 1901.

U. S., March, 1901.—Train Accidents in the United States in March. Detailed list and classified summary, with remarks. 4300 w. R R Gaz—May 3, 1901.

U. S., April, 1901.—Train Accidents in the United States in April. Detailed list and classified summary. Also information concerning the I. C. C. accident reports. 4700 w. R R Gaz—June 7, 1901.

U. S., May, 1901.—Train Accidents in the United States in May. Detailed list and classified summary. 3700 w. R R Gaz—July 12, 1901.

U. S., June, 1901.—Train Accidents in the United States in June. Detailed list and classified summary; 211 accidents, in which 67 persons were killed and 241 injured. 4500 w. R R Gaz—Aug. 2, 1901.

U. S., July, 1901.—Train Accidents in the United States in July. Monthly statement of accidents in the order of the dates of their occurrence. 3000 w. R R Gaz—Sept. 27, 1901.

U. S., August, 1901.—Train Accidents in the United States in August. Record of accidents, with notes. 3800 w. R R Gaz—Oct. 18, 1901.

U. S., September, 1901.—Train Accidents in the United States in September. A record of the most prominent railroad accidents during the month, with editorial comments. 3500 w. R R Gaz—Nov. 15, 1901.

U. S., Oct., 1901.—Train Accidents in the United States in October. A condensed record of the principal accidents. 3500 w. R R Gaz—Nov. 29, 1901.

U. S., Nov., 1901.—Train Accidents in the United States in November. Record of the principal accidents, with remarks on those of special interest. 4500 w. R R Gaz—Dec. 20, 1901.

U. S., December, 1901.—Train Accidents in the United States in December. A condensed record of the principal accidents, with editorial comments on the most serious. 5500 w. R R Gaz—Jan. 31, 1902.

U. S., Jan.-March, 1902.—Government Accident Bulletin No. 3. The report of the Interstate Commerce Commission summarizing the collisions, derailments and casualties during the three months ending March 31. 1500 w. R R Gaz—Aug. 1, 1902.

U. S., Feb., 1902.—Train Accidents in the United States in February. Condensed record of the principal train accidents, with remarks on the most serious. 3600 w. R R Gaz—March 28, 1902.

U. S., March, 1902.—Train Accidents in the United States in March. A condensed record of the principal accidents, with remarks on the most serious ones. 3000 w. R R Gaz—May 9, 1902.

U. S., April, 1902.—Train Accidents in the United States in April. Classified list of principal accidents. 2500 w. R R Gaz—May 30, 1902.

U. S., June, 1902.—Train Accidents in the United States in June. Classified list. 2500 w. R R Gaz—Aug. 1, 1902.

U. S., July, 1902.—Train Accidents in the United States in July. Condensed record of the principal accidents. 3000 w. R R Gaz—Sept. 5, 1902.

U. S., August, 1902.—Train Accidents in the United States in August. Condensed record, with remarks. 4000 w. R R Gaz—Sept. 26, 1902.

U. S., Sept., 1902.—Train Accidents in the United States in September. Condensed record of the principal train accidents during the month, with comments. 2500 w. R R Gaz—Nov. 7, 1902.

U. S., December, 1902.—Train Accidents in the United States in December. Condensed record of the principal accidents, with editorial comments on the more serious. 4000 w. R R Gaz—Feb. 13, 1903.

U. S., January, 1903.—Train Accidents in the United States in January. Condensed record, with editorial review of the more serious accidents. 5300 w. R R Gaz—Feb. 27, 1903.

U. S., February, 1903.—Train Accidents in the United States in February. Condensed record of principal ones, with notes on the more serious ones. 3000 w. R R Gaz—April 3, 1903.

U. S., March, 1903.—Train Accidents in the United States in March. A condensed record of the the principal accidents, with notes on the more principal accidents, with remarks. 2500 w. R R Gaz—April 24, 1903.

U. S., April, 1903.—Train Accidents in the United States in April. Condensed record, with editorial notes on the most serious. 2500 w. R R Gaz—May 22, 1903.

U. S., July, 1904.—Train Accidents in the United States in July. Detailed record. 2400 w. R R Gaz—Vol. 27, No. 10.

Washouts, A. T. & S. Fé.—Destructive Western Torrents. Illustrates and describes some destructive effects in New Mexico, Arizona, Southern California and Nevada, especially on the Atchison, Topeka & Santa Fé. 1000 w. Ry Age—Sept. 9, 1904.

Westfield Collision.—The Westfield Collision. An editorial discussion of means of preventing rear collisions, and some particulars in regard to the accident. 5000 w. R R Gaz—Feb. 6, 1903.

Wind Pressure.—See **Leven Viaduct, Eng.**

Wrecking Outfit.—Wrecking Outfit, Pennsylvania Lines West. An illustrated account of a very complete wrecking outfit of the Pennsylvania Lines West, with editorial. 2700 w. Ry & Engng Rev—Nov. 3, 1900.

The New York Central Wrecking Outfits. Illustrated detailed description. 1700 w. R R Gaz—Dec. 4, 1903.

Wrecking Outfits on the Pennsylvania. Describes the wreck trains and outfits, illustrating details of special tools carried. 2500 w. R R Gaz—March 11, 1904.

Modern Wrecking Appliances. Illustrates and describes recent improvements. 2200 w. Ry & Engng Rev—March 12, 1904.

See also **ELECTRIC CAR—Line; TOOL CAR.**

RAILWAY ACCOUNTING.

See also **RAILWAY FINANCE; RAILWAY OPERATION; RAILWAY STATISTICS; RAILWAY VALUATION.**

Underlying Principles and General Practices of Railway Accounting Departments. From a lecture by J. L. Burgess, at the Iowa State College. Considers the importance of the accounting department, the duties of accounting officers, the methods, etc. Serial. 1st part. 3000 w. Ry & Engng Rev—Dec. 23, 1905.

Analysis.—An Analysis of Railroad Operations. S. M. Hudson. Criticises the classification of earnings and operating expenses adopted by the Interstate Commerce Commission and by railroads generally, and outlines a classification giving more definite results. 2000 w. Ry Age—Oct. 4, 1901.

Cost Units.—Units of Costs. A. H. Plant. Address at meeting of the Assn. of Am. Ry. Accounting Officers, New York. 1700 w. Ry Age—Sept. 1, 1905.

Interline Settlement.—Method of Settling Interline Accounts. A paper prepared under instructions from the Assn. of Am. Ry. Acc. Officers, explaining the manner of settling interline accounts between railroads in the United States, Canada and Mexico. 1500 w. Ry Age—July 14, 1905.

International Ry. Congress.—Notes on the Organization of the Accounts Department of the Belgian State Railways. Question XIV of the seventh session of the Railway Congress, following on a study of railway bookkeeping generally. 38,300 w. Bul Int Ry Cong—April, 1905.

Machine Recording.—Recording Waybill Statistics by Machinery. Describes a method of auditing freight accounts and compiling statistics relating to freight traffic. Illustrates machines used. 3500 w. R R Gaz—July 4, 1902.

Maintenance of Way.—Classification of Maintenance-of-Way Expenses. Walter G. Berg. Read at convention of Am. Ry. Engng. & Maintenance of Way Assn. On the distribution of railroad expenses, outlining a proposed system for keeping accounts. 16,700 w. Ry Age—March 20, 1903.

The Distinction Between Repairs and Improvements, and a Proposed Classification of Railroad Maintenance of Way Expenses. Walter G. Berg. Abstract of a paper before the Am. Ry. Engng. & Maintenance of Way Assn. 1500 w. Eng Rec—April 4, 1903.

Material.—Material Accounts. A. D. Parker. Address at meeting of the Assn. of Am. Ry. Accounting Officers. Describes the methods of handling material accounts, offering suggestions. 4000 w. Ry Age—June 7, 1901.

See also **RAILWAY MATERIAL.**

Operating Expenses.—The Relations Between Operating Expenses and Rates (Die Beziehungen Zwischen Betriebkosten und Tarifen). E. Fränkel. A paper before the Verein für Eisenbahnkunde, giving a discussion of the proper distribution of operating expenses of railways and their relations to rates. 3000 w. Glasers Annalen—June 1, 1903.

See also **RAILWAY FINANCE.**

Real Estate.—A Method of Preparing and Preserving Records of Railway Real Estate. Arthur Haviland. Gives a description and contents of record sheets, method of compiling and method of filing records. 3000 w. Eng News—Oct. 30, 1902.

Repairs and Improvements.—See **Maintenance-of-Way.**

Repair Shop.—See **ELECTRIC RAILWAY SHOP—Accounting; LOCOMOTIVE; LOCOMOTIVE SHOP; RAILWAY SHOP.**

Switching.—Switching. F. A. Healy. A report submitted to the S. E. Accounting Conference at Nashville, Tenn., and unanimously recommended for adoption as the best system thus far introduced. 4800 w. Ry Age—May 19, 1905.

RAILWAY ASSOCIATION.

See **RAILWAY COMMISSION; RAILWAY EMPLOYEE; RAILWAY LEGISLATION; RAILWAY TRAFFIC.**

RAILWAY BRIDGE.

See also **ARCH; BRIDGE; CULVERT; GIRDER; RAILWAY; RAILWAY CONSTRUCTION; RAILWAY STRUCTUE; TRESTLE; VIADUCT.**

Standards.—See **BRIDGE—Railway Standards.**

RAILWAY BUILDINGS.

See also **BUILDING; GRAIN ELEVATOR; RAILWAY CONSTRUCTION; RAILWAY SHOP; RAILWAY STATION; RAILWAY STRUCTURE; RAILWAY TERMINAL; ROUNDHOUSE.**

Montreal, Grand Trunk.—See **BUILDING.**

Superintendent.—See **RAILWAY ORGANIZATION—Bridges and Buildings.**

RAILWAY CAR.

See also **CAR; CAR, MOTOR-DRIVEN; TRAIN.**

Springs.—See **SPRING—Semi-Elliptic.**

RAILWAY COALING STATION.

See **COALING STATION.**

RAILWAY COMMISSION.

See also **RAILWAY LEGISLATION; RAILWAY RATES; RAILWAY STATISTICS; RAILWAY TRAFFIC.**

England.—Work of the English Railway and Canal Commission. Abstract of a paper by S. J. McLean in the "Quarterly Jour. of Economics." Reviews the actual results obtained during the last 17 years by a body possessing many of the functions proposed for the Interstate Commerce Commission. 2500 w. R R Gaz—Vol. XXXIX., No. 21.

Interstato Commerce.—See **RAILWAY ACCIDENT; RAILWAY LEGISLATION; RAILWAY RATES; RAILWAY SAFETY APPLIANCE; RAILWAY STATISTICS.**

National Association.—Power, Duties and Work of State Railroad Commissions. Report presented at meeting of the Nat. Assn. of R. R. Com., Deadwood, S. D. A discussion of this subject. 3500 w. Ry Age—Sept. 1, 1905.

RAILWAY CONGRESS.

See also **ELECTRIC RAILWAY—International Railway Congress; RAIL;** and under other specific headings.

Subjects and Reporters—International Railway Congress. Gives the questions and reporters for the seventh session of this Congress, which will be held in Washington, D. C., May, 1905. 1500 w. R R Gaz—Aug. 22, 1902.

International Railway Congress. A general review of the Seventh International Railway Congress, which met in Washington. Serial. 1st part. 1700 w. Engr, Lond—July 21, 1905.

Official Information Issued by the Permanent Commission of the Railway Congress. Summary of the proceedings of the seventh session at Washington, D. C., 1905. 12,600 w. Tables. Bul Int Ry Cong—Sept., 1905.

RAILWAY CONSOLIDATION.

See **RAILWAY FINANCE; TRUST.**

RAILWAY CONSTRUCTION.

See also **RAILWAY; RAILWAY CURVE; RAILWAY ECONOMICS; RAILWAY ENGINEERING; RAILWAY GRADE; RAILWAY LOCATION; RAILWAY PERMANENT WAY; RAILWAY STATION; RAILWAY TERMINAL; SUBWAY; TRACK; TRACK DEPRESSION; TRACK ELEVATION; TRACKLAYING; TUNNEL.**

Albula, Switzerland.—See **Switzerland; RAILWAY.**

Anatolia.—Construction Work on the Anatolian Railway, Turkey (Von der Anatolischen Eisenbahn). Hr. Denicke. An illustrated description of tunnel repair work on this road in Asiatic Turkey. 1400 w. Zentralblatt d Bauverwaltung—April 4. 1903.

Atchison, Topeka and Santa Fe.—Some Railway Construction in Oklahoma. A. G. Allen. An illustrated account of construction work on a line being built by the A., T. & S. F. Ry. from Newkirk, Ok., to Pauls Valley, Ind. Ter. 2000 w. Pro Am Soc of Civ Engrs—Aug., 1903.

See also **California.**

Austria.—See **RAILWAY.**

Baikal.—See **RAILWAY—Siberia Baikal.**

Baltimore and Ohio.—The Rebuilding of the Baltimore & Ohio Railroad. Gives an outline of the general scheme, and an illustrated account of the proposed reconstruction work. 4000 w. R R Gaz—Aug. 22, 1902.

Baltimore & Ohio's Reconstruction. An account of the comprehensive improvements in progress in both roadbed and equipment. 2600 w. Ry Age—Sept. 18, 1903.

Improvements on the Cleveland Division of the B. & O. Illustrated description of improvements to cost about $4,000,000, including straightening the line, reducing grades and changing from single to double tracks. 2200 w. R R Gaz—Vol. XXXVIII., No. 11.

See also **Track.**

Benton Cut, Mont.—The Construction of the Benton Cut on the Great Northern Railway, Montana. George H. Herrold. An illustrated account of heavy work accomplished during the past year. 1200 w. Eng News—Sept. 12, 1901.

Big Four.—Big Four Revision Between Cincinnati and Sunman. Describes improvements made with a view to reducing the grades and rectifying the alignment between Lawrenceburg Junction and Sunman. Ill. 1400 w. Ry Age—Jan. 29, 1904.

The Improvements on the Big Four Line between Lawrenceburg Junction and Sunman. Describes the relocation of the line, grade reductions, and shortening of the line, explaining why the changes were made. Ills. 1300 w. Eng Rec—March 5, 1904.

Rebuilding the Cairo Division of the Big Four. Describes the condition of this portion of the line, giving an illustrated account of the reconstruction in progress to prepare it for the heavy traffic due to development of immense coal fields. 2500 w. R R Gaz—Vol. XXXIX, No. 17.

Boone, Iowa.—See **VIADUCT.**

Bridgeport, Conn.—The Bridgeport Improvement on the New York, New Haven & Hartford. Illustrates and describes extensive improvements, including a viaduct which will eliminate some 25 grade-crossings, a large new station, etc. 2800 w. R R Gaz—July 25, 1902.

The Bridgeport Improvements of the New York, New Haven & Hartford Railroad. A statement of the conditions at this point, and an illustrated detailed description of difficult work in eliminating grade crossings and four-tracking this road without interfering with traffic. Serial. 1st part. 2200 w. Eng Rec—July 23, 1904.

Brilliant Cut-Off.—See **Pennsylvania R. R., Pittsburg.**

British.—Current Railway Construction. A review of the construction operations in which the principal railway companies of the United Kingdom are at present engaged. 1500 w. Engng—Oct. 11, 1901.

British Regulations.—English Board of Trade Regulations for Track, Bridge and Signal Work. Gives the requirements governing new construction of railways as relating to signaling, interlocking, passenger stations, bridges, track and switch work. 3000 w. Ry & Engng Rev—Aug. 19, 1905.

Brooklyn.—The Atlantic Avenue Improvements of the Long Island Railroad. The improvements will consist of an alternate subway and elevated road for 26,700 ft. east of the Flatbush Avenue terminal, removing these tracks from the street grade. Ill. 2500 w. R R Gaz—April 25, 1902.

Methods of Work on the Atlantic Avenue Improvement of the Long Island R. R. Illustrated description of the subway and viaduct construction for removal of tracks from the surface of the street. 2200 w. Eng News—Dec. 18, 1902.

Progress of the Atlantic Avenue Improvement of the Long Island Railroad. An illustrated article showing work, nearing completion, to get the tracks of this road off grade on Atlantic Ave., Brooklyn. 1700 w. R R Gaz—July 31, 1903.

Atlantic Avenue Improvement on the Long Island Railroad. Outlines the future plans for this road, showing the importance of the removal of the surface tracks. Gives an illustrated description of the work. 1500 w. Ry Age—July 31, 1903.

The Atlantic Avenue Improvement of the Long Island Railroad in Brooklyn, N. Y. James B. French. An illustrated detailed description of the character and details of this work; it includes subway construction, steel viaducts, open cut, etc. 4500 w. Trans Assn of Civ Engrs of Cornell Univ—1904.

Brush Specifications. — See **BRUSH SPECIFICATIONS.**

Buffalo & Susquehanna.—Extensions of the Buffalo & Susquehanna Railroad. Elisha Walker. Describes the extensions, amounting to about 185 miles, to accommodate coal traffic. 1600 w. Eng Rec—Nov. 21, 1903.

California, Santa Fe.—Extending the Santa Fe Railroad into San Francisco. Herbert I. Bennett. Illustrates and describes an interesting piece of railroad construction in California, where a swamp was crossed on an embankment of peat and decayed tule grass. 1200 w. Sci Am Sup—July 15, 1905.

Canada.—See **RAILWAY.**

Canadian Northern Ry.—The Canadian Northern Railway in the West. R. D. Willson. An illustrated article, with map, describing construction work and great increase in mileage. 2000 w. R R Gaz—Vol. XXXVIII., No. 11.

Central R. R. of N. J.—See **Flood Repairs.**

Chicago.—See **RAILWAY TERMINAL; TRACK ELEVATION.**

Chicago and Alton.—Bridge and Track Improvements on the Chicago & Alton. Deals with roadway improvements during the past year, giving photographs of the interesting structures. 2200 w. Ry Age, Special No—March 21, 1902.

Rebuilding a Great Railroad. Frank H. Spearman. An account of reconstruction work, introducing novel methods, straightening tracks, rebuilding bridges, etc. 2500 w. World's Work—Oct., 1904.

Chicago, Burlington & Quincy.—See **RAILWAY.**

Chicago, Cincinnati.—The Building of the Chicago, Cincinnati & Louisville and Cincinnati, Richmond & Muncie Railroads. H. L. Weber and Fred R. Charles. Illustrates and describes rapid construction, with interesting engineering features. 2000 w. Eng Rec—Jan. 21, 1905.

C., I. & St. L.—The Chicago, Indianapolis and St. Louis Short Line. Illustrates and describes a new cut-off being constructed at a cost of $3,000,000. It will reduce the distance from Indianapolis to St. Louis by 12 miles. 3300 w. R R Gaz—March 11, 1904.

China.—The Work of the German Railway Soldiers in China in 1900-1901 (Die Thätigkeit der Deutschen Eisenbahntruppen in China 1900-1901). Major Bauer. A paper before the Verein für Eisenbahnkunde, giving an extended review of work in building and repairing railways, bridges, etc., in the northern part of China during the foreign military occupation. Serial. 2 parts. 18,000 w. Glasers Annalen—April 15, May 1, 1902.

The Shan Tung Railway (Ueber die Shantung Eisenbahn). A. Gaedertz. An address before the Verein für Eisenbahnkunde, giving an account of the railway being built by the Germans in the northeastern part of China. Profile. 5000 w. Glasers Ann—July 1, 1903.

Railway Making in China. Thos. M. Reid. An illustrated account of the Anglo-American development of Chinese transportation facilities. 3000 w. Engineering Magazine—Dec., 1903.

The Actual Building of a Chinese Railway. Justin Burns. A fully illustrated account of the operative conditions of railway construction on the Canton-Hankow Railway. 4000 w. Engineering Magazine—Nov., 1904.

The Actual Building of a Chinese Railway. Justin Burns. The second article describes the earthwork, bridges, track and train service of the Canton-Hankow Railway. 4000 w. Engineering Magazine—Dec., 1904.

See also **RAILWAY—China.**

Cincinnati and Sunman.—See **Big Four.**

C. C. C. & St. L. R. R.—Line Improvements Between Indianapolis and Cincinnati, C. C. C. & St. L. R. R. George A. Stearns. Describes briefly work including reducing gardes, straightening the line, replacing bridges, and double tracking, without interrupting traffic. Ills. 800 w. Eng News—March 16, 1905.

Concrete Reinforced.—See also **BRIDGE—Concrete Reinforced.**

Cost.—See **Albula.**

Denver & Rio Grande.—Improvements on the Denver & Rio Grande. Brief description, with illustrations, of grade reductions, elimination of curvature, relocation, etc. 1400 w. R R Gaz—March 25, 1904.

Denver, Northwestern & Pacific.—General Engineering Features of the Denver, Northwestern & Pacific Ry. Brief illustrated description of the construction of this line between Denver, Colo., and Salt Lake, Utah. 1600 w. Eng Rec—Feb. 25, 1905.

The Denver, Northwestern & Pacific Ry. W. P. Hardesty. An illustrated detailed description of the construction of a new line which shortens the distance by rail between Denver and Salt Lake City, and opens new territory. 4500 w. Eng News—March 9, 1905.

Ditching Costs.—Cost of Ditching Cuts and Widening Embankments. Extracts from a committee report to the St. Louis meeting of the Roadmasters and Maintenance-of-Way Assn. 3500 w. R R Gaz—Vol. XXXVII., No. 19.

Drainage.—Drainage of English Railroads. Edward Davy Pain. An illustrated article showing typical methods of treating slopes and of draining cuttings. 2700 w. R R Gaz—April 3, 1903.

See also **DRAINAGE—Pillar for Banks.**

Duncannon, Pa.—Improvements on the Pennsylvania R. R. at Duncannon, Pa. Brief illustrated description of a change of alignment which gives an unobstructed view of the track and eliminates 16 grade-crossings. 500 w. Ry & Engng Rev—Nov. 8, 1902.

Economics.—See **RAILWAY ECONOMICS.**

Ecuador.—Construction Difficulties on the Guayaquil & Quito Railway. An illustrated article describing the building of this railroad in the tropics. 1500 w. Eng Rec—Oct. 22, 1904.

Embankments.—Some Notes on the Classification of Material and Shrinkage in Embankments. C. E. Crownover. Concerning methods used on the Union Pacific in connection with difficult work in Wyoming. 1600 w. Engs' Year Bk, Univ. of Minn.—1901.

The Construction and Maintenance of Railway Embankments. Editorial discussion of practice in America and in England, and the causes of settlement, shipping, etc. 2000 w. Eng News—Oct. 9, 1902.

See also **EARTHWORK.**

Estimates.—Estimates for Railways for Light Traffic. William D. Marks. Gives detailed estimates of such railways, discussing a recent paper by Jas. Cravath. 2200 w. Eng News—July 20, 1905.

Flood Protection.—See FLOOD—Railway Protection.

Flood Repairs.—Flood Repairs to the Lehigh & Susquehanna Division of the Central Railroad of New Jersey. M. A. Zook. Illustrations with description of repairs to roadbed and bridges. 1000 w. Eng News—Feb. 4, 1904.

Görlitz-Berlin.—The Construction of the Görlitz Railway and Its Connections Between Berlin and Grünau (Ausbau der Görlitzer Vorortstrecke und ihrer Anschlüsse swischen Berlin und Grünau). H. Biedermann. An illustrated account of recent extensions of suburban railway connections in the vicinity of Berlin. 4000 w. 2 plates. Glasers Annalen—Nov. 1, 1904.

Grade Reduction.—See RAILWAY GRADE.

Graduation.—Graduation. The term as here used embraces the preparation of the ground, the excavation and placing of the material, and other general work incident to the formation and maintenance of the railway roadbed and yards. Report of the Committee of the Am. Ry. Engng. & Main. of Way Assn. With discussion. 9200 w. Ry Age (Spe. No.)—March 15, 1901.

Guatemala.—Railway Building in the Tropics. John L. Caspar. An illustrated article on the construction of the Northern Railway of Guatemala, and the Honduras Railway. 2800 w. Gunton's Mag—June, 1903.

See also **RAILWAY.**

Gulf and Ship Island.—The Rebuilding of the Gulf & Ship Island. An account of this road and its reconstruction, with plan, map and illustrations showing the general scheme of the work. 1700 w. R R Gaz—July 31, 1903.

Honduras.—See Guatemala.

Illinois Central.—The Illinois Central Improvements—New Lines and Second Track. An illustrated account of new lines, with a statement of the purpose they are to serve, and of second track work in progress. 2000 w. R R Gaz—Aug. 28, 1903.

General Rules for Construction Work Illinois Central Railroad. A review of the recently prepared rules on a road which is kept in a condition of high efficiency. 3000 w. Eng Rec—April 23, 1904.

Indiana Southern.—Construction Work of the Southern Indiana Railway. Illustrated description of construction work in the coal districts of Sullivan and Greene counties. 1800 w. Eng News—Feb. 25, 1904.

Iowa.—See RAILWAY—Chicago, Burlington and Quincy.

Ireland.—The Letterkenny and Burton Port Railway. An illustrated account of railway work in the west of Ireland, particularly the Burton Port extension, a government subsidized light railway. 3000 w. Transport—July 3, 1903.

Lackawanna.—Improvements on the Lackawanna Since 1899. An illustrated review of changes made in equipment and permanent way. 5000 w. R R Gaz—Nov. 14, 1902.

Improvements on the Morris & Essex Division of the Lackawanna R. R. Explains recent changes made necessary by the great increase in population near New York, describing and illustrating important features of the work. Serial. 1st part. 3500 w. Eng Rec—Nov. 12, 1904.

See also **TRACK ELEVATION—Newark.**

London-Brighton.—L. B. and S. C. Railway Improvements. A descriptive and illustrated account of some of the more important works being carried out on the London, Brighton & South Coast Railway, viaducts, bridges, etc. Serial. 1st part. 500 w. Engr, Lond—Jan. 23, 1903.

London and Bright Railway Widening. The first of a series of articles describing interesting work in England in connection with widening main lines without interrupting traffic. Ill. Serial. 1st part. 4500 w. Engng—Oct. 30, 1903.

London & Southwestern.—Widening the South-Western Railway. An account of the important work on the different sections, which will provide the London and South-Western Ry. with four tracks from Waterloo to Worting Junction. 2300 w. Engr, Lond—Feb. 8, 1901.

Some Interesting Roadbed Construction. Brief description of work on the London & Southwestern Ry. in widening its roadbed for a four-track line. 500 w. Ry & Engng Rec—Feb. 16, 1901.

Lucin Cut Off.—See RAILWAY—Salt Lake.

Masonry.—See MASONRY—Railway.

Massachusetts Central.—Relocation of the Central Massachusetts Railroad Around the Wachusett Reservoir. An illustrated description of heavy construction work on the new line made necessary by the construction of this reservoir. 3000 w. Eng Rec—Jan. 2, 1904.

Mexican National.—Widening the Gauge of the National Railroad of Mexico. J. L. Bothwell. An account of the interesting features of this work. 800 w. Eng Rec—Feb. 20, 1904.
See also **RAILWAY.**

Missouri Southern.—The Southern Missouri Railway. Charles A. Sheppard. An illustrated detailed description of an important piece of railroad construction. 2300 w. Eng Rec—April 16, 1904.

Morenci Southern.—See RAILWAY.

N. J. Central.—See Central R. R. of N. J.

N. Y. C. & H. R. R.—The Improvements in the Pennsylvania Division of the New York Central & Hudson River Railroad. Two-page plate with description. 1400 w. R R Gaz—March 14, 1902.

Improvements on the New York Central. Notes from the annual report of the company concerning important improvements under way or contemplated. 800 w. R R Gaz—Oct. 31, 1902.

See also **Schenectady Detour; BRIDGE; ELECTRIC RAILWAY; RAILWAY ENGINEERING; RAILWAY PERMANENT WAY.**

N. Y., N. H. & H. R. R.—Improvements on the New York, New Haven & Hartford. Map, plans and description of proposed changes on this very important road, including the rebuilding of the Harlem & Port Chester as a six-track line, wholly or partially operated by electricity. 3500 w. R R Gaz—Vol. XXXVIII., No. 11.
See also **Bridgeport.**

N. Y., O. & W.—Rail-Concrete Masonry on the New York, Ontario & Western. Illustrations and brief description showing method of using concrete masonry built on a foundation of old rails. 400 w. R R Gaz—May 22, 1903.

Norfolk & Western.—Construction on the Clinch Valley Division, Norfolk & Western R. R. Illustrated descriptions of particular portions of the work, with summary taken from Mr. Low's paper, in the "Pro. of the Am. Soc. of Civ. Engrs." 2000 w. Ry & Engng Rev—July 20, 1901.

Norfolk & Western Road Improvements. George L. Fowler. An illustrated article, describing improvements in grades and alignment. 1800 w. R R Gaz—Oct. 2, 1903.

Northern Pacific R. R.—Railway Building Through a Forest. Illustrated description of work on the Hoquiam branch of the Northern Pacific R. R. in the state of Washington. 800 w. Ry Age—Oct. 3, 1902.

Ogden-Lucin.—See RAILWAY—Salt Lake.

Oklahoma.—See RAILWAY.

Oregon Railroad & Navigation.—Rebuilding the O. R. & N. A fully illustrated article of work on the Oregon Railroad & Navigation lines to make a route of low grades and easy curves. 800 w. R R Gaz—Vol. XXXVIII., No. 11.

Oregon Short Line.—Improvements on the Oregon Short Line. Illustrated account of important new construction on this branch of the Union Pacific system. 1400 w. Ry Age—Dec. 26, 1902.

The Leamington Cut-Off of the Oregon Short Line R. R. in Western Utah. W. P. Hardesty. An illustrated detailed description of this important work. 5300 w. Eng News—Sept. 17, 1903.

Recent Improvements on the Oregon Short Line R. R. W. P. Hardesty. An illustrated article describing trestles, bridges, &c., recently built, and improvements in roadbed, grades and curves. 2500 w. Eng News—Oct. 15, 1903.

Paris.—The Prolongation of the Orleans Railway to the Quai d'Orsay (Prolongement de la Ligne d'Orleans au Quai d'Orsay). H. de la Brosse. Describing especially the difficult underpinning and supporting of buildings in running the line under the heart of Paris. 4500 w. 2 plates. Rev Gen des Chemins de Fer—Feb., 1901.

Paris Metropolitan.—See **UNDERGROUND RAILWAY.**

Paris-Versailles.—See **ELECTRIC RAILWAY.**

Pennsylvania.—Improvements on the Pennsylvania Railroad. An account of improvements recently made, or soon to be made, taken from the last annual report. 1200 w. R R Gaz—May 3, 1901.

New Construction Work on the Pennsylvania R. R. Extracts from the annual report giving interesting particulars of recently completed work. 1500 w. Eng News—March 13, 1902.

Improvements on the Pennsylvania Railroad. S. Whinery. An outline of some of the more important improvements in progress, as well as those recently completed and projected. Ill. Serial. 1st part. 4800 w. R R Gaz—March 13, 1903.

Construction Work on the Pennsylvania R. R. between Harrisburg and Gallitzin. An illustrated description of the work in progress, the methods employed, certain details of construction, and cost. 4400 w. Eng News—Sept. 24, 1903.

Pennsylvania Low-Grade Line Down the Susquehanna. Illustrated description of an important improvement made in the construction of a new double-track freight line, especially describing the stone bridge at Shocks Mills, Pa. 2200 w. R R Gaz—March 11, 1904.

The Low Grade Freight Cut-Off of the Pennsylvania R. R. Illustrates and describes the construction of a low-grade double-track freight line in Southeastern Pennsylvania, which involved some of the heaviest railroad work ever undertaken in the United States. Serial. 1st part. 4000 w. Eng Rec—Dec. 16, 1905.

The Pennsylvania Railroad Low Grade Freight Line from Harrisburg to Atglen, Pa. Explains the purpose and character of this work, giving an illustrated description of important railway grading, with very heavy work on a small portion of the line. 3500 w. Eng News—Dec. 28, 1905.

Penn. R. R., Pittsburg.—The Brilliant Cut-Off of the Pennsylvania R. R. An illustrated description of a cut-off built to relieve the congested traffic conditions at Pittsburg; built at a great cost, owing to the rugged country, although but three miles in length. 3000 w. Eng Rec—May 6, 1905.

The Brilliant Cut-Off of the Pennsylvania Railroad at Pittsburg. Illustrated description of an important change to relieve the congestion of freight traffic at Pittsburg. 700 w. Ry Age—Oct. 16, 1903.

Penn. R. R., Wilmington, Del.—See **Wilmington.**

Peru.—See **RAILWAY.**

Pittsburg, Carnegie & Ohio.—Location and Construction of the Ohio Residency, Pittsburg, Carnegie & Western R. R. Describes interesting engineering features on the portion of this line lying within the state of Ohio, also the methods used, giving costs of certain kinds of work. 4400 w. Eng News—May 21, 1903.

See also **TUNNEL.**

Quebec.—St. John.—Jacques Cartier Cut-Off. John David Black. Illustrates and describes details of an improvement made on the Quebec, Lake St. John Railway. 1400 w. Can Engr—June, 1902.

Regulations.—See **British Regulations; Illinois Central; RAILWAY—China.**

Resident Engineer.—Notes on Railway Construction from the Resident Engineer's Standpoint. F. C. French. Slightly condensed paper read at the meeting of the Iowa Engng. Soc. Calls attention to points of difference in the practice of a number of roads, in the hope of securing uniformity and of giving information to young engineers. 8000 w. Eng News—Feb. 4, 1904.

Impressions of a Resident Engineer on Railroad Construction. Friend P. Williams. Describes the location and contruction of eight miles of modern railroad, reviewing the engineering side of the work and discussing points of special interest. 3000 w. Ills. Trans Assn of Civ Engrs of Cornell Univ—1904.

See also **RAILWAY ORGANIZATION; RAILWAY PERMANENT WAY.**

Richmond, Fred'b'g & Potomac.—Revision of Grades and Double-Tracking on the Richmond, Fredericksburg & Potomac. Profile showing changes in alignment, with description of other improvements. 1200 w. R R Gaz—April 1, 1904.

Richmond-Washington.—Reconstruction of the Richmond-Washington Line. Brief account of changes, including the double-tracking of the entire line. 600 w. Ry Age—Oct. 3, 1902.

Rio Grande Western Ry.—Line Changes on the Rio Grande Western Ry., in Utah. W. P. Hardesty. Briefly outlines the history of the road, and describes the improvements made and proposed. Ill. 2200 w. Eng News—June 4, 1903.

Rock Fill.—The Cascade Rock-Fill on the Erie R. R. Sketch plan and illustration, with brief description. 600 w. Eng News—Dec. 27, 1900.

Rock Island Ry.—The Rock Island's New Line to El Paso. An illustrated description of important construction work between Liberal, Kan., and Carrizozo, N. M., a distance of about 392 miles. 1000 w. Ry Age—Nov. 8, 1901.

See also **RAILWAY.**

Russia.—Railway Construction in Russia. Details from an historical sketch of the rise and progress of the Russian railway system, published in a recent number of the Russian "Official Messenger." 1800 w. Engr, Lond—March 20, 1903.

St. Louis, Kansas City & Colorado.—Engineering and Construction of the St. Louis, Kansas City & Colorado Railroad. Inset and illustrations with description and general information, specifications, etc. 6800 w. Ry Age—March 20, 1903.

The St. Louis, Kansas City & Colorado. J. L. Campbell. Illustrated description of a new line constructed on an exceptionally permanent basis for a new road. 4500 w. R R Gaz—Vol. XXXVII., No. 19.

Salt Lake.—See **RAILWAY.**

San Pedro, Los Angeles & Salt Lake.—See **RAILWAY—Salt Lake-Los Angeles.**

Schenectady.—The Schenectady Improvements of the New York Central. Plan, sketch map, and description of changes made to avoid high grades and crossings at street level. 1700 w. R R Gaz—April 15, 1904.

Schenectady Detour.—The Schenectady Detour of the New York Central & Hudson River Railroad. Alignment, profile and brief description of an important improvement saving a heavy grade and the passage of many trains through the city at the street level. 350 w. R R Gaz—Sept. 19, 1902.

Side-Hill Cuts.—Some Ideas on Side-Hill Cuts. Henry W. Allen. Points of information on cuttings for roadbed in side-hills. Ill. 900 w. Ry & Engng Rev—April 13, 1901.

Side-Leveler.—See **SIDE-LEVELER.**

Simplon.—See **RAILWAY; TUNNEL.**

Sink Hole, Michigan.—Haslett Park Sink-Hole, Grand Trunk Ry. Leslie A. Waterbury, in the "Michigan Engineer." Describes one of many sink-holes in Michigan which have caused track troubles. Ills. 1500 w. Ry & Engng Rev—Dec. 31, 1904.

South-Eastern, Eng.—South-Eastern Railway Works. An account of the new construction and improvements of the South-Eastern and Chatham Ry. Co. on the lines about London. 1500 w. Engr, Lond—Feb. 8, 1901.

South-Eastern and Chatham Improvements. An illustrated account of widenings, loops, reconstructed stations, and other improvements. 3500 w. Transport—Oct. 24, 1902.

Southern.—Double-Track Work on the Southern Railway Between Alexandria and Orange, Va. John W. Ash. An illustrated description of the work of grading, track work, bridges and masonry. 3500 w. Eng News—March 2, 1905.

Southern Pacific.—See **RAILWAY—Salt Lake.**

Suspension Bridge.—See **BRIDGE—Suspension.**

Switzerland.—The New Lines of the Rhaetikon Railway (Die Neuen Linien der Rhätischen Bahn). H. Hennings. With topographical maps and profiles of the new line between Thusis and St. Moritz, and plans of the loop tunnels and other construction work. Serial. Part I. Schweizerische Bauzeitung—July 6, 1901.

Difficult Mountain Railway Construction in Switzerland. Contour maps and description of new lines under construction, especially the line connecting Thusis with St. Moritz, involving a number of compound loops, mostly in tunnel, with numerous tunnels, bridges, etc. 1700 w. Eng News—Dec. 19, 1901.

The Railway from Reichenau to Ilans, Switzerland (Die Neuen Linien der Rhätischen Bahn. Die Bahn Reichenau-Ilans). P. Salus. An illustrated description of the construction of a short railway up the Hitler Rhine valley in eastern Switzerland. Map and profile. Serial. 2 parts. 4500 w. Schweiz Bauzeitung—May 30, June 6, 1903.

See also **RAILWAY; TUNNEL.**

Tennessee.—The Tennessee Central Railway. Illustrates and describes some of the peculiar and difficult features in construction owing to the character of the country through which the road passes. 1000 w. Engr, Lond—Jan. 25, 1901.

Texas & Oklahoma.—The Construction of the Texas and Oklahoma Railroad. Robert F. Powell. Describes the construction work, illustrating details of interest. 2400 w. Eng Rec—March 5, 1904.

Tracklaying.—See **TRACK LAYING.**

Trestle Filling.—Trestle Filling on the N. C. & St. L. Ry. Extracts from a paper by I. O. Walker, presented before the Engng. Assn. of the South. Illustrated description of work on one of the divisions of this road. 2300 w. Ry & Engng Rev—April 13, 1901.

Relative Cost of Filling Trestles. I. O. Walker. Extracts from a paper in the Pro. of the Engng. Assn. of the south, describing and discussing work done on the N., C. and St. L. R. R. 2800 w. R R Gaz—April 19, 1901.

The Dale Creek Fill, Union Pacific R. R. Gives illustration and describes the methods of work. 1000 w. Ry & Engng Rev—May 4, 1901.

See also **TRESTLE.**

Union Pacific.—Heavy Railway Construction in Wyoming. J. I. Boggs. An illustrated description of work on the Union Pacific Railroad to reduce grades and straighten alignments. The description is confined to the heaviest part of the work on the Second Division, extending over four miles. 5000 w. Pro Am Soc of Civ Engs—Feb., 1901.

Roadbed Improvements on the Union Pacific. An outline of the heavy construction work in progress, and the engineering features, with descriptions and illustrations of methods of work. 2100 w. Ry & Eng Rev—March 16, 1901.

Heavy Railway Construction in Wyoming. Discussion of paper by J. J. Boggs. 1000 w. Pro Am Soc of Civ Engrs—May, 1901.

The Rebuilt Union Pacific. An illustrated article giving information concerning the heavy engineering work that has been carried out in the recent improvements on this road, principally on the Wyoming division, at a cost of about $15,000,000. Map. 3300 w. Ry Age—Aug. 9, 1901.

Reconstruction of the Union Pacific Railroad. Illustrates and describes costly reconstruction work between Cheyenne and Evanston in Wyoming. 1000 w. Sci Am—April 5, 1902.

Reduction of Gradient and Elimination of Distance, Curvature, and Rise and Fall on Union Pacific Railroad. J. B. Berry. An interesting account of extensive revision work so far accomplished, the methods adopted, and related matter of interest. 12,500 w. Ry Age—March 18, 1904.

An Analysis of the Value of Recent Improvements on the Union Pacific. J. B. Berry. Abstract of a paper presented at the meeting of the Am. Ry. Engng. & Main. of Way Assn. Shows in a general way the work done, and gives a study of the operating statistics, summarizing the advantages and savings. 3500 w. R R Gaz—March 25, 1904.

See also Embankments; Trestle Filling; Wyoming; **PERMANENT WAY; TRACK.**

Union Station, St. Louis.—See **RAILWAY STATION—St. Louis.**

Utah.—The Reconstruction of the Utah Central Railway. W. P. Hardesty. An illustrated description of the newly constructed line between Salt Lake City and Park City at a cost of $400,000. 3000 w. Eng News—Jan. 17, 1901.

Vicksburg, Miss.—Alabama & Vicksburg Improvements in Vicksburg, Miss. Illustrated description of changes made, with explanation of the causes that led to them. 2000 w. Ry & Engng Rev—May 18, 1901.

Wabash-Pittsburg.—The Wabash Extension into Pittsburg. Gives the history of this new line, with illustrations and descriptions of interesting construction work. 3800 w. R R Gaz—March 11, 1904.

Western Maryland.—The Cumberland Extension of the Western Maryland R. R. Illustrated detailed description of construction work under many difficulties, from Big Pool to Cumberland. Serial. 1st part. 3500 w. Eng Rec—March 4, 1905.

Wilmington, Del., P. R. R.—Pennsylvania Improvements at Wilmington, Del. Illustrates and describes improvements including a brick arched viaduct, drawbridge and other changes. 1200 w. Ry Age—March 31, 1905.

Pennsylvania Improvements at Wilmington, Del. Illustrates and describes extensive improvements, including a brick arched viaduct, massive stone retaining walls, plate girders, drawbridge, changes of track, a new passenger station and office building, etc. 2500 w. Ry Age—Nov. 3, 1905.

Winter.—Methods for Winter Railway Location and Construction. E. H. Drury. Descriptive notes of methods used in locating and building railways in mid-winter in a northern bush country, where the thermometer is sometimes 40 degrees below zero. 2000 w. Eng Rec—July 4, 1903.

Wyoming.—See **Embankments; Union Pacific Ry.**

RAILWAY CONVENTION.

See **CAR; RAILWAY CONGRESS; RAILWAY STRUCTURE.**

RAILWAY CROSSING.

See **GRADE CROSSING; TRACK.**

RAILWAY CROSS TIE.

See **CROSS TIE; RAIL; RAIL FASTENING; RAILWAY CONSTRUCTION; RAILWAY PERMANENT WAY; TRACK.**

RAILWAY CURVE.

See also **RAILWAY CONSTRUCTION; RAILWAY ENGINEERING; RAILWAY LOCATION; SURVEYING.**

A Problem in Railroad Curves. Malverd A. Howe. Mathematical demonstration. 700 w. R R Gaz—June 20, 1902.

An Important Problem in Railway Curves. Antonio Llano. Gives a problem of constant occurrence in railroad work, especially in the location of street railway curves, and the solution which the writer considers simpler than those usually seen. 300 w. Eng Rec—Aug. 26, 1905.

Car Vibrations.—See **CAR—Vibrations; VEHICLE—Vibrations.**

Compound.—Compound Curves (Ueber Korbbögen). Leopold Herzka. A mathematical and graphical discussion of compound circular curves. Diagrams. 3000 w. Zeitschr d Oesterr Ing u Arch Vereines —April 3, 1903.

Equalizing.—Method of Computation by the Addition of Ordinates (Procédé de Calcul par Addition d'Ordonnées). Pierre le Fort. Describing a method of equalizing railway curves permitting a continuous variation in the radius of curvature in all cases. 12,000 w. Rev Gen des Chem de Fer—March, 1903.

Laying Out.—The Determination of Curve Deflections and Rail Joints (Beitrag zur Lehre von der Berechnung der Bogenweichen und Geleisverbindungen). A mathematical discussion of the laying out of railway curves and juctions. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 1, 1905.

Line and Surface.—Line and Surface for Railway Curves. Charles C. Wentworth. Discusses the original center line used as the base of measurement, indicating what was wrong, and proposing simpler means for correcting the trouble than those now in use. 2000 w. Pro Am Soc of Civ Engrs—Feb., 1902.

Outer Rail Elevation.—Inaccuracy in Some Engineering Approximations; Formulas for Elevation of Outer Rail on Curves. W. D. Taylor. Calls attention to cases of approximation where inaccuracies occur. 900 w. Eng News—Feb. 18, 1904.

Relining.—The Field Practice of Relining Railway Curves. Howard C. Ives. Considers the cases under three heads, giving methods used by writer. 1500 w. Eng News—Dec. 26, 1901.

Slide Rule Computations.—Slide Rule Computations for Laying Out Curves. Henry T. Stiff. Briefly explains how the slide rule may be used with accuracy and a great saving of time. 900 w. Eng News—Feb. 20, 1902.

Spiral.—Holbrook's Spiral Curves. E. Holbrook. An explanation of the actual work in the field, giving tables and figures. 1700 w. Eng News—June 13, 1901.

Suggestion for a More Uniform Practice in Fixing the Lengths of Spiral Curves. W. D. Taylor. A discussion of the principles controlling these curves, with tables proposed for connecting the degree of curve, the superelevation, the maximum velocity and lengths of spiral. 2000 w. Eng News—April 17, 1902.

Suggestions for a Uniform Practice in Fixing the Lengths of Spiral Curves. W. D. Taylor. Gives tables connecting the degree of curve, amount of superelevation, the maximum velocity and lengths of spiral, with suggestions for making an economical adjustment. 2000 w. Wis Engr—May, 1902.

Spiral Curves for Railways (Cur les Raccordements a Courbure Progressive pour Voies Ferrées). M. d'Ocagne. A discussion of the clothoide curve, with tables for its application to railways. 4500 w. Ann des Ponts et Chaussées—3 Trimestre, 1902.

Cornu's Spiral as a Transition Curve. D. N. Lehmer. A mathematical demonstration of the application of Cornu's spiral to railroad work. 3500 w. Cal Jour of Tech—April, 1904.

See also **Transition.**

Surveying.—The Surveying of Curves in Irregular Ground (Die Absteckung von Kurven in Coupiertem Terrain). Friedrich Lorenz. Comparing various methods of laying out railway curves and their utility under different conditions. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 27, 1904.

Transition.—Transition Curves. J. H. Lary. Gives the writer's ideas on spiraling track, with formulae and tables. 1200 w. Jour W Soc of Engs—Oct., 1900.

Transition Curves. W. B. Lee. A mathematical study of the cubic parabola. 600 w. Pro Am Soc of Civ Engrs—Aug., 1901.

Transition Curves. George D. Snyder. Discussion of a paper on this subject by W. B. Lee. 900 w. Pro Am Soc of Civ Engrs—Sept., 1901.

Transition Curves. C. A. Sundstrom's discussion of a paper by W. B. Lee. 1500 w. Pro Am Soc of Civ Engrs—Oct., 1901.

Transition Curves on the Southern Pacific R. R. An explanation of methods employed by the engineering department of this road, illustrated by example. Diagram and tables. 1400 w. Eng Rec—Nov. 11, 1905.

Setting Out and Checking Circular and Transition Curves in Railway Track. Illustrated description of a simple instrument, designed by F. A. Smith, by which the section foreman can check the accuracy of his curves. 1600 w. Eng News—Nov. 16, 1905.

See also **Equalizing; Spiral.**

Vertical.—Vertical Railway Curves. H. J. Randall. Considers curves to round off the angle made by the change of grade, discussing what justification there is for making the curve from 200 to 400 feet or more in length, showing the advantage of increasing the length is much greater for short trains than long ones. Ills. 5000 w. Jour Assn of Engng Socs—Sept., 1904.

See also **RAILWAY GRADE.**

RAILWAY DEMURRAGE.

See **RAILWAY TRAFFIC—Demurrage.**

RAILWAY EARNINGS.

See **RAILWAY ACCOUNTING; RAILWAY FINANCE; RAILWAY STATISTICS.**

RAILWAY ECONOMICS.

See also **RAILWAY; RAILWAY CONSTRUCTION; RAILWAY ENGINEERING; RAILWAY FINANCE; RAILWAY LOCATION; RAILWAY MANAGEMENT; RAILWAY OPERATION; RAILWAY TRAFFIC.**

British.—British Railway Economics. Editorial review of the officially drafted balance sheet recently issued. 2100 w. Engng—Oct. 11, 1901.

Railway Economics. Editorial review of the statement of the Board of Trade on the results of the work of the railways of the United Kingdom during the past year. 1800 w. Engng—May 20, 1904.

Hill Address.—Mr. James J. Hill on Consolidations, Competition and Rates. Address on the relations of railways to the public interests, delivered at Fargo, N. D., before the Grain and Stock Brokers' Convention. 2800 w. Ry Age—Jan. 17, 1902.

See also **TRUST—Railways.**

Improvements.—Economics of Railway Improvements. W. W. Colpitts. The object of the paper is to outline methods by which the most economical results may be obtained in operation, and to define a basis upon which the yearly value of railway improvements may be quickly and accurately estimated. 6500 w. Can Soc of Civ Engrs. (Adv proof)—Oct. 24, 1901.

Economics of Railway Improvements. W. W. Colpitts. From a paper read before the Canadian Soc. of Civ Engrs. Discusses mistakes made in railway engineering, and the various improvements that make for economy of operation. Serial. 1st part. 4700 w. Ry & Engng Rev—Nov. 23, 1901.

RAILWAY EMBANKMENT.

See **EARTHWORK; EXCAVATION; RAILWAY CONSTRUCTION.**

RAILWAY EMPLOYEE.

See also **RAILWAY MANAGEMENT; RAILWAY OPERATION; RAILWAY ORGANIZATION; STREET RAILWAY MANAGEMENT.**

Accidents.—The Superintendent, the Conductor and the Engineman. B. B. Adams. Discusses the relation of these men to the collision record. 7000 w. R. R. Gaz—July 18, 1902.

American and English.—English and American Railroad Employees. Editorial discussion of the conditions affecting railroad transportation in the two countries. 2800 w. R R Gaz—Sept. 5, 1902.

Apprentice.—See **APPRENTICE.**

Atchison.—See **TRADE UNION—Atchison Railway.**

Claim Agent.—See **STREET RAILWAY ACCIDENT—Claims.**

Discipline.—Record Discipline. Reviews the paper read by Charles Dyer before the Rocky Mountain Ry. Club, and the discussion, with editorial comment. 2800 w. R R Gaz—Dec. 21, 1900.

The Discipline and Control of Railway Employees. W. H. Canniff. A review of the methods which have been found most successful in American railway management. 3500 w. Engineering Magazine—Jan., 1901.

Discipline. C. B. Fairchild. Read at convention of the N. Y. State St. Ry. Assn. A discussion of matters relating to the proper discipline of employees. 5000 w. St Ry Jour—Sept. 13, 1902.

Efficient Discipline. Papers by C. H. Ketcham, W. W. Wheatly, G. W. Sengerland, and Thomas E. Mitten, discussing this subject from different points of view, with a general discussion following. 19,000 w. N Y R R Club—Nov. 21, 1902.

Notes on Discipline. A. J. Love. On the importance of discipline in railroad work, the force of correct habits, and related subjects. 1500 w. R R Gaz—July 17, 1903.

Discipline of Trainmen as Relating to Automatic Block Signals. R. G. Kenly. Quotes cases showing that signals are not properly observed, and discusses briefly the best discipline and what it aims to accomplish. 800 w. Ry Sig Assn, Adv Paper—May 23, 1905.

See also **STREET RAILWAY MANAGEMENT—Employee.**

Education.—The Education of Railroad Men for Subordinate Positions of Responsibility. Walter S. Berg. Address before the Convention at St. Louis. Deals particularly with reference to employees of the bridge and building department of railroads. 7300 w. Pro of Assn of Ry Supts of Brdgs & Bldgs—Oct., 1900.

The Higher Education of Railway Officials. Rev. Henry A. Stimson. A discussion of the special education needed by the men who have charge of railways in their larger relations. 2300 w. Ry Age—May 1, 1903.

Firemen.—The Employment and Preparation of Firemen. E. W. Pratt. Discusses mainly the personality and character of the men, method of hiring and educating the men, &c. General discussion. 17,000 w. Pro W Ry Club—Jan. 17, 1905.

Industrial Commissioner.—See **RAILWAY OPERATION—Industrial Department.**

Locomotive Engineer.—Essential Qualities of a Successful Locomotive Engineer. W. J. Hill. Considers education, experience and good judgment the most essential. 1600 w. Ry & Engng Rev—Aug. 12, 1905.

Main. Way Forces.—A Method for Standardizing Maintenance of Way Forces. H. W. Church. Gives statistics for summer and winter work and explains method by example and chart. 2000 w. Ry & Engng Rev—March 18, 1905.

Payment.—Cash versus Checks in Paying Railway Employes. Gives arguments that have been suggested against and in favor of each of the methods of payment. 4000 w. Ry Age—Sept. 29, 1905.

Pennsylvania.—See **RAILWAY MANAGEMENT.**

Pension, Canadian Pacific.—Pension Plan of the Canadian Pacific. Rules and regulations of a system put in operation Jan. 1, 1903, showing how it differs from those of American companies. 1600 w. Ry Age—Dec. 19, 1902.

Physical Tests.—Vision, Color-Sense and Hearing. Charles H. Williams. Considers methods of examination and required standards. Also discussion. 18,000 w. W Ry Club—Feb. 18, 1902.

Vision of Enginemen and Firemen in Railway Service: Some Factors Affecting Same. Dr. Nelson M. Black. An explanation of the trying conditions and the importance of perfect and quick vision, giving opinions of experts and conclusions. General discusion. Ils. 14,400 w. Pro W Ry Club—Nov. 15, 1904.

See also **STREET RAILWAY MANAGEMENT—Employes.**

Police.—The Railroad Police. Josiah Flynt. Showing the value and economy of a systematic police organization. 4000 w. R R Gaz—June 12, 1903.

Provident Institutions.—On the Question of Provident Institutions (Subject XVI for Discussion at the Seventh session of the Railway Congress). M. Riebenack. Report No. 1 for countries using the English language. 3500 w. 14 tables. Bul Int Ry Cong—Dec., 1904

Relief Department.—Railroad Employees' Relief. J. A. Anderson. An account of the origin and formation of the Relief Department of the Pennsylvania Railroad, and the results of 14 years' operation. Serial. 1st part. 3000 w. R R Gaz—Dec. 21, 1900.

Track Foremen.—A Track Foreman's Qualifications. J. E. Conley. Part of a graduating thesis by a writer who has had years of railroad service. 3300 w. R R Gaz—May 1, 1903.

Train Dispatcher.—The Expert Train Dispatcher. From the "N. Y. Times." An explanation of the work and great responsibility carried by the dispatcher. 2300 w. Sci Am Sup—Aug. 22, 1903.

Wages.—See **Payment; WAGES—Railway Employes.**

Work Regulation.—On the Question of the Duration and Regulation of Work. Mr. Philippe. (Subject XV for discussion at the seventh session of the Railway Congress). For all countries, except America and Switzerland. 31,000 w. Bul Int Ry Cong—Sept., 1904.

On the Question of Duration and Regulation of Work. Pl. Weissenbach. (Subject XV for discussion at the seventh session of the Railway Congress). Report No. 1 for Switzerland. 11,300 w. Bul Int Ry Cong—Sept., 1904.

Report No. 3 on the Question of the Duration and Regulation of Work (Subject XV for discussion at the 7th session of the Railway Congress) G. L. Potter. For America. 16,800 w. 4 tables. Bul Int Ry Cong—Nov., 1904

Yardmaster.—The Work of a Yardmaster. J. D. Tyler. Read before the New England R. R. Club. Discusses the qualifications and training needed and the character of the work 2200 w. Ry & Engng Rev—Nov. 18, 1905.

RAILWAY ENGINEERING.

See also **RAILWAY; RAILWAY CONSTRUCTION; RAILWAY CURVE; RAILWAY GRADE; RAILWAY LOCATION; RAILWAY ORGANIZATION; SURVEYING.**

Feats of Modern Railroad Engineering. Henry Harrison Lewis. An illustrated account of difficult work, tunneling mountains, bridging chasms, etc. 2000 w. World's Work—Sept., 1903.

America.—Diversity of Practice in General Engineering on American Railways. Archibald A. Schenck. Notes some points of difference in engineering practice on American railways. Deals chiefly with methods of work, showing the leading aim on various roads. General discussion follows. 31,000 w. Jour W Soc of Engrs—Feb., 1903.

N. Y. Central.—The Engineering Department of the New York Central A general outline of the immense work done by this department and the problems to be solved, and an account of recent changes of grade and line. Ill. 4800 w. R R Gaz—March 8, 1901.

New York Central's Standard Engineering. Illustrated description of improvements of importance now being executed. 5500 w. Ry Age (Spe. No.)—March 15, 1901.

New York Central's Current Engineering. Illustrations and description of features which may be considered as samples of the standard engineering of the road in the lines covered. 5800 w. Ry Age. Special No—March 21, 1902.

See also **RAILWAY CONSTRUCTION; RAILWAY PERMANENT WAY.**

RAILWAY EXHIBITION.

See also **LOCOMOTIVE EXHIBITION.**

Düsseldorf.—Railway and Transportation Exhibits (Das Eisenbahn und Verkehrswesen). M. Buhle. The first of a series of illustrated articles describing in detail the exhibits of railway material and appliances at Düsseldorf in 1902. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing —Aug. 16, 1902.

Pan-American.—The Pan-American Exposition. General remarks on the exposition, with illustrated description of the transportation exhibits. 7800 w. Ry & Engng Rev—June 15, 1901.

Paris.—The Central Railway of France (Compagnie des Chemins de Fer du Midi). A review of the exhibits of this company, including rolling stock, tools, etc. 20,000 w. 6 plates. Rev Gen d Chemins de Fer—Jan., 1901.

The Eastern Railway of France (Compagnie des Chemins de Fer de l'Est). An account of the permanent way exhibit of this road at Paris, including roadbed, rails, signals, etc., etc. 8000 w. 22 plates. Rev Gen des Chemins de Fer—Dec., 1900.

Railway Affairs at the Paris Exposition (Das Eisenbahnwesen auf der Letzten Pariser Weltausstellung). Hr. Kriesche. A paper and discussion on Paris terminal stations, American locomotives, weights of freight cars, turn-tables, etc. 4500 w. Glasers Ann—March 15, 1901.

See also **RAILWAY SAFETY APPLIANCE.**

St. Louis.—The Transportation Exhibits at the St. Louis Exposition (Das Eisenbahnverkehrswesen auf der Weltausstellung in St. Louis, 1904). Fr. Gutbrod. A review of the railway exhibits at St. Louis, the first portion describing the locomotive testing plant of the Pennsylvania Railroad. Serial. Part I. 6000 w. Zeitschr d Ver Deutscher Ing—Sept. 3, 1904.

See also **CAR—Private, St. Louis Exhibition; LOCOMOTIVE EXHIBITION; LOCOMOTIVE TEST; ST. LOUIS EXPOSITION; TURNTABLE.**

RAILWAY FAST TRAIN.

See **LOCOMOTIVE PERFORMANCE; RAILWAY OPERATION; TRAIN, FAST.**

RAILWAY FENCING.

Railway Fencing. R. W. Leonard. A discussion of this subject, the most economical and efficient type, cost, &c. Also considers cattle guards. 1600 w. Can Soc of Civ Engrs, Adv Proof—April, 1903.

RAILWAY FINANCE.

See also **RAILWAY; RAILWAY ECONOMICS; RAILWAY MANAGEMENT; RAILWAY RATES; RAILWAY STATISTICS; RAILWAY TAXATION; RAILWAY TRAFFIC; RAILWAY VALUATION.**

American.—The Present Position of American Railroads. Thomas F. Woodlock. Extracts from articles written for "The Economist" (London). 2000 w. R R Gaz—Sept. 27, 1901.

See also **RAILWAY; RAILWAY STATISTICS.**

American and British.—The Relative Finances of British and American Railways. W. Pollard Digby. Aims to show the relation which the respective railway investments in the United Kingdom and United States bear, both as regards capital and revenue, to the respective populations and external commerce. 4500 w. Engr, Lond—Aug. 11, 1905.

Assessment.—See **RAILWAY VALUATION.**

Boston & Albany and N. Y. Central.—The Absorption of the Boston & Albany by the New York Central. Editorial concerning the lease for 99 years about to be ratified. 1300 w. R R Gaz—Nov. 2, 1900.

British.—British Railways as Affected by Higher Fuel, Material and Labor. Compares the records of the five principal railways, to show the general situation, and considers the extent, duration and its incidence. 2400 w. Ir & Coal Trds Rev—Aug. 16, 1901.

British Rolling Stock.—Tabular Statement of the Expenditure in the Locomotive, Carriage and Wagon Departments of English Railways. Shows the cost of working and receipts of the eleven principals railways of England. 900 w. Engr, Lond—Oct. 18, 1901.

The Earning Power of British Rolling Stock from 1894 to 1903. W. Pollard Digby. Gives tables showing the rolling stock, the railway earnings, the average earnings per locomotive, and other statistics of interest. 2500 w. Engr, Lond—Sept. 22, 1905.

Capitalization.—The Value of the Railroads and Their Capitalization. H. T. Newcomb, in the "Yale Review," August. Some notes on capitalization statistics. 1400 w. R R Gaz—Aug. 29, 1902.

C. H. & D. and Erie.—The Cincinnati, Hamilton & Dayton Sale. Editorial on the sale of this road to the Erie, and the effects from the change of control. 1500 w. R R Gaz—Vol. XXXIX. No. 12.

Consolidations.—See **Boston & Albany and N. Y. Central; C. H. & D. and Erie; TRUST.**

Depreciation Fund.—The Need of a Depreciation Fund in Railway Accounts. Charles H. Grinling. A discussion of British railway finance. Considers that, under the present financial practice, such parts of a railway and its equipment as are liable to wear out and need to be replaced are wrongly dealt with. 3300 w. Bankers' Mag, Lond—May, 1903.

Earnings.—Disproportion of Gross and Net Railroad Earnings. Editorial discussion of the returns as published by the "Financial Chronicle." 1200 w. Ir Age—Sept. 10, 1903.

See also **British Rolling Stock; Electric; RAILWAY ACCOUNTING; RAILWAY STATISTICS.**

Eastern Illinois Purchase.—The Eastern Illinois Purchase. Editorial discussion of the purchase of the Chicago & Eastern Illinois R. R. by the St. Louis & San Francisco R. R. Co. 2000 w. R R Gaz—Aug. 15, 1902.

Electric, Europe.—See **ELECTRIC RAILWAY—European Commercial Possibilities.**

Electric, N. Y., N. H. & H.—Returns from Electrified Steam Railroads. Editorial discussion of the returns from the lines of the New York, New Haven & Hartford. 1500 w. R R Gaz—Feb. 13, 1903.

Electric, Securities.—See **ELECTRIC RAILWAY—Securities.**

French.—Financial Results of the French Railroads in 1903. Statement of the results of operation, with comparison with 1902, and review of the accounts in general. 2400 w. R R Gaz—Vol. XXXVIII., No. 26.

Germany.—The Working Results of the Railways in Germany in 1899. Brief review of statistics concerning traffic, expenditures, etc. 1200 w. Engr, Lond—April 26, 1901.

Government Co-Operation.—See **LIGHT RAILWAY.**

Hill Address. — See **RAILWAY ECONOMICS; TRUST—Railway.**

Louisville & Nashville.—The Atlantic Coast Line Purchase of the Control of the Louisville & Nashville. Information concerning the terms of the sale, and plans for the future development. 1800 w. R R Gaz—Oct. 3, 1902.

Material Accounts.—See **RAILWAY ACCOUNTING—Material.**

New South Wales.—New South Wales Railways. Editorial review of causes of the deficit of the past year. 1700 w. Engng—Oct. 30, 1903.

N. Y. C. & H. R.—New York Central and Hudson River. Showing how operating expenses have consumed earnings, giving statistics. Map. 1400 w. R R Gaz—Oct. 30, 1903.

N.Y., N. H. & H.—New York, New Haven & Hartford. Report of earnings, operating expenses, etc., for the last year. 600 w. R R Gaz—Oct. 30, 1903

See also **Electric, N. Y., N. H. & H.; RAILWAY.**

Northern Pacific.—The Contest for Control of the Northern Pacific. A brief account of the cause of the recent collapse in the stock market. 1000 w. Ry Age—May 17, 1901.

Ontario & Western.—The Ontario & Western Transfer. Editorial, explaining the situation that led to the purchase of this road by the New York, New Haven & Hartford. 1200 w. R R Gaz—Vol. XXXVII, No. 21.

Ownership.—Who Own the Railroads? H. T. Newcomb. Gives a memorandum of the results of a recent investigation which disproves the erroneous impression that railroad ownership is vested in a small group of the very rich. 2000 w. R R Gaz—Vol. XXXVIII, No. 8.

Pennsylvania Report.—The Pennsylvania Annual Report. A report of operation for 1902; improvements made and expenditures; and improvements planned; with much information of interest. Also editorial. 6700 w. R R Gaz—March 6, 1903.

Philadelphia & Reading.—Reading Company. A report of earnings and operating expenses. 900 w. R R Gaz—Oct. 30, 1903.

St. Louis Southwestern.—St. Louis Southwestern. Brief report of earnings, operating expenses, etc. 600 w. R R Gaz—Oct. 30, 1903.

Southern-Mobile & Ohio.—The Southern's Absorption of the Mobile & Ohio. Information concerning the contract, with a discussion of the condition of the property, the earning capacity and related matter of interest. Ill. 2500 w. Ry Age—May 24, 1901.

Tokyo Electric.—See **ELECTRIC RAILWAY—Tokyo.**

Trusts.—See **TRUST—Railway.**

United Power & Transportation Co.—See **ELECTRIC RAILWAY.**

Valuation.—See **Capitalization; RAILWAY VALUATION.**

RAILWAY FROG.

See **TRACK—Blocking; Crossing.**

RAILWAY GRADE.

See also **RAILWAY CONSTRUCTION; RAILWAY ECONOMICS; RAILWAY ENGINEERING; RAILWAY LOCATION; RAILWAY PERMANENT WAY.**

What is Meant by a Grade Stated in Per Cent? Carl Hering. An explanation. 800 w. St Ry Jour—July 19, 1902.

Air Brake.—See **AIR BRAKE—Mountain Grades.**

Curves.—See **RAILWAY CURVE—Vertical.**

Electric.—The Computation of the Maximum Effective Incline for an Electric Railway (Rechnerische Bestimmung der Günstigen Maximalen Steigung für Elektrische Bahnen). Henri Somach. Deriving formulas and curves based upon the adhesion, tractive power, length of road, speed and other operative conditions. 2000 w. Elektrotech Zeitschr—May 18, 1905.

Illinois Central.—Grade Reduction on the Illinois Central. Reviews the changes in progress on the different divisions. Map. 2500 w. R R Gaz—Aug. 14, 1903.

Grade Reduction. Omaha and Springfield Divisions, Illinois Central R. R. J. C. Gray. Notes on the best practice in grade reduction, with illustrations of work. 1300 w. Ry & Engng Rev—Aug. 27, 1904.

"Madison Incline," Ind.—See **LOCOMOTIVE.**

Momentum.—Momentum Grades: Some Comments on Their Literature and Their Probable Future Use. W. D. Taylor. Revises briefly papers giving information on this subject, with comments. 4800 w. Eng News—April 28, 1904.

Newark, N. J.—See **TRACK ELEVATION.**

Profile.—The Railway Profile Considered with Reference to Propelling Power. Prof. William D. Pence. Condensed from a paper read before the Indiana Engng. Soc. Calls attention to fundamentals connected with the operation of locomotives and trains needed to be understood by the civil engineer having charge of line construction. 1600 w. Eng Rec—Sept. 10, 1904.

Reduction.—Grade Reduction. E. Holbrook. Discusses points in relation to the physical and business conditions which aid in determining the benefits to be derived by grade reductions. 5000 w. Ry Age—May 3, 1901.

Reduction of Grade on Railroads. C. D. Purdon. Discusses questions bearing on the reduction of grades to secure economy in operation. 3000 w. Jour Assn of Engng Socs—July, 1903.

See also Illinois Central; **RAILWAY CONSTRUCTION.**

Tables.—Units for Indicating Grades. Carl Hering. Refers to sources of confusion, and gives a conversion table for grades. 1000 w. St Ry Jour—March 7, 1903.

Velocity.—See **UNDERGROUND RAILWAY—Tubular.**

Virtual.—Investigation as to Virtual Grades. Canadian Pacific Ry. A. C. Dennis. Diagrams, with explanation of their use. 1000 w. Eng News—Nov. 22, 1900.

Virtual Grades for Freight Trains. A. C. Dennis. An account of experimental investigations to see what minor grades could be run with momentum, and where the stalling point was on those which could not be run. 2000 w. Pro Am Soc of Civ Engrs—Nov., 1902.

Virtual Grades for Freight Trains. Discussion of a paper by A. C. Dennis. 2800 w. Pro Am Soc of Civ Engrs—Dec., 1902.

Virtual Grades for Freight Trains. Continued discussion of paper by A. C. Dennis. Plate. 1700 w. Pro Am Soc of Civ Engrs—Jan., 1903.

RAILWAY HISTORY.

See **LOCOMOTIVE—History; RAILWAY—History.**

RAILWAY INVENTION.

What the Inventor has Done for the Railway Worker. Arthur M. Waitt. Discussing improvements in permanent way, rolling stock, motive power, and details of railway operation. 3000 w. Engineering Magazine—March, 1904.

RAILWAY LAND.

See **RAILWAY REAL ESTATE; RAILWAY VALUATION.**

RAILWAY LEGISLATION.

See also **RAILWAY RATE; RAILWAY TAXATION; RAILWAY TRAFFIC; RAILWAY VALUATION.**

Accident, Milwaukee.—See **STREET RAILWAY ACCIDENT.**

British.—Board of Trade Control Over Railroads in Great Britain. H. Raynor Wilson. An explanation of what this control consists and how the power is exercised. Serial. 1st part. 5200 w. R R Gaz—Sept. 5, 1902.

The Railways in Parliament. Editorial review of the bills before the British parliament and the improvements proposed. 3000 w. Engng—Nov. 28, 1902.

Chile.—See **RAILWAY—Transandine.**

Commerce Court.—National Regulation of Railways. Charles A. Prouty. Abstract of a paper before the Philadelphia meeting of the Am. Econ. Assn. Suggests the creation of a commerce court and outlines the work belonging to it. 1300 w. Ry Age—Jan. 2, 1903.

Connecticut.—Railroad Legislation in Connecticut. Clarence Deming. An outline of the present situation in the Connecticut legislature in regard to electric and steam railroads. 1800 w. R R Gaz—June 26, 1903.

Connecticut's New Railroad Legislation. Clarence Deming. A review of what was accomplished in the legislative session of 1905, especially as affecting the New Haven Company. 2000 w. R R Gaz—Vol. XXXIX. No. 3.

See also **ELECTRIC RAILWAY.**

Cuba.—The Cuban Railroad Law. Condensed abstract of the main features of the new code of laws for the government and regulation of the railroads recently issued by the military governor. 1500 w. R R Gaz—April 11, 1902.

Electric.—Some Notes Respecting the Legal Status of Electric Interurban Railways. Gives information in regard to the legal status of electric railways in Indiana, Illinois, Ohio, Michigan, New York, Connecticut and Massachusetts. 2800 w. Eng News—March 5, 1903.

Freight Interchange.—See **ELECTRIC RAILWAY.**

Government Control.—See also **RAILWAY RATE.**

Grade Crossing.—See **GRADE CROSSING—Massachusetts.**

Grand Trunk Pacific Bill.—The Grand Trunk Pacific Railway Legislation. Discusses notable features of the Grand Trunk Pacific bill, giving information in regard to the project. Also editorial. 3500 w. Ry Age—Aug. 7, 1903.

See also **RAILWAY—Canada Transcontinental.**

Industrial Commission.—Industrial Commission on Railways. A summary of the commission's recommendations on and discussion of railway affairs. 8200 w. Ry Age—Feb. 7, 1902.

Interstate Commission.—The Inadequate Powers of the Interstate Commerce Commission. Edward P. Bacon. Discusses the powers of this commission and the proposed amendments, and the subject of railway rates. 5000 w. N Am Rev—Jan., 1902.

Proposed Amendments of the Inter-State Commerce Act. Walker D. Hines. A protest against the proposed legislation to amend the act, with editorial. 2500 w. Ry & Engng Rev—Jan. 18, 1902.

Annual Report of the Interstate Commerce Commission. Extracts concerning packing-house products, rates, traffic associations, safety appliances, &c. 4500 w. R R Gaz—Jan. 31, 1902.

The Interstate Commerce Law. Editorial discussion of the Elkins bill to enlarge the powers of the Interstate Commerce Commission. 2000 w. R R Gaz—Feb. 14, 1902.

Light Railways vs. Tramways.—See **LIGHT RAILWAY—Tramway Compared.**

London, Bill 1903.—See **UNDERGROUND RAILWAY.**

London Tube.—See **UNDERGROUND RAILWAY.**

Massachusetts.—See also **ELECTRIC RAILWAY—Steam Compared; GRADE CROSSING.**

Nebraska.—See **RAILWAY RATE.**

Northern Securities.—The Northern Securities Case Before the United States Supreme Court. Abstracts of briefs and arguments setting forth both sides of the contention. The Government brought the suit upon the charge that the Sherman anti-trust law had been violated. 8500 w. Ry Age—Dec. 18, 1903.

See also **INDUSTRY—Merger Decision.**

Pooling.—Senator Cullom on Pooling Legislation. From the Chicago "Tribune." Considers that Congress has authority to grant the railroads permission to pool. 900 w. Ry Age—Jan. 2, 1903.

Regulation.—See **RAILWAY RATE.**

Routing Freight.—See **RAILWAY TRAFFIC.**

Wisconsin.—See **RAILWAY TAXATION; STREET RAILWAY ACCIDENT.**

RAILWAY LOCATION.

See also **RAILWAY; RAILWAY CONSTRUCTION; RAILWAY CURVE; RAILWAY ECONOMICS; RAILWAY ENGINEERING; SURVEYING.**

Some Theories Upon Railroad Location. J. G. G. Kerry. Abstract of a paper read before the Canadian Soc. of Civ. Engrs. Considers preliminary work, grades, curvature, etc. 5700 w. Eng News—Aug. 20, 1903.

Railroad Reconnaissance. Willard Beahan. Considers the principles and methods of work in determining the route and line. Discussion. 6800 w. Jour W Soc of Engrs—Oct., 1903.

Australia.—Railway Location in Victoria, Australia. D. M. Fraser. Deals with the application of the principles of economic railway location, as developed by A. M. Wellington, to the conditions in Australia. Chiefly considers light traffic railways. 13,300 w. Eng News—May 12, 1904.

Canada.—Some Theories upon Railroad Location. J. Kerry. A discussion of factors of importance, especially from a Canadian point of view. Maps. 11,000 w. Can Soc of Civ Engrs, Adv Proof—March, 1903.

Center Line.—See **SURVEYING—Railway Center Line.**

Chicago, Burlington & Quincy.—See **RAILWAY.**

China.—See RAILWAY; RAILWAY CONSTRUCTION.

Choctaw, Oklahoma & Gulf.—Methods of Location on the Choctaw, Oklahoma & Gulf Railroad. F. Lavis. On the methods of making surveys as practiced on this road, the organisation and equipment of parties, etc. 9500 w. Pro Am Soc of Civ Engrs—Dec., 1904.

Methods of Location on the Choctaw, Oklahoma & Gulf Railroad. Discussion of paper by F. Lavis. 3500 w. Pro Am Soc of Civ Engrs—Feb., 1905.

Florida Everglades.—Railway Location in the Florida Everglades. William J. Krome. An illustrated article describing an exploration survey through this territory. Serial. 1st part. 1800 w. Eng Rec—April 2, 1904.

Forest.—Notes on Railway Location in Forest Country. Moses Burpee. Considers the difficulties, the outfit needed, the methods, etc. 3400 w. Eng Rec—Nov. 7, 1903.

Locating a Railroad Line Through a Forest. J. A. Macdonald. Describes the method of getting from one controlling point to another in a rough and difficult forest country. 700 w. R R Gaz—Vol. XXXIX., No. 5.

Instructions.—General Instructions to Locating Engineers. Issued by William Ashton, Resident Engineer, Oregon Short Line R. R. 1200 w. Serial. 1st part. Eng Rec—Oct. 24, 1903.

Knoxville, La Follette & Jellico.—The Location of the Knoxville, La Follette and Jellico Railroad, of the Louisville & Nashville system. W. D. Taylor. Aims to show the considerations that determined each important step in the layout of an important engineering work. Maps. 7700 w. Pro Am Soc of Civ Engrs—Feb., 1904.

The Location of the Knoxville, La Follette and Jellico Railroad, of the Louisville and Nashville System. Discussion of W. D. Taylor's paper on this subject. 12,800 w. Pro Am Soc of Civ Engrs—April, 1904.

Massachusetts Central.—See RAILWAY CONSTRUCTION.

Mathematics.—Mathematics of the Paper Location of a Railroad. J. C. L. Fish. Presents the mathematical steps involved in preparing, from the paper location of a railroad, a set of mathematically consistent alignment notes by which to run the corresponding field location. 3500 w. Eng News—March 16, 1905.

Norfolk & Western.—Location of the Clinch Valley Division, N. & W. Emile Low. Deals especially with the location between St. Paul and Coeburn, Va., where some unusual problems were solved. Ills. 2500 w. R R Gaz—June 10, 1904.

Stadia.—See SURVEYING.

RAILWAY MANAGEMENT.

See also RAILWAY EMPLOYEE; RAILWAY ENGINEERING; RAILWAY FINANCE; RAILWAY OPERATION; RAILWAY ORGANIZATION; RAILWAY TRAFFIC.

Australia.—Colonial Railway Administration During Crises. Editorial discussion of the policy adopted by the Queensland Ry. Commissioner during the agricultural crisis of the past year, comparing with that of the New South Wales railway authorities. 2000 w. Engng—Nov. 6, 1903.

See also Government Ownership.

British vs. American.—Railroad Management in England and the United States. Charles Hansel. An explanation of the different conditions in the two countries which make the methods incomparable. 1200 w. R R Gaz—Nov. 21, 1902.

Some Thoughts and Suggestions on Railroad Organization and Management. A. M. Waitt. Considers some of the features of organisation in England, comparing with America, and discusses the needs of large systems, offering suggestions. 4000 w. R R Gaz—March 11, 1904.

See also RAILWAY—Yorke Report; RAILWAY OPERATION.

Engineers.—Engineers and Railway Management (Eisenbahnbetrieb und Ingenieur). G. Gerstel. A review of the relation of the work of the engineer to the general details of railway operation and management. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 29, 1901.

Railway Management and the Civil Engineer. Theodore Voorhees. Lecture before the College of Civil Engineering. Suggestions on the relation between the civil engineer and the railway management, giving notes on the general organization of a railway company. 6000 w. Trans Assn of Civ Engrs of Cornell Univ—1902.

Government Ownership.—Government Ownership of Railways. H. R. Meyer. The first of a series of articles aiming to give the facts regarding the experience of Europe and Australasia in the adjustment of railway rates and management of the railways. Serial. 1st part. 4000 w. Ry Age—July 10, 1903.

See also RAILWAY.

Industrial Department.—See RAILWAY ORGANIZATION.

Pennsylvania.—The Personnel, Material and Methods of a Railroad. L. F. Loree. An address before the Assn. of Transportation Officers, full of practical suggestions. 2000 w. R R Gaz—March 8, 1901.

Work Regulation.—See RAILWAY EMPLOYEE.

RAILWAY MANUFACTURING.

Railway Companies as Manufacturers. Editorial discussing the English practice, the railway companies making everything they use. Does not consider the practice necessarily economical. 1000 w. Loc Engng—Nov., 1902.

RAILWAY MATERIAL.

See also LABORATORY—Railway; RAILWAY ACCOUNTING; RAILWAY MANUFACTURING; RAILWAY SHOP.

Accounts.—See RAILWAY ACCOUNTING—Materials.

Pennsylvania.—See RAILWAY MANAGEMENT; SPECIFICATIONS.

Repairs.—Manufacture of Material at a Repair Point. W. F. Jones. Discusses the question from the point of economy and the retaining of men in the dull season. General discussion. 2500 w. Pro Cent Ry Club—May, 1905.

See also RAILWAY SHOP.

See also LOCOMOTIVE; LOCOMOTIVE SHOP; RAILWAY SHOP.

Store Department.—The Store Department. C. F. Balch. Outlines the needed equipment of a railroad store, considering the facilities, organization and operation. 2000 w. Ry Age—Aug. 4, 1905.

Storehouse, Altoona.—The Storehouse System at Altoona. George L. Fowler. An explanation of the method of receiving, storing, distributing and transferring material, giving forms used. 3000 w. Eng News—June 2, 1904.

Supply Department.—See RAILWAY ORGANIZATION.

Testing.—Test Departments. C. W. Gennet, Jr. Considers the object of the test department in railroading, and the method of carrying on the work. 2400 w. R R Gaz—April 10, 1903.

See also LABORATORY—Railway.

Testing, Long Island.—The Department of Tests on a Railroad. Extracts from a paper by H. B. Hodges, read before the New England R. R. Club. On the desirability of railroads maintaining their own laboratory and a system of inspection and tests of supplies purchased, giving an account of the practice of the Long Island R. R. 3800 w. R R Gaz—Feb. 15, 1901.

RAILWAY MOTIVE POWER.

See also ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY—Steam Compared; LOCOMOTIVE; LOCOMOTIVE OPERATION.

What Motive Power Officers Consider Important. Report of interviews with progressive men. Serial. 1st part. 2000 w. Am Engr & R R Jour—Nov., 1900.

Gasoline Vehicles.—See CAR; MOTOR-DRIVEN; GASOLINE LOCOMOTIVE.

Rock Island Report.—Rock Island Motive Power Committee Report. Extracts from investigations and recommendations regarding locomotives and motor cars. 2400 w. R R Gaz—Vol. XXXVII., No. 29.

Waitt Address.—The Situation With Motive Power. From the address of A. M. Waitt at the convention of the Am. Ry. Mas. Mecs.' Assn. Reviews the developments of the last five years, considering locomotive design and construction, operating expenses and efficiency, shop practice, etc. 4000 w. Ry & Engng Rev—June 28, 1902.

Master Mechanics' Association. Extract from the able address of President Waitt, discussing recent motive power improvements, the handling of traffic, etc. 2000 w. Am Engr & R R Jour—July, 1902.

RAILWAY OIL HOUSE.

See **OIL STORAGE.**

RAILWAY OPERATION.

See also **LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE RATING; RAILWAY ACCIDENT; RAILWAY ACCOUNTING; RAILWAY EMPLOYEE; RAILWAY MANAGEMENT; RAILWAY MOTIVE POWER; RAILWAY ORGANIZATION; RAILWAY TRAFFIC; RAILWAY TRANSPORTATION; TRAIN; TRAIN, FAST; TRAIN SERVICE.**

Mr. John F. Wallace on Railroading. Extracts from a lecture delivered at Chicago. Reviews the growth of the present railway systems, the organization and operation. 3300 w. Ry & Engng Rev—May 23, 1903.

Air Brake Records.—See **AIR BRAKE.**

All Stations Express Train.—See **Moving Train Boarding.**

American.—Railroad Operation in the United States. Sidney Graves Koon. An investigation of the general tendency in recent years, based on statistics given in a paper by H. Ward Leonard. 1200 w. Sib Jour of Engng—Nov., 1904.

American vs. British.—British and American Railroad Methods. Extract from a letter of an American mechanical engineer giving opinions, wherein British methods could be improved. 900 w. R R Gaz—Dec. 5, 1902.

See also **RAILWAY—Yorke Report; RAILWAY MANAGEMENT.**

Australia.—A Run from Adelaide to Sydney. Describes the train and run of 1059 miles. 2700 w. Engr, Lond—Dec. 28, 1900.

Boarding Moving Trains.—See **Moving Train Boarding.**

Branch Lines.—See **TRAIN SERVICE.**

British.—Impressions of Foreign Railroad Practice. The first of a series of articles giving an interesting discussion of transportation methods. The present article considers English operation. Serial. 1st part. 2700 w. Am Engr & R R Jour—Jan., 1904.

Why English Railroads Are Safe. James Davenport Whelpley. Discusses the safeguards employed, government supervision, and the pressure of public opinion. Ills. 3700 w. World's Work—March, 1905.

Methods of Operating English Railways (Betriebseinrichtung der Englischen Eisenbahnen). Prof. Cauer. A fully illustrated account of British railway terminals and methods of operation, in the light of German observation. Serial. Part I. 4000 w. 1 plate. Glasers Annalen—April 1, 1905.

Notes on British Railways (Mitteilungen von den Englischen Eisenbahnen). W. Cauer. An address before the German Railway Association discussing British terminals and operative methods from a German viewpoint. 4500 w. 1 plate. Glasers Annalen—Aug. 1, 1905.

Some English Railways. Editorial review of the returns of the first six months of the present year, with discussion of the traffic, service, etc. 2000 w. Engng—Aug. 25, 1905.

See also **TRAIN SERVICE.**

British, French and German.—Impressions of Foreign Railroad Practice. The first of a series of articles giving interesting comparison of English, French and German practice. Serial. 1st part. 1500 w. Am Engr & R R Jour—May, 1905.

Car Clearance.—See **RAILWAY TRAFFIC.**

Car Interchange.—See **RAILWAY TRAFFIC.**

Delays.—Train Delays. Condensed report on train delays, their causes, cost, responsibility for and remedies, presented at the Oct. meeting of the Pacific Coast Ry. Club. Serial. 1st part. 3000 w. R R Gaz—Nov. 23, 1900.

Despatching.—Economic Train Despatching. G. W. Turner. Read before the Pacific Coast Ry. Club. Discusses the subject generally, criticizing some features of present practice. 1500 w. Ry & Engng Rev—March 23, 1901.

Simplification of Train Despatching. Editorial on the changes made in the time tables of the Chicago, Burlington & Quincy R. R. 2500 w. R R Gaz—July 19, 1901.

Train Despatching. Extracts from a paper by C. N. Woodward, read before the New England R. R. Club. Discusses the work and the practice, the men and the service. 2000 w. R R Gaz—Nov. 8, 1901.

See also Telephone; **ELECTRIC RAILWAY; RAILWAY EMPLOYEE—Train Despatcher; RAILWAY SIGNAL; STREET RAILWAY MANAGEMENT.**

Dining Car.—See **CAR—Dining.**

Double-Heading.—Double-Heading with Heavy Engines. Report of a committee of the Central Railway Club, with discussion. 3000 w. R R Gaz—Oct. 25, 1901.

Double Traction.—The Use of Double Traction (Note sur l'Emploi de la Double Traction). M. Herdner. A discussion of the action of two locomotives hauling a train, showing the practicability of dividing the work to advantage between the two machines. 4000 w. Rev Gen des Chem de Fer—March, 1904.

Economy.—Economy in Railroad Operations. W. B. Waggoner. Outlines the general situation and offers suggestions based on study and experience. General discussion. 12,600 w. Pro W Ry Club—Jan. 19, 1904.

See also **Speed Economy.**

Electric Tablet System.—Electric Tablet System on New Zealand Railways. A detailed report, giving the regulations governing the working of the system. 16,000 w. Cons Repts—April, 1905.

Electric vs. Steam.—See **ELECTRIC RAILWAY—Steam Compared.**

Expenses, Train.—Economical Train Operation. G. R. Henderson. Endeavors to make clear how the most efficient rating may be practically studied, both as regards cost of operation and amount of business handled. Serial. 1st part. 3000 w. Am Engr & R R Jour—Oct., 1904.

Fast Train.—See **TRAIN, FAST.**

France.—Impressions of Foreign Railroad Practice. The present article deals especially with French methods, considering them the most scientific treatment given to the locomotive at the present time. Serial. 1st part. 1500 w. Am Engr & R R Jour—Dec., 1904.

See also **British, French and German.**

Freight Train.—The Heavy Freight Train in American Railroad Practice. George R. Henderson. Discusses the effects of overloading, giving tables showing average earnings per ton-mile, average weight of train, and average cost of haulage, etc., and the handling of heavy freight trains. 4000 w. R R Gaz—Vol. XXXVIII., No. 18.

Comparative Cost of Fast and Slow Freight Service. W. B. Poland. A report of data collected during the months of Jan. and Feb., 1904, and conclusions. 1200 w. Ry Age—Nov. 25, 1904.

See also **Weight Increase.**

Graphic Records.—Graphic Records of Cars and Trains. Notes from G. F. Richardson, master of transportation on the Southern Pacific, concerning graphic methods in use. 1500 w. R R Gaz—Aug. 16, 1901.

Graphic Train Logs. Paul T. Warner. Explains the method of preparing these interesting records, which show all stops and variations in speed on the run. Gives four curves prepared in the manner indicated. 1000 w. R R Gaz—Vol. XXXIX., No. 5.

High Speed.—See **LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; TRAIN, FAST.**

Industrial Department.—See **RAILWAY ORGANIZATION.**

Lap Sidings.—Lap Sidings on the Cleveland & Pittsburgh. L. F. Loree. Reprint of an article published Dec. 26, 1900, which has been inquired for, but was out of print. A statement of the situation and account of the "lap sidings," with diagrams. 2400 w. R R Gaz—Sept. 13, 1901.

Locomotive Pooling.—See **LOCOMOTIVE POOLING.**

Mileage.—Mileage: How Car Performance Can Be Improved. W. M. Prall. Considers a through car moving on a through contract, and a reorganized terminal service necessary. Also discussion. 4500 w. St. Louis Ry Club—May 10, 1901.

Mileage Statistics.—Train and Locomotive Mileage Statistics. E. F. Knibloe. Presented at St. Louis meeting of the Am. St. Ry. Assn. Reviews the manner the subject came before the association and the investigations undertaken and methods. 2200 w. Ry Age—Oct. 25, 1901.

Moving Train Boarding.—Method of Unloading Passengers from Moving Trains. Illustrates and describes the use of "saddle cars" successively taken up and dropped from a moving train. 700 w. Sci Am—Jan. 4, 1902.

An All-Stations Express Train. Diagrams and description of a scheme for obviating the stopping of local trains, devised by Prof. J. Brown. 1500 w. Sci Am Sup—Aug. 15, 1903.

Northern Pacific.—The First Time Card on the Northern Pacific. A facsimile of this interesting time card, with reminiscent notes concerning the early days on the Northern Pacific, by George W. Cushing. 1800 w. Ry Mas Mech—Jan., 1901.

"Red Card" System.—See **RAILWAY TRANSPORTATION—Fast Freight, Canadian Pacific.**

Signal.—See **RAILWAY SIGNAL.**

Single Track.—A Panacea for One Class of Butting Collisions. H. W. Forman. Considers the present method of moving trains on a very busy single track railroad, with suggestions for insuring greater safety. 2000 w. R R Gaz—Vol. XXXVII., No. 12.

See also **RAILWAY SIGNAL.**

Skipping Tests.—See **AIR BRAKE.**

Speed.—See **LOCOMOTIVE PERFORMANCE; TRAIN, FAST.**

Speed Economy.—The Most Advantageous Loads and Speeds for Merchandise Trains (Les Charges et les Vitesses le Plus Favorable des Trains de Marchandises). F. Barbier. Deducing formulas in which to introduce the operative conditions and determine the best train mileage. 1800 w. Génie Civil—Feb. 14, 1903.

The Efficient Speed of Freight Trains (De Gunstige Snelheid van Goederen Treinen). F. J. Vaes. With tables and curves showing the relation between cost and speed in merchandise transport. 8500 w. De Ingenieur—March 7, 1903.

Standards.—Correct Railroad Standards. W. H. Sheasby. Prize paper, read before the Pacific Coast Ry. Club. A criticism of some railroad practices and methods. 4000 w. Ry Age—July 3, 1903.

Supervision.—Some Ideas on Road Supervision. Eugene M'Auliffe. Discusses economics in the mechanical and operating departments. 2000 w. Loc Engng—Jan., 1901.

Telegraph.—See **Despatching; TELEGRAPH—Railway.**

Telephone.—Telephone Train Despatching. On the adaptability of telephones to this work, precautions necessary, and the reason why so little used. 1800 w. R R Gaz—Jan. 4, 1901.

The Railway Telephone. E. A. Chenery. Discusses the use of telephones in railway work, and thinks a great deal of work now done by telegraph must be done by the telephone. Gives plate of the N. Y., N. H. & H. R. R. telephone systems. 2800 w. St. Louis Ry Club—Dec. 14, 1900.

The Telephone in Railroad Service F. P. Valentine. Read before the Assn. of Ry. Tel. Supts. Discusses the advantage of the use of the telephone in this work and how to obtain the best results. 3200 w. R R Gaz—July 5, 1901.

The Railroad Telephone. C. A. Hammond. Discusses the advantages of the telephone in railway operation. 1600 w. R R Gaz—June 13, 1902.

Railroad Telephone Service. Waldon Fawcett. Gives some of the uses made of this means of communication in railway service. 1500 w. Loc Engng—Oct., 1902.

The Use of Modern Telephones as Applied to Railroads. B. A. Kiser. Read before the Assn. of Ry. Tel. Supts. Shows the work actually being done on one of the railroads by the use of the telephone. 1500 w. Ry Age—June 24, 1904.

The Telephone System of the Prussian-Hessian Railways (Der Streckenfernsprecher der Preussisch-Hessischen Eisenbahnen). Arthur Wilke. An illustrated description of the use of a telephone line system for the regulation and operation of a railway system. 2500 w. Glasers' Annalen—July 15, 1904.

See also **ELECTRIC RAILWAY—Despatching; TELEPHONE—Railway.**

Telephone vs. Telegraph.—Telephone vs. Telegraph on Railroad Lines. G. F. Jenks. Reviews the reasons why the telephone should not supersede the telegraph. 1000 w. Elec Wld & Engr—Jan. 12, 1901.

Train Control.—See **RAILWAY SIGNAL—Locomotive Cab; TELEPHONE—Railway.**

Train Despatching.—See **Despatching; Telephone; RAILWAY EMPLOYEE.**

Train Orders.—Is the "19" Form of Train-Order Unsafe? H. W. Forman. A discussion of train orders, and collisions and accidents due to their misinterpretation. 2500 w. R R Eng—April 8, 1904.

The Middle Order and the "19" Order. H. A. Dalby. Discusses methods of handling train orders, especially the use of the "middle order." 2800 w. Ry Age—Dec. 2, 1904.

See also **Train Rules; RAILWAY SIGNAL.**

Train Record.—See **Graphic Record.**

Train Rules.—The Standard Code on the Chicago and North Western. Notes the principal features in which the code varies from the "Standard," as issued by the American Ry. Assn. 1700 w. R R Gaz—May 16, 1902.

The Standard Code on the C. N. O. & T. P. Gives extracts from the rules for conductors, with remarks. 4800 w. R R Gaz—June 19, 1903.

An Explanation of Form F. An explanation and discussion. 2200 w. R R Gaz—Vol. XXXVII., No. 14.

Standard Code Rules. H. W. Forman. Discusses the need of revision of rules for single track. Serial. 1st part. 3000 w. R R Gaz—Vol. XXXVIII., No. 9.

See also Train Order.

Train Staff.—The Train Staff System. Describes this English system of controlling the traffic on single-track railroads. Ill. 3300 w. Ry & Engng Rev—Nov. 2, 1901.

Signals and Signaling. George Sherwood Hodgins. An illustrated article describing the electric train staff system as used on four or five roads in the United States. 1800 w. Ry & Loc Engng—Feb., 1905.

See also **RAILWAY SIGNAL—Ireland.**

Train Staff, Electric Railways.—Block Signal Systems for Electric Railways. H. D. Emerson. Showing the adaptability of the block system, and its application, by means of the "train staff," to high-speed electric railways. 2000 w. St Ry Jour—Aug. 16, 1902.

The Train Staff for Electric Railroads. Editorial discussing the views of H. D. Emerson as given in the "Street Railway Journal," advocating the use of the "train staff" in single-track interurban electric railroads. 1600 w. R R Gaz—Sept. 19, 1902.

Train Staff, New Zealand.—Train Staff Operation on New Zealand Railways. Nearly full consular report, giving the general regulations and details of the system, which has been in operation eight months. Serial. 1st part. 8000 w. Ry & Engng Rev—April 20, 1905.

Train Staff, Queen and Crescent.—Instruction of Queen and Crescent Train Men. A. J. Love, with editorial. The "train staff" system of train control is explained. It makes operating on a single track absolutely free from danger of collisions. 2900 w. Loc Engng—April, 1902.

Train Staff, Reading.—The Train Staff on the Reading. Brief illustrated description of the train staff system of train despatching and block signaling introduced in a short section of single track line between Mahanoy tunnel and Buck Mountain. 1000 w. R R Gaz—Dec. 6, 1901.

Train Tonnage.—See **Weight Increase; RAILWAY TRANSPORTATION—Tonnage.**

Union Pacific.—See **RAILWAY CONSTRUCTION.**

United States.—See **American; RAILWAY ACCIDENT.**

Waitt Address.—See **RAILWAY MOTIVE POWER.**

Weight Increase.—Has the Increase in Weight of Freight Trains and Locomotives Reached Its Limit? Editorial discussion of this subject, quoting from Mr. Sullivan's address before the Cent. Ry. Club. 1800 w. Eng News—Nov. 28, 1901.

See also **Freight Train; CAR—Capacity; RAILWAY TRANSPORTATION—Train Loads.**

Wind Pressure.—See **RAILWAY ACCIDENT—Leven; TRAIN RESISTANCE; WIND PRESSURE—Trains.**

Work Regulation.—See **RAILWAY EMPLOYEE.**

Wrecking Outfits.—See **RAILWAY ACCIDENT.**

RAILWAY ORGANIZATION.

See also **RAILWAY EMPLOYEE; RAILWAY MANAGEMENT; RAILWAY OPERATION.**

Railroad Organization. George T. Sampson. General remarks, with a description of one of the best organizations in the United States, and, as the writer believes, in the world. 13,000 w. Jour Assn of Engng Socs—Jan., 1902.

Railroad Organization. Arthur Hale. A paper read at New York University. Discusses the organization of the entire service. 4000 w. R R Gas—April 11, 1902.

Bridges and Buildings.—The Superintendent of Bridges and Buildings—His Duties and Responsibilities. Onward Bates. An address before the St. Louis Convention. 3500 w. Pro of Assn of Ry Supts of Bdgs & Bldgs—Oct., 1900.

British vs. American.—See **RAILWAY MANAGEMENT.**

Claim Department.—See **RAILWAY TRAFFIC; STREET RAILWAY ACCIDENT; STREET RAILWAY MANAGEMENT.**

Division Engineers.—The Division Engineer in Railway Work. Willard Beahan. A discussion of the qualifications desirable in a successful division engineer, and the character of his work, giving suggestions. 6800 w. Jour W Soc of Engrs—Aug., 1905.

Industrial Departments.—Industrial Departments of Railways. Discusses methods of modern management to provide for future traffic and increase the revenue. 2500 w. Ry Age—July 14, 1905.

The Industrial Department. A review of the history of the railroad industrial department, with editorial on the work of the industrial commissioner. 5800 w. R R Gaz—Vol. XXXIX., No. 25.

Mechanical Officers.—Some of the Duties of Mechanical Officers. S. P. Bush. An interesting paper discussing these duties and illustrating by actual occurrences the position taken by the writer. General discussion. 10,000 w. W Ry Club—Sept., 1901.

Office.—See **WORKS MANAGEMENT.**

Rock Island.—The New Engineering Organization on the Rock Island System. An explanation of the present organization, which places the engineering force in a position of much greater responsibility. 1700 w. Eng Rec—Sept. 3, 1904.

Shop Force.—See **RAILWAY SHOP—Management.**

Southern Ry.—The Organization of a Great Railroad. Gives the organization of the Operating Department of the Southern Ry. 1400 w. R R Gaz—Nov. 9, 1900.

Stock Yard.—See **STOCK YARD—Railway.**

Superintendent of Motive Power.—The Superintendent of Motive Power and What Is Expected of Him. A general discussion of his responsibilities and requirements and how best to fit him for his work. 3400 w. R R Gaz—June 13, 1902.

Supply Department.—The True Perspective of the Supply Department. George Yeomans. A short paper with lengthy discussion on the importance of this department of railways. 1600 w. Pro W Ry Club—Dec. 19, 1905.

See also **RAILWAY MATERIAL.**

Telegraph Department.—See **RAILWAY OPERATION; TELEGRAPH—Railway.**

RAILWAY PERMANENT WAY.

See also **CROSS TIE; GRADE CROSSING; RAIL; RAILWAY; RAILWAY CONSTRUCTION; RAILWAY CURVE; RAILWAY GRADE; RAILWAY SIGNAL; RAILWAY STATION; RAILWAY SWITCH; RAILWAY TERMINAL; RAILWAY YARD; ROUNDHOUSE; SLEEPER; TRACK; TRACK ELEVATION; TRACKLAYING.**

Practical Necessity of a Thoroughly Good Roadbed for the Fast and Economical Handling of Traffic. Michael L. Lynch. Considers the importance of location of railways, remodeling, improvements of roadbed, track, etc. General discussion. 2 plates. 2500 w. St. Louis Ry Club—Nov. 9, 1900.

Roadway. Report of the American Railway Engineering and Maintenance of Way Association, with discussion at the Chicago convention. 16,700 w. Ry Age, Special No.—March 21, 1902.

Ballast.—Ballasting. Report of the Com. of the Am. Ry. Engng. & Main. of Way Assn., with discussion. 3000 w. Ry Age (Spe. No.)—March 15, 1901.

Ballasting New Railways. Abstract of an article by J. C. Rockbold, in the "Roadmaster and Foreman." Advocates ballasting with plenty of good earth until the roadbed has become consolidated enough for permanent ballast. 1300 w. Eng News—Aug. 22, 1901.

Ballast for Railways. Considers the kinds of ballast used and the value of each. 3000 w. Engr, Lond—Aug. 28, 1903.

Stone Ballast. E. A. Hermann. Remarks on the tendency to replace ballast formerly used with crushed stone, giving the claims of superiority. 700 w. Eng News—Dec. 17, 1903.

Ballast. From the report of a committee to Am. Ry. Engng. & Main. of Way Assn. Explains the requirements of ballast, and considers the materials available. 3300 w. Eng Rec—March 26, 1904.

See also **BRIDGE FLOOR.**

Cattle Guard, Canada.—The Cattle-Guard Question in Canada. Gives the conditions to regulate the types of guard, submitted by a specially appointed commission, and the changes proposed in location and arrangements. 1100 w. Ry & Engng Rev—Jan. 3, 1903.

Electric Railway.—See **ELECTRIC RAILWAY—Permanent Way; TRACK—Street.**

Embankment. — See **EARTHWORK; RAILWAY CONSTRUCTION.**

European and American.—See **TRACK.**

Frost Action.—Disturbance of Roadbed and Bridges by Frost on the Trans-Siberian Railway. Illustrated description of interesting phenomena observed on this line in Siberia. 500 w. Eng News—July 31, 1902.

Gates.—Improvements in Gates at Crossings (Neuerungen an Wegeschranken). Hr. Scholkmann. A paper before the Verein für Eisenbahnkunde, giving an account of improvements in hand-operated gates for railway grade crossings, and an illustrated description of an automatic gate worked by gas engine. 2000 w. Glasers Annalen—June 1, 1903.

See also **GRADE CROSSING.**

Germany.—Recent Studies in the Superstructure of Railways (Neue Beobachtungen, Messungen, und Versuche am Eisenbahn-Oberbau). Dr. Haarmann. An address before the Berlin Railway Society discussing the changes necessary in permanent way to meet the modern demands. 7000 w. Glasers Annalen—June 15, 1904.

High-Speed.—See **LOCOMOTIVE; TRAIN, FAST.**

Inspection.—Permanent Way Inspection. Gives details of a new system of permanent way inspection started by the London and South-Western Railway Company. 2000 w. Engr, Lond—May 5, 1905.

Inspection, Premium.—Premium Track Inspection. Gives results of the annual inspection of track on one English and two American railroads, all of which have adopted the premium system of rewarding good work in that department. 1800 w. R R Gaz—July 22, 1904.

Lackawanna.—See **RAILWAY CONSTRUCTION.**

London and Southwestern.—See **RAILWAY CONSTRUCTION.**

Maintenance.—Railway Maintenance-of-Way. H. J. Slifer. Considers means of securing the best results with the least expenditure. Also discussion. 6000 w. Jour W Soc of Engrs—Oct., 1903.

Some Records of Maintenance-of-Way Expenses on American Railways. Replies to inquiries and information from individual railway companies, with editorial discussion. 6000 w. Eng News—July 27, 1905.

Committee Reports of the American Railway Engineering and Maintenance of Way Association. Abstracts of reports on ballasting, ties, buildings, masonry, yards and terminals, etc. 6500 w. Eng News—March 23, 1905.

Roadway. Abstract of Report at meeting of the Am. Main. of Way Assn. Gives specifications for the formation of roadbed, standard plans, etc., with discussion. 7500 w. Ry Age—March 24, 1905.

American Railway Engineering and Maintenance of Way Association Reports. Abstracts of the reports presented to the Maintenance of Way Assn., covering a wide range of subjects. 13,500 w. R R Gaz—Vol. XXXVIII., No. 12.

Modern Track Construction. A. Morrison. From paper entitled "The Construction and Maintenance of a Railroad Capable of Taking Care of the Present Traffic and Rolling Equipment," read before the Roadmasters' and Maintenance of Way Assn. 1800 w. Ry & Engng Rev—Sept. 23, 1905.

N. Y. Central.—New York Central Roadbed Improvements in the Vicinity of New York City. Illustrates and describes improvements made north of Mott Haven, including additional tracks, tunnels, new roadbed, cut-offs, depression, etc. 1600 w. Ry & Engng Rev—Dec. 16, 1905.

Improvements of the New York Central & Hudson River Within the Electric Zone. G. R. Wadsworth. Illustrates and describes the Marble Hill cut-off, the Port Morris Branch depression, elimination of grade crossings and special station improvements, and the four-tracking of the Hudson & Harlem divisions. 2000 w. R R Gaz—Vol. XXXIX., No. 19.

The Marble Hill Cut-Off and Port Morris Branch, New York Central Terminal Improvements. Gives a general review of the conditions at the New York terminal of the N. Y. C. & H. R. R. R., and within the territory to be operated by electricity, describing this enormous engineering undertaking, which will approximate $60,000,000 in cost. Ills. 5000 w. Eng Rec—Nov. 4, 1905.

See also RAILWAY CONSTRUCTION; RAILWAY ENGINEERING; RAILWAY TERMINAL.

Oil Sprinkling.—The Oiled Roadbed on the Long Island Railroad. C. L. Addison. A brief statement of conditions previous to the application and the success and cost. 700 w. R R Gaz—March 8, 1901.

Oiled Roadbeds. Waldon Fawcett. Describes the operation of oiling a roadbed, illustrating the oil-sprinkling train. Also an account of its successful use on highways. 1100 w. Sci Am—Oct. 26, 1901.

Oiled Roadbeds of Railways in California. Abstracted from Bulletin No. 2, Department of Highways of the State of California, Sacramento. 1700 w. Eng News—Dec. 1, 1904.
See also ROAD.

Panama.—See RAILWAY.

Rail, Fast Train.—See RAIL.

Renewal.—The Quick Renewal of Permanent Way. Considers methods and points needing care, and means of avoiding accidents while the work is in progress. 5000 w. Engr, Lond—Oct. 17, 1902.

San Pedro and Salt Lake.—See RAILWAY.

Side-Leveler.—See SIDE-LEVELER.

Specifications.—Specification for the Formation of a Roadway. Part of the committee report on roadway at the convention of the Am. Ry. Engng. & Maintenance of Way Assn. 7500 w. Ry & Engng Rev—March 21, 1903.

Subsidence.—Coal Workings Under a Railway. Clement E. Stretton. Read before the Leicester Sec. of the Permanent Way Inst. Briefly considers the practical and the legal side of subsidence caused by mining in England. 1500 w. Col Guard—March 10, 1905.

Switzerland.—The Standard Road Bed of the Swiss Government Railways (Die Oberbau-Normalien der Schweizerischen Bundesbahnen). Giving the standard rail sections and also full details of the standard metallic cross ties. 2000 w. Schweiz Bauzeitung—Jan. 31, 1903.

Tracks, Steel Longitudinals.—See TRACK—Steel Longitudinals.

Union Pacific.—Kansas City-Topeka Double Track Work of the Union Pacific. An illustrated account of improvements amounting practically to rebuilding the line between the cities named. 3000 w. R R Gaz—Vol. XXXIX., No. 23.

See also RAILWAY CONSTRUCTION.

RAILWAY POOLING.

See RAILWAY FINANCE; RAILWAY LEGISLATION; RAILWAY RATES; RAILWAY TRAFFIC.

RAILWAY POWER STATION.

See ELECTRIC RAILWAY; ELECTRIC STATION.

RAILWAY PROJECT.

See RAILWAY; RAILWAY CONSTRUCTION.

RAILWAY RATES.

See also RAILWAY FINANCE; RAILWAY LEGISLATION; RAILWAY TRAFFIC.

Rate-Making and Its Causes. C. L. Wellington. A general discussion of the difficulties in making railroad tariff and the influences which determine them. 1500 w. Pro Rocky Mountain Ry Club—Nov., 1902.

Scientific Rate Making. Suggests a scheme of rate schedules. 2700 w. Ry Age—Dec. 26, 1902.

Adjustments.—Railway Freight Rates. J. N. Faithorn. An address before the College of Engng. of the Univ. of Wisconsin. Gives a general description of rate adjustments made necessary by changed conditions, outlining the prevailing systems. 5400 w. Wis Engr—Feb., 1903.

American and British.—English and American Rates. George S. Gibb, in the London "Times." A comparison, giving information not before available. Also editorial. 2800 w. R R Gaz—May 27, 1904.

British.—Cheaper Railway Fares. Horace Bell. Abstract of a paper read before the Glasgow Congress. Discusses the need of reduction in the United Kingdom. 1600 w. Ir & Coal Trds Rev—Sept. 6, 1901.

English Railway Rate Making and Governmental Rate Control. Abstracts from a recent work by W. M. Acworth, with comments by W. D. Taylor. 4500 w. Ry Age—July 21, 1905.

Competition.—Competition and Railway Rates. Charles A. Prouty. An address before the Illinois Mfrs. Assn. at Chicago. A discussion of present conditions and the danger of railroad monopoly. 5500 w. Ry Age—April 4, 1902.

Differentials.—Railroad Discrimination Against New York, and the Remedy. Abel E. Blackmar. Treats of discrimination against a locality in the interests of a carrier, and the rate problem. Discusses the differential agreement. 4800 w. Pro Am Soc of Civ Engs—April, 1901.

Railroad Discrimination Against New York, and the Remedy. Discussion of paper by Abel E. Blackmar. 14,800 w. Pro Am Soc of Civ Engrs—Aug., 1901.

Railroad Discrimination Against New York, and the Remedy. Herman Conrow. Continued discussion of paper on this subject by Abel F. Blackmar. 5500 w. Pro Am Soc of Civ Engrs—Sept., 1901.

German Coal Imports.—The New German Railway Rates for the Carriage of English Coal Imports. An explanation of the condition of affairs at the present time. 1000 w. Col Guard—Oct. 26, 1900.

Government Control.—See British; Regulation; RAILWAY; RAILWAY MANAGEMENT.

Grain.—Grain Rates Declared Too High. Reviews the decision of the Interstate Commerce Commission holding that the advance made recently in freight rates on grain and grain products from the West to the Atlantic seaboard is not justified. 1400 w. R R Gaz—May 1, 1903.

Illinois.—Freight Rates in Illinois. Statement in full of the C. B. & Q. Railway to the Quincy Freight Bureau. 3200 w. Ry Age—Oct. 17, 1902.

International Ry. Congress.—On the Question of Slow Freight Rates (Subject XIII. for Discussion at the Seventh Session of the Railway Congress). Harry Smart, for England. Explains the general principles with description of different systems of rating slow freight goods. 3300 w. Bul Int Ry Cong—July, 1904.

On the Question of Slow Freight Rates. W. J. Van Overbeck de Meyer. Report (No. 3) for all countries, except America, England, Italy, Spain, Portugal, France and Belgium, on subject XIII. for discussion at the seventh session of the Railway Congress. Tables. 31,500 w. Bul Int Ry Cong—March, 1905.

Live Stock.—Live Stock Rates Between Chicago and the Missouri River. A. B. Stickney. An argument made before the Interstate Commerce Commission in the case of the Chicago Live Stock Exchange vs. the A., T. & S. F. Ry. Co. and others. 14,000 w. Ry Age—Jan. 23, 1903.

Why Live Stock Carrying Rates Are Too Low. W. W. Cotton. Considerations presented at the convention in Portland, Ore., showing the costliness and hazard in connection with this class of traffic. 3500 w. Ry Age—Feb. 12, 1904.

Low.—A Railway Freight Rate of 2 Mills Per Ton-Mile. Editorial discussion of the remarkable low rates. 1800 w. Eng News—Nov. 8, 1900.

Nebraska.—The Nebraska Maximum Raté Decision. S. M. Hudson. A study of this decision concerning the justness of certain rates. 2600 w. Ry Age—June 6, 1902.

Operating Expenses.—See **RAILWAY ACCOUNTING.**

Passenger.—Passenger Fares—An International Comparison. W. M. Acworth. Compares the North-eastern Railway of England with the railways of other countries, showing interesting results. 1500 w. Ry Age—Dec. 2, 1904.

Preferential.—Preferential Rates. A letter from Walker D. Hines, objecting to statements recently published in this paper. Also editorial. 2300 w. Ry Age—Dec. 20, 1901.

Roosevelt's Message.—The President on Rate Regulation. Condensed abstract of the portion of the President's message which treats of railroad rate regulation. 2000 w. R R Gaz—Vol. XXXIX., No. 23.

Regulation.—Some Principles of Railway Regulation. H. T. Newcomb. A discussion of rates, legislation, etc., followed by general discussion. 10,500 w. N Y R R Club—March 20, 1902.

Legislative Regulation of Railroad Rates. Walker D. Hines. Presented at Philadelphia meeting of the Am. Econ. Assn. Discusses the question of enlarging the powers of the Interstate Commerce Commission by giving it the power to make rates and regulations for interstate traffic. 5400 w. Ry Age—Jan. 2, 1903.

The Regulating of Railroad Rates. Hon. Martin A. Knapp. Outlines the questions involved and the principles to be applied in the regulation of railroad rates by public authority. 3000 w. R R Gaz—Vol. XXXVIII., No. 2.

Government Control of Railroad Earnings. L. F. Day. Discusses unwise legislation affecting railway rates, opposing the giving of the rate-making power to the Interstate Commerce Commission. 5000 w. Ry Age—Feb. 10, 1905.

Federal Regulation of Railway Rates. Albert N. Merritt. A discussion of this subject, concluding that government regulation, beyond that now exercised, is a dangerous policy. 3300 w. Ry Age—April 7, 1905.

Government Rate Making and the Constitution. George R. Peck. Abstract of an address delivered before the Union League Club, Chicago. Considers that the making of rates by the Interstate Commerce Commission would result, in many cases, in a violation of the constitution. 2200 w. Ry Age—April 21, 1905.

Railway Rate Regulation—Its Bearing Upon Public Transportation. James L. Cowles. Advocating the extension of the postal system to general transport rates as a solution of the railway rate problem. 1000 w. Sci Am Sup—April 22, 1905.

A Simple Scheme of Rate Regulation. Judge P. S. Grosscup. Extracts from an address before the Union League Club, Chicago. Discusses various phases of the rate question, and gives his opinion in favor of a transportation department of government. 3500 w. Ry Age—April 28, 1905.

Rate Making by Government. Hugo Richard Meyer. Discusses the problem of rate regulation, considering the American rate practices which the Interstate Commerce Commission has condemned. Concludes that the evils from government regulation would be far greater economically and more disastrous politically than the evils which now exist. 6000 w. R R Gaz—May 12, 1905.

Growing Sentiment for a Properly Constituted Commission. J. W. Midgley. A discussion of the need of a commission to regulate railroads, giving the views of prominent writers as well as the opinions of the writer. 2800 w. Ry Age—May 12, 1905.

Both Sides of the Rate Regulation Discussion Restated. Gilson Gardner. A statement of the arguments presented in the joint debate carried on in Washington. 3300 w. Ry Age—June 16, 1905.

See also **RAILWAY—Government Ownership; RAILWAY FINANCE; RAILWAY MANAGEMENT; TRUST.**

Slow Freight.—See **International Ry. Congress.**

Steel Exports.—See **STEEL INDUSTRY—Railway Rates.**

United Kingdom.—See **British.**

RAILWAY REAL ESTATE.

See also **RAILWAY; RAILWAY ACCOUNTING; RAILWAY STRUCTURE; RAILWAY VALUATION.**

Records.—See **RAILWAY ACCOUNTING—Real Estate.**

RAILWAY REGULATION.

See **RAILWAY LEGISLATION; RAILWAY RATES; RAILWAY TRAFFIC.**

RAILWAY REPORT.

See **RAILWAY; RAILWAY ACCIDENT; RAILWAY FINANCE; RAILWAY LEGISLATION; RAILWAY MOTIVE POWER; RAILWAY SAFETY APPLIANCE; RAILWAY STATISTICS; RAILWAY STRUCTURE; RAILWAY TRAFFIC.**

RAILWAY SAFETY APPLIANCE.

See also **AIR BRAKE; BRAKE; CAR COUPLER; GRADE CROSSING; INTERLOCKING; RAILWAY ACCIDENT; RAILWAY SIGNAL; RAILWAY SWITCH.**

Electric Railway.—Report of the Commission on Safety Appliances for Electric Railways (Vorschlag der Sicherheits Kommission betreffend Sicherheitsvorschriften für Elektrische Bahnanlagen). The preliminary report submitted to the Electrotechnical Society for discussion. 3000 w. Elektrotech Zeitschr—June 2, 1904.

Inspection.—Safety Appliances. George Groobey. Extracts from a paper read before the New England R. R. Club. On the number and kind of defects found by the inspectors of safety appliances. 2000 w. R R Gaz—April 1, 1904.

Interstate Com. Report.—Safety Appliances and Accident Reports. Extract from the 15th annual report of the Interstate Commerce Commission, with appendix showing the most common defects in car equipment. 14,000 w. St. Louis Ry Club—June 13, 1902.

A Study of the Interstate Commerce Commission Accident and Safety-Appliance Reports. Extracts from the report of a committee of the Car Foremen's Assn. of Chicago. 3000 w. R R Gaz—Feb. 5, 1904.

Maintenance.—Safety Appliances and Their Maintenance. George Hannauer. Read before the meeting of Cent. Assn. of R. R. Officers. Suggestions for the economical maintenance of power brakes, automatic couplers, etc. 3000 w. Pro St Louis Ry Club—June 10, 1904.

Paris Exposition.—Railway Safety Appliances at the Paris Exposition of 1900 (Die Einrichtungen zur Sicherung des Eisenbahn-Zugverkehres auf der Weltausstellung Paris 1900). G. Rank. A general description of the signaling and other safety appliances exhibited at Paris. Serial. Part I. Zeitschr d Oesterr Ing u Arch Ver—Sept. 13, 1901.

RAILWAY SERVICE.

See **RAILWAY OPERATION; TRAIN, FAST; TRAIN SERVICE.**

RAILWAY SHOP.

See also **CAR SHOP; ELECTRIC RAILWAY SHOP; LOCOMOTIVE SHOP; RAILWAY TERMINAL; ROUNDHOUSE.**

Progress in Locomotive and Car Shop Plans. Editorial comments on the great improvement shown in recently built shops, calling attention to points of interest. 2600 w. R R Gaz—June 20, 1902.

A Typical Shop to Serve a Road or Division Equipped with 300 Locomotives. L. R. Pomeroy. Extracts from a paper presented to the Mas. Mechs.' Assn. Con. Suggestions for shop construction and arrangement. Also discussion. 3000 w. R R Gaz—Oct. 24, 1902.

Railway Shops. R. H. Soule. The first of a series of articles on modern railroad shops and their problems. Serial. 1st part. 1400 w. Am Engr & R R Jour—Feb., 1903.

Railroad Shops. Walter G. Berg. The first of a series of articles discussing carefully the shop question and its relation to the other departments. Ill. Serial. 1st part. 3000 w. R R Gaz—March 13, 1903.

Aguascalientes.—See **Mexican Central.**

Altoona, Pa.—See **FOUNDRY.**

Angus.—See **Montreal, Angus.**

A., T. & S. F.—The New Shops of the Atchison, Topeka & Santa Fe. An illustrated detailed description of these large shops and their equipment, with inset. 3800 w. R R Gaz—Nov. 7, 1902.

B. & O.—See **LOCOMOTIVE HOUSE; ROUNDHOUSE.**

Baring Cross, Ark.—The Baring Cross Shops of the St. Louis, Iron Mountain & Southern Railway. Illustrates and describes this new plant near Little Rock, Ark., calling attention to the symmetry and convenience of the track and building arrangements. 3000 w. Ry Age—June 13, 1902.

Blacksmith.—Ideal Blacksmith Shop and Equipment for General Railroad Work. A. W. McCaslin. Extract of paper before National Assoc. of Blacksmiths. 1200 w. R R Gaz—Vol. XXXVII., No. 11.

Equipment for a Modern Blacksmith Shop for Railroad Work. A. W. McCaslin. Presented before the Nat. R. R. Mas. Blacksmiths' Assn. Describes the requirements of a model shop. 2300 w. Ry Mas Mech—Nov., 1904.

Organization and Operation of a Railroad Blacksmith Shop. A. W. McCaslin. Hints for the foreman and explanation of methods found satisfactory. 1800 w. Am Engr & R R Jour—Jan., 1905.

See also **Montreal, Angus.**

Bloomington, Ill.—Bloomington Shop Improvements. Illustrated description of improvements on the Chicago & Alton Railroad. 1000 w. Am Engr & R R Jour—April, 1901.

The Chicago and Alton Shops at Bloomington, Ill. An illustrated description of these extensively remodeled shops and their new equipment. 3200 w. R R Gaz—June 27, 1902.

Canadian Pacific.—See **Montreal.**

Chicago.—West Chicago Shop of the Chicago and North-Western Railroad. R. T. Shea. Illustrated detailed description. 2200 w. Loc Engng—Jan., 1902.

Rock Island Shop Improvements at Chicago. Information concerning recent changes made necessary by the increase in traffic. 900 w. Ry Age—Jan. 31, 1902.

Chicago & North Western.—Improvements at the Chicago and North Western Shops. Illustrated detailed description of improvements in engine terminal facilities and other departments. 2000 w. R R Gaz—Nov. 21, 1902.

Chicago & Northwestern Shop Enlargements at Chicago, Ill. An illustrated account of the extensive improvements being made. 1800 w. Ry Age—May 30, 1902.

See also **LOCOMOTIVE SHOP—Schedule.**

Collinwood, O.—The Collinwood Shops of the Lake Shore. An illustrated description of new shops at Cleveland, which will be among the most complete in the country. 2000 w. Ry Age—April 11, 1902.

New Locomotive and Car Shops. Illustrating and describing the new shops at Collinwood, Ohio. Serial. 1st part. 4000 w. Am Engr & R R Jour—Oct., 1902.

See also **ROUNDHOUSE.**

Columbus, Ohio.—Shop Improvements of the Pennsylvania at Columbus. An illustrated description of the extensive improvements of the general shops at Columbus, Ohio. Serial. 2 parts. 1700 w. Ry & Engng Rev—April 11 and 17, 1903.

Cost Reducing Methods.—See **Management.**

Crewe, Eng.—The Railway Town of Crewe. Charles S. Lake. An illustrated article reviewing the development of the home of the London & North-Western Railway works, describing the shops, which are the largest in the world. 5400 w. Cassier's Mag—Sept., 1903.

Danville, Ill.—Danville Shops of the Chicago & Eastern Illinois Railway. Illustrated detailed description of the new shops at Oaklawn, east of Danville, and their equipment. 3500 w. Ry Mas Mech—June, 1904.

Darlington, Eng.—Northeastern Locomotive Works, Darlington. Illustrates and describes these very large works and their equipment. 1200 w. Engr, Lond—Aug. 18, 1905.

Denver, Colo.—The New Shops of the Colorado & Southern. Ground plan, illustrations and description. 2000 w. Ry Age—Dec. 14, 1900.

Du Bois, Pa.—New Shops at Du Bois, Pennsylvania. Illustrated description of the most important details, with particular reference to the locomotive shop, power house and roundhouse. 2200 w. Am Engr & R R Jour—May, 1902.

New Shops at Du Bois, Pennsylvania. Illustrated description of shops for the Buffalo, Rochester & Pittsburg Railway, having a capacity of 200 locomotives per year. 1300 w. Am Engr & R R Jour—April, 1902.

See also **ELECTRIC DRIVING; MECHANICAL PLANT.**

Dunmore, Pa.—Erie Railroad Shops, Dunmore, Pa. Plan and front elevation, with description of shops representing the best modern practice. Gives also a list of tools and motors used. 3000 w. Loc Engng—Feb., 1902.

East Buffalo, Lackawanna.—East Buffalo Locomotive Repair Shop of the Delaware, Lackawanna & Western. Illustrates and describes the rebuilt and enlarged shops at this point, and their equipment. 1200 w. Ry Age—Dec. 30, 1904.

Eastern Ry., France.—See **Epernay, France.**

East Los Angeles, Cal.—The Southern Pacific Shops at East Los Angeles. General plan and description. 1400 w. R R Gaz—Aug. 14, 1903.

East Moline, Ill.—New Shops of the Chicago, Rock Island & Pacific Ry. at East Moline, Ill. An illustrated detailed description of a very interesting new plant. 4300 w. Eng News—Feb. 11, 1904.

The New Rock Island Shops at East Moline, Ill. An illustrated detailed description of these shops and their equipment. 2500 w. Ry Age—Aug. 21, 1903.

The East Moline Shops of the Rock Island. An illustrated account of the electrical distribtuion and speed control, the location of machine tools and a description of the smith shop and store house. 3000 w. Ry Age—Feb. 26, 1904.

East Moline Locomotive Shops. Begins an illustrated detailed description of these five repair shops of the Rock Island system. Serial. 1st part. 3000 w. Am Engr & R R Jour—Nov., 1905.

East St. Louis.—New Shops of the Terminal Railroad Association of St. Louis at East St. Louis, Ill. Illustrated detailed description of this new plant and its equipment. Serial. 1st part. 1600 w. Ry Mas Mech—April, 1904.

Electric Driving.—See **ELECTRIC DRIVING—Railway Shop; POWER PLANT—Railway Shop.**

Electric Plant.—See **ELECTRIC PLANT.**

Elizabethport, N. J.—New Locomotive and Car Shops of Concrete Construction. Illustrates and describes the new shops of the Central Railroad of New Jersey at Elizabethport. 1500 w. Am Engr & R R Jour—Nov., 1901.

The Advance of Concrete Construction. An illustrated description of the new car shops at Elizabethport, N. J.; all the buildings, with one exception, are being constructed with concrete walls, and some have the roof of concrete also. 1400 w. Ir Age—Oct. 3, 1901.

New Yards and Shops of the Central Railroad of New Jersey at Elizabethport, N. J. Illustrations and description. The buildings are of monolithic concrete construction. Explains the traffic conditions that had to be provided for, and much information of the shops and their equipment. Serial. 1st part. 4000 w. R R Gaz—Dec. 27, 1901.

See also **ELECTRIC DRIVING—Railway Shop; POWER PLANT.**

Elkhart.—See **ROUNDHOUSE.**

Epernay, France.—A Large Locomotive-Building and Repair Works in France. C. R. King. An illustrated account of the Epernay shops of the Est Railway, especially of the general machine-tool equipment and methods. Ills. Serial. 1st part. 3500 w. The Engineering Magazine—July, 1905.

A Large Locomotive Building and Repair Works in France. Charles R. King. A fully illustrated account of the shops of the Eastern Railway of France at Epernay. 4500 w. Engineering Magazine—Aug., 1905.

Equipment.—Railroad Repair Shop Design and Equipment. George A. Damon. Considers present tendencies in new and reconstructed shops, introducing a general discussion of shop problems. 15,800 w. W Ry Club—April 21, 1903.

Shop Equipment. William S. Cozad. A criticism of the average railroad shop facilities. 2400 w. Am Engr & R R Jour—Aug., 1904.

See also Power Equipment; ELECTRIC DRIVING.

Fads and Fancies.—See LOCOMOTIVE.

Fire Protection.—Fire Protection in Railroad Shops. H. S. Knowlton. Suggestions concerning means that should be taken to guard against fire. 1800 w. Ry Age—June 9, 1905.

See also FIRE PROTECTION.

Fond du Lac.—New Shops of the Wisconsin Central at Fond du Lac. General and detail plans of new repair shops, with illustrations and description. 1800 w. Ry & Eng Rev—Jan. 19, 1901.

Locomotive and Car Shops. An illustrated description of the new shops at Fond du Lac for the Wisconsin Central Railway. 1500 w. Am Engr & R R Jour—May, 1901.

Ft. Worth & Denver City.—New Shops at the Ft. Worth & Denver City Ry. Illustrated detailed description of small shops with provision for extension. 800 w. R R Gaz—March 21, 1902.

Grand Rapids, Mich.—New Shops of the Pere Marquette R. R. at Grand Rapids, Mich. Illustrated detailed description. Serial. 1st part. 2000 w. Ry Mas Mech—Feb., 1905.

Locomotive Repair Shops of the Père Marquette. Illustrated detailed description of the shops at Grand Rapids, Mich., and their equipment. 5500 w. Ry Age—March 24, 1905.

Hannibal, Mo.—New Shops at Hannibal, Mo.—Hannibal and St. Joseph Railway. Gives plans, sections and location of machines, with description of the shops and their equipment. 4200 w. R R Gaz—Sept. 13, 1901.

The Hannibal Shops of the Chicago, Burlington & Quincy Railroad. Illustrated detailed description of the recently completed shops and their equipment. 4300 w. St. Louis Ry Club—May 16, 1902.

Harrisburg, Pa.—See ELECTRIC RAILWAY SHOP—Concrete Reinforced.

Heating.—See HEATING.

High-Speed Steel.—See TOOL STEEL—Railway Shop.

Jackson, Mich.—Michigan Central Shop Improvements at Jackson, Mich. An illustrated description of improvements being made, which include a new central power and lighting station, and the building of a large addition to the machine and erecting shop. 2300 w. R R Gaz—Sept. 19, 1902.

Extensive Shop Improvements. Plans, illustrations and description of the important features in the extensive improvements under way at Jackson, Mich., for the shops of the Michigan Central Railroad. 3000 w. Am Engr & R R Jour—March, 1903.

Keyser Valley, Pa.—See CAR SHOP.

Kingsland, Lackawanna.—The Kingsland Shops of the Delaware & Western R. R. Brief illustrated description of shops in course of construction at Kingsland, N. J. 800 w. Eng Rec—March 25, 1905.

The Kingsland Shops of the Lackawanna R. R. These coach and locomotive shops in New Jersey are illustrated and described. They will cover an area of 8.5 acres, and will cost $1,000,000 when completed and equipped. 3500 w. Eng Rec—Dec. 2, 1905.

Lehigh Valley.—See Sayre.

Linz, Austria.—See ELECTRIC DRIVING—Railway Shop.

London & North-Western.—See Wolverton, Eng.

McKees Rocks, Pa.—New Locomotive and Car Shops. An illustrated description of the shop equipment and buildings of the Pittsburg & Lake Erie R. R., at McKees Rocks, Pa. Serial. 1st part. 2000 w. Am Engr & R R Jour—Nov., 1903.

McKees Rocks Shops of the Pittsburg & Lake Erie. Illustrated detailed description of this large plant, which represents the most approved modern practice. 4800 w. Ry Age—Dec. 18, 1903.

Machine Tools.—Some Money-Saving Schemes, Minneapolis & St. Louis R. R. Brief description of devices for saving labor in shops and tending to economy. A tool for truing wrist pins; a tool for threading radical stays, having button heads; a device for facing off the joints on cinder hoppers; and other tools and methods are described. Ills. 1500 w. Ry Mas Mech—Dec., 1905.

See also MACHINE TOOL—Railway Shops; WORKS MANAGEMENT—Railway Shop.

Management.—Cost Reducing Methods in Railroad and Car Shops. George W. Scott. Discusses the advantage of improved plant facilities, well selected machinery, improved methods, etc. 2000 w. Ry & Engng Rev—Nov. 2, 1901.

Problems in the Management of a Railway Shop. R. T. Shea. Gives illustrations of chances for saving in some of the larger shops. 1300 w. Loc Engng—Jan., 1902.

Railroad Shop Management. William S. Cozad. Discusses in a general way the subject of shop organization and the relation which must exist between the management and the men before putting the shops on a satisfactory piecework basis. Serial. 1st part. 2000 w. Am Engr & R R Jour—Dec., 1903.

Fundamental Principles of Effective Organization and Economic Management Applied to R. R. Car-Repair Shops. Charles Streicher. A consideration of this subject, followed by general discussion. 5500 w. Pro Pacific C Ry Club—Feb. 20, 1904.

Running Railroad Repair Shops on the Monthly Appropriation Plan. Charles Streicher. Showing the advantages of this method. General discussion. 10,000 w. Pro N Y R R Club—Feb. 17, 1905.

Shop Management, Organization and Methods. H. A. Lyddon. Read before the Northwest Ry. Club. On the importance of having men of character and ability as heads of the various departments, discussing the present conditions. 4400 w. Ry & Engng Rev—May 13, 1904.

A Plan for Maintaining Railroad Repair Shop Machinery. M. K. Barnum. On the importance of well-equipped tool-rooms. With a very interesting discussion. 17,000 w. Pro W Ry Club—March 21, 1905.

The Development of Railroad Shop Practice in the United States. M. K. Barnum. Discusses the present tendency in all shops and the improvement in equipment for securing economy and efficiency. R R Gaz—Vol. XXXVIII., No. 18.

The Organization of Railway Shop Forces. H. T. Bentley. Discussion of the requisites necessary to obtain the best results. General discussion follows. 10,000 w. Pro W Ry Club—Sept. 19, 1905.

The Conduct of American Repair Shops (Aus dem Betriebe Amerikanischer Reparaturwerkstätten). G. Dinglinger. Describing especially the methods of railroad shops in the United States, with forms of time cards, job and material tickets, inspection forms, and general works management system. 6000 w. Glasers Annalen—Dec. 15, 1905.

See also WORKS MANAGEMENT.

Memphis.—The Memphis Shops of the Illinois Central. Illustrates and describes improvements that will greatly increase the present terminal facilities. 1100 w. R R Gaz—Oct. 17, 1902.

Mexican Central.—Mexican Central Shops at Aguascalientes, Mex.—An account of improvements at this place, with description of the new shops and their equipment. Ill. 1000 w. Ry Age—June 6, 1902.

A New Steam Turbine Power Plant. Illustrates and describes the application of the electrical system of power distribution in the shops of the Mexican Cent. Ry. at Aguas Calientes, Mexico. 1300 w. Am Engr & R R Jour—Dec., 1903.

The Mexican Central Shops at Aguascalientes. Illustrated description of the shops and their equipment. 2500 w. R R Gaz—Aug. 5, 1904.

Power Equipment of the New Shops of the Mexican Central Railway Company, Limited, Aguascalientes, Mexico. R. M. Henderson. Well illustrated account of buildings, power plant, electric distribution, etc. Serial. 2 parts. 7000 w. Elec Rev, N Y—Aug. 13 and 20, 1904.

Power Plant of the Mexican Central Shops at Aguascalientes. Illustrated description of steam and electric plant for railway shops. Serial. 1st part. 3500 w. Eng Rec—Aug. 20, 1904.

Michigan Central.—Michigan Central Shops at Jackson, Mich. Illustrated description of extensive improvements being made. 1200 w. Ry Age—June 20, 1902.

Milwaukee.—Milwaukee Shop Improvements of the Chicago, Milwaukee & St. Paul. An illustrated description of the modernization and enlargement of this important plant, with rearrangement and extensive increase of yard tracks. 3500 w. R R Gaz—June 26, 1903.

See also **POWER PLANT—Ry. Shop, Milwaukee.**

Minneapolis.—The Cedar Lake Shops of the Minneapolis & St. Louis R. R. Illustrated description of shops at Minneapolis of interest because of their location, and local conditions, and for their labor-saving devices. 4000 w. Ry & Engng Rev—June 21, 1902.

Mohon, France.—Manufacture of Car Mountings at the Shops of the Eastern Railway of France at Mohon (Fabrication des Ferrures aux Ateliers de la Cie d'Est à Mohon). L. Tolmer. A very complete account of the works and tools for the production of the metallic parts of railway cars, showing the processes in detail. 10,000 w. Revue de Mécanique—Dec. 31, 1902.

Moline, Ill.—See **East Moline.**

Montreal.—The Canadian Pacific Railway Shops at Montreal. An illustrated description of the power plant, electric installation, transportation, water system, heating, general construction and equipment. Serial, 1st part. 4000 w. Eng Rec—March 19, 1904.

Montreal, Angus.—Angus Locomotive and Car Shops, Montreal. Begins an illustrated detailed description of the largest railroad shop plant ever built and put into service at one time. A most interesting and instructive plant. Serial. 1st part. 1400 w. Am Engr & R R Jour—Dec., 1904.

Blacksmith Shop. Illustrates and describes this part of the plant of the Angus shops, Montreal. 1200 w. Am Engr & R R Jour—Oct., 1905.

Newark, N. J.—Equipment of the New Plank Road Car Shops of the Public Service Corporation. Martin Schreiber. Well illustrated description of special tools and general equipment of shops at Newark, N. J. 5000 w. St Ry Jour—Sept. 2, 1905.

See also **ELECTRIC RAILWAY SHOP.**

New Zealand.—The Railway Workshops at Addington, New Zealand. Illustrations and account of work at these shops, which manufacture all articles used in connection with the railways. St. Louis Ry Club—Oct. 10, 1902.

Oak Grove, Pa.—Pennsylvania Division Shops of the N. Y. C. & H. R. R. R. Gives list of new installations, and illustrated description of shops at Oak Grove, Penn., for locomotives and freight car repairs. 2500 w. Ry & Engng Rev—May 31, 1902.

Oaklawn, Ill.—The Oaklawn Shops of the Chicago & Eastern Illinois Railroad. An illustrated detailed description of these shops and their equipment. 5500 w. Eng Rec—Nov. 21, 1903.

Oelwein.—Improvements at the Oelwein Shops, Chicago Great Western Ry. Illustrates and explains the changes made in the original equipment of these shops. 6500 w. Ry & Engng Rev—June 25, 1904.

Omaha, Neb.—The Union Pacific Shops. Illustrated detailed description of the new shop plant at Omaha, Neb., which is rapidly occupying the site of the old shops. 4800 w. Ry Age—Dec. 12, 1902.

Organization.—See **Management; RAILWAY ORGANIZATION; WORKS MANAGEMENT.**

Pennsylvania.—See **Wilmington, Del.**

Pere Marquette R. R.—See **Grand Rapids.**

Piece Work.—See **WAGES.**

Pittsburgh & Lake Erie—See **McKees Rocks, Pa.**

Pocatello, Idaho.—Oregon Short Line Shops at Pocatello, Idaho. Illustrated description of these new shops and their equipment. 1200 w. Ry Age—March 28, 1902.

Pocatello Shops of the Oregon Short Line. Illustrates and describes details of this enlarged shop plant in Idaho. 2000 w. Ry & Engng Rev—Feb. 7, 1903.

Portsmouth, Va.—Seaboard Air Line Shops at Portsmouth, Va. Illustrated detailed description of buildings built to replace those destroyed by fire. Ry Age—Jan. 15, 1904.

Power Equipment.—Power Equipments for Railroad Shops. George A. Damon. A consideration of the important things to examine before reaching a conclusion in the problem of supplying a modern railroad shop with an up-to-date power equipment. Ill. Serial. 1st part. 3300 w. R R Gaz—June 21, 1901.

See also **Equipment; ELECTRIC DRIVING; POWER PLANT.**

Power Plant.—See **East Moline, Ill.; POWER PLANT.**

Reading, Pa.—See **LOCOMOTIVE SHOP.**

Renovo, Pa.—The Renovo Shops—Pennsylvania Railroad. Illustrates and describes improvements made in these shops, so far as completed. 1700 w. Ry Age—Aug. 14, 1903.

Repair Records.—See **LOCOMOTIVE.**

Repairs.—See **ELECTRIC RAILWAY SHOP; LOCOMOTIVE SHOP.**

Roanoke, Va.—The Roanoke Shops of the Norfolk & Western. Brief description of extensive improvements, involving a complete change in the power plant. 1300 w. R R Gaz—June 20, 1902.

Rock Island.—See **East Moline, Ill.**

St. Louis Terminal.—See **East St. Louis.**

St. Paul.—The Omaha Railway Shops at Saint Paul. An illustrated description of the extensive improvements made in the St. Paul shops to furnish better facilities for rolling-stock maintenance. 1600 w. Ry Age—Aug. 22, 1902.

The Great Northern Shops at St. Paul. Full illustrated detailed description of these shops. 2-page plate. 4000 w. R R Gaz—June 19, 1903.

San Bernardino, Cal.—Shop Improvements on the Southern California R. R. Illustrates and describes the enlargement and extension of these shops at San Bernardino, Cal. 1100 w. R R Gaz—Aug. 29, 1902.

San Bernardino Shops of the Santa Fe System. Illustrated description of the complete transformation of the old plant, with new construction and additions which will give a new arrangement throughout. 1200 w. Ry Age—Sept. 26, 1902.

Sayre, Pa.—Proposed Extension of Lehigh Valley Railroad Shops at Sayre, Pa. Outlines the proposed plan for the gradual extension and rearrangement of the plant. 1000 w. Eng Rec—May 30, 1903.

The Steelwork of the Lehigh Valley R. R. Shops at Sayre. An illustrated article dealing with the design and details of the steelwork of these locomotive repair shops. 3400 w. Eng Rec—Jan. 21, 1905.

The New Shops of the Lehigh Valley Railroad at Sayre, Pa. Illustrated description. 1000 w. Ry & Loc Engng—Sept., 1905.

Scrap.—See **SCRAP.**

Seaboard Air Line.—See **Portsmouth, Va.**

Sedalia, Mo.—The Sedalia Shops of the Missouri Pacific. Illustrated detailed description of shops under construction. 1500 w. Ry Age—Sept. 23, 1904.

Small Roads.—Repair Shops for Small Roads. Francis G. Daniell. Suggestions for design, equipment, &c. 1500 w. St Ry Jour—June 18, 1904.

South Louisville, Ky.—The New Plant of the Louisville & Nashville R. R. Co. at South Louisville, Ky. Illustrated description of a new plant for repair and construction of cars and locomotives, which aimed to have the very best arrangement and equipment for carrying on the work. 5500 w. Engr, U S A—Aug. 1, 1905.

South Louisville Shops, Louisville & Nashville R. R. An illustrated description of the large new repair and manufacturing plant recently put into operation. Serial. 1st part. 5500 w. Ry & Engng Rev—Oct. 7, 1905.

Spencer, Southern Ry.—Improvements at the Spencer Shops of the Southern Railway. An illustrated description of the enlargement of locomotive repair shops in North Carolina. 2500 w. R R Gaz—Vol. XXXVII, No. 24.

Steel Cars.—Shop Practice in Maintenance of All-Steel Cars. Report of committee with general discussion. 5000 w. Cent Ry Club—Jan., 1902. See also **CAR—Steel.**

Tool Steel.—See **TOOL STEEL—Railway Shop.**

Tools.—See **MACHINE TOOL—Railway Shops; TOOL; TOOL STEEL.**

Topeka, Kan.—Topeka Shop Extensions. R. P. C. Sanderson. Illustrated account of extensive shop improvements on the A., T. & St. F. Ry. 3000 w. Am Engr & R R Jour—June, 1901.

Wilmington, Del.—The Wilmington Shops of the Pennsylvania. An illustrated detailed description of this plant which shows advantageous features of equipment and arrangement. 5500 w. Ry Age —April 8, 1904.

Winnipeg, Canada.—Winnipeg Shops of the Canadian Pacific. Illustrates and describes large modern shops for repair work. 1000 w. R R Gaz—Vol. XXXIX, No. 26.

Wolverton, Eng.—London and North-Western Carriage Works, Wolverton. Briefly reviews the history of Wolverton since the first locomotive works was established, and gives an illustrated detailed description of the modern works, which cover 80 acres. 2200 w. Engng—April 1, 1904.

RAILWAY SIDING.

Lap.—See **RAILWAY OPERATION.**

RAILWAY SIGNAL.

See also **GRADE CROSSING; INTERLOCKING; RAILWAY SWITCH.**

Some Questions About Progress and Uniformity in Signaling. B. B. Adams. Extracts from a paper read before the Ry. Sig. Club. 1000 w. R R Gaz—Nov. 9, 1900.

Signaling a Railroad. George W. Blodgett. Outlines a plan for spending a limited amount of money for signaling purposes to advantage. Ill. 2300 w. R R Gaz—July 26, 1901.

The Arrangement of Switch and Signal Apparatus (Einiges über die Einrichtung der Weichen- und Signalstellwerke). Hr. Scholkmann. A review of existing conditions, particularly in Germany, and a plea for greater simplicity in apparatus. 3000 w. Centralblatt d Bauverwaltung —Dec. 28, 1901.

Improvements in Railway Safety Appliances (Neuerungen im Eisenbahnsicherungswesen). Hr. Scholkmann. Describing improved block signal systems, including electric, pneumatic, and liquefied gas control and operation. 5000 w. 1 plate. Glasers Annalen—Feb. 15, 1905.

The Development of Railway Signalling. W. P. Digby. An illustrated article reviewing the various improvements in railway signalling. 2400 w. Transport—Sept. 5, 1902.

Signalling and Interlocking. Report, with colored inset, presented at convention of the Am. Ry. Engng. & Maintenance of Way Assn. Also discussion. 20,000 w. Ry Age—March 20, 1903.

The Evolution of Railroad Signalling. Charles Hansel. Historical review, with statement of the writer's views on the best practice. Editorial note. 4000 w. R R Gaz—July 10, 1903.

Signals and Signalling. George S. Hodgins. The present article gives a historical review of the art of signalling. Serial. 1st part. 3000 w. Loc Engng—Nov., 1903.

Three-Position, Separate Home and Distant, and Overlapping Automatic Block Signals. Report presented at meeting of Ry. Sig. Club. 1500 w. Ry Age—Nov. 6, 1903.

Automatic Railway Signalling. Briefly reviews the power and automatic signalling systems, the methods of working, &c., and discusses the question of the normal position of signals. Serial. 1st part. 3000 w. Engr, Lond—Feb. 12, 1904.

What Are the Merits of the Block System on Railroads Operating in Iowa. P. G. Campbell. Considers the details of manual blocking and the benefits. General discussion. 3500 w. Pro Iowa Ry Club—June 13, 1904.

Railroad Signalling. G. E. Ellis. Discusses the general principles of railroad signaling and types used. Ills. 9000 w. Jour W Soc of Engrs—Aug., 1904.

Alternating Current.—See **Rochester, N. Y.**

America.—Railway Signaling in America. The present number reviews the remarks of Lord Claude Hamilton, after a seventeen days' visit in America, during which he studied railway methods, and discusses briefly the different conditions in England and the United States. Serial. 1st part. 2100 w. Engr, Lond—May 12, 1905.

Length of American Railroads Worked by the Block System. A summary of miles of railroad in the United States worked by the block system. 3500 w. R R Gaz—Jan. 11, 1901.

The Progress of Block Signaling on American Railways. Editorial review of a report of the Committee on Safety Appliances of the Am. Ry. Assn. 2000 w. Eng News—Aug. 21, 1902.

Block Signals on American Railroads. Gives tabulated statement of the miles worked by the block system on each road using it, with notes on proposed new signaling. 2000 w. R R Gaz—Feb. 27, 1903.

Block Signals on American Railroads. A discussion of signal arrangements in America from the English point of view. 1600 w. Engr, Lond —Jan. 27, 1905.

See also **British vs. American; Yorke Report.**

American & European.—Review of Signaling Since the Last Congress. B. B. Adams. A review of American and European practice during the last five years in the field of railroad signaling. 2300 w. R R Gaz—Vol. XXXVIII., No. 20.

Am. Main. of Way Assn. Report.—Signaling and Interlocking. Abstract of report at meeting of Am. Main. of Way Assn. Considers the standard arrangement of signals, controlling, construction, &c., with discussion. 10,500 w. Ry Age—March 24, 1905.

See also **RAILWAY PERMANENT WAY—Maintenance.**

Annet's Multiple Route.—Single Semaphore for Multiple Route Indication. An illustrated description of Annet's route indicating system. 800 w. Bul Int Ry Cong—Dec., 1903.

Antwerp.—See **Electric, Siemens; INTERLOCKING.**

Austria.—The Introduction of the Block System on the Austrian Railways (Die Einführung des Fahrens in Raumdistanz auf den Oesterreichischen Eisenbahnen). Ludwig Freund. An account of the change from the time-interval to the space-interval system of train operation, in Austria. 3500 w. Oesterr Wochenschr f d Oeffent Baudienst—April 19, 1902.

Automatic.—Automatic Train Signals (Selbstthätige Zugdeckung). A. Birk. An examination of the increasing demands for automatic block signals, in view of the reduced headway of trains, together with suggestions for improvements. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 23, 1900.

The Safe Course. Charles Hansel. Arguments favoring the equipping of railroads with automatic signals and showing that a successful system must be designed to be a check on the engineer, but not to supersede him. 1800 w. Eng News—April 2, 1903.

Automatic Railway Signaling. Illustrates and describes the London & South-Western Railway Company's installation at Salisbury. 2000 w. Transport—May 29, 1903.

Automatic Signaling. William John Cudworth. Read at the Engng. Con. of the Inst. of Civ. Engrs. Discusses the various systems of automatic working that have been tried. Ill. 1000 w. Engng—June, 1903.

Automatic Electric Railway Signaling; Its Purposes; Also Past and Present Installations. C. C. Rosenberg, and H. S. Balliet. Shows the method of installation and apparatus from the inception of automatic signaling, the improvements made, etc. 8000 w. Jour Fr Inst—Sept., 1903.

Automatic Block Signals for Railroads. Ralph Scott. An illustrated article explaining the general practice. 4500 w. Am Elect'n—Sept., 1903.

Automatic Block Signals. Ralph Scott. Discusses the relative inherent advantages of each standard system. Ills. 2500 w. Am Elect'n—Aug., 1904.

Automatic Block Signals. Ralph Scott. Discusses siding protection, simple signal circuits, track circuit controlling, etc. Diagrams. 3500 w. Am Elect'n—Dec., 1904.

See also **Electric**; and under names of railroads and inventors.

Automatic Stop.—An Expert's Experience with Automatic Stops. W. H. Elliott. A discussion of the inherent difficulties in the working of the automatic stop that makes its use objectionable. 8300 w. R R Gas—March 6, 1903.

See also **TRAIN OPERATION.**

Auxiliary.—Auxiliary Railway Signaling. Remarks on the most generally approved systems of auxiliary signaling, considering briefly some of their chief characteristics. 3700 w. Elec Engr, Lond—Feb. 24, 1903.

Auxiliary Motor.—Auxiliary Electric Motor (Servo-Moteur Electrique). M. Rouby. A description of an arrangement of electric motor for assisting in the movement of the levers of the Vignier and Saxby signaling apparatus. 1800 w. Rev Gen des Chem de Fer—May, 1901.

Bannstein-Muttershausen.—See **Electric, Schreiber.**

Battery Troubles.—See **ELECTRIC CELL—Railway Signal.**

Bleynie and Ducousso.—The New Collective Long-Distance Signal System (Système Nouveau dit des Leviers d'Itinéraires pour la Commande à Distance des Aiguilles et Signaux de Chemins de Fer). G. Bleynie. A detailed description of the Bleynie and Ducousso system, recently installed on the Chemin de Fer du Midi. 15,000 w. 7 plates. Rev Gen des Chemins de Fer—Oct., 1903.

Boston Elevated.—Train Movement Signaling on the Boston Elevated Railway. Howard S. Knowlton. Illustrates and describes the block signal installation, with its interlocking and automatic features. 3300 w. St Ry Jour—Sept. 7, 1901.

Automatic Block Signaling on the Boston Elevated. Illustrated description of details taken from a bulletin issued by the Union Switch & Signal Co. 5000 w. R R Gas—Oct. 11, 1901.

See also **ELEVATED RAILWAY.**

"Boulder," Scotland.—"Boulder" Signaling and New Express Locomotives on the Caledonian Railway. Norman D. Macdonald. A description of the unique arrangements for safety over a road made dangerous by falling rocks. Also illustrated descriptions of the locomotives used. 1100 w. Ry Age—July 25, 1902.

British.—Railway Block Signaling. J. Pigg. A well-illustrated paper, read before the Newcastle section of the Institution of Electrical Engineers, on block signaling, with particular reference to British practice. 7000 w. Elec Engr, Lond (Supplement)—Jan. 2, 1903.

See also **American.**

British vs. American.—English and American Railroad Signaling. J. Pigg. Reviews the methods of protection that have been in use at various times, and discusses present practice. Ill. Serial. 1st part. 1700 w. Elec Rev, Lond—Sept. 27, 1901.

Buffalo Belt Line.—Signaling for the Pan-American Exhibition. Gives plan of the Buffalo Belt Line of the N. Y. C. R. R., and brief account of the signaling equipment. 400 w. R R Gas—Dec. 7, 1900.

Carbonic Acid Gas.—Carbonic Acid Gas for Signals. P. G. Ten Yyck. Explains its use under compression as a power for operating semaphore signals. 1500 w. R R Gas—Vol. XXXVIII, No. 8.

See also **Electro-Gas.**

Chesapeake & Ohio.—Block Signaling on Lines of Light Traffic. Describes examples on the Chesapeake & Ohio, and the manner of working, with comments on the conditions and cost. 2000 w. R R Gas—Vol. XXXVIII, No. 6.

Chic., Mil. & St. Paul.—Automatic Block Signals—C. M. & St. P. Ry. W. H. Elliott. An illustrated description of a recent installation on 14 miles of double track between Savanna, Ill., and Green Island, Ia. 1800 w. Ry Age—May 1, 1903.

Chicago Station, M. & St. P.—Automatic Signal-Protection for Milwaukee Passenger Station, Chicago, Milwaukee & St. Paul Railway. An illustrated description of a recently installed system to protect the five tracks under the train-shed of the passenger station. 2000 w. Ry Age—July 3, 1903.

Cold Weather.—Performance of Automatic Signals in Cold Weather. H. S. Balliet. A discussion of the more important failures during the severe weather of this winter. 1200 w. R R Gas—Feb. 26, 1904.

Crewe.—The "Crewe" System of Railway Signaling. Illustrated description of an electric system. 4800 w. Elec Rev, Lond—Nov. 28, 1902.

The "Crewe" System of Electric Railway Signaling. Illustrated description of the system of working points and signals at this station on the London & North-Western Ry. 900 w. Engr, Lond—Dec. 5, 1902.

The "Crewe" System of Electrically-Operated Points and Signals. Illustrated detailed description. 3200 w. Engng—July 17, 1903.

See **Electric.**

Development.—Development of Railway Signaling in the Last Twenty-five Years. A review of the development in block signaling, and interlockings. Ill. 4500 w. Ry Mas Mech—Feb., 1903.

De Wallace.—Automatic Train Order Signal, Hocking Valley Ry. An illustrated description of the De Wallace system, which gives automatically a warning to the engineer, and automatically stops the train. 1600 w. Ry & Engng Rev—July 19, 1902.

Disk.—The Virtues of the Enclosed Automatic Disk Signal. A letter to the editor aiming to show that the disk signal is equally reliable with the semaphore. 1800 w. R R Gas—May 9, 1902.

Distant.—Electric Distance Signals (Die Einrichtung des Electrischen Distanssignales) A. Prasch An account of the improved Krisik system as used on an experimental section of the Austria State Railways. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 31, 1902.

The Distant Signal. H. Raynar Wilson. A letter explaining British practice, and points of difference from American practice. 2300 w. R R Gas—July 24, 1903.

Good Practice in the Use of Distant Signals. W. H. Elliott. Read before the Ry. Sig. Club at Pittsburg. Gives experience of different roads with distant signals, and discusses causes that affect the operation of signals. 3000 w. R R Gas—Nov. 7, 1902.

Earth Connections.—See **RAIL BOND—St. Gothard Railway.**

Eastern Railway, France.—See **Electro-Pneumatic.**

Electric.—Electrically Operated Railway Signals. F. J. Postel. Reviews the systems of signaling used, describing especially the applications of electricity to the operation of signals. 3000 w. Technograph, No. 15—1900-1901.

Modern Electric Block Signaling. E. F. Bliss. Abstract of a thesis presented for graduation at the Univ. of Nebraska. Outlines some of the more important features of present automatic block-signal practice. Ill. 4800 w. Elec Wld & Engr—Aug. 23, 1902.

Electrical Features of Block Signaling. L. H. Thullen. Gives a brief sketch of the older methods of signaling, and an illustrated description of the modern electric signals. 2400 w. Am Inst of Elec Engrs—June, 1905.

See also **Automatic**; and under names of systems and railroads; **INTERLOCKING.**

Electric, British.—An English Electric System of Railway Signaling. F. O. Perkins. An illustrated description of the Webb & Thompson electric point and signal apparatus installed on the London & Northwestern Railway. Shows the devices used in one of the signal cabins at Crewe, which will contain more than 1,000 levers. 1800 w. Sci Am Sup—Nov. 11, 1905.

Electric, Easton, Pa.—Signaling at Phillipsburg and Easton. An illustrated description of the "all-electric" switch and signal plants at these adjoining places, recently installed on the Lehigh Valley Railroad. 2000 w. R R Gas—Dec. 11, 1903.

Electric Lamp.—Electric Signal Lighting on the Lancashire and Yorkshire Railway. Illustrates and describes the method employed for fitting up their electric signal lamps. 1500 w. Elec Rev, Lond—Dec. 2, 1904.

Electric, Paris.—The Electric Method of Operating Switches and Signals (Les Appareils Electriques pour la Commande des Aiguilles et des Signaux). M. Rodary. A description of the system in use at the Paris terminal of the Paris, Lyons and Mediterranean Railway. 5000 w. Rev Gen des Chem de Fer—Dec., 1903.

Electric, Phillipsburg, N. J.—See **Electric, Easton, Pa.**

Electric Railway.—A Simple Railway Signal System. E. C. Parham. Describes a signal system for use on single-track trolley roads. Ill. 1200 w. Am Elect'n—Jan., 1901.

The Adoption of Electric Signals on Suburban and Interurban Railways, of Single or Double Track and Their Economy of Operation. William Pestell. Read before the Am. St. Ry. Assn. Discusses the experience of steam roads, the use of the telephone, the systems generally used, types of electric signals, &c. 2200 w. St Ry Rev—Oct. 12, 1901.

Electric Signals on Suburban and Interurban Railways. William Pestell. Read before the Am. St. Ry. Assn. Discusses the need, the devices in use, and gives a copy of the resolutions drawn up by a committee appointed by the Mass. St. Ry. Assn. 2000 w. Ry & Engng Rev—Nov. 9, 1901.

Block Signals on Heavy Electric Railroads. Reviews some of the principal work that has been done on the electric elevated and subway roads, giving illustrated descriptions of two systems. 4500 w. St Ry Jour—April 5, 1902.

Automatic Block Signals for Electric Railways. Editorial discussion of the need of such systems, considering proposed schemes. 1500 w. St Ry Jour—June 7, 1902.

Signals for Urban and Interurban Railways. G. W. Palmer, Jr. Read before the Am. St. Ry. Assn. Shows the growing need of the best signal system possible, and discusses the requirements. 1700 w. St Ry Rev—Oct. 11, 1902.

Block Signaling of Electric Railways with Track Circuit Control. J. B. Struble. Read before the Utica convention. Describes arrangements of alternating current track circuits for electric roads. 1000 w. St Ry Jour—Sept. 24, 1904.

Automatic Signal and Safety Systems as Applied to Electric Railways. Edward Taylor. Deals chiefly with the weak points of the signal systems, showing that there is still room for improvement. 3500 w. St Ry Jour—May 6, 1905.

See also **Boston Elevated; London; N. Y. Subway; Single Track Tramway; Street.**

Electric, Schreiber.—Electric Automobile Block Signals on the Bannstein-Muttershausen Local Railway in Lorraine (Elektrisch Selbsttätige Block signale der Industrialbahn "Bannstein-Muttershausen" in Lothringen). L. Kohlfürst. A description, with diagram, of an electric signal system, designed by Georg Schreiber, on a short single-track branch railway, connecting an industrial works with a main line. 3000 w. Zeitschr f Elektrotechnik—April 26, 1903.

Electric Semaphore.—The Union Electric Semaphore Signal. Illustrates and describes the mechanism and electric connections of an automatic system of railway signaling. 1100 w. Sci Am Sup—Oct. 25, 1902.

Electric, Siemens.—The Electric Signal System of the Central Railway Station at Antwerp (Appareils pour la Manoeuvre Electrique des Aiguillages et des Signaux de la Gare Centrale d'Anvers). L. Weissenbruch. A general description of the Siemens electric switch and signal system at Antwerp. 7500 w. Rev Gen des Chem de Fer—July, 1904.

See also **INTERLOCKING—Antwerp.**

Electric Train Staff.—See **RAILWAY OPERATION —Train Staff.**

Electric Wire.—Report of Committee No. 13 on Rubber-Covered Wire. Report presented to the convention of the Railway Signal Association. Suggestions as to requirements and tests, with reasons. 2800 w. Elec Rev, N Y—Oct. 28, 1905.

Electro-Gas.—The Westinghouse Electro-Gas Signal. Illustrated description of a signal in which carbon-dioxide gas, stored in a liquid form in small reservoirs, furnishes the power for the signal motor. 1200 w. Engng—Dec. 4, 1903.

See also **Hall.**

Electro-Pneumatic.—See **Power; Westinghouse; RAILWAY TERMINAL—Long Island City, N. Y.**

Erie R. R.—The Electric Danger Signals on the Erie Railroad. Illustrated description of the auto-electric installation in the Bergen tunnel, Jersey City. 1400 w. Elec Rev, N Y—July 19, 1902.

Explosive.—See **Fusee.**

Fog.—Mechanical Fog Signal Appliance. Illustrates and describes Pindar's apparatus which places detonators on the rails by mechanical means. If necessary the detonator may be withdrawn when the engine is within a foot of it. 1000 w. Engr, Lond—June 6, 1902.

Signaling Fast Trains in Fog. Editorial discussion, with suggestion that the signal be sounded for "all right" instead of sounding for "stop" or "caution." 2500 w. R R Gaz—July 11, 1902.

Fog Signaling. A study of ten accidents on British railways due to fogs, and how to prevent the ignoring of danger signals. Shows the difficulties to be overcome. 2400 w. Engr, Lond—Aug. 5, 1902.

See also **FOG SIGNAL—Clayton's.**

Fort Wayne Ry.—Automatic Block Signals on the Fort Wayne. Illustrates and describes the arrangement of signals from Allegheny City, Pa., to Homewood, on a busy suburban line. 3700 w. R R Gaz—Jan. 18, 1901.

Fusees.—Railroad Fusees. J. C. Ramage and Lewis Cheeseman, Sr. Considers the composition and mechanical construction of fusees from the standpoint of safety, and the requirement which actual service demands of a good fusee. 3000 w. R R Gaz—May 13, 1904.

Gas Motors.—See **Hall Electro Gas.**

German.—See **St. Louis Exposition.**

Grade Crossing, Electric.—An Audible and Visible Railway Signal for Grade Crossings, Operated by a High Tension Current. Emile Guarini. Illustration and brief description of a new system introduced by Siemens & Halske. 300 w. Sci Am—Aug. 15, 1903.

Hall Electro-Gas.—The Hall Electro-Gas Signal. An illustrated description of the apparatus for working the semaphore signals by gas motors. 1700 w. R R Gaz—June 5, 1903.

Hall Electro-Gas Normal Danger Signals on the Union Pacific. Illustrated detailed description of an installation in Wyoming. 1200 w. R R Gaz —Dec. 18, 1903.

Automatic Block Signals. Ralph Scott. Illustrates and describes the standard Hall electro-gas signal. 3000 w. Am Elect'n—April, 1905.

Herman's Electric.—Herman's Automatic Electric Semaphore. Illustrated description of an instrument designed to work three-position signals. 1200 w. R R Gaz—March 14, 1902.

Hungary.—Automatic Electric Block Signal System of the Southern Hungarian Railway (Elektro-Automatische Blocksignal anlage der Ungarischen Sudbahn). O. Ehrenfest. With photographs of the apparatus and plans of the system of connections. 3000 w. Elektrotech Zeitsch—March 7, 1901.

International Ry. Congress.—On the Question of the Automatic Block System (Subject X for discussion at the seventh session of the Railway Congress). C. H. Platt. Report for America. Ills. 11,000 w. Bul Int Ry Cong—Sept., 1904.

On the Question of the Automatic Block System (Subject X for Discussion at the Seventh Session of the Railway Congress). Mr. Margot. Report No. 2 for all countries except America. 10,800 w. 4 tables. Bul Int Ry Cong—Dec., 1904.

Ireland.—Railway Stocks and Telegraphs—Recent Practice. A. T. Kinsey. Read before the Dublin Loc. Sec. of the Inst. of Elec. Engrs. Discusses the extension of block signal working on the Irish double-track railways and the introduction of the train staff system on single-track lines. 5400 w. Elec Engr, Lond—April 18, 1902.

Jacob Electric.—Automatic Electrical Block Signal System (Selbstthätigen Elektrischen Zugdeckungseinrichtung). H. Sumpf. A description of the system of L. Jacob, of Casse, with plate showing the construction in detail. 2000 w. 1 plate. Glaser's Annalen—May 15, 1901.

Kinsman.—Kinsman Block System for Control of Railway Trains. Illustrated description. 1000 w. Elec Wld & Engr—Feb. 15, 1902.

See also **LOCOMOTIVE—Automatic Control.**

Krizik.—The Krizik Block Signal System (Das Blocksignal System Krizik). A. Prasch. A description of the improved block system of Krizik, in which the semaphores and switches are operated direct by electric power. Two articles. 6000 w. Zeitschr d Oester. Ing u Arch Ver—Sept. 27, Oct. 4, 1901.

Experiments with the Krizik Block Signal System (Die Versuche mit dem Blocksignal System Krizik). A. Prasch. Tests made on the Austrian State Railways with the Krizik system of automatic electric signals, operating by a contact made by the train. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 9, 1903.

See also **Distant.**

Krupski, Electric.—The Krupski System of Electric Distance Signals (Krupski Stromlauf an Ordnung für Elektrische Distanzsignale). L. Kohlfürst. A detailed description of the automatic electric signal system used on the Swiss railways. 1800 w. Schweiz Bauzeitung. June 3, 1905.

Lamp.—The Design, Construction, Efficiency and Maintenance of Signal Lamps. Report of committee of Railway Signal Assn., at Niagara Falls meeting. Discussion and report of tests, maintenance, conclusions, &c. 6500 w. Eng News—Oct. 19, 1905.

See also **Electric Lamp.**

Legislation.—Safety Appliances and Block Signals—Proposed Bill Requiring Use of the Block System. Report of the Committee on Safety Appliances and Block Signals at the Sixteenth Annual Convention of the Nat. Assn. of Ry. Com. at Birmingham, Alabama. 5500 w. Ry Age—Nov. 18, 1904.

Lenses.—Signal Lenses. A. G. Wilson. Discusses the lenses now applied to railroad lamps, the tests that should be made, &c. 1400 w. R R Gaz—Vol XXXIX., No. 14.

Lightning Interruption.—Lightning and Automatic Block Signals. H. S. Balliet. Describes interruptions due to lightning, considering their origin and the methods employed to control such troubles. 1500 w. R R Gaz—Vol. XXXVII. No. 18. Serial. 1st part.

Lightning and Automatic Block Signals. H. S. Balliet. A discussion of the kinds of fractures due to lightning, the cause and the efforts to correct these troubles. Ills. 2200 w. R R Gaz—Vol. XXXVII., No. 16.

See also **LIGHTNING; LIGHTNING PROTECTION.**

Locations.—Automatic Signal Locations. C. C. Rosenberg. Condensed paper read before Ry. Sig. Club, at St. Louis. Suggestions concerning methods of locating, and things to be avoided. 1200 w. R R Gaz—Nov. 2, 1900.

Automatic Signal Location. Shows the importance of the proper location, calling attention to points that should be considered. 2000 w. Ry Age—April 3, 1903.

Locomotive Cab.—Railway Signaling. Describes a system that has been experimented upon in France, by which a signal disc and alarm bell inside the cab are electrically operated when the engine runs accidentally past a danger signal. 1300 w. Engng—Feb. 7, 1902.

The Miller Locomotive Cab Signal. Illustrates and describes the essential features of this system, by which stop and go-ahead signals are given in the cab of the locomotive. 2200 w. R R Gaz—Feb. 21, 1902.

A New Safety Signal System for Repeating Railway Danger Signals Visibly and Audibly in the Locomotive Cab. From "La Nature." Illustrates and describes an invention of Capt. Netter, the object of which is to reproduce in the engineer's cab the signals seen along the track. 1800 w. Sci Am Sup—Aug. 2, 1902.

A New Railway Block Signal System. An illustrated detailed description of the Miller block signals which have just been placed in the Park avenue tunnel, New York. They are automatic and given directly in the engine cab. 4800 w. Eng News—Dec. 18, 1902.

New Safety Device for Railways. Illustrates and describes the construction and method of operation of an electric device for preventing collisions. 1000 w. U S Cons Repts, No. 1543—Jan. 13, 1903.

I. The Miller Automatic Railway Signals. II. Fixed Signals on Line Side vs. Signals Carried on Locomotives. III. Editorial. Three articles dealing with the Miller system of automatic railway signaling. 5700 w. Elec Rev, Lond—Feb. 13, 1903.

Telephones in Engine Cabs. Describes the nature and operation of a new safety device for railroads, which has been tested in Germany. 600 w. Sci Am Sup—Feb. 21, 1903.

Automatic Electrically Controlled Engines. George F. Walsh. Brief description of automatic train controlling systems which seem promising. 1500 w. Elec Rev, N Y—Feb. 7, 1903.

An Official Recommendation of Automatic Stops in Connection with Block Signals. Extract from report of the Illinois R. R. & Warehouse Commission in which E. G. Ewald strongly favors automatic brake-setting devices. Ill. 2500 w. Eng News—Feb. 19, 1903.

Automatic Control of Locomotives. Illustrated description of apparatus controlling the throttle of a locomotive, and the system of automatic signalling. 800 w. Sci Am—June 18, 1904.

Electric Signaling on Railways. Illustrates and describes the apparatus devised by Mr. Jan Voet, for repeating all signals on the engine. 1800 w. Elec Rev, Lond—July 1, 1904.

A New System for the Protection of Trains by Engine-Cab Signals. Emile Guarini. Illustrates and describes a device invented by MM. Pfirmann and Wendorf, which gives an audible signal in the cab. It requires a third rail. 1000 w. Sci Am Sup—Sept. 24, 1904.

See also **Kinsman; LOCOMOTIVE—Automatic Control.**

London District.—Automatic Signaling on the District Railway. Illustrated description of the first instance in Great Britain of an electric railway automatically signaled by means of track circuits. 2000 w. Engr, Lond—Nov. 27, 1903.

London Metropolitan.—Sub-Stations and Automatic Signaling on the District Railway. Describes the Charing Cross sub-station as a type, and the system of signaling installed. Ills. 4700 w. Elect'n, Lond—Feb. 3, 1905.

London South-Western.—Pneumatic Signaling on the London and South-Western Railway. Illustrates and describes a plant on the low-pressure pneumatic system at Salisbury. 1500 w. Engr, Lond—Dec. 19, 1902.

Maintenance.—Maintenance of Automatic Electric Block Signals. H. S. Balliet. From a paper presented at Buffalo meeting of the Ry. Sig. Club. Considers the maintenance of track circuits, signal circuits and the maintenance force. 1700 w. Ry & Engng Rev—Oct. 5, 1901.

Manual Control.—Controlled Manual Block Signals—Illinois Central. Illustrates and describes a manually controlled block system installed on certain single-track lines carrying heavy traffic. 1200 w. Ry Age—Oct. 7, 1904.

Marin System.—The Marin Signal System for Railways (Das System Marin zur Sicherung Fahrender Eisenbahnzüge). Hr. Raffalovich. A paper before the Verein für Eisenbahnkunde, giving an illustrated description of a signaling system which automatically causes the locomotive whistle to blow, besides showing a visual signal. 2500 w. Glasers Annalen—June 1, 1903.

Mendel, Tyrol.—The Signal and Telephone System on the Cable Section of the Mendel Railway (Die Signal und Telephoneinrichtung auf der Drahtseilstrecke der Mendelbahn). Karl Jordan. Describing the working methods employed on a cable incline in the Tyrol. 1800 w. Zeitschr f Elektrotechnik—Oct. 30, 1904.

See also **MOUNTAIN RAILWAY.**

Midland, Eng.—A New System of Signaling on the Midland Railway. Illustrates and describes the new system of electric signaling installed at Derby station. 8800 w. Elect'n, Lond—June 23, 1905.

Miller.—See Locomotive Cab.

Modern Practice.—Modern Practice in Railway Signaling. I. A. Timmis. Abstract of a paper read before the Glasgow Congress. Briefly discusses pneumatic and electric systems. 1800 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Modern Railway Signal Practice. Ernest C. Webster. A review of the development of fixed signals, with illustrations. 5000 w. Yale Sci M—Feb., 1905.

Multiple Route.—See **Annet's Multiple Route.**

N. Y. & Long Branch.—Automatic Block Signals and Interlocking on the New York & Long Branch Railroad. Illustrates and describes a remarkable installation covering 37 1-2 miles, and costing $175,000. 1000 w. Ry Age—Feb. 19, 1904.

N. Y. Subway.—Signals on the Interborough Rapid Transit Lines in New York City. An illustrated detailed description of the scheme adopted, which is a departure from any previous installation. 3300 w. Ry Age—June 17, 1904.

The Block Signal and Interlocking Systems of the Subway Division of the Interborough Rapid Transit Company. An illustrated detailed description of the electro-pneumatic system installed and the conditions it was designed to meet. 6000 w. St Ry Jour—Oct. 8, 1904.

The Signal System on the Subway Division, Interborough Rapid Transit Co., New York. An illustrated description of the electro-pneumatic block and interlocking system as modified to meet the severe conditions of heavy traffic on an electric railway where the rails are used for the return circuit. 3000 w. Eng Rec—Nov. 12, 1904.

Signaling in the Subway. J. M. Waldron. Describes this very successful system of block signaling and the care given it to keep it in perfect order. 2500 w. Ry Sig Assn, Adv Paper—May 23, 1905.

The Block System of the New York Subway (Das Blocksystem der New Yorker Untergrundbahn). S. G. Freund. Well illustrated description of signal system and safety appliances. 4000 w. Elektrotech Zeitschr—Sept. 14, 1905.

See also **INTERLOCKING.**

Night.—Simplifying Night Signals and Shortening Block Sections. Criticism of points in a recent paper by A. M. Schoyer, before the Ry. Club of Pittsburg. 1500 w. R R Gaz—March 18, 1904.

Block Signals. A. M. Schoyer. Considers the questions of color for night signals, railways controlled entirely by signals, and one arm signals for blocking two or three blocks. 5000 w. Pro Ry Club of Pittsburg—Feb., 1904.

Normal Danger.—Normal Clear vs. Normal Danger Automatic Block Signal Systems. Discusses the merits of the two systems, and suggests that enginemen be required to observe the signal operate. 1800 w. Ry Age—July 17, 1903.

Normal Danger vs. Normal Clear.—Normal Danger vs. Normal Clear. C. H. Platt. States the important reasons published for favoring the normal clear system, discussing each in detail and favoring the normal danger system. 1500 w. R R Gaz—Vol. XXXIX., No. 15.

North Eastern Ry., York, Eng.—Power Signalling. Brief illustrated description of an installation at York, England, on the North Eastern Railway Electric power is used. 800 w. Elec Engr, Lond —Oct. 16, 1903.

Oakland-Port Costa, Cal.—Automatic Electric Block Signals. Mellen C. M. Hatch. Illustrates and describes a system recently installed between Oakland and Port Costa, California, explaining its operation. 3000 w. Cal Jour of Tech—Sept., 1904.

Paris Exposition.—See **RAILWAY EXHIBITION; RAILWAY SAFETY APPLIANCE.**

Penn. R. R.—Automatic Block Signals on the Philadelphia and New York Divisions of the Pennsylvania Railroad. An illustrated description of what is probably the most elaborate railroad plant, for so long a distance, in the world. It is equipped with automatic track circuit block signals for about 104 miles, the road being four tracked. 3800 w. R R Gaz—May 16, 1902.

Performance.—Performance of Automatic Block Signals Under Unfavorable Conditions. H. S. Balliet. The first of a series of articles discussing the maintenace and operation of automatic signals. Serial. 1st part. 2500 w. R R Gaz—March 25, 1904.

Pétange, Luxemburg.—See **INTERLOCKING—Taylor Electric.**

Pfirmann & Wendorf.—See **Locomotive Cab.**

Pneumatic Low Pressure.—See **INTERLOCKING—Northern Ry., France.**

Power.—Modern Power Signaling. Illustrated description of the electro-pneumatic signaling system, indicating the main principles. 1800 w. Engng Times—Feb., 1904.

Power, Eng.—Progress of Power Signaling in England. Charles H. Grinling. A review of the progress made in introducing automatic signals. The first were on the Liverpool Overhead Electric Railway, in 1893. 1800 w. R R Gaz—Nov. 6, 1903.

Primat Rear Guard.—Safety Apparatus for Trains (Appareils de Securité des Trains). J. Prouteau. A description of the Primat system for furnishing an automatic rear-guard signal. 1800 w. Revue Technique—April 10, 1901.

Prussian-Hessian.—The Development of Safety Appliances on the Prussian-Hessian State Railways (Einrichtungen zur Erhöhung der Betriebssicherheit auf den Preussisch-Hessischen Staatsbahnen). H. Scholkmann. With especial reference to the introduction of the block system and improved methods of signaling. 5000 w. Glasers Annalen —Nov. 15, 1902.

Rochester, N. Y.—A Track Circuit Block Signal for Electric Railways. Describes a system recently demonstrated at Rochester, N. Y. 2000 w. Eng News—Dec. 24, 1903.

Alternating Current for Signaling on Interurban Electric Railways. An account of the demonstrations at Rochester, N. Y., of the automatic block signaling system of S. Marsh Young. Ill. 3000 w. St Ry Jour—Dec. 26, 1903.

Rowe.—See **Telephone.**

Rowell-Potter.—Rowell-Potter Safety Stop and Block Signals on the C. M. & St. P. Ry. Describes the apparatus in detail giving illustrations, and discusses the subject of signaling generally. 3800 w. Ry & Engng Rev—March 15, 1902.

Sacek.—Automatic Electric Block Signals for Railways (Elektrisch Selbstthätige Block Signale für Eisenbahnen). L. Kohlfürst. Advocating the introduction of automatic signals, and describing the Sacek system. Serial. Part I. Elektrotech Zeitschr—Nov. 8, 1900.

See **Electric.**

St. Gothard Ry.—The Electric Lighting of Railway Signals (Elektrische Beleuchtung von Eisenbahnsignalen). A. Frey. Describing the system of incandescent lamps used with the signal system on the St. Gothard Railway, in Switzerland. 2000 w. Elektrotech Zeitschr—Aug. 11, 1904.

See also **RAIL BOND.**

St. Louis Exposition.—German Track and Signal Exhibit at the World's Fair. An illustrated description of the exhibit, explaining its working. 1800 w. Ry & Engng Rev—July 23, 1904.

St. Louis Tunnel.—A Description of the Present Method of Signaling Trains Through the St. Louis Tunnel. M. Wuerpel. Jr. Gives a short history of the traffic and earlier attempts at signaling, with illustrated detailed description of the system now in use. 5500 w. St Louis Ry Club—Jan. 11, 1901.

San Antonio, Tex.—The New Southern Pacific Passenger Station at San Antonio, Tex. John D. Isaacs. Illustrations, with brief description of a recent adaptation of the mission style of architecture. 600 w. Eng News—Dec. 31, 1903.

Semaphore Indication.—The Upward Indication of the Semaphore Arm. L. R. Clausen. Reviews the history of this method of signaling, and discusses the question of changing from the downward to the upward indication for proceed, giving arguments in favor of the change. Ils. 2000 w. Wis Engr—Dec., 1905.

Semaphore Spectacle.—The Semaphore Spectacle. W. H. Elliott, Discusses the proper design and requirements of the frame used to hold the colored glass for night indications, and also to support the signal blade or arm. 2000 w. Ry Sig. Assn, Adv Paper—May 23, 1905.

Shop.—See **RAILWAY-SIGNAL WORKS.**

Siemens and Halske.—See **Electric Siemens; Grade Crossing Electric; INTERLOCKING—Antwerp.**

Single Track.—Block Signals and Other Safety Appliances as Used on Different Railroads. Jno. L. Davis. Concerning block signaling on a single track road. 5000 w. Pro St Louis Ry Club—Nov. 12, 1904.

Theory and Practice of Single-Track Blocking. H. D. Emerson. A discussion of the advantages of the block system, with much related information of interest, and general discussion. 29700 w. N Y R R Club—Dec. 16, 1904.

See also **RAILWAY OPERATION.**

Single Track, C. N. O. & T. P. Ry.—The Operation of an Automatically Blocked Single Track Railroad. H. M. Waite. Brief paper on the successful working of this system on the Cinc. New Orleans & Texas Pacific Ry. 2500 w. Pro St Louis Ry Club—Aug. 11, 1905.

Single Track Tramways.—Signaling on Single Line Tramways. Lionel E. Harvey. Brief account of hand-operated and automatic systems in use. 1800 w. Elec Rev, Lond—April 17, 1903.

Specification.—See also **INTERLOCKING.**

Standard Arrangement.—Standard Arrangement of Signals at Interlocking Plants. From a report of a Committee of the American Railway Engineering and Maintenance of Way Association. 2000 w. Eng News—March 23, 1905.

Storage Battery.—Storage Batteries for Block Signals. E. L. Reynolds. Abstract of a paper read before the Ry. Signal Assn. Reports of companies that have been using storage batteries for signal work, and remarks on the importance of the operating men understanding the best method of operating the cells. 1500 w. R R Gaz—Vol. XXXVIII, No. 2.

Installation and Maintenance of Storage Battery for Track Circuits. C. C. Anthony. Gives data showing the storage batery to be well adapted to meet the requirements for track circuits. Discusses battery resistance. 3800 w. Ry Sig Assn, Adv Paper—May 23, 1905.

Street.—Automatic Signals for Street and other Secondary Railways (Sicherungen im Kleinbahn- und Strassenbahn-Betriebe durch Selbstthätige Scheiben-, Licht- und Glockensignale). An illustrated description of electric signal apparatus, visible and audible, which can also be applied to standard railways, and is independent of the motive power. 2000 w. Ill Zeitschr f Klein u Strassenbahnen—Jan. 1, 1902.

See also **Electric Railway; Single-Track Tramway.**

Sykes'.—Electric Signaling. W. R. Sykes' system is illustrated and described. 2400 w. Tram & Ry Wld—May 8, 1902.

Taylor Electric.—See **INTERLOCKING.**

Telegraph Lines.—The Use of Telegraph Lines for Signal Conductors (Telegraphenleitungen als Rückleitungen für Signalleitungen). A. Prasch. Describing experiments made on the Austrian railways without interfering with the use of the wires for telegraphy. 2500 w. Elektrotech Zeitschr—Dec. 8, 1904.

Telephone.—A Novel Block or Telephone Signal System. Describes a block or telephone signal system independent in itself, invented by Edward Rowe. 1400 w. Sci Am Sup—May 14, 1904.

See also **RAILWAY OPERATION.**

Track Circuits.—Track Circuits in Railway Signaling Plants. A. G. Shaver. Discusses briefly important points in track circuit work. 600 w. Eng News—May 16, 1901.

Train Order.—Train Order Signals. Part of the report of the committee on signaling and interlocking presented at the convention of the Am. Ry. Engng. & Maintenance of Way Assn. 1200 w. Ry & Engng Rev—March 21, 1903.
See also **RAILWAY OPERATION.**

Train Staff System.—See **RAILWAY OPERATION.**

Train Telephone.—See **TELEPHONE—Train Communication.**

Uneconomical Use.—Uneconomical Use of Block Signals. Editorial suggested by the address of Mr. Hope before the Ry. Signal Assn. 1000 w. R R Gaz—Feb. 26, 1904.

Union Pacific.—Interlocking and Signal Work on the Union Pacific. Illustrates and describes recent work between Council Bluffs, Ia., and Gilmore, Neb., including the Union Station at Omaha. 1500 w. Ry Age—Jan. 17, 1902.

United States.—See **American.**

Voet.—See **Locomotive Cab.**

Webb & Thompson.—See **Electric British.**

Westinghouse.—See also **Electro Gas; RAILWAY TERMINAL—Long Island City.**

Westinghouse, Paris.—The Electric-Pneumatic Signal System of the Est Station in Paris (Manoeuvre Electropneumatique des Signaux à la Gare de Paris-Est). E. Wagner. An account of the installation of the Westinghouse signal system in the terminal of the Eastern Railway of France at Paris. 1800 w. Génie Civil—July 9, 1904.

Westinghouse, Pittsburg.—A Description of the Westinghouse Electro-Pneumatic Interlock Switch and Signal System Installed in the Yards of the Pennsylvania Union Station, Pittsburg, Penna., by the Union Switch and Signal Company. J. G. Schreuder. Ill. 5000 w. Pro Engrs Soc of W Penn—July, 1892.

Yorke Report.—Colonel Yorke's Report on Signal Practice in America. Charles Hanell. A reply to the portion of this report bearing on automatic signals. 1400 w. Ry & Engng Rev—May 2, 1903.

Col. Yorke on Automatic Signaling. The reply of H. A. Yorke in explanation of points misunderstood, and in reply to criticisms of his views as expressed in his recent report. 1800 w. Ry Age—June 19, 1903.

See also **RAILWAY.**

RAILWAY SIGNAL WORKS.

Union S. & S. Co.—New Offices and Works of the Union Switch & Signal Co. Illustrated detailed description. 1500 w. Ry & Engng Rev—Nov. 9, 1901.

The New Shops of the Union Switch and Signal Company. Illustrated detailed description of new shops at Swissvale, Pa. 1100 w. R R Gaz—March 14, 1902.

RAILWAY SPEED.

See also **ELECTRIC RAILWAY—High Speed; LOCOMOTIVE—High Speed; LOCOMOTIVE PERFORMANCE; RAILWAY OPERATION; SPEED INDICATOR; TRAIN, FAST.**

Accelerometer.—See **ACCELEROMETER.**

RAILWAY STATION.

See also **ELECTRIC RAILWAY STATION; ELEVATED RAILWAY STATION; RAILWAY CONSTRUCTION; RAILWAY STRUCTURE; RAILWAY TERMINAL; RAILWAY YARD; STREET RAILWAY STATION.**

Accident, Charing Cross.—See **ROOF COLLAPSE—Charing Cross Station, Eng.**

Albany, N. Y.—The New York Central Station, Albany, N. Y. Plan, photographic views and description of a fine structure. 600 w. Archts & Builds Mag—Oct., 1901.

See also **RAILWAY TERMINAL.**

Ashland, O.—Tile Depot and Freight House, A. & W. R. R. Illustrated description of new building erected at Ashland, Ohio. 600 w. Ry & Engng Rev—Jan. 19, 1901.

Basle.—The New Station at Basle, Switzerland. Describes a very large new station being constructed at a level of about 10 ft. below that of the present building, and so involving the lowering of the whole permanent way, but without interruption of traffic. 2000 w. Engr, Lond—May 2, 1902.

See also **STREET RAILWAY STATION.**

Berlin.—Recent Improvements in Railway Stations in the North of Berlin (Les Récent Agrandissements des Gares de la Région Nord de Berlin). An account of terminal improvements with especial reference to the Stettin station. 1800 w. 1 plate. Génie Civil—Nov. 7, 1903.

See also **ELEVATED RAILWAY STATION.**

Binghamton, N. Y.—New Passenger Station of the D. L. & W., at Binghamton, N. Y. Illustrations, sections and plans with brief description. 500 w. Ry & Engng Rev—Dec. 6, 1902.

Bismarck, N. D.—Concrete Passenger Station for the Northern Pacific Ry., at Bismarck, N. D. Illustrated description. 1200 w. Ry & Engng Rev—Dec. 21, 1901.

Bombay.—The Railway Station at Bombay, India. Tipton S. Blish. Illustration and information concerning the most beautiful railway station in the world. 1200 w. St Louis Ry Club—Oct. 10, 1902.

Bordeaux.—The Bordeaux New Railway Station. Illustrates and describes a fine central railway station in France. Serial. 1st part. 800 w. Engng—April 11, 1902.

Boston.—Back Bay Station, Boston; New York, New Haven & Hartford Railroad. Illustrates and describes a fine station built to serve the residential district. 2200 w. Ry & Engng Rev—Aug. 8, 1903.

See also **ELEVATED RAILWAY STATION; RAILWAY TERMINAL.**

Bridgeport, Conn.—The New Bridgeport Station. Elevation, cross section, plan, and brief description of this new station on the N. Y., N. H. & H. R. R. On account of recent track elevation the train level will be at the second story. 500 w. R R Gas—Jan. 22, 1904.

Brooklyn, N. Y.—See **RAILWAY TERMINAL.**

Buffalo Union.—Propósed Union Station for Buffalo. Extract from a report by W. J. Wilgus. Plan and information of a proposed terminal in which thirteen roads are interested. 1000 w. R R Gas—Vol. XXXVIII, No. 1.

Camden, N. J.—The Pennsylvania Railroad Train-Shed at Camden. Illustrated detailed description of a rectangular steel structure, accommodating twelve lines of tracks. 1800 w. Eng Rec—Sept. 14, 1901.

Canal Exchange.—Connecting Stations Between Railways and Waterways (Des Gares de Raccordement entre Chemins de Fer et Voies Navigables). M. Mazoyer. Describing the railway connections of the canals of Roanne, the Loire, and the Nivernaise, illustrating the stations at the points of junction. 7000 w. 4 plates. Ann des Ponts et Chaussées—1 Trimestre, 1903.

Railway and Canal Exchange Stations. Mr. Mazoyer. Illustrated detailed description of German interchange stations, and matters relating to them. 2000 w. Trac & Trans—Nov., 1903.

See also **TRANSPORTATION.**

Charing Cross Accident.—See **ROOF COLLAPSE.**

Chicago.—A New Passenger Station in Chicago. Illustrated description of the accepted plans for a station at Van Buren street. 1600 w. Ry Age—June 14, 1901.

See also **RAILWAY TERMINAL.**

Chicago Freight.—Freight Distributing Station, Chicago Terminal Transfer R. R. Illustrates and describes a receiving station conducted on a novel plan. 1000 w. Ry & Engng Rev—April 27, 1901.

A Modern Freight House. Wisconsin Central Ry. Illustrated detailed description of one of the best freight houses of modern construction and its equipment. The building is two stories high and is in Chicago. 3300 w. Ry & Engng Rev—Sept. 14, 1901.

New Freight House for the Chicago Great Western, in Chicago. Illustrated description of a new four-story house equipped with modern conveniences for handling the freight of a large city terminal. 700 w. Ry & Engng Rev—March 15, 1902.

New Freight House for the Baltimore and Ohio. Illustrates and describes a large structure being built in Chicago, having features of exceptional interest. 800 w. Ry Age—Nov. 6, 1903.

Chicago, Rock Island—Lake Shore.—The New Rock Island-Lake Shore Passenger Station at Chicago. Illustrated description of a combined office building and station, which is of interest because of the dispatch with which the work has been carried on. 2000 w. Ry Age—March 20, 1903.

New Terminal Station at Chicago for the C., R. I. & P. Ry. and the L. S. & M. S. Ry. Illustrated detailed description of a station in which the tracks are elevated above the street level. 5500 w. Eng News—Aug. 6, 1903.

The Rock Island Terminal Station, Chicago, Ill. An illustrated detailed description of a large station. 3400 w. Eng Rec—Sept. 12, 1903.

Cincinnati Freight.—Central Ave. Freight Station at Cincinnati; C. C. C. & St. L. Ry. Illustrated description of rapid construction work. 1500 w. Eng News—July 4, 1901.

New Freight Station at Cincinnati, O.; Cincinnati Southern Ry. Illustrated description, with statement of the requirements as given in the specifications. 1000 w. Eng News—Dec. 7, 1905.

Coaling.—See **COALING STATION; RAILWAY BUILDING.**

Cologne.—The Transformation of the Railway Facilities about Cologne (Ueber die Umgestaltung der Bahnanlagen bei Köln). H. Kumbier. Describing the importance of Cologne as a railway centre, with especial reference to the new passenger stations. 3500 w. Glasers Annalen—Nov. 15, 1905.

Concrete.—See **Bismarck, N. D.**

Concrete Block.—See **Freight, East Waterloo.**

Copenhagen.—The International Competition for the Rebuilding of the Passenger Station at Copenhagen (Der Internationale Wettbewerb für den Umbau des Personenbahnhofs in Kopenhagen). With plans of the prize-winning designs and a discussion of the proposed improvements. 1800 w. Schweizerische Bauzeitung—Oct. 20, 1900.

Dayton, O.—New Union Passenger Station at Dayton, O. Illustrated detailed description of an exceptionally fine station. 1400 w. Eng News—Aug. 8, 1901.

Des Moines, Iowa.—A Railroad Depot Street Shed at Des Moines. Illustrated description of a 45-ft. shed for a platform, where it was necessary to have an attractive structure. 800 w. Eng Rec—May 18, 1901.

Dresden.—The New Passenger Stations in Dresden (Die Neuen Personenbahnhöfe in Dresden). Josef Unger. With numerous illustrations of the new stations in Dresden, and plans of the buildings, track yards and connections. 2500 w. 4 plates. Zeitschr d Oesterr Ing u Arch Ver—Dec. 5, 1902.

East Waterloo Freight.—Concrete Block Freight House for the Chicago Great Western. Illustrated description of building at East Waterloo, Iowa. 400 w. R R Gas—Vol. XXXVII., No. 11.

Electric Railway.—See **ELECTRIC RAILWAY STATION.**

Elevated.—See **ELEVATED RAILWAY STATION.**

Ferry House.—See **FERRY HOUSE.**

Grand Junction, Colo.—Denver & Rio Grande Station at Grand Junction, Colo. Drawings and description of a somewhat unusual station of pleasing appearance. 350 w. Ry Age—Aug. 25, 1905.

Grand Trunk.—New Stations on the Grand Trunk. Illustrations and brief descriptions of stations at Portland, Me., and at Flint, Lansing and Durand, Mich. 800 w. Ry Age—Sept. 25, 1903.

Ground Decoration.—Decoration of Station Grounds on the Philadelphia and Reading. Illustrates the grounds at several stations and gives details of the practice of this company. Serial. 1st part. 600 w. Ry & Engng Rev—April 6, 1901.

See also **Suburban.**

Hoboken, Lackawanna.—New D. L. & W. Terminal at Hoboken. Illustrations and brief description of proposed new railroad and ferry terminal. 500 w. R R Gas—Vol XXXVIII. No. 12.

The Platform Shelters of the New Lackawanna Terminal at Hoboken. Brief illustrated description of the proposed shed, which consists of a number of low, short-span, longitudinal sections, with the steel protected by concrete. 1000 w. Eng Rec—June 24, 1905.

Lackawanna's Eastern Terminal at Hoboken. An illustrated detailed description of the proposed station and ferry house, which will take the place of the recently burned structures. Plate. 2700 w. Ry Age—Aug. 25, 1905.

A Novel Train-Shed for the New Hoboken Terminal of the Lackawanna. Illustrated description of a departure in train-shed design, stating the advantages claimed. 700 w. R R Gas—Vol. XXXIX. No. 9.

Hydraulic Elevator.—See **ELEVATOR—Hydraulic.**

Icing Plant.—See **ICING PLANT.**

Illinois Central.—Passenger Stations of the Illinois Central. Illustrations of 15 stations representing the most characteristic types in use on this road, with notes. 1200 w. R R Gas—May 20, 1904.

Kilindini.—See **RAILWAY—Uganda.**

Knoxville, Tenn.—New Station for the Southern at Knoxville, Tenn. Brief illustrated description of a fine station now in process of construction. 500 w. Ry Age—Dec. 6, 1901.

London, Clapham Junction.—Extension of Clapham Junction Station—London and South-Western Railway. Plans and description of an extensive engineering work in progress, which will provide eight running tracks and a loop line between the Junction and the terminal station at Waterloo. 1800 w. Engr, Lond—May 1, 1903.

London, Euston.—A London Railroad Station. Illustrated detailed description of Euston station, of the London & North Western Railway. 1900 w. R R Gas—Aug. 2, 1901.

Mazeras.—See **RAILWAY—Uganda.**

Nashville, Tenn.—See **RAILWAY TERMINAL.**

Newark, N. J.—New Station of the Lackawanna at Roseville Avenue, Newark. Illustrates and describes a new staion made necessary by the change of grade. 600 w. R R Gaz—July 29, 1904.

See also **TRACK ELEVATION.**

New York Central.—Some Engineering Features of the Grand Central Station, New York. Illustrated description of the electric lighting, hydraulic elevator, air compressing, ventilating and heating equipment. 3500 w. Eng Rec—Feb. 23, 1901.

The New York Central Terminal. Editorial on the plan for the improvement of the Grand Central Station in New York City. 1200 w. R R Gaz—Dec. 12, 1902.

The New Grand Central Station. Illustration, with brief description of a proposed station to be built on the present site. 1400 w. R R Gaz—Vol. XXXVII, No. 29.

The New Grand Central Station. Brief illustrated description of the proposed structure, with editorial. 2400 w. Sci Am—Jan. 21, 1905.

The Grand Central Station Terminal Improvements. An illustrated article explaining some of the difficulties in the construction of this new station in the heart of New York Ciy. 1400 w. Sci Am—Sept. 16, 1905.

See also **ELECTRIC RAILWAY; ELECTRIC RAILWAY STATION; RAILWAY TERMINAL.**

Nottingham, Eng. — Great Central Railway. Victoria Station, Nottingham. Illustrated description of a fine joint station. Serial. 1st part. 1200 w. Engr, Lond—Jan. 18, 1901.

Victoria Station, Nottingham, England. Description and illustrations of a fine station opened for traffic about one year ago. 1500 w. Ry Age (Spe. No.)—March 15, 1901.

The New Victoria Station at Nottingham. Illustrated detailed description of the fine joint station used by the Great Central and Great Northern Railways. Serial. 1st part. 2800 w. Engng—Nov. 15, 1901.

Oiling.—See **OIL STORAGE.**

Paris.—The Modern Railroad Station. Jean Schopfer. Part first is a finely illustrated description of the recently built Quai d'Orsay station in Paris. Serial. 1st part. 4000 w. Archt Rec—Oct., 1901

See also **RAILWAY CONSTRUCTION.**

Peoria, Ill.—The Peoria Train-Shed. Illustrated description of a 477x109-ft. train-shed, with some unusual structural features and special methods of roof illumination. 700 w. Eng Rec—Dec. 8, 1900.

Philadelphia.—Passenger Transfer Station at Philadelphia, Pennsylvania R. R. Plan and brief description of improvement of terminal facilities. 500 w. Eng News—June 12, 1902.

Pittsburg.—Pittsburg & Lake Erie Station at Pittsburgh. Illustrates and describes one of the finest passenger stations in the United States. 1200 w. R R Gaz—June 7, 1901.

The New Pennsylvania Station at Pittsburg. Illustrated description of a fine structure nearing completion. It combines an office building with commodious arrangements for the traveling public. 1000 w. Ry Age—Oct. 4, 1901.

A Model Terminal Station. Illustrates and describes the mechanical and electrical equipment of the new terminal station of the Pittsburg & Lake Erie, at Pittsburg, Pa. 6000 w. Ry Age, Special No.—March 21, 1902.

The New Union Station P. R. R., Pittsburg, Pa. G. C. Clark. An illustrated article dealing with the location, preparation of site, approaches, elevated tracks and train sheds. 5000 w. Pro Engrs Soc of W Penn—July, 1902.

Construction, Design, etc., of the New Union Station for the Pennsylvania Railroad, Pittsburg, Pa. J. G. Glaver. Briefly reviews the progress in construction of business buildings, during the last 20 years, and gives an illustrated description of the design, construction work, etc., of this station which combines the features of a modern office building and a station. 4000 w. Pro Engrs Soc of W Penn—July, 1902.

The Steel Construction in the Wabash Terminal at Pittsburg. Illustrated detailed description of the construction of the Wabash trainshed. 1800 w. Eng Rec—Nov. 12, 1904.

Passenger Station for the Wabash R. R. at Pittsburg. Illustrations with brief description. 600 w. Ry & Engng Rev—Nov. 1, 1902.

The Erection of the Pennsylvania R. R. Train Shed, Pittsburg. Describes the erection of a 260x555 foot building 110 ft. in extreme height, in which the difficulties of erection were increased by the necessity of maintaining uninterrupted service, and many complications due to raising the grades and constructing on the site of the old building. 2500 w. Eng Rec—Nov. 1, 1902.

See also **POWER PLANT.**

Platform Sheds.—Railway Platform Sheds (Freistehende Perronhallen). Karl Haberkalt. An illustrated mathematical discussion of the design and construction of roofs and their supporting columns for station platforms. 1 plate. 6000 w. Oesterr Wochenschr f d Oeffent Baudienst—March 8, 1902.

See also **Hoboken; Pittsburg.**

Richmond, Va.—Passenger Station of the Southern Railway at Richmond. Illustrated description. 450 w. R R Gaz—Nov. 9, 1900.

New Union Station at Richmond, Va. Illustrated detailed description of a fine passenger station. 1000 w. Ry & Engng Rev—Nov. 30, 1901.

See also **RAILWAY TERMINAL.**

Roanoke, Va.—Norfolk & Western Station at Roanoke. Illustrated description of a fine passenger station under construction. 800 w. R R Gaz—Vol. XXXVII, No. 25.

Roof.—See also **ROOF—Railway Station.**

St. Louis.—Cupples Station—A Combined Freight Depot and Business Block. Earl Mayo. A description of this remarkable station in St. Louis, for handling, distributing and trans-shipment of goods. 1400 w. Sci Am—Aug. 29, 1903.

Some Details of Reconstruction Work, St. Louis Union Station. A. P. Greensfelder. Describes the work at the St. Louis station and vicinity, which was under the direct charge of the writer, giving reasons for the adoption of the various plans and methods. 10,000 w. Jour Assn of Engng Socs—May 1905.

See also **RAILWAY TERMINAL.**

St. Louis & San Francisco R. R.—New Stations on the St. Louis & San Francisco. Gives plans and illustrated descriptions of some of the designs. 1200 w. R R Gaz—Vol. XXXVII., No. 8.

St. Paul.—Improvements at the St. Paul Union Depot. Abstract of a report submitted by Henry M. Sperry, describing these improvements which will greatly increase the facilities of this station. 2000 w. R R Gaz—Aug. 29, 1902.

See also **RAILWAY TERMINAL.**

Shed, Des Moines.—See **Des Moines, Iowa.**

Sidney, Australia.—The New Central Station at Sidney, New South Wales. Illustration with description of a new station under construction costing nearly $5,000,000. 2700 w. Eng News—March 30, 1905.

Sioux City, Iowa.—New Stations for the National of Mexico and Chicago & Northwestern. Illustrates and describes these stations, located at Sioux City, Iowa, and Monterey, Mexico. 1100 w. R R Gaz—May 8, 1903.

Skylights.—Experience with Skylight Construction for Railway Train Sheds. A record of experience showing that no form of construction gives enduring service under existing conditions, and that the failure is due to the distortion and destruction of the framework. 5000 w. Eng News—April 21, 1904.

Street Railway.—See **STREET RAILWAY STATION.**

Suburban.—Artistic Suburban Stations. Illustrates examples in the vicinity of Chicago. 600 w. Ry Age—June 14, 1901.

Train Shed.—See **Des Moines; Hoboken; Lackawanna; Platform Shed.**

Troy, N. Y.—Proposed Union Station at Troy, N. Y. A brief account of the present condition of the property, with an illustrated description of the structure proposed. 700 w. Ry Age—Aug. 23, 1901.

Underground Railway, Boston.—See **UNDERGROUND RAILWAY—Boston.**

Washington, D. C.—The Proposed Union Station for Washington, D. C. Map, showing erection of a proposed station for the Pennsylvania and Baltimore & Ohio railroads, with information concerning it. 1100 w. Ry Age, Special No—March 21, 1902.

The New Union Railroad Station at Washington, D. C. An account of the advantages of the new location chosen, with illustrated general description of the station building. 2500 w. Eng Rec—Oct. 31, 1903.

The Washington Union Station. An illustrated description of a fine station, to cost not less than $4,000,000. 2000 w. R R Gaz—Dec. 4, 1903.

The Union Terminal Arrangements at Washington. Illustrated explanation of work to be carried out with a view to securing beauty as well as usefulness, at a cost of about $20,000,000. 2500 w. Ry Age—March 18, 1904.

Substructure for the New Union Station, Washington. Illustrated description of the substructure of an important terminal, which consists entirely of concrete piers and walls. Serial. 1st part. 2800 w. Eng Rec—Aug. 6, 1904.

The Washington Terminal Improvement. W. F. Strouse. An illustrated general description of the Union Station and the elimination of grade crossings in Washington. 7200 w. Eng Rec—Nov. 5, 1904.

New Terminal at Washington, D. C. An illustrated detailed description of the union station, the station grounds, and yard tracks, the methods of construction, etc., with a full account of the work thus far. 7400 w. Ry & Engng Rev—March 18, 1905.

The Washington Terminal. Theodore Starrett. An illustrated description of this beautiful terminal station in process of construction. 1800 w. Arch Rec—Dec., 1905.

See also **RAILWAY TERMINAL; TRACK.**

Waterway Exchange.—See **Canal Exchange.**

West Milwaukee, C. M. & St. P.—See **RAILWAY TERMINAL.**

Wilmington, Del.—See **RAILWAY CONSTRUCTION.**

RAILWAY STATISTICS.

See also **RAILWAY; RAILWAY ACCIDENT; RAILWAY FINANCE; RAILWAY LEGISLATION; RAILWAY TRAFFIC.**

The Railroads of the World. Tabulated information compiled and reduced from statistics published in the "Archiv für Eisenbahnwesen," with editorial. 2000 w. R R Gaz—May 31, 1901.

The Railways of the World (Die Eisenbahnen der Erde). A tabulated statement of the railways of the world by countries, showing the mileage, growth since 1898, and relation to area and population. 2000 w. Stahl u Eisen—July 15, 1904.

Length and Cost of Construction of the Railways of the World (Longuer et Prix d'Etablissement des Chemins de Fer). A tabulated view of the mileage, territory and population served, and general cost of the railways of the world at the close of 1903. 2000 w. Génie Civil—Dec. 16, 1905.

Austrian Local.—Statistics of the Austrian Local Railways for 1899 (Uebersichts-Tabellen, zusammengestellt aus der Statistik des Verbandes der Oesterreichischen Localbahnen für das Jahr 1899). General statistical tables. 3000 w. Mitt d Ver f d Förderung d Local u Strassenbahnwesens—Feb., 1902.

Belgium.—Statistics of the Belgian Railways for 1900 (Statistiques des Chemins de Fer de la Belgique pour l'Année 1900). Abstract from government reports, giving general statistics, with tables of state and private railways. 1500 w. Rev Gén d Chemins de Fer—June, 1902.

Bosnia-Herzegovina.—The State Railways of Bosnia and Herzegovina (Die Bossnisch-Herzegowinischen Staatsbahnen). From the "Zeitsch. d. Vereins Deutscher Eisen-Verwaltungen." A general statistical report of these railways and their operation in 1900. 1600 w. Ill. Zeitschr f Klein u Strassenbahnen—Jan. 16, 1902.

Graphic.—Graphic Statistics of Railways, Showing how the "Revenue Statistics" can be analyzed to exhibit the results of the working clearly and correctly. Deals only with the number of passengers as compared with train mileage but other results can be obtained by the same method. 1500 w. Engr, Lond—March 28, 1902.

International.—Statistics of International Transport (Statistique des Transports Internationaux). Gen. A. de Wendrich. A discussion of the necessity for a simplified system of regulating and recording international traffic on the Continental railways; with forms for recording statistics. 4000 w. Rev Gen d Chem de Fer—Dec., 1904.

Mileage.—**RAILWAY OPERATION.**

Practical Use.—Railroad Statistics and Their Practical Use. A. D. Parker. Read before the Rocky Mt. Ry. Club. Also editorial criticising some of the ideas advanced. 3600 w. Ry & Engng Rev—May 25, 1901.

Prussia.—Budget for the Prussian State Railways in 1902 (Etat der Eisenbahn-Verwaltung für das Etatsjahr 1902). The official estimates for operation and maintenance, with many tables. Serial. 6000 w. Glasers Ann—Feb. 15, 1902. See also **RAILWAY.**

Switzerland.—Statistics of the Swiss Railways for 1899 (Statistique des Chemins de Fer Swisses pour l'Année 1899). An analysis of the Government statistics. Tables. 2000 w. Rev Gen d Chemins de Fer—March, 1902.

Statistics of Swiss Railways (Aus der Schweizerischen Eisenbahnstatistik). With comparative tables, showing the development of Swiss railways in 1898, 1899, and 1900. 2500 w. Schweizerische Bauzeitung—July 10, 1902.

United States.—Statistics of Railways of the United States for the Year Ending June 30, 1901. Abstract of the report of the Inter-state Commerce Commission, giving figures of interest in regard to mileage, equipment, employees, service, earnings, accidents, etc. 1600 w. Eng News—July 18, 1901.

RAILWAY STRUCTURE.

See **BRIDGE; CULVERT; GIRDER; RAILWAY PERMANENT WAY; RAILWAY STATION; RAILWAY TERMINAL; ROUNDHOUSE; VIADUCT.**

Concrete Reinforced.—See **CONCRETE REINFORCED—Railway Structures.**

Convention.—Convention of the Bridges and Building Association. An account of meeting, with reports, discussions, etc. 7500 w. R R Gaz—Oct. 31, 1902.

Iron and Steel.—Iron and Steel Structures. Report of the American Railway Engineering and Maintenance of Way Association, on contracts for bridge work, specifications for rolled steel, live loads, impact and unit strains, with discussion. 16,800 w. Ry Age, Special No—March 21, 1902.

Iron and Steel Structures. Abstract of report presented at meeting of the Am. Main. of Way Assn. General specifications, with discussion. 22,500 w. Ry Age—March 24, 1905.

Masonry.—See **MASONRY.**

Report.—Buildings. Report of the American Railway Engineering and Maintenance of Way Association, on coaling stations and water tanks. Ill. 11,700 w. Ry Age Special No. March 21, 1902.

Abstracts of Reports at the Convention of the Association of Railway Superintendents of Bridges and Buildings. Reports on auxiliary coaling stations, wearing surface of roadway for overhead bridges and turntables operated by power. 2500 w. Eng News—Oct. 30, 1902.

Rutland-Canadian.—See **RAILWAY.**

Salt Lake-Los Angeles.—See **RAILWAY.**

RAILWAY SURVEYING.

See **RAILWAY; RAILWAY CURVE; RAILWAY ENGINEERING; RAILWAY LOCATION; SURVEYING.**

RAILWAY SWITCH.

See also **INTERLOCKING; RAILWAY SIGNAL; TRACK.**

Accounting.—See **RAILWAY ACCOUNTING—Switching.**

Automatic.—The Operation of Automatic Electric Track Switches. Sidney Diamant. An illustrated description of types of electric switches on trial in New York City. 3000 w. St Ry Jour—April 1, 1905.

A New Automatic Point Shifter. J. P. Tierney. Read before the Dublin Sec. of the Inst. of Elec. Engrs. Illustrated description of the point shifter used on the Dublin United Tramways system. 2500 w. Elec Engr, Lond—June 2, 1905.

Blocking.—See **TRACK.**

Chicago and Western Indiana.—See Renewals.

Derail.—See DERAIL.

Facing-Point.—Facing-Point Switch Protection. L. S. & M. S. Ry. Illustrated description of a signal lever attachment to the switch stand, arranged to be interlocked with the switch points, adopted as the standard device for the protection of facing-point switches on the road named. 900 w. Ry & Engng Rev—April 20, 1901.

Gillmor Automatic Lock.—Gillmor's Automatic Switch Lock. An illustrated description of the construction and operation. 1200 w. R R Gaz—June 12, 1903.

Lap Sidings.—See RAILWAY OPERATION.

Renewals.—Crossing and Slip Switch Renewals on the Chicago & Western Indiana R. R. Illustrates and describes improvements in certain features of slip switch design, and the interesting methods pursued in the work of renewal. 1400 w. Ry & Engng Rev—May 31, 1902.

Split.—Split Switches. Extracts from a report presented before the Roadmasters' Assn. of America. 900 w. Ry & Engng Rev—Nov. 24, 1904.

Towers.—See INTERLOCKING—Switch Tower.

Turnouts.—The Computation of Turnouts (Die Berechnung von Muttergeleisen). Max Fischl. A discussion of the construction of railway switches and turnouts, including the computation of the curves, and the arrangement of cross ties and fastenings. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 6, 1903.

Vaughan Split.—The Vaughan Split Switch. Illustrated detailed description of this design. 700 w. Ry & Engng Rev—June 22, 1901.

Westinghouse.—See RAILWAY TERMINAL—Long Island City, N. Y.

RAILWAY SWITCH WORKS.

See RAILWAY SIGNAL WORKS.

RAILWAY TARIFF.

See RAILWAY RATES; RAILWAY TRAFFIC.

RAILWAY TAXATION.

See also RAILWAY FINANCE; RAILWAY VALUATION.

Car Lines.—Taxation of Freight Car Lines. Editorial discussion of some of the plans for taxing car lines now in vogue in the United States. 1800 w. Ry Age—Oct. 2, 1903.

Wisconsin.—The Wisconsin Railway Taxation Bill. Gives extracts from the briefs presented by the C. M. & St. P. and the C. & N. W. Rys. in reply to the recommendations on railway taxation in Gov. La Follette's annual message. 11,600 w. Ry Age—March 13, 1903.

RAILWAY TECHNICAL BUREAU.

See LABORATORY—Railway; RAILWAY MATERIAL—Testing.

RAILWAY TELEGRAPH.

See RAILWAY OPERATION—Telephone vs. Telegraph; TELEGRAPH—Railway.

RAILWAY TERMINAL.

See also RAILWAY CONSTRUCTION; RAILWAY STATION; RAILWAY STRUCTURE; RAILWAY YARD; SUBWAY; TRACK DEPRESSION; TRACK ELEVATION; TRANSPORTATION.

Railroad Terminals. Elmer L. Corthell. Read before the Int. Engng. Cong., St. Louis. Classifies the types of large stations, discussing them in detail and giving interesting tables. 6000 w. Ry & Engng Rev—Oct. 8, 1904.

Albany, N. Y.—The Albany Improvement on the New York Central. An illustrated account giving a general idea of the conditions overcome and the methods of prosecuting the work, which involved an expenditure of nearly two million dollars. 6000 w. Ry & Engng Rev—March 16, 1901.

New York Central Improvements at West Albany. Illustrations giving a general idea and some deails of the new yards, round-houses and accessories, a coal stocking plant, and a coal trestle, on the N. Y. C. & H. R. R. R. 900 w. R R Gaz—March 29, 1901.

See also RAILWAY STATION.

Albuquerque, N. M.—Atchison, Topeka & Santa Fe Improvements at Albuquerque, New Mexico. Illustrated description of extensive improvements including a hotel and station, a freight station, an office building, with an opera house and two large warehouses. 1000 w. Ry Age—Nov. 8, 1901.

Altona, Germany.—See Hamburg.

Atlanta, Ga.—New Passenger and Freight Terminals at Atlanta, Ga. Illustrates and describes a somewhat unusual arrangement, due to the peculiar shape of the property and differences in level of street and tracks. 800 w. R R Gaz—March 18, 1904.

Baltimore, Western Maryland.—Tidewater Terminal of the Western Maryland at Baltimore. An illustrated description of the new terminal at Port Covington. 1000 w. R R Gaz—Vol. XXXVII, No. 23.

The Baltimore Terminal of the Western Maryland R. R. Illustrated description of the Atlantic terminus of the Gould railroad system. 2500 w. Eng Rec—July 1, 1905.

Berlin.—See RAILWAY STATION.

Blair Furnace, Pa.—Blair Furnace Freight Locomotive Terminal, Pennsylvania R. R. Illustrated description of a large locomotive terminal recently put into operation. 1500 w. Ry & Engng Rev—Dec. 23, 1905.

Boston.—The New York Central's Boston Terminal. Brief illustrated account of proposed improvement in Boston terminal facilities. 400 w. Ry Age—May 17, 1901.

See also RAILWAY STATION.

British.—See also RAILWAY OPERATION—British.

Brooklyn, N. Y.—Underground Brooklyn Terminal of the Long Island Railroad. Plans and description of the terminal at Flatbush and Atlantic avenues. 1700 w. R R Gaz—April 1, 1904.

Chicago.—One Central Railway Terminal for Chicago. R. C. Sattley. A plan for handling all the Chicago railroads in one terminal is presented, its requirements considered, and 3 plates given. Also general discussion. 18,000 w. Jour W Soc of Engrs—Oct., 1901.

New Chicago Terminal for Lake Shore & Michigan Southern and Chicago, Rock Island & Pacific. Illustration, plans, and descriptive notes. 600 w. R R Gaz—March 14, 1902.

Work of the Past Year in and Around Chicago. An account of the extensive track elevation, including elevation of yards, and involving many difficulties; the building of freight-houses and suburban passenger stations; interlocking plants; enlarged yards and terminals, &c. 2800 w. R R Gaz—March 14, 1902.

Chicago Railway Terminals. Frederic A. Delano. An illustrated article outlining a plan to bring the six different passenger terminals to one point in the city. 2800 w. R R Gaz—Vol. XXXVII, No. 2.

See also RAILWAY STATION; RAILWAY YARD; TRANSPORTATION.

Chicago, Chicago & Northwestern.—The Chicago Freight Terminals of the Chicago & Northwestern. Gives maps and plans with description and information of the methods of handling the freight. Serial. 1st part. 4500 w. R R Gaz—Vol. XXXIX. No. 11.

Cincinnati, C. N. O. & T. P.—New Freight Terminal at Cincinnati, of the Cincinnati, New Orleans and Texas Pacific. Illustrates and describes this new terminal, giving a map showing its location. 1500 w. R R Gaz—Vol. XXXIX., No. 18.

Compressed Air Plant.—See COMPRESSED AIR PLANT—St. Louis Terminal.

Division.—See Tide-Water.

Electric Plant, Weehawken.—See ELECTRIC STATION—Weehawken.

Electric Railway.—See ELECTRIC RAILWAY TERMINAL.

Facilities.—Facilities at Railroad Terminals. Albert P. Greenfelder. Discussion at the Int. Engng. Cong. at St. Louis, of the facilities required in large statons, with suggestions for improvements. 2000 w. Ry & Engng Rev—Oct. 29, 1904.

Freight, Chicago.—See Chicago; RAILWAY STATION—Chicago Freight; RAILWAY YARD—Chicago; TRANSPORTATION.

Freight Classification.—See RAILWAY YARD.

German.—The Arrangement and Operation of Railway Terminals (Ueber Anlage und Betrieb der Verschubbanhöfe). H. Pallasmann. An examination of the various arrangements of tracks and yards for the shifting of cars and making up of trains at railway terminals. 7000 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—March 19, 1904.

Glasgow.—The Glasgow and Southwestern's Extensions at Glasgow. An illustrated description of a great terminal enlargement in the heart of a busy city, where the approach is over an important river as well as numerous streets. 2500 w. Transport—Jan. 3, 1902.

Hamburg.—The Reconstruction of the Railway Connections in and about Hamburg (Die Umgestaltung der Eisenbahnanlagen in und um Hamburg). H. Caesar. An account of the important changes and reconstruction work which has been done at the railway terminals at Altona and Hamburg. 3000 w. Glasers Annalen—Oct. 15, 1903.

Jersey City.—New Erie Terminals at Jersey City and New York. An illustrated account of extensive changes to be made in Jersey City and Manhattan, including ferry-houses, office building, new station, track and yards, &c. 1300 w. R R Gaz—April 24, 1903.

Locomotive Operation.—See **LOCOMOTIVE OPERATION—Terminals.**

Long Island.—See **Brooklyn; New York, Pennsylvania.**

Long Island City, N. Y.—Passenger Terminal at Long Island City. General description, with illustrations of yard and tracks and Westinghouse electro-pneumatic interlocking switch and signal system. 1 plate. 1800 w. R R Gaz—Vol. XXXVII., No. 9.

Manhattan.—See **Jersey City.**

Nashville, Tenn.—The Nashville Union Station. Illustrations and general plan of yards, with description. 2800 w. Ry & Engng Rev—Dec. 22, 1900.

New Orleans.—The New Orleans Terminal Company. An illustrated detailed description of improvements in the terminal facilities of the New Orleans & Northeastern R. R. 2000 w. Ry Age—June 23, 1905.

New York Central.—The New Yard at the Grand Central Station. Plan and description of the recent rearrangement and improvements. 2300 w. R R Gaz—March 22, 1901.

The New York Central's Plans for the Improvement of the Park Avenue Tunnel. Announcement of the changes in the method of operating that has been decided upon, with editorial discussion, and report of the investigation of the disaster. 5700 w. Eng News—Jan. 23, 1902.

Proposed Solution of the New York Central Terminal Problem. A general outline of the plan proposed for operating the Park Ave. tunnel. 1600 w. Sci Am—Jan. 25, 1902.

The Proposed Tunnel Loop at the Grand Central Station. Plan showing the arrangement proposed with explanatory notes. 700 w. R R Gaz—Jan. 31, 1902.

New York Central Underground Passenger Loop. Plan with brief description. Also recommendations of the New York Railroad Commissioners concerning the movement of trains, &c. 1100 w. Ry Age—Jan. 31, 1902.

The New York Central's Terminal Proposition. An illustrated outline of the improvements suggested for the Park Ave. tunnel and a plan for the removal of a number of grade crossings. 1600 w. Ry Age—Dec. 19, 1902.

Grand Central Station Improvements and Connection with Rapid Transit Subway. Brief illustrated account of the extensive improvements proposed for this terminal in New York, and of the Park Ave. tunnel. 1200 w. Sci Am—Jan. 17, 1903.

History of the Grand Central Terminal, New York City. An interesting review of the early history of the New York Central and Hudson River Railroad. 2500 w. R R Gaz—Nov. 13, 1903.

Terminal Improvements of the New York Central & Hudson River in New York. G. R. Wadsworth. Illustrated detailed description of the extensive alterations and important changes in progress. 2800 w. R R Gaz—Vol. XXXIX., No. 16.

Electric Equipment and Reconstruction of the New York Terminal Lines and Grand Central Station, New York Central & Hudson River R. R. A finely illustrated article summarising this great work now in progress which is to cost about $60,000,000. 1200 w. Eng News—Nov. 16, 1905.

Terminal Yard Improvements of the New York Central & Hudson River R. R. Briefly outlines the conditions at this terminal before the commencement of improvements, and gives an illustrated account of the extensive work in progress. 3000 w. Eng Rec—Nov. 18, 1905.

See also **ELECTRIC RAILWAY—Danger; N. Y. Central; RAILWAY ACCIDENT; RAILWAY STATION; TUNNEL.**

New York, Pennsylvania.—The Long Island Railroad Entrance to Manhattan. Illustrates the proposed terminal at Thirty-third St., near Broadway, giving information concerning the plans. 500 w. R R Gaz—Dec. 6, 1901.

The Pennsylvania Railroad Terminal in New York. Describes briefly the $60,000,000 plan for tunneling the North and East Rivers at New York and building a very large terminal station on Manhattan Island. 900 w. Eng Rec—Dec. 14, 1901.

The Pennsylvania and Long Island R. R. Extensions Across the North and East Rivers. Gives a map showing the projected tunnels and bridges across the North and East Rivers, and discusses the work. 1700 w. Eng News—Dec. 19, 1901.

The Pennsylvania Railroad in New York. An article by H. G. Prout, printed in the "N. Y. Times." A sketch map of the new line across New York City, a discussion of the great undertaking and its object. 1500 w. R R Gaz—Sept. 19, 1902.

The New York Terminal of the Pennsylvania Railroad. Information from an official statement in regard to this proposed work. 1200 w. R R Gaz—Jan. 16, 1903.

Excavation and Retaining Wall for the Pennsylvania R. R. Terminal Station, New York City. Brief illustrated description of the contract plans for the underground terminal and its construction. 3000 w. Eng News—June 2, 1904.

New York Terminal Station of the Pennsylvania. Illustrations from photographs of the model at the St. Louis Exposition, with explanatory notes. 400 w. R R Gaz—Sept. 23, 1904.

The Pennsylvania Freight Terminals in New York. An illustrated description of new arrangements for handling the enormous freight business of New York and vicinity. 3500 w. R R Gaz—Vol. XXXVIII., No. 11.

See also **TUNNEL.**

Noisy-le-Sec, Paris.—See **ROUNDHOUSE.**

Oban, Scotland.—A Highland Railway Terminus. Brief illustrated description of the picturesque terminals of the Oban Railway, at Oban, Scotland. 400 w. Ry & Loc Engng—Dec., 1905.

Pan-American, Buffalo. — See **STREET RAILWAY TERMINAL.**

Paris.—The New Paris Terminal of the Orleans Railway (Prolongement de la Ligne d'Orléans dans Paris). A. Dumas. A very well illustrated description of the underground extension of the Orleans Ry. along the left bank of the Seine, and of the magnificent station on the Quai d'Orsay and its mechanical equipment. 1 plate. 1200 w. Génie Civil—Jan. 25, 1902.

The Extension of the Orleans Railroad in Paris. Illustrated description of the method of driving a double-track railway tunnel with a roof shield. 1600 w. Eng Rec—April 5, 1902.

See also **RAILWAY CONSTRUCTION; RAILWAY EXHIBITION—Paris.**

Pittsburg.—See **RAILWAY STATION.**

Port Richmond, Philadelphia.—Port Richmond Terminal of Philadelphia & Reading Ry. Illustrates and describes what is supposed to be the largest seaboard railroad terminus in the United States, if not in the world. Covers 140 acres of ground and contains 78 miles of track. 1500 w. Ry & Engng Rev—Dec. 14, 1901.

Richmond, Va.—The Terminal Improvements of the Chesapeake & Ohio Ry., at Richmond, Va. Illustrated description of work, including a long line of viaduct, and a new union station and train shed. 2200 w. Eng News—Nov. 29, 1900.

See also **RAILWAY STATION.**

St. Louis.—Inadequate Freight Terminals. George Hannauer, with discussion. Discusses local conditions at St. Louis, which are similar to other large cities, and the remedy. Shows what a freight terminal should be, &c. 7000 w. St. Louis Ry Club—Feb. 14, 1902.

The St. Louis Terminal Improvements. Inset, with description of the rearrangement to enlarge the capacity and improve the facilities. Some interesting engineering problems involved. 3400 w. R R Gaz—March 20, 1903.

St. Louis Terminals Up-to-Date. Jno. J. Baulch. A report showing the importance of this city as a railroad center, and giving information of interest. 5500 w. St Louis Ry Club—April 10, 1903.

Improvement of Railway Terminal Facilities at St. Louis, Mo. Abstract of a committee's report considering needed improvements. 2500 w. Eng News—Oct. 29, 1903.

Some Proposed Improvements in St. Louis Terminals. A. P. Greensfelder. Describes work being done and contemplated, at a cost of millions of dollars. 7000 w. St Louis Ry Club—Oct. 9, 1903.

Proposed Improvements in St. Louis Terminals. A. P. Greensfelder. Plans and description of the various improvements already made or contemplated, and an account of methods of handling the immense traffic. 7700 w. Jour Assn of Engng Socs—Jan., 1904.

Terminal Necessities. W. M. Prall. Considers the necessities of the service and the difficulties. 4500 w. St Louis Ry Club—Oct. 9, 1903.

Recent Terminal Improvements. Daniel Breck. Gives an outline of the work undertaken at the Union Station of St. Louis during the Exposition. 7300 w. St. Louis Ry Club—Feb. 10, 1905.

Recent Terminal Improvements in St. Louis. Daniel Breck. Gives a general view of the problems as they presented themselves and the methods employed in defining difficulties and reaching solutions. 9 plates. 5500 w. Jour Assn of Engng Socs—May, 1905.

See also **POWER PLANT; RAILWAY STATION; TRACK.**

St. Louis Exposition.—Wabash Terminals at St. Louis. Plans and description of arrangements at the World's Fair grounds. 1400 w. Ry Age—Jan. 22, 1904.

St. Paul.—Yard and Stations Improvements at St. Paul, Minn. General plan of rearrangement of track system for the St. Paul Union Depot Co., with illustrated description of other improvements. 2000 w. Ry Age, Special No—March 21, 1902.

San Antonio, Texas.—Southern Pacific Passenger Station at San Antonio. An illustrated description of a new passenger station in the Mission style of architecture. 600 w. R R Gaz—Dec. 18, 1903.

Savannah, Ga.—Terminal Improvements at Savannah. An illustrated description of the recent work by the Georgia & Alabama Terminal Company, on Hutchinson Island, opposite the city of Savannah, and on the north bank of the Savannah River. 1300 w. R R Gaz—Aug. 2, 1901.

Seattle—Great Northern.—Great Northern Terminal Improvements at Seattle. Illustrates and describes improvements found necessary, including the construction of a tunnel under the business district. 2000 w. R R Gaz—Vol. XXXVII, No. 21.

Staten Island, N. Y.—The Proposed Terminal at St. George, Staten Island. A statement of the recent propositions made by the steam and the electric transportation companies to furnish ferry service, with an illustrated description of the accepted plans. 1000 w. St Ry Jour—May 30, 1903.

Street Railway.—See **STREET RAILWAY TERMINAL.**

Sydney, N. S. W.—Sydney Central Railway Station. Gives a block plan showing approaches and roads, as recommended by the N. S. W. Central Station Board. 900 w. Aust Min Stand—Oct. 31, 1901.

Tampa.—Terminal Improvements of the Plant System, at Port Tampa, Fla. A comprehensive illustrated description of this terminal, including much recent engineering work and giving much information of the business which passes through this point. 3800 w. Ry & Engng Rev—March 15, 1902.

Tide-Water.—Design and Operation of Division and Tide-Water Terminals. C. L. Bardo. A discussion of inadequate yard facilities, and yard design, methods of switching and their efficiency, &c., successful operation of yards. General discussion follows. 1300 w. N Y R R Club—Dec. 18, 1903.

Vicksburg, Miss.—See **RAILWAY CONSTRUCTION.**

Victoria, Canadian Pacific.—Canadian Pacific Improvements at Victoria. An illustrated article describing the improvement of railroad property at this point, including the building of a fine hotel. 1500 w. R R Gaz—Vol. XXXVIII, No. 16.

Washington, D. C.—The Washington Terminal Improvements of the Baltimore & Ohio and the Pennsylvania Railways. W. F. Strouse. An illustrated article describing the work of eliminating grade crossing, the terminal stations, etc. 6000 w. Eng News—Nov. 10, 1904.

New Yards and Terminal Approaches at Washington, D. C. W. F. Strouse. Illustrates and describes the new yards and terminal facilities, the bridges which carry the tracks over the streets, retaining walls, etc. 3300 w. R R Gaz—Vol. XXXVII, No. 22.

See also **RAILWAY STATION.**

Weehawken Power Plant.—See **ELECTRIC STATION.**

West Milwaukee, C. M. & St. P.—Recent Improvements at West Milwaukee, C., M. & St. P. Ry. Illustrated description of new buildings, and installation of modern appliances 2500 w. Ry & Engng Rev—April 29, 1905.

RAILWAY TESTING.

See **LABORATORY—Railway; RAILWAY MATERIAL.**

RAILWAY TRACK.

See **CROSS TIE; RAIL; RAILWAY PERMANENT WAY; TRACK.**

RAILWAY TRAFFIC.

See also **RAILWAY; RAILWAY FINANCE; RAILWAY LEGISLATION; RAILWAY MANAGEMENT; RAILWAY RATES; RAILWAY TRANSPORTATION.**

Associations.—Railway Traffic Associations—Their Origin, Object and Results. C. E. E. Childers. Read before the Traffic Club of Pittsburg. Their aim to secure uniformity, stability and reasonableness of rates. 3000 w. Ry Age—Nov. 27, 1903.

Automobile Feeders.—See **AUTOMOBILE—Railway Feeder.**

Beef Contract.—A Novel and Important Freight Contract. A slightly abridged copy of a circular issued by A. B. Stickney, giving particulars of a contract just made with the beef shippers. 2500 w. R R Gaz—Aug. 15, 1902.

British.—Stability of Traffic on British Railroads. Reviews an article published in "The Statist" (London) on the relative stability of the traffic on British railroads compared with that of other countries. 1000 w. R R Gaz—Jan. 29, 1904.

Railway Traffic. A review of the Board of Trade returns and the effect of tramway traffic. Refers to the problem of classes to be solved in England and gives information of interest. 3300 w. Engng—Sept. 16, 1904.

See also **RAILWAY TRANSPORTATION.**

Car Carding.—Following Up Time, Fast or Carded Freight. P. D. Satchwell. Describes a carefully worked out system, known as the '(Best by Test." 1700 w. Ry Age—Oct. 20, 1905.

Car Clearance.—See **Clearance.**

Car Counting.—The Proper Method of Counting Cars Handled Over Terminals in Figuring Cost of Handling Per Car. R. V. Miller. Gives a few of the methods of counting cars and the method recommended by the writer. 3000 w. St. Louis Ry Club—Aug. 6, 1902.

Car Distribution.—A Practical Method of Car Distribution. C. C. Riley. Read before the Car Accountants' Assn. Describes a system now in use on the Chicago Great Western. 2500 w. R R Gaz—May 27, 1904.

Car Famines.—See **RAILWAY TRANSPORTATION.**

Car Interchange.—Car Interchange Rules in Europe. A summary of the regulations of the principal countries. 900 w. R R Gaz—Dec. 7, 1900.

Report of Committee on Interchange Rules. Gives the report of the committee and its discussion. 8000 w. Cent Ry Club—March, 1901.

Reports of Committees on Revision of the Rules of Interchange. Reports and general discussion. 16,500 w. W Ry Club—April, 1901.

Report of the Committee on Revision of the Rules of Interchange. Report, discussion and recommended changes. 6000 w. W Ry Club—March 18, 1902.

Proposed Changes in the M. C. B. Code of Car Interchange Rules. The importance of stencilling "capacity" as well as weight on the outside of all cars. 500 w. Loc Engng—July, 1902.

How Fairness is Secured in Car Interchange. From the Pittsburg "Commercial Gazette." A discussion of former and present practice. 2200 w. Loc Engng—May, 1904.

Car Recording.—A New Method of Car Recording. F. Lincoln Hutchins. Brief description of a method using a registering machine. 900 w. Ry Age—July 28, 1905.

Car Service.—The Decline in Freight Car Performance. Reviews the efforts being made by J. W. Midgley to get the roads to agree upon a per diem charge for the use and detention of cars. 3300 w. Ry Age—Dec. 13, 1901.

Mr. Midgley's Car Service Investigations. A review of Mr. J. W. Midgley's seventh circular letter, which discusses plans that have been tried or suggested to promote greater activity in freight car performance. 2000 w. Ry Age—Jan. 17, 1902.

Checks.—The Elimination of the Brass Check. Abstract of paper by M. G. Carrel, presented at meeting of the Genl. Pass. Agts. Assn. An argument in favor of the substitution of the card for the brass check, and showing its advantages. 1400 w. Ry Age—Nov. 9, 1900.

Claims.—Railway Freight Claims. R. L. Calkins. A discussion of the freight claim department, its purposes and relations to other departments. General discussion follows. 11,000 w. N Y R R Club—Oct. 16, 1902.

Freight Claims. W. A. Terry. Discusses difficulties due to carelessness of both shippers and carriers and the placing of the responsibility, and matters relating to adjustment. General discussion. 16,000 w. Pro Ry Club of Pittsburgh—Feb., 1905.

Clearance.—Advantages of a Railway Clearance System. J. W. Midgley. Review of attempts to establish a clearance system for cars and accounts: clearing yards the desideratum at crowded terminals. 3000 w. Ry & Engng Rev—Aug. 13, 1904.

Advantages to be Derived from a Railway Clearance System. J. W. Midgley. A review of the Southern Iron Car Line, Green Line, and other attempts at clearing. 5500 w. Ry Age—Dec. 9, 1904.

Comments on Recent Criticisms of Clearance Proposals. J. W. Midgley. A reply to criticisms on a series of articles by the writer, outlining proposed clearance plans. 4000 w. Ry Age—Aug. 18, 1905.

Early Proposals to Form a Clearing House in Connection with Trunk Line Associations. J. W. Midgley. Reviews the various schemes for establishing a railway clearing house, explaining the views of various railway men. 5000 w. Ry Age—Nov. 10, 1905.

Clearance, Eng.—A Glance at the Railway Clearing House of England—Can the Plan Be Profitably Followed in America? J. W. Midgley. An explanation of the system and of the conditions in England. 3500 w. Ry Age—June 16, 1905.

Further Observations Regarding the Railway Clearing House of England. J. W. Midgley. Considers the difficulties due to freight classification and discusses the "coaching" department in England, the mileage department, and other English methods. Serial. 1st part. 5000 w. Ry Age—July 7, 1905.

Coal Cars.—See **CAR—Coal; RAILWAY TRANSPORTATION.**

Community of Interest.—Community of Interest from a Traffic Standpoint. B. D. Caldwell. An interesting address on the progress we may look for in this new century, and its application to the community of interest in railroading. Discusses some of the principles essential. General discussion. 16,000 w. N Y R R Club—Jan. 16, 1902.

Consolidated Shipments.—Forwarding Companies and Consolidated Shipments. A ruling concerning the right of the railroads to refuse to transport at carload rates, shipments of less than carload lots which have been consolidated, with editorial discussion. 2000 w. Ry & Engng Rev—Nov. 2, 1901.

Demurrage.—Demurrage. A. W. Sullivan. Extracts from an address on "Car Service in Its Relation to Operation," delivered before the Nat. Assn. of Car Service Mgrs., at Chicago. 1300 w. R R Gaz—June 19, 1903.

The Doctrine of Demurrage. Editorial discussion of special statutes of different States modifying the general law. 2500 w. R R Gaz—Dec. 11, 1903.

Reciprocal Demurrage Laws. Ashley J. Elliott. Speech before the Chamber of Commerce, Decatur, Ill. 3500 w. Pro St Louis Ry Club—Aug. 11, 1905.

The Implements and Causes of Demurrage Controversies. Ashley J. Elliott. Discusses some of the problems of car service. 4500 w. Pro St Louis Ry Club—Dec. 9, 1905.

Differentials.—See **RAILWAY RATES.**

Electric Railway Freight.—See **ELECTRIC RAILWAY—Freight Interchange.**

England and America.—See **RAILWAY—Yorke Report.**

Europe.—Review of Traffic Questions. C. Colson. The railways in 1902 and 1903 in France, England and Germany. 5000 w. 5 plates. Bul Int Ry Cong—Dec., 1904.

European Tunnels.—See **Simplon; RAILWAY—Simplon Connections; TUNNEL—Alpine.**

Express and Freight.—Two Well-Managed Express and Freight Departments. Operating details of this service as illustrated at Rochester and at Albany, N. Y. 2000 w. St Ry Rev—March 15, 1901.

Express, Eng.—Small Parcels Traffic in England. Describes the methods employed by the London & Northwestern Railway as typical of general practice. 3500 w. Ry Age—Oct. 2, 1904.

Fast Freight.—See **RAILWAY TRANSPORTATION.**

Fast Freight, Frisco System.—See **RAILWAY TRANSPORTATION.**

Fast Freight, Santa Fe.—See **RAILWAY OPERATION.**

Freight Car-Hire.—See **Per Diem.**

Freight Claim.—See **Claims.**

Germany.—Freight Movement on German Railways (Die Güterbewegung auf Deutschen Eisenbahnen im Jahre 1900 im Vergleich zu der in den Jahren 1899, 1898 und 1897). Statistical tables, particularly of mining and metallurgical products. 600 w. Glückauf—Nov. 23, 1901.

Industrial Department.—See **RAILWAY MANAGEMENT.**

International Congress.—See **Suburban.**

Light Railway Influence.—See **LIGHT RAILWAY.**

Long and Short Haul.—Long and Short Haul. Supreme Court decision in the East Tennessee, Virginia and Georgia case, involving rates to Nashville and Chattanooga. 6000 w. Ry Age—April 19, 1901.

Mileage.—See **RAILWAY OPERATION.**

New South Wales.—New South Wales Railways and Trade. Editorial discussing the progressive development shown in the management of the railways, and the consequent general prosperity. 1700 w. Engng—Oct. 25, 1901.

"Owner's Risk."—The Railway Companies and "Owner's Risk." Discusses a proposed alteration which the British railway companies are endeavoring to carry through. 1700 w. Engr, Lond—Sept. 26, 1902.

Per Diem.—The Per Diem Basis for Settlement of Freight Car Hire. J. M. Daly. A discussion of the advantages and objections relating to this system, generally favorable to its adoption. 3400 w. R R Gaz—Jan. 10, 1902.

Mileage vs. Per Diem. W. M. Prall. Discusses the present conditions and what may be expected under per diem; and how the cars shall be cleared at terminals so that the car owner may be protected, if per diem is adopted. 3600 w. St. Louis Ry Club—March 14, 1902.

Per Diem as a Standard of Measurement and Per Diem Rules as Practically Applied at St. Louis Terminals. W. M. Prall. Gives deductions from the applications of the per diem rules in the St. Louis and East St. Louis terminals. General discussion follows. 12,000 w. St. Louis Ry Club—Nov. 14, 1902.

Per Diem, as Applied by Car Service Associations in Their Industrial Rule. W. M. Prall. Read at convention of the Nat. Assn. of Car Service Mgrs. An explanation of the object of these rules and their underlying principle. 1200 w. Ry Age—June 17, 1904.

Per Diem from a Terminal Standpoint. Jno. J. Baulch. Briefly notes some features of car service from the terminal point of view. 2300 w. St Louis Ry Club—March 14, 1902.

Errors in Calculating an Average Per Diem Rate. Two letters discussing the recent letter of Mr. Midgley. 1700 w. R R Gaz—April 4, 1902.

The Per Diem Reform. Editorial discussion of this question. 1800 w. R R Gaz—April 11, 1902.

"Per Diem" Runs Against the First Snag. Discussing the action of the Boston & Maine, and New York, New Haven and Hartford roads concerning the transportation of cotton. 2000 w. Ry Age—June 20, 1902.

A Question to be Decided in Connection with Per Diem Agreements. Editorial discussion of the question where state laws grant to shippers a specific number of days for loading and unloading. 1700 w. R R Gaz—Aug. 15, 1902.

The Operation of the Per Diem System of Settlement for Car Hire. Papers on this subject by M. B. Casey and by W. H. Rosevear, with discussion by members. 12,300 w. N Y R R Club—Dec. 19, 1902.

The Operation of the Rules for the per Diem Basis of Car Hire. F. A. Delano. Discusses some of the difficulties which have developed in the actual operation of the rules. 2200 w. Pro Iowa Ry Club—Oct. 20, 1903.

Comments on the Per Diem Rules. Arthur Hale. Comments on the rules in their order. Also editorial. 4500 w. Ry Gaz—Vol. XXXVII., No. 18. Serial. 1st part.

Per Diem. W. G. Hunter. Short paper introducing a general discussion of this subject. 4500 w. Pro Iowa Ry Club—Sept. 11, 1905.

See also **Car Service.**

Pooling Locomotive.—See **LOCOMOTIVE POOLING.**

Private Car.—Private Cars. J. W. Midgley. An inquiry into their growth, developments and operations. Serial. 2 parts. 5800 w. Ry Age—Oct. 10 and 17, 1902.

See also **CAR; REFRIGERATOR CAR.**

Rates.—See **RAILWAY RATES.**

Rebates, England.—Freight Rebates in England. Extract from the London "Mail," concerning a rebate agreement by the Midland Ry. and the consequences. 700 w. U S Cons Repts, No. 938—Jan. 18, 1901.

Routing Freight.—Interstate Commission on the Right to Route Freight. The conclusions of the majority opinion, and the dissenting opinion of Chairman Knapp, are given practically in full, in the cases regarding the right of carriers to control the routing of shipments of fruit. 5000 w. Ry Age—June 6, 1902.

St. Louis Terminal.—Affairs of the Terminal Railroad Association of St. Louis. A statement aiming to explain the relations of this association to the merchants and manufacturers. 3000 w. Ry & Engng Rev—May 30, 1903.

Simplon Tunnel.—The Lines of Approach to the Simplon (Le Linee di Accesso al Sempione). A report of the discussion in the Chamber of Deputies under which the various Italian railways are to partake in the traffic through the Simplon tunnel. 1000 w. Gior d Lav Pubb e delle Str Ferr—Dec. 25, 1901.

Steam vs. Electric.—Competition of Steam vs. Electric Parallels. C. H. Davis. From a paper read before the Canadian Soc. of Civ. Engrs. Outlines the laws of passenger traffic and discusses the effect of competition. 2000 w. Can Engr—May, 1902.

See also **ELECTRIC RAILWAY—Connecticut; Massachusetts; Steam Competition.**

Through Booking.—Through Booking and Conveyance of Passengers, Parcels and Merchandise on Tramways and Light Railways. T. Upton. A discussion of the phases of the subject from an English point of view. Serial. 1st part. 1500 w. Elec Rev, Lond—March 11, 1904.

Time Element.—The Influence of Time Element on Mechanical and Transportation Matters. H. T. Herr. Discusses the proper basis for traffic statistics, with the view of drawing out opinions of others, and securing economy and efficiency. 1400 w. Am Engr & R R Jour—March, 1903.

Ton-Mile.—The Ton-Mile in India. Notes by Lieut. Gen. Sir Richard Strachey stating the reasons which led to the adoption of ton and passenger mileage returns, more than 30 years ago, under the orders of the Government of India, and the results which have followed. 1800 w. Transport—Jan. 31, 1902.

Ton-Mile Basis for Engine Service Statistics. Gives a form of locomotive and car performance sheet devised by Jno. M. Taylor of the Illinois Central R. R., with remarks on the completeness in detail, etc. Ry & Engng Rev—June 14, 1902.

Ton-Mile Railway Statistics, and Railway Rates and Terminal Charges. R. Price-Williams. Gives a tabular statement showing the value of the ton-mile principle as applied to ascertaining goods and mineral traffic receipts, with discussion of this and related subjects. 1500 w. Ir & Coal Trds Rev—Oct. 27, 1905.

Tonnage.—Effects of Tonnage Ratings on the Cost of Transportation. C. H. Quereau. Read before the Mas. Mechs.' Assn. Showing savings and benefits due to the use of tonnage ratings. 3000 w. Ry & Engng Rev—June 27, 1903.

The Coal Carriers. Frederick E. Saward. Shows the importance of tonnage to the railroads, giving some idea of the annual haulage, especially from the coal territory. 2200 w. R R Gaz—Vol. XXXIX., No. 23.

Train Loads.—See **RAILWAY TRANSPORTATION.**

Train Tonnage.—See **RAILWAY OPERATION.**

United States.—See also **RAILWAY FINANCE.**

Workingmen's Trains.—See **TRAIN SERVICE.**

RAILWAY TRANSPORTATION.

See also **IRON ORE TRANSPORTATION; RAILWAY OPERATION; RAILWAY RATES; RAILWAY TRAFFIC; TRAIN SERVICE; TRANSPORTATION.**

Some Problems in Modern Railway Transportation. Philip Burtt. Extracts from a paper read at the meeting of the York Ry. Lecture and Debating Soc. Discusses problems bearing on the development and increase of business, and the economy. 4000 w. Transport—Dec. 2, 1904.

In Relation to the Transportation Problem. W. M. Prall. Principally a discussion of freight transportation and its problems. General discussion follows. 9000 w. Pro Ry Club of Pittsburgh—Nov., 1905.

America.—Railways and Industry. H. T. Newcomb. Reviews the charges brought about by the railway system, especially in America. 2500 w. Gunton's Mag—Jan., 1902.

American Overland.—American Overland Transport to the Orient. H. Emerson. A discussion of the development of Pacific Coast commerce in connection with the transcontinental railways; considering the pending reversal of the commerce route now existing through the Suez Canal. 4000 w. Engineering Magazine—March, 1903.

Automobile Compared.—See **AUTOMOBILE; TRANSPORTATION.**

Baggage.—Report on the Question of Baggage (Subject XI, Littera A, for discussion at the 7th session of the Railway Congress). George H. Daniels. 12,800 w. 1 table. Bul Int Ry Cong—Nov., 1904.

Berlin.—See **TRANSPORTATION.**

Branch Lines.—See **TRAIN SERVICE.**

Break-in-Two.—See **TRAIN—Parting.**

Brilliant Cut Off.—See **RAILWAY CONSTRUCTION—Pennsylvania.**

British.—Goods and Mineral Traffic. Discusses affairs in England, the difficulties in making up heavy trains, and the need of improvements to secure economical handling. 2500 w. Engr, Lond—Oct. 25, 1901.

Handling Merchandise Freight on British Railroads. Outlines the conditions of freight service in Great Britain, and gives an account of recent changes made at Crewe by the London & Northwestern Ry. 1500 w. R R Gaz—June 6, 1902.

Problems in Transportation by Rail in the United Kingdom. George Harrison Sheffield. Presidential address before the Newcastle-on-Tyne Assn. of Students of the Inst. of Civ. Engrs. Discusses needed improvements in rolling stock, electric power and other developments. 4200 w. R R Gaz—Feb. 12, 1904.

See also **RAILWAY TRAFFIC.**

Capacity of Track.—Limit of Capacity of Single Track. Presents papers by H. C. Thompson and Augustus Mordecai, read in 1883, also responses to a general invitation to discuss this subject, and an editorial. 18,700 w. Ry & Engng Rev—March 15, 1902.

Car Famines.—How to Prevent Car Famines. W. L. Surran. A letter giving suggestions that the writer thinks will alleviate if it does not remedy. 1800 w. Ry Age—Feb. 14, 1902.

Car Transporters.—See **CAR TRANSPORTER.**

Chicago Switching Yards.—See **RAILWAY YARD.**

China.—See **RAILWAY; RAILWAY CONSTRUCTION; TRANSPORTATION.**

Coal Carrying.—The Anthracite-Carrying Railways. H. T. Newcomb. A statement of the conditions connected with anthracite transportation, and the difficulties arising. 2000 w. Rev of Revs—July, 1902.

See also **CAR—Coal.**

Cost Reduction.—The Development of Economy in Railroad Transportation Since 1875. S. Whinery. A discussion of the factors which have led to the reduction in the cost of the ton mile. 3500 w. Engineering Magazine—Jan., 1905.

See also **CAR—Capacity; Coal.**

Cuba.—Railroading in Cuba. Relates incidents in regard to travel on Cuban railways, both humorous and exasperating. 2500 w. Ry & Engng Rev—Dec. 16, 1905.

See also **RAILWAY.**

Employee.—See **RAILWAY EMPLOYEE.**

Explosive.—Transportation of Explosives on the P. R. R. Extracts from a recent circular giving regulations for the transportation of the various classes of explosives. 900 w. R R Gaz—Vol. XXXIX. No. 2.

An Expert Report on the Transportation and Handling of Explosives by Railways. Full abstract of Dr. Charles B. Dudley's report, and of the report of the Committee on Experts. 8500 w. Eng News—Nov. 9, 1905.

Regulations for the Transportation of Explosives. Gives the regulations drafted by the committee of the Am. Ry Assn. and approved at Chicago, Oct. 25, 1905. 3500 w. Eng News—Nov. 23, 1905.

Express Business. — See **ELECTRIC RAILWAY; RAILWAY TRAFFIC.**

Fast Freight, Canadian Pacific.—Handling Fast Freight on the Canadian Pacific. Gives forms and information concerning the new method of handling fast freight on through trains, known as the "Red Card" system. 2200 w. R R Gaz—Sept. 23, 1904.

Fast Freight, Chicago & N. W.—Time Freight on the Chicago & Northwestern. Gives particulars of the system in use. Ills. 1000 w. R R Gaz—Vol. XXXIX., No. 9.

Fast Freight, England.—Handling Fast Freight in England. An account of the extravagant development of this type of traffic in England. 2000 w. R R Gaz—Vol. XXXIX. No. 21.

Fast Freight, Erie.—Time Freight on the Erie. Describes the system of handling and keeping a record of the movement of fast freight. The principle on which it is based is the grouping of cars containing freight of similar classification from one point to another point and making one manifest for the group of cars. 2000 w. R R Gaz—Vol. XXXIX., No. 20.

Fast Freight, Frisco System.—The Frisco System of Handling Time Freight. An explanation of the present time freight system, giving forms used, and general information. 3000 w. R R Gaz—Vol. XXXIX., No. 7.

Fast Freight, Santa Fe.—Handling Fast Freight on the Santa Fe. Information in regard to the system in use on this line for handling high-class and special freight—known as the Red Ball system. 1600 w. R R Gaz—Vol. XXXIX., No. 8.

Fish, British.—The Great Central's Fish Traffic. An illustrated article describing the important traffic from the royal docks at Great Grimsby, and giving an account of the development. 4500 w. Ry Age—May 13, 1904.

Freight.—I. The Best Way to Keep Freights on Time, from a Conductor's Standpoint. T. H. Beacon. II. How to Keep Way Freights on Time, from an Agent's Standpoint. R. F. Weeks. Two papers discussed together. Also III. The Best Way to Handle Freights so That They Will Be on Time, from Train Dispatcher's Position. 9500 w. Pro Iowa Ry Club—Jan. 19, 1904.

Improvement in Handling of Freight. J. Rothschild. Outlines a plan used on a large railroad system, which has proved satisfactory. 1500 w. Ry & Engng Rev—July 6, 1901.

Management of Freight Trains and Freight Houses. Abstract of a paper by L. C. Fritch. Suggestions from the Supt. of the B. & O. Southwestern. 1600 w. R R Gaz—Aug. 9, 1901.

The Handling of Freight Traffic. L. C. Fritch. Full paper. Discusses the classification, methods, &c., offering suggestions of value. 1600 w. St Louis Ry Club—Aug. 9, 1901.

How to Handle Freight Safely. R. C. Richards. Extracts from an address by the general claim agent of the Chicago & North Western R. R. to the agents of that company, giving much practical advice. Serial. 1st part. 2500 w. R R Gaz—Vol. XXXVII., No. 11.

Freight, Great Northern.—The Great Northern Line Freight System. Gives particulars of the system used. 900 w. R R Gaz—Vol. XXXIX, No. 10.

Freight Transfer Houses.—Freight Transfer Houses and Consolidation of Picked-Up Freight. Edwin H. Lea. Gives suggestions which the writer feels would materially improve the present service. 2000 w. R R Gaz—June 20, 1902.

Freight Transferring.—Handling Freight so as to Avoid Losses. Extracts from an address on loss and damage and its effect upon railroad revenue, delivered to the freight agents of the N. Y. C. & H. R. R., by R. L. Calkins. 2200 w. R R Gaz—Vol. XXXIX. No. 19.

Fruit.—The Tropical Fruit Traffic. Describes the methods, shipments and railroad facilities for caring for the fruit, especially bananas. 1800 w. Ills. R R Gaz—Vol. XXXVII., No. 8.

Grain.—Relations of Railroads to the Grain Trade. F. A. Delano. Discusses points in facilitating the cononomical and rapid handling of grain, the improvements made and needed. 3700 w. Ry Age—Oct. 16, 1903.

The Grain Carriers. Map, tables and interesting information concerning the grain carrying railroads in the United States. 4000 w. R R Gaz—Vol. XXXVIII, No. 8.

See also **GRAIN ELEVATOR; GRAIN HANDLING.**

Grain, France.—The Railways of France and the Transport of Cereals (Les Chemins de Fer Français et les Transports de Céréales). R. Bloch. A general review of the grain traffic of France and its distribution among the various railways. 5000 w. Rev Gen des Chemins de Fer—April, 1901.

India.—Passenger Traffic on Indian Railways. Concerning traffic where the average number of passengers in a train is greater than in any other country. 1500 w. Engr, Lond—Nov. 18, 1904.

Goods Traffic on Indian Railways. Information concerning the unsatisfactory speed of India goods trains, discussing some of the causes. 1500 w. Engr, Lond—March 17, 1905.

Long Material.—Loading Long Material. Tables and directions prepared by Mr. Pulaski Leeds, for the loading of lumber, logs and stone on open cars and carrying structural material, girders, &c. 1000 w. Ry Age—July 12, 1901.

See also **RAIL—Unloading; SHAFT—Unloading; TRANSPORTATION—Lumber.**

N. Y. Harbor.—Railroad Freight Handling in New York City. Illustrated description of the system of lightering in New York harbor, method of handling the cars, etc. 1000 w. Sci Am—June 14, 1902.

See also **TRANSPORTATION.**

Passenger.—Some Features of Railway Traveling, Past and Present. Frederick McDermott. Presents features showing the growth and progress, and gives facts of interest concerning early methods of conducting transportation. General discussion. 8500 w. Jour Soc of Arts—Feb. 22, 1901.

See also **TRAIN SERVICE.**

Promptness.—What Can We Do Toward Getting Trains Over the Road with More Promptness? Eugene McAuliffe. States familiar troubles and offers some suggestions for remedying them. 1700 w. St Louis Ry Club—Jan. 10, 1902.

Prussia.—See **CAR—Capacity.**

Rails.—See **RAIL—Unloading.**

Refrigerator Car.—See **REFRIGERATOR CAR.**

Russo-Japanese, Military.—The Railways of Eastern Asia and the Russo-Japanese War (Die Eisenbahnen Ostasiens und der Russisch-Japanische Krieg). Dr. Franz Ritter v. Le Monnier. A review of the railway transport facilities of Russia and Japan, and their relation to military movements. Two articles. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 29, 1904.

See also **RAILWAY—Japan; Manchuria; Siberia.**

St. Louis Exposition.—The Railway Problem as Applied to the Louisiana Purchase Exposition to be Held in St. Louis. A. D. 1903. H. J. Pfeifer. Discusses the railroad business in connection with the proposed fair, giving suggestions for the arrangements needed. 4000 w. St Louis Ry Club—Oct. 11, 1901.

The Railway Problem as Applied to the Louisiana Purchase Exposition to be Held in St. Louis, A. D. 1903. George Hannauer. Brief suggestions advising the organization of a separate World's Fair Freight Terminal. 900 w. St Louis Ry Club—Oct. 11, 1901.

The Railway Problem as Applied to the Louisiana Purchase Exposition to be Held in St. Louis, A. D. 1903. Jno. J. Baulch. Suggestions for the efficient handling of the construction work, transport of materials and exhibits, and prompt transportation of passengers. 3300 w. St Louis Ry Club—Oct. 11, 1901.

The Railway Problem as Applied to the Louisiana Purchase Exposition to be Held in St. Louis, A. D. 1903. William R. Brannan. Outlines the conditions at St. Louis and a plan for satisfactorily caring for the crowds of people expected. 8000 w. St Louis Ry Club—Oct. 11, 1901.

The Railway Problem as Applied to the Louisiana Purchase Exposition to be Held in St. Louis, A. D. 1903. Charles E. Koons. Suggestions in connection with transportation of exhibits and people, and the general management of affairs. 2000 w. St Louis Ry Club—Oct. 11, 1901.

The Railway Problem as Applied to the Louisiana Purchase Exposition to be Held in St. Louis, A. D. 1903. Discussion of the prize papers on this subject by A. T. Perkins and others. 3200 w. St Louis Ry Club—Nov. 8, 1901.

See also **RAILWAY TERMINAL; TRANSPORTATION.**

Shaft.—See **SHAFT—Unloading.**

Size Car.—See **Train Loads; CAR—Capacity.**

Suburban.—On the Question of the Suburban Traffic (Subject XII for Discussion at the Seventh Session of the Railway Congress). A. W. Sullivan. Summary of information in response to a circular of inquiry. 4 tables and figures, with 46 photographs. 9900 w. Bul Int Ry Cong—Oct., 1904.

Suburban Traffic. Extracts from a report prepared by A. W. Sullivan for discussion at the International Railway Congress, with editorial. 3000 w. R R Gaz—Vol. XXXVII, No. 25.

On the Question of the Suburban Traffic (Subject XII for Discussion at Seventh Session of the Railway Congress). H. G. Drury. Report No. 2 for all countries except America. 19,800 w. 9 tables & figures. Bul Int Ry Cong—Dec., 1904.

See also **TRAIN SERVICE.**

Tonnage.—See **Train Loads.**

Tracing.—Some Ideas in Handling and Tracing High Class Freight. W. B. Harrison. Paper and discussion aiming to simplify the tracing of delayed freight. 3500 w. Pro Iowa Ry Club—Dec. 8, 1905.

Train Loads.—Increasing the Revenue Train Load by the Use of Large Capacity Cars and Improvements in Construction and Maintenance of Details. F. F. Gaines, with general discussion. 1200 w. N Y R R Club—May 16, 1901.

The Train Tonnage Craze. G. W. Turner. Unfavorable to heavy tonnage trains. Discusses the subject. 1600 w. Ry & Engng Rev—Dec. 14, 1901.

Train Tonnage. Henry Miller. Discusses, in a general way, how to properly and economically load and operate trains. 1000 w. St Louis Ry Club—Jan. 10, 1902.

Handling Less Car Load Tonnage. Edwin H. Lea. Discusses the causes of the irregularities that lead to losses in the payment of damage claims, and the remedies. 1100 w. R R Gaz—Feb. 14, 1902.

Average Lading of Freight Cars and Tons Lading of Freight Trains. J. H. McPartland. Suggestions for the loading of cars that will accomplish a saving. Followed by general discussion. 8800 w. Pro W Ry Club—Jan. 20, 1903.

See also **CAR—Capacity.**

United States.—See **America; TRANSPORTATION.**

Workingmen's Trains.—See **TRAIN SERVICE.**

RAILWAY VALUATION.

See also **RAILWAY FINANCE; RAILWAY REAL ESTATE; RAILWAY TAXATION.**

What Is the Value of a Railroad for Purposes of Taxation? Charles Hansel. A discussion of the work of Prof. M. E. Cooley, who was selected to examine and report on the railroad properties of the State of Michigan, and the subject in general. 2500 w. R R Gaz—April 19, 1901.

Railroad Taxes and Plans for Ascertaining Fair Valuation of Railroad Property. Report presented at the Nat. Assn. of R. R. Com., Deadwood, S. D. Considers the best means of taxing railroad properties, and the best means of determining the fair valuation of the properties. 2500 w. Ry Age—Sept. 8, 1905.

Michigan.—Expert Valuation of Railway and Other Corporate Property in Michigan. Concerning the accurate valuation undertaken under the direction of the Michigan Board of State Tax Commissioners. Explains the purpose and scope of the work, and the organization of the force, etc. 9300 w. Eng News—Dec. 20, 1900.

Nebraska.—The True Principles for Assessment of Railway Property. Principles laid down in a decision by the Supreme Court of Nebraska. 1500 w. Ry Age—Oct. 3, 1902.

Texas.—Methods Used by the Railroad Commission of Texas, Under the Stock and Bond Law, in Valuing Railroad Properties. R. A. Thompson. Report of this law and the railroads valued since its passage, describing the methods used. 5400 w. Pro Am Soc of Civ Engrs—Jan., 1904.

Railroad Franchise Values in Texas. W. H. Coverdale. Remarks on the methods of the Texas Commission in the matter of valuation. 1000 w. R R Gaz—Feb. 12, 1904.

U. S. Census.—Railroad Valuations in State Reports. Abstract of a report by Prof. Harold M. Bowman, made for Bul. No. 21, of the Census Bureau. Briefly explains the systems of valuation provided for by the laws of the several states, giving a critical review of the systems and administrative reports. 4500 w. R R Gaz—Vol. XXXIX, No. 10.

The Census Office Railroad Valuation. An editorial discussion of the work of Prof. Adams and his assistants. 2500 w. R R Gaz—Vol. XXXIX, No. 9.

RAILWAY WATER SERVICE.

See also **FEED-WATER PURIFICATION—Locomotive; RAILWAY STRUCTURE; TRACK TANK; WATER SCOOP.**

Water Service. Report of Com. of the Am. Ry. Engng. & Main. of Way Assn. Reports of three sub-committees considering the source of supply, method of pumping, and character of water, with discussion. 7200 w. Ry Age (Spe. No.)—March 15, 1901.

The Water Question. The first of a series of articles prepared by a well-known chemist and engineer who has made a special study of the subject. Describes methods of overcoming objectionable conditions in water for locomotive boilers. Serial. 1st part. 700 w. Am Engr & R R Jour—April, 1902.

Improvement of Water Service on Railways. Describes the work of improving the water for locomotive service as carried out by a company in Chicago, which has in course of construction 16 plants with a capacity of 3,756,000 gals. per day. Ill. 4300 w. Ry & Engng Rev—Oct. 18, 1902.

Modern Water Supply for Locomotives. F. M. Whyte. Extracts from a report to the Mas. Mechs.' Assn. Showing the present "state of the art." Considers the sources, pumping power, reservoir tanks, water cranes, track tanks, etc. Followed by general discussion. 7000 w. R R Gaz—July 11, 1902.

A., T. & S. F. Ry.—Railroad Water Supply. William Archer. An illustrated article describing the methods used on the A., T. & S. F. Ry. to supply water for locomotive purposes and for improving the quality. 3500 w. Ry Age—April 25, 1902.

Auxiliary Tanks.—On the Use of Auxiliary Tanks for Increasing the Rate of Supply of Water Cranes. Ch. Coda. Illustrates and describes the system which has been successfully applied on the Rome-Pisa line. Also a report on means for preventing the freezing of water in water supply installations, and economic methods for keeping water in tanks at constant temperature. 2200 w. Bul Int Ry Cong—Sept., 1903.

Chicago & Alton.—Chicago & Alton Water Supply. An illustrated description of the system of reservoirs, with information relating to them. 1500 w. Ry Age—March 20, 1903.

Galesburg, Ill.—The Burlington's Water Supply at Galesburg. Illustrated description of a plant to cost $90,000, to supply the locomotives, shops and roundhouses of the C. B. & Q. R. R. 1600 w. Ry Age—Oct. 11, 1901.

Halensee, Berlin.—Water Supply at the Halensee Station (Wasserstation auf Bahnhof Halensee). M. Buhle. Illustrating water tower, tank, and pumping plant in the environs of Berlin; capacity 3,000 cubic metres per day. 1000 w. Zeitschr d Ver Deutscher Ing—March 26, 1904.

Rome-Pisa.—See **Auxiliary Tanks.**

Speldorf, Germany.—The Water Supply Plant at the Speldorf Station (Die Wasserversorgungsanlage auf Bahnhof Speldorf). S. Lamm. Details of the water tower and pumping plant for locomotive supply at the Speldorf division station on the Essen line of the Westphalian railways near Duisburg. Serial. Part I. 1000 w. Glasers Annalen—Nov. 15, 1905.

Tank Insulation.—Protection of Water Tanks from Action of Frost. From a Committee report to the Assn. of Ry. Supts. of Bridges & Buildings. Gives extracts from a circular of inquiry, and summary of information received. Ills. 3000 w. Ry & Engng Rev—Oct. 28, 1905.

Protecting Railway Water Tanks from Freezing. Presents the available means of protecting water tanks as given in a committee report made to the Assn. of Ry. Supts. of Bridges & Bldgs. Ills. 1500 w. Eng News—Nov. 2, 1905.

Union Pacific.—Improvement of Water Service on the Union Pacific R. R. An illustrated description of the Ft. Steele pumping station, and brief notes concerning other supplies. 1700 w. Ry & Engng Rev—Nov. 23, 1901.

RAILWAY WRECKING.

See **RAILWAY ACCIDENT.**

RAILWAY YARD.

See also **RAILWAY SHOP; RAILWAY STATION; RAILWAY TERMINAL.**

Yards and Terminals. Extracts from the report of the Maintenance of Way Assn.'s committee in reference to terms used and their definitions, and matters relating to the location, size, etc., of the yards. 3200 w. R R Gaz—March 15, 1901.

On Yards and Terminals. Report of the American Railway Engineering and Maintenance of Way Association, giving plans and discussion. 14,000 w. Ry Age, Special No—March 21, 1902.

Alexandria, Va.—New Freight Yard at Alexandria, Va., for the Washington Southern Ry. and the Richmond, Fredericksburg & Potomac R. R. W. A. MacCart. Plan and profile with descriptive notes. 1200 w. Eng News—Nov. 30, 1905.

American and German.—Passenger Coach Yards. From a pamphlet compiled by Prof. Oder and Dr. Blum on German and American practice. 2500 w. R R Gaz—Vol. XXXIX. No. 10.

Am. Main. of Way Assn. Report.—Yards and Terminals. Abstract of a report at meeting of the Main. of Way Assn. Considers especially summit and gravity yards. Short discussion. 4500 w. Ry Age—March 24, 1905.

Brooklyn Electric Railway.—See **CAR HOUSE.**

Chicago.—Freight Yards of the Chicago Transfer & Clearing Company. Plans and description of the largest railroad yard in the world, now building at Chicago. 1200 w. R R Gaz—March 8, 1901.

The Chicago Clearing Yards. Illustrated detailed description of the most extensive system of yard tracks ever constructed at one location. 6000 w. Ry & Engng Rev—Nov. 16, 1901.

Switching Yards of the Chicago Transfer & Clearing Co. Illustrated description of these new switching and transfer yards. The fundamental principle is the reduction of the great delays and expense incurred by the present system. Also editorial discussion. 6800 w. Eng News—Jan. 2, 1902.

Freight Yards of the Chicago Transfer and Clearing Co. Illustrated detailed description of work nearly completed, which will give an immense switching yard connected with all railroads entering Chicago. 2100 w. R R Gaz—March 14, 1902.

See also **RAILWAY STATION; RAILWAY TERMINAL.**

Chicago & Western Indiana.—Chicago & Western Indiana's New Passenger Car Yard, Chicago. Illustrated detailed description of the construction and equipment of a new yard for cleaning and repairing coaches. 3300 w. Ry Age—Feb. 17, 1905.

Classification.—Yards for Sorting Freight Terminal Classification. Presents plans of division and terminal yards, discussing the requirements. 2200 w. R R Gaz—Dec. 20, 1901.

Denver, Colo.—See **RAILWAY SHOP.**

Design.—Method of Procedure in Remodeling Freight Yards. W. C. Cushing. A discussion of the general principles governing yard design and operation, illustrated by plans. 4500 w. R R Gaz—Jan. 4, 1901.

Progress in Yard Design. W. C. Cushing. Describes and illustrates briefly some recent work in this field, noting the extensive improvements introduced at great cost. 2 plates. 8000 w. R R Gaz—Vol. XXXVIII., No. 19.

Yard Design Regarded as a Switching Machine for Sorting Cars. F. A. Delano and G. H. Brommer. Gives a plan of a typical yard and fourteen requirements. 700 w. R R Gaz—March 8, 1901.

Certain Considerations in Designing Yards. W. L. Derr. Suggestions concerning the arrangements in yards and the circumstances that should be considered in determining the yard design. 1200 w. R R Gaz—March 8, 1901.

The Re-Design of Freight Yards. Shows the importance of the yard problem and discusses briefly yards well and poorly designed. 2100 w. R R Gaz—March 22, 1901.

The Setting Out of Yard Tracks. Particulars in regard to methods adopted in different yards, with remarks on the advantages and points needing care. Ill. 2600 w. Eng News—March 28, 1901.

Design, Richards.—Design and Operation of a Modern Freight Yard. Joseph T. Richards. Considers a plan for a general yard design and the method of operating it. Discussion. 8000 w. Pro Engrs' Club of Phila—April, 1905.

Dewitt, N. Y. Central.—Hump Yards at Dewitt, N. Y. C. & H. R. R. R. Gives plan of the yards, showing the great network of tracks and the hump by which the distribution and classification of freight traffic is effected. 600 w. Ry & Engng Rev—April 1, 1905.

Elizabethport, N. J.—See **RAILWAY SHOP.**

Fairview, Pa.—The Fairview Yard, Northern Central and P. R. R. Plan and description of improvements made to relieve a serious congestion in the Harrisburg yard. 700 w. R R Gaz—April 15, 1904.

Galesburg, Ill., Burlington.—New Freight Yard of the Burlington at Galesburg. Gives a map showing the situation at this important point, with plans and description of the yard arrangements. 1000 w. R R Gas—Vol. XXXIX. No. 10.

Gravity.—A New Yard Design. W. C. Cushing. Gives a plan of a gravity freight yard for a large traffic, designed by the writer, with remarks on defects observed in the committee design. 1800 w. R R Gas—March 13, 1903.

Greenville, N. J., P. R. R.—The Greenville Yards and Transfer Arrangements of the Pennsylvania Railroad. Illustrated detailed description of important developments at this point, preparatory to caring for the expected increase in traffic, which includes New England business in connection with the N. Y., N. H. & H. R. R. 2000 w. Ry Age —March 24, 1905.

New York Central.—See **ELECTRIC RAILWAY; RAILWAY TERMINAL.**

Norfolk & Western.—Norfolk & Western Yard Improvements. George L. Fowler. An illustrated article outlining the work at Bluefield, W. Va., East Portsmouth, O., Roanoke, Va., and Williamson, W. Va. 3800 w. R R Gas—Sept. 25, 1903.

Northern Central.—See **Fairview.**

Pennsylvania.—See **Fairview.**

Pittsburg.—The New Pennsylvania Yard at Pittsburg. Two-page plate with description of an entirely reconstructed and greatly enlarged yard and approaches. 1400 w. R R Gas—March 14, 1902.

St. Paul.—See **RAILWAY TERMINAL .**

Stock Yard.—See **STOCK YARD—Railway.**

Teaming.—Teaming Yards at Railway Stations. H. J. Pfeifer. Read before the St. Louis Ry. Club. Discusses the qualities of a properly constructed yard and its care. 1600 w. Eng News —Jan. 19, 1905.

West Albany, N. Y.—Arrangement and Operation of American Freight Yards. George L. Fowler. Illustrated description of the West Albany Yard of the New York Central, and the method of operation. 4200 w. R R Gas—Vol. XXXVIII., No. 22.

RAINFALL.

See also **DRAINAGE; METEOROLOGY; RIVER DISCHARGE; RIVER REGULATION; SEWER —Rainfall; SPILLWAY; WATER SUPPLY.**

Boston.—Maximum Rates of Rainfall at Boston. Charles W. Sherman. A record of rainfall from 1879 to 1904, inclusive, with discussion and comparison with records obtained elsewhere. 1500 w. Pro Am Soc of Civ Engrs—Dec., 1904.

Maximum Rates of Rainfall at Boston. Continued discussion of paper by Charles W. Sherman. 4000 w. Pro Am Soc of Civ Engrs—March, 1905.

British.—Rainfall and Village Water Supplies. Abstracts of papers with the discussions thereon, presented to the Conference on Water Supplies and River Pollution. 9700 w. Jour Gas Lgt— Nov. 5, 1901.

California.—Relation of Rainfall to Run Off in California. J. B. Lippincott and S. G. Bennett. Diagrams, tables and data resulting from a study of these watersheds. 2000 w. Eng News—June 5, 1902.

Rainfall on the Pacific Coast of North and South America and the Factors of Water Supply in California. Marsden Manson. Shows the variations in the rainfall, considering how this, with other factors, controls the water supply, the storage facilities, and related subjects. Map. 5000 w. Jour Assn of Engng Soc's—March, 1903.

Causes.—The Causes of Rainfall. Prof. W. M. Davis. An explanation of the causes, and reasons for believing the artificial production of rain impossible. General discussion. 6300 w. Jour N. E. Water Wks Assn—June, 1901.

Colorado Southern.—See **New England.**

Drainage.—See **DRAINAGE; SEWER—Rainfall.**

New England.—Rainfall and Run-Off of New England, Atlantic Coast and Southern Colorado Streams. William O. Webber. Tabulated information with explanatory notes. General discussion. 15,000 w. Jour Assn of Engng Socs— Nov., 1903.

Rainfall and Run-Off from Catchment Areas in New England. L. M. Hastings. Explains methods of determining the average rainfall, and matters of related interest. Diagrams, tables and discussion. 7000 w. Jour New Eng W Wks Assn—March, 1904.

New Orleans.—Rainfalls. Alfred F. Théard. Facts concerning the local rainfall at New Orleans are given. 4200 w. Jour Assn of Engng Soc's— June, 1902.

Sewer.—See **SEWER—Rainfall.**

RANGE FINDER.

See also **GUNNERY; GUN SIGHT.**

Richard's Stadia.—See **SURVEYING INSTRUMENT —Stadia.**

RAPID-FIRE GUN.

See **GUN; NAVY;** and specific types of naval vessels.

RAPID TRANSIT.

See **ELECTRIC RAILWAY; ELEVATED RAILWAY; TRANSPORTATION; UNDERGROUND RAILWAY.**

New York.—See **UNDERGROUND RAILWAY.**

RARE EARTHS.

See **INCANDESCENT GAS LIGHTING; NERNST LAMP;** and under specific earths, minerals and metals.

RARE ELEMENTS.

See **RADIOACTIVITY—Rare Elements.**

RARE METAL.

See **METAL—Rare;** and under specific metals.

RATCHET.

Hundhausen.—See **PUNCHING.**

RAY.

See **ELECTRO-PHYSICS; RADIATION; RADIOACTIVITY; RADIOGRAPHY.**

REAMER.

See also **TOOL.**

Hardening.—See **HARDENING—Reamers.**

RECLAMATION.

See **DRAINAGE; IRRIGATION; RIVER REGULATION; SHORE PROTECTION.**

RECORDER.

See also **ELECTRIC INSTRUMENT; ELECTRIC METER; SPEED RECORDER.**

Blast Furnace.—See **BLAST FURNACE—Stock Line Recorder; BLAST FURNACE GAS—Recorder.**

Errors.—Registering Errors of Recording Levers (Erreurs d'Inscription des Leviers Enregisteurs). F. Cellerier. An examination of the causes of error in multiplying levers, such as are used in indicators, barographs, testing-machine recorders, etc. 7500 w. Revue de Mécanique—Jan. 31, 1905.

Mathot.—See **INDICATOR—Automobile Engines.**

RECORDING MACHINE.

See also **INDICATOR; MANOGRAPH.**

An Automatic Recording Machine. E. C. Oliver. Communication from the University of Illinois, illustrating and describing a machine which records on a continuous strip of paper the momentary changes of conditions in making tests of steam, gas, or other engines or machines. 1800 w. Am Mach—Feb. 27, 1902.

RECORDING INSTRUMENT.

See **ELECTRIC INSTRUMENT; RECORDER;** and under specific kinds of instruments and apparatus.

RECTIFIER.

See also **ELECTRIC CURRENT RECTIFIER.**

Leblanc.—See **ELECTRIC CURRENT RECTIFIER; TRANSFORMER—Leblanc Rectifying.**

REFLECTOR.

See also **HEADLIGHT; SEARCHLIGHT.**

Electrolytic.—The Cowper-Coles Electrolytic Process for the Manufacture of Parabolic Reflectors. An illustrated account of an ingenious process. 2800 w. Elect'n, Lond—Feb. 8, 1901.

An Electrolytic Process for the Manufacture of Parabolic Reflectors for Searchlights and Locomotive Headlights. Sherard Cowper-Coles. An illustrated description of the process invented by the writer. Serial. 1st part. 3500 w. Elec Chem & Met—March, 1901.

Photometry.—See **PHOTOMETRY—Reflector.**

REFRACTOMETER.

An Improved Form of Refractometer. Illustrated description of an instrument, designed by G. F. Herbert Smith, in which the refractive power of a substance is determined by the method of total reflection. 1800 w. Min Jour—Oct. 14, 1905.

REFRACTORY MATERIAL.

See also **BRICK—Fire; ELECTRIC FURNACE; FOUNDRY—Cupola; FURNACE.**

Refractory Materials. Percy Longmuir. A brief review of these materials and their general properties, showing the treatment needed to prepare them for industrial conditions. 2300 w. Ir Trd Rev—Jan. 23, 1902.

A Study of Refractory Materials (Etude sur les Matériaux Réfractaires). M. A. Morel. An examination of the properties of materials employed to resist high temperatures, including graphite, silica, alumina, lime and the various fire clays. 4000 w. Revue Technique—Nov. 25, 1904.

Chromite Hearth.—Chromite as a Hearth-Lining for a Furnace Smelting Copper Ore. William Glenn. Describes a chromite cupola-bottom which has done good service for nearly two years. Ill. 1800 w. Trans Am Inst of Min Engrs—Feb., 1901.

Electric Furnace Lining.—Refractory Materials in Electrical Resistance Furnaces. F. A. J. Fitzgerald. Deals with finding a satisfactory refractory material for lining electric furnaces, giving much information concerning methods of employing the materials recommended. 6000 w. Elec-Chem Ind—Nov., 1904.

Refractory Materials for Furnace Linings. E. Kilburn Scott. A Faraday Society paper, giving details on the use of carborundum and of electrically shrunk magnesite for furnace linings. 2500 w. Elec-Chem & Met Ind—April, 1905.

Heat Insulation.—Notes on Heat Insulation, Particularly with Regard to Materials Used in Furnace Construction. R. S. Hutton and J. R. Beard. A record of experimental investigations and results. Ills. 1500 w. Elec Rev, N Y—July 22, 1905.

Heat Insulation. R. S. Hutton and J. R. Beard. Describes experiments to determine the relative value of heat-insulating materials used for the bricks or linings of furnaces. Diagrams. 1700 w. Eng Rec—Nov. 25, 1905.

Manufacture.—The Manufacture of Refractory Materials (Ueber die Fabrikation Feuerfester Produkte). H. Huffinger. With plans and sections of a typical manufacturing plant, and description of the manufacture of fire brick, clay retorts, and refractory products generally. 1800 w. Glückauf—Feb. 4, 1905.

Metallurgical Works.—Fire-Resisting Masonry in Iron and Steel Manufacture (Einwirkung Zerstörender Einflüsse auf Feuerfestes Mauerwerk im Hüttenbetriebe). Bernhard Osann. A general discussion of firebrick and other fire-resisting masonry, and the causes which tend to injure them. 4000 w. Stahl u Eisen—July 15, 1903.

REFRIGERATING MACHINE.

See **REFRIGERATION.**

REFRIGERATION.

See also **COOLING; ICE HOUSE; ICING PLANT; LOW TEMPERATURE; MECHANICAL PLANT; POWER PLANT.**

Process of Refrigeration. Arthur Pennell. Describes the process briefly. 1100 w. Ice & Refrig—May, 1901.

Refrigeration and Refrigerating Mixtures (Kältemischungen und Kälteerzeugung). M. Greliert. A comparison of the relative advantages of refrigerating mixtures and refrigerating machinery for breweries. 2500 w. Gesundheits Ingenieur—May 31, 1902.

Water as a Refrigerating Agent. F. E. Mathews. Compares the evaporation of ammonia to that of water, giving table of comparative properties, etc. 2200 w. Ice & Refrig—June, 1902.

Commercial Methods of Cooling. Henry H. Kelley. Illustrated descriptions of various methods of producing low temperatures. 1300 w. Engr, U S A—July 15, 1902.

Different Methods of Producing Cold. The Absorption and Compression Systems. Oswald Gueth. Presented before the James Watt Assn., N. A. S. E. The first of three lectures on this subject. 5700 w. Engr, U S A——Dec. 1, 1902.

The Necessary Apparatus for Mechanical Refrigeration. Oswald Gueth. A lecture delivered before the James Watt Assn., No. 7, N. A. S. E. An illustrated article discussing the apparatus used in ammonia compression plants, the diversity found, the different systems, and related subjects. 6300 w. Engr, U S A—May 1, 1903.

Mechanical Refrigeration. Otto Luhr. Explains process and gives formulas for capacity, efficiency, etc. 3500 w. Ice & Refrig—June, 1903.

The Manufacture of Artificial Ice. Oswald Gueth. A lecture delivered before the Jas. Watt Assn. Illustrates and describes the methods used in the manufacture of artificial ice for commercial purposes. Serial. 1st part. 2300 w. Engr, U S A—Nov. 2, 1903.

The Common Systems of Mechanical Refrigeration. Sterling H. Bunnell. Explains the distinctive points of the various systems. 2500 w. Engr, U S A—May, 1904.

Systems and Methods of Mechanical Refrigeration. Sterling H. Bunnell. Explains the distinct- of the various methods of producing artificial cold, discussing details of practical construction and operation. 5000 w. Engineering Magazine—June, 1904.

The Production and Applications of Artificial Cold (Production et Application du Froid Artificiel). F. Cottarel. A study of artificial refrigeration, with descriptions of some important installations. Four articles. 9000 w. 3 plates. Génie Civil—May 21, 28, June 4, 11, 1904.

Mechanical Refrigeration. W. W. Edwards. Introduction, explaining the principles of refrigeration, and an illustrated description of the Allen dense air machine and its operation is given in the present number. Serial. 1st part. 2500 w. Engr, U S A—Oct. 2, 1905.

Absorption.—Refrigeration on Absorption System. Robert A. Whelan. Illustrates and describes details of operation. 4200 w. Ice & Refrig—Dec., 1903.

Recent Absorption Refrigerating Machines (Nouvelles Machine Frigorifiques à Affinité). J. Hignette. Describing the Larrieu & Bernat machine, recently installed at Grenelle, Paris. 2000 w. Mem Soc Ing Civ de France—Dec., 1903.

Test of an Absorption Refrigerating Machine (Untersuchung einer Absorptions-Kältemaschine). R. Habermann. With diagrammatic illustration of the machine and complete tabulated data and results of test and heat balance. 4000 w. Zeitschr d Ver Deutscher Ing—June 24, 1905.

See also **Thermodynamics.**

Air Circulation.—Air Circulation in Cold Stores. Madison Cooper. Discusses the distinction between circulation and ventilation, how to promote circulation, and the methods that hinder. Serial. 1st part. 4000 w. Ice & Refrig—May. 1901.

Ammonia Compression System.—The Ammonia Compression System. T. F. Andersen. Abstract of a lecture before Illinois No. 28. Discusses points of importance in securing economy and efficiency. 2200 w. Compressed Air—Sept., 1901.

See also **Tests.**

Ammonia Compressor.—High-Speed Ammonia Compressor. Illustrated description of a type of machine embodying several important improvements. 700 w. Engng—Sept., 1905.

See also **Compressor; Test.**

Ammonia Condenser.—The Ammonia Condenser. T. R. Wingrove. Discusses the various conditions which affect the circulation of the ammonia. Diagram. 1800 w. Ice & Refrig—June, 1904.

Ammonia Condensers. John Levy. Calls attention to defects in the older ammonia condensers, and considers the shell condenser the best form. Ills. 1200 w. Ice & Refrig—March, 1904.

Baltimore.—Baltimore Refrigerating and Heating Co.'s Plant. Illustrates and describes a combination power, heating, refrigerating and electric lighting service. 7800 w. Ice R Refrig—July, 1905.

Banana Sheds.—The New Banana Cooling Sheds at Springfield, Mo. Illustrated account of train sheds and refrigerating plant, on the American Linde refrigerating air circulating system, for cooling trainloads of bananas in transit. 1200 w. Ice & Refrig—Sept., 1905.

Belgium.—Cold Storage Plant in Belgium. Illustrated description of its construction and equipment. 3000 w. Ice & Refrig—May, 1901.

See also **Brussels Markets.**

Berlin.—Refrigerating Plant in Berlin. R. Stetefeld. An illustrated description of a modern municipal cold storage and ice-making plant in Germany. 4700 w. Ice & Refrig—May, 1902.

The Refrigerating Plant of the Berlin Cold Storage Company (Die Berliner Kühlhäuser der Gesellschaft für Markt und Kühlhallen). Dr. C. Linde. With full details of the construction and machinery of this important cold storage plant in Berlin. 4000 w. Zeitschr d Ver Deutscher Ing—Nov. 1, 1902.

Boston Cold Storage.—See **Boyle.**

Boyle.—1,000 Horse Power Refrigerating Machine (1,000 Pferdige Kältemaschine). G. Döring. A description of the Boyle machine at the Quincy Market cold storage warehouse in Boston. 1800 w. Zeitschr d Ver Deutscher Ing—Dec. 2, 1905.

Breweries.—See **German Breweries; Linde; Mexican Brewery; Ruppert's.**

Brussels Markets.—The Cold-Storage Plant of the Brussels Markets (Frigorifère des Halles Centrales de Bruxelles). Leon Ducuroir. A full account of the ammonia refrigerating plant on the Fixary system, in successful operation at Brussels for the preservation of market material and the production of ice. 7500 w. 2 plates. Rev Univ des Mines—Nov., 1900.

Butterine Factory.—Cooling Plant in Butterine Factory. Illustrates and describes the refrigerating and power plant of the Capitol City Dairy Co., Columbus, O. 2300 w. Ice & Refrig—Jan., 1902.

Calcium Chloride.—A Calcium Chloride Cooler. J. A. Mermilliod. Gives the writer's experience in overhauling a poorly equipped ice plant and connecting cold storage department, and illustrates and describes the cooler. 1200 w. Ice & Refrig—Feb., 1903.

Car.—See **REFRIGERATOR CAR.**

Carbon Dioxide.—Carbonic Anhydride Refrigerating Machinery for Marine Use. S. H. Bunnell. States the advantages of carbonic anhydride as a refrigerant, and describes machinery recently installed on new vessels. Ill. 3500 w. Eng News—April 9, 1903.

See also **Vienna; REFRIGERATOR CAR—Miller.**

Cardiff Trial.—Trial of Refrigerating Machines at Cardiff. An illustrated description of the machine awarded the prize offered by the Royal Agricultural Soc. of Eng. 1100 w. Engng—June 28, 1901.

Central Station.—See **MECHANICAL PLANT.**

Chicago.—A Modern Closed Type Ice Making Plant. Illustrated detailed description of the People's Pure Ice Co.'s plant, Chicago, for distilled-water ice manufacturing. 3500 w. Ice & Refrig—March, 1904.

Chicago Warehouse.—A Unique Cold Storage Warehouse in Chicago. Illustrated description of a warehouse with the mechanical plant on the top floor, giving details of electrical equipment, etc. 4800 w. Ice & Refrig—Feb., 1902.

Power Plant of the Booth Cold Storage Warehouse, Chicago. Illustrates and describes an interesting mechanical equipment, where the power plant is located in the top story of a nine-story building. The electric part is a two-wire 220-volt system, involving 85 feeders. 3400 w. Eng Rec—Feb. 1, 1902.

Cold Air.—Cold Air Refrigeration. H. Muenster. Describes an example of abattoir refrigeration on the cold air system in Germany. 2000 w. Ice & Refrig—June, 1901.

A Cold Storage Warehouse. An illustrated description of the conversion of a brewery in Rochester, N. Y., into a cold storage plant. The system of refrigeration makes use of a circulation of chilled air to the rooms to be cooled. 2000 w. Eng Rec—May 18, 1903.

Cold Storage by Cold Air Circulation. Illustrated description of E. M. Upton's plant at Rochester, N. Y., where the American Linde Air Circulation system is installed. 3800 w. Ice & Refrig—April, 1904.

See also **Air Circulation.**

Comparisons.—Comparing Refrigerating Systems. Relative value of compression refrigerating machines operated with ammonia, carbon dioxide and sulphur dioxide, and wet and dry air coolers. Paper by Richard Stetefeld, with synopsis of discussion. Diagrams. 8200 w. Ice & Refrig—Dec., 1904.

Compressor.—Analyzing the Compressor. Gardner T. Voorhees. Begins an investigation into the economical action of the compression refrigerating machine. Serial. 1st part. 1100 w. Ice & Refrig—May, 1902.

See also **Ammonia Compressor; Test.**

Condensed Steam.—Condensed Steam for Ice Making. William W. Stickney. Observations on the proper care of distilled water supply and how to overcome some of the most serious difficulties met. 1800 w. Ice & Refrig—Dec., 1904.

Distilled Water.—See **Chicago; Condensed Steam; DISTILLATION—Ice Making Plants.**

Durban, South Africa.—A "Boer" Cold Storage Plant in South Africa. Illustrates and describes the plant at Durban, S. Africa. 4800 w. Ice & Refrig—June, 1901.

Dwellings.—Cooling of Dwellings. Alfred Siebert. Explains a system of artificial cooling, and how to control humidity, etc. 1800 w. Ice & Refg—July, 1903.

East Hampton, N. Y.—An Efficient Ice Plant at East Hampton, N. Y. Illustrates and describes a 10-ton ice-making plant of the plate class that produced on a seven-day test, an average of 14.04 tons of ice per ton of coal, at the rate of 14.6 tons daily. 1800 w. Eng Rec—Aug. 6, 1904.

Electric.—The Relation of the Central Station to the Motor-Driven Refrigerating Machine. G. W. Goddard. Abstract of a paper read at meeting of the Edison Ill. Cos. Explains the system of the present refrigeration compression machine, and its many applications, showing the advantages of electric-driving. 1600 w. Elec Rev, N Y—Nov. 11, 1905.

See also **Niagara Falls.**

Electric Power.—Electric Power for Refrigeration. J. C. Chamberlain. Illustrated description of an automatic refrigerating plant and its operation. 1700 w. Elec Wld & Engr—April 1, 1905.

El Reno, Okla.—A Model Western Ice Factory. Illustrated detailed description of a new plant at El Reno, Okla., and its power, distilling and freezing equipment. 2000 w. Ice & Refrig—Aug., 1902.

Excavation.—See **EXCAVATION—Freezing Process.**

Fixary System.—See **Brussels Markets.**

Foundations.—Foundations for Ice Machines. T. R. Wingrove. First of a series of articles on erecting and operating refrigerating machines; discusses preparing for and building suitable foundations. Serial. 1st part. 2400 w. Ice & Refrig—Feb., 1904.

Furnace Blast.—See **BLAST FURNACE—Dry Air Blast.**

Furs and Fabrics.—Cold Storage of Furs and Fabrics. Madison Cooper. Reviews the beginnings of this industry, discussing points connected with it. Also gives extract from an article by Dr. Albert M. Read. Ill. 3000 w. Ice & Refrig—Oct., 1901.

German Breweries.—Recent Refrigerating Plants in Germany (Nouvelles Installations Réfrigérantes pour Brasseries en Allemagne). Describing the plants of the breweries at Ohlig, Nuremberg, Dortmund and Brunswick. 1800 w. 1 plate. Génie Civil—May 24, 1902.

Hampton, Va.—See **ELECTRIC STATION.**

Ice House.—See **ICE HOUSE.**

Lake Superior.—Lake Superior Cold Stores. General illustrated description of the plant of the Lake Superior Produce & Cold Storage Co., at Houghton, Mich. 700 w. Ice & Refrig—Nov. 1, 1902.

Linde.—Improved Refrigerating Appliances in Breweries (Neuere Kühlanlagen in Brauereien). R. Schöttler. Illustrating and describing the installations of the Linde refrigerating apparatus in a number of German breweries. 2 plates. 2500 w. Zeitschr d Ver Deutscher Ing—April 5, 1902.

Efficiency Tests of Linde Ice Machines (Leistungsversuche an Linde-Maschinen). E. Brauer. An account of tests on Linde refrigerating machines at two German breweries. 1500 w. Zeitschr d Ver Deutscher Ing—May 9, 1903.

See also Cold Air; Tests.

Liquid Air.—See LIQUID AIR—Refrigeration.

Low Temperatures.—See LOW TEMPERATURE.

Maintenance.—Shutting Down an Ice Plant. William Nottberg. Illustrated directions for the proper care of the plant. 1400 w. Power—Dec., 1902.

Shutting Down Ice Plants and Preparing Them for the Summer Season. William Nottberg. Reviews things of importance to have plants in proper order. 1800 w. Power—April, 1903.

Manila.—The U. S. Refrigerating Plant at Manila, P. I. Illustrated description of a 2-story plant 245 ft. square, built by the War Department for cold storage and ice making. 3000 w. Eng Rec—July 5, 1902.

Marine.—See Shipboard.

Mexican Brewery.—Mexican Brewery and Ice Plant. Illustrated description of an ice and refrigerating plant at the Cerveceria Moctesuma, Mexico. 1400 w. Ice & Refrig—Jan., 1901.

Miller System.—See REFRIGERATOR CAR.

Mine Shaft.—See also SHAFT SINKING—Dawdon, Eng.; Freezing Process.

N. Y. Stock Exchange.—See COOLING.

Niagara Falls.—Ice-Making by Electricity. Orrin E. Dunlop. Brief illustrated description of the electrically-operated ice-making plant at Niagara Falls. 900 w. Sci Am—Aug. 5, 1905.

Nome.—Cold Storage at Nome, Alaska. Brief illustrated description of a plant at Nome City. 1000 w. Ice & Refrig—June, 1901.

Norfolk, Va.—The Plant of the Norfolk Refrigerating Storage Company. Illustrated description of a refrigerating and ice-making plant with an underground conduit for the public supply of refrigerating brine. 2200 w. Eng Rec—June 8, 1901.

Office Buildings.—Refrigeration for Office Buildings. Illustrates and describes the refrigerating plant of the First National Bank building in Chicago, and the refrigeration in the Heyworth building, run with exhaust steam. 2000 w. Ice & Refrig—Aug., 1905.

See also MECHANICAL PLANT.

Paris Exposition.—Cold Storage at the Paris Exposition. An account of the exhibits, describing the plants. 3000 w. Engr, Lond—March 15, 1901.

Refrigerating Machines at the Paris Exposition (Die Weltausstellung in Paris, 1900. Die Kältemaschinen). R. Schöttler. An illustrated general review, with particular descriptions of various details. 2500 w. Zeitschr d Ver Deutscher Ing—March 23, 1901.

Parts of Machines.—Ice Machine Parts. T. R. Wingrove. Remarks on the need of attention to the parts in the erection of ice making plant, atmospheric condensers, purging oil out of condenser connections, &c. Ill. 2800 w. Ice & Refrig—May, 1904.

Pipe Line.—Pipe Line Refrigeration. J. E. Starr. Address before the Am. Soc. of Refrig. Engrs. Reviews the work done in pipe line distribution, both those using brine circulation and those using direct expansion, the problems in connection with such systems and the progress made in solving them. 2500 w. Eng News—Dec. 14, 1905.

Porto Rico.—A Porto Rico Ice Plant. William E. Groff. Illustrates and describes the plant of the San Juan Ice and Refrigerating Co., and the difficulty met in constructing it. 800 w. Ice & Refrig—May, 1901.

Quincy Market, Boston.—See Boyle.

Railway Icing Plant.—See ICING PLANT.

Rouen, France.—Ice Making in France. Views and descriptions of an ice-making and cold storage plant at Rouen, France. American machinery and methods preferred. 700 w. Ice & Refrig—Jan., 1901.

Ruppert's Brewery, N. Y.—Jacob Ruppert's Ice Plant in New York. Illustrated detailed description of the largest ice-making plant in the world, the construction of the buildings, machinery installed, etc. 5600 w. Ice & Refrig—Jan., 1901.

St. Louis.—New Ice Manufacturing Plant in St. Louis. An illustrated description of a closed type plant located on one floor, the machinery, general equipment, &c. 2000 w. Ice & Refrig—Dec., 1903.

St. Louis Exposition.—Ice Making and Refrigeration at Louisiana Purchase Exposition. Description and views of the 500-ton plant installed. 3000 w. Ice & Refrig—Aug., 1904.

Refrigerating Plants at Louisiana Purchase Exposition. An illustrated detailed description of this very interesting exhibit. 8500 w. Ice & Refrig—Sept., 1904.

Scale.—Scale. Arthur Pennell. Cause of formation of scale on the ammonia condenser from water poured over it, in ice making and refrigerating plants and method of prevention or of minimizing losses from this cause. 1500 w. Ice & Refrig—Nov., 1905.

See also BOILER SCALE.

Schwarzschild & Sulzberger.—See POWER PLANT.

Scranton.—Cold Storage at Scranton. Illustrated description of the Scranton Cold Storage and Warehouse Co.'s plant and its equipment. 1000 w. Ice & Refrig—Feb., 1905.

Shipboard.—Refrigeration on Shipboard. E. N. Percy. The first of a series of articles written to urge the use of a higher standard of refrigerating machinery for marine service, its inspection, etc. Serial. 1st part. 1800 w. Ill. Marine Engng—May, 1902.

Refrigeration on Shipboard. E. N. Percy. Points on some errors in refrigerating equipment on vessels, discussing points in design of apparatus, and the plan and operation of cold rooms. 4000 w. Ice & Refrig—Oct., 1902.

Marine Installations for the Carriage of Refrigerated Cargoes. R. Balfour. Read before the Inst. of Nav. Archts. Describes the three systems of refrigeration most used, and discusses the construction of vessels best adapted, the design and arrangement of the holds in which the frozen cargo is carried. Ill. 6000 w. Engr, Lond—April 24, 1903.

Refrigerating Plants on New United Fruit Company Steamers. Illustrates and describes the plants installed on these vessels fitted for carrying bananas. 2800 w. Marine Engng—May, 1903.

See also Carbon Dioxide.

Small Cold Storage.—A Modern Small Cold Storage House. Eugene T. Skindle. Discusses what is the best material for construction, how to build, piping, etc. Ill. 1600 w. Ice & Refrig—Nov., 1900.

Small Machine.—An Experience with a Small Ice Machine. R. L. Shipman. Describes a defect in a small refrigerating set and the temporary and permanent remedies. Ill. 1500 w. Ice & Refrig—Aug., 1902.

South Africa.—Erecting Cold Stores in South Africa. Albert Moon. Interesting description of conditions in South Africa and the erection of a cold storage plant while war was in progress. 1600 w. Ice & Refrig—Jan., 1901.

Standard Unit.—Standard Unit of Refrigeration.—J. C. Bertsch. Urging the necessity of establishing a standard unit of refrigeration, and showing that for computing the capacities of refrigerating machines the temperatures are the only correct basis. 3300 w. Trans Am Soc of Mech Engrs, No. 05—Dec., 1903.

Standard Unit Ton of Refrigeration. Description and views of plant and apparatus used for special tests made to determine the actual work accomplished by the refrigerating machine under conditions such as ordinarily prevail. 2700 w. Ice & Refrig—Aug., 1904.

Standard Unit of Refrigeration. F. E. Matthews. An explanation of the proposition offered by the writer in which the nominal rating is based on the standard ton of 288,000 British thermal units per day, equivalent to the evaporation of 27 pounds of anhydrous ammonia per hour from the standard condition of 90 degrees liquid into 0 degrees saturated gas. 5700 w. Trans Am Soc of Mech Engrs, No. 067—June, 1905.

Systems.—Artificial Refrigeration. F. E. Matthews.

An explanation of systems used, with illustrations. 2500 w. Power—Aug., 1904.

Tank.—How to Buy or Build an Ice-Making Tank. William Nottberg. An illustrated article giving the writer's idea of the different insulations used in the construction of such tanks. 2200 w. Engr, U S A—July 1, 1902.

Tests.—Recent Tests of Refrigerating Machines in Practical Service (Neuere Versuche an Kühlmaschine Verschiedener Systeme im Praktischen Betriebe). H. Lorenz. With tabulated data and results of a number of machines of the ammonia, sulphurous acid, and carbonic acid types. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 9, 1902.

Tests of an Ammonia Refrigerating Machine (Versuche an einer Ammoniak-Kompressionskältemaschine). Rich. Stetefeld. An illustrated description of a test of an ammonia-compression refrigerating machine built by the Halle Machine Works. 1200 w. Zeitschr d Ver Deutscher Ing —April 4, 1903.

The Scientific Results of the Munich Refrigeration Investigation Station (Die Wissenschaftlichen Ergebnisse der Münchener Kälte-Versuchsstation). C. Linde. A review of tests of various ice machines, of liquid air and of special researches made from 1893 to 1900. 4000 w. Zeitschr d Ver Deutscher Ing—July 25, 1903.

A Comparison of Old and Recent Tests of Ammonia Compression Refrigerating Machines (Vergleich Aelterer und Neuer Versuchsergebnisse von Ammoniak-Kompressions-Kältemaschinen). G. Döderlein. Giving tabulated results of tests, and deducing formulas for use in computation. 3000 w. Zeitschr d Ver Deutscher Ing—Oct. 10, 1903.

See also Cardiff Trials; Linde.

Theatre, Cologne.—The Cooling Plant of the New Municipal Theatre at Cologne (Die Luftkühlanlage für das Neue Stadttheater in Köln a. Rh.). Joseph Musmacher. A full account of the plant for supplying artificially cooled air in summer time. The temperature of the theatre is maintained at 20 degrees C. 3000 w. 1 plate. Gesundheits-Ingenieur—March 10, 1904.

Thermodynamics.—Absorption Refrigerating Machines (Sulle Macchine Refrigeranti ad Assorbimento). R. Mansetti. A thermodynamic study of the absorption class of machines, using the temperature-entropy diagram. 7000 w. Ann d Soc Ing e Arch Ital—No. III, 1902.

Unit.—See Standard Unit.

Vacuum Process.—Ice Making by the Vacuum Process. Edward A. Osse. Illustrated description of machinery and process used. 1200 w. Ice & Refrig—Feb., 1904.

Vienna.—The Ice Producing Plant in Vienna (Die Eisfabrik der Approvisionierungs-Gewerbe in Wien). J. Hermanck. Illustrating and describing the new large plant in Vienna, using carbonic acid gas. 2000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Nov. 8, 1901.

Water Purification.—See Chicago; Condensed Steam; DISTILLATION; WATER PURIFICATION — Ice Plants.

Water Supply.—Water. E. T. Skinkle. On the proper handling of the water supply in the manufacture of ice and in cold storage. 2300 w. Ice & Refrig—Jan., 1903.

Waynesboro, Pa.—A Model Ice-Making Plant. Illustrated description of a plant in Waynesboro, Pa. 1200 w. Ice & Refrig—Sept., 1901.

Wolverhampton.—An English Municipal Ice and Cold Storage Plant. Brief description of the plant of the corporation of Wolverhampton. 1000 w. Eng Rec—July 26, 1902.

REFRIGERATOR CAR.

New Types of Refrigerator Cars. Describes standard refrigerator cars, Bashaw's car, Fugazzi's car, Johnson car, Bohn system car, Coolidge's car, S. & S. Sales car, and the fish commision car. Ills. 4000 w. Ice & Refrig—Dec., 1904.

Burlington Service.—Development of Refrigerator Car Service on the Burlington. Reviews the history of their use and gives facts of interest in regard to the service, especially on the road named. 2500 w. Ry Age—June 30, 1905.

Miller.—The Miller System of Mechanical Refrigeration. Illustrated description of an ice-making machine operated from the car axle. 2500 w. R R Gas—Oct. 23, 1903.

Mechanical Refrigeration of Freight Cars. Warren H. Miller. An illustrated description of the Miller system in which carbon-dioxide gas is used as the refrigerating medium. 2500 w. Stevens Ind—April, 1904.

"Private."—An Apology for the Private Car and a Remedy for Its Abuses. A. M. Simmons. Reviews briefly the history of the private car, the circumstances which led to the building of refrigerator cars, the growth of the industry, the present problem, and a suggestion for its solution 2500 w. Ry & Engng Rev—July 29, 1905.

See also CAR; RAILWAY TRAFFIC.

REFUSE.

See also WASTE REMOVAL; WASTE UTILIZATION.

Sawmill.—See FUEL—Sawmill Refuse; WASTE REMOVAL; WOODWORKING MACHINERY.

REFUSE DISPOSAL.

See also FACTORY WASTE; SANITATION; SEWAGE DISPOSAL; STREET CLEANING; WASTE REMOVAL; WASTE UTILIZATION.

The Disposition of City Waste. E. R. Pritchard. Discusses the collection, sorting, sanitary and economic disposition, etc. 8400 w. Dom Engng—Dec. 20, 1900.

Refuse Destruction: Its Sanitary and Its Steam Raising Aspects. Frank Broadbent. The present article discusses mainly the dangers arising from the improper disposition of refuse. Serial. 1st part. 3000 w. Elec Rev, Lond—May 30, 1902.

Refuse Destructors. W. Francis Goodrich. A review of progress with discussion of systems, apparatus, costs, etc. Serial. 1st part. 3300 w. Mech Engr—Oct. 18, 1902.

The Sanitary Disposal of Municipal Refuse. An informal discussion of the disposal of ashes, street sweepings, dry rubbish and garbage. 18,-800 w. Pro Am Soc of Civ Engrs—Jan., 1903.

The Sanitary Disposal of Municipal Refuse. Informal discussion by Messrs. Falk, Baker, Baldwin and Parsons. 4000 w. Pro Am Soc of Civ Engrs—Feb., 1903.

The Sanitary Disposal of Municipal Refuse. Continued informal discussion of this subject. Ill. 10,000 w. Pro Am Soc of Civ Engrs—March, 1903.

The Sanitary Disposal of Municipal and Institutional Waste by Cremation. Selections from a paper by W. F. Morse, read at meeting of the Am. Pub. Health Assn., giving a statement of reasons for the success of garbage destruction in England and the practical failure in America. Ill. 1800 w. Munic Engng—Jan., 1904.

The Utilization and Disposal of Municipal Waste. William F. Morse. Considers the disposition of garbage, ashes, refuse and street sweepings in large cities. Ills. 5200 w. Jour Fr Inst —June, 1904.

The Burning of Town Refuse. George Watson. With special reference to the destructors at Brussels, West Hartlepool, Moss Side, and Westminster. Ills. 9000 w. Inst of Mech Engrs—June, 1904.

Refuse Destruction by Burning, and the Utilisa- of Heat Generated. C. Newton Russell. Treats the practical side of the question, describing the works with which the writer is associated. Ills. 4800 w. Inst of Mech Engrs—June, 1904.

The Disposal of Municipal Refuse. F. K. Rhines. Discusses the various classes of refuse and the difficulties of disposing of each, and why some methods succeed while others fail. 6500 w. Jour Assn of Engng Socs—Oct., 1904.

Municipal Waste. John H. Simon. Gives methods of disposal and reduction adopted after investigating systems of various cities. 2700 w. Munic Jour & Eng—Jan., 1905.

Destructors and Their By-Products. F. L. Watson. Abstract of a paper read before the Leeds Loc. Sec. of the Inst. of Elec. Engrs. Describes the means of feeding in use, systems of storing, the methods of taking off the gases of combustion, &c., and matters relating to the plant generally. 4000 w. Elect'n, Lond—Dec. 1, 1905.

Aldershot, Eng.—See SEWAGE DISPOSAL.

American.—The Unsatisfactory Condition of Garbage Disposal in the United States. M. N. Baker. Read before the League of Am. Munic., at Jamestown, N. Y. Discusses the inadequate service and primitive methods and suggests points for improvement. 1800 w. Eng News—Aug. 22, 1901.

The Latest Garbage Disposal Statistics. Editorial review of a paper by C. E. A. Winslow and P. Hansen, presented at the Washington meeting of the Am. Pub. Health Assn. 2000 w. Eng News—Nov. 5, 1903.

Disposition of Municipal Refuse. W. F. Morse. Read before the Am. Pub. Health Assn., at Boston. Describes American conditions, giving data from representative cities. 3200 w. Munic Jour & Engr—Oct., 1905.

The Incineration of Municipal Waste. Howard G. Bayles. Read before Am. Soc. of Munic. Imp. Gives information, gathered from various cities of the United States, as to efficiency, cost, and various features of the practice. 4000 w. Munic Engng—Oct., 1905.

Arnold-Edgerton.—See Baltimore.

Atlanta, Ga.—A New Garbage Furnace at Atlanta, Ga. Describes a Lester furnace which has been in operation about one year, and has given satisfaction. 1200 w. Eng News—Feb. 7, 1901.

Baltimore.—The Garbage Reduction Plant at Baltimore. Brief illustrated description of a plant on the Arnold-Edgerton system. 1000 w. Eng Rec—June 13, 1903.

Baltimore's System of Garbage Disposal. Describes and illustrates a recently constructed plant having new features. 700 w. Sci Am—Oct. 31, 1903.

Bermondsey, Eng.—See ELECTRIC STATION.

Birmingham, Eng.—See ELECTRIC POWER.

Bolton, Eng.—Refuse and Sewage Disposal Station. Col. W. F. Morse. Illustrates and describes a plant at Bolton, England, where power is obtained from sewage, sludge and refuse, with economy. 2000 w. Munic Jour & Engr—April, 1904.

Boston.—The Garbage Reduction Plant at Boston, Mass. Describes a plant which combined the Arnold reduction process with a method of ammonia recovery involving the use of by-product coke ovens. Ill. 3000 w. Eng Rec—Sept. 14, 1901.

The Garbage Disposal Problem in Boston and Elsewhere. Editorial discussion of sanitary garbage disposal. 2000 w. Eng News—Aug. 7, 1902.

British.—British Refuse Destructors and American Garbage Furnaces. An editorial on the poor results in America as compared with Great Britain, and some of the causes. 2800 w. Eng News—April 13, 1905.

See also London; SEWAGE DISPOSAL.

Buenos Aires.—Proposed Garbage Furnaces with Heat Utilization at Buenos Aires, Argentine Republic. Information concerning specifications for five plants with a combined capacity of 800 tons a day, for which this city calls for bids. 900 w. Eng News—Aug. 8, 1901.

Buffalo, N. Y.—Some Features of the New Garbage Reduction Works at Buffalo, N. Y. Slightly condensed paper by C. A. Blessing describing some parts of these reduction works. 700 w. Eng News—Feb. 26, 1903.

Chattanooga, Tenn.—See MUNICIPAL IMPROVEMENT.

Chicago.—Some Financial, Political and Sanitary Phases of Garbage Disposal. A brief description of a garbage furnace to be tested at one of the electric lighting stations in Chicago, with editorial discussion of various phases of the subject. 2400 w. Eng News—Feb. 14, 1901.

Cleckheaton, Eng.—See ELECTRIC STATION.

Darwen, Eng.—See ELECTRIC RAILWAY.

Decarie Crematory.—The Decarie Garbage Crematory at Minneapolis. Illustrated description of the incinerators which are essentially a modification of water-tube boilers. 900 w. Eng Rec—Oct. 5, 1901.

Electric Railway, Brooklyn.—Disposal of City Ashes as an Adjunct of Street Railway Business in Brooklyn. Illustrated description of the arrangements made by the Brooklyn Rapid Transit Co. for the removal and disposal of ashes, street sweepings and rubbish. 3000 w. St Ry Jour—April 23, 1904.

Electric Station.—Refuse Destructors in Combination with Electric Power Stations. J. S. Highfield. Abstract of paper read at the Con. of Munic. Engrs. Assn. at Glasgow, with editorial comment. Considers refuse unsuitable for fuel for the generation of electrical energy. 2500 w. Elec Rev, Lond—July 19, 1901.

Electricity from Refuse—the Case for the Modern Destructor. W. Francis Goodrich. Abstract of a paper read before the Manchester Soc. of the Inst. of Elec. Engrs. Discusses how far a destructor may be relied upon as a power producer, the conditions needed for success, reporting tests, etc. 3800 w. Elec Engr, Lond—Nov. 14, 1902.

Destructor and Electricity Stations in Small Towns. S. D. Schofield. Abstract of a paper read before the Leeds Soc. of the Inst. of Elec. Engrs. Discusses the economy of this combination in the present article, showing the destructor is not a factor in the economical generation of electricity. Serial. 1st part. 1400 w. Elec Engr, Lond—Nov. 27, 1903.

Description of Refuse Destructor and Electrical Power Generating Station in Course of Erection at Saltley. D. J. Roberts. Illustrates and describes this combined scheme for cremating ordinary refuse and utilizing the heat for raising steam for generating electricity for traction and lighting purposes. 3800 w. Elec Engr, Lond—Sept. 9, 1904.

The Combination of Dust Destructors and Electricity Works Economically Considered. W. P. Adams. Abstract of a paper read before the Inst. of Elec Engrs. Gives a brief description of generally known types of destructors, discussing the principal aspect of combined plants, and the commercial results achieved. Serial. 1st part. 4400 w. Elect'n, Lond—Dec. 16, 1904.

The Combination of Dust Destructors and Electricity Works Economically Considered. Frank Broadbent. A critical review of a recent paper by W. P. Adams on the above subject. 2700 w. Elec Rev, Lond—Dec. 23, 1904.

City Refuse as Fuel in Electric Plants. George E. Walsh. Discusses what has been accomplished in England and recent improvements that have been introduced. 2800 w. Am Elect'n—July, 1905.

See also London; New York; Power Plants; ELECTRIC STATION.

Evanston, Ill.—Garbage Cremation at Evanston, Ill. Illustrated description of a furnace used to destroy garbage only. 600 w. Eng Rec—June 8, 1901.

Fort Wayne, Ind.—How Properly to Collect and Dispose of Garbage. H. P. Scherer. Explains the methods used in disposing of garbage by total incineration, giving suggestions from experience at Ft. Wayne, Ind., where the crematory has been in successful operation for five years. 3500 w. Munic Engng—Nov., 1900.

Fuel Value.—Garbage as Fuel for Steam Production. W. L. Hedenberg. States the success gained in England and urges a study of the subject in the United States as a matter of economy. 1000 w. Munic Engng—March, 1901.

The "Fuel" Value of Town Refuse. Ed. C. de Segundo. An article arguing that refuse destructors must be regarded primarily as sanitary appliances, although, within limits, their heat may be usefully applied. 3500 w. Page's Mag—Dec., 1902.

The "Fuel" Value of Town Refuse:—A Rejoinder. Frank Broadbent. A reply to an article by E. C. de Segundo, in the December issue of "Page's Magazine." 2500 w. Elec Rev, Lond—Jan. 23, 1903.

The Fuel Value of Refuse. W. H. Booth. Discusses its value as a heat producer, and its use by electric stations. 1500 w. Elec Rev, Lond—Feb. 6, 1903.

See also Manchester.

Fulham, London.—See London, Fulham.

Glasgow.—See Partick.

Goodrich's Book.—The Present State of Refuse Disposal in Different Countries (Etat Actuel de la Question des Ordures Ménageres dans les Divers Pays). Ach. Livache. An illustrated, comprehensive review of the subject, founded largely on W. F. Goodrich's book. 15,000 w. Bull Soc d'Encouragement—Feb., 1902.

Horsfall Destructor.—The Horsfall Refuse Destruct-

or and Forced Draught System. Information of results obtained with this type of destructor. Ill. 1400 w. Elec Rev, Lond—July 31, 1903.

Indianapolis.—Garbage Disposal at Indianapolis, Ind. Gives an outline of the history of garbage disposal in this city, and describes the present reduction system. 1600 w. Eng News—Jan. 31, 1901.

La Fayette, Ind.—Garbage Disposal in La Fayette, Ind. Severance Burrage. Illustrated description of the crematory building and methods of collection, with a copy of the ordinance under which the collection is carried out. 2600 w. Munic Engng—June, 1901.

Land, St. Louis.—The Land Disposal of Garbage: An Opportunity for Engineers and Contractors. Editorial on the experiment at St. Louis, where the garbage is plowed into the land on an island in the river. 2500 w. Eng News—April 6, 1905.

London.—British Refuse Destructors. Notes on the destructors of four London boroughs giving a general idea of the conditions. Serial. 1st part. 6500 w. Eng News—April 13, 1905.

See also **ELECTRIC STATION.**

London, Fulham.—Dust Destruction and Electric Lighting at Fulham. An illustrated account of a combined refuse destructor, electricity supply and disinfector in the Borough of Fulham, England. 5000 w. Lightning—Feb. 14, 1901.

An English Combined Central Station and Destructor Plant. Illustrated detailed description of the plant of the borough of Fulham, London. 4400 w. Elec Wld & Engr—May 4, 1901.

London, Hackney.—The Electricity Works and Destructor of the Metropolitan Borough of Hackney. Illustrated description of a successful and economical plant. Serial. 1st part. 1500 w. Elec Rev, Lond—March 11, 1904.

London, Rotherhithe.—Refuse Destruction and the Displacement of Coal. Information from report made to the Rotherhithe Vestry by its surveyor. 1700 w. Ir & Coal Trds Rev—Nov. 9, 1900.

Manchester Steam Users.—Refuse Destructors. A report on tests carried out by the Manchester Steam Users' Association, under the supervision of C. E. Stromeyer. 2000 w. Elec Engr, Lond—Jan. 27, 1905.

Manuring.—The Use of Refuse in Agriculture (Ueber die Landwirtschaftliche Verwertung des Mülls). Dr. Wilsing. A discussion of the use of refuse and garbage for manuring purposes. 3000 w. Gesundheits-Ingenieur—May 20, 1903.

Milwaukee.—Garbage Collection, Removal, and Final Disposal at Milwaukee, Wis. Illustrates and describes the new municipal garbage crematory, with notes on the history of garbage disposal at Milwaukee, containing useful lessons. 5000 w. Eng News—Jan. 23, 1902.

Minneapolis.—See **Decarie Crematory.**

New York.—A House-Refuse Incinerator for New York City. Illustrated description of a crematory constructed on a timber pier for burning wood, paper and similar refuse. 1400 w. Eng Rec—April 19, 1902.

Proposed Light Refuse Crematory for New York City. Illustrated detailed description of a proposed plant to be built on the dumping pier for New York City by the Department of Street Cleaning. 1600 w. Eng News—April 17, 1902.

The Disposal of New York's Refuse. An illustrated account of methods in use, with some references to past methods. 2300 w. Sci Am—Oct. 24, 1903.

Rubbish Incineration in New York City and the Design for the New Stanton Street Incinerator. Illustrated description of the new plant, with information of interest. 4000 w. Eng Rec—Jan. 30, 1904.

Electric Light and Rubbish in New York City. S. S. Edmonds. Describes the new combined rubbish incinerator and electric lighting plant at Delancey Slip, Manhattan. Ills. 3000 w. Engr, U S A—Sept. 1, 1905.

The Combined Rubbish Destructor and Power Plant in New York. An illustrated detailed description of the Williamsburg bridge plant, its equipment and operation. 4000 w. Eng Rec—Nov. 11, 1905.

See also **STREET CLEANING.**

New York, Riker's Island Plant.—The Riker's Island and Refuse Conveyor Plant. The refuse from Manhattan, New York, exclusive of garbage, is being used to extend the area of this island, and the plant which has been installed for unloading and distributing the material is illustrated and described. 1500 w. Eng Rec—Sept. 17, 1904.

Partick, Glasgow.—Partick Municipal Electricity and Destructor Works. Illustrated description of buildings and plant costing about £6,500. 2300 w. Elect'n, Lond—March 28, 1902.

A British Refuse Lighting Plant. Illustrates and describes the plant to supply the Burgh of Partick, near Glasgow, in which the destructor plant furnishes the principal source of heat for raising steam. 2000 w. Elec Wld & Engr—April 26, 1902.

Power Plants.—The Use of Refuse Destructors in Power Plants. States the requirements of a successful destructor; the methods of burning, types of furnace in use, and brief accounts of various works, mostly in England. Ill. 3500 w. Engr, U S A—April 1, 1903.

See also **Electric Station; Fuel Value; London.**

Steam Production.—See **Electric Stations: Fuel Value; London; Manchester; Power Plant.**

Toronto.—The New Garbage Cremator at Toronto. Illustrated description of a new destructor which combines the Mann, the Thackeray, and the Dixon systems. 1000 w. Eng Rec—Sept. 10, 1904.

Trenton, N. J.—Engineer's Report on the Garbage Furnaces of Trenton, N. J. A reprint of the report of Mr. Rudolph Hering, which is a comprehensive study of conditions at Trenton and of garbage cremation in general. 3500 w. Eng News—Sept. 11, 1902.

An Investigation of a Garbage Crematory. Extracts from a report by Rudolph Hering to the Special Committee on Crematory of the City Council of Trenton, N. J. Descriptive. Serial. 1st part. 3500 w. Sci Am Sup—May 16, 1903.

United States.—See **America.**

Washington, D. C.—Refuse Disposal in the District of Columbia. Dr. William C. Woodward. Extracts from a paper read before the Am. Pub. Health Assn. Reviews the history of the past ten years in the city of Washington. 3500 w. Eng Rec—Sept. 28, 1901.

Wimbledon, Eng.—See **ELECTRIC STATION.**

Zurich.—The Municipal Refuse Destructor at Hard, Zurich (Die Städtische Kehrichtverbrennungsanstalt im Hard in Zurich). J. Fluck. Illustrating and describing the design and operation of the refuse disposal plant at Zurich. Two articles. 4000 w. Schweiz Bauzeitung—Jan. 21, Feb. 4, 1905.

See also **STEAM TURBINE—Refuse Destruction Plant.**

REHEATER.

See **COMPRESSED AIR; STEAM ENGINEERING; STEAM TURBINE.**

REICHSANSTALT.

See **LABORATORY; TESTING LABORATORY.**

REICHSTAG BUILDING.

Berlin.—See **DOME.**

REINFORCED CONCRETE.

See **CONCRETE REINFORCED.**

RELAY.

See also **ELECTRIC PROTECTIVE APPARATUS; TELEGRAPH; TELEPHONE.**

Time.—See **ELECTRIC PROTECTIVE APPARATUS; ELECTRIC SWITCH.**

RELUCTANCE.

Air Gap.—See **ELECTRIC GENERATOR DESIGN.**

REPAIR SHIP.

Durban, Natal.—See **FLOATING DOCK.**

"Vulcan."—The Repair Ship a Military Auxiliary to the Naval Fleet in Peace and War. F. W. Bartlett. References to the work of the Vulcan during the Spanish-American war, with an explanation of the many ways such a ship can be made of value in times of peace. Also outlines the general scheme of such a ship. 19,000 w. Jour Am Soc of Nav Engrs—Nov., 1902.

REPAIR SHOP.

See **CAR SHOP; ELECTRIC RAILWAY SHOP; LOCOMOTIVE SHOP; MACHINE SHOP; RAILWAY SHOP.**

RESCUE APPARATUS.

See also **LIFE SAVING APPLIANCE; MINE ACCIDENT; RESCUE STATION.**

Rescue Apparatus—An Analogy Between Military and Mining Methods. Reviews experiments made in the mining operations of military engineers, dating back to the latter part of the 18th century. Serial. 1st part. 3300 w. Ir & Coal Trds Rev—May 24, 1901.

The Latest Improvements in Artificial Respiration. Apparatus (Die Jüngste Entwicklung der Atmungsapparate). G. A. Meyer. An account of the improved respiration devices, using oxygen and absorbing the carbonic acid by caustic potash. The trials in the Shamrock mines are described. 10,000 w. Glückauf—Sept. 3, 1904.

Improved Respirators for Mining Service (Nouveaux Appareils Respiratoires en Usage dans les Mines). H. Schmerber. Describing the recent German devices for using oxygen in exploring and rescue work in mines. 3000 w. Génie Civil—Oct. 1, 1904.

Recent Investigations upon the Use of a Working Respirator Apparatus (Neue Untersuchungen über die Erfordernisse eines zur Arbeit Brauchbaren Rettungsapparates). B. Dräger. Describing recent devices for artificial respiration for life-saving service in mines. 3000 w. Glückauf—Oct. 15, 1904.

Invention to Guard Against Deadly Gases. Illustrated description of an apparatus for rescue work in firedamp. Also statistics concerning explosions in Wales. 2000 w. U S Cons Repts—Sept., 1905.

Saving Life in Mines. Illustrates and describes an apparatus invented, to guard against deadly gases in mines, devised by Professors Bamberger and Böck, of Vienna. 900 w. Min Rept—Oct. 12, 1905.

Bamberger-Böck.—The Pneumatogen, a New System of Respiration (Pneumatogen, ein Neues System von Atmungsapparaten). Drs. M. Bamberger and F. Böck. Describing an apparatus for exploring gaseous mines, employing sodium peroxide for regenerating the air. 4500 w. Glückauf—June 24, 1905.

A New Respiration Apparatus. A brief description of the two present forms of the Bamberger-Böck pneumatogen. Ills. 1400 w. Sci Am Sup—Dec. 23, 1905.

Giersberg.—Automatic Life-Saving Apparatus (Automatischer Sauerstoff Rettungsapparat). Dr. L. Michaelis. An illustrated description of the 1901 model of the Giersberg apparatus, carrying compressed oxygen, and an absorbent of carbonic acid. 1500 w. 1 plate. Glückauf—June 22, 1901.

Walcher-Gaertner.—The von Walcher-Gaertner Pneumatophore (Der v. Walcher-Gaertnersche Pneumatophor). Dr. Gustav Gaertner. An answer to R. Daniloff's criticism of this apparatus for breathing in an atmosphere of poisonous gases. 2400 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 28, 1901.

RESCUE STATION.

Altofts, Eng.—The Colliery Rescue Station at Altofts. Illustrates and describes the arrangements for training men in the use of rescue appliances, and for testing their reliability. 2200 w. Col Guard—Nov. 29, 1901.

RESERVOIR.

See also **CISTERN; DAM; IRRIGATION; RETAINING WALL; STANDPIPE; TANK; WATER SUPPLY; WATER STORAGE; WATER TOWER; WATERWORKS.**

Notes on the Construction of a Storage Reservoir. W. H. Richards. Illustrates and describes such portions of the construction as are somewhat unusual. 1700 w. Jour New Eng W Wks Assn—March, 1904.

Aden, Arabia.—The Ancient Water-Tanks of Aden, Arabia. Arthur Stanley Riggs. Brief illustrated description of these interesting old reservoirs. 1100 w. Eng News—July 14, 1904.

Altoona, Pa.—See **WATERWORKS.**

Amsterdam, N. Y.—Amsterdam Reservoir Construction. Illustrated description of the new Glenwild storage reservoir belonging to the system of Amsterdam, N. Y. Serial. 1st part. 2000 w. Fire & Water—Nov. 7, 1903.

Arid Regions.—Government Construction of Reservoirs in Arid Regions. H. M. Chittenden. A statement of the reservoir problem of the arid section of the United States, showing its importance, and discussing the question in its various aspects. 6000 w. N Am Rev—Feb., 1902.

See also **IRRIGATION; WATER SUPPLY.**

Assuan.—See **DAM; IRRIGATION—Egypt.**

Baden, St. Louis.—The Baden Reservoir of the St. Louis Water-Works. Illustrations and brief description of an interesting structure. 600 w. Eng Rec—Oct. 21, 1905.

Belmont, Philadelphia.—The Upper Belmont Reservoir at Philadelphia. Illustrated description of a two-basin 72,000,000-gal. reservoir, noteworthy for the piping details and the method of lining the banks and bottoms. 2200 w. Eng Rec—May 25, 1901.

Boston Waterworks.—Railroading in a Reservoir. Fred H. Colvin. Illustrates and describes interesting features in the construction of Boston's work in connection with its new water supply. Serial. 1st part. 1000 w. Loc Engng—Dec., 1901.

See also **Brookline; Spot Pond; Wachusett; DAM; PUMPING ENGINE TEST; WATERWORKS.**

Brookline, Mass.—Covering an Old Reservoir at Brookline, Mass. F. I. Winslow. Describes the construction of a groined arch concrete roof. 800 w. Eng News—Nov. 12, 1903.

Burlington, Vt.—Cleaning the Distributing Reservoirs of the Water-Works of Burlington, Vt. F. H. Crandall. Describes the work that is carried out twice each year. 900 w. Eng News—Dec. 12, 1901.

Carthage.—Ancient Reservoirs of Carthage. Brief illustrated description of these remarkable structures. 700 w. Sci Am—Sept. 23, 1905.

Cedar Grove, N. J.—See **Newark, N. J.**

Cheesman.—See **DAM; WATERWORKS—Denver, Col.**

Chelsea, Mass.—Repairs to the Lining of a Small Reservoir on Powder Horn Hill, Chelsea, Mass. Caleb Mills Saville. Illustrated notes on a piece of work recently carried out, giving methods and cost. 2000 w. Jour N Eng W-Wks Assn—March, 1905.

Cleaning.—See **Burlington, Vt.; Spot Pond, Mass.**

Cleaning, Pittsburg.—Cleaning a Water-Works Reservoir by Dredging. F. B. Marsh. Describes apparatus and methods used in cleaning reservoir No. 1, in Pittsburg, and the cost. 1200 w. Eng Rec—Sept. 3, 1904.

Columbus, O.—See **DAM.**

Concrete and Puddle.—Concrete and Puddle Core Walls for Reservoir Embankments. William Watts. Abstract of a paper before the British Assn. of Water-Works Engrs. Discusses the use of concrete in preference to clay puddle, giving the author's recommendations; compares the cost, and describes construction. 2000 w. Eng News—June 30, 1904.

Concrete and Puddle for Reservoir Embankments. William Watts. Information on the use of concrete for this purpose, the comparative cost of puddle and concrete trenches, the mixing, etc. 4000 w. Cement—March, 1905.

See also **DAM.**

Concrete Lining.—A Concrete Reservoir Lining at Salt Lake City, Utah. Illustrates and describes interesting features of this concrete construction. 900 w. Eng Rec—Aug. 24, 1901.

See also **Jerome Park, N. Y.**

Concrete Lining, Waterproofing.—Some Notes on Cost of Waterproofing the Concrete Lining of Reservoirs, W. C. Hawley. Discusses the Sylvester process and variations of it, describing the application made and giving cost. General discussion. 3500 w. Jour N Eng W-Wks Assn—June, 1904.

Concrete Reinforced.—A Concrete-Steel Reservoir for East Orange, New Jersey. Gives a description of this reservoir, which is somewhat novel in design, with illustrations of details. 2000 w. Eng Rec—March 26, 1904.

See also **Fort Meade, S. D.**

Copper Age, Colo.—The Copper Age Reservoir.

Brief description, with diagrams, of plans for a hydro-electric plant near Victor, Colorado, which will furnish electric power to the Victor and Cripple Creek mines. A granite masonry dam will be built at a point having unexcelled natural advantages. 800 w. Min Rept—Dec. 15, 1904.

Core Walls.—See Concrete 'and Puddle; DAM.

Covered.—See Brookline; Natick; Newton; FILTRATION; RESERVOIR FAILURE—Madrid.

Covered vs. Open.—Open and Covered Service Reservoirs. W. Ingham. Read before the Brit. Assn. of Water-Works Engrs. Extracts from a paper dealing with the design, construction and cost of open and covered reservoirs. 4800 w. Jour Gas Lgt—July 30, 1901.

See also FILTRATION.

Cross River, N. Y.—The Cross River Reservoir for the Water Supply of New York City. Describes briefly this new reservoir of 10 billion gallons capacity, to be built to store the surplus water of an easterly tributary of the Croton River. Ills. 1100 w. Eng Rec—May 20, 1905.

Croton.—The Opening of the New Croton Reservoir. An interesting account, fully illustrated, of the rise of water behind the new dam, after the shutting down of the gates, with other information about the water supply of New York City. 1800 w. Sci Am—April 15, 1905.
See also DAM.

Dam.—See DAM.

Discharge Regulation.—Automatic Regulation of Discharge from a Reservoir. F. Rigand. Gives solutions of the question, with mathematical development of formula. 1000 w. Min & Sci Pr—May 10, 1902.

Earth.—See DAM.

East Canyon Creek, Utah.—The East Canyon Creek Reservoir, Morgan Co., Utah. William M. Bostaph. A brief history of this irrigation enterprise and an illustrated description of the work. 3200 w. Eng Rec—Nov. 25, 1905.

East Liverpool, Ohio.—The Failure of the East Liverpool Reservoir. Illustrated description of a concrete-lined reservoir bank 23 ft. deep, which failed where the drain pipe passed through it. 500 w. Eng Rec—Nov. 2, 1901.

East Orange, N. J.—See Concrete Reinforced.

Estimating, Excavation.—Estimating Soil Stripping from Water-Supply Reservoirs. Two papers and discussion at meeting of the Boston Soc. of Civ. Engrs. I. A Comparison of Three Methods of Estimating Quantities of Soil Stripping from Water-Supply Reservoirs. Frank S. Hart. II. Method of Estimating Quantities of Soil Excavation from Wachusett Reservoir. Charles A. Bowman. Ill. 14000 w. Journ Assn of Engng Socs—April, 1903.

Failure.—See Madrid; DAM FAILURE; RESERVOIR FAILURE.

Filling Time.—The Time Required to Fill Reservoirs (Die Füllzeit für Beliebig Gestaltete Sammelbecken bei Irgend Welchem Zuflusse). Prof. P. Kresnik. A graphical method for determining the time required to fill basins of any shape with any flow of water. 1200 w. Oesterr Zeitschr f d Oeffent Baudienst—May 31, 1902.

Forbes Hill.—See Quincy, Mass.

Fort Meade, S. D.—The Construction of a Reinforced Concrete Reservoir at Fort Meade, South Dakota. Samuel H. Lea. Gives a brief description of the locality, and the conditions requiring the construction, and the new pipe line, with details of the reservoir and its construction. Ills. 7400 w. Eng News—Dec. 28, 1905.

Fossil Creek.—The Flood Reservoir at Fossil Creek. Illustrations, with report of this reservoir demonstrating the feasibility of this class. 900 w. Sci Am Sup—March 28, 1903.

Galatz, Underpinning.—See UNDERPINNING—Galatz Reservoir.

Gloucester, Mass.—Haskell's Brook Reservoir and Dam, Gloucester, Mass. H. W. Spooner. Illustrates and describes the construction of the new impounding reservoir, the preparation of the basin, and the building of the dam. 2000 w. Jour N Eng W-Wks Assn—March, 1905.

Holyoke, Mass.—The New High Service Reservoir at Holyoke, Mass. Illustrates and describes a recently completed dam and reservoir to supply water to the elevated portions of this city of 50,000 inhabitants. 1800 w. Eng Rec—Nov. 26, 1904.

Hydro-Electric Plant.—See HYDRO-ELECTRIC PLANT—Valley Reservoir.

Jerome Park, N. Y.—Jerome Park Reservoir. Illustrated description of this very important work. 2000 w. Sci Am—June 1, 1901.

The Needless Changes in the Jerome Park Reservoir Construction. Alfred Craven. An illustrated discussion. 2200 w. Eng News—Dec. 19, 1901.

The Jerome Park Reservoir. Editorial discussion of the recent developments and reports concerning changes recommended. 1400 w. Eng Rec—Jan. 18, 1902.

Further Reports on the Jerome Park Reservoir. Letters from Mr. Elnathan Sweet, and Mr. J. J. R. Croes, with responses by Mr. Wm. R. Hill. 5700 w. Eng News—Feb. 6, 1902.

Report of the Commission of the Jerome Park Reservoir. Report on the condition of the walls, discussing the water-tightness of the retaining walls and the best methods of securing a water-tight bottom of concrete, and the use of stone dust in the place of sand and mortar. 5400 w. Eng News—Aug. 6, 1903.

Progress in Construction of Jerome Park Reservoir, New York City. Information concerning this engineering work with illustrations showing the progress and present condition of the work. 3500 w. Eng Rec—April 23, 1904.

Completing the Jerome Park Reservoir. An illustrated article reviewing briefly the Croton reservoirs and describing the new reservoir at Jerome Park. 1800 w. Sci Am—May 13, 1905.

Method and Cost of Concreting Jerome Park Reservoir, New York City. Halbert P. Gillette. Illustrates and describes the work of lining 250 acres of reservoir basins with concrete, discussing the economics and suggesting improvements. 1800 w. Eng News—Sept. 21, 1905.

See also DAM—Croton; WATERWORKS—New York.

Jerome Park, Gatehouse.—Jerome Park Reservoir Gatehouses and Concrete Lining. An illustrated article describing details of the gatehouses of this large New York reservoir, and of the lining of the bottom and slopes. Serial. 1st part. 1600 w. Eng Rec—July 23, 1904.

Kathiawar, India.—See IRRIGATION—India.

Leech Lake, Minn.—Repairing a Leaking Cofferdam; and Pile-Driving Methods at the Leech Lake Storage Reservoir, Minn. W. C. Weeks. An illustrated description of interesting reconstruction work, describing the methods used to stop leaks, the construction, and details of experiences in connection with the work. 2800 w. Eng News—Sept. 19, 1901.

Leoben, Austria.—See WATER SUPPLY.

Location.—Notes on the Arrangement of Reservoirs (Erfahrungen bei Anordnung von Wasserleitungs-Reservoiren). Heinrich Adolph. A discussion of the advantages and disadvantages of various locations for reservoirs, with respect to the distribution system. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 30, 1903.

London.—See WATERWORKS.

McKeesport, Pa.—A Concrete Settling Reservoir at McKeesport, Pa. The reservoir described and illustrated was built by the National Tube Co., to purify the water of the Monongahela River to render it fit for use in the boilers and hydraulic machinery. 2000 w. Eng Rec—May 27, 1905.

Madrid.—See RESERVOIR FAILURE.

Marikanave, India.—A Great Indian Reservoir. R. B. Buckley. An illustrated description of the Marikanave reservoir, in Mysore, now approaching completion, which will be the largest in India. 2000 w. Public Works—April, 1905.

Mississippi Headwaters.—A Topographical Survey of the Reservoir System at the Headwaters of the Mississippi River. W. C. Lemen. Gives briefly the history of the steps leading to the creation of this reservoir system, and a description of the survey. 3300 w. Technograph, No. 15—1900-1901.

See also Leech Lake, Minn.

Morgan Co., Utah.—See East Canyon Creek.

Natick, Mass.—Covering the Natick, Mass., Reservoir with a Concrete Roof. Frank L. Fuller.

Illustrated description of this work. 11000 w. Jour N E Water Wks Assn—Dec., 1903.

Newark, N. J.—The Cedar Grove Reservoir of the Newark, N. J., Waterworks. The present article gives a general illustrated description, dams, and contractor's plant. Serial. 1st part. 2500 w. Eng Rec—Dec. 5, 1903.

New London, Conn.—A New Reservoir at New London, Conn. An illustrated description of a new reservoir nearly completed, which will almost double the water supply. 2800 w. Eng Rec—Nov. 22, 1902.

New Milford, N. J.—Sheet Steel Piles in Reservoir Construction. Describes a reservoir near New Milford, New Jersey, explaining the conditions. Ills. 1200 w. Eng Rec—Nov. 18, 1905.

Newton, Mass.—A New Covered Reservoir at Newton, Mass. Describes especially the covering, which is of flat concrete steel construction. Ill. 1200 w. Eng Rec—Aug. 30, 1902.

New York.—See **Cross River; Croton; Jerome Park; WATERWORKS.**

Nile.—See **DAM—Assuan; IRRIGATION—Egypt; RIVER REGULATION; WATERWAY—Egypt.**

Philadelphia.—See **Belmont; WATERWORKS.**

Portland, Me.—New Reservoir at Portland. Description of basin just completed near Sebago Lake, Maine. 1800 w. Fire & Water—Dec. 5, 1903.

The New Sebago Lake Reservoir of the Portland Water Company. Edmund M. Blake. An account of the supply of Portland and the recent improvements to increase it which involved interesting engineering features. Ill. 4000 w. Eng Rec—Jan. 23, 1904.

Pribram.—The New Spillways of the Pribram Reservoirs (Die Neuen Ueberlaufgerinne der Pribramer Hauptteiche). Julius Divis. An illustrated account of improvements to safeguard the dams and reservoirs at a large Bohemian silver and lead works and mines. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 10, 1902.

The Pribram Reservoirs and the Floods of July, 1897 (Die Pribramer Werksteiche und das Juli-Hochwasser des Jahres 1897). Julius Divis. An illustrated account of damage done to dams and spillways at these Bohemian silver and lead works and mines, and the new constructions. 1 plate. 7000 w. Oesterr Wochenschr f d Oeffent Baudienst—July 12, 1902.

Puddle Core Embankment.—See **Concrete and Puddle.**

Quincy, Mass.—Construction of the Forbes Hill Reservoir and Stand-Pipe at Quincy, Mass. C. M. Saville. Illustrated description of work carried out to furnish storage and protection to the southern part of the Metropolitan water district, and to provide for sudden and unusual drafts. 6000 w. Eng News—March 13, 1902.

The Construction of a Reservoir and Standpipe on Forbes Hill, Quincy, Mass. C. M. Saville. An illustrated detailed account of the construction work, cost, etc. 14800 w. Jour N E W Wks Assn—Sept., 1902.

Forbes Hill Reservoir and Water Tower, Quincy, Mass. Alfred D. Flinn. Illustrated description of a steel standpipe enclosed in a masonry tower, and of an open basin with a very thick concrete lining of unusual construction. 2200 w. Eng Rec—March 15, 1902.

Railway Water Service.—See **RAILWAY WATER SERVICE.**

Reading, Pa.—Reading and Its Reservoirs. Illustrates and describes the present waterworks system, and the difficulties encountered because of the city being built on a slope. 1000 w. Fire & Water—Jan. 26, 1901.

Roof Failure.—See **RESERVOIR FAILURE—Madrid.**

Saint Cloud.—See **WATERWORKS—Paris.**

St. John, N. B.—Reservoir Repairs at St. John, N. B. An illustrated description of the improvement of source of supply, increasing the reservoir capacity, and connected work. 1800 w. Fire & Water—Aug. 29, 1903.

St. Louis.—See **Baden; WATERWORKS.**

Salt Lake City.—See **Concrete Lining.**

Sebago Lake, Me.—See **Portland.**

Settling.—See **McKeesport, Pa.**

Solingen.—See also **DAM; HYDRO-ELECTRIC PLANT.**

Spot Pond, Mass.—Clearing and Enlarging the Spot Pond Storage Reservoir, Metropolitan Water Supply. Caleb Mills Saville. Illustrated description of work to bring this reservoir in Massachusetts up to modern sanitary requirements. 3000 w. Eng News—Dec. 12, 1901.

Staines, Eng.—See **WATERWORKS—London**

Trenton, N. J.—The New Water Works Reservoir at Trenton, N. J. Charles A. Hague. Illustrates and describes a reservoir having a capacity of 110,000,000 gallons, and gives a report of its use since September, 1899. 2300 w. Eng News —June 13, 1901.

The New Water Works Reservoir at Trenton, N. J. Charles Arthur Hague. Illustrated description of a reservoir of 110,000,000 gallons capacity, and interesting features of its construction. 2500 w. Fire & Water—Aug. 31, 1901.

Urft Valley.—See **DAM.**

Utah Lake.—The Utilisation of Utah Lake as a Reservoir. W. P. Hardesty. Describes this lake, which is about 30 miles from Salt Lake City, showing that it is almost a natural reservoir. Gives an account of efforts to utilize more of the water by pumping, and discusses its possibilities as a reservoir. Ill. 5800 w. Eng News —May 21, 1903.

Victor, Colo.—See **Copper Age.**

Wachusett.—The Earth Work of the Wachusett Reservoir. Robert M. Pratt. Describes the work as carried out on this reservoir which will furnish water for the city of Boston. 1800 w. Munic Engng—June, 1902.

The Wachusett Reservoir for Boston Water Supply. Illustrated description of this great engineering work, storing 63,000,000,000 gallons. 1800 w. Sci Am—July 1, 1905.

See also **Boston Waterworks; Estimating Excavation; DAM; RAILWAY CONSTRUCTION—Massachusetts Central.**

Waterproofing.—See **Concrete Lining, Waterproofing.**

RESERVOIR FAILURE.

See also **DAM FAILURE.**

Camden, N. J.—A Reservoir Break at Camden, N. J. An account of a failure due to overfilling, with illustrations. 1000 w. Eng Rec—Oct. 11, 1902.

Madrid.—The Waterworks Catastrophe in Madrid. T. A. Greenhill. An illustrated account of the failure of the reinforced concrete covering of a service reservoir. 2000 w. Eng Rec—July 22, 1905.

Failure of the Roof of a Reservoir at Madrid (Effondrement de la Couverture d'un Reservoir d'Eau en Construction à Madrid). With illustrations showing the manner of failure of the reinforced concrete vaulting. 1800 w. Génie Civil—Sept. 23, 1905.

Red Wing, Minn.—Failure of a Reservoir Bottom at Red Wing, Minn. F. H. Bass. Brief illustrated description of a peculiar failure. 500 w. Eng News—Dec. 8, 1904.

Roof.—See **Madrid.**

Utica.—See **DAM FAILURE.**

Winston, N. C.—The Failure of a Small Brick Reservoir at Winston, N. C. J. L. Ludlow. Brief, illustrated description. 900 w. Eng News—Nov. 17, 1904.

RESISTANCE BOX.

See **ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE; RHEOSTAT.**

RESISTANCE OF MATERIALS.

See **COLUMN; MATERIALS' STRENGTH; PLATE; TESTING.**

RESONANCE.

See **ELECTRO-PHYSICS—Resonance.**

RESPIRATOR.

See **RESCUE APPARATUS.**

RETAINING WALL.

See also **DAM; EARTHWORK; MASONRY; RAILWAY CONSTRUCTION; RESERVOIR.**

Masonry Dams and Retaining Walls in General. Concrete Works, etc. Charles Baillairgé. Remarks on retaining walls in Quebec, their failures and rebuilding. Also considers stone or masonry dams, concrete dams, and curved or bowed dams. 6800 w. Can Soc of Civ Engs—Adv. Proof—Jan. 3, 1901.

Mistaken Ideas with Reference to the Resultant Force and the Maximum Pressure in Retaining Wall Calculations. J. S. D. Moffet. An explanatory illustration. 1800 w. Feilden's Mag—Sept., 1903.

Concerning Retaining Walls and Earth Pressures. H. P. Boardman. Discusses the principal retaining wall theories and their defects, and considers their strength and stability, and suggests the making of experimental tests on a large scale to obtain data concerning the lateral presure of earth. 5500 w. Eng News—Aug. 17, 1905.

Austrian Railway.—Sliding Embankments (Fliessende Hänge). Max Singer. A description of the yielding of the sides of a railway cutting in the Eger valley, in Austria; with the methods employed for retaining the embankment. 4500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—March 14, 1902.

Chicago, Lake Front.—Concrete Retaining Wall of the Illinois Central on the Lake Front, Chicago. Illustrations and description of the east wall now under construction, with outline of work previously completed. 1000 w. R R Gaz—Vol. XXXIX., No. 20.

Concrete.—A Concrete Wall Eleven Years Old. Illustration and data in regard to a retaining wall on the Coast division of the Southern Pacific. 900 w. R R Gaz—Vol. XXXVIII., No. 26.

See also **Niagara Gorge.**

Concrete Reinforced.—A New Design of Concrete-Steel Retaining Wall. Illustrated description of a construction patented by Frank A. Bone. 700 w. Eng News—March 27, 1902.

Design for Reinforced Concrete Retaining Wall. F. F. Sinks. An illustrated description of a design, with statement of assumptions and methods. 800 w. R R Gaz—Vol. XXXVII., No. 29.

High Reinforced Concrete Retaining Wall Construction at Seattle, Wash. C. F. Graff. Illustrates and describes the methods of design and construction. 2200 w. Eng News—March 9, 1905.

Retaining Walls (Stützwände). Zdenko Ritter von Limbeck. Discussing especially the peculiar advantages of properly designed reinforced concrete construction for retaining walls to resist the thrust of earth pressure. 2000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—July 8, 1905.

See also **CONCRETE REINFORCED—Wall.**

Graphical Design.—The Graphical Determination of Retaining Wall Surfaces (Graphische Ermittelung der Flächen von Stützmauer-Profilen). Karl Lechner. An illustrated description of graphical methods in retaining wall calculations. 2 plates. 800 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 28, 1901.

Moving.—Moving a Long Brick Wall. Illustrated description of the method of enlarging a section of the New York Rapid Transit Railway subway by moving back the retaining walls. 800 w. Eng Rec—Oct. 26, 1901.

Widening a Section of the New York Rapid Transit Railway by Moving the Side Walls. Illustrated description of the moving of brick-faced concrete retaining walls, placing them on new foundations. 1500 w. Eng News—Jan. 9, 1902.

Niagara Gorge.—Concrete Revetment for a 200-Foot Cliff. Niagara River Gorge, Niagara Falls, N. Y. Illustrated description of a revetment being built for the rock cliff. 500 w. Eng News—Nov. 2, 1905.

Seattle, Wash.—See **Concrete Reinforced.**

RETORT.

Gas.—See **GAS RETORT.**

REVENUE CUTTER.

"Mohawk."—Trial of the United States Revenue Cutter Mohawk. Description of the vessel and its equipment, with report of the contract trial. 1800 w. Marine Engng—July, 1904.

REVETMENT.

See **RETAINING WALL.**

REVOLVER.

See **PISTOL.**

RHEOSTAT.

See also **CONTROLLER; ELECTRIC HEATING; ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE; ELECTRIC SWITCH; ELECTRIC TESTING.**

Bimetallic.—Bimetallic Rheostat. F. Punga. Illustrates and describes a rheostat devised by Mr. Hobart, in which iron and copper are combined. 800 w. Elec Rev, Lond—March 31, 1905.

Current Density.—See **ELECTRIC RESISTANCE.**

Dynamo Regulation.—Determination of the Number and Amount of the Steps of a Rheostat for the Shunt Windings of Generators (Bestimmung der Stufenzahl und der Einzelnen Stufen für Nebenschlussregler von Generatoren). Rudolf Krause. An illustrated description of a method for designing the resistances for regulating the electromotive force of a dynamo. 1000 w. Elektrotech Zeitschr—Jan. 23, 1902.

Determination of the Regulating Resistance of Self-Exciting Shunt Generators (Bestimmuug der Stufen und Stufung des Gegulirwiderstandes von Nebenschlussgeneratoren mit Selbsterregung). Rudolf Krause. An illustrated discussion of the design of rheostats for regulating dynamos. 800 w. Elektrotech Zeitschr—May 1, 1902.

A Rheostat for Shunt-Wound Field Coils when Separately Excited (Nebenschlussregulierwiderstände für Fremderregung). Carl Kinsbrunner. An illustrated description of a regulating resistance, placed across the terminals of the source of current, with many contact points to which the magnet coils can be connected, so varying the drop of potential in the latter; this arrangement is particularly useful in getting magnetisation curves. 600 w. Elektrotech Zeitschr—March 26, 1903.

Hobart.—See **Bimetallic.**

Lighting.—A Rapid Method of Computing the Regulating Resistances for Electric Lighting Conductors (Praktische und Schnelle Berechnung der Widerstandsregulatoren für Lichtleitungen). P. Gesing. Deducing a simple formula for feeder regulating rheostats and providing full tables for practical use. 2000 w. Elektrotech Zeitschr—April 3, 1902.

Liquid.—Liquid Rheostats (Ueber Flüssigkeitsanlasser). Dr. F. Niethammer. Discussing the effects of various arrangements of electrodes, and different kinds of electrolytes. 2000 w. Zeit f Elektrotechnik—Jan. 17, 1904.

A New Form of Liquid Rheostat for Starting Electric Motors. States the advantages and disadvantages of liquid rheostats and gives an illustrated description of a new type invented by Mr. Woolliscroft. 1000 w. Sci Am— Dec. 3, 1904.

See also **Water.**

Motor Starting.—See **Starting.**

Plug.—Improved Plug Rheostats (Neuerung an Stöpselrheostaten). W. Knobloch. An illustrated description of resistance boxes in which one or more metal strips are inserted between those in which are the plug holes, by which arrangement the manipulation is simplified. 800 w. Elektrotech Zeitsch—Feb. 13, 1902.

Rotating Contact.—Precision Rheostat and Bridges with Rotating Contact Pieces (Präcisions-Kurbelrheostaten und Brücken). Prof. M. Th. Edelmann. A short illustrated description of a Wheatstone bridge in which the resistances are cut in and out by rotating contacts, instead of by plugs. 800 w. Elektrotech Zeitschr—March 21, 1901.

A New Kind of Resistance Box with Rotating Contact Pieces (Eine Neue Art von Kurbelrheostaten für Messzwecke). Dr. Rudolf Franke. An illustrated description of a rheostat in which the resistance coils are cut in and out by a rotating sliding contact, instead of by plugs. 500 w. Elektrotech Zeitschr—March 28, 1901.

Starting.—Starting Resistances. Arthur E. Gott. Read before the Newcastle Sec. of the Inst. of Elec. Engrs. Discusses incorrectly divided resistances, starting without resistance, and early starters, in this present number. Serial. 1st part. 2700 w. Elec Engr, Lond—Jan. 24, 1902.

Notes on Motor-Starter Switches. A. H. Bate. Read at meeting of Birmingham Sec. of the Inst. of Elec. Engrs. Compares a few of the many forms of starting rheostats, and outlines the principles involved. 3400 w. Mech Engr—May 30, 1903.

Graphical Proportioning of Starters (Zeichnerische Bestimmung von Anlassern). Rudolf Krause. Deriving diagrams for use in designing starting rheostats for motors of various types and speeds. 1500 w. Zeitschr f Elektrotechnik—Oct. 4, 1903.

Calculation of Motor Starting Rheostats. F. Meurer and A. Simon. Gives the method of Prof. Görges for shunt motors, as given in "Elektrotechnische Zeitschrift." 500 w. Elec Wld & Engr—March 12, 1904.

See also **CONTROLLER; ELECTRIC MOTOR; ELECTRIC SWITCH.**

Water.—Water Loads for Electricity Works. W. E. Warrilow. Ilustrates and describes a "home-made" resistance, constructed at small cost, that has proved useful and satisfactory. 1500 w. Elec Rev, London—Dec. 28, 1900.

Rheostats for Dynamo Load Tests. Brief illustrated description of how to make a simple form of water rheostat. 1000 w. Am Elect'n—Oct., 1903.

Artificial Loads for the Dissipation of Electric Power. F. H. Davies. On the arrangement of a properly designed and permanent water load, considering points of importance. Ills. 2500 w. Elec Engr, Lond—July 22, 1904.

Water Rheostats. H. M. Phillips. Suggestions for making rheostats, and for increasing or decreasing the resistance, and related matters. 3500 w. Engr, U S A—June 1, 1905.
See also Liquid.

RIFLE.

See also **GUN.**

Lee Straight-Pull.—The Lee Straight-Pull Magazine Rifle. E. G. Parkhurst. Illustrated description, with statement of the advantages claimed for the straight pull system. 2500 w. Am Mach—Nov. 22, 1900.

Straightening.—See **GUN.**

RIM TENSION.
See **CENTRIFUGAL FORCE; FLYWHEEL.**

RING.

Flanged Mouthpiece.—See **MATERIALS' STRENGTH—Flanged Rings.**

RIPARIAN RIGHTS.

See **WATER RIGHTS.**

RIVER.

See also **CANAL; DREDGING; FLOOD; HARBOR; HYDRAULICS; NAVIGATION; RIVER REGULATION; WATER CURRENT; WATERWAY.**

Argentine.—Argentine Rivers. E. L. Corthell. Explains the hydraulic features of the Rio de la Plata and its tributaries, the products of this region, &c., giving reports of surveys and other information. Ill. 6300 w. Eng News—Jan. 7, 1904.

See also **NAVIGATION—River Plate; RIVER REGULATION—Negro.**

Charles, Mass.—Geological History of the Charles River. Frederick G. Clapp. An interesting study explaining why the river follows its present course, tracing the great courses, etc. Ill. Serial. 1st part. 8,500 w. Tech Qr—Sept., 1901.

Clyde.—See **HARBOR—Glasgow.**

Commerce Limitations.—See **NAVIGATION—Rivers.**

Cross Section.—See **RIVER DISCHARGE—Flood.**

Government Control.—See **WATER RIGHTS.**

Hooghly, India.—The River Hooghly. Leveson Francis Vernon-Harcourt. An account of this very interesting branch of the Ganges, founded upon very careful investigations, and a study of all the available charts. Ills. 41,500 w. (No. 3478). Inst of Civ Engrs.

Meander Belts.—Limiting Width of Meander Belts. Prof. Mark S. W. Jefferson. A study, seeking to establish a limit for the width of the belt of meanders of any given stream. Ill. 3300 w. Nat Geog Mag—Oct., 1902.

Mississippi.—The Lower Mississippi River: Physical Characteristics, Methods of Improvement, Character and Volume of Traffic. J. A. Ockerson. An illustrated descriptive article. 7500 w. Jour Assn of Engng Soc's—Nov., 1901.

See also **FLOOD; RIVER REGULATION.**

Mississippi Delta.—Growth of Mississippi Delta. Warren Upham. Information of the growth and changes of the delta and mouths of this river. 3500 w. Am Geol—Aug., 1902.

Navigation.—See **NAVIGATION; RIVER REGULATION; WATERWAY.**

Obstructions.—See **BRIDGE—Lift vs. Swing; NAVIGATION; WATERWAY.**

Orinoco, S. A.—The Orinoco—A Wasted Waterway. G. L. M. Brown. Illustrated description of this remarkable river, its peculiarities, the vessels that navigate it, etc. 2200 w. Sci Am—Nov. 25, 1905.

Plate.—See **NAVIGATION—River Plate.**

Profile.—See **RIVER BED; RIVER DISCHARGE; SURVEYING—River Profile.**

Rhine.—A Hydrologic Study of the German Rhine (Etude Hydrologique du Rhin Allemand). Ed. Maillet. An examination of the work of the special commision having in charge the flood-warning system of the Rhine within the German Empire. 5000 w. Ann des Ponts et Chaussées—2 Trimestre, 1903.

See also **INDUSTRY—Upper Rhine; RIVER REGULATION.**

Seine.—The Navigable Seine (La Seine Maritime). L. Sekutowicz. An exhaustive discussion of the river Seine as a navigable stream from the sea, with especial reference to the port of Rouen. Four articles. 1 plate. 10,000 w. Génie Civil—July 19, 26, Aug. 2, 9, 1902.

Susquehanna.—See **NAVIGATION.**

Thames.—See **HARBOR—London; RIVER REGULATION.**

Yangtse.—Steam Traffic and Trade in the Upper Yangtse. J. Mobsby. Gives a review of all that has been accomplished by steam navigators above Ichang, proving that steamers can pass the rapids, but that it cannot be a commercial success. Suggests means of encouraging trade, and gives information of the cities. 4200 w. Jour Soc of Arts—Oct. 4, 1901.

Yukon-Kuskokwim.—See **WATERWAY.**

RIVER BED.

See also **RIVER DISCHARGE; RIVER REGULATION; WATER FLOW.**

The Form of Beds of Navigable Rivers (La Forme du Lit des Rivières Navigables). M. Fargue. A study of the manner in which the empirical laws are found to be verified in actual instances. 5000 w. Ann des Ponts et Chaussées—2 Trimestre, 1903.

Shifting.—The Form of a Course of Water with a Shifting Bed (Forme des Cours d'Eau à Fond Mobile). G. Poisson. An analytical study of the flow of water in streams, taking into account the variations in the form of cross section due to the shifting of the bed. 12,000 w. 2 plates. Ann des Ponts et Chaussées—1 Trimestre, 1902.

The Natural Equilibrium of the Beds of Flowing Streams (Untersuchung über die Natürliche Gleichgewichtform Beweglicher Flussbetten). F. Kreuter. A discussion of the proper form to be given to artificial river banks in regulating and controlling streams. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 25, 1904.

RIVER DISCHARGE.

See also **FLOOD; HYDRAULICS; HYDRO-ELECTRIC PLANT; IRRIGATION; RIVER BED; RIVER REGULATION; WATER FLOW; WATER GAUGE; WATER POWER.**

Arkansas Tributaries.—Characteristics of Two Companion Streams of the Plains. E. C. Murphy. Information in regard to the Neosho and Verdegris Rivers, two tributaries of the Arkansas River, showing remarkable fluctuations in flow. 2500 w. Eng News—April 27, 1905.

Floods.—General Discussion on the Discharge of Streams. On the influence of floods and protection from them. 4700 w. Pro Engrs' Club of Phila—April, 1902.

A Method of Computing Flood Discharge and Cross-Section Area of Streams. E. G. Murphy. Gives methods for finding these measurements, with tables. 1500 w. Eng News—April 6, 1905.

See also **FLOOD; WATER FLOW—Kutter's Formula.**

Hydro-Electric Plant.—See **HYDRO-ELECTRIC PLANT—Water Flow.**

Measurement.—Method of Computing Daily and Monthly Discharge of Streams with Sandy, Changeable Bed. E. C. Murphy. Brief description of two methods devised by hydrographers of the U. S. Geological Survey for such conditions. 1200 w. Eng News—April 21, 1904.

Notes on the Computation of Stream Gaugings. O. V. P. Stout. An explanation of the Harlacher method of computing discharge. 1000 w. Eng News—Dec. 8, 1904.

See also **WATER FLOW.**

Normal Sections.—The Natural Normal Sections of Streams (Die Natürlichen Normalprofile der Fliessenden Gewässer). Richard Siedek. A paper discussing the ideal condition of water flow in rivers, and the regulation of streams in harmony with natural laws. Diagrams. 1 plate. 6500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 21, 1902.

St. Francis River, Can.—An Estimate of the Discharge of the St. Francis River. K. M. Cameron. A summary of the methods employed and of the results obtained by the students of McGill University in the determination of the discharge of the river by means of current meters. Ill. 2800 w. Can Soc of Civ Engrs—Adv Proof—April, 1903.

RIVER FLOW.

See **RIVER DISCHARGE; WATER FLOW.**

RIVER GAUGE.

See **RIVER DISCHARGE; TIDE INDICATOR; WATER FLOW; WATER GAUGE.**

RIVER IMPROVEMENT.

See **NAVIGATION; RIVER; RIVER REGULATION; WATERWAY.**

RIVER POLLUTION.

See also **FACTORY WASTE; SEWAGE; SEWAGE DISPOSAL; WATER POLLUTION; WATER PURIFICATION; WATER SUPPLY.**

River Pollution. Abstracts of papers, with the discussions, as presented to the British Sanitary Institute, 1901, conference on water supplies and river pollution. 8500 w. Jour Gas Lgt—Nov. 26, 1901.

Stream Pollution and Its Pecuniary Damage to Natural Water Resources. Marshall O. Leighton. Read before the Central States Water Works Assn. Shows the value of water as a source of wealth as long as unpolluted, and reviews the damage done to the Passaic river in New Jersey, giving an outline of the work of the division of hydrography of the United States Geological survey. 2000 w. Munic Eng—Oct., 1902.

Allegheny.—The Allegheny River, a Bacteriological Problem. Dr. W. H. Ingram. Considers the distribution of disease by impure water, especially typhoid fever, and shows this river to be a source of danger. As the conditions cannot be removed a filtering plant is urged. 5500 w. Pro Engrs Soc of W Penn—Dec., 1903.

Au Sable, N. Y.—See **Lake Champlain, N. Y.**

Boquet, N. Y.—See **Lake Champlain, N. Y.**

British.—On the Pollution of Our Rivers. Charles Milnes Gaskell. Reviews the history of the rivers of Great Britain, and the action against river pollution; what has been accomplished, and what remains to be done. 6300 w. Nineteenth Cent—July, 1903.

See also **SEWAGE DISPOSAL.**

Cincinnati, Ohio.—A Sanitary Survey of Mill Creek Valley, at and near Cincinnati, Ohio. Describes the conditions of this stream which is said to be probably the foulest in the state, and the efforts under way to remedy the nuisance. 700 w. Eng News—Feb. 12, 1903.

Factory Wastes.—The Pollution of Streams by Manufactural Wastes, and Methods of Prevention. H. W. Clark. Reports investigations upon the purification, or utilisation of the wastes from industrial works, especially considering the wastes from woolen mills, tanneries, paper mills and silk mills. 5100 w. Jour N Eng Water Wks Assn—Dec., 1901.

See also **FACTORY WASTE.**

Illinois.—The State Sanitary Survey of the Illinois and Desplaines Rivers. A report of the investigations and the conclusions reached by Dr. John H. Long. 3000 w. Eng Rec—Aug. 17, 1901.

Lake Champlain, N. Y.—Report on the Pollution of Lake Champlain, the Boquet and Au Sable Rivers by Wood Pulp Mill Refuse and by Algae. Abstracts of the reports of Olin H. Landreth and of G. C. Whipple, giving conclusions and recommendations. 8000 w. Eng News—May 25, 1905.

Mersey-Irwell, Eng.—See **SEWAGE DISPOSAL.**

New Jersey.—Stream Pollution Enjoined in New Jersey. Decision of New Jersey Court of Chancery forbidding a paper company to discharge waste liquids into a water-course from which a domestic supply is drawn farther down stream. 2800 w. Eng Rec—July 12, 1902.

See also **Passaic.**

New York Bay.—See **SEWAGE DISPOSAL.**

Ohio.—An Important Decision Concerning River Pollution by Sewage. Condensed from decision of Ohio Supreme Court, in Balliett vs. City of Mansfield. 6400 w. Eng Rec—Aug. 16, 1902.

Passaic, N. J.—Report of the Passaic Valley District Sewerage and Drainage Commissioners. Items of interest from the report of Rudolph Hering in regard to the purification of the Passaic River in New Jersey. 1800 w. Eng Rec—Feb. 14, 1903.

Sewerage of the Passaic River Valley. Editorial discussing the methods of final disposal of the domestic and manufacturing sewage of this district proposed in the recently submitted report of Messrs. Hering, Croes, and Brown. 1500 w. Eng Rec—Dec. 28, 1901.

The Pollution of the Passaic River and Its Prevention. Ernest Adams. Gives a full account of the trouble from the pollution of this river of New Jersey, and the correction. 3500 w. Munic Engng—Nov., 1904.

See also **New Jersey; SEWAGE DISPOSAL.**

Remedial Policy.—Stream Pollution and Remedial Policy. M. O. Leighton. Considers the natural pollution due to the land being occupied, the household sewage and refuse, and the wastes from industries, discussing the limitations which should obtain in all requirements even while aiming at improvements. 3000 w. Pro Indiana Engng Soc—1903.

Stream Pollution and Remedial Policy. M. O. Leighton. Abstract of paper read before the Indiana Engng. Soc. Considers the limitations which should obtain in all requirements made for the purpose of stopping stream pollution, and ways that a reform may be brought about. 2800 w. Munic Engng—Feb., 1903.

Severn, Eng.—Pollution and Self-Purification of the River Severn at Shrewsbury. A review by George C. Whipple of a report issued by the Royal Commission on Sewage Disposal. 1500 w. Eng Rec—Nov. 29, 1902.

Royal Commission Studies on Pollution and Self-Purification of the River Severn. Reviews the second report of the Royal Commission, giving extracts of interest. Map. 3500 w. Eng News—Feb. 19, 1903.

See also **SEWAGE DISPOSAL—British Commission.**

Sudbury, Mass.—See **WATER PURIFICATION—Self.**

Thames.—See **RIVER REGULATION.**

Trade Waste.—See **Factory Wastes; FACTORY WASTE.**

Typhoid Fever.—See **SEWAGE DISPOSAL—Oyster Pollution; WATER POLLUTION.**

United States.—See **SEWAGE DISPOSAL; WATER POLLUTION.**

West Riding, Eng.—See **Yorkshire.**

Yorkshire.—West Riding Rivers. A series of papers dealing with the various phases of the task undertaken by the West Riding Rivers Board. Serial. 1st part. 3500 w. Engng—March 4, 1904.

The West Riding Rivers Bill. A discussion of the bill to prevent the pollution of streams by trade effluents. Serial. 1st part. 3600 w. Engng—Feb. 3, 1905.

RIVER PROTECTION.

See **RIVER REGULATION.**

RIVER PURIFICATION.

See also **RIVER POLLUTION; WATER PURIFICATION; WATER SUPPLY.**

Self.—See **RIVER POLLUTION—Severn, Eng.; WATER PURIFICATION.**

RIVER REGULATION.

See also **BREAKWATER; CANAL; DAM; DRAINAGE; DREDGING; FLOOD; HARBOR; NAVIGATION; RESERVOIR; RIVER; RIVER BED; SHORE PROTECTION; WATER CURRENTS; WATERWAY.**

River Regulating Works (Les Travaux de Régularisation et le Régime des Rivières). L. L. Vauthier. Discussing especially improvement works for the control of inundations. Paper at the VIII Congress of Navigation. 12,000 w. Ann des Ponts et Chaussées—2 Trimestre, 1902.

Ahnapee, Wis.—Drilling and Blasting Submerged Rock. A statement of the cost and methods of drilling and dredging 11,000 yds. of rock in 4 to 8 ft. of water at Ahnapee Harbor, Wis. 1500 w. Eng Rec—March 9, 1901.

Alabama.—Improvement of the Black Warrior, Warrior and Tombigbee Rivers, in Alabama. R. C. McCalla. An illustrated article giving detailed description of work to cost about $5,000,000. 11,500 w. Pro Am Soc Civ Engrs—April, 1902.

Improvement of the Black Warrior, Warrior and Tombigbee Rivers, in Alabama. Discussion of the paper by R. C. McCalla. 7800 w. Pro Am Soc of Civ Engrs—Sept., 1902.

Improvement of the Black Warrior, Warrior and Tombigbee Rivers, in Alabama. Continued discussion of paper on this subject by R. C. McCalla. 13,000 w. Pro Am Soc of Civ Engrs—Oct., 1902.

Improvement of the Black Warrior, Warrior and Tombigbee Rivers, in Alabama. Continued discussion of R. C. McCalla's paper. 8700 w. Pro Am Soc of Civ Engrs—Nov., 1902.

The Economic Improvement of the Coosa and Alabama Rivers, in Georgia and Alabama. D. M. Andrews. A discussion of the problems in river improvement, and the best practice from the economic point of view. 3800 w. Pro Am Soc of Civ Engrs—April, 1903.

America.—See **United States**; and under names of rivers and States.

Austria.—River Regulation in Upper Austria (Die Flussregulierungs- und Wildbachverbauungs-Action in Oberoesterreich). With map showing present and proposed works, and with data as to cost of the works. 1200 w. Oesterr Wochenschr f d Oeffent Baudienst—July 26, 1902.

Stream Regulation in Upper Austria (Die Gewässerregulierung in Oberösterreich). S. Stern. Plans and illustrations of a number of mountain streams and the works constructed for their control. 4000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 31, 1904.

See also **Danube; Oppa.**

Austria and Germany.—The Results of the Improvement of Navigable Streams (Die Erfolge der Fahrwasserbesserung Schiffbarer Flüsse). A. v. Weber-Ebenhoff. A review of the commercial results which have followed river improvements works in Austria and Germany during the past ten years. 7500 w. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1900.

See also **Moldau-Elbe; CANAL.**

Bank.—See **CANAL.**

Bank Construction.—See **CANAL.**

Bank Protection.—The Serrazanetti System of Protective Works for the Banks of Rivers and Brooks (Das System Serrazanetti zur Herstellung von Schutzbauten an Flüssen und Bächen). An illustrated description of a system using wire netting gabions, which has been successfully employed in Italy. 2500 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 14, 1901.

The Use of Cobblestones Imbedded in Portland Cement in River Improvements (Die Anwendung von mit Portlandzement Gebundenen Klaubsteinen bei Flussregulierungen). Max Jesovits. Illustrated methods of protecting river banks. 400 w. Oest Wochenschr f d Oeff Baudienst—Sept. 9, 1905.

See also **Mississippi; Missouri; CANAL; PIER—Philadelphia; SHORE PROTECTION.**

Bilbao, Spain.—See **HARBOR.**

Bohemia.—See **Moldau-Elbe; Oppa; CANAL—Austria.**

Cache, Ill.—The Cache River Drainage Survey. A. H. Bell. Abstract of a paper presented to the Illinois Soc. of Engrs. and Survs. An account of the work and the condition of the river. 1200 w. Eng News—Feb. 4, 1904.

California.—See **DRAINAGE.**

Canada.—See **HARBOR.**

Chagres, Panama.—See **CANAL—Panama.**

Channel Form.—Natural and Artificial Forms of River Channels (Natürliche und Künstliche Formen des Flussgerinnes). Valentin Lapaine. An examination of the natural tendency of streams to flow in curved channels, suggesting that artificial controlling works should be designed accordingly. 2000 w. Oesterr Wochenschr f d Oeffent Baudienst—April 2, 1905.

See also **RIVER BED.**

Chicago.—Design for Controlling Works at the Head of the Chicago Drainage Canal. Abstract of a paper read by Ossian Guthrie before the W. Soc. of Engs. Illustrated description of proposed works, consisting of a lock the full width of the canal, sub-divided by a central wall, the left-hand channel being a by-pass and the right-hand channel a lock. 2500 w. Eng News—Jan. 8, 1900.

Design for a Controlling Works at the Chicago End of the Drainage Canal. Ossian Guthrie. Describes plan for the purpose of maintaining a uniform current for the relief and navigation of vessels. General discussion. 3800 w. Jour W Soc of Engs—Feb., 1901.

The Improvement of the Chicago River. Addresses at the annual dinner of the W. Soc. of Engs. by R. W. Hunt, L. E. Cooley, P. B. Weare, O. N. Carter, A. R. Reynolds, J. C. Braden, Wm. H. Chadwick, Isham Randolph, Wm. Boldenweck, and J. G. Keith. 11,500 w. Jour W Soc of Engs—Feb., 1901.

Expert Commission's Plans for Increasing the Flow Through the Chicago Drainage Canal. Explains the two plans submitted, and a summary showing their conclusions and the manner in which they have been reached. 1400 w. Eng News—April 4, 1901.

Schemes Suggested by the Expert Commission for the Improvement of the Chicago River. An explanation of the three schemes, with estimates. 2000 w. Eng News—May 2, 1901.

An Official Report on the Improvement of the Chicago River. Extracts from the report of Mr. Isham Randolph. 4500 w. Eng News—June 27, 1901.

I. The Chicago River. Thomas T. Johnston. A discussion of the sanitary and nevigation interests. II. Discussion. Isham Randolph. III. Notes on "The Chicago River." Ernest L. Cooley. The last two papers disagree with statements made in the first. 13,300 w. Jour W Soc of Engrs—Aug., 1901.

Cost of the Chicago Drainage Canal. Gives a summary of receipts and expenditures taken from a recent report. 500 w. Eng News—Oct. 26, 1905.

See also **DREDGING—Dipper; HARBOR; WATER POWER.**

China.—Improving Rivers in China. Concerning the improvement of the Peiho and Whangpoo rivers, with the regulations. 2500 w. U S Cons Repts, No. 1149—Sept. 30, 1901.

Columbia.—See **NAVIGATION—Rivers, Pacific Northwest.**

Coosa.—See **Alabama.**

Danube.—The Regulation of the Danube at Vienna (Ueber Donau-Regulierungs-Bauten bei Wien). Rudolf Halter. A general account of the river improvement and harbor work which has been carried on for many years. Plans. 6500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 31, 1902.

The Regulation of the Austrian Danube (Ausbildung der Fahrrinne in der Oesterreichischen Donau). Arthur Herbst. An illustrated account of the work of deepening the channels and improving the navigation on the Danube. 3 plates.

1000 w. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 8, 1902.

Danube Delta.—The Mouth of the Danube. C. H. Kühl. Read before the Glasgow Congress. Describes recent improvements effected in the navigable condition of the Sulina branch and outlet of the Danube. Chart. 4200 w. Engng—Dec. 27, 1901.

Danube, Hungary.—The Regulation of the Danube in Hungary (Die Regulierung des Donaustromes in Ungarn). Karl Grünhut. An exhaustive study of the various states of the river, with diagrams of the water levels and data concerning the regulation works. Three articles. 15,000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Nov. 14, 21, 28, 1902.

Delaware.—The Shoaling of the Delaware. Plan to keep the channel deep enough to maintain navigation between Philadelphia and the sea. 1100 w. Naut Gaz—May 23, 1901.

See also **HARBOR—Philadelphia.**

Delaware and Schuylkill.—The Improvement of the Channels of the Delaware and Schuylkill Rivers by the City of Philadelphia. An illustrated article stating the projects, giving details of the work and of the methods and machinery used. Also discussion. 9800 w. Pro Engrs Club of Phila—April, 1902.

Drau, Styria.—Correction of the River Drau by Sunken Trees (Ueber eine Anwendung von Sinkbäumen am Drauflusse). Anton Weber. A description of the method of sinking weighted trees to form a correcting embankment on the Drau, near Pettau, in Styria. 2000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—April 29, 1905.

Elbe.—See **Moldau-Elbe.**

Emscher, Westphalia.—The Regulation of the Emscher River, Westphalia (Die Regelung der Vorflutverhältnisse im Emschergebiete). B. Schulz. An account of the pollution of this slowly flowing stream with low banks, in a mining and manufacturing district, and of projects for its improvement. 2200 w. Glückauf—May 16, 1903.

The Improvement of the Emscher River (Verbesserung der Vorflut im Emschergebiet). Hr. Middeldorf. A paper before a Dortmund mining society, describing the unsatisfactory conditions in the valley of the Emscher, Westphalia, and giving plans for improving the current flow and the sanitary condition of the stream. 2 plates. 2500 w. Glückauf—June 27, 1903.

Europe.—See **WATERWAY.**

Failure.—Reasons for the Failure of River Regulation Works. Discussion by Major D. C. Kingman, U. S. A., of the reasons why river improvements by regulation have often been unsatisfactory. 1700 w. Eng Rec—March 22, 1902.

Fascine Mattress.—Fascine Mattresses for River Beds (Die Anwendung von Grundschwellen). A. Lernet. An illustrated description of fascine mattresses, held together with cross ties, for the protection of the beds of mountain streams against erosion. 1400 w. Oesterr Wochenschr f d Oeff Baudienst—April 18, 1903.

Fulda, Germany.—See **DAM.**

Germany.—The Regulation Works on the Rivers of Northern Germany (Régularisation des Rivières de l'Allemagne der Nord). M. Robert. A study of the river improvement work of northern Germany in view of the proposed regulation of the Loire. 12,000 w. Ann des Ponts et Chaussées—1 Trimestre, 1901.

See also **Austria-Germany**; and under names of rivers.

Georgia.—See **Alabama.**

Grand, Ontario.—The Grand River, Ontario Peninsula. W. H. Breithaupt. Discusses the effects of deforestation and swamp drainage, and the need of river improvement. Ills. 2000 w. Can Soc of Civ Engrs—Dec. 14, 1905. (Adv. proof.)

Hoogli, Calcutta.—Hooglie River—Proposed Deep Water Approach to Calcutta. Lindon W. Bates. Describes the physical characteristics and discusses the remedial projects, giving the writer's proposals in detail. Plates. 18,000 w. Jour W Soc of Engs—Oct., 1900.

Illinois.—The Improvement of the Illinois and Des Plaines Rivers. Extracts from a report by U. S. engineer officers against the extension of deep water navigation from the Chicago drainage canal to the Mississippi, unless Congress authorizes a corresponding improvement of that river. 1800 w. Eng Rec—Jan. 5, 1901.

Land Reclamation Along the Illinois River. Describes the method used in reclaiming large tracts of land on both sides of the Illinois River, and the flood protection of ten tracts varying from 3000 to 15,000 acres each. Ills. 1500 w. Eng Rec—Aug. 5, 1905.

See also **Chicago.**

India.—See **Indus; Hoogli; Sutlej; IRRIGATION; WEIR.**

Indus.—Proposed Permanent Protective Works for Town of Dera Ghazi Khan. Specification of work which is not only to stop the invasion of the river Indus, but cause it to restore the land washed away. Ill. 2000 w. Ind and East Engr—Oct., 1901.

Italy.—See **WATERWAY.**

Japan.—River Regulation in Japan (Wildbachverbauung in Japan). Prof. Ferd. Wang. An illustrated description of the forestation of hillsides and protection of the banks of brooks and rivers. 1200 w. Oesterr Wochenschr f d Oeffent Baudienst—June 7, 1902.

Kistna, India.—See **IRRIGATION.**

Lahn, Germany.—See **IRON ORE.**

Levee.—See **Mississippi; Wisconsin; DRAINAGE—St. Francis Levee; FLOOD.**

Loire, France.—Improvements of the River Loire. Concerning the proposed deepening of the channel to a depth of 26 feet, and other changes. 800 w. U S Cons Repts, No. 1091—July 19, 1901.

The Navigable Loire (La Loire Navigable). R. Philippe. A historical and technical account of the development of the navigation of the Loire, including the regulation of the stream and the commercial value of the traffic. Three articles. 9000 w. Génie Civil—May 24, 31, June 7, 1902.

Maas, Holland.—See **Railway Crossings.**

Madison, Wis.—The Work of the Madison Park and Pleasure Drive Association, Madison, Wis. W. D. Taylor. Illustrates and describes the improvement of the Yahara River by cleaning and deepening the river bed by dredging, raising the bridges, securing the land on both banks for driveways, etc. 1500 w. Eng News—Dec. 10, 1903.

The Improvement of the Yahara River. James M. Gilman. An illustrated account of proposed improvements in a small stream near Madison, Wis., connecting two lakes. 3500 w. Wisconsin Engr—Dec., 1903.

Mersey.—See **DREDGING; HARBOR—Liverpool.**

Mississippi.—Works for the Improvement of the Mississippi River, as Shown at the Paris Exposition of 1900. Describes the interesting exhibits of models, drawings and maps of the various works. 2400 w. Ry & Engng Rev—Dec. 15, 1900.

Reservoirs and the Control of the Lower Mississippi. Maj. C. McD. Townsend. Discussion of a paper on this subject by James A. Seddon. 6400 w. Jour W Soc of Engrs—April, 1901.

The Protection of Cities in the Mississippi Valley Against the Encroachment of the River. L. W. Brown. An illustrated study of the conditions and the systems of protection thus far tried. 3700 w. Eng News—June 13, 1901.

The Improvement of the Lower Mississippi River. J. A. Ockerson. Extracts from a paper read before the Glasgow Congress. An interesting summary of work in progress. Describes the conditions, the revetment and contraction works, levees, etc. 3000 w. Eng News—Sept. 19, 1901.

Bank Revetment on the Lower Mississippi River. Charles Le Vasseur. Read before the Memphis Engng. Soc. Illustrates and describes the revetment work; the making of the mattress, the launching, etc. 2700 w. Eng News—Oct. 31, 1901.

Making the Southwest Pass of the Mississippi a Ship Channel. An account of a great engineering undertaking now under way, for which Congress has appropriated $1,750,000. 2500 w. Sci Am Sup—Feb. 20, 1904.

The Reclamation of River Deltas and Salt Marshes. J. Francis Le Baron. Shows the desirability of reclaiming such lands, especially at the mouth of the Mississippi, and along the whole seaboard. An illustrated study of the treatment. 8500 w. Pro Am Soc of Civ Engrs—Nov., 1904.

The Improvement of the Mississippi River Between St. Louis and Cairo. William P. Wooten. A paper published by the Engng. School, U. S. A., Washington Barracks, D. C. A summary of the work in progress by the U. S. Government, with interesting explanation of the natural causes that produce the conditions found in the beds of such rivers. 5200 w. Eng News—March 9, 1905.

The Levee and Drainage Problem of the American Bottoms. Edwin G. Helm. Discusses the protection from overflow of the Mississippi River and the drainage of the interior waters of the American Bottoms. 11,700 w. Jour Assn of Engng Socs—Sept., 1905.

The Mississippi: Controlling Floods, Navigation Improvements. H. Van Meerten. A continuation of the Haupt-Van Meerten discussion. Ills. 5500 w. Jour Fr Inst—June, 1905.

See also Yasoo; **DRAINAGE—St. Francis Levee; DREDGING; FLOOD; RESERVOIR; RIVER.**

Mississippi Delta.—The Erosion of River Beds. Critical letter discussing the plan of improving the southwest pass of Mississippi as outlined by Lewis M. Haupt, with reply from the author. Ill. 8000 w. Eng News—Oct. 25, 1900.

The Southwest Pass Jetties. H. W. Parkhurst. Gives general description and specifications of work contemplated at New Orleans for the improvement of navigation. Ills. 4000 w. R R Gaz—Vol. XXVIII., No. 24.

See also **RIVER.**

Mississippi Headwaters.—See **RESERVOIR.**

Mississippi Levee.—The Levee Theory on the Mississippi River. An informal discussion of the subject—"In the treatment of the Mississippi River, is the levee theory justified by experience?" 21,000 w. Pro Am Soc of Civ Engrs—Aug., 1903.

The Levee Theory on the Mississippi River. Continued discussion of whether the levee theory is justified by experience. 9500 w. Pro Am Soc of Civ Engrs—Oct., 1903.

Mississippi, Minneapolis.—The Meeker Island Dams and Locks. James A. Gould. Information concerning work under construction which will give Minneapolis a commercial waterway. Ill. 1700 w. Yale Sci M—Nov., 1900.

See also **CONCRETE.**

Missouri.—Revetment Work on the Missouri River; Chicago & Alton Ry. W. R. DeWitt. Illustrated description of the design and construction of this work, carried out in accordance with the plan of the U. S. Government with all improvements. 2300 w. Eng News—June 5, 1902.

Technical Methods of River Improvement as Developed on the Lower Missouri River, by the General Government, from 1876 to 1900. S. Waters Fox. Gives a brief description of the river, and of the more important works. Ills. 17,000 w. Pro Am Soc of Civ Engrs—Jan., 1905.

Technical Methods of River Improvement, as Developed on the Lower Missouri River by the General Government from 1876 to 1903. Discussion of the paper by S. Waters Fox. Ills. 7700 w. Pro Am Soc of Civ Engrs—April, 1905.

Models.—Hydraulic Experiments with Models (Ueber die Bedeutung von Modellversuchen für den Flusswasserbau). C. Krischan. A paper before the Oesterr. Ing. und Arch. Verein, giving a well-illustrated description of experiments with models of jetties and weirs, showing the superiority of curved lines over rectangular for structures for regulating streams. 5500 w. Zeitschr d Oesterr Ing u Arch Vereines—June 27, 1902.

Modern Methods.—Modern Methods of River Regulation (Ueber Neuere Flussregulierungs-Methoden). Ignaz Pollak. A review of the latest Continental practice involving the study and maintenance of the natural bed of the stream. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 4, 11, 1901.

Mohawk.—Straightening the Mohawk River. Review of report by S. E. Babcock, who has recently surveyed this river and believes the improvement can be made. 3000 w. Fire & Water—Feb. 9, 1901.

Moldau-Elbe.—The Canalisation of the Moldau and the Elbe in Bohemia (Die Canalisierung des Moldau und Elbeflusses in Böhmen). H. Frans. Giving illustrations of the movable dams and details of the projected improvements. 2500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Nov., 1900.

The Status of the Canalisation of the Moldau and Elbe at the Close of 1900 (Ueber den Stand der Canalisierungsarbeiten an der Moldau und Elbe am Schlusse des Jahres 1900). J. Riedel. With data of progress and cost, and diagrams of the capacity of locks. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—July 26, 1901.

The Canalization Works in Bohemia (Die Canalisierungs-Bauten in Böhmen). Johann Mrasick. A paper before the Oesterr. Ing. und Arch. Verein, giving an account of the canalization of the Moldau and Elbe Rivers, and the progress of the work. 8500 w. Zeitschr d Oesterr Ing u Arch Vereines—June 27, 1902.

The Canalization of the Moldau and Elbe in Bohemia, in 1901 (Thätigkeit der Commission für die Canalisierung des Moldau und Elbeflusses in Böhmen im Jahre 1901). Abstract of the report of the commission for improving these waterways of Austria, showing progress of the work, with illustrations. 1200 w. Oesterr Wochenschr f d Oeffent Baudienst—July 5, 1902.

The Canalization of the Elbe and the Moldau. Illustrates and describes the system of canalization under construction. 1800 w. Sci Am Sup—March 26, 1904.

The Work of the Commission for the Regulation of the Moldau and the Elbe in Bohemia in 1904 (Die Tätigkeit der Kommission für die Kanalisierung des Moldau- und Elbeflusses in Böhmen im Jahre 1904). H. Frans. Details of the progress of the work, with illustrations of locks, movable dams, etc. 3500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Oct. 7, 1905.

See also **Austria and Germany; CANAL—Austria.**

Monongahela.—The Extended Navigation on the Monongahela River. F. L. Emory. Briefly reviews the history of locks and dams for river improvement, and gives an account of the proposed work on the river named. 3400 w. Jour Worcester Poly Inst—Jan., 1901.

Mountain Torrents.—See **Austria; Japan; FORESTRY—Mountains.**

Negro, Argentina.—The Regulation of a River of Semi-Constant Regime (E Regolarizzazione del Fiume a Regime Semicostante). C. Cipolletti. A hydrographical study of the Rio Negro, Argentina, with map of the river and its drainage basin. 7500 w. Ann d Soc Ing e Arch Ita—No. III, 1902.

Neste, France.—The Artificial Feeding of the Neste (L'Alimentation Artificielle de la Neste). P. Frick. An account of the manner in which some lakes of the Pyrenees have been tapped to supply an agricultural district. 2000 w. Génie Civil—Jan. 12, 1901.

The Artificial Feeding of the Neste (L'Alimentation Artificielle de la Neste). P. Frick. An illustrated account of the works for the diversion of water from lakes in the Pyrenees for the maintenance of the level in the river and canal of Neste in th upper Pyrenees. 1800 w. Génie Civil—Jan. 2, 1904.

New South Wales.—See **Richmond; DREDGING.**

Nile.—The Regularisation of the Nile. Editorial discussion of the river as represented in Sir William Garstin's recent report as to irrigation projects on the Upper Nile. 2000 w. Engng—Sept. 6, 1901.

See also **DAM—Assuan; IRRIGATION; NAVIGATION; WATERWAY—Egypt; WEIR.**

Ohio.—Waterway Improvement on the Ohio. William Gilbert Irwin. An account of important improvements made and projected with a view to increasing its facilities as a commercai stream. 2000 w. Sci Am—Aug. 15, 1903.

From Pittsburg to Tidewater. An illustrated article discussing the proposed canalization of the Ohio river from Pittsburg to the Mississippi. 2500 w. Marine Rev—April 6, 1905.

Ohio River and Its Improvement. Gives a statement showing the distribution and fall of the river, its tributaries, with the improvements under discussion, the commerce of the river, etc. 4500 w. Marine Rev—April 13, 1905.
See also **Pittsburg.**

Oppa, Bohemia.—The Regulation of the Oppa at Jägerndorf (Die Oppa-Regulierung in Jägerndorf). M. Kohut. With map and section, showing the construction of dikes for controlling the channel of the river Oppa, as it passes through the town of Jägerndorf, Bohemia. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 27, 1901.

Paris Exposition.—See **Mississippi.**

Pittsburg.—Full Use of the Rivers at Pittsburg and the Removal of the Obstructions to Such Use. Capt. William L. Sibert. Reviews the present situation at Pittsburg, showing the possibilities of water transportaton, and gives a preliminary study with sketches showing a plan for raising bridges in the Allegheny River. 3000 w. Pro Engrs' Soc of W Penn—Oct., 1902.

Improved Waterway Necessary for Commercial Outlet. Capt. W. B. Rodgers. A short paper on the need of improving the transportation facilities of Pittsburg, especially the navigation of the river. 1500 w. Pro Engrs Soc of W Penn—Feb., 1903.

See also **Monongahela; Ohio.**

Railway Crossings.—The Regulation of River Beds at Railway Crossings (Verruiming en Vernauwing van hel Rivier bed bij Spoorwegovergangen). A. B. Marinkelle. Describing especially the manner in which the channel of the Maas has been regulated at the bridge at Buggenum, Holland. 3500 w. De Ingenieur—Sept. 14, 1901.

Rhine.—The Regulation of the Rhine between the Vorarlberg and Switzerland (Die Rheinregulierung zwischen Vorarlberg und Schweiz). With a profile showing the slopes and the various stages of high and low water. 1500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—July 19, 1902.

The Technology of Waterway-Improvement, with Especial Reference to the Rhine (Technik und Wasserstrassenabgaben mit besondrer Beziehung auf den Rhein). Dr. J. Landgraf. A review of the improvements which have been made on various stretches of Rhine, with data as to costs. 3500 w. Zeitschr d Ver Deutscher Ing—March 4, 1905.

See also **RIVER.**

Ribble, Eng.—The River Ribble and Preston Dock. A review of the Commissioner's Report and of the recent report of the resident engineer, Mr. A. F. Fowler, concerning the work accomplished. 2200 w. Engr, Lond—Jan. 18, 1901.

Richmond, N. S. W.—Improvements at the Entrance to the Richmond River, New South Wales. Thomas Edward Burrows. Gives an account of the works carried out or in course of construction, in accordance with the recommendations of the late Sir John Coode. 5400 w. Ills. (No. 3508). Inst of Civ Engrs.

Rio de la Plata.—See **NAVIGATION—River Plate; RIVER—Argentine.**

Sacramento.—A Proposed Improvement of the Channel of the Sacramento River. W. L. Huber. Discusses schemes for carrying off the flood water, and reclaiming valuable land. 1200 w. Cal Jour of Tech—April, 1904.

Report of the Commission of Engineers on the Rectification of the Sacramento and San Joaquin Rivers. Describes work, to cost nearly 25 million dollars, for protecting some 1,700 sq. miles from floods. Map. 7500 w. Eng News—March 9, 1905.

See also **DRAINAGE—Swamp, California; HYDRAULIC MINING—Debris.**

St. Lawrence.—Improving St. Lawrence River Route. Outlines the proposed improvements to facilitate navigation, better lighting, dredging, etc. 1600 w. Marine Rev—Aug. 21, 1902.

St. Lawrence Channel.—The Improvement of the St. Lawrence River Ship Channel. Reviews the work done on the channel of the St. Lawrence River between Montreal and Quebec. 1500 w. Eng News—July 28, 1904.

San Joaquin, Cal.—See **Sacramento.**

Scheldt.—The Improvement of the Scheldt in Belgium (Del Verbetering van de Belgische Schelde). J. W. Welcker. An account of the plans for the improvement of the Scheldt between Antwerp and Fort Lillo, including the proposed cut-off. 8000 w. De Ingenieur—April 6, 1901.

See also **HARBOR—Antwerp; PORT—Antwerp.**

Screen.—See **SCREEN.**

Seine.—See **CANAL LOCK; RIVER.**

Silt-Bearing Streams.—Effects of Dams and Like Obstructions in Silt-Bearing Streams. Elmo G. Harris. A study of the changes due to a deposit of silt, with conclusions reached. 1400 w. Eng News—Aug. 15, 1901.

Snake, Wash.—See **NAVIGATION—River, Pacific Northwest.**

Sunken Trees.—See **Drau, Styria.**

Surabaya Strait.—See **STRAIT—Surabaya.**

Sutlej, India.—The Protection Works of the Banks of the Sutlej, British India (Travaux de Protection des Rives du Sutlej). G. Richon. Describing the dikes erected for the protection of the Kaiser-i-Hind bridge. 1800 w. 1 plate. Génie Civil—Dec. 17, 1904.

Thames.—The Thames Conservancy. A summary of the general report for the year ending Dec. 31, 1901, on channel improvement, purification and water supply. 2500 w. Engr, Lond—June 28, 1901.

The Thames Barrage Scheme. Discusses a measure to be introduced for the consideration of Parliament which provides for endocking the river by the construction of a barrage between Gravesend and Tilbury. 3000 w. Builder—Jan. 14, 1905.

See also **HARBOR—London; WATER SUPPLY—London.**

Tiber.—The Completion of the Regulation of the Tiber (Sal Compimento della Sistemasione del Tevere). Giovanni Cadolini. An account of the regulation works establishing a navigable channel from Rome to the sea. 6000 w. 1 plate. Ann d Soc Ing e Arch Ital—No. III. 1902.

United States.—Notes on the Improvement of River and Harbor Outlets in the United States. D. A. Watt. A study of the conditions of several localities before and after improvement, giving a summary of the principles corroborated and the generally accepted theories. Ills. and maps. 6500 w. Pro Am Soc of Civ Engrs—May, 1905.

Notes on the Improvement of River and Harbor Outlets in the United States. L. J. Le Conte and William W. Harts. Discussion of the paper by D. A. Watt, presented in "Proceedings" for May. 5200 w. Pro Am Soc of Civ Engrs—Sept., 1905.

U. S. Government Work.—Some Needed Reforms in the Conduct of River and Harbor Work. Extracts from an address by Hon. Theodore E. Burton, setting forth some of the evils attendant upon the present method of providing for and carrying on river and harbor works. 2500 w. Eng News—April 17, 1902.

U. S. Legislation.—See **HARBOR.**

Water Hyacinth Destruction.—Destroying the Water Hyacinth by a New Chemical Process. Describes a method now being tried for ridding southern rivers of this troublesome growth, which seems to give promise of success. 900 w. Sci Am—July 4, 1903.

Whampou.—Improvement of the Whampou River by the Removal of the Wu Sung Bar (Amelioration de la Navigabilité de la Rivière Whampou par la Supression de la Barre de Woosung). J. J. Chollot. Project for the improvement of the river connecting Shanghai with the Yangtse-Kiang, with extract from engineers' report and Chinese treaty. Map. 7000 w. Mem d l Soc d Ing Civils de France—Jan., 1902.

Wisconsin.—The Improvement of the Portage Levee System. Prof. Leonard S. Smith. Describes the topography of the vicinity of Portage, on the Wisconsin River, Wis., stating what has been done to protect the land from the overflow, the faults of the work, and the improvements needed. Ill. 4500 w. Wis Engr—Feb., 1904.

Yahara.—See **Madison, Wis.**

Yazoo.—Improvements at the Mouth of the Yazoo River. Brief account of the work in progress for the improvement of the harbor of Vicksburg, and of navigation on the Yazoo River. Maps and Ill. 900 w. Ry & Engng Rev—Jan. 26, 1901.

The Yazoo River Diversion Canal at Vicksburg, Miss. Gives the history of the project, methods of work, and illustrations. 2200 w. Eng News—March 12, 1903.

The Vicksburg Harbor and the Yazoo River Diversion Canal. Walter H. Polk. An illustrated description of interesting engineering work which has given new life to the city of Vicksbung. 3000 w. Eng Rec—Feb. 20, 1904.

See also **RAILWAY.**

Yellow River, China.—The Regulation of the Yellow River in China. William Starling. Discussing Chinese trade and Chinese river improvement, especially the regulation of the Yellow River as an artery of commerce. 4000 w. Engineering Magazine—Dec., 1900.

Yukon-Kuskokwin.—See **WATERWAY.**

RIVET.

See also **BOILER MANUFACTURE; BRIDGE ERECTION; GIRDER; RIVETED JOINT; RIVETING.**

Dimensions.—Concerning Rivet Heads. Gives a table for the various diameters of rivets, showing the proper projections through the plates to be joined, illustrating its use by examples. 1500 w. Locomotive—Feb., 1903.

Joint.—See **RIVETED JOINT.**

Metal Modifications.—Modifications in the Quality of the Metal of Rivets by the Operation of Riveting (Modification de la Qualité du Métal des Rivets par l'Operation du Rivetage). M. Charpy. Showing that the rivets may be improved or injured according to the temperature conditions. 800 w. Comptes Rendus—July 31, 1905.

Shearing Strength.—The Shearing Strength of Rivets. Report read at the Chicago convention of the Master Steam-Boiler Makers. 1200 w. Ir Age—June 29, 1905.

The Shearing Strength of Rivets. E. S. Fitzsimmons. Read at convention of Mas. Steam Boilermakers. Describes tests made and results. 1200 w. Ir Trd Rev—Oct. 5, 1905.

Spacing.—See **GIRDER—Rivet Spacing; SHIPBUILDING—Rivet Spacing.**

Structural Steel Work.—Rivets in Structural Steel Work. C. J. Tilden. Notes differences and suggests means of comparison between theory and practice. 1800 w. Harvard Engng Jour—May, 1903.

RIVETED JOINT.

See also **BOILER MANUFACTURE; MOMENT OF INERTIA—Polar; RIVET; RIVETING.**

Design.—Designing of Riveted Joints. Charles E. Frick. Some suggestions helpful in designing joints and testing their efficiency. 1500 w. Boiler Maker—Dec., 1905.

Efficiency.—Efficiencies of Riveted Lap Joints. C. G. Robbins. Gives tables covering both single and double-riveted lap joints of plates from 1-4 to 1-2 inch in thickness, rivets from 1-2 to 1 inch in diameter, and pitches varying by sixteenths of an inch from 1 3-4 inches to 4 3-8 inches, with explanation. 1500 w. Power—Jan., 1903.

Efficiencies of Riveted Joints. Gilbert S. Walker. Gives a diagram for determining the efficiency, explaining the method of using it. 2000 w. Eng News—Feb. 4, 1904.

Lap.—Why the Lap-Joint Fails. Engravings, with notes, showing why the lap-joint is so apt to develop cracks between the sheets. 400 w. Power—Oct., 1905.

See also **Efficiency.**

Table.—A Table for Pitch and Efficiency of Riveted Joints. Philip B. Hill. Gives table prepared to facilitate the design of a riveted joint for any given case, explaining its use. 1000 w. Eng News—July 16, 1903.

RIVETER.

See also **PNEUMATIC TOOL; RIVETING.**

Chain.—See **MACHINE TOOL—Roll Grooving.**

Electric, Portable.—See **MACHINE TOOL.**

Frame Design.—Design of Punch and Riveter Frames. John S. Meyers. Describes method of making necessary calculations, illustrating by example. 2000 w. Mach, N Y—Nov., 1903.

Hand Pressure.—A Hand Pressure Riveting Machine. Dr. Alfred Gradenwitz. Illustrated description of a machine constructed by F. Arnodin with the view to obtain by hand labor rivets as satisfactory as those obtained by hydraulic pressure or other mechanical means. 400 w. Sci Am—Aug. 19, 1905.

Yokes.—Notes on the Design of Riveter Yokes. Chester B. Albree. Discusses the design of a pneumatic toggle joint riveter of 12-foot gap, made in one steel casting, of sufficient stiffness to drive rivets 1 3-4 inches in diameter. Ill. 2300 w. Pro Engrs of Soc of W Penn—Jan., 1903.

RIVETING.

See also **BOILER MANUFACTURE; BRIDGE CONSTRUCTION; BRIDGE ERECTION; GIRDER; PNEUMATIC TOOL; RIVET; RIVETED JOINT.**

Notes on Workmanship in Riveting. A. J. Himes. A discussion of points in riveting and the testing of rivets. 1600 w. Eng News—Oct. 19, 1905.

Boiler.—See **BOILER; BOILER MANUFACTURE.**

Crane.—See **CRANE—Riveter Towers.**

Drilled vs. Punched Holes.—Drilled vs. Punched Rivet-Holes in the Hulls of Ships. A. F. Yarrow. Read at the Engng. Con. of the Inst. of Civ. Engrs. Gives results of experience thus far, describes and illustrates the methods of drilling, and strongly favors the drilling. 1400 w. Engng—June 26, 1903.

Field.—See **AIR COMPRESSOR.**

Girders.—See **GIRDER—Rivet Spacing.**

Hydraulic.—Hydraulic-Driven Rivets. Frank B. Kleinhans. Directions for good work in rivet driving. Ills. 900 w. Boiler Maker—June, 1905.

India Bridge.—Bridge Riveting in India. J. Graham. Information concerning the work and workmen, wages, etc. Ill. 2200 w. Engr, Lond—Aug. 9, 1901.

See also **VIADUCT—Gokteik.**

Metal Flow.—See **METAL—Flow.**

Plate Girders.—See also **GIRDER.**

Temperature.—See **RIVET—Metal Modifications.**

ROAD.

See also **PARK; PARKWAY; PAVEMENT; PUBLIC WORKS; STREET; TRANSPORTATION.**

Fallacies and Facts Concerning Good Roads. Editorial on a paper by I. O. Baker, printed in "The Technograph," concerning misleading statistics that have been published. 2500 w. Eng News—Nov. 15, 1900.

Civilization and Wagon Roads. Ira O. Baker. Read before the Illinois Soc. of Engrs. & Surv's. On the merits of dirt roads. 1900 w. Eng Rec—Feb. 15, 1902.

Facts and Fallacies Concerning Good Roads. Letter from Martin Dodge, replying to criticisms of the Road Inquiry Bureau's statistics, with editorial. 6000 w. Eng News—Jan. 17, 1901.

Some New Ideas in Road Construction. Editorial review of papers by Messrs. Gillette and Whinery. 2000 w. Eng News—June 6, 1901.

Roads, Streets and Pavements. H. G. Tyrrell. Gives points on the location of roads, and discusses their construction in the present article. Serial. 1st part. 2300 w. Can Engr—Feb., 1902.

Highway Construction. E. R. Buckley. Discusses principally the character of the pavement to be constructed and the methods employed, but also considers other matters related to this subject. 7000 w. Jour Assn of Engng Socs—April, 1902.

Roads. John Price. Extract from address before the Birmingham students of the Inst. of Civ. Engrs. Considers the various kinds of pavements, the standard of economy, gradients, cost, etc. 1500 w. Quarry—Dec. 1, 1902.

A Few Thoughts on Present Practice of Road Construction. James Owen. Considers briefly the construction, materials, practice, etc. 2000 w. Eng Rec—April 25, 1903.

Good Roads. George C. Diehl. Reviews what has been done in road improvement, the methods employed to advance the work, etc. 3000 w. Jour Assn of Engng Soc's—Oct., 1903.

Alaska.—Road Building in the Far North. C. W. Purington. An account of road building in Alaska, the conditions, difficulties, costs, etc. Serial. 1st part. 1600 w. Eng & Min Jour—Nov. 24.

American.—See **United States;** and under names of States and places.

Atlantic City-Pleasantville.—A Difficult Piece of Road Building. From a report by J. J. Albertson. An account of the building of a road across salt meadows between Pleasantville and Atlantic City. 1200 w. Eng Rec—May 21, 1904.

Austrian Mountain.—Improvement of a Mountain

Highway in Austria. Condensed translation from "Oesterreichische Monatschrift für den Oeffentlichen Baudienst," describing work on the Karlstadter highway. 1500 w. Eng Rec—Oct. 11, 1902.

Automobile, England.—Why Not a Motor Car Way Through England? B. H. Thwaite. Suggests the construction, and describes the character of a special roadway for motor vehicles. 1500 w. Nineteenth Cent—Aug., 1902.

Automobile Rights.—See **AUTOMOBILE—Legislation; Public Relations.**

Automobile Traction.—See **Wear; AUTOMOBILE—Road; PAVEMENT.**

Benguet, P. I.—Construction of the Benguet Road, Luzon, Philippine Islands. Illustrates and describes a notable piece of highway construction through rough country, and under exceptionally hard conditions. 2500 w. Eng Rec—Dec. 23, 1905.

Broken Stone.—Broken-Stone Roads. Reginald Ryves. A study of the method of constructing roads, the materials used, the effect of water, &c. Serial. 1st part. 2200 w. Engng—Jan. 20, 1905.

Buxton, Eng.—Road Making in Buxton, England. John Hatton. On the making of tarred macadam roads. Ills. 1800 w. Munic Engng—March, 1904.

California.—See **Oil Sprinkling.**

Carlsbad, Oiled.—See **Oiled, Carlsbad.**

Charles River Speedway.—The Charles River Speedway of the Boston Metropolitan Park System. William T. Pierce. Illustrated detailed description of a speedway costing about $450,000. 2500 w. Eng Rec—April 29, 1905.

Coal Tar.—See **Tar.**

Concrete.—See **PAVEMENT.**

Convict Labor.—Road Building with Convict Labor in the Southern States. J. A. Holmes. From the "Year Book" of the U. S. Dept. of Agriculture. Information concerning the classes of convicts employed, their management, the kinds of roads built, etc. 5000 w. Eng News—Nov. 20, 1902.

Corniche.—The Corniche Road in the Maritime Alps (La Corniche de l'Esterel). M. Therel. A historical and technical description of the construction of the famous Corniche road along the Riviera in the south of France. 1500 w. 2 plates. Ann des Ponts et Chaussées—2 Trimestre, 1905.

Cost Reduction.—Methods of Reducing the Cost of Contractors' Work on Road Construction. Halbert Powers Gillette. Concerning certain economies that wil reduce the cost of macadam road construction. 1800 w. Eng News—March 27, 1902.

Curves.—Radius and Width of Curves in Roads (Krümmungshalbmesser und Breite der Strassenwendeplätze). Prof. F. Loewe. Discussion of the layout of curves in streets and roads, with formulae and diagrams. 3000 w. Zeitschr d Oest Ing u Arch Ver—Aug. 25, 1905.

Cuyahoga Co., O.—The Permanent Improvement of Public Highways. William H. Evers. Gives general specifications and information concerning the road improvements in Cuyahoga County, Ohio, using brick paving. 4800 w. Brick—July, 1902.

Cyprus.—Road Construction on the Island of Cyprus. Describes the making and maintenance of roads in an island where traffic is by diligences and vehicles not weighing much more than 2 tons when loaded. 1500 w. Eng Rec—Aug. 27, 1904.

Dominica, West Indies.—The Interior Main Road, Dominica. An illustrated account of a proposed road, already surveyed, for the improvement of the island and the opening of the interior. 2000 w. Engr, Lond—July 12, 1901.

Dust Laying.—See **Tar; Oiled; DUST; STREET SPRINKLING.**

Earth.—The Cost of Wagon Transportation and of the Maintenance of Earth Roads. I. O. Baker. Abstracts of two papers presented at meeting of the Illinois Soc. of Engs. & Survs. Deals with actual conditions and prices. 3600 w. Eng News—Jan. 31, 1901.

Earth Roads and Earth Work. Halbert Powers Gillette. Extract from a forthcoming book. Describes the lines along which the cross section should be designed, and discusses other important points in road construction. Ill. 4500 w. Eng News—July 25, 1901.

The Dirt Road. G. A. Roullier. Considers points often neglected, and gives suggestions for grading and drainage. 1100 w. Eng Rec—April 25, 1903.

See also **Illinois; EARTHWORK.**

Electric Railway.—Street Railways and State Highways. Harold Parker. Remarks referring especially to Massachusetts. 1800 w. Jour Assn of Engng Socs—Aug., 1902.

Relation Between Macadam Roads and Electric Street Railways. Edward P. North. Read at the Good Roads convention. Discusses the effect of electric railways in developing country districts and their influence on road maintenance. 1500 w. Eng Rec—Sept. 13, 1902.

See also **PAVEMENT—Railway; TRACK—Street.**

Engineering.—The Need of Systematic Instruction in Highway Engineering. A. N. Johnson. Read before the Soc for the Promotion of Engng. Education. Remarks on the large sums of money being expended for the improvement of highways, and the need of experienced men for supervision. 1500 w. Eng Rc—July 8, 1905.

France.—Secrets of the Good Roads of France. William Ballantine. Considers methods of construction, materials, repairs, maintenance, traffic, &c. 2700 w. Automobile—March 11, 1905.

See also **STREET—Paris.**

Georgia Stone Material.—See **STONE.**

Grades.—Road Grades. C. H. Fitch. A discussion of some points in road surveying and construction. 1400 w. Min & Sci Pr—Sept. 6, 1902.

Gravel.—A Study of Road-Building Gravels. Ira O. Baker. Discusses the requisites for a good road gravel, and gives results of a study of a number of well-known gravels. 3500 w. Eng News—Oct. 23, 1902.

Illinois.—Construction and Care of Earth Roads in Illinois. Ira O. Baker. Extract from a bulletin issued by the Illinois Agricultural Experiment Station. 3700 w. Eng News—April 18, 1901.

Illinois Laws.—Road Laws of Illinois. Ira O. Baker. Briefly states the essential features of the laws relating to the construction and care of wagon roads. 2300 w. Eng Rec—April 25, 1903.

India.—See **CABLEWAY.**

Iowa.—Data on Roads and Pavements in Iowa. Abstract of the report of the Committee on Roads and Pavements, presented at the meeting of the Iowa Engineering Society. 1800 w. Eng News—Feb. 9, 1905.

Law.—See **Illinois; Massachusetts; New Jersey; New York; Pennsylvania; AUTOMOBILE—Legislation; Public Relations.**

Luzon, P. I.—See **Benguet.**

Lynn, Mass.—See **EARTHWORK.**

Macadam.—Is the Continuous Repair System the Most Economical for Macadam Roads? Halbert Powers Gillette. A record of macadam resurfacing, with recommendations of treatment that will prove more economical than the usual practice. 1000 w. Eng News—June 6, 1901.

The Selection of Materials for Macadam Roads. Extracts from a report by Logan Waller Page on the properties of road materials suitable for different classes of traffic. 3100 w. Eng Rec—May 17, 1902.

An Appreciative Analysis of Macadam Road Construction. C. H. W. Biggs. Read at the Bristol meeting of the Incor. Assn. of Munic. & Co. Engrs. Gives the writer's views on proper construction of roads. 1300 w. Builder—Aug. 30, 1902.

The Adjustment of Macadam Road Design to Various Subgrade Soils. From the report of the Massachusetts Highway Commission, describing methods employed. 700 w. Eng News—Sept. 4, 1902.

Macadam Roads and Road Specifications. Ernest McCullough. A brief review of methods used in the construction of macadamized streets, with a record of some of the difficulties encountered. 3000 w. Eng News—Feb. 26, 1903.

An Example of Thin Macadam Road Construction Along the Charles River, Mass. J. Albert Holmes. Describes the road previous to the placing of the macadam surface and the work. Ill. 800 w. Eng News—Jan. 14, 1904.

See also New Jersey; Port Huron; Tar Macadam; PAVEMENT—Macadam; Tar Macadam; ROAD MATERIAL.

Macadam Tarred.—See Buxton, Eng.; Tar Macadam; PAVEMENT—Tar Macadam.

Machinery.—Making Roads by Machinery. Waldon Fawcett. Illustrated description of special apparatus employed in road making, with an account of the government investigations of the Office of Road Inquiry of the Department of Agriculture. 1500 w. Sci Am—Jan. 11, 1901.

Latest Progress in Good Roads Construction. Waldon Fawcett. Gives illustrated description of improved machinery, of great power and efficiency, used in the construction of roads. 1400 w. Sci Am—Oct. 3, 1903.

See also Train.

Madagascar.—See TRANSPORTATION.

Maintenance.—Cost of Road Maintenance and Road Maintenance Efficiency. W. Worby Beaumont. Suggests methods of finding values of cost and efficiency for comparison. 1500 w. Engr, Lond—Oct. 24, 1902.

The Maintenance of Roads (Entretien des Routes). M. Lavigne. An account of the maintenance of roads in France and Luxemburg, with descriptions of steam rollers. Serial. 4 parts. 5000 w. Moniteur Industriel—April, 11 and 25, May 9 and 30, 1903.

Improved Maintenance of Earth Roads. Henry P. Morrison. Suggests lines of investigation tending to the betterment of country roads. 1500 w. Eng Rec—May 2, 1903.

Maintenance, N. Y.—The Maintenance of New York State Roads. Suggestions from bulletin issued by Mr. Henry A. Van Alstyne, State Engineer, dealing with gravel, macadam, and stone roads. 2000 w. Eng Rec—Jan. 21, 1905.

Marsh.—See Rio Grande—Holly Beach.

Maryland Shell.—See Shell, Maryland.

Maryland, Specifications.—Maryland Road Specifications. Extracts from specifications for the construction of macadam and telford roads, giving the essential features. 1200 w. Eng Rec—Nov. 7, 1903.

Maryland Surveys.—See SURVEYING—Road.

Massachusetts.—Recent Road Construction in Massachusetts. A review of the report of the State Highway Commission, describing the method of building various classes of highways, and of keeping them in repair. 2100 w. Eng Rec—April 6, 1901.

The State Roads of Massachusetts. Extract from a paper by Albert S. Merrill in "The Municipality." Concerning the work of the Highway Commission. 2400 w. Eng Rec—Jan. 11, 1902.

Recent State Road Construction in Massachusetts. Describes mainly the methods adopted in preparing sub grades for broken stone and gravel roads. 1600 w. Eng Rec—April 5, 1902.

The Work of the Massachusetts Highway Commission. W. E. McClintock. Read before the Am. Soc. of Munic. Imp. Reports the work accomplished and the methods of execution. 1500 w. Munic Engng—Nov., 1902.

Massachusetts State Highways. A. B. Fletcher. On the work of the Massachusetts Highway Commission. 1200 w. Eng Rec—April 25, 1903.

Road Making in Massachusetts. Asa Goddard. Gives the history of the work under the State aid laws, explaining the duties and methods of the commissioners. Serial. 1st part. 1800 w. Automobile—March 12, 1904.

See also Electric Railway; New York.

Materials.—See ROAD MATERIALS; STONE.

Mines.—Roads for Mines. James W. Abbott. Discusses the essential points in this branch of the engineer's practice. Location, grade, staking out the line, and details of construction are considered in the present article. Ill. Serial. 1st part. 3000 w. Eng & Min Jour—May 16, 1903.

Good Roads for Mines. James W. Abbott. Read at the Am. Min. Cong. The importance of highway improvement, particularly in its effect upon the mining industry. 2000 w. Min Rept—Sept. 24, 1903.

See also ORE TRANSPORTATION.

Mississippi.—See Oiled.

New Jersey.—The New Jersey State Road System. William L. Dickinson. A description of the results of the New Jersey State road law. 1800 w. Eng Rec—Jan. 19, 1901.

Road Maintenance in New Jersey. A statement of a method of maintaining roads by continuous rather than general repairs. 2200 w. Eng Rec—April 20, 1901.

State Road Construction in New Jersey. Explanation, from official reports, of the remarkable success of State aid for New Jersey highways. 1800 w. Eng Rec—March 22, 1902.

State Highway Laws of New Jersey. A statement of the laws based on reports furnished by Henry I. Budd, the state commissioner of public roads. 2200 w. Eng Rec—April 25, 1903.

Methods of Macadam Construction in Some New Jersey Towns. Describes the method used in northeastern New Jersey, discussing its merits. 1500 w. Eng News—Aug. 27, 1903.

New Jersey Specifications.—The New Specifications for Broken Stone Roads in New Jersey. A review of the requirements adopted by the Association of State and County Road Engineers of New Jersey. 1200 w. Eng Rec—March 30, 1901.

New York.—Road Building in New York State. Information concerning the progress in road construction, the material, cost, &c. Ill. 1800 w. Stone—June, 1901.

Notes Concerning Road Construction. Describes the method employed in building the State aid roads in New York. Also gives the recent experience of the State roads of Massachusetts. 1800 w. Eng Rec—Aug. 30, 1902.

The Work of the New York State Highway Commission. Edward A. Bond. Read before the Am. Soc. of Munic. Imp. Information concerning the work accomplished and work remaining to be done, with remarks on its importance. 1200 w. Munic Engng—Nov., 1902.

See also SURVEYING—Road.

New York-Chicago. — Planning a New York-Chicago Highway. Robert Bruce. Reviews the history of various road enterprises and outlines the route most in favor for the construction of a national highway. Maps. 3500 w. Automobile—Aug. 1, 1903.

New York Laws.—New York State Aid Road Laws. An explanation of the Higbie-Armstrong law and the Fuller law. 1600 w. Eng Rec—April 25, 1903.

North Carolina.—Economical Methods of Road Improvement in the South. Charles H. Scott. Describes treatment given roads in North Carolina which proved both satisfactory and economical. 1800 w. Eng News—March 27, 1902.

Oiled.—Oiled Roads and Their Benefit. Paper by T. F. White, describing the results of sprinkling oil on roads in Southern California. 2500 w. Eng Rec—Nov. 10, 1900.

Oil in Street Construction. T. F. White. Abstract of a paper read before the League of California Municipalities. Describes the practice during the last three years in San Bernardino County, Cal., in making roads of loose sand and sandy clay as well as better material, by soaking them with oil. 2600 w. Eng Rec—Feb. 22, 1902.

The Use of Oil on Macadam Pavements. Theodore F. White. Read before the Soc. of Munic. Imp. Gives the experience on California roads, and the satisfactory results obtained by asphalted macadam roads. 2000 w. Munic Engng—Oct., 1905.

Oil on Highways. Gives results of experiments, data on cost, and discusses advantages of its use on roadbeds, street railways and highways. 1600 w. St Ry Rev—Dec. 15, 1900.

Oil on Railroads and Wagon Roads. D. S. Harrison. Report of the manner of applying and the advantages resulting. 1400 w. Technograph, No. 15—1900-1901.

Oil for Clay Roads. Describes the treatment given a buckshot road near Clarkesdale, Miss. 1000 w. Eng Rec—Nov. 30, 1901.

Use of Mineral Oil in Road Improvement. James W. Abbott. From the year book of the U. S. Dept. of Agrl. for 1902. A review of tests, benefits, objections, preparation, etc. Ill. 6800 w. Automobile—Sept. 5, 1903.

See also Tar; DUST; RAILWAY PERMANENT WAY.

Oiled, California.—Oiled Road Construction in San Bernardino County, Cal. Describes a method of constructing a road from gravel and sand sprinkled with heavy oil and rolled much like macadam. 1200 w. Eng Rec—March 30, 1901.

The Use of Oil on Roads. Hiram M. Chittenden. From the "Report of the Chief of Engineers for 1902." Suggests points that should be investigated to determine its value, and gives results of its use in California. 1800 w. Eng News—April 23, 1903.

The Oiled Roads of California. Information from a recently issued bulletin presenting all the available data in regard to oiled roads in the State. Serial. 1st part. 5000 w. Eng Rec—Dec. 1, 1904.

Oiled Roads in California. Extracts from a recently issued bulletin, with photographs showing the conditions of the roads and samples of work. 3500 w. Munic Engng—March, 1905.

The Use of Oil on Macadam Roads and Oil-Asphalt Streets in California. Theodore F. White. Reviews the methods and results obtained by the use of oil, and the construction of asphalted-macadam roads. 1500 w. Eng News—Sept. 21, 1905.

Oiled, Carlsbad.—The Oiling of Highways (Ueber Oelbesprengung von Strassen). F. Drobny. Describing the experiments made with oil sprinkling to prevent the raising of dust in the streets of Carlsbad. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 4, 1905.

Ontario.—See **Tar Macadam.**

Paving.—The Economic Value of Paved Roads. Halbert-Powers Gillette. A letter discussing the arguments of Prof. I. O. Baker, and giving the writer's views, with editorial reply. 3500 w. Eng News—April 11, 1901.

See also **PAVEMENT.**

Pennsylvania Law.—Pennsylvania's New Good Roads Law. A copy of the Sproul bill, for the purpose of constructing good roads throughout the state, which recently passed the legislature. 5000 w. Munic our of Engrs—June, 1903.

Persia.—The New Road From Enseli to Teheran. A description of a portion of an important enterprise carried out under Russian influence in Persia. Map. Serial. 1st part. 3200 w. Engr, Lond—Feb. 1, 1901.

Philippines.—See **Benguet; MILITARY ENGINEERING; PHILIPPINES.**

Pittsburg.—The Grant Boulevard, Pittsburg. John Brunner. Describes the construction of a boulevard 15,407 feet long and 60 feet wide, between the business and residence sections of the city. 1800 w. Eng Rec—Jan. 18, 1902.

Polo, Ill.—Broken Stone Roads Near Polo, Illinois. Leslie A. Waterbury. Describes the roads named and discusses some of the principles of road construction. 3400 w. Technograph, No. 16—1901-2.

Port Huron, Mich.—Cost of Building Roads at Port Huron, Mich. Frank F. Rogers. Abstract of a paper read at Grand Rapids, before Mich. Engng. Soc. A brief illustrated description of two roads, with summary of cost. 2000 w. Eng News—March 6, 1902.

Porto Rico.—American Road Builders in Porto Rico. Albert Wells Buel. Information concerning the work in progress, the difficulties, cost, etc. Ill. 1800 w. R R Gas—Nov. 23, 1900.

Road Building and Other Public Works in Porto Rico Under the U. S. Military Administration. Illustrated article showing the extent and character of the work, abstracted from the reports of Capt. William Judson. 2000 w. Eng News—March 21, 1901.

Public Utilities.—Roadways: Their Relationship to the Various Public Services. A. E. Broadberry. Read before the Inst. of Gas Engrs. Suggestions for an organized arrangement of roadways in their relation to sewers, surface drainage, water and gas supply, telephones, &c. General discussion. 4500 w. Gas Wld—June 11, 1904.

Railway.—See **Electric Railway; PAVEMENT; TRACK—Street; TRACKWAY.**

Rio Grande-Holly Beach, N. J.—Marsh Roads. Stillwell H. Townsend. From a paper in the Report of the N. J. Commissioner of Highways for 1904. Describes the construction of a road through the salt marsh from Rio Grande to Holly Beach. 800 w. Eng Rec—May 13, 1905.

Riverside Drive, N. Y.—See **PARKWAY.**

Sand and Road Dust.—See **ROAD MATERIAL—Cementing Power.**

Shell, Maryland.—Shell Roads in Maryland. Extract from the Maryland Geol. Survey's Report on the State Highways, relating to roads surfaced with oyster shells. 1800 w. Eng Rec—Nov. 17, 1900.

Specifications.—Can Present Standard Road Specifications Be Improved. Halbert Powers Gillette. Calls attention to certain clauses in the "standard specifications" for macadam road-work as practiced in New York and Massachusetts. 3800 w. Eng News—Nov. 7, 1901.

See also under names of States.

Sproul Bill.—See **Pennsylvania Law.**

Steel.—See **TRACKWAY.**

Surveying.—See **SURVEYING.**

Tar.—Coal Tar as a Road Material. Favors its use, discussing precautions necessary and giving general information. Ill. 1700 w. Automobile—May 23, 1903.

The Tarring of Roads (Goudronnages des Routes). M. Guillet. An account of the results effected by the use of tar to prevent dust on roads in the departments of Seine and Marne, from 1903 to 1905. 4000 w. Ann des Ponts et Chaussées—4 Trimestre, 1905.

The Use of Tar on Roads (Goudronnage des Chaussées). An account of the use of coal tar for laying dust on the highways in the Department of Seine-et-Marne, France. 10,000 w. Ann des Ponts et Chaussees—2 Trimestre, 1903.

Tar-Macadam.—Tar-Macadam Roadways in Ontario. Report of the city engineer of Hamilton, Ontario, describing the method of construction. Ill. 2500 w. U S Cons Repts, No. 1649—May 18, 1903.

Tarred Roads in America. Information concerning tar-macadam roads as shown in Ontario and from other sources, with cost, work of construction, etc. Ill. 2800 w. Automobile—July 11, 1903.

See also **PAVEMENT.**

Tennessee.—Suggestions for Road Building in Tennessee. Hunter McDonald. Extracts from a paper presented to the Tenn. Good Roads Convention. Discusses gradients, materials, drainage, etc. 1500 w. R R Gas—Nov. 15, 1901.

Testing Materials.—See **ROAD MATERIAL.**

Test, Viagraph.—Testing Road Surfaces by the Viagraph. Thomas Aitken. Read before the Scottish Assn. of Munic. Engrs. & Survs. Gives a report of tests carried out in London, and various cities of Scotland, showing autographic records of the irregularities of road surfaces taken by this instrument. 3800 w. Quarry—Feb. 1, 1903.

The Viagraph: An Instrument for Measuring Road Wear. Charles Lavell. Illustrated description of an ingenious invention for measuring and registering wear in road surfaces. 500 w. Sci Am—May 13, 1905.

Traction.—See **TRACTION.**

Train.—Good Roads Train, Illinois Central R. R. An illustrated account of a train loaded with road-making machinery sent out to construct sample stretches of public highway between New Orleans and Chicago. 1200 w. Ry & Engng Rev—April 27, 1901.

Transportation.—See **TRANSPORTATION—Roads.**

Transportation Cost.—See **Earth.**

Troy, N. Y.—Notes on Some Moderate Cost Roads. William G. Raymond. Describes roads recently constructed, near Troy, N. Y., giving the contract prices for building. Ill. 1500 w. Eng Rec—July 18, 1903.

United States.—Progress of Road Building in the United States. Maurice O. Eldridge. A review of the early roads of the country, and of the progress made in various parts of the country. 3000 w. Brick—Jan. 1, 1901.

The Building of American Highways. George Ethelbert Walsh. Discusses the conditions which led to the movement for improved roads, what has been accomplished, the new industry developed, etc. 3800 w. Gunton's Mag—Aug., 1901.

See also under names of States and places.

Wear.—Wear of Roads by Horse Haulage and Motor Traffic. W. Worby Beaumont. Read at Leicester meeting of the Incor. Assn. of Munic.

& Co. Engrs. Also discussion. Refers principally to English roads, and considers the greatest wear due to horses' feet. 4500 w. Elec Engr, Lond—July 12, 1901.

ROAD LOCOMOTIVE.

See **ROAD ROLLER; TRACTION ENGINE.**

ROAD MATERIALS.

See also **ASPHALT; ASPHALT PAVEMENT; ROAD; STONE.**

Cementing Power.—Some Observations upon the Binding of Sand by Stone Dust. Halbert Powers Gillette. Outlines a theory that if correct would make it possible to bind clean sand with fine stone dust forming a macadam, and aims to show that such a phenomenon occurs. 1100 w. Eng News—May 15, 1902.

The Cementing Power of Road Materials. Logan Waller Page and Allerton S. Cushman. Reports the results of researches made by the Bureau of Chemistry, U. S. Dept. of Agriculture. 3500 w. Eng News—Nov. 17, 1904.

Georgia.—See **STONE.**

Testing.—Improvements in Tests of Macadam Materials. Describes experiments to standardize tests of the resistance to abrasion and of the cementing power of different stones. 2300 w. Eng Rec—April 19, 1902.

See also **LABORATORY—Road Material; PAVEMENT.**

ROAD ROLLER.

See also **EARTHWORK—Roller.**

The Management of Road Locomotives. T. C. Aveling. Read before the Midland Munic. Officers' Assn. Points for the maintenance of road-making machinery. 2500 w. Quarry—Aug., 1904.

Electric.—See **EARTHWORK—Roller.**

Molding.—See **MOLDING—Land Roller.**

Oil Engine.—Oil Engine Road Rollers. Illustrated description of a successful application of oil engines to road rollers. Two of these engines have been used in France for two years. 800 w. Engr, Lond—March 21, 1902.

See also **EARTHWORK—Roller.**

ROAD TRACTION.

See **TRACTION; TRACTION ENGINE.**

ROCK.

See also **GEOLOGY; MINERAL; ORE DEPOSIT; ROAD MATERIAL; STONE.**

Analysis.—See **MINERAL.**

Discoloration.—See **STONE.**

Explosive.—Explosive Rock. J. B. Jaquet. An account of the phenomena and discussion of the causes. 2000 w. Eng & Min our—March 30, 1905.

Limburgite.—See **LIMBURGITE.**

Trench Work.—See **EXCAVATION—Rock, Boston.**

ROCK CRUSHING.

See **CRUSHING; GOLD MILLING; ORE TREATMENT; STAMP MILL.**

ROCK-CUTTING MACHINERY.

Submarine.—See **DRILLING; RIVER REGULATION—Ahnapee, Wis.**

ROCK DRILL.

See also **BORING; COAL MINING MACHINERY; COMPRESSED AIR; DRILLING; MINING MACHINERY; QUARRY—Modern Methods; TUNNEL; WELL BORING.**

Rock Drills. Ewart C. Amos. Refers to early machines, comparing them with the latest types, and considers in detail percussion drills and diamond prospecting drills. Ills. 5800 w. Engng Rev—July, 1904.

Notes on the Construction and Practical Operation of Rock-Drilling Machines. E. M. Weston. Notes on practical work at machine drilling, giving information of value. 10,000 w. Jour Chem, Met & Min Soc of S Africa—Aug., 1905.

Notes on the Construction and Practical Operation of Rock-Drilling Machines. Lengthy discussion of E. M. Weston's paper on this subject. 13,000 w. Jour of Chem, Met & Min Soc of S Africa—Oct., 1905.

Air vs. Electricity.—See **Electric vs. Air.**

Bits.—Rock-Drill Bits. T. H. Proske. Brief illustrated descriptions of various patterns. 800 w. Eng & Min Jour—May 5, 1904.

Box.—See **Electric.**

Brandt Hydraulic.—See **Hydraulic.**

Cleveland Iron Mine.—A Contrast in Cleveland. Frank Seymour. Refers to the types of hand drill used in the early days of ironstone mining, in the Cleveland district, England, and gives an illustrated description of the power drills now used. Serial. 1st part. 3500 w. Ir & Coal Trds Rev—Aug. 19, 1904.

Contest.—Rock Drilling Contest at Idaho Springs, Colorado. An illustrated account of contest with air drills, giving tabulated record. 1200 w. Min Rept—July 17, 1902.

See also **Trials.**

Davis Calyx.—See **DRILLING.**

Electric.—A New Electric Rock Drill (Ueber eine Neue Elektrische Gesteinsbohrmaschine). R. Classen. A revolving diamond drill is driven from an electric motor by means of a flexible shaft. 2000 w. Glückauf—Nov. 24, 1900.

An Improved Electric Rock Drill (Ueber eine Neue Elektrische Gesteinsbohrmaschine). W. Missner. An illustrated description of the Lange-Fromholt machine, as made by Siemens & Halske. 2500 w. Glückauf—Dec. 22, 1900.

The Fromholt Electric Diamond Drill (La Performatrice à Diamants et à Commande Electrique de M. Fromholt). M. Barbet. The tube containing the diamonds is revolved by electric power, while the pressure is given by the cooling water acting on a piston. 3000 w. Bull Soc d'Encour—April, 1901.

The Frombolt Electric Drill. From the "Bulletin de la Société d'Encouragement pour L'Industrie Nationale." Illustrated description of an electrically driven diamond rock drill possessing new and promising features. 1500 w. Col Guard—June 14, 1901.

Electrically Driven Diamond Drill (Perforatrice à Diamants et à Commande Electrique). An illustrated description of the Frombolt electric drill for mining, quarrying and tunnelling. 1200 w. Génie Civil—Sept. 7, 1901.

The Development of Electrically Driven Rock Drills (Ueber die Entwicklung der Gesteinsdrehbohrmaschinen mit Elektrischem Antriebe). C. Schraml. A review of recent progress, with description of the machines of the Union Electric Co., Siemens & Halske, and Bornet. Two articles. 500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—May 18, 25, 1901.

Practical Trials with Rotary Electric Rock Drills. C. Schraml, in "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Report of trials and illustrated description of drills used. 1800 w. Col Guard—June 7, 1901.

Electric Solenoid Impact Rock Drill (Elektrische Solenoid-Stossbohrer für Hartes Gestein). E. Heubach. A review of early electrical rock drills and a description of the improved drill of the Union Elektricitäts Gesellschaft and its work in hard rock. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—Oct. 19, 26, 1901.

Electric Mining Drills Abroad. Frank C. Perkins. Illustrated description of Siemens & Halske and other drills as used in German mines. 3000 w. Mines & Min—May, 1903.

Electric Rock-Drills. E. J. Munby. A discussion of the application of electricity to drilling, showing its utility, economy, etc. 1800 w. Stevens Ind—July, 1903.

Electric Drill for Boring Up-Hill in Mine Galleries. From "Revue Technologique." Illustrated description. Col Guard—Sept. 11, 1903.

Electrically-Driven Impact Drills (Die Stossbohrmaschinen mit Elektrischem Antrieb). Paul Sorgo. An illustrated account of the electric rock drills made by the Austrian Siemens-Schuckert Works. 2500 w. 1 plate. Oesterr Zeitschr f Berg u Huttenwesen—June 18, 1904.

The Box Electric Rock-Drill. Frank E. Shepard. Illustrated description of drill invented by W. A. Box, with details of construction and operation. 4300 w. Trans Am Inst of Min Engrs—Feb., 1903.

Improved Electric Rock Drills (Neuere Elektrische Stossbohrmaschinen). W. Wolf. Describing improved forms of solenoid rock drills, with details of construction. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 18, 1905.

See also Trials; **COAL MINING MACHINERY; DRILL; ELECTRIC EQUIPMENT**—Coal Mine; Mine; **MINING MACHINERY.**

Electric vs. Compressed Air.—The Progress of Rock Drilling in 1902 (Die Gesteinbohrmaschinenfrage im Jahre 1902). Th. Giller. A comparison of the relative advantages of compressed air and electricity, showing that the best results are to be expected from their combination. 3000 w. Glückauf—Aug. 30, 1902.

The Rock Drill Question in 1902 (Die Gesteinbohrmaschinenfrage im Jahre 1902). H. Drolz. A comparison of the relative merits of compressed air and electricity for operating rock drills, with data from recent experience. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 20, 1902.

Compressed-Air vs. Electric Rock Drills (Die Gesteinbohrmaschinenfrage im Jahre 1902. Druckluft und Elektricität). Q. Classen and Hugo Drolz. Discussion as to the relative advantages and costs of compressed-air and electric rock drills. 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 18, 1903.

See also **COAL MINING MACHINERY.**

Flottmann.—The Flottmann Rock Drill (Die Flottmannsche Gesteinbohrmaschine). Hr. Limberg. An illustrated description of a rock drill to be driven by compressed air or steam, with improved valve gear having very little friction. 1 plate. 1500 w. Glückauf—March 8, 1902.

François Rotary.—The François Rotary Rock Drill (Note sur la Perforation Mécanique par Rodage Système A. et J. François). N. Orban. Illustrated description of rotary rock-boring machines, used in Northern French and Belgian coal mines. 8 plates. 3000 w. Rev Univ d Mines—March, 1902.

The François Rotary Rock Drill. N. Orban, in "Revue Universelle des Mines, de la Métallurgie, etc." Describes and illustrates the three types employed at the Werister Colliery in Belgium. 1100 w. Col Guard—June 13, 1902.

Fromholt.—See Electric.

Hand "Drillibite."—The "Drillibite" Hand Rock-Drill. Illustrated detailed description of a portable drill-holder and turner aiming to enable one man to do the work of two when drilling holes by hand-power. 1500 w. Engng—Jan. 29, 1904.

Hydraulic.—Hydraulic Rock-Borer. An illustrated detailed description of the Brandt hydraulic rock drill, the principal machine employed in boring the Simplon Tunnel. 1300 w. Engr, Lond—Feb. 24, 1905.

Operation.—Mining with Machine Drills. E. L. LeFevre. Discusses rock drills as a factor in economic mining. Serial. 1st part. 2000 w. Min & Sci Pr—July 11, 1903.

The Machine Drill in Mining. Reviews the progress made with the machine drill, the work it has accomplished and the methods. Also its importance in economical working. Ills. 3500 w. Min & Sci Pr—July 15, 1905.

Sharpener.—Fern's "Challenge" Sharpener for Rock Drills. An illustrated description of the machine and its operation. 1200 w. Engng—Oct. 23, 1903.

The "Ajax" Rock-Drill Sharpener. Illustrated description, with a comparison of the cost of hand and machine sharpening. 600 w. Engng—May 19, 1905.

Siemens & Halske.—See Electric; Trials.

Submarine.—See **DRILLING; RIVER REGULATION**—Ahnapee, Wis.

Trials.—Trials of the Siemens & Halske Crank Percussion Rock Drill (Ergebnisse mit Kurbel-Stoss-Bohrmaschinen, System Siemens and Halske). R. Goebel. Data and results of tests with electric drills at Peine, Hannover. Details of working costs are given, the current being supplied from gas engines using furnace gases. 2000 w. Glückauf—June 4, 1904.

Trials of Rock Drills. J. B. Carper. Data on trials showing relative air consumption per cubic inch of rock drilled by different makes of drills. 3500 w. Mines & Min—Sept., 1904.

Recent Trials with Pneumatic Rock Drills (Neuere Versuche mit Luftbohrmaschinen). F. Hempel. Tabulated results of experiments with a number of German rock drills, showing the work done for a given consumption of air. 1800 w. Glückauf—Nov. 12, 1904.

See also Contest.

"Triumph."—The Triumph Rock Drill of the Ruhrthaler Machine Works (Die Gesteinsbohrmaschine "Triumph" der Ruhrthaler Maschinenfabrik). Describing an improved form of reciprocating pneumatic rock drill for mining. 1500 w. 1 plate. Glückauf—Aug. 24, 1901.

Valve Gears.—The Action of Valve Gears in Pneumatic Rock Drills (Die Wirkungsweise der Steuerungen an Druckluft-Gesteinsbohrmaschinen). Carl Weidmann. A review of the different systems of operating the valves, with diagrams showing their action. 4500 w. Glückauf—Sept. 24, 1904.

Valve Gears of Compressed-Air Rock Drills. C. Weidmann, in "Glückauf." An illustrated study of the action of valve gears in rock drills. 2000 w. Quarry—Feb., 1905.

See also **VALVE GEAR.**

ROCK POWDER.

See **CEMENT.**

ROCK SALT.

See **SALT; SALT WORKS.**

ROD MILL.

See **ROLLING MILL.**

ROENTGEN RAY..

See **ELECTRO-PHYSICS; FLUOROSCOPE; INDUCTION COIL; INTERRUPTER; RADIOACTIVITY; RADIOGRAPHY; VACUUM TUBE.**

ROLL.

See also **ROLLING MILL.**

Angle.—The Design of Angle Rolls. William Hirst. Discusses important points in rolling, the designs of rolls for making angles, the early forms of passes, &c. Ill. Serial. 1st part. 3700 w. Ir Age—Aug. 8, 1901.

Rolls for Uneven Angles. William Hirst. Describes the operation of rolling angular sections, illustrating by examples. Serial. 1st part. 3000 w. Ir Age—Jan. 12, 1905.

Beam.—Designing Beam Rolls. Carl Holzweiler. Abstract of an article published in "Stahl und Eisen," giving data used by the author to lay out the rolls and then to see whether or not the design is satisfactory. Ills. 1500 w. Ir Age—Aug. 17, 1905.

Calibration.—The Calibration of Rolls (Walzenkalibrierung). A. Sattmann. A discussion of the correct form and dimensions to be given to the passes in rolling-mill rolls for special shapes. 3000 w. Stahl u Eisen—Sept. 1, 1903.

The Calibration of Rolls (Das Kalibrieren der Walzen). Alexander Sattmann. A discussion of the method of proportioning the passes in the rolls of mills for rolling structural shapes of iron or steel, so as to effect the reduction and forming of the desired profiles. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 17, 1903.

The Calibration of Rolls for Rolling Mills (Die Kalibrierung der Walzen im Walzwerksbetriebe). Emil Kirchberg. Describing the method of laying out the passes in rolls for rolling I beams and structural shapes. 3500 w. Stahl u Eisen—Oct. 15, 1903.

The Calibration of Rolls for I-Beams (Das Kalibrieren der Profilwalzen für I-Eisen). Carl Holzweiler. With table giving the dimensions of passes in rolls for I-beams, and plates showing the successful reductions. 2000 w. 2 plates. Stahl u Eisen—April 15, 1905.

Chill.—Chill Rolls. R. E. V. Luty. Considers some of the problems of their manufacture and use. Serial. 1st part. 4000 w. Ir Age—April 23, 1903.

Design.—Notes on the Design of Rolls. Emil Kirchberg. From "Stahl und Eisen." An illustrated article discussing changes and progress, material, &c. 3800 w. Ir Age—Dec. 10, 1903.

Notes on the Design of Rolls. Emil Kirchberg. From a paper printed in "Stahl und Eisen," with additions. Notes on recent changes, influence of temperature, draft, reheating, &c. Ill. 4300 w. Ir & Coal Trds Rev—Jan. 22, 1904.

Lincoln Plant, Pittsburg.—Lincoln Plant of the United Engineering & Foundry Co., at Pittsburg.

An illustrated description of one of the largest plants for the manufacture of rolls for the working of iron and steel. 2500 w. Ir Trd Rev—July 7, 1904.

Manufacture.—Roll Turning. W. S. Standiford. Describes the roll lathe and tools for roll turning, roll turners' troubles, etc. 3500 w. Am Mach—Vol. 28, No. 4.

Roll Turning: An Important Factor in the Iron and Steel Industry. W. S. Standiford. An illustrated description of a special department of work, describing the peculiar machines and methods. 4000 w. Engineering Magazine—June, 1905.

See also Lincoln Plant.

Plate Straightening.—Plate-Straightening Rolls. Illustrated detailed description of machine constructed for the new armor-plate mills at Creusot. 600 w. Engng—June 19, 1903.

Turning.—See **Manufacture.**

ROLLER.

Dam Construction.—See **EARTHWORK—Roller.**

Molding.—See **MOLDING—Land Rollers.**

Road.—See **ROAD ROLLER.**

ROLLER BEARINGS.

See also BALL BEARINGS; BEARINGS.

Notes on Rolling Bearings. William W. Estes. Where roller bearings will effect saving, and the things tending to increase their economy, with discussion of various designs, and record of practical experience with the anti-friction bearings. 6000 w. Jour Worcester Poly Inst—May, 1901.

Further Comparisons of Roller Bearings. Thomas W. How. Presents the requirements of satisfactory roller bearings and results obtained. 3800 w. Tram & Ry Wld—Nov. 11, 1901.

Roller Bearings. Paper read by Prof. Hele-Shaw before the Automobile Club of Great Britain and Ireland on this subject. Ill. 3500 w. Horseless Age—April 9, 1902.

The Essential Conditions of Sliding and Roller Bearings (Die Wesentlichen Eigenschaften der Gleit-und Rollenlager). Prof. R. Stribek. A comparison of the resistance of journal friction with the action of roller bearings; with diagrams showing the effect of various lubricants. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—Sept. 6, 1902.

Bridge.—See **BRIDGE BEARINGS.**

Conical.—See **CRANE HOOK—Roller Bearing.**

Friction.—The Friction of Roller Bearings. C. H. Benjamin. Reports a series of experiments in which roller bearings were compared with plain cast-iron bearings and with babbitted bearings under similar conditions. 1000 w. Mach, N Y—Oct., 1905.

Manufacture.—Making a Roller Bearing. Describes new features of construction recently made and the methods of manufacture. Ill. 2700 w. Am Mach—Dec. 3, 1903.

Marine Engine.—Bearings for Marine Engines. Stephen P. M. Tasker. Discusses the advantages, and reports the test made of the steam yacht "Sagamore." 800 w. Marine Engng—Sept., 1902.

Tests.—Tests of Roller Bearings. W. H. Booth. Reports some tests made on a new bearing in good order, and discusses the economy. 2900 w. Tram & Ry Wld—Oct. 17, 1901.

ROLLING.

See also ROLL; ROLLING MILL.

The Laws of the Rolling of Iron (Lois du Laminage du Fer). R. Tonkow. A study of the relation of the diameter and speed of rolls to the extent of reduction of the metal at each pass. 8000 w. Rev Univ des Mines—Oct., 1902.

Continuous.—See **ROLLING MILL; STEEL METALLURGY—Casting and Rolling.**

ROLLING DISC.

Mechanics.—See **MECHANICS—Rolling Disc.**

ROLLING MILL.

See also IRON METALLURGY; IRON WORKS; RAIL; ROLL; STEEL METALLURGY; STEEL WORKS.

The Rolling Mill of the Present (Die Walzwerks-Einrichtungen der Gegenwart). A. Sattmann. A general review of modern rolling mill practice, with especial reference to the specialisation of the various departments of the industry. Serial. Part I. 2500 w. Stahl u Eisen—Nov. 15, 1901.

American.—Notes on American Steel Works. David E. Roberts. Illustrated notes dealing principally with details which seem to the writer of practical interest, and confined to rolling mills. Serial. 1st part. 1800 w. Engng—Sept. 9, 1904.

Some of the Significant Features of American Rolling Mill Practice. D. F. Nisbet. Notes on steam generation, engines for roll trains, hydraulic systems, electrical appliances, ingot stripping, pit furnaces, mills, etc. Ills. 6000 w. Ir Trd Rev—Oct. 27, 1904.

Armor Plate.—Armor Plate Rolling Mill for the French Government (Panzerplattenwalzwerk der Französischen Marineverwaltung). W. Schnell. Illustrating heavy reversing rolling mill built in Germany for the "Forges Nationale de la Chaussade" at Guérigny, France. 1000 w. 1 plate. Stahl u Eisen—Feb. 15, 1905.

An Armor Plate Rolling Mill. Illustrated description of a rolling mill, recently constructed to the order of the French Navy Department, and its operation. 500 w. Engr, Lond—Sept. 1, 1905.

See also ARMOR PLATE; STEEL WORKS.

Bar.—See **Wire-Rod.**

Beam Rolls.—See **ROLL—Beam.**

Belgian Rod.—The Passing of the Belgian Rod Mill. States the reasons for the looping type of rod mill giving way to the continuous mill. Ill. 2000 w. Ir Age—May 23, 1901.

British vs. American.—A Comparison Between American and British Rolling Mill Practice. William Garrett. Read at the London meeting of the Iron and Steel Inst. A paper of great interest, blaming principally the owners and managers of British iron and steel works for the loss of British trade, and discussing points of importance. Also editorial. 1900 w. Engng—May 17, 1901.

Burbach, Germany.—Universal Rolling Mill of the Burbach Works (Universalwalzwerkanlage der Burbacher Hütte). Illustrating and describing an installation with direct-connected steam engine and hydraulically operated tables. 1200 w. 1 plate. Stahl u Eisen—Jan. 1, 1904.

The New Universal Mill of the Burbach Works (Die Neue Universalstrasse der Burbacher Hütte). Fr. Frölich. Details and photographs of a mill built by the Duisburg works and installed at Burbach, including direct-connected engine and steam plant. 2000 w. Zeitschr d Ver Deutscher Ing—Oct. 29, 1904.

Calibration of Rolls.—See **ROLL.**

Carnegie.—New Carnegie Plate Mill at Homestead, Pa. (Neue Blechwalzwerksanlage der Carnegie Steel Co. in Homestead, Pa.). Hermann Jelies. An addition to a previous article on "American Rolling Mills," giving an illustrated description of these works, in which a practically new plant of the Bethlehem Co. was used. 1 plate. 700 w. Stahl u Eisen—Feb. 1, 1902.

Clairton.—The Clairton Twenty-eight Inch Three-High Steel Billet Mill. Illustrates and describes a billet mill with improved housings, hydraulic lifting tables and electrically-driven rollers. 1000 w. Eng Rec—Jan. 2, 1904.

Cold Rolling.—See **STEEL.**

Continuous.—The Modern Continuous Rolling Mill. Axel Sahlin. Read before the Staffordshire Ir. & Steel Inst. An illustrated article describing mills investigated during a tour of study and inspection in the United States. 9600 w. Ir & Coal Trds Rev—March 27, 1903.

See also Test.

Conveying Rolls.—See **Live Rolls.**

Differdingen, Germany.—The Rolling Mills of the Differdingen Iron Works (Die Walzwerkanlage des Deutsch-Luxemburgischen Bergwerks, Differdingen). With numerous views of the various departments of the works. 1800 w. Stahl u Eisen—Jan. 1, 1903.

The New Wire-Rod Rolling Mill at Differdingen (Die Neue Drahtwalzwerkanlage in Differdingen). K. Gruber. Describing a plant in which the rolls are driven by a double gas engine, operating with blast-furnace gas. 2000 w. 1 plate. Stahl u Eisen—April 1, 1904.

See also STEEL CONSTRUCTION—Grey Beams.

Dog.—See Gripping Tongs.

Dortmund.—The New Rolling Mill Plant of the Dortmund Union (Die Neue Walzwerkanlage der Dortmunder Union). H. Brauns. A very completely illustrated description of the large reversing mill recently erected at Dortmund, Germany. 3000 w. 1 plate. Stahl und Eisen—June 1, 1902.

Duisburg.—See Burbach, Germany.

Electric Driving.—Improved Electric Driving for Rolling Mills (Neue Elektrische Antriebe bei Trio, Blech-, und Universalwalzwerken). A. Schwarze. With especial reference to the operation of the rising and falling tables, and auxiliary machinery for three-high mills, etc. 2500 w. Stahl u Eisen —Oct. 15, 1901.

Electrically Driven Rolling Mill (Eine Elektrisch Betriebene Feinstrasse). F. Janssen. Illustrated description of the new electric equipment of the Bergischen Steel Works at Remscheid, constructed by the Union Elektrizitäts Gesellschaft of Berlin. 2500 w. Stahl u Eisen—Jan. 15, 1903.

Electrically Driven Live Rolls (Ein Elektrisch Betriebener Blockrollgang). F. Janssen. Illustrating the operation of a set of live rolls for rolling mill feed by means of electric group driving with details and diagrams of operation. 1800 w. Stahl u Eisen—Sept. 1, 1903.

The Electric Driving of Reversing Trains of Rolls (Der Elektrische Antrieb von Reversier-Walzenstrassen). Karl Ilgner. An illustrated discussion of electric driving for rolling mills, and account of experiments with an electric mine hoist. 1400 w. Stahl u Eisen—July 1, 1903.

Electric Driving of Reversing Rolling Mills (Der Elektrische Antrieb von Reversierwalzwerken). Karl Ilgner. A discussion of the advantages of electric driving for rolling mills, with data and results of tests upon a number of installations. Serial. 2 parts. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 22, 29, 1905.

Tests of Motor Driven Roller Tables at Duquesne. Albert Kingsbury. Describes tests made to determine data for use in estimating the sizes of motors required in this class of service. 3000 w. Ir Age—March 31, 1904.

Electrically Driven Rolling Mills. H. Koettgen. Condensed from a paper read at Duesseldorf before the Verein Deutscher Eisenhuettenleute. Discusses the problem of electric driving in its application to three-high mills, roll tables, reversing mills, &c. 4800 w. Ir Age—May 19, 1904.

The Electric Driving of Rolling Mills. Brief illustrated account of two modern German rolling mills equipped electrically. 900 w. Elect'n, Lond—June 16, 1905.

Electrically-Driven Rolling Mills. Ralph W. Birkett. A short account of, and deductions drawn from the writer's observations of the working of an electrically-driven mill recently erected at Queens ferry. 4500 w. Engr, Lond—Sept. 8, 1905.

Electric Driving of Rolling Mills (Elektrischer Antrieb von Walzwerken). A. Bayer. A mathematical examination of the conditions of rolling-mill work, showing the proportions of fly-wheel necessary to overcome the maximum resistance. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen —Sept. 23, 1905.

See also ELECTRIC DRIVING—Iron Works; ELECTRIC MOTOR—Cascade System.

Electric Transfer Table.—A Two-High Roll Train with Electrically Driven Transfer Tables (Die Neue 950er Duo Reversirstrasse mit Elektrisch Fahrbaren Rollgängen). An illustrated description of a rolling mill at Morgenroth, Silesia, in which the metal is handled between the passes by an electrically driven table which travels parallel to the rolls. 1 plate. 800 w. Stahl u Eisen—Feb. 15, 1902.

Engines.—See ROLLING-MILL ENGINE.

Friedenshütte, Germany.—The Friedenshütte Rolling Mill (Trägerwalzwerk der Friedenshütte). Fr. Frölich. Illustrated description of recent mills for rolling beams and structural shapes, at the Friedenshütte, in Upper Silesia. 2000 w. Zeitschr de Ver Deutscher Ing—Sept. 17, 1904.

Gas Power.—See Differdingen; BLAST-FURNACE GAS; GAS ENGINE.

Germany.—See ROLLING MILL ENGINE; STEEL WORKS; and under names of places and companies.

Gripping Tongs.—Rolling Mill Dogs. Ulrich Peters. Illustrates and describes types of gripping tongs, or automatic methods of gripping. 1100 w. Am Mach—Sept. 24, 1903.

Heinle-Truxall.—Improved Mill for Rolling Edges Together with Flat Shapers. Albert G. Heinle. An illustration of the Heinle-Truxall rolling mill, with description of interesting features and operation. 1300 w. Am Mfr—Jan. 31, 1901.

History.—Some Landmarks in the History of the Rolling Mill. Charles H. Morgan. Retiring presidential address before the Am. Soc. of Mech. Engs., Dec. 4, 1900. Historical review of its development, showing the important effect it has had on the material welfare of the country. Ill. 1100 w. Jour Worcester Poly Inst—March, 1901.

Landmarks in the Rolling Mill History of the United States. William Garrett. Reviews the progress, calling attention to the most striking phases in the development, and giving short sketches of men prominent in the work, with photographs. 9000 w. Ir Trd Rev—Nov. 14, 1901.

Hollow Geared.—Hollow Geared Rolls with Internal Coupling (Ueber Hohlkammwalzen mit Innerem Angriff der Spindeln für Walzwerke). R. M. Daelen. An illustrated description of coupling shafts with spherical heads gearing into the hollow ends of rolls. 800 w. Stahl u Eisen—Feb. 15, 1902.

Jessop, Washington, Pa.—See Power Chart; STEEL WORKS.

Live Rolls.—Notes on Live Conveying Rolls for Structural-Shape Rolling Mills (Einiges über Warmlager und Adjustagen Schwerer Profileisenstrassen). Bruno Quast. Discussing methods for increasing the carrying capacity of the conveying rolls for rail and similar mills. 2000 w. Stahl u Eisen—Aug. 15, 1905.

See also Electric Driving; Electric Transfer Table.

Machinery Treatment.—The Treatment of Machinery in Rolling Mills. G. E. Flanagan. Discusses the bad treatment the machinery usually receives. 1400 w. Am Mach—Nov. 20, 1902.

Merchant Steel.—Evolution of the Rolling Mill. Extracts from an article by T. J. Brown, published in "Camp and Plant." Describes the merchant steel department of the Minnequa works at Pueblo, Colo. Also sketches the evolution of the rolling of merchant steel in the United States. 5500 w. Ir Trd Rev—Aug. 27, 1903.

Middletown, O.—A Steel Rolling Mill Building. Illustrated description of a 340x133-ft. steel mill building and a 45x70 ft. boiler house of the American Rolling Mill Co. 1000 w. Eng Rec—July 20, 1901.

Modernizing.—Plans for Modernizing Antiquated Rolling Mills (Vorschläge zur Modernisierung Veralteter Walzwerksanlagen). H. Hübers. With plans of changes and estimates of cost of change compared with economy effected. 2500 w. Stahl u Eisen—Jan. 1, 1905.

Plans for Modernising Antiquated Rolling Mills (Vorschläge zur Modernisierung Veralteter Walzwerksanlagen). Adolf Röck. A review of a previous paper by Hübers, comparing the efficiency of old and new methods and appliances. 2000 w. Stahl u Eisen—March 1, 1905.

Monterey, Mexico.—A Rolling Mill at Monterey, Mexico (Walzwerksanlage in Monterey, Mexiko). Oskar Goldstein. With plan of the works and views of the various departments. Rails and structural shapes are rolled. 2000 w. 1 plate. Stahl u Eisen—June 15, 1904.

Morgan Continuous.—See Test.

Neepsend, Sheffield.—The Neepsend Rolling Mills, Sheffield. Describes the improvements made and work done in this English mill. The products are wire, block sheets, sheets for saw blades, blanks for files, tool steel bars, etc. 2300 w. Engr, Lond—Nov. 29, 1901.

See also ROLLING-MILL ENGINE.

Niederschelden, Germany.—The New Plate Rolling Mill of the Charlotten Works (Das Neue Blechwalzwerk der Charlottenhütte). A. Ruhfus. Illustrated description of the new works at Niederschelden on the Sieg. 1500 w. 1 plate. Stahl u Eisen—June 1, 1904.

Old Rails.—See RAIL—McKenna; Re-Rolling.

Pueblo, Colo.—See Merchant Steel.

Pelton Wheels.—See WATER WHEEL—Pelton.

Power.—The Determination of Power for Rolling Iron and Steel. Louis Katona. A discussion intended to give light on questions bearing upon this subject. 4000 w. Trans Am Inst of Min Engrs—Feb., 1903.

Power Chart.—Measuring the Power Required for Sheet Rolling Mills. H. G. Manning. Gives a power chart used by the writer, and explains its use. Jessop Steel Co., Washington, Pa. 700 w. Eng News—April 23, 1903.

Rail.—See also Youngstown; **RAIL—Manufacture; STEEL WORKS.**

Rail Renewal.—See **RAIL—Re-Rolling.**

Rail Temperatures.—See **RAIL—Rolling Temperatures.**

Rendsburg, Germany.—See **STEEL WORKS.**

Reverse Curves.—Reverse Curves Rolling Mill. Illustrated description of a machine designed for the rolling of reverse curves from the flat strip or hoop. 1000 w. Engr, Lond—Oct. 30, 1903.

Reversing Gear.—See **GEAR—Coil Clutch Reversing.**

Röchling, Germany.—Rolling Mill for Billets (Blockwalswerk). W. Schnell. Illustrated description of rolling mill and double reversing tandem reversing engines at the Röchling iron works at Völklingen on the Saar. 1000 w. 3 plates. Stahl u Eisen—April 15, 1902.

Rod.—Record of Rod Mills and What Has Been Accomplished. William Garrett. A review of the progress in this field. 2500 w. Am Mfr—Feb. 21, 1901.

See also **Belgian Rod; Test; Wire Rod.**

Rolls.—See **ROLL.**

Sectional Material.—The Rolling of Sections in Iron and Steel. Adolph S. White. Considers the methods used in the rolling of angles and channels and their relative merits. Ill. 1800 w. Ir Age—March 27, 1902.

The Rolling of Sections in Iron and Steel. Adolph S. White. Describes methods which have given entirely satisfactory results, giving drawings of the rolls and templates used. Serial. 1st part. 2200 w. Ir Age—Oct. 13, 1904.

See also **STEEL—Structural.**

Small vs. Large.—The Small Mill Plant vs. the Large Mill Plant. D. F. Nisbet. Examines some of the usages as to their values and efficiencies, as found in types of rolling mills taken as examples. A comparison of old and modern practice. 5500 w. Ir Trd Rev—Feb. 25, 1904.

Steam Plant.—See **BOILER—Rolling Mill; ROLLING-MILL ENGINE.**

Test.—Efficiency Test of a Continuous Rod Mill. Describes the plant and test of a Morgan continuous rod mill. Il. 2000 w. Ir Age—Sept. 12, 1901.

Efficiency Test of a Continuous Rod Mill. Describes the plant and method of testing used at a two weeks' test of the plant of the Morgan Construction Co. of Worcester, Mass. Ill. 1200 w. Ir & Coal Trds Rev—Sept. 27, 1901.

Universal.—New Universal Rolling Mills (Neuere Universalwalzwerke). Fr. Frölich. Illustrated description of rolling mills at the National Tube Co.'s Pittsburg, and at some Continental works. 1000 w. Zeitschr d Ver Deutscher Ing—Sept. 2, 1905.

See also **Burbach.**

Universal and Roughing.—The Construction and Operation of a Combined Roughing and Universal Rolling Mill (Ueber Bau und Betrieb einer Kombinierten Grob- und Universalstrasse). J. Hübers. An illustrated discussion of plans for trains of rolls for large blocks and smaller shapes, to be worked together or separately. 1500 w. Stahl u Eisen—May 1, 1903.

Universal Triple.—Universal Triple Rolling Mill (Universal Trio Walzwerk). Illustrated description of a powerful vertical triple rolling mill built at the Sack Machine Works near Düsseldorf. 1800 w. 1 plate. Stahl u Eisen—Aug. 15, 1903.

Völklingen.—See **Röchling.**

Wire Rod.—The Construction and Operation of Wire Rod Rolling Mills (Ueber Bau und Betrieb von Drahtwalzwerken). J. Hübers. Describing various arrangements of rolls for continuous mills, including one in which they are placed side by side, the rod passing around in a spiral. 2000 w. Stahl u Eisen—March 15, 1904.

Recent Progress in Wire-Rod and Bar Rolling-Mill Plants. Considers recent practice in England, Germany and America. Ills. 2800 w. Engng—June 3, 1904.

Wire-Rod and Bar Rolling-Mill Plants. Engravings and particulars of work from a German plant. 1000 w. Engng—Dec. 23, 1904.

See also **Differdingen.**

Youngstown, Ohio.—The Republic Iron and Steel Company's Rail Mill. Illustrated description of a mill at Youngstown, Ohio, where conditions compelled unusual engineering skill. 1500 w. Ir Age—Nov. 9, 1905.

See also **ROLLING-MILL ENGINE; STEEL WORKS.**

ROLLING-MILL ENGINE.

See also **ROLLING MILL; STEEL WORKS.**

Double Tandem Reversing Engine with Improved Valve Gear (Zwillings Tandem Reversiermaschine mit Neuer Steuerung). W. Schnell. A heavy rolling mill engine with piston valves and Allan straight link, the link being reversed by hydraulic power. 800 w. 1 plate. Stahl u Eisen—Aug. 1, 1905.

Balancing.—The Balancing of Rolling Mill Engines. George Service. Read before the West of Scotland Ir. & Steel Inst. Considers (1st) the work actually being performed by the engine; (2d) the actions taking place in the various parts of the engines and their effect on the engine as a whole, while performing this work. 3000 w. Ir & Coal Trds Rev—Nov. 28, 1902.

Cockerill.—The Cockerill Rolling Mill Engine at the Liége Exhibition. Two-page plate and other illustrations, with brief description of this 10,000 H. P. reversing compound three-crank tandem steam engine. 500 w. Engng—Sept. 22, 1905.

Six-Cylinder Compound Engine (Machine à Vapeur Compound à Six Cylindres). An illustrated description of a rolling-mill reversing engine of 10,000 H. P. at the Cockerill works at Seraing, Belgium. 1500 w. 1 plate. Génie Civil—Nov. 25, 1905.

Gas Engine.—See **GAS ENGINE—Rolling Mill; ROLLING MILL—Differdingen.**

German.—German Rolling Mill Engines and Their Design. An illustrated article discussing single cylinder engines, compound engines, and triple expansion engines. Serial. 1st part. 1800 w. Ir & Coal Trds Rev—Nov. 3, 1905.

Hungary.—A Large Rolling Mill Engine. Illustrated description of an engine in use at the great Hungarian State Steel Works of Diósgyör, near Miskolc. 500 w. Engr, Lond—Feb. 3, 1905.

Lubrication Test.—See **LUBRICATION—Engineering Value.**

Murray.—The Murray Rolling Mill Engine. Illustrated detailed description of an exhibit at the St. Louis World's Fair. 1700 w. Ir Age—Aug. 11, 1904.

Neepsend Triple.—Triple Rolling Engine. Gives drawings and comparison with the Neepsend rolling mill engine. 1200 w. Engr, Lond—Jan. 17, 1902.

Rottmann Valve Gear.—The Reconstruction of a Twin Reversing Rolling Mill Engine, with Rottmann Valve Gear (Umbau einer Zwillings-Reversiermaschine mit Rottmann Steuerung). An account of the conversion of a twin reversing engine into a tandem compound, with a consequent saving in steam. Indicator diagrams. 1 plate. 600 w. Stahl u Eisen—July 1, 1903.

Investigations of a Tandem Double Reversing Engine (Versuchsergebnisse an einer Tandem Zwillingsreversiermaschine). Data and results of tests of a double cylinder rolling-mill engine with the Rottmann valve gear. 1000 w. Stahl u Eisen—Dec. 1, 1903.

Tod.—Tod Rolling Mill Engines. Illustrates and describes modern engines built at Youngstown, Ohio. 3400 w. Ir Age—July 28, 1904.

Vertical.—16,000-Horse-Power Vertical Rolling-Mill Engines. Fully illustrated description of quite a departure in rolling-mill engines, believed to be the most powerful engine yet built for this purpose. 1600 w. Engng—June 23, 1905.

18,000 Horse Power Rolling Mill Engines. Two-page plate, illustrations and description of a vertical rolling-mill engine recently constructed, intended to drive the heaviest class of rolls, and to be very economical in steam. 900 w. Engng—Aug. 18, 1905.

Wardsend, Sheffield.—Rolling Mill Engine. Illustrates and describes the compound engines at the Wardsend Steel Works, Sheffield, Eng. Ropes are used for driving, one of the drives having extraordinary length, but giving satisfactory results. 600 w. Engr, Lond—May 2, 1902.

Youngstown, O.—A Rolling Mill Engine of 6000 H. P. Illustrated detailed description of a very large and powerful steam engine for a rolling mill in Youngstown, O. 2000 w. Eng News—Aug. 28, 1902.

See also Tod; **ROLLING MILL; STEEL WORKS.**

ROLLING ROADWAY.

Cleveland, O.—See **MOVING ROADWAY.**

ROLLING STOCK.

See also **CAR; CAR, MOTOR-DRIVEN; ELECTRIC CAR; ELECTRIC LOCOMOTIVE; LOCOMOTIVE; LOCOMOTIVE TENDER; RAILWAY MOTIVE POWER; STREET CAR; TRAIN.**

Düsseldorf Exposition.—See **CAR.**

London & North-Western.—See **CAR—Private, Royal British.**

ROOF.

See also **BUILDING CONSTRUCTION; DOME; FIREPROOF CONSTRUCTION; FRAMEWORK; ROOF TRUSS; TRUSS;** and under specific buildings and structures.

Armory.—Steel Armory Roofs. H. G. Tyrrell. Facts relating to steel roofs that will be of assistance in securing an approximate estimate of the amount of steel in a proposed roof. 900 w. Archts and Builds Mag—Oct., 1901.

Armory, Baltimore.—See **ARMORY—Baltimore.**

Armory, N. Y.—A Novel Method of Erecting the Roof Trusses of the 71st Regiment Armory, New York City. W. T. McCarthy. Illustrates and describes an economical and novel method of erecting a riveted truss of long span. 1500 w. Eng News—June 16, 1904.

Three-Hinged Arch Roof of the New 69th Regiment Armory, New York City. Gives drawings of the framing, with description. 2000 w. Eng News—June 1, 1905.

See also **ARMORY.**

Church.—Reinforcing and Replacing Church Roof Trusses. Illustrated description of the method of taking down 60-ft. timber trusses destroyed by dry rot, and replacing them with steel work without injuring a plaster ceiling suspended from the old trusses. 1000 w. Eng Rec—April 20, 1901.

Church, N. Y.—The Tremont Church Roof, New York: Illustrated description of unusual pointed hingeless arch trusses for a 73x95 ft. auditorium. 1100 w. Eng Rec—Oct. 19, 1901.

Collapse.—See **ROOF COLLAPSE.**

Concert Hall, Zürich.—Notes on the Concert Hall at Zurich (A Propos de la Halle des Concerts de Zurich). Prof. B. Recordon. Discussing especially the design of framed timber roofs of large span; the Zurich concert hall is covered by a braced arch of 50 metres clear span. 3500 w. 1 plate. 1 plate. Bull Tech de la Suisse Rom—Nov. 10, 1905.

Concrete Reinforced.—A Steel-Concrete Stable Roof. Illustrated description of a 200x89 ft. roof having steel trusses and a covering of concrete slabs, stiffened by steel framing and wire netting. 1100 w. Eng Rec—Dec. 22, 1900.

A Roof on the Melan System (Eine Ueberdachung nach Bauweise Melan). Illustrating and describing a flat arched roof of 18 metres span over a hall in Vienna. Beton u Eisen—4 Heft, 1903.

Reinforced Concrete Roof for a Locomotive Roundhouse, Long Island R. R. Illustrates and describes the material and methods of construction. 1200 w. Eng News—April 14, 1904.

Design.—Progress in the Design of Roof Structures Since 1850. Ewing Matheson. A short history of the improvements during the last fifty years. Ill. 3000 w. Engr, Lond—Jan. 9, 1903.

Economy in Roofs. A reply in part to a paper by Mr. Ewing Matheson, published on Jan. 9th, and especially discussing recent examples and their cost. 3000 w. Engr, Lond—March 13, 1903.

Ferroinclave.—See **FIREPROOF CONSTRUCTION.**

Formulae, Hips and Valleys.—Formulas for Hips and Valleys. O. E. Emrich. Formulas and diagrams, with brief explanation. 600 w. Eng Rec—Jan. 7, 1905.

Gas Works.—Iron Roofs for Gas Works. Norton H. Humphrys. An illustrated article describing the treatment given to iron roofing, and the advantages of this form of structure. 2000 w. Jour Gas Lgt—Dec. 8, 1903.

See also **GAS WORKS.**

Hippodrome, N. Y.—See **STEEL CONSTRUCTION.**

Hotel Astor, N. Y.—Some Roof Trusses in the Hotel Astor. Description, diagrams and details of mansard roof framing. 1500 w. Eng Rec—Dec. 5, 1903.

Machine Shop.—Machine Shop Roofs. John E. Sweet. A short article, with sketches, giving suggestions for the design of roofs. 600 w. Cassier's Mag—Aug., 1905.

Machine Shop, Working.—Roofing Existing Shops While Work is Proceeding. R. H. Fowler. An illustrated description of a method of re-roofing shops without interfering with work. 1400 w. Inst of Mech Engrs—July, 1903.

Roofing Existing Shops While Work is Proceeding. R. H. Fowler. An illustrated description of methods used in reroofing the shops of the steam plough works at Leeds, Eng. 1600 w. Inst of Mech Engrs—Nov. 20, 1903.

New Appliances for Re-roofing Shops Without Stopping Work. Describes the work as carried out at Leeds by specially designed machinery. Ills. 1000 w. Sci Am Sup—April 2, 1904.

Melan.—See **Concrete Reinforced.**

Metallurgical Works.—Notes on Roofs and Roof Coverings. Especially considers suitable material for the roofs of mining and metallurgical works. 2000 w. Eng & Min Jour—Sept. 5, 1903.

Railway Station.—Railway Station Roofs. Discusses and criticizes the roofs used on stations of British railways. 2700 w. Engr, Lond—Aug. 2, 1901.

See also **RAILWAY STATION—Platform Sheds.**

Railway Station, Washington.—Steel Roof Trusses in the New Union Railroad Station at Washington. Describes details of an elaborate roof, giving diagrams. 1800 w. Eng Rec—Feb. 6, 1904.

See also **RAILWAY STATION.**

Spherical.—See **DOME.**

Terne Plates.—See **Tin.**

Timber, Long Span.—Temporary Structures in Wood (Halles Provisoires en Bois). A description of recent buildings in Switzerland, covered by timber roofs of large span. 1000 w. Génie Civil—Dec. 16, 1905.

Tin.—Terne Plates for Tin Roofing. William Martin. Read before the Nat. Assn. of Master Steel Metal Workers. Discusses the causes of the decadence of terne plates as a roof covering. Also discussion. 3500 w. Am Arch—Sept. 2, 1905.

Town Hall, East Orange, N. J.—The East Orange Town Hall Roof. Illustrated description of an unusual type of wooden roof truss. 500 w. Eng Rec—Oct. 26, 1901.

Van Cortland Park, N. Y.—Details of the Large Timber Roof of a Public Shelter in Van Cortlandt Park, New York. Illustrates the timber roof framing and main truss of a roof covering an area of about 85 by 162 feet. 900 w. Eng Rec—Feb. 27, 1904.

Wind Pressure.—See **WIND PRESSURE—Roof.**

ROOF COLLAPSE.

Charing Cross, London.—The Catastrophe at Charing Cross. Editorial on the accident at Charing Cross Station, when two bays of the large roof collapsed without any apparent reason. 1200 w. Engng—Dec. 8, 1905.

The Lesson of the Charing Cross Accident. Editorial discussing whether iron and steel ought to be regarded as permanently trustworthy materials of construction. Gives drawings and a brief description of the main constructional features of the Charing Cross Station, with added information. 4800 w. Builder—Dec. 23, 1905.

The Timbering of the Charing Cross Station Roof. Illustrations showing the work in progress at the station, with brief description. 600 w. Engng—Dec. 29, 1905.

ROOF TRUSS.

See also **BUILDING CONSTRUCTION; FRAMEWORK; GIRDER; ROOF; STEEL CONSTRUCTION; TRUSS.**

Armory.—See **ARMORY; ROOF.**

Church.—See **ROOF.**

Hippodrome, N. Y.—See **STEEL CONSTRUCTION.**

ROPE.

See also **HOISTING; HOISTING TACKLE; MINE HAULAGE; ROPE TRANSMISSION; WIRE ROPE.**

Rope. J. W. Walton. From a book issued by a Cleveland firm, giving interesting information concerning the processes of manufacturing, and the origin of wire rope. 4500 w. Marine Rev—March 13, 1902.

Aloe Fibre.—Flat Hoisting Cables of Aloe Fibre (L'Emploi des Cables Plats en Aloes). C. Vertongen. Giving a very elaborate study of the stresses for deep hoists and computations for cables of uniform strength. Serial. Part I. 12,000 w. 3 plates, Rev Univ des Mines—April, 1901.

See also **Vegetable Fibre.**

Belgium Coal Mines.—Winding Ropes in Belgium. Abstract of the results of an inquiry into the conditions of service of winding ropes in Belgian Collieries, both in regard to Manila hemp and steel ropes. 2500 w. Col Guard—Jan. 16, 1903.

Hoisting.—Hoisting Ropes. George S. Whyte. Considers quality of materials, methods of manufacture, style of lay, and their influence on wearing qualities. 2400 w. Mines & Min—April, 1904.

The Commercial Selection of Hoisting Ropes (Beitrag zur Wirtschaftlichen Wahl von Förderseilen). Ernst Schmid. An examination of winding ropes for mines, with diagrams, enabling a selection to be made according to the depth, load and quality. Two articles. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 27, June 3, 1905.

See also **Aloe Fibre; Belgian Coal Mines; Mine; HOISTING.**

Hoisting, Breakage.—Accidental Breakage of Winding Ropes in Mines. Prof. John Perry. Read before the British Assn. at Johannesburg. Gives several problems and the writer's method of solving them. Mathematical. 3000 w. Engr, Lond—Sept. 1, 1905.

Hoisting, Cap.—Caps or Attachments for Winding Ropes. W. H. Becker. Read before S. Wales Inst. of Engrs. Gives a report of tests of rope caps showing that they do not equal 50 per cent. of the breaking strain of the ropes, and gives an illustrated description of a new cap that has held a rope to its full breaking strain. 2000 w. Col Guard—May 5, 1905.

Hoisting, Connections.—Hoisting Rope Connections (Förderkorb-Zwischengeschirre). H. Eigen. An illustrated discussion of the best methods of attaching wire hoisting ropes to cages and buckets. 1500 w. Glückauf—May 27, 1905.

Hoisting, Deterioration.—Deterioration of Winding Ropes. Extracts from a paper by J. A. Vaughan and W. M. Epton, read before the Transvaal Inst. of Mech. Engrs. Discusses the causes and gives recommendations to ensure safety. 2400 w. Col Guard (Sup.)—April 21, 1905.

Hoisting, Inspection.—See **HOISTING—Rope Inspection.**

Manila.—Working Loads for Manila Rope. C. W. Hunt. Gives and discusses three tables showing the results of tests on manila ropes. 1800 w. Trans Am Soc of Mech Engrs, No. 917—Dec., 1901.

Mine.—Notes on Mine Ropes. Charles W. Comstock. Considers the various materials of which ropes are made, their endurance under tests and use, forms of strand and methods of construction. 8000 w. Mines & Min—April, 1904.

See also **Hoisting; HOISTING; MINE HAULAGE.**

Nickel Steel.—See **WIRE ROPE.**

Power Transmission.—See **ROPE TRANSMISSION.**

Splicing.—Transmission Rope Splicing. Frederick S. Greene. An illustrated description of the English transmission splice. 1000 w. Power—March, 1903.

See also **WIRE ROPE.**

Terminology.—See **WIRE ROPE.**

Tests.—See **HOISTING—Rope Testing; HOISTING TACKLE.**

Vegetable Fiber.—Ropes of Vegetable Fiber. Charles W. Comstock. Considers the various materials used, methods of manufacture and treatment, strength and durability under different conditions, &c. 3300 w. Mines & Min—June, 1904.
See also **Aloe Fibre.**

Wire.—See **ROPE TRANSMISSION; WIRE ROPE.**

ROPE DRIVING.

See **BELTING; POWER TRANSMISSION; ROPE TRANSMISSION.**

ROPE TRANSMISSION.

See also **BELTING; POWER TRANSMISSION; ROPE; WIRE ROPE.**

Rope Driving. H. J. Nichols. Read before the British Inst. of Draughtsmen. Brief discussion of the advantages and systems used. 1500 w. Prac Engr—Nov. 16, 1900.

Rope Transmission of Power. E. C. De Wolfe. Extract from a paper before the Indiana Engng. Soc. Explains the important features to be considered in designing a system of rope drives for power transmission. 2500 w. Eng Rec—Feb. 8, 1902.

Some Notes on Rope Driving. States the leading features of a rope drive and gives the most modern practice bearing upon these chief points. 1200 w. Prac Engr—July 31, 1903.

Some Difficulties of Rope Transmission. Arthur Holmes Morse. Considers difficulties in designing rope drives, discussing the defects. 5000 w. Harvard Engng Jour—Nov., 1903.

The Transmission of Power by Ropes. Edwin Kenyon. Abstract of a paper read before the Staffordshire Iron and Steel Inst. Discusses cost and the applications to practice, systems, &c. 4000 w. Ir & Coal Trds Rev—Nov. 27, 1903.

The Transmission of Power by Ropes. Edwin Kenyon. Abstract of a lecture delivered at the Blackburn Technical School. Considers cost, applications, the various systems, the construction of ropes, splicing, etc. Ills. 5300 w. Mech Engr—March 26, 1904.

The Transmission of Power by Ropes. Edwin Kenyon. A discussion of conditions where the transmission of power by ropes is more economical, and the applications that may be made of this method of driving, the different systems, and all details connected with them. Ills. 11,700 w. Trans Inst of Engrs & Shipbuilders—Nov. 22, 1904.

Transmission of Power by Ropes. Explains the English and American systems, discussing factors that favor this method, and points in designing of drives. 1400 w. Min & Sci Pr—Dec. 12, 1903.

Some Notes on Rope Driving. John Joseph Flather. Notes on the systems used, the materials, care, strains, speed, &c. Ills. 6000 w. Engrs' Soc. Univ of Minn—Year Book, 1904.

Rope Transmission of Power. Frederick S. Greene. States briefly the most important advantages of rope transmission, and notes the growing use. Ills. Serial. 1st part. 1500 w. Min Rept—Oct. 27, 1904.

Rope Driving. A consideration of points conducive to successful rope-driving. 1500 w. Col Guard—Dec. 9, 1904.

Rope Driving. C. Boysen. Discusses the application of hemp ropes for the transmission of power, its advantages, the two systems in use, &c., giving formulas and equations for solving problems of rope drives. 1500 w. Power—March, 1905.

American System.—Transmission with Endless Cables (Transmissions par Cables sans Fin). G. Mohr. A description of the American system of rope transmission, using an endless rope with several turns about the pulleys, and with a weighted tension idler. 1000 w. Génie Civil—Jan. 31, 1903.

Notes on Rope Transmission. E. A. Reuleaux. Notes and tables on the American system of rope transmission only. 1600 w. Am Mach—June 9, 1904.

Buffalo, N. Y.—A Rope Transmission Plant at Buffalo, N. Y. Illustrated description of the plant at the Spencer Kellogg Linseed Oil Works. 2500 w. Power—May, 1901.

Mines.—See **HOISTING; MINE HAULAGE; ROPE.**

Multiple System.—A New Scheme in Rope Transmission. George F. Willis. Illustrated description of a new system which can be applied to a driver using any number of ropes. 900 w. Power—March, 1905.

See also **WIRE ROPE.**

Textile Plants.—Advantages of Rope Transmission in Textile Plants. Frederick S. Greene. Abstract of a paper read before the N. England Cotton Mfrs. Assn. Sums up the advantages as far as they apply to textile plants, giving a comparison of cost. 1500 w. Ir Age—May 5, 1904.

Wire Rope.—The Transmission of Power by Wire Rope. W. H. Graves. Illustrated description of a system known as the single loop, a modification of belt driving, grooved wheels being used in place of pulleys, and an endless wire rope in place of a belt. 8800 w. Mines & Min—April, 1904.

Wire Rope Transmission. C. Boysen. States their advantages over hemp rope, and gives information of value relating to their use. Ills. 900 w. Power—June, 1905.

See also **WIRE ROPE.**

ROPEWAY.

See **CABLEWAY.**

ROTARY CONVERTER.

See also **ELECTRIC CURRENT CONVERTER; ELECTRIC DISTRIBUTION; ELECTRIC GENERATOR—Double Current; ELECTRIC MACHINERY; ELECTRIC MOTOR—Induction; ELECTRIC STATION; ELECTRIC SUB-STATION; MOTOR GENERATOR; TRANSFORMER.**

Sychronous Converters. W. E. Goldsborongh. Read before the Northwestern Elec. Assn. Considers this useful electrical machine, explaining the theory of its working, and its management. 4500 w. Elec Rev, N Y—Feb. 2, 1901.

Rotary Transformers: Their History, Theory and Characteristics. George W. Colles. A thesis presented in candidature for the degree of Master of Science in the Columbian University. A review of electric current transforming devices, tracing their evolution from early beginnings to the present. Ill. Serial. 1st part. Jour Fr Inst—March, 1901.

The Design and Action of the Rotary Converter. D. B. Rushmore. A discussion of the principles and construction of this important apparatus in the transmission and utilization of electric power. Serial. 1st part. 3500 w. Engineering Magazine—Dec., 1901.

The Operation of the Rotary Converter. D. B. Rushmore. Mr. Rushmore's second paper treats of the practical experience met in the operation of the rotary converter, including starting, hunting, inversion, compounding, and speed control. 3500 w. Engineering Magazine—Jan., 1902.

Rotary Converters. A. S. M'Allister. Concerning the satisfactory and economical operation. 2500 w. Am Elect'n—Dec., 1901.

Notes on the Practical Working of Rotary Converters. J. B. Salter. An illustrated article aiming to demonstrate the flexibility of the rotary converter when employed in a combined alternating and continuous current station. 1900 w. Elec Rev, Lond—Oct. 17, 1902.

The Rotary Converter. George T. Hanchett. A simple description, with diagrams, of the theory of the rotary converter for changing alternating into direct current. 2000 w. Cent Station—June, 1903.

Operation of Rotary Converters. W. T. Fernandes. Considers their operation and control. Ill. 2200 w. Am Elect'n—Sept., 1903.

Notes on the Theory and Working of Rotary Converters. W. Rogers explains the characteristics, the methods of working, etc., and considers the advantages and disadvantages of the rotary converter as a transformer for alternating and continuous currents. Diagrams. 3500 w. Elec Engr, Lond—Sept. 11, 1903.

Rotary Converters and Motor Generator Sets. William C. L. Eglin. A description and comparison. 2400 w. Int Elec Cong of St Louis—Sept., 1904.

A. I. E. E. Discussion.—Synchronous Converters and Motor-Generators. W. L. Waters. A discussion of synchronous motor generator sets and synchronous converters. Ills. 5000 w. Am Inst of Elec Engrs—June 22, 1905.

Discussion on "Synchronous Converters and Motor-Generators," at Asheville, N. C. 4500 w. Am Inst of Elec Engrs—Sept., 1905.

Cascade.—The Cascade Converter. A description of a combination of an induction motor and a synchronous converter. The machine is designed for the transformation of alternating into direct current. Also editorial. 1700 w. Elec Wld & Engr—Oct. 21, 1905.

Compound vs. Shunt.—Compound Wound vs. Shunt Converters. P. M. Lincoln. Discusses the advantages and disadvantages of the compound wound as compared with the shunt rotary. 2500 w. St Ry Jour—Aug. 29, 1903.

Synchronous Converters. F. G. Baum. An explanation of the theory of operation of converters. Gives the characteristic regulation curves of a small polyphase converter when employed as a shunt machine, and when compounded. 3000 w. Elec Wld & Engr—April 9, 1904.

Design.—The Design of Rotary Converters (Ueber die Berechnung Rotierender Umformer). Hans S. Meyer. A general account, theoretical and practical, of the design of these machines, taking up each point in order, with illustrations and diagrams. 4000 w. Elektrotech Zeitschr—April 4, 1901.

See also **ELECTRIC GENERATOR DESIGN.**

Efficiency.—Experiments on Synchronous Converters. W. M. Thorton. Read before the Newcastle Local Section of the Inst. of Elec. Engrs. The object of the experiments was to find how the efficiency varied with load for all conditions of excitation; to find any discrepancies between the theoretical and observed losses; and to locate the causes which would give rise to them. 4200 w. Elect Engr, Lond—Dec. 5, 1902.

Efficiency Curves of Rotary Converters. A. S. McAllister. Some facts concerning the curves of rotary converters. 700 w. Elec Wld & Engr—June 4, 1904.

Electric Railways.—See **ELECTRIC SUB-STATION—Railway; STORAGE BATTERY—Electric Power Station.**

Electric Sub-Station.—See **ELECTRIC SUB-STATION—Manhattan Ry., N. Y.**

Energy Transformations.—Energy Transformations in the Synchronous Converter. William S. Franklin. The object of the paper is to determine the fractional part of the total energy which is conductively transferred from supply mains to service mains and the part which is inductively transferred. 3500 w. Trans Am Inst Elec Engrs—July, 1903.

External Reactance.—External Reactance for Synchronous Converters. Clarence P. Fowler. An explanation of the effect of external reactance on the regulation of rotary converter. 1100 w. Elec Wld & Engr—June 17, 1905.

General Electric Co.—The Construction and Use of Rotary Converters in America (Bau und Betrieb von Drehumformern in Amerika). E. Alexanderson. With diagrams showing the practice of the General Electric Company. 2500 w. Elektrotech Zeitschr—Sept. 10, 1903.

Germany.—Recent Converter Installations (Neuere Umformungsanlagen). F. Collischonn. Illustrating and describing several large motor-generators and rotary converters recently erected in Germany. 4000 w. Elektrotech Zeitschr—Sept. 21, 1905.

Graphical Computation. — See **ELECTRIC TRANSMISSION.**

Hunting.—Some Notes on the Hunting of Rotary Converters. Clarence P. Fowler. Notes some of the most important causes, and means of preventing. 800 w. Am Elect'n—Nov., 1903.

Management.—Practical Management of Rotary Converters. F. P. de Wilde. An explanation of two general methods of operating rotaries. Diagrams. 2200 w. Am Elect'n—Oct., 1904.

Motor Generators Compared.—Rotary Converters and Motor-Generators. Frank C. Perkins. An illustrated review of the various uses to which this transforming apparatus is applied. Serial. 1st part. 2200 w. W Elect'n—Dec. 8, 1900.

Motor Generators vs. Rotary Converters. An account of an exhaustive test of two different types of motor-generators of considerable capacity, as to their efficiency, power-factor, rise of temperature, regulation and individual losses. Also editorial. 2800 w. Elec Wld & Engr—Sept. 21, 1901.

Parallel.—See Hunting; **ELECTRIC GENERATOR, ALTERNATING.**

Permutator.—"Permutators." Charles V. Drysdale. Describing a special form of rotary converter, in which the exciting field is produced by the primary current in a short-circuited magnetic ore, instead of using an external magnet. 2300 w. Elect'n, Lond—Dec. 8, 1905.

Phase-Swinging.—Notes on Rotary Converters and Phase-Swinging. W. M. Thornton. On the use of damping coils, explaining their action. Serial. 1st part. 2400 w. Elect'n, Lond—Sept. 27, 1901.

Power Supply.—See **MOTOR-GENERATOR.**

Pulsations.—Investigations of the Pulsation of the Continuous Current in a Rotary Converter (Untersuchungen über die Pulsation des Gleichstromes bei dem Rotierenden Umformer). E. Cramer. A repetition of the investigations of Banti, showing the influence of the pulsations upon the determination of efficiency. 7000 w. Elektrotech Zeitschr—Nov. 19, 1903.

The Pulsation of the Continuous Current of Rotary Converters (Die Pulsation des Gleichstromes Rotierender Umformer). R. Elsässer. A graphical analysis of the relations of the continuous and alternating currents in a rotary converter showing the causes of pulsation. Single-phase and polyphase currents are discussed. 6000 w. Elektrotech Zeitschr—March 3, 1904.

The Pulsation of the Direct-Current Output of Rotary Converters. Translation in abstract of an article by R. Elsässer in "Elektrotechnische Zeitschrift." An attempt to show that the chief cause of the pulsations is the superposition of the ohmic voltage drops due to the direct current and the alternating current within the armature conductors. 2000 w. Elec Engr, Lond—April 29, 1904.

Seattle, Wash.—Operation of Synchronous Converters. S. C. Lindsay. History of the experience with 60-cycle synchronous converters in Seattle during the last three years and a half. 2500 w. Trans Am Inst of Elec Engrs—June, 1904.

Six-Phase.—Six-Phase Transformation. A. S. McAllister. Explains the transformation from two or three phases to six phases by means of rotary converters. Diagrams. 900 w. Am Elect'n—Dec., 1902.

Starting.—Starting Rotary Converters. Arthur B. Weeks. Gives directions for starting, and notes on other points relating to rotaries. Ill. 2400 w. Am Elect'n—July, 1901.

The Starting of Rotary Converters. Sydney Woodfield. Considers briefly all the methods one is likely to meet with. 2500 w. Elec Rev, Lond—April 21, 1905.

How to Start Rotary Converters. Arthur Wagner. Gives diagrams showing the connections for different methods employed, together with the various conditions under which they operate. Serial. 1st part. 1000 w. Elec Jour—July, 1905.

Storage Battery.—Behavior of Rotary Converters in Traction Installations with Stationary Accumulators. Dr. Angelo Banti. An account of the singular behavior which the converter displayed according to the kind of service to which it was devoted, and the conclusions. 2800 w. Elect'n, Lond—Jan. 16, 1903.

Rotary Converters in Parallel with Storage Batteries (Umlaufende Einanker-Umformer in Parallelschaltung mit Pufferbatterien). B. Jacobi. Discussion of the use of rotary converters in connection with "floating" storage batteries on an electric distribution system, and particularly the arrangement on the electric railway at Remscheid, Germany. Diagrams. 1000 w. Elektrotech Zeitschr—Aug. 24, 1905.

See also **ELECTRIC SUB-STATION; STORAGE BATTERY.**

Sub-Station.—See also **ELECTRIC MACHINERY—Polyphase; ELECTRIC SUB-STATION.**

Testing.—See **ELECTRIC GENERATOR—Testing.**

Voltage Controller.—The Synchronous Converter as Voltage Controller. M. Seidner. Shows by graphical treatment how these machines may be employed for indirectly regulating the voltage by changing the field of the converter. 2200 w. Elec Wld & Engr—May 3, 1902.

ROTARY CURRENT.

See **ELECTRIC CURRENT, ALTERNATING; ELECTRIC DISTRIBUTION—Polyphase; ELECTRIC GENERATOR, ALTERNATING—Polyphase; ELECTRIC MOTOR—Polyphase; ELECTRIC TRANSMISSION.**

ROTARY ENGINE.

See also **MOTOR; STEAM TURBINE.**

Rotary Engine. A brief review. 400 w. Engr, U S A—Jan. 15, 1901.

A Curious Rotary Engine. Joseph Riley. Photograph and sectional model with brief description. 1200 w. Engr, U S A—May 1, 1903.

Alternating.—See **Primat.**

Antiquity.—Antiquity of the Rotary Engine. E. P. Buffet. Illustrates two models of early dates, embodying this principle. One about 1796, the other much earlier. 1500 w. Power—April, 1904.

Colwell.—The Colwell Rotary Engine, Reciprocating Engine and Condenser. Illustrates and describes recent inventions of W. S. Colwell, which possess features of interest. 2000 w. Sci Am Sup—Feb. 2, 1901.

Cooley.—See **Epicycloidal.**

Epicycloidal.—The Cooley Epicycloidal Steam Engine. Illustrates and describes a new type of rotary engine and the principle of its construction. 1400 w. Mach, N Y—May, 1903.

Hoffman.—The Hoffman Rotary Engine. An illustrated description of what is said to be the first rotary engine which has reached the stage of commercial manufacture. 2000 w. Ir Age—Dec. 29, 1904.

Hult.—The Hult Rotary Engine (Le Moteur Rotatif Hult). E. Dieudonné. An illustrated description of this Swedish rotary engine, exhibited at Paris. 1800 w. Revue Technique—Jan. 25, 1901.

The Hult Rotary Steam Engine. An illustrated description of the construction and method of working. 2000 w. Engng—Oct. 17, 1902.

The Hult Rotary Steam Engine. Illustrated description of an engine in which the cylinder participates in the rotary motion of the piston, and which is now being made in sizes up to 250 horse power. 1800 w. Feilden's Mag—Jan., 1903.

The Hult Rotary Steam Engine. An illustrated description of the construction and working of a novel engine. 2000 w. Elec Rev, Lond—May 1, 1903.

Steam Turbines and Rotary Engines. Principally a description of the Hult rotary engine and its working. 2000 w. Am Mach—May 21, 1903.

Indicator.—See **INDICATOR—Rotary Engine.**

Jones.—A Novel Rotary Engine. Illustrates and describes a rotary steam engine patented by Oliver C. Jones. 900 w. Sci Am—Oct. 25, 1902.

Patschke.—The Patschke Rotary Steam Engine (Die Rotations-Dampfmaschine System Patschke. With numerous illustrations of details for a rotary engine of the radial eccentric-arm type. 1500 w. 1 plate. Glückauf—Dec. 6, 1902.

Primat.—The Primat Alternating Rotary Engine (Le Moteur Alterno-Rotatif Primat). An illustrated description of a rotary engine with four cylinders, which can be used as an internal-combustion engine, a steam or vapor engine, or a compressed-fluid engine. 1200 w. Rev Technique—May 10, 1903.

Warren.—The Warren Rotary Engine. An illustrated detailed description of the engine and its operation. 2200 w. Ir Age—July 9, 1903.

See also **MOTOR—Combustion.**

ROTARY KILN.

See **CEMENT KILN; CEMENT WORKS; IRON METALLURGY—Nodulating.**

ROTHWELL.

Biographical Notice of Richard P. Rothwell, C. E., M. E. R. W. Raymond. 5500 w. Trans Am Inst of Min Engrs—Nov., 1901.

ROUNDHOUSE.

See also **LOCOMOTIVE SHOP; RAILWAY SHOP; RAILWAY TERMINAL; RAILWAY YARD.**

Roundhouse Construction and Equipment. Editorial discussion of needed improvements and best construction. 3900 w. Eng News—Aug. 22, 1901.

American.—American Roundhouses and Their Operation. W. E. Dunham. Discusses the general principles observed in laying out plans for roundhouses, some of the interesting features of certain plans, the requirements etc. 4000 w. R R Gaz—Vol. XXXVIII., No. 20.

Austrian State Railway.—The Locomotive House of the Austrian State Railways at Knittelfeld (Heizhaus Knittelfeld der K. K. Oesterreischen Staatsbahnen). Oskar Rother. With description of roundhouse, coaling plant, and general mechanical installation. 3500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Aug. 30, 1902.

Baltimore & Ohio.—See **Fairmont, W. Va.**

Blair Furnace, Pa.—See **RAILWAY TERMINAL.**

Clinton, Iowa.—A Modern Roundhouse. Illustrated detailed description of a thoroughly equipped roundhouse plant for the Chicago & Northwestern Ry., at Clinton, Ia. 1000 w. Am Engr & R R Jour—Jan., 1900.

Heating System of the Clinton, Ia., Roundhouse. Illustrated description of an admirable arrangement and a statement of its advantages. 700 w. R R Gaz—Dec. 28, 1900.

Collinwood, O.—An Up-to-Date Roundhouse. Illustrated description of a new plant at Collinwood, on the Lake Shore & Mich. So. Ry. 700 w. Am Engr & R R Jour—Oct., 1901.

Collinwood Roundhouse. Illustrates and describes details and appliances of this interesting terminal on the L. S. & M. S. Ry. 900 w. Am Engr & R R Jour—Jan., 1902.

See also **RAILWAY SHOP.**

Comparison.—See **Square vs. Round.**

Construction.—Roundhouse Framing. R. D. Coombs. Gives the writer's ideas of desirable construction. Ills. 2500 w. Pro Am Soc of Civ Engrs—April, 1905.

Denver, Colo.—See **RAILWAY SHOP.**

East Cambridge, Mass.—New Engine House on the Boston & Maine at East Cambridge. Illustrated description. 900 w. R R Gaz—June 13, 1902.

Elkhart, Ind.—New Engine Houses at Elkhart, L. S. & M. S. Ry. Illustrates and describes this example of the latest phase of development of engine houses, which makes running repairs possible, and furnishes a system of piping for blowing off, washing out and filling boilers. 4500 w. Ry & Engng Rev—April 1, 1905.

New Roundhouses at Elkhart. Illustrated description of the arrangement of shops, power house and other buildings, and an account of the rapid inspection and repairs accomplished with the facilities at this Indiana plant of the Lake Shore & Michigan Southern Railway. 1600 w. Am Engr & R R Jour—Feb., 1905.

Facilities.—Roundhouse Facilities. General discussion by members. 7300 w. Cent Ry Club—April, 1901.

Fairmont, West Va.—B. & O. Standard Engine House and Machine Shop, at Fairmont, W. Va. Illustrated detailed description. 600 w. R R Gaz—Aug. 1, 1902.

Galewood, Ill.—New Roundhouse, C. M. & St. P. Ry. at Galewood, Ill. Plan and description. 1600 w. Ry & Engng Rev—June 25, 1904.

Holloway, Ohio.—New Roundhouse of the Baltimore & Ohio Railway. Illustrated detailed description of a building to be erected at Holloway, Ohio. 1200 w. Ry Mas Mech—June, 1903.

Intercolonial, Canada.—New Engine House Construction on the Intercolonial Ry. Illustrates and describes the engine house at St. John, N. B., giving information of a number of others. 1300 w. Ry & Engng Rev—March 12, 1904.

Knittelfeld.—See **Austrian State Railway.**

Light.—Increased Light for Roundhouses. T. A. Lawes. Brief illustrated description of a method of wall construction permiting large window area. 500 w. Am Engr & R R Jour—Oct., 1902.

McKee's Rocks, Pa.—See **Pittsburg & Lake Erie Ry.**

Master Mechanics' Report.—An Up-to-Date Roundhouse. Report of the Committee of the American Railway Master Mechanics' Association. Ill. 3000 w. Am Mas Mech Assn—Saratoga meeting, 1901.

Up-to-Date Roundhouses. A committee report of the Master Mechanics' Assn. in which Mr. Robert Quayle describes and discusses plans of terminals recently constructed; Mr. D. Van Alstyne presents his ideas of an ideal plan; Mr. G. M. Basford considers the details of terminals, and Mr. V. B. Lang discusses the operation of locomotive terminals. Ill. 6000 w. R R Gaz—June 27, 1902.

Noisy-le-Sec, Paris.—Locomotive Terminal of the French Eastern Railway at Noisy-le-Sec. Brief illustrated account of these buildings in the suburbs of Paris and their appointments. 1200 w. Ry & Engng Rev—Nov. 3, 1900.

Locomotive Running Sheds; Eastern Railway of France. An illustrated description of these engine houses at Noisy-le-Sec, near Paris, and their equipment. 900 w. Engng—Sept. 13, 1901.

Oelwein, Iowa.—New Roundhouse and Coal Chutes for the Chicago Great Western Ry. at Oelwein, Iowa. Illustrated description. 1200 w. Ry & Engng Rev—Aug. 20, 1904.

Pittsburg & Lake Erie Ry.—The Roundhouse of the Pittsburg & Lake Erie R. R. Brief illustrated description of the structure at McKee's Rocks, Penn. 700 w. Ry Mas Mech—Dec., 1901.

Rensselaer, N. Y.—The New Roundhouse at Rensselaer. Illustrates and describes a roundhouse of the New York Central & Hudson River Railroad, and its equipment. 700 w. Am Engr & R R Jour—Feb., 1903.

New Roundhouse of the New York Central at Rensselaer. Illustrates and describes a new passenger engine roundhouse and its attendant facilities. 2400 w. R R Gaz—Feb. 20, 1903.

Roof, Concrete Reinforced.—See **ROOF—Concrete Reinforced.**

St. John, N. B.—See **Intercolonial.**

Slades Green, Eng.—See **LOCOMOTIVE SHOP.**

Square.—Square Roundhouses. George P. Nichols. Aims to show the disadvantages of the usual roundhouse form, and to demonstrate the superiority of the square house. General discussion. Ill. 3500 w. Pro W Ry Club—Feb. 16, 1904.

Square Engine House—Terminal Railroad Association of St. Louis. Illustrated description of the houses serving the passenger engines during the World's Fair. 2200 w. Ry Mas Mech—Oct., 1904.

Square vs. Round.—A Comparison of Circular and Rectangular Engine Houses. Editorial discussion of George P. Nichols' paper before the Western Railway Club, with extracts. 3000 w. Eng News—March 3, 1904.

ROWING.

Indicator.—The Application of the Steam-Engine Indicator to Rowing. C. M. Allen. Illustrated description of the apparatus used, with analyses of the cards taken, and the results. Ill. 2500 w. Jour Worcester Poly Inst—May, 1901.

ROWLAND.

Henry A. Rowland. Cary T. Hutchinson. On the work done by him in applied electrical science. 2000 w. Elec Wld & Engr—May 4, 1901.

RUBBER.

See also **GUTTA PERCHA; ELECTRIC CABLE; INSULATION; TIRE.**

India Rubber. Mervyn O'Gorman. Some facts about this substance that motorists should know. 2000 w. Autocar—April 18, 1903.

Belting.—See **BELTING—Rubber.**

Insulation.—See **INSULATION.**

Naphtha Recovery.—The Recovery of Naphtha in India-Rubber Works. Calls attention to points connected with the recovery and means of obtaining satisfactory results. 2400 w. Engng—March 8, 1901.

Recovered.—Recovered Rubber. Information concerning this material. 1800 w. Engng—May 23, 1902.

Supply.—India-Rubber and Its Sources of Supply. Briefly reviews the past supply and what is being done to ensure the supply for the future. 3000 w. Engr, Lond—May 31, 1901.

RUBBER TIRE.

See **TIRE.**

RUBBER WORKS.

Matteawan, N. Y.—See **BUILDING CONSTRUCTION—Running Stream.**

RUBY.

See also **PRECIOUS STONE.**

Artificial Production.—The Artificial Production of Rubies. Translated from "La Nature." Describes the production of rubies by fusion. Ills. 1200 w. Sci Am Sup—June 3, 1905.

See also **DIAMOND.**

RUDDER.

See also **MARINE ENGINEERING; NAVAL ARCHITECTURE; SHIPBUILDING; STEERING GEAR.**

Rudders. J. Foster King. Read at Glasgow Meeting of Inst. of Engrs. & Shipbuilders in Scotland. Discusses types of rudders in use in normal vessels of the merchant service. Ill. 6400 w. Naut Gaz—April 3, 1902.

Balanced.—See **ARMORED CRUISER—"Good Hope."**

Design.—Notes on the Calculation of Size of Rudder Stocks. J. W. Clary. Explains the theory of these calculations, giving the results of tests from ships in service, and deriving formulae which may be quickly applied. 4000 w. Marine Engng—Oct., 1905.

Pressures.—The Normal Pressures on Thin Moving Plates. A. W. Johns. Abstract of paper read before the Inst. of Naval Archts. Gives results of experimental investigations in air and in water. 2000 w. Engr, Lond—April 15, 1904.

Welding.—See **ALUMINOTHERMY—Rudder Post.**

RUDDER BOOM.

See also **HYDRO-ELECTRIC PLANT; SCREEN; WATER POWER.**

The Rudder Boom. Halbert Powers Gillette. Describes this device, which has been applied to the diverting of the driftwood from the intake of the pipe at Snoqualmie Falls power plant, and calls attention to other uses that may be made of it. 1500 w. Eng News—June 12, 1902.

RUHMKORFF COIL.

See **INDUCTION COIL.**

RUNNING LIGHTS.

See **NAVIGATION—Lights.**

RURAL ENGINEERING.

See **AGRICULTURAL ENGINEERING; DRAINAGE; IRRIGATION; SANITATION; SANITARY ENGINEERING.**

RUSSIA.

See also **COAL INDUSTRY; IRON INDUSTRY; MINERAL REGION; RAILWAY;** and under other specific headings.

Engineering Opportunities in Central and Southwestern Asia. A. H. Ford. Mr. Ford's second paper deals with the various engineering developments, railway, manufacturing and mining, of Russian Asia, calling attention to the opening for Anglo-Saxon enterprise. 3500 w. Engineering Magazine—March, 1901.

Engineering Opportunities in the Russian Empire. A. H. Ford. An exposition of the vast demands for machinery and for technical skill in the exploitation of the natural wealth of the Russian empire. 3000 w. Engineering Magazine—April, 1901.

Russia as a Market for Machinery and Machine Tools. A. H. Ford. A review of present condition of the machinery trade in Russia, with especial reference to the disadvantageous position of the United States. 3000 w. Engineering Magazine—July, 1901.

Waterways.—See **WATERWAY—Russia.**

RUSTING.

See **IRON—Rusting; METAL CORROSION; METAL PROTECTION; WATER; WATER PURIFICATION.**

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SAFETY APPLIANCE.

See also **ELECTRIC PROTECTIVE APPARATUS; ELEVATOR; ENGINE STOP; HOISTING; LIFE-SAVING APPLIANCE; LIGHTNING PROTECTION; RAILWAY; RESCUE APPARATUS; SAFETY VALVE; SAW GUARD; WORKS MANAGEMENT.**

Belting.—See **BELTING—Safe Management; BELT SHIFTER.**

Boilers.—See **SAFETY VALVE; WATER GAUGE—Alarm.**

British.—See **RAILWAY OPERATION.**

Brooklyn.—Guarding Machinery Against Accidents. Illustrates and describes measures taken by a Brooklyn firm to guard various points of danger. 700 w. Am Mach—Aug. 21, 1902.

Coal Mine.—See also **COAL MINING; EXPLOSIVE; FIREDAMP; HOISTING; MINING; RESCUE APPARATUS.**

Coal Mine, Austria.—See **COAL MINING—Wilczek, Austria.**

Coat of Mail.—See **ELECTRIC SHOCK.**

Cotton Mules.—See **Textile Machinery.**

Electric Station.—See **ELECTRIC PROTECTIVE APPARATUS; ELECTRIC STATION MANAGEMENT.**

Electric Works.—See **ELECTRIC WORKS—Inspector's Report.**

Elevator.—See **ELEVATOR.**

Engines.—Fencing of Steam and Gas Engines. Henry D. Marshall. Reviews the usual modern practice of furnishing protection to diminish risk of accidents to attendants, and offers suggestions for additional safeguards. Ill. 2000 w. Inst of Mech Engrs—March 21, 1902.

Engine Stop.—See **ENGINE STOP.**

France.—The Prevention of Accidents to Factory Workmen. Jacques Boyer. A review to French legislation and practice in guarding workmen from accidental injury from machinery. 4000 w. Engineering Magazine—Dec., 1902.

German Factories.—Arrangements for the Protection of Workmen (Einrichtungen für Unfallverhütung und Schutz der Arbeiter). Otto Kunze. An account of safety devices and sanitary arrangements in some modern German shops and factories. 3000 w. Oesterr Wochenschr f d Oeff Baudienst—May 2, 1903.

Grinding Machine.—See **GRINDING—Protective Devices.**

Hague Records Building.—See **Hydraulic.**

Hoisting.—See **HOISTING—Safety Appliance; HOISTING ENGINE.**

Hydraulic.—The Hydraulic Safety Devices of the Public Records Building at The Hague (De Hydraulische Veiligheidsinrichtingten van het Algemeen Rijks-Archiefgebouw te s'Gravenhage). W. Schlusen. Describing the complete system by which all doors, windows and other openings may be immediately closed by hydraulic power, providing protection against fire and burglary. 2500 w. De Ingenieur—Sept. 19, 1903.

Hydraulic Machinery.—See **HYDRAULIC MACHINERY—Safety Devices.**

Hygiene.—Shop Hygiene and Accident Prevention (Unfallverhütung und Gewerbehygiene). Dr. W. Heffter. A general discussion of the proper methods of securing the health and safety of workmen. Serial. Part I. 2000 w. Zeitschr d Ver Deutscher Ing—June 7, 1902.

See also **WORKS MANAGEMENT.**

Incline Plane.—See **HOISTING—Safety Appliance.**

Light Shafts.—Protection of Light Shafts and Safety Devices in Connection with Lift Doors and Controlling Gears. Henry C Walker. An illustrated article considering the cases most frequently met, and the form of safety appliance best to adopt in each case. Serial. 1st part. 2500 w. Prac Engr—May 23, 1902.

Machine Tools.—Guarding Machine Tools. W. H. Johnson. Considers the conditions fulfilled by a perfect guard, the materials used, and the ways of applying them. 3 plates. 1500 w. Inst of Mech Engrs—March 21, 1902.

Mine.—See also **MINE ACCIDENT—Safety Measures; RESCUE APPARATUS; SAFETY LAMP.**

Mine Haulage.—See **HOISTING.**

Paris Exposition.—Safety Appliances at the Exposition of 1900 (Les Appareils de Securité à l'Exposition de 1900). H. Schmerber. The first part discusses especially the safety appliances used in connection with mining hoists, etc. Serial. Part I. 2000 w. 1 plate. Génie Civil—June 29, 1901.

See also **LIFE-SAVING APPLIANCE.**

Railway.—See **CAR COUPLER; RAILWAY ACCIDENT; RAILWAY SAFETY APPLIANCE; RAILWAY SIGNAL.**

Respirator.—See **RESCUE APPARATUS.**

Steam-Pipe Valve.—See **SAFETY VALVE.**

Telephones.—See **ELECTRIC PROTECTIVE APPARATUS; LIGHTNING PROTECTION.**

Textile Machinery.—Fencing or Guarding Machinery Used in Textile Factories, with Special Reference to Machinery Used by Cotton Spinners and Manufacturers. Samuel R. Platt. Illustrated descriptions. 6 plates. 3000 w. Inst. of Mech Engrs—March 21, 1902.

Recent Safety Appliances for Cotton Mules. J. H. Crabtree. Illustrated descriptions of scroll and pulley-guards for the prevention of accidents. 1800 w. Engng—Dec. 2, 1904.

Underlie Shafts.—See **HOISTING—Safety Appliance.**

SAFETY FACTOR.

See also **BRIDGE DESIGN; MATERIALS' STRENGTH.**

Factors of Safety. Robert Henry Smith. Presidential address, Civil and Mech. Engrs. Soc. Discusses in detail the conditions affecting the factor of safety, the systematic testing of materials, etc. 5000 w. Engr, Lond—Oct. 11, 1901.

SAFETY FUSE.

See **BLASTING; ELECTRIC PROTECTIVE APPARATUS; EXPLOSIVE.**

SAFETY LAMP.

See also **COAL MINE EXPLOSION; FIREDAMP.**

Safety Lamps and Colliery Explosions. James Ashworth. Discusses the safety value of various lamps, giving illustrations. 3300 w. Can Min Rev—June 30, 1902.

Recent Experiments on Safety Lamps (Nouvelles Expériences sur les Lampes de Sureté). H. Schmerber. Describing the appliances and results at the testing station at Frameries, Belgium. The lamps are exposed to explosive gases drawn from the mines. Two articles. 3000 w. Génie Civil—Oct. 21, 28, 1905.

Acetylene.—See **ACETYLENE—Mine Lamp.**

Austrian Regulations.—Precautions against Benzine Fires in Lamp Rooms (Sicherheitsvorkehrungen gegen Benzinbrand in den Lampenkammern). Dr. J. Fischer. Review of the official Austrian regulations concerning the filling and handling of miners' lamps. 1500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—April 15, 1905.

Belgian Mines.—Safety Lamps for Belgian Coal Mines. A summary of experiments undertaken to show that certain regulations for the use of safety lamps at Belgian coal mines were no longer needed and should be repealed. Also discusses the comparative merits of different types of lamps. Ills. 4000 w. Eng & Min Jour—April 20, 1905.

New Safety Lamps Authorized for Use in Belgian Mines. V. Watteyne and S. Stassart, in "Annales des Mines de Belgique." Illustrated description. 800 w. Col Guard—May 26, 1905.

British.—Safety Lamps and Colliery Explosions. Reviews reports of recent explosions given in the blue-book recently issued, and discusses the safety lamps used in British mines. 4200 w. Engr, Lond—May 23, 1902.

Covers.—Experiments on the Best Dimensions of Safety Lamp Covers (Versuche zur Ermittelung der Zweckmässigsten Abmessungen der Sicherheitslampenkörbe). H. Fändrich. Giving the results of investigations into the best proportions for the wire-gauze covers for lamps of the Davy type. 3000 w. 2 plates. Glückauf—Dec. 1, 1900.

Electric.—Miners' Electrical Safety Lamps. Sydney F. Walker. Read before the Inst. of Elec. Engrs., England. Gives particulars of a number of attempts at producing a safety lamp to meet the needs of miners, discusses the difficulties, and the advantages a reliable electric lamp would possess. Serial. 1st part. 3500 w. Ir & Coal Trds Rev—March 29, 1901.

Electric, Bohres.—The Bohres Electric Mine Lamp (Bohres' Elektrische Grubenlampe). Adolf Bohres. Illustrating a portable electric safety lamp with storage-battery cell and osmium incandescent lamp. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 11, 1904.

Failure.—Failures of Safety Lamps Whilst in Use. James Ashworth. An account of some of the disasters and the lessons which may be derived from them. 6600 w. Mines & Min—June, 1901.

Form.—Influence of the Form of Gauze Mantle Upon the Security of Safety Lamps (Ueber den Einfluss der Drahtkorbform auf die Durschlagssicherheit der Wetterlampe). H. Fähndrich. A discussion of the best dimensions for the gauze cylinder for safety lamps to prevent the ignition of gases without. 1000 w. Glückauf—May 18, 1901.

Gas Detection.—See **FIREDAMP—Indicator.**

History.—Safety Mining Lamps. Rufus J. Foster. Reviews the history of mine lighting from the earliest times, and the development of the Davy lamp, and the lamps of other inventors. Ill. 6200 w. Jour Fr Inst—Aug., 1903.

Hübner's Benzine.—Hübner's Benzine Safety Lamp (Hübner's Benzin-Sicherheitslampe). H. Rössner. The lamp is provided with a special device, enabling it to be lighted after closing. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 17, 1902.

Oil.—See **OIL—Safety Lamps.**

Oil Economy.—Some Notes for Effecting Economy in the Use of Safety-Lamp Oil. Ellis Barraclough. Read before the Nat. Assn. of Col. Mgrs. Describes an improvement that makes it possible to use cheaper oil, and yet secure better illumination. 2000 w. Ir & Coal Trds Rev—March 24, 1905.

Penetrability.—Experiments on the Penetrability of Safety Lamps (Durchblaseversuche mit Sicherheitslampen). H. Fähndrich. An examination of the resistance offered by the wire gause of safety lamps to the penetration of gases under pressure. Two articles. 7500 w. 2 plates. Glückauf—June 8 and 15, 1901.

Stuchlik.—See **ACETYLENE—Mine Lamp.**

Testing.—Lamp-Testing Apparatus at the Johann Mine at Karwin (Moravia). Showing the very complete arrangement of reservoirs and measuring devices in use for observing the behavior of safety lamps in the presence of mine gases. 3500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 5, 1901.

Lamp-Testing Apparatus at the Johann Shaft, Karwin. L. Volf, in "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrates and describes an apparatus so arranged that the lamps can be tested in vertical, up-hill and down-hill draughts. 2400 w. Col Guard—Jan. 11, 1901.

Wolf.—See **ACETYLENE—Mine Lamp.**

SAFETY VALVE.

See also **BOILER; BOILER EXPLOSION; ENGINE STOP; STEAM ENGINEERING; VALVE.**

Safety Valves (Soupapes de Sûreté). F. Sinigaglia. An exhaustive discussion of the design and proportions of safety valves for steam boilers, with data as to discharge, and an examination of the various formulas. Serial. Part I. 5000 w. Revue de Mécanique—March 31, 1902.

Improvements in Steam Boiler Fittings (Neuerungen an Dampfkesselarmaturen). Discussing especially recent forms of balanced safety valves and pressure-reducing valves. 1800 w. Glückauf—Sept. 5, 1903.

Care.—Care and Management of Steam Boilers. William H. Fowler. The present number considers safety valves. Ills. Serial. 1st part. 1500 w. Mech Engr—July 30, 1904.

Fournier.—A Cause of Steam Boiler Explosions (Sur une des Causes d'Explosion des Chaudières à Vapeur). J. Fournier. Describing an improved form of inward-opening safety valve unaffected by the jet action of the escaping steam. 1200 w. Comptes Rendus—July 28, 1902.

High Lift.—High-Lift Safety Valves (Sicherheitsventile, Insbesondre Solche mit Hohem Hub). P. H. Rosenkranz. An examination of the forms of valves and seats best adapted to give effective relief to steam pressure. 2500 w. Zeitschr d Ver Deutscher Ing—March 4, 1905.

Practice.—Notes on Safety Valve Practice. R. S. Hale. Discusses the size of valves to be used and ways of improving safety valve practice. 1600 w. Engr, U S A—Oct. 1, 1903.

Royle.—See **VALVE.**

Size.—The Size of Lever Safety Valves. R. A. Douglass. Discusses methods of determining the discharging capacity of safety valves. Ill. 3000 w. Am Elect'n—Jan., 1902.

Safety Valves. H. K. Spencer. Considers the method of determining the size of safety valve necessary for a given boiler. 1500 w. Marine Engng—March, 1903.

Springs.—See **SPRING—Safety Valve.**

Steam-Pipe Cut-Off.—A Valve which Closes Automatically on the Breaking of a Steam Pipe (Ein Neues bei Rohrbruch Selbstthätig Absperrendes Dampfventil). Hr. Richter. A paper giving an illustrated description of a valve which automatically shuts off the escape steam from the boilers in case of a steam-pipe explosion. 2000 w. Zeitschr d Ver Deutscher Ing—Jan. 18, 1902.

Self-Closing Valves (Selbstschlussventile). R. Pöthe. Illustrating and describing a variety of automatic valves which act to shut off steam in case of explosions or breakages of pipes or mains. Three articles. 4500 w. Schiffbau—April 26, May 10, 24, 1905.

See also **ENGINE STOP.**

Stop.—Large Stop Valves for High-Pressure Steam. J. Hamilton Gibson. Read before the N. of England Inst. of Engrs. and Shipbuilders. Abstract. Gives a brief illustrated description of a new valve, or rather an altered valve, and its successful working. 1200 w. Col Guard—Dec. 24, 1902.

Steam Closing Stop Valves for Boilers. A. B. Willis. Illustrates and describes the old form of automatic stop valve, the advance to a steam closing stop valve, and the latest form. 1500 w. Ir Age—Nov. 24, 1904.

See also **Steam-Pipe Cut-Off; ENGINE STOP.**

SAIL.

See also **SAILING VESSEL.**

Design.—The Design and Making of Sails. Adrian Wilson. Read before the Mass. Inst. of Tech. Briefly considers the proper distribution of the areas of the drawing power, method of finding the center of effort, different conditions under which a boat may be used, the shape and proportion of sails, &c. Ills. 5400 w. Marine Engng—March, 1905.

SAILBOAT.

See also **BOAT; SHIPBUILDING; YACHT.**

Construction.—See **SHIPBUILDING—Small Vessels.**

Gasoline Auxiliary.—See **BOAT, GASOLINE—Fishing Boat; Motors.**

"Reliance."—See **YACHT.**

SAILING VESSEL.

See also **SCHOONER; SHIP; SHIPPING; YACHT.**

American.—The Old American Sailing Packets and Clipper Ships. John H. Morrison. Brief review of these early vessels and their development to meet the conditions of the times. Ill. 1500 w. Naut Gaz—Aug. 6, 1903.

See also **SHIP.**

Rigging.—The Rigging of American Sailing Vessels. Fred. M. Cook. Illustrates and describes various rigs used for sailing vessels. 2500 w. Marine Engng—Jan., 1904.

SAIL VEHICLE.

A Boat on Wheels. John L. von Blon. Illustrates and describes a novel sail propelled vehicle which has been in service on the United States western desert for eight months. 900 w. Sci Am—April 19, 1902.

ST. LOUIS EXPOSITION.

See also under specific headings.

The International Exposition at St. Louis, 1904 (Die Weltausstellung in St. Louis, 1904). Paul Möller. A general account of the status of the buildings and preparations at the beginning of 1903, as seen by a visiting German engineer. 3000 w. Zeitschr d Ver Deutscher Ing—Jan. 10, 1903.

Engineering Work on the Louisiana Purchase Exposition at St. Louis. Information obtained during a recent visit of inspection, giving technical details of the engineering work in progress. Ill. 6400 w. Eng News—April 23, 1903.

Some of the Engineering Features of the Louisiana Purchase Exposition, St. Louis, 1904. An illustrated article, giving general topographic plan of the grounds. The present number explains the character of the exposition, the civil engineering methods, river improvement, transportation, &c. Serial. 1st part. 3000 w. Eng Rec—Oct. 3, 1903.

The Universal Exposition at Saint Louis, 1904 (L'Exposition Universelle de Saint Louis, 1904). Hugues Brussel. With plan of the grounds and numerous views of the buildings. 2500 w. Génie Civil—Feb. 20, 1904.

The Engineering Characteristics of St. Louis. The first of a series of articles, giving illustrated descriptions of engineering features of the city likely to be of interest to foreign visitors. 4000 w. Engr, Lond—April 22, 1904.

The International Exhibition at St. Louis, U. S. A. The present article is introductory to a description of this great enterprise, with remarks on the construction work. Serial. 1st part. 2500 w. Engr, Lond—May 6, 1904.

The International Exposition at St. Louis (Die Weltausstellung in St. Louis). Fr. Frölich. An excellent and fully illustrated description of the technical and engineering features of the exposition by the special representative of the Verein Deutscher Ingenieure. Three articles. 18,000 w. Zeitschr d Ver Deutscher Ing—Aug. 27, Sept. 3, 10, 1904.

The St. Louis Exposition from the Standpoint of the Engineer. W. H. Bryan. A handsomely illustrated account of the exposition, treating of the salient points of the project, its execution, and the exhibits of mechanical interest. 5000 w. Engineering Magazine—October, 1904.

The International Exhibition at St. Louis, U. S. A. Walter Francis Reid. A brief account of the buildings and their contents, with remarks. Discussion. 9000 w. Jour Soc of Arts—Dec. 9, 1904.

Belleville Exhibit.—See **STEAM ENGINE.**

Buildings.—The Buildings of the Louisiana Purchase Exposition. A general outline of the architectural scheme at the St. Louis Fair. 700 w. Eng Rec—Oct. 26, 1901.

See also **BUILDING CONSTRUCTION.**

Coal Testing.—See **FUEL TEST—St. Louis Exposition.**

Compressed Air.—See **COMPRESSED AIR—St. Louis Exposition; COMPRESSED AIR PLANT—St. Louis Exposition.**

Electric Features.—Some of the Electrical Features of the Exposition. E. B. Ellicott. Calls attention to some points of interest in the electrical work at St. Louis. Ills. 2500 w. Jour W Soc of Engrs—Aug., 1904.

See also **ELECTRIC EXHIBITION.**

Electric Lighting.—See **ELECTRIC LIGHTING.**

Electric Station.—See **ELECTRIC STATION—St. Louis Exposition.**

Engineering Exhibits.—A Review of the Engineering Exhibits at the St. Louis Exposition. General review. 2500 w. Eng News—Aug. 11, 1904.

Fuel Testing Plant.—See **FUEL TEST—St. Louis Exposition.**

Locomotive Exhibit.—See **LOCOMOTIVE EXHIBITION; RAILWAY EXHIBITION.**

Locomotive Testing Plant.—See **LOCOMOTIVE TEST—St. Louis Exposition.**

Machinery.—Power and Machinery at the St. Louis World's Fair. An interesting report of noteworthy engineering features. 3500 w. Ir Age—Dec. 10, 1903.

The World's Fair Machinery Display. Lieut. G. L. Carden. Calls attention to notable exhibits and features of interest. Ills. 2300 w. Elec Wld & Engr—May 7, 1904.

Power Plant.—See **ELECTRIC PLANT; POWER PLANT; STEAM ENGINE—St. Louis Exposition; ELECTRIC STATION.**

Railway Exhibit.—See **LOCOMOTIVE EXHIBITION; RAILWAY EXHIBITION.**

Refrigeration.—See **REFRIGERATION—St. Louis Exposition.**

Screw Machinery.—See **MACHINE TOOL—Nut Tapping.**

Steam Turbine.—See **STEAM TURBINE—St. Louis Exposition.**

Turret Lathe.—See **LATHE—Turret.**

Westinghouse Exhibit.—The Novel Features of the Westinghouse Exhibit at the Louisiana Purchase Exposition. Edgar S. Downs. Reviews the striking features of the exhibits. 3500 w. Elec Rev, N Y—Dec. 24, 1904.

SALT.

See also **ELECTRO-CHEMISTRY; MINERAL REGION; MINING INDUSTRY; SALT WORKS.**

Austria.—The Salt Works of Austria in 1898 and 1899 (Die Salinen Oesterreichs in den Jahren 1898 and 1899). Abstract of the official government reports. Serial. Part I. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 30, 1901.

The Salt Industry in Austria, in 1900 (Die Salinen Oesterreichs im Jahre 1900). Abstract from a government report, giving statistics of salt mines and salt works and their operation, employees, etc. Serial. 3 parts. 6000 w. Oesterr Zeitschr f. Berg u Hüttenwesen—April 4, May 9 and 16, 1903.

California.—The Desert Dry Lakes of California. G. E. Bailey. Notes on these saline lakes and the value of their deposits, and the importance of protecting and preserving them. Serial. 1st part. 2200 w. Min & Sci Pr—Aug. 27, 1904.

Deposits.—The Formation and Geology of the Salt Deposits. F. O. Jones. An explanation of their formation and account of the causes that contributed. Ill. 2200 w. Sci Am—July 26, 1902.

Electrolysis.—See **ELECTRO-CHEMISTRY—Sodium Chloride.**

Halle, Germany.—Chamber Workings in Rock Salt Mining (Ueber Bergmühlen im Kalisalzbergbau). H. Kegel. A description of the method of excavating working chambers in the rock-salt mines of the Halle district, with formulas for computing costs. 3000 w. Glückauf—Aug. 5, 1905.

Kansas.—Evaporated Salt Industry in Kansas. W. R. Crane. An illustrated article describing the works where salt is made from brines, reporting concerning the output, value, methods, etc. 3000 w. Eng & Min Jour—Feb. 7, 1903.

Rock Salt Mining in Kansas. W. R. Crane. Describes the room and pillar system of mining employed. 2300 w. Eng & Min Jour—June 6, 1903.

Rock Salt Mining. W. R. Crane. Illustrated description of the deposit and the methods employed at the plant of the Royal Salt Co., at Kanopolis, Kansas. 2000 w. Mines & Min—Sept., 1904.

Kansas Salt Industry. W. R. Crane. Illustrates and describes the methods employed in obtaining brines, and the arrangement of the evaporating and manufacturing apparatus. 3500 w. Mines & Min—Oct., 1904.

New York.—Mining and Manufacture of Rock Salt. F. E. Englehardt. An illustrated description of methods used in the mines of New York State. Serial. 1st part. 2500 w. Sci Am Sup—Oct. 3, 1903.

Ohio.—The Salt Deposits of Northeastern Ohio. J. A. Bownocker. An account of the discovery and report of the wells. Plate. 1500 w. Am Geol—June, 1905.

Potassium.—See **POTASSIUM SALT; SALT WORKS—Germany.**

Roumania.—The Occurrences of Salt in Roumania (Das Salzvorkommen in Rumänien). W. Teisseyre and L. Mrazec. A geological and general description of the salt beds and salt mines of Roumania. Illustrations and map. Serial. 4 parts. 1 plate. 6000 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 11, 18, 25 and May 2, 1903.

U. S. Western.—Salt-Making in the Far West. E. Goldsmith. Describes the method used for procuring salt from the Pacific Ocean or from Great Salt Lake. 2000 w. Jour Fr Inst—Jan., 1905.

SALT LAKE.

See **RAILWAY—Salt Lake.**

SALT MINE.

See also **SALT; SALT WORKS.**

Louisiana.—See **SHAFT SINKING—Salt Mine, Louisiana.**

SALTPETER.

See **ELECTRO-CHEMISTRY; NITRATE.**

SALT WORKS.

See also **SALT.**

France.—The Salt Works of Rosières-Varangéville, France (Die Saline Rosières-Varangeville). Victor Wenhart. A description of salt mines and works in the north of France. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 21, 1903.

Germany.—The Alexandershall Salt Mills at Berka-on-the-Werra (Salzmühlenanlage der Gewerkschaft Alexandershall in Berka a-Werra). With plans of the buildings and details of the mills for grinding the potassium salts for fertilizing purposes. The machinery is driven by steam turbines. 1200 w. Zeitschr d Ver Deutscher Ing—March 5, 1904.

See also **SALT—Halle.**

SALVAGE.

See also **WRECK.**

The Salving and Floating of Wrecked Vessels (Sauvetages et Renflouages des Navires Neufragés). M. Dibos. A general review of methods of wrecking and raising sunken boats and ships. 10,000 w. Mem Soc Ing Civils de France—March, 1902.

"Salvage." C. M. Holmes. Paper read before the Insurance Inst. of Victoria, Aust. A brief statement of the law in regard to civil salvage. Serial. 1st part. 3500 w. Aust Min Stand—Sept. 18, 1902.

Modern Methods of Saving Ships. Morgan Robertson. An illustrated article showing how new inventions have made successful difficult wrecking operations. 2000 w. World's Work—Jan. 1903.

The Salvage of Ships. Outlines briefly the history and administration of the Liverpool Salvage Assn., which has been in existence for 47 years, and describes the work carried out, illustrating the equipment. Serial. 1st part. 3500 w. Engng—Jan. 20, 1905.

"Alala."—Salvage Case. Judgment delivered in the Victorian Vice-Admiralty Court with respect to the claim against the owners of the Steamship Alala for £6000 for salvage of that vessel and cargo on the 24th of April. 2800 w. Aust Min Stand—Sept. 12, 1901.

Boston Towboat Co.—Wrecking Work of the Boston Towboat Company. Winthrop L. Marvin. An illustrated account of the work, with descriptions of the methods used, and reports of some of the vessels saved, with related matter of interest. 3300 w. Marine Engng—May, 1903.

"Chili."—The Refloating of Ships (Le Renflouement des Navires). H. Pierron. An account of the refloating and salvage of wrecked ships, particularly of the "Chili," sunk near Bordeaux. 2000 w. Rev Tech—June 10, 1905.

"Ekliptika."—The Repairing of the Steamship Ekliptika (Die Reparatur des Dampfers Ekliptika). An account of the raising and docking of a vessel after being submerged for more than a year off the coast of Sweden. 1000 w. Schiffbau—Sept. 14, 1904.

Interesting Repair Work on the Steamship "Ekliptika." Dr. Alfred Gradenwitz. An illustrated article describing the raising and repairing of a vessel wrecked on the Swedish coast. 800 w. Sci Am Sup—Nov. 26, 1904.

"Hutchinson."—Salving the Hutchinson. An illustrated account of a remarkable rescue of a vessel on the Great Lakes. 3000 w. Marine Rev—Dec. 24, 1903.

King's Lynn.—See **STEAMBOAT.**

Lightship.—Novel Means of Launching a Vessel. Illustrates and describes the method used in restoring lightship No. 50 to the water, after being high and dry upon the beach. 1200 w. Marine Rev—Aug. 1, 1901.

A Novel Salvage Operation. Waldon Fawcett. Illustrates and describes the raising of the Columbia River lightship from the sands on the beach on the N. Pacific Coast, and the removal of the vessel overland to the waters of Baker's Bay. 1600 w. Sci Am—Nov. 16, 1901.

"Maine."—To Raise the "Maine." A brief account of the methods by which the successful contractors propose to raise this vessel, and also the "Alfonso XII." 600 w. Ir Age—Feb. 14, 1901.

Proposed Cofferdam for Raising the Battleship "Maine." An illustrated explanation of the proposed method of raising this vessel and freeing Havana harbor of the obstruction. 2500 w. Eng News—Dec. 8, 1904.

"Muenchen."—Salvage of the German steamer Muenchen. Translated from "Marine Rundschau." An account of the grounding of a steamer on one of the Caroline Islands and the work of salvage under trying conditions. Ill. 3300 w. Naut Gaz—Oct. 8, 1903.

"Ranger."—Marine Salvage and Wreck Raising. Describes the equipment of the salvage vessel "Ranger," and some information of the work. 1500 w. Engr, Lond—May 27, 1904.

"Sars."—Italian Sea-Going Salvage Tug "Sars." Illustrations, with brief description. 700 w. Marine Engng—Sept., 1904.

Submarine Boat.—See **SUBMARINE BOAT—Salvage.**

"Walter Bibby."—The Salvage of the Dredger "Walter Bibby." An illustrated account of one of the most difficult salvage operations yet conducted. 1000 w. Engng—July 14, 1905.

"Willamette."—Salving of the Steamship "Willamette." Illustrates and describes interesting work in salving a vessel when the hull was broken in two parts. Many difficulties were encountered, but it finally left under its own steam. 1900 w. Marine Engng—Oct., 1901.

SAMPLING.

See also **ASSAYING; MINE VALUATION; ORE; ORE TREATMENT; PROSPECTING.**

Notes on Sampling. Suggestions of importance to secure correct sampling, with discussion of methods. Ill. 2500 w. Min Rept—Oct. 24, 1901.

Difficulties and Errors in Sampling Ores of Gold and Other Metals. P. G. Morgan. An account of some sampling from the writer's experience, calling attention to a few sources of error, and suggestions. 1000 w. N Z Mines Rec—Oct. 16, 1902.

The Sampling and Estimation of Ore in a Mine. T. A. Rickard. The first of a series of articles giving details of personal practice, and containing valuable information. Ill. Serial. 1st part. 3000 w. Eng & Min Jour—Feb. 7, 1903.

Mine Sampling. G. W. Miller. On sampling, testing and valuing of ores, their classification, requirements of a mine examiner, etc. Ils. Serial. 1st part. 1800 w. Ores & Metals—Sept. 1, 1904.

Mine-Sampling and Ore-Valuation. James Park. A discussion of methods of sampling, assaying, &c. 3000 w. N Z Mines Rec—March 16, 1905.

Automatic.—An Automatic System of Sampling. Paul Johnson. Detailed descriptions with illustrations, of the practice at the British Columbia Copper Companies Smelting Works. 2500 w. Eng & Min Jour—April 12, 1902.

An Automatic Sampler for Tailings, Sands and Slimes. C. H. Pead. Illustrated description of a design by the writer which has given good results. 700 w. Jour Chem & Met Soc of S Africa—April, 1903.

Notes on Automatic Ore Sampling. Alfred Harvey. Principally a description of the working of the Vezin Sampler. Diagrams. 1400 w. Min & Sci Pr—June 6, 1903.

Automatic Ore Sampling. Alfred Harvey. Line drawings and description of an automatic ore sampling plant designed to take a correct sample with the least possible crushing of the ore. 1500 w. Min & Sci Pr—Jan. 30, 1904.

See also Silver King.

Check, Australia.—Check Sampling the Great Fingall Mine, Western Australia. Charles M. Rolker. Describes the methods, giving results. 3800 w. Min Jour—Sept. 30, 1905.

Coal Mine.—Commercial Value of Coal Mine Sampling. Marius R. Campbell. Recommends certain rules for mine sampling, based on experience in receiving coal for the government coal-testing plant at St. Louis. 1600 w. Min Wld—May 20, 1905.

The Commercial Value of Coal-Mine Sampling. Marius R. Campbell. Describes the method of sampling for the geological survey coal-testing plant at St. Louis, and gives a proposed method for general work. 3500 w. Am Inst of Min Engrs—Sept., 1903.

Colorado.—See **Cripple Creek; GOLD.**

Cripple Creek, Colo.—The Sampling of Ore as Practiced in the Cripple Creek District. C. E. Wolcott. Describes the methods practiced in one of the greatest gold camps, where sampling is of particular importance. 1300 w. Min Rept—Sept. 8, 1904.

Dumps.—The Sampling of Mine and Mill Dumps. A. W. Warwick. Illustrates by an example the tendency to overvalue these dumps in the present article. Serial. 1st part. 800 w. Min Rept—June 11, 1903.

The Sampling of Mill Dumps or Tailing Ponds. A. W. Warwick. Gives the method adopted by the writer, illustrating by example. 1500 w. Min Rept—July 21, 1904.

Emergency Sampler.—An Emergency Sampler. W. Denham Verschoyle. Illustrates and describes an inexpensive sampling device and reports the tests made of it. 500 w. Eng & Min Jour—Sept. 16, 1905.

Hand.—Hand Sampling in Small Stamp Mills. A. W. Warwick. Discusses the effects of careless sampling methods, with suggestions for accurate sampling. 1400 w. Min & Sci Pr—Oct. 21, 1905.

Higham.—See **Wet.**

Iron Ore.—Cargo Sampling of Iron Ores at Lake Erie Ports. W. J. Battle & Son. Read at meeting of the L. Sup. Min. Inst. Explains how samples are taken, advocating large samples, and giving the methods of analysis used. 2500 w. Ir Age—Nov. 2, 1905.

See also **IRON ORE—Analysis.**

Mill Work.—Sampling Mill Work. Jesse Scobey. Discusses prevalent systems, and the importance of the records, describing a method devised by the writer. 2100 w. Min & Sci Pr—Sept. 21, 1901.

Mine Valuation.—Notes on Mine Valuation and Sampling. A. W. Warwick. Briefly considers the various steps of mine valuation and correct sampling. 2000 w. Min Rept—May 26, 1904.

A Comparison Between Two Methods of Mine Sampling. A. W. Warwick. Briefly describes the two methods and compares the results. 800 w. Min Rept—July 7, 1904.

See also **MINE VALUATION.**

Pead Sampler.—See **Automatic.**

Sands and Slimes.—Improved Sands and Slimes Samplers. Illustrated description of two recently devised appliances. 800 w. Jour Chem, Met & Min Soc of S Africa—Nov., 1904.

Shipments.—Sampling Ore Shipments. W. J. Adams. Description of standard sampling methods used at ore-treatment works, and reasons for discrepancies between their assays and those of the mine owners. 2000 w. Min & Sci Pr—Aug. 6, 1904.

Silver King, Utah.—A Model Tramway and Sampler. James H. Steel. Illustrates and describes the new 250-ton automatic sampler and aërial wire-rope tramway of the Silver King Mining Co., Park City, Utah. Also describes the method of working the plant. 2000 w. Eng & Min Jour—Nov. 9, 1901.

Sizing.—See **ORE TREATMENT—Sizing.**

Stope Box.—Notes on Stope Box Sampling. Wager Bradford. An account of the system of daily stope box sampling as carried out at Langlaate Deep. 3800 w. Jour of Chem, Met and Min Soc of S Africa—Oct., 1905.

Tailing Ponds.—See **Dumps.**

Transvaal Mines.—Notes on Mine Sampling of the Main Reef Series. D. J. Williams. Considers the methods in use on the Witwatersrand, and the equipment needed, sectional drawings and points of importance. Ill. 5500 w. Jour Chem & Met Soc of S Africa—Oct., 1902.

Vezin Sampler.—See **Automatic.**

Wet.—A New Wet Sampler. Edgar Smart. Drawings and description of a new design invented by J. Higham. 1500 w. Page's Mag—July, 1903.

SAND.

See also **BRICK—Sand Lime; CEMENT; CONCRETE; MOLDING; MORTAR; ROAD MATERIAL.**

Braking Cars.—See **BRAKE—Sand.**

Core.—See **MOLDING.**

Electric Railway.—See **BRAKE.**

Foundry.—See **MOLDING.**

Massachusetts.—A Study of Hard-Packed Sand and Gravel. W. O. Crosby. Describes material encountered in the modified drift of the Nashua Valley, south of Clinton, Mass., and a series of tests made. 1400 w. Tech Qr—Sept., 1902.

Molding.—See **MOLDING—Sand.**

Mortar.—Mortar Sand. J. C. Hain. Read before the Nat. Assn. of Cement Users. Treats 'of the properties of various qualities of sand for use in concrete, giving an account of tests with interesting results. 4400 w. Ry & Engng Rev—Jan. 21, 1905.

Mortar Sand. J. C. Hain. Calls attention to the peculiarities of some sands, comparing their laboratory tests with a standard. 4000 w. Munic Engng—Feb., 1905.

See also **MORTAR.**

New Mexico.—The White Sands of New Mexico. Frank W. Brady. An illustrated description of a remarkable formation of nearly pure gypsum sand. 2000 w. Mines & Min—June, 1905.

SAND BLAST.

See also **FOUNDRY—Management; METAL PROTECTION.**

The Sand Blast (Die Sandstrahlgebläse). Ernst Schulz. An illustrated general review of the sand blast and the various kinds of apparatus for producing the blast. Serial. 2 parts. 8000 w. Zeitschr d Ver Deutscher Ing—May 10 and 17, 1902.

Sand Blast Machines (Les Machines à Jet de Sable). A. de Riva-Berni. Illustrating a number of devices for utilizing the abrading action of the sand blast in the arts. 2500 w. 1 plate. Génie Civil—Sept. 6, 1902.

A New Sand-Blast Apparatus. Francis Sticker. Illustrated detailed description of the apparatus. 2000 w. Am Mach—Vol. 27, No. 41.

Bridge Cleaning.—See **Metal Cleaning; Steel Cleaning; METAL PROTECTION.**

Metal Cleaning.—Cleaning Metal Work With the Sand Blast. Describes two plants, one consisting of a hoisting engine run backward to serve as an air compressor and delivering air into a boiler acting as a receiver. 1400 w. Eng Rec—May 4, 1901.

Steel Cleaning.—Sand-Blast Cleaning of Structural Steel. George W. Lilly. Gives some of the results which have been attained, and data as to the cost and other elements entering into its application. 7500 w. Pro Am Soc of Civ Engrs—Feb., 1903.

Sand-Blast Cleaning of Structural Steel. Discussion of paper by George W. Lilly. 6500 w. Pro Am Soc of Civ Engrs—April, 1903.

SAND DRYER.

See also **SAND HOUSE.**

Locomotive.—Improved Sand Dryer and Bin for Locomotive Sand. Drawings and description of a new rotary sand dryer recently put into service on the Chicago, Milwaukee & St. Paul Ry. 400 w. Am Engr & R R Jour—Oct., 1901.

SAND DUNES.

The Problem of the Dune. F. B. Kellogg. Methods of arresting the encroachments of sand, by growing beach grass and otherwise. 2000 w. Cal Jour of Tech—May, 1904.

SAND HOUSE.

Sand Houses and Appliances. Illustrates and describes the sand dryers, houses and appliances used by different railroads. 1500 w. Ry Mas Mech—May, 1905.

SANDSTONE.

See also **BUILDING MATERIAL; QUARRY; STONE.**

Arch Hinge Joints.—See **ARCH—Sandstone Hinges.**

Artificial.—See **BRICK—Sand Lime.**

Bohemia.—The Sandstone of Salesiushöhe near Ossegg, Bohemia (Der Sandstein der Salesiushöhe bei Ossegg). Hans Hofer. With description of the strata, and map and section, and a discussion of the geological conditions. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—April 1, 1905.

Pavement.—See **PAVEMENT—Sandstone.**

Saxony and Silesia.—See **QUARRY—Sandstone.**

SAND TRACK.

See **DERAIL—Sand Track.**

SANITARY ENGINEER.

See **PLUMBER; SANITARY ENGINEERING.**

SANITARY ENGINEERING.

See also **DRAINAGE; PLUMBING; REFUSE DISPOSAL; SANITATION; SEWAGE DISPOSAL; SEWERAGE; WATERWORKS.**

The Civil Engineer as a Guardian of the Public Health. J. B. Johnson. Reprint from Jour. Assn. of Engng. Socs. Concerning the duty of civil engineers to lead public sentiment, and secure sanitary conditions in cities and towns, such as the securing of clean streets, pure water, prompt removal and destruction of refuse, etc. 5300 w. Wis Engr—Jan., 1901.

British.—Sanitary Engineering. Editorial review of progress made during the last year in sewage disposal. 1800 w. Engr, Lond—Jan. 4, 1901.

Sanitary Engineering and Water Supply in 1901. Reviews the results of the year in sewage disposal, water supply, and related matters. 4000 w. Engr, Lond—Jan. 3, 1902.

Sanitary Engineering in 1903. A review of the progress made during the past year in England, discussing present methods. 2500 w. Engr, Lond—Jan. 1, 1904.

British Law.—Sanitary Law. H. Harcourt Verden. Read before the Inst. of San. Engrs., Ltd. Deals only with points of importance to sanitary engineers in Great Britain. 3300 w. Engng—Jan. 1, 1904.

Cuba.—See **Havana; SEWER—Quemador.**

Havana.—Sanitary Engineering in Havana. Chester C. Torrance. Gives a map of the city describing its former condition and the improvements made while the island was under the care of the United States; also discusses needed improvements. 6000 w. Trans Assn of Civ Engrs of Cornell Univ—1904.

See also **MUNICIPAL ENGINEERING; PAVEMENT; SANITATION; SEWERAGE.**

History.—See **WATERWORKS.**

New Orleans.—See **U. S. Southern; PUMPING STATION—Electric; Sewage; SEWERAGE.**

U. S. Southern.—Sanitary Engineering in the South and the Labor Question. J. N. Hazlehurst. Read before the Am. Soc. of Munic. Imp. Describes the progress of sanitary work in the South, and some of the difficulties met in the construction of these works, giving information concerning the negro labor. 2000 w. Eng News—Sept. 21, 1905.

Sanitary Engineering in the Southern States. J. N. Hazlehurst. Read before the Am. Soc. of Munic. Imp. A brief general review of the work accomplished and an outline of the works being installed at New Orleans. 2200 w. Munic Engng—Oct., 1905.

SANITATION.

See also **DRAINAGE; PLUMBING; REFUSE DISPOSAL; SANITARY ENGINEERING; SEWAGE DISPOSAL; SEWERAGE; WATER SUPPLY—Protection.**

Architecture.—See **ARCHITECTURE—Sanitary.**

British.—Sanitary Betterment in Great Britain. From the address of Dr. John C. Thresh, before the Inst. of San. Engrs., Great Britain. A review of the history of the sanitary movement in England. 4000 w. Dom Engng—April 15, 1902.

Car.—See **CAR—Sanitation.**

Chestnut Hill, Mass.—Sanitary Engineering Work in a Large Residence. Illustrated description of the design of the plumbing, heating, ventilation, and lighting systems for a house at Chestnut Hill, Mass. 2000 w. Eng Rec—April 29, 1905.

Country House.—The Sanitation of a Country House. Max Clarke. Read before the British Archt. Assn. Discusses the sanitary requirements of houses, the drainage, foundations, walls, roofs, plumbing, sewage disposal, etc., etc. 11,800 w. Builder—Nov. 23, 1901.

Electric Car.—See **ELECTRIC CAR.**

Floods.—The Sanitary Measures to be Adopted After Floods. George A. Soper. Extracted from the Am. Jour. of Med. Sci. Suggestions for safeguarding the health and prevention of epidemic diseases. 2800 w. Sci Am Sup—June 14, 1902.

Galveston.—The Sanitary Cleaning of Galveston After the Great Storm of 1900. George A. Soper. Extract from a report made to the Chamber of Commerce of the State of New York, on the general plan, organization, and results. 1800 w. Eng News—April 25, 1901.

Gas Stove.—See **GAS STOVE—Sanitation.**

German Factories.—See **SAFETY APPLIANCE.**

Havana.—Sanitary Condition of Habana. Report tending to show that the healthy conditions brought about by thorough cleansing and inspection system are relaxing and there is a danger of returning to the former unsanitary conditions. 2200 w. U S Cons Repts, No. 1508—Dec. 1, 1902.

See also **MUNICIPAL ENGINEERING; PAVEMENT; SANITARY ENGINEERING; SEWERAGE.**

Industrial Plants.—See **WORKS MANAGEMENT—Hygiene.**

Japanese Army.—Army Sanitation in Manchuria. A review of the address by Major Louis Livingston Seaman before the Committee on Military Affairs of the U. S. House of Representatives, concerning army sanitation, and the great success of Japanese methods. 2200 w. Sci Am Sup —July 8, 1905.

Machine Shop.—See **MACHINE SHOP—Sanitation; SAFETY APPLIANCE—German Factories.**

Manila.—Present and Prospective Sanitation of Manila. O. L. Ingalls. An account of the method of waste disposal previous to American occupation and description of the sewerage system installed. 3000 w. Trans Assn of Civ Engrs of Cornell Univ—1905.

Municipal.—The Principles of Municipal Sanitation (Principien der Städtereinigung). Dr. Paul Degener. A study of the wastes of modern cities and the methods of their removal and disposal. Serial. Part I. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—May 3, 1901.

Municipal Sanitation. William Weaver. Abstract of a paper before the Glasgow Congress. Discusses sewerage and drainage, water supply, highways and refuse. 1400 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Report of the Chairman of the Committee on Sewerage and Sanitation. Prof. A. Prescott Folwell. Presented to the Am. Soc. of Munic. Imp. Considers municipal sanitation, food inspection, baths, drainage, etc. 3800 w. Eng Rec—Oct. 18, 1902.

See also **MUNICIPAL ENGINEERING; REFUSE DISPOSAL; SEWAGE DISPOSAL; SEWERAGE; STREET CLEANING; WATER SUPPLY.**

New York Subway.—See **UNDERGROUND RAILWAY—New York, Sanitation.**

Office Buildings.—Sanitation of Office Buildings. Henry Leffmann. A condemnation of some conditions often found in these buildings. General discussion. 4800 w. Pro Engrs Club of Phila—July, 1905.

Panama.—What Has Been Accomplished at Panama. Theodore P. Shonts. Extracts from an address before the Am. Hardware Mfrs. Assn. Discusses the sanitation of the Isthmus, and the providing of suitable habitations for all classes of employees, and the food supply. The difficulties to be overcome are explained. 3000 w. Eng News —Nov. 16, 1905.

See also **CANAL—Panama Sanitation.**

Roman Colony.—Sanitary Provisions in the Roman Colony at Lincoln, England. Abstract of a paper by Dr. William O'Neill, on the water and sewerage systems, crematory, and private baths. 1500 w. Eng Rec—March 23, 1901.

Schools.—See **HEATING AND VENTILATION.**

SAPPHIRE.

See also **PRECIOUS STONE.**

Anakie Fields.—See **Queensland.**

Montana.—Sapphire Mines of Montana. An illustrated account of these valuable gem mines, the methods of working stones found, etc. 1500 w. W Min Wld—June 1, 1901.

Sapphire Mining, Yogo, Montana. An illustrated description of these valuable deposits and the methods of mining. 1400 w. Min & Sci Pr —July 27, 1901.

Queensland.—The Sapphire Fields of Anakie. B. Dunstan. Locates and describes these sapphire fields in Central Queensland. Ill. Serial. 1st part. 11,800 w. Q Gov Min Jour—May 15, 1902.

The Anakie Sapphire Fields. B. Dunstan. Information from the annual progress report of the acting-government geologist. Ill. 1500 w. Queens Gov Min Jour—June 15, 1903.

Sapphire Fields of Central Queensland. Lionel C. Ball. Notes on their present condition. Ills. 6500 w. Queens Gover Min Jour—March 15, 1905.

SAULT STE. MARIE.

See also **ELECTRIC INDUSTRY; ELECTROCHEMISTRY; HYDRO-ELECTRIC PLANT.**

Engineering and Industrial Enterprises at Sault Ste. Marie. An illustrated general description of the various industrial enterprises centered here. 8000 w. Eng News—Jan. 9, 1902.

The Consolidated Lake Superior Company. Information from President Shields' report on the various productive properties of the company in the Lake Superior iron region and at Sault Ste. Marie. 3000 w. Ir Age—July 23, 1903.

SAW.

See also **WOODWORKING MACHINERY.**

Band.—Horizontal Log Band-Saw. An illustrated description with statement of advantages claimed. 1800 w. Engng—Oct. 16, 1903.

Bench.—See **STEAM ENGINE—Portable.**

Cutting-Off Machine.—German Cold Saw Cutting-Off Machines. Illustrations with brief descriptions of three machines made in Würtemberg. 500 w. Am Mach—July 17, 1902.

Hack.—Recently Designed English Power Hack-Saws. James Vose. Illustrated descriptions of machines for stock up to five-inch diameter, and for stock up to ten-inch diameter. 800 w. Am Mach—Vol. 28, No. 42.

Pneumatic.—See **COMPRESSED AIR—Sawing.**

Taylor-Newbold.—The New Taylor-Newbold Metal Cutting Saw. Describes tests made at Philadelphia. Ills. 1200 w. Am Mach—June 16, 1904.

The Taylor-Newbold Saw. S. Newbold. Read before the Phila. Found. Assn. Illustrates and describes this tool and its operation. 2000 w. Foundry—Nov., 1905.

Toothless Cold.—The Toothless Cold Saw. E. D. Sewall. Gives an experience in repairing a cross-cut saw of very hard plate, with comments by Prof. Benjamin Silliman of Yale College, experiments, and applications of the method. 3000 w. Ir Age—Dec. 21, 1905.

Wire.—See **QUARRY—Helicoidal Wire.**

SAWDUST.

Exhaust Conveyors.—See **WOODWORKING MAchinery—Sawdust Removal.**

SAWED SURFACES.

Lines Produced in the Sawing of Metals (Lignes Superficielles Apparaissant dans le Sciage des Métaux). Ch. Frémont. An examination of the markings of sawed metallic surfaces, with reference to other marks than those produced by the saw. 1000 w. Comptes Rendus—Nov. 12, 1900.

SAW GUARD.

See also **SAFETY APPLIANCE.**

Improved Safety Guard for Circular Saws (Nouveaux Chapeaux de Sureté pour Scies Circulaires). H. Mamy. Illustrating an improved guard which rises to admit the work and closes after it. 1500 w. Génie Civil—Nov. 2, 1901.

SAWMILL ENGINES.

Portable.—See **STEAM ENGINE—Portable.**

SCALES.

See **WEIGHING MACHINE.**

SCHOOL.

See also **COLLEGE; EDUCATION; LABORATORY.**

Correspondence.—See **EDUCATION—Correspondence; Electrical Engineer.**

Hackettstown, N. J.—See **COLLEGE.**

Manchester, Eng.—See **EDUCATION.**

Motorman.—See **STREET RAILWAY MANAGEMENT—Employee; Instruction.**

SCHOOL SHIP.

See also **TRAINING SHIP.**

The Training of Sailors. Illustrated description of a recently launched vessel specially designed for the training of boys for the naval and merchant marine. 1700 w. Engng—April 21, 1905.

"Okean."—The School Ship and Transport "Okean" (Das Schul- und Transportschiff "Okean"). Carl Züblin. A well illustrated description of a steamer built at Kiel, Germany, for the Russian government, to serve as a school ship for machinists and engineers and also as a transport. It is equipped with four different makes of water-tube boilers. Serial. Part 1. 2 plates. 500 w. Schiffbau—June 23, 1903.

The Russian School Ship and Transport "Okean" (Das Russische Schul- und Transportschiff "Okean"). An illustrated description of a 12,000-ton steamer built at the Howaldt yard in Kiel, Germany, for the Russian government, to be used as a transport between the Baltic and the Pacific and as a school ship for machinists. Serial. 2 parts. 1800 w. Zeitschr d Ver Deutscher Ing—June 27, July 4, 1903.

St. Mary's.—New York School Ship "St. Mary's." Illustration, with account of the service of this vessel. 600 w. Marine Engng—Nov., 1900.

The Sloop-of-War St. Mary's. Illustrations with description and a summary of her history from the time of launching, her part in the Civil War, and her use as a Public Marine School, with a brief article describing life on board. 3800 w. Rudder—March, 1901.

"Young America."—The Young America. Illustration, with description, of a vessel to carry a floating school, which is under construction. Not a school ship in the usual acceptance of the term, but to carry students being prepared for business or for college, enabling them to see the world at the same time. 1400 w. Engr, Lond—March 20, 1903.

The Nautical Preparatory School and the Ship "Young America." Illustrates and describes a ship that will take young men and prepare them, while afloat, for business or college life, giving schooling, practical training and world-wide travel. 2800 w. Marine Engng—April, 1903.

SCHOONER.

See also **SHIPBUILDING; SHIPPING; YACHT.**

Fore and Aft Schooners. Theodore Lucas. An illustrated discussion of this type of vessel which has proved itself easier and cheaper to handle than the square rig. 1700 w. Naut Gaz—Jan. 1, 1903.

"Addie M. Lawrence."—Six-Masted Schooner "Addie M. Lawrence." Illustrated description of this large wooden sailing vessel, built at Bath, Me. 900 w. Marine Engng—June, 1903.

American.—Development of the Schooner in American Waters. John H. Morrison. Reviews the history of this type of merchant vessel. Ills. 4000 w. Naut Gaz—Aug. 4, 1904.

"Dorothy Palmer."—American Coasting Schooners. Illustration, plans and details of the "Dorothy Palmer," one of the latest and best of the wooden types. 1700 w. Naut Gaz—Feb. 18, 1904.

Fishing, Norwegian.—See **STEAMBOAT.**

Five-Masted.—Modern Five-Masted Schooner. James A. Hargan. Illustrates and describes the large steel sailing vessels being built at Bath. Me. 1700 w. Marine Engng—April, 1902.

Freight.—See **STEAMSHIP.**

"Likelike."—See **Steam.**

Maine.—Modern American Wooden Schooners. Descriptions of two of the latest to be launched from Maine shipyards. 1100 w. Naut Gaz—March 21, 1901.

Mechanical Equipment.—The Mechanical Equipment of Modern Schooners. B. C. Tuthill. The "Geo. W. Wells" is illustrated and described as a type of the large six-masted schooners, the method of fitting out being practically the same in the latest built schooners of large size. 1500 w. Marine Engng—Jan., 1902.

Mechanical Equipment of a Seven-Masted Schooner. Illustrates and describes the machinery on the "Thomas W. Lawson." 1500 w. Marine Engng—Nov., 1902.

The Steam Equipment of a Modern Schooner. An illustrated description of the auxiliary steam appliances, comprising a boiler used for power and heating purposes, steam winches, for anchor, sail, and cargo hoisting, and an outfit of pumps, etc. 1800 w. Mach, N Y—Dec., 1903.

"Rob Roy."—Fishing Schooner "Rob Roy," Sailing Out of Gloucester, Mass. Illustrations, with description of one of the finest fishing vessels afloat. 800 w. Marine Engng—May, 1901.

Seven-Masted.—A Seven-Masted Steel Schooner. Illustration and description of a vessel constructed throughout of steel. The vessel is propelled entirely by sails, but has a considerable installment of machinery, steam power being used for the hoisting of anchors and sails. 800 w. Sci Am—Oct. 19, 1901.

See also **"Thomas W. Lawson."**

Six-Masted.—See **"Addie M. Lawrence."**

Steam.—Description of the Steam Schooners Engaged in the Pacific Coast Trade. D. S. Kimball. Illustrated description of these vessels and their engines, manner of loading, etc. 1400 w. Marine Engng—June, 1901.

Pacific Coast Steam Schooner "Likelike." Illustrated detailed description. 1200 w. Marine Engng—Oct., 1904.

Steam Equipment.—See **Mechanical Equipment.**

"Thomas W. Lawson."—Successful Launch of 7-Master. Describes the new seven-masted steel schooner "Thomas W. Lawson," and the Fore River shipyard. 2300 w. Naut Gaz—July 17, 1902.

The Seven-Masted Schooner—In General and in Detail. Henry P. Jones. An illustrated description of the "Thos. W. Lawson," the latest example of this type of vessel, with remarks on the present standing of sailing vessels in the American merchant marine. Also editorial. 4800 w. Eng News—Nov. 6, 1902.

See also **Mechanical Equipment.**

SCIENCE.

See also **CHEMISTRY; ELECTRO-PHYSICS; INVENTION; MECHANICS; PHYSICS.**

Discoveries.—Sir William Henry Preece's Address before the Society of Arts. The subject discussed was the great scientific discoveries of the 19th century. 10,700 w. Jour Soc of Arts—Nov. 22, 1901.

Evolution.—The Evolution of Science (L'Evolution de la Science à Travers les Siècles). Maurice Levy. The annual address of the President of the Académie des Sciences of France, reviewing the progress of science in past centuries. 6000 w. Comptes Rendus—Dec. 17, 1900.

SCIENTIFIC SOCIETY.

See **ENGINEERING SOCIETY.**

SCOOP WHEEL.

See also **WATER WHEEL—Current.**

The Water Lift Wheels at the Maas Improvement Works (Die Schaufelräder an der Neuen Maasmündung). A description of the water lift wheels driven by compound steam engines, and used in the drainage works at the mouth of the Maas; with data of performance. 1800 w. Glasers Annalen—July 15, 1901.

Steam Scoop Wheel at Schellingwonde (Schepradstoomgemaal bij Schellingwonde). H. van Oordt. Illustrated description of large scoop wheels for lifting water about 2 metres for drainage works at Schellingwonde, Holland. 1500 w. De Ingenieur—Sept. 7, 1901.

Test of a Scoop Wheel (Beproeving van een Scheprad). J. C. Dijxhoorn. Describing the Paul scoop wheel for raising large volumes of water against a low lift, with data and results of tests, showing an efficiency of 50 per cent. 2500 w. De Ingenieur—Nov. 16, 1901.

SCOUT.

See **CRUISER.**

SCRAP.

See also **BRASS—Scrap.**

Castings.—Scrap Metal Castings. Walter J. May. Suggestions for the use of scrap, the sorting, treatment, etc. 2400 w. Prac Engr—June 13, 1902.

Locomotive and Car.—Locomotive and Car Scrap. T. A. Lawes. Illustrated description of scrap bins and a report of the good results from their use. Discussion follows. 7000 w. W Ry Club—Sept. 16, 1902.

Sorting.—Sorting Scrap Iron. Walter J. May. Hints on the sorting and use of this material. 700 w. Prac Engr—Sept. 18, 1903.

Specifications.—Scrap Iron Specifications. W. G. Scott. Read before the Am. Found. Assn. Gives a general classification of the material known as "foreign scrap," which in many cases is purchased by specification. 5000 w. Ir Trd Rev—June 16, 1904.

SCREEN.

See also **COAL SCREENING; ORE TREATMENT.**

Newark Waterworks.—Mechanically Operated Screens, Newark Waterworks. Illustrated detailed description of the novel manner of handling these metal framed screens, as given in a paper by J. Ralph Van Duyne. 600 w. Eng Rec—June 3, 1905.

Sewage.—See **SEWAGE DISPOSAL—Screening Apparatus.**

Waterworks.—See also **LEAF ARRESTER; RUDDER BOOM.**

Wien River.—Drift Screen on the Wien River at Weidlingau (Die Holzrechen-Anlage in den Hochwasserbehältern des Wienflusses bei Weidlingau). A. Swetz. Detailed description of the grating for the interception of drift and floating debris at the river protection works on the Wien near Weidlingau, Austria. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—July 31, 1903.

SCREENING.

See also **COAL PREPARATION; COAL SCREENING; ORE TREATMENT.**

Pan Breeze.—See **COKE HANDLING—Pan Breeze Machine.**

SCREW.

See also **PROPELLER; SCREW CUTTING; SCREW MACHINE; SCREW THREAD.**

Gas Fittings.—See **SCREW THREAD—Standardization.**

Heads.—Note on Heads of Machine Screws. H. G. Reist. Remarks on the variation of size and shape and the inconvenience caused, giving formula and table showing the shapes and dimensions of size of screws ordinarily used. 450 w. Trans Am Soc of Mech Engrs, No. 064—June, 1905.

Leading.—See **SCREW MACHINE.**

Measurement.—See **GAUGE; SCREW THREAD.**

Square Threaded.—The Geometry of the Square-Thread Screw. Ferdinand Peam. Indicates how screws and nuts of low helix angle may be made a commercially perfect fit. Ills. 3000 w. Am Mach—Vol. 27, No. 43.

See also **SCREW CUTTING.**

Wood.—Development of the Wood Screw. Charles D. Rogers. Read before the Providence, R. I., Assn. of Mech. Engrs. Interesting historical sketch. 3000 w. Ir Trd Rev—July 11, 1901.

SCREW CAPS.

Electric Welding.—Electrically Welded Screw Caps and Bolts. Report of the Committee of the Franklin Institute on Science and the Arts. Describes and approves the method originated by David J. Kurtz. Recommends the award of the John Scott legacy premium and medal. 1800 w. Jour Fr Inst—Sept., 1905.

SCREW CUTTING.

See also **SCREW; SCREW MACHINE; SCREW THREAD.**.

A Couple of Mechanical Paradoxes. O. C. Stutz. Illustrates the practical application of peculiar mechanical principles in the cutting of screw threads. 1600 w. Mach, N Y—Dec., 1900.

Tools and Methods for Accurate Thread Cutting. Jos. M. Stabel. An illustrated article describing the methods of a writer who has had large experience. 1500 w. Mach, N Y—July, 1903.

Chasers.—See **Hobs.**

Fractional Threads.—Cutting Fractional Screw Threads. Fred H. Colvin. An explanation of ways of solving various problems. 1800 w. Mach, N Y—Nov., 1903.

Hobs.—Thread Tools and Gauges. A. Norman. The present article discusses hobs and chasers and their manufacture. Ills. Serial. 1st part. 1500 w. Am Mach—Vol. 28, No. 6.

Lathe Screw.—See **SCREW MACHINE—Leading Screws.**

Milling Machine. — See **MILLING MACHINE — Thread; SCREW MACHINE.**

Square Threads.—Cutting Square Threaded Screws. A. L. de Leeuw. Explanation of methods. Ill. 2000 w. Am Mach—Oct. 17, 1901.

Cutting Square Threaded Screws. W. S. Rowell. An illustrated description of method and tools. 2000 w. Am Mach—Feb. 13, 1902.

A Difficult Job of Square Thread Cutting. Herbert V. Purman. An illustrated detailed description of a very unusual piece of work. 2000 w. Am Mach—Vol. 27. No. 37.

SCREW HOIST.

See **HOISTING—Screw.**

SCREW MACHINE.

See also **LATHE; MACHINE TOOL—Thread Cutting; SCREW; SCREW CUTTING; SCREW THREAD.**

Design for Special Screw Cutting Lathe. M. W. Leech. Drawings and description of a design for cutting short fine threads used on mountings for instrument work. 350 w. Am Mach—Aug. 22, 1901.

2x12-inch Screw Machine. Illustrated description of a machine designed for handling long pieces and its equipment of tools being applicable to all classes of work requiring such operations as turning, threading, etc. 1300 w. Am Mach—Dec. 25, 1902.

Automatic.—Automatic Screw-Cutting Lathe. Illustrates and describes a lathe which will cut screws up to 2 in. in diameter. Its movements are automatic, and right or left threads may be cut. 2000 w. Engng—July 18, 1902.

Automatic Screw Machine. Illustrated description of a recent design. 1000 w. Am Mach—June 23, 1904.

Automatic Screw Machines and Attachments. Engravings, with descriptive notes. 2200 w. Am Mach—Vol. 27. No. 36.

See also **National-Acme; New Hartford; Schmutz.**

Camming.—Camming Automatic Screw Machines. C. L. Goodrich. An illustrated detailed description. 2200 w. Ir Age—Feb. 20, 1902.

Camming Automatic Screw Machines. Reprint of an article by W. A. Jeboult, published in the "Mechanical World," explaining the principle and demonstrating the method of laying out the cams on the drums of screw machines. Ill. 2600 w. Mach, N Y—Feb., 1903.

Directions for Camming the Brown & Sharpe Automatic Screw Machine. R. E. Flanders. 4800 w. Ill. Mach, N Y—Sept., 1903.

Castings Finishing.—The Finishing of Castings on Automatic Screw Machines. Gives illustrated description of machines for this work. 1000 w. Engng—July 3, 1903.

Forming Tools.—See **New Hartford; TOOL—Forming.**

Leading Screws.—The Interchangeability of Large Screws. Reviews the report of the committee appointed by the British War Department, giving verbatim the part of the report dealing with the design and construction of the leading-screw-adjusting machine, and the recommendations. Ills. 8700 w. Engng—Aug. 4, 1905.

Standard Leading Screws for Screw-Cutting Lathes. From the report of a committee appointed by the British War Department to consider the provision of standard leading screws for screw-cutting lathes. States the difficulties surrounding the problem, the action that should be taken and gives the recommendations. 4000 w. Mech Engr—Aug. 5, 1905.

Magazine Feed.—A Magazine Feed for the Automatic Screw Machine. Mike Romitur. Illustrated description of a tool found valuable in the screw-machine department. 800 w. Am Mach—April 11, 1901.

Milling.—A Screw-Milling Machine. Illustrates and describes machines for cutting screw threads entirely by the use of milling cutters. 1300 w. Am Mach—Aug. 22, 1901.

The Milling-Cutter Applied to the Production of Screw-Threads. Illustrates and describes a new method of screw-cutting, and the special machine for carrying it out; the new feature being the use of a milling cutter for forming the thread. 2500 w. Ill. Eng News—Jan. 1, 1903.

Screw Milling Machines. H. Liebert. Abstract of a paper read before the Manchester Assn. of Engrs. An illustrated article describing this machine, its working and giving information in regard to it. 3500 w. Am Mach—March 17, 1904.

See also **MILLING MACHINE.**

National-Acme.—The National-Acme Manufacturing Co. and Its Automatic Screw Machines. An illustrated article giving details of the manufacturing operations and of the machines. 2400 w. Ir Trd Rev—Dec. 4, 1902.

New Hartford.—The New Hartford Automatic Screw and Forming Machines. Illustrated description of the machine and its operation. 2200 w. Ir Age—Sept. 8, 1904.

Nut Forming.—See **MACHINE TOOL—Nut Tapping.**

Schmutz.—The Schmutz Automatic Screw Machine. Illustrates and describes a screw machine having no turret, and the tools are simple pieces of bar steel ground to shape at the ends, easily sharpened, and adjusted by a turn of a spanner. 1200 w. Engng—March 14, 1902.

Sittman.—The Sittman Screw Machine. Illustrated detailed description of a machine embodying new and valuable features. 3800 w. Ir Age—July 11, 1901.

Sloan.—The Sloan Screw Machine (Machine à Fabriquer les Vis à Metaux et Autres par M. Sloan). Illustrated description of a machine for cutting screws and irregular shaped pieces. 1000 w. Métallurgie—April 8, 1903.

SCREW PILE.

See **PILE DRIVING—Screw.**

SCREW PROPELLER.

See **PROPELLER.**

SCREW THREAD.

See also **PIPE THREAD; SCREW; SCREW CUTTING; SCREW MACHINE.**

Angle Table.—A Screw-Thread Angle Table. George L. Colburn. A table giving the angle of helixes of various pitches and diameters with respect to a line perpendicular to the axis, with explanatory notes. 500 w. Am Mach—June 9, 1904.

B. A. Committee.—British Association Small Screw Gauge Committee. A brief review of the origin of this committee and of their final report. 2000 w. Mech Engr—April 2, 1904.

Casting.—See **CASTING—Threads.**

Gas Connections.—See **Standardization.**

Incandescent Lamp Socket.—See **INCANDESCENT LAMP SOCKET.**

Measurement.—Measuring External Thread Diameters. Joseph M. Stabel. Describes a method of thread measurement by means of wires and micrometers, giving tables. 1600 w. Mach, N Y—Jan, 1904.

Measuring External Screw Thread Diameters. Walter Cantelo. Gives sketches, formulas and tables, worked out by the writer, so that by using ordinary micrometer calipers and wire of the diameter called for in the table, the standard threads can be compared with the figures given. 1200 w. Am Mach—June 25, 1903.
See also **GAUGE.**

Measuring Machine.—Screw-Measuring Machine at the National Physical Laboratory. Illustrates and describes a machine at the British National Laboratory for micrometrically testing the accuracy of commercially-produced screw-threads and taps. 1200 w. Engng—Nov. 13, 1903.

Measuring Microscope.—A Microscope for Measuring Screw Threads. Illustrated description of instrument. 700 w. Am Mach—Jan. 21, 1904.

Metric.—International System of Metric Screw Threads (Système International des Filetages à Base Metrique). A review of the system proposed at Zurich, in 1898, together with the recent discussion concerning the dimensions of keys and wrenches. 7500 w. Bull Soc d'Encour—Jan., 1901.

International Metric Screw-Thread System (Internationales Gewindesystem auf Metrischer Grundlage). A description, with diagram and table of the system adopted by the Ver. Deutsch. Ing., the Société d'Encouragement pour l'Ind. Nat. and the Ver. Schweiz. Masch. Industrieller at Zürich, Oct., 1900. 800 w. Zeitschr d Oesterr Ing u Arch Ver—April 12, 1901.

See also **Standardization; WEIGHTS AND MEASURES.**

Pipe.—See **GAUGE; PIPE THREAD.**

Porter System.—Finer Screw Threads. Charles T. Porter. Argues that the existing system reduces the area of cross-section of the bolt unnecessarily, and that the steep inclination allows the nut to jar loose easily. A table for the system proposed is given. 600 w. Trans Am Soc of Mech Engrs, No. 0964—Dec., 1902.

Standardization.—The Standardization of Screws for Gas Connections. J. Payet. Read before the Société Technique de l'Industrie du Gas en France. Describes the international system in use for rods and bolts and explains how it may be applied to gas connections. 800 w. Prac Engr—July 4, 1902.

The Unification of the Pitch of Screw Threads (Note Sur l'Unification des Pas de Vis). T. Payet. A discussion of the metric screw threads for gas pipe and fittings suggesting changes with a view to unification. 4000 w. Bull Soc d'Encour—July 31, 1902.

The Unification of Screw Threads (Unification des Filetages). A discussion of the standardisation of metric screw threads for small screws, less than six millimetres in diameter. 6000 w. Bull Soc d'Encour—Sept., 1904.

See also **Metric; INTERCHANGEABILITY; PIPE THREAD; SCREW MACHINE—Leading Screws; WEIGHTS AND MEASURES.**

Tyler System.—A Proposed Standard for Machine Screw Thread Sizes. Charles C. Tyler. Attention is called to the inconvenience resulting from the variation in size and a standard is proposed having an angle of 60 degrees and a flat at the top of the thread equal to 1-8 of the pitch. 3500 w. Trans Am Soc of Mech Engrs, No. 0931—May, 1902.

SCULPTURE.

See **MUNICIPAL ART.**

SCUTTLING.

See also **WRECK.**

Some Facts Concerning the Scuttling of Ships. Lawrence Irwell. Gives several cases of scuttling and the relation to insurance. 2500 w. Marine Rev—Oct. 17, 1901.

SEA BARRIER.

See also **COFFERDAM; SEA WALL; SHORE PROTECTION.**

Hodbarrow, Eng.—Sea Barrier at the Hodbarrow Mines. Illustrated description of a barrier 7,000 ft. long, built in a semi-circular line from shore to shore in order to exclude sea water, so that rich iron deposits may be mined. 1800 w. Engng—April 7, 1905.

SEA MILLS.

Cephalonia.—The "Sea Mills" of Cephalonia. William P. Mason. Brief description of mills equipped with undershot wheels which are driven by sea water flowing landward from the coast. Ills. 300 w. Eng News—Oct. 5, 1905.

SEA POWER.

See **NAVY.**

SEARCHLIGHT.

See also **ELECTRIC EQUIPMENT—Navy; PROJECTION APPARATUS; REFLECTOR.**

Modern Searchlight Practice. Frank C. Perkins. An illustrated article describing various types of searchlights. 1400 w. Marine Engng—June, 1902.

Acetylene.—See **AUTOMOBILE—Acetylene Searchlight; HEADLIGHT.**

Lighthouse.—See **LIGHTHOUSE—Helgoland.**

Pan-American Exposition.—Searchlight Signalling at the Pan-American Exposition. Orrin E. Dunlap. An account of the proposed display during the months of the exposition, showing the beautiful effects and the great usefulness of searchlights. 2000 w. Sci Am Sup—April 27, 1901.

St. Louis Publishing House.—See **ELECTRIC PLANT.**

U. S. Navy.—The Modern Searchlight in the Navy. Frank C. Perkins. Illustrated descriptions of some searchlights in use and the methods of operating. 1500 w. Elec, N Y—June 5, 1901.

SEA SIGNAL.

See **ELECTRIC SIGNAL; FOG SIGNAL; NAVIGATION; SHIP TELEGRAPH.**

SEA WALL.

See also **BREAKWATER; DOCK; HARBOR; PIER; RIVER REGULATION; SEA BARRIER; SHORE PROTECTION; WHARF.**

East Cambridge, Mass.—The Failure of a Sea Wall and Its Reconstruction. Clarence T. Fernald. An illustrated account of the failure of the old wharf at East Cambridge and the construction of the new sea wall. General discussion. 2500 w. Jour Assn of Engng Socs—June, 1903.

Essex, Eng.—See **SHORE PROTECTION.**

Galveston.—See **SHORE PROTECTION.**

Hodbarrow, Eng.—See **SEA BARRIER.**

Hull, Mass.—Failure of a Concrete Sea Wall. George W. Blodgett. An illustrated account of the breaks in the sea wall at Hull, Mass., describing the conditions and the cause of the two breaks. 900 w. R R Gaz—Vol. XXXIX. No. 3.

Philadelphia.—See **PIER.**

Rotterdam.—Quay Wall Construction at Rotterdam (Kadebouw te Rotterdam). R. A. Van Sandick. A very complete account of the harbor improvements at Rotterdam, with numerous illustrations showing the difficult character of the work. 10,000 w. De Ingenieur—Jan. 24, 1903.

SEA WATER.

Action on Copper.—See **CONDENSER—Corrosion; METAL CORROSION.**

Action on Metal.—See **SHAFT—Corrosion; SHEATHING; SHIP—Corrosion; Hull Protection.**

SECONDARY BATTERY.

See **STORAGE BATTERY.**

SEGMENT.

Machining.—See **MACHINE TOOL—Segment.**

SEISMOGRAPH.

See also **EARTH MOVEMENT; EARTHQUAKE.**

Earthquake Recorders in America. Describes the instrument at Baltimore, and the records made by it. 500 w. Sci Am—June 7, 1902.

SELENIUM.

Calorimetric Estimation.—Calorimetric Estimation of Selenium. J. E. Clennell. Gives a method for the rapid approximate estimation of small quantities of selenium in ores, bullion, smelting-room products, zinc-gold precipitates, cyanide solutions, &c. 900 w. Eng & Min Jour—Oct. 28, 1905.

Coke.—Selenium in Coke. J. F. Smith. Read before the Yorkshire Sec. of the Soc. of Chem. Ind. An account of investigations, giving results. 1000 w. Aust Min Stand—July 23, 1903.

Light Telephony.—See **LIGHT TELEPHONY.**

Radioactive Substances.—See **RADIOACTIVITY — Selenium Resistance.**

SELF-INDUCTION.

See **INDUCTANCE.**

SEPARATOR.

Oil.—See **OIL SEPARATOR.**

Steam.—See **STEAM SEPARATOR.**

SERPENTINE.

The Serpentines of Manhattan Island and Vicinity and Their Accompanying Minerals. D. H. Newland. Concerning their distribution, general features, chemical composition, etc. Serial. 1st part. 36000 w. Sch of Mines Qr—April, 1901.

SERPOLLET MOTOR.

See **AUTOMOBILE, STEAM; CAR, MOTOR-DRIVEN.**

SEWAGE.

See also **DRAINAGE; PLUMBING; SEWAGE DISPOSAL; SEWAGE FARM; SEWER; SEWERAGE.**

Acid.—See **SEWAGE DISPOSAL.**

Analysis.—The Interpretation of a Sewage Analysis. Earle B. Phelps. Considers raw or untreated sewages and septic sewages and the interpretation of analytical data. 7400 w. Tech Qr—March, 1905.

An Often Neglected Factor in Sewage Analysis. Ellen H. Richards. On the importance of time where life is concerned in the change. Gives reports of tests made. 700 w. Tech Qr—June, 1905.

See also **WATER ANALYSIS.**

British.—See **SEWAGE DISPOSAL.**

British Law.—Rights as to Sewage. Algernon Barker. A discussion of English law affecting sewage, citing some cases in illustration. Serial. 1st part. 8700 w. Jour Roy Inst of Brit Archts—June 8, 1901.

Composition.—The Composition of Sewage in Relation to Problems of Disposal. George W. Fuller. Gives a review of the progress in this field, the prevailing methods of disposal, and especially the dilution method and modes of treatment preparatory to filtration. 9800 w. Tech Quar—June, 1903.

Effluent Purity.—Standards of Purity for Sewage Effuents. Part of a paper by Prof. Dr. Dunbar (Hamburg) read before the Congress of the Sanitary Inst. at Glasgow. Discusses whether we are able to judge by the results of chemical analysis whether sewage freed from suspended matter tends to putrefy. 4500 w. Builder—Aug. 20, 1904.

Effluent Stability.—The Stability of Effluents of Sewage Filters of Coarse Materials. H. W. Clark. Slightly condensed from a paper in the 1901 report of the State Board of Health of Massachusetts, giving results of experiments on bacterial action. 3500 w. Eng Rec—Dec. 27, 1902.

Factory Waste.—See **FACTORY WASTE.**

Flow.—See **SEWER.**

Gas Manufacture.—See **GAS MANUFACTURE—Sewage Sludge.**

Seaweed.—Sewage and Seaweed. Information concerning experiments made by Dr. E. A. Letts, of Belfast, showing that the occurrence of sea-lettuce in large quantities in any locality is associated with the pollution of the sea water by sewage. Also discusses schemes of sewage purification and means of mitigating the nuisance. 1200 w. Builder—Nov. 23, 1901.

See also **SEWAGE DISPOSAL—Oyster Pollution.**

Standard of Purity.—See **Effluent Purity.**

Testing, Columbus, O.—The Sewage Testing Station at Columbus, Ohio. John H. Gregory. Brief remarks on the extensive improvements planned, with illustrated description of the testing station. 2500 w. Eng Rec—Nov. 19, 1904.

SEWAGE DISPOSAL.

See also **DRAINAGE; FACTORY WASTE; MUNICIPAL ENGINEERING; PLUMBING; REFUSE DISPOSAL; RIVER POLLUTION; SANITATION; SEWAGE; SEWAGE FARM; SEWER; SEWERAGE; WATER POLLUTION; WATER PURIFICATION.**

Sewerage and Sewage Disposal. Solon C. Smith. From a paper read before the Ohio Inst. of Mun. Engrs. Discusses the modern methods and the progress of this branch of sanitary engineering. 4000 w. Munic Engng—Aug., 1901.

The Proper Operation of Sewage Purification Plants. John W. Alvord. Abstract of a paper prepared for the meeting of the Am. Soc. of Mun. Imp. On the proper regulation of septic tanks, contact beds, etc., with notes on plants built by the author. 3500 w. Eng News—Nov. 27, 1902.

Sewage Purification. Informal discussion by Messrs. Rudolph Hering and George W. Rafter. 3400 w. Pro Am Soc of Civ Engrs—Sept., 1903.

Sewerage Work; a Twenty-five Years' Review. Rudolph Hering. Reviews the works for collecting and conveying the foul waters and those for effecting their proper disposal, showing the rapid development in America. 2600 w. Eng Rec—Jan. 3, 1903.

Sewage Disposal. Rudolph Hering. Part of a paper read before the League of Am. Munic. Gives an expert's views, describing the practice in foreign cities, and the best methods in the United States. 2000 w. Munic Jour & Engr—Dec., 1903.

Practical Points in Sewage Disposal Works. Extracts from a paper by Henry C. H. Shenton, before the Soc. of Engrs., discussing the latest practice, particularly from the point of view of an engineer. 3000 w. Eng Rec—May 14, 1904.

Practice in Sewage Disposal. Henry C. Shenton. Read before the British Soc. of Engrs. The latest methods employed, from the engineer's side of the question. Serial. 1st part. 3000 w. Munic Jour & Engr—Jan., 1905.

Sewage Disposal. Prof. W. S. Leavenworth. Reviews the various methods in use. 4500 w. Dom Engng—May 25, 1904.

Sewage Disposal for Small Cities and Towns. T. Chalkley Hatton. Outlines several systems used for sewage purification, the choice depending on the character of the sewage. 3300 w. Munic Engng—Nov., 1904.

Sewage Disposal. Morrell Vrooman. Digest of a paper read before the League of Am. Municipalities. Briefly discusses various methods of disposal. 3500 w. Munic Jour and Engr—July, 1905.

Sewage and Its Disposal. H. Lemmoin-Cannon, in "Technics." Considers some of the principal methods used for its treatment and disposal. 3000 w. Sci Am Sup—Sept. 23, 1905.

The Scientific Disposal of City Sewage: Historical Development and Present Status of the Problem. C. E. A. Winslow. Discusses briefly the various methods tried in both Europe and America, and gives the opinion that only experimentation in each case will determine what method is most desirable. 6500 w. Tech Qr—Dec., 1905.

Acid Sewage.—The Action of the Septic Tank on Acid Sewage. A review of the experiments for 15 months made by Leonard P. Kinnicutt and Harrison P. Eddy on the work actually done by a closed tank, on sewage containing an unusual amount of iron salts. 3800 w. Eng Rec—May 10, 1902.

Experiments at Worcester, Mass., on Treating Acid Iron Sewage in a Closed Septic Tank. Leonard P. Kinnicutt and Harrison P. Eddy. Report of careful experimental study, giving much information on the septic tank. Also editorial. 8800 w. Eng News—May 29, 1902.

Treatment of Sewage in a Large Open Septic Tank at Worcester, Mass. Information regarding the experience with this tank as given in Mr. Harrison P. Eddy's report for the year ending Nov. 30, 1901. 900 w. Eng News—May 29, 1902.

Aldershot, Eng.—See **MUNICIPAL ENGINEERING; SEWAGE FARM.**

American.—Sewage Purification and Water Pollution in the United States. Gives a list of 95 cities and towns where some means of treating the sewage is practiced, with remarks on methods in use. 2000 w. Eng News—April 3, 1902.

Andover, Mass.—Sewage Disposal Works and Experiments at Andover, Mass. An illustrated description of the works and an account of experiments which proved that with the somewhat stale sewage which reached these works septic-tank action was not favorable to subsequent purification. 3500 w. Eng Rec—April 23, 1904.

Ash, Eng.—Bacterial Sewage Disposal at Ash, England. Describes these works, which are of interest on account of the conditions under which they were built. 2200 w. Eng Rec—Sept. 24, 1904.

Automatic Regulators.—New Automatic Regulators for Septic Tanks and Contact Beds. Illustrates and describes two recently patented devices, explaining their operation. 2300 w. Eng Rec—Nov. 8, 1902.

Bacterial.—Purification of Sewage by Bacterial Methods. Leonard P. Kinnicutt. An explanatory outline of what takes place, with a review of the methods classed under this head. Ill. Also general discussion. 10,700 w. Jour N E Water Wks Asn—Dec., 1900.

Sewage Disposal. A paper before the Indiana Engng. Soc., by F. A. Barbour, on the utility of bacteriolytic processes of treatment and the degree of purification which it is advisable to strive for. 2900 w. Eng Rec—March 30, 1901.

The Bacterial Purification of Sewage (L'Épuration Bactérienne des Eaux d'Egout). G. Bichou. A review of British experience in comparison with that employed on the sewage farms of Paris. 2000 w. Génie Civil—June 15, 1901.

The Biological Purification of Sewage (De Biologische Reiniging van Afvalwater). J. van der Breggen. Description of the septic tank and oxidizing beds in use at Winterswijk. 1500 w. De Ingenieur—Aug. 3, 1901.

Bacterial Sewage Disposal in England. Extracts from a report by C. H. Rust of the result of investigations in numerous cities. 2000 w. Eng Rec—Aug. 10, 1901.

Bacterial Purification of Sewage. B. H. Buxton. Outlines the changes which take place in sewage when treated by bacterial methods. 3300 w. Eng Rec—April 26, 1902.

The Vitality of Sewage Bacteria in Soil and the Antagonism of Soil Bacteria to the Tphoid Bacillus. A review by G. C. Whipple of investigations during the last few years carried on for the Local Government Board of England, as given in a paper by Dr. Sidney Martin. 1600 w. Eng Rec—Nov. 8, 1902.

Sewage and Refuse Disposal. Describes the tanks, distributing chamber, sludge beds, etc., of the latest system of bacterial treatment of sewage in Great Britain. 3200 w. Munic Jour & Engr—April, 1903.

Bacterial Treatment of Water and Sewage Up to Date. Dr. Percy Frankland. Read before the Engng. Con. of the Inst. of Civ. Engrs. Introductory to a discussion. Names the points most desirable to consider; the relative merits of different methods, contact beds, effluents, storm water, etc. 1800 w. Engr, Lond—July 10, 1903.

On the Distribution of Sewage on Bacteria Beds. John C. Thresh, and Martin Priest. Abstracted from a paper read before the Inst. of San. Engrs. A discussion of the best means for the distribution. 1500 w. Engr, Lond—July 24, 1903.

On the Distributing of Sewage on Bacteria Beds. John C. Thresh. Read before the Sanitary Inst. Discusses briefly the three methods in use, favoring distribution by sprinklers or sprays, at frequent intervals. 2000 w. Engng—Aug. 21, 1903.

The Design of Works for the Bacterial Treatment of Sewage. Stuart H. Davies. A discussion of the most important points in the design of works, with general consideration of the subject. 2700 w. Engng—Oct. 9, 1903.

A British View of the Bacterial Treatment of Sewage. Dr. Samuel Rideal. Abstract of a paper before the International Cong. of Hygiene at Brussels. Gives conclusions based on careful study. 1200 w. Eng News—Oct. 22, 1903.

The Bacterial Disposal of Sewage. G. Everett Hill. Discusses why sewage disposal is of vital interest, the methods in use, and the value of these methods. 6800 w. Jour Fr Inst—Jan., 1905.

The Functions of Various Types of Bacteria in the Purification of Sewage, with Some Methods for Their Quantitative Determination. H. W. Clark. A study in which attempts have been made to work out bacterial or biochemical tests which will give a bacterial measure of the changes which may occur in filters and filter effluents. 6500 w. Eng News—Jan. 12, 1905.

The Bacteriolysis of Peptones and Nitrates. Stephen De M. Gage. An investigation into types of bacteria normally present in sewage and the effluents of sewage disposal systems. 12,000 w. Tech Qr—March, 1905.

The Bacteriological Treatment of Sewage. F. Herbert Snow. Reviews the work of investigators in this field, giving a summary of what is now known about bacterial treatment of sewage by the various processes. Also general discussion. 12,800 w. Pro Engrs' Club of Phila—July, 1905.

The Treatment of Crude Sewage in Triple Contact Beds. T. Hughes. From a paper before the British Ass'n of Mgrs. of Sewage Disposal Works. Gives the results of six years endeavor to deal with crude sewage in "bacteria" or "contact-beds" without any preliminary treatment or separation. 5400 w. Mining Engng—Aug., 1905.

The Bacterial Purification of Sewage. Albert Glyndon. Gives a brief description of the more important systems of sewage disposal now in use. Ills. 2500 w. Sci Am—Dec. 9, 1905.

See also **Ash; Chichester; Columbus; Combined;**

Draper Co.; Filters vs. Contact Beds; Horsham; Knobloch Cesspool; London; Manchester; Massachusetts Experiments; Nitrification; Septic Tank; Woonsocket, R. I.

Baden, Austria.—The Purification System of the Sewerage of the City of Baden (Ueber die Reinigung Städtischer Abwässer und die Reinigungsanlage der Stadt Baden). Thomas Hofer. A review of sewage purification systems, with a detailed description of the plant of the city of Baden: Two articles. 2 plates. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—July 1, 1904.

See also **WATERWORKS.**

Bayer System.—The Bayer System of Sewage Disposal (Abwasserreinigung, System Alexander Bayer). Abstract of a paper before the Oesterr. Ing. und Architekten Verein, giving a description of a system for purifying sewage and factory and slaughter house wastes, and utilising many of the products. 1 plate. 7000 w. Oesterr Wochenschr f d Oeffent Baudienst—Nov. 30, 1901.

Bedford, Ind.—A Septic Tank at Bedford, Ind. Plan and description of the plant. 1300 w. Eng Rec —Nov. 15, 1902.

Sewerage and Sewage Disposal at Bedford, Ind. G. C. Houston. From a paper before the Indiana Engng. Soc. Describes the system adopted for a hilly surface, and the treatment given the sewage. 2000 w. Munic Engng—Feb., 1904.

Bed Treatment.—See **Winter.**

Berlin, Ont.—Sewage Disposal at Berlin, Ont. A sewage plant, comprising two septic tanks, two storage tanks, a pumping station, and 14 acres of intermittent sand filters, is illustrated and described. 2400 w. Eng Rec—Dec. 23, 1905.

Biological.—See **Bacterial.**

Birmingham, Eng.—See **ELECTRIC POWER.**

Bolton, Eng.—See **REFUSE DISPOSAL.**

Bombay, India.—See **Leper Asylum.**

Boston.—Boston's Sewage Disposal Plant. From the "Boston Transcript." Descriptive. 2000 w. Dom Engng—Oct. 15, 1901.

Electro-Pneumatic Control of the Moon Island Sewage Reservoir. Gives a resume of the sewage systems of Boston with an illustrated description of the appliances now in use. 2500 w. Ry & Engng Rev—May 17, 1902.

See also **PUMPING ENGINE.**

Bradford, Eng.—Bradford Sewage and Its Treatment. F. W. Richardson. A paper before the British Assn., describing the peculiar character of the sewage, due to the large quantities of waste liquors from woolen mills and dyeing establishments, and the methods of treatment which have been tried. 4200 w. Eng Rec—Dec. 8, 1900.

Brewery, Eng.—Experiments in Purifying Brewery Refuse. From an account by H. Maclean Wilson of some experiments in the purification of brewery works at Rotherham. 1300 w. Eng Rec—Oct. 8, 1904.

British.—Recent Progress in Sewage Purification in England. Gilbert J. Fowler. Information concerning results of recent practice in England, and experimental work, with conclusions reached. 5000 w. Dom Engng—March 15, 1901.

The Present Status of the Sewage Problem in England. Report of a lecture by L. P. Kinnicutt on current British opinion concerning septic tanks, contact beds and intermittent continuous filters. 1600 w. Eng Rec—March 29, 1902.

The Present Status of the Sewage Problem in England. Prof. Leonard P. Kinnicutt. Discusses septic tanks, contact beds, and intermittent continuous filtration methods in their relation to the bacterial treatment of sewage. Discussion and illustrations. 12,800 w. Jour Assn of Engng Socs—June, 1902.

A Bird's-Eye View of Some Twenty-five British Sewage Works. Brief accounts with general comments. 3000 w. Eng News—May 12, 1904.

Small Sewage Disposal Plants. Illustrated description of four British plants. 1600 w. Engr, Lond—Aug. 5, 1904.

A Recent Visit to Twenty-Four British Sewage Works. M. N. Baker. A report of visits to British sewage purification works, their methods of treatment, and matters of interest. General discussion. 9300 w. Jour Assn of Engng Socs—Dec., 1904.

See also **Bacterial**; and under names of towns and places.

British Commission.—Preliminary Conclusions of the British Royal Commission on Sewage Disposal. The conclusions given relate to the questions of kinds of land available for sewage treatment, whether the new bacterial processes without subsequent land treatment are sufficient, and what should be done for better river protection. 800 w. Eng News—Aug. 15, 1901.

The Second Report of the Royal Commission on Sewage Disposal. Reviews the collection of reports issued by the commission, dealing with some of the bacterial phases of sewage and with the pollution and self purification of the River Severn. 4000 w. Eng News—Oct. 9, 1902.

The Royal Commission on Sewage-Disposal. Reviews the third report of the Commissioners, the evidence already accumulated and conclusions as to methods which may be properly adopted. 3500 w. Builder—July 25, 1903.

The Royal Commission on Sewage Disposal. A review of the Commission's fourth report. Serial. 1st part. 2800 w. Engr, Lond—Oct. 7, 1904.

See also **RIVER POLLUTION—Severn.**

British vs. American.—Sewage Treatment in Great Britain and Some Comparisons with Practice in the United States. M. N. Baker. Introduction to recently published works. Shows the dissimilarity in the conditions affecting the treatment, and gives a summary of the main features of British works recently visited, with conclusions and comments. 2500 w. Eng News—Oct. 6, 1904.

Burnley, Eng.—Septic Tanks and Double Contact Beds at Burnley, England. Describes the sewage works of a cotton weaving town of about 100,000 inhabitants. They include large detritus tanks, septic tanks and double contact beds. 1700 w. Eng News—Oct. 26, 1905.

Burton-upon-Trent.—Sewerage and Sewage Disposal of Burton-upon-Trent. Jonah Walker Smith. A paper published by the Inst. of Civ. Engrs. A description of the work that has been carried out since 1883, describing the conditions previous to that time. The sewage is pumped to a farm and treated by broad irrigation and intermittent filtration. 4300 w. Eng Rec—Jan. 25, 1902.

Cesspools.—A Successful Dry Well. An illustrated description of a sanitary arrangement for taking care of house sewage where no sewers are available. 1200 w. Met Work—Dec. 3, 1904.
See also **Knobloch.**

Charlotte, N. C.—Sewage Purification Plant at Charlotte, N. C. Cecil C. E. Beddoes. A report of the working of an economical plant. Ills. 1800 w. Eng Rec—June 24, 1905.

Chichester, Eng.—Combined Chemical and Biological Sewage Disposal Works at Chichester, England. Description of these works which have been recently enlarged. 2000 w. Eng Rec—Jan. 14, 1905.

Sewage Disposal Works at Chichester. James Saunders. Gives the early history of early sanitary conditions in this old Roman city and an illustrated description of the new sewage disposal works. 3500 w. Public Works—April, 1905.

Cinder Filter Bed.—Some Notes on the Cost of Cinders for Sewage Filter Beds. Ernest McCullough. Practical points on the cost and manipulation of cinders. 2200 w. Eng News—Aug. 18, 1904.

Collingswood, N. J.—Sewage Disposal at Collingswood, N. J. G. Everett Hill. Illustrates and describes a plant with a septic tank and four coke filters. 2200 w. Engng Rec—May 3, 1902.

Columbus, Ohio.—The Ohio State Board of Health on Septic Sewage Disposal. A review of a report refusing permission to Columbus to dispose of its sewage by septic treatment without subsequent filtration. 2100 w. Eng Rec—Feb. 2, 1901.

Progress on the Sewage Works and Water Softening and Purification Works of Columbus, Ohio. Julian Griggs. Abstract of a paper presented before a gathering of municipal organizations, giving information of the progress made on these improvements. 1400 w. Eng News—Sept. 21, 1905.

The Sewage Purification Works at Columbus, Ohio. Julian Griggs. Illustrates and describes the purification works to be built as a result of the investigations during one year to ascertain the most efficient and economical method of purifying the dry weather sewage flow. The method comprises septic tanks, sprinkling filters and settling basins. 3800 w. Eng Rec—Dec. 30, 1905.

See also **Testing Station; SEWAGE—Testing.**

Combined.—The Purification of Sewage Water (Epuration des Eaux d'Egout). G. Richon. A discussion of the use of combined chemical and biological processes, as used in Belgium and in Austria. 2500 w. Génie Civil—Sept. 13, 1902.

Connecticut Commission.—The Connecticut Sewerage Commission on Methods of Sewage Disposal. A statement by a State Board on the merits and disadvantages of sewage disposal by chemical treatment, filtration, septic treatment, and biological filtration. 2500 w. Eng Rec—March 23, 1901.

Annual Reports of the State Sewerage Commissions of Connecticut and New Jersey. Describes the work of the commission in each State, and comments on the reports. 2700 w. Eng News—March 28, 1901.

Contact Bed.—See **Bacterial; Septic Tank.**

Cornell Experiments.—See **Septic Tank Experiments.**

Country Houses.—Sewage Disposal in Summer Resorts. Dr. P. H. Bryce. Simple, inexpensive, practical suggestions for places without sewerage systems. Ill. 2000 w. Can Archt—Oct., 1901.

The Sewage Disposal of Suburban Houses and Public Institutions. Dr. P. H. Bryce. Read at meeting of the Ontario Assn. of Archts. Indicates an efficient and economical method of dealing with all house wastes. 3500 w. Can Archt—Feb., 1902.

A Sewage Disposal System for a Country House. William C. Tucker. Illustrates and describes a sub-surface disposal system for a house with three bathrooms and about twenty-one fixtures. 700 w. Am Arch't—Feb. 22, 1902.

Sewage Purification Plants for Summer Cottages. John W. Alvord. Shows how modern improvements in the septic tank can be adopted for summer resort cottages at small cost. Ill. 600 w. Sci Am Sup—Oct. 17, 1903.

Sewage Disposal for Mansions and Large Country Houses. A. S. Goodridge. Read before the Inst. of San. Engrs. Considers methods of disposal, advocating the natural or earth processes wherever it is possible to apply them. 4000 w. Dom Engng—Dec. 9, 1905.

See also **Cesspool; Seaside; Septic Tank.**

Depew, N. Y.—Sewage Purification Works at Depew, N. Y. G. Everett Hill. Illustrates and describes the system which includes a septic tank, coke primary filters or "contact beds," and stone secondary filters on the wave-bed plan. 1500 w. Eng News—June 26, 1902.

Development.—The Development of Sewage Disposal during the Last Century. Charles Mason. Read before the British Soc. of Engrs. Reviews the various stages through which the theory and practice of sewage purification has passed during the last century. Serial. 1st part. Dom Engng—Jan. 15, 1902.

Draper Co., Hopedale, Mass.—Septic Tanks, Pump Wells, and Filter Beds of the Draper Co., Hopedale, Mass. Leonard Metcalf. Illustrated description of an interesting plant for disposal of the sewage and wastes of a large plant for the manufacture of cotton machinery. 2000 w. Eng News—April 25, 1901.

Dublin.—The Discharge of Sewage into Dublin Harbor, Ireland. Extracts from a paper by William K. Parry and Walter E. Adeney before the Inst. of Civ. Engrs. Gives investigations made and conclusions drawn, and abstract of discussion criticizing the conclusions. 3200 w. Eng Rec—Feb. 14, 1903.

Dwelling.—See **Country House.**

Earth Process.—See **Country House.**

Electric Pumping. — See **Fond-du-Lac; Pittsfield; Saratoga; PUMPING ENGINE—Boston Sewerage; PUMPING STATION—Sewage.**

Elmhurst, N. Y.—Sewage Disposal at Elmhurst, N. Y. Illustrates and describes a recently completed plant on Long Island, designed to treat 1,000,000 gallons of sewage per day by sedimentation and intermittent sand filtration. 2200 w. Eng Rec—July 22, 1905.

England.—See **Bacterial; British; and under names of towns and places.**

Experiments.—See **Septic Tank Experiments; Testing Station; Washington University; York.**

Filter.—See **Cinder Filter Bed; Massachusetts; Stoddart Filter; FILTRATION.**

Filters vs. Contact Beds.—Filters versus Contact Beds in Sewage Purification. W. S. Shields. From a paper before the Indiana Engng. Soc. Considers the septic tank as used in England and America, and the opinions concerning it, and describes filtration plants of interest, especially sand filters, operated intermittently and automatically. Ill. 3000 w. Munic Engng—Feb., 1904.

Sewage Contact Beds Declared Superseded by Percolating or Sprinkling Filters. Prof. Bostock Hill. From a paper read before the British Assn. of Mgrs. of Sewage Disposal Works. Briefly discusses some important points in sewage disposal. 600 w. Eng News—Oct. 19, 1905.

Fond du Lac, Wis.—The Septic Tank System at Fond du Lac. Describes a plant in which sewage is pumped by electric motors, stopped and started automatically, to a septic tank, the effluent of which is discharged either to filter beds or directly into a stream. 800 w. Eng Rec—Feb. 22, 1902.

Sewage Disposal at Fond du Lac, Wisconsin. Irvine Watson. An illustrated detailed description of a septic tank installation. 1700 w. Munic Engng—May, 1902.

Electric Sewage Pumps, Septic Tanks, and Contact Beds at Fond du Lac, Wis. George S. Pierson. Gives general information regarding the city and its sewerage system, with illustrated description of the fine plant recently put in operation. 3000 w. Eng News—May 22, 1902.

Gaol, Victoria, B. C.—See **Jail.**

Gardner, Mass.—The New Sewage Disposal Works at Gardner, Mass. Illustrated description of coke strainers and intermittent filters, with automatic apparatus for discharging sewage over them, operating at 150,000 gallons per acre daily on the filters. 2300 w. Eng Rec—April 12, 1902.

Gas Manufacture.—See **GAS MANUFACTURE—Sewage Sludge.**

German Experiments.—German Experiments with Sewage Treatment by Septic Tanks and Contact Filter Beds. Reports results of experiments extending over 3 1-2 years. 900 w. Eng News—April 10, 1902.

Glasgow.—See **SEWERAGE.**

Glasgow Congress.—Papers on Sewage Purification Read Before the Glasgow International Engineering Congress. Abstract of papers and discussions with editorial comment. 5500 w. Eng News—Oct. 10, 1901.

Glencoe, Ill.—The Septic Tank System at Glencoe, Ill. Illustrated description of septic tanks and filters built to treat 25,000 gallons of sewage daily. 900 w. Eng Rec—Oct. 19, 1901.

Septic Tank and Double Contact Filter Beds for Treating the Sewage of Glencoe, Ill. H. D. Wyllie. Illustrates and describes the works, grit chamber, septic tank, filters, method of working, etc. 800 w. Eng News—Oct. 24, 1901.

Greensboro, N. C.—The Septic Tanks at Greensboro, N. C. W. G. Potter. Brief description of the construction of septic tanks where peculiar difficulties were encountered. Ill. 1200 w. Eng Rec—Dec. 10, 1904.

Hampton, Eng.—The Shone Sewerage System and Bacterial Beds at Hampton, England. Describes a system where all the sewage is pumped by compressed air and purified by contact beds and land treatment. The latter was required by the Local Government Board and effects no purification of the effluent from the beds. 1600 w. Eng Rec—April 27, 1901.

Sewage Disposal at Hampton, England. An explanation of these works, taken from "The Surveyor." 2200 w. Eng Rec—July 22, 1905.

Hebden Bridge, Eng.—Sewage Disposal at Hebden Bridge. Illustrates and describes a new installation in which chemical precipitation forms the principal feature. 1500 w. Engr, Lond—Oct. 23, 1903.

Holland, Mich.—A New Form of Septic Tank for Holland, Michigan. Messrs. Alvord & Shields. Illustrated description of a tank arranged to permit large variations in its capacity to suit the character of sewage to be treated. 1700 w. Eng Rec—March 16, 1901.

Horsham, Eng.—The Biological Disposal of Sewage from Isolated Buildings. Prof. Frank Clowes. Deals with the application of the biological method of treatment to the sewage from the new colony established at Horsham. Ills. Also discussion. 11,800 w. Jour Roy Inst of Brit Archts—Feb. 20, 1904.

Hospital, Eastern Indiana.—Sewage Purification. C. M. Ginther. Remarks on methods of purification with a brief illustrated description of the very successful plant installed at the Eastern Indiana Hospital for the Insane. 1500 w. Sci Am Sup—Aug. 27, 1904.

Indiana Harbor.—Sewer System for Indiana Harbor, Indiana. Otto Gersbach. Describes the plant of a town on Lake Michigan. 1200 w. Eng Rec—April 11, 1903.

Infirmary, Dayton, O.—Sewage Disposal by Intermittent Filtration at the Montgomery Co. Infirmary, Near Dayton, O. Benjamin H. Flynn. Illustrated description of the disposal works, and account of cost. 1000 w. Eng News—Sept. 12, 1901.

Intermittent Filtration.—See **Massachusetts**; **Pittsfield.**

Iowa.—Sewage Disposal in Iowa. Prof. A. Marston. Information and illustrated descriptions of plants in various parts of the state. Discussions. 12,300 w. Jour W Soc of Engrs—Dec., 1903.

Irrigation.—See **Jail**; **SEWAGE FARM.**

Italy.—An Early Example of Combined Septic Treatment and Filtration of Sewage. Describes small installations in Italy made prior to 1890. 1200 w. Eng Rec—March 30, 1901.

Ithaca, N. Y.—See **Septic Tank Experiments.**

Jail, Victoria, B. C.—Sewage Disposal at Provincial Gaol, Victoria, B. C. E. Mohun. Drawing and description of the method adopted in an isolated plant. 1100 w. Can Soc of Civ Engrs, Adv proof—Dec., 1903.

Septic Tank and Broad Irrigation for Sewage Disposal at the Provincial Jail, Victoria, B. C. Brief illustrated description. 500 w. Eng News—March 3, 1904.

Knobloch Cesspool.—The Knobloch Cesspool (Die Knobloch'sche Senkgrube). Prof. O. Richter. Illustrated description of a biological chemical process for purifying cesspool contents. 1 plate. 1500 w. Oest Wochenschr f d Oeff Baudienst—Aug. 26, 1905.

La Grange, Ill.—The Septic Tank at La Grange, Ill. William B. Ewing. Briefly describes this system of sewerage, and gives an account of the developments following the beginning of use of the tank. Ill. 1300 w. Eng Rec—Feb. 21, 1903.

Leper Asylum, Bombay.—Sewage Disposal at a Leper Asylum. Outlines an interesting and instructive series of experiments carried out at the Matunga Leper Asylum, at Bombay, as given in a recent report by C. C. James. 3500 w. Engr, Lond—Oct. 11, 1901.

Liberty, N. Y.—A New Septic Sewage Disposal Plant. Colin R. Wise. Illustrated description of the construction and operation of the plant at Liberty, N. Y. 2000 w. Munic Engng—July, 1901.

Liernur.—See **SEWERAGE.**

London.—The Treatment of London Sewage. Frank Clowes. On the advantages of bacterial treatment, giving information based on personal experiments and observation. Also discussion. 7000 w. Jour Soc of Arts—Dec. 14, 1900.

Bacterial Treatment of London Sewage and American Sewage Disposal Problems. Editorial discussion of the report of Dr. Clowes and Dr. Houston, relating to the London experiments. 1800 w. Eng News—Jan. 24, 1901.

See also **Middlesex.**

Madison, Wis.—The New Sewage Disposal Plant at Madison, Wis. F. E. Turneaure. Read before the Am. Soc. of Munic. Eng. An account of the various methods tried, the plant built and condemned, and a description of the plant in progress of construction, consisting of a septic tank and rapid filter. 3700 w. Eng News—Oct. 17, 1901.

Mairich.—See **Ohrdruf, Germany.**

Manchester, Eng.—Modern Methods of Sewage Purification. Information from the recent annual report of the Connecticut Sewerage Commission, concerning the experiments at Manchester, Eng. Ill. 2200 w. Munic Engng—May, 1901.

The Management of Septic Tanks and Bacterial Contact Beds. Gilbert J. Fowler. From a paper read before the Royal Inst. of Public Health, and published in the London "Contact Journal." Gives results of experience at Manchester, Eng., discussing the destruction of sludge, the production of an easily vitrified effluent, reduction of suspended matter, etc., etc. 2800 w. Eng News—Sept. 19, 1901.

The Treatment of Manchester Sewage. G. J. Fowler. Abstract of a paper read before the Sanitary Inst. Congress. Gives an account of experiments carried out to determine the best treatment for the sewage of this city, and the conclusions reached. Serial. 1st part. 3200 w. Engng—Oct. 10, 1902.

The Operation of the Sewage Works of Manchester, England, 1904-5. A report of the operation of remodelled sewage works. 1700 w. Eng News—Nov. 2, 1905.

See also **Screening Apparatus.**

Manila.—See **SANITATION.**

Marion, Iowa.—The Septic Tank at Marion, Iowa. Illustrated description of the concrete septic tank of a city of 4,200 population, the septic effluent being discharged directly into a small brook. 1400 w. Eng Rec—April 6, 1901.

Massachusetts.—A Description of Sewage Disposal Systems in Massachusetts. X. Henry Goodnough. Reviews the progress of sewage disposal in the State, and gives brief illustrated description of the more important plants. 4700 w. Jour Assn of Engng Soc's—May, 1904.

Adaptability of the Massachusetts Method of Intermittent Sand Filtration to Sewage Disposal Problems in Other States. F. Herbert Snow. Discusses the part the Massachusetts State Board of Health has taken in placing the art of sewage disposal on a scientific basis, and considers four typical problems outside of the State. Discussion, including also Mr. Goodnough's paper. 11,000 w. Jour Assn of Engn Soc's—May, 1904.

See also **SEWAGE—Effluent Stability.**

Massachusetts Experiments.—The Septic Tank Experiments of the Massachusetts State Board of Health. A review of experiments indicating that a septic tank may be a useful adjunct to filters, but that anaerobic action may be carried too far. Also describes experiments with very rapid filtration through 10 1-2 ft. of broken stone, giving remarkable results. 2800 w. Eng Rec—Dec. 22, 1900.

Mechanical Aids.—Mechanical Aids to Sewage Purification. Illustrated description of apparatus whereby sewage itself can aid in its own purification, the flow of the sewage furnishing the motive power for the periodic feeding of filter beds. 2000 w. Engr, Lond—Nov. 16, 1900.

Mersey-Irwell, Eng.—Improvements of the Mersey and Irwell Rivers, England. Explains the results attained after 10 years of government oversight of the sewage purification works in an English water-shed. 800 w. Eng Rec—July 26, 1902.

Middlesex, Eng.—New Sewage Disposal Works in Middlesex. Reginald Brown. Illustrated detailed description. 2400 w. Public Works—Jan., 1905.

See also **London.**

Milton, Mass.—Drinking Water from Sewage. Describes a plant at Milton, Mass., showing how a septic tank converts household waste into a wholesome water supply. 2500 w. Dom Engng—Dec. 15, 1901.

Minworth Greaves, Eng.—Sewage Purification Works Under Construction at Minworth Greaves, England. Information from a paper by A. Bryan, before the Assn. of Munic. Co. Engrs. Describes the intake chamber, experimental beds, percolating beds, the use of aerated floors, etc. 3800 w. Eng Rec—Oct. 8, 1904.

Mitchell.—The Mitchell System of Sewage Disposal. Describes works involving sedimentation followed by rapid filtration combined with aeration. 800 w. Eng Rec—June 14, 1902.

Mosman Septic Tanks.—See **Sydney.**

New Haven, Conn.—The Efficiency of the New Haven Sewerage System. Frederick Jackson. From a paper before the Conn. Assn. of Civ. Engrs. Explains the method used to determine the efficiency of this sewerage system. 2500 w. Munic Engng—July, 1905.

New Jersey Commission.—See Connecticut Commission; New York Bay; RIVER POLLUTION.

Newton, Mass.—See PUMPING STATION.

New York Bay.—Report of the New York Bay Pollution Commission. Extracts from the report, showing reasons for the unqualified disapproval of the Passaic Valley trunk sewer scheme. Editorial also. 5500 w. Eng News—May 1, 1905.

Sewage Discharge into New York Bay. Review of the report of the New York Bay Pollution Commission. Map. 2700 w. Eng Rec—May 6, 1905.

1900.—See SANITARY ENGINEERING.

Nitrification.—The Nitrifying Organisms in Sewage Filters. Dr. Schultz-Schultzenstein. Translated from the German. Describes investigations, isolating and studying the nitrifying bacteria in sewage filters, and comparing them with nitrifying organisms in cultivated fields. 7800 w. Tech Qr—June, 1904.

Nuneaton, Eng.—Sewage Disposal Works at Nuneaton, England. Describes a system which deals successfully with sewage receiving waste from the works of wool scourers, fell-ongers and hat factories. 1400 w. Eng Rec—Oct. 4, 1902.

Ohio.—Sewage Purification Plants in Ohio. Information from the annual report of the State Board of Health of Ohio, with illustrations of some of the plants. 2500 w. Munic Engng—April, 1905.

Sewage Purification with Special Reference to the Problem in Ohio. R. Winthrop Pratt. Gives a brief account of the general history and theory of sewage purification, and states the geological conditions in Ohio which affect this problem, describing some of the principal Ohio plants. Ills. 10,500 w. Jour Ass'n of Engng Socs—June, 1905.

Ohrdruf, Germany.—The Mechanical Purification of Sewage (Ueber Anstalten zur Mechanischen Reinigung der Abwasser). Dr. Th. Weyl. Describing especially the installation of the Mairich system at Ohrdruf near Gotha. 2000 w. 1 plate. Gesundheits-Ingenieure—Nov. 15, 1902.

Oswestry, Eng.—Sewage Disposal at Oswestry, Eng. Information concerning a contact-bed system. 1600 w. Eng Rec—July 6, 1901.

Oyster Pollution.—On the Sterilisation of Effluents. Samuel Rideal. A discussion of this subject with special reference to oysters and other shellfish, and to watercress beds. Also discussion. 17,600 w. Jour Roy San Inst—Aug., 1905.

Concerning Sewage Disposal from the Standpoint of Pollution of Oysters and Other Shellfish, and Especially with Reference to Their Transmission of Typhoid Fever. George W. Fuller. A concise summary of the most prominent instances of epidemics of typhoid fever and other diseases due to polluted oysters and other shellfish. Suggestions for correcting this danger. Discussions. 16,000 w. Jour Fr Inst—Aug., 1905.

Paris Exposition.—See SEWERAGE.

Pasadena, Cal.—Scientific Disposition of Sewage. Charles F. Holder. Describes the very successful disposition of sewage from the city of Pasadena, Cal. 1700 w. Sci Am—Oct. 22, 1904.

Passaic River, N. J.—See Connecticut Commission; New York Bay; RIVER POLLUTION.

Pawtucket, R. I.—The Septic Tank Experiments at Pawtucket. Describes experiments covering 10 months and dealing with a very strong sewage. 1800 w. Eng Rec—Feb. 16, 1901.

Old and New Methods of Sewage Purification at Pawtucket, R. I. Summary from a paper by George A. Carpenter, of work with the septic tank and with bacteria beds, and the intermittent sand filters. 2500 w. Eng News—Feb. 27, 1902.

Pittsfield, Mass.—The New Sewage Disposal Works at Pittsfield, Mass. An illustrated description of the new plant to take the place of the temporary outlets into the Housatonic River. 1800 w. Eng News—April 24, 1902.

Pittsfield Sewage Disposal Plant. Illustrates and describes the new system on the plan of intermittent filtration. 1300 w. Fire & Water—May 3, 1902.

The Intermittent Sewage Filters at Pittsfield, Mass. Illustrated description of a system of storage tanks, electric pumps and intermittent filters of 25 acres extent. 1300 w. Eng Rec—May 10, 1902.

See also PUMPING STATION—Electric, Sewage.

Plainfield, N. J.—Septic Tanks and Contact Beds at Plainfield, N. J. Andrew J. Gavett. An illustrated description of a new plant consisting of two septic tanks and a double set of bacterial contact beds. 1700 w. Eng Rec—Nov. 16, 1901.

Pneumatic.—See SEWERAGE—Liernur.

Providence, R. I.—The Sewage Precipitation Works at Providence. Illustrated description of 20 concrete tanks, 5 sludge reservoirs, press house, chemical building and laboratory forming the works for the chemical treatment of the Providence sewage before it is discharged into the river. 2900 w. Eng Rec—May 4, 1901.

Sewage Disposal in Providence. Illustrated description of a plant employing the chemical precipitation method, its cost and operation. 1500 w. Munic Jour & Engr—Dec., 1901.

Residential.—See Country House; Seaside; Septic Tank.

Rome City, Ind.—Sewage Purification Works at Island Park Resort, Rome City, Ind. George S. Pierson. Illustrated description of plant, consisting of a septic tank, combined with purification beds. 1000 w. Eng News—July 21, 1904.

Rotherham, Eng.—See Brewery.

Salford, Eng.—The Salford Sewage Works. J. Corbett. Abstract of a paper before the Sanitary Inst. Congress at Manchester, Eng. An account of some of the most interesting results of sewage purification experiments. 3000 w. Engng—Dec. 26, 1902.

Saltley, Eng.—The Disposal of Sewage Sludge at Saltley, England. George A. Hart. Illustrated description of a recent experience in sewage and sludge disposal at the Saltley outfall works of the Birmingham, Tame and Rea District Drainage Board. 3500 w. Eng Rec—Nov. 5, 1904.

Santa Monica, Cal.—See Soldiers' Home.

Santa Rosa, Cal.—A Dozen Years' Experience in Sewage Purification at Santa Rosa, Cal. Reviews the early experiences and describes the combination of septic tanks, settling tank, and upward filtration now in use. Ill. 1000 w. Eng News—Oct. 2, 1902.

Saratoga, N. Y.—Sewage Disposal at Saratoga Springs, N. Y. Illustrated detailed description of recent improvements, embracing slow sand filtration beds in connection with septic tanks, a new main sewer, a small pump well and pumping station, an installation of electrically driven centrifugal pumps, etc. 4500 w. Eng Rec—Jan. 21, 1905.

The Sewage Disposal Works at Saratoga, N. Y. F. A. Barbour. Explains the conditions to be met, and gives an illustrated detailed description of the plant and its construction. It includes a new main sewer, the building of a small pump well and pumping station, the lifting of the sewage 15 feet by centrifugal pumps, the laying of a 9,000 foot force main, the building of a septic tank of 1,000,000 gals. capacity, and the construction of 18 acres of sand filters. 9500 w. Jour Assn of Engng Socs—Feb., 1905.

Screening Apparatus.—New Sewage Screening Apparatus at Manchester. A description of works for removing detritus from the sewage before it passes through the disposal works. 1000 w. Eng Rec—Nov. 16, 1901.

Seaside.—Seaside Sewage Disposal. Arthur J. Martin. Abstract of a paper before the Royal Institute of Public Health (British), giving a general review of sewage disposal of seaside towns. 1500 w. Eng News—Aug. 25, 1904.

Sewage Disposal. J. N. McClintock. Describes a plant at a seaside cottage to prevent pollution of the water where sea bathing is permissible. 1200 w. Munic Engng—Nov., 1904.

Septic Tank.—The Function of the Septic Tank in Sewage Purification (Ueber Zweck und Bedeutung des Faulraumes bei Abwasserreinigungs-Anlagen). Dr. O. Kröhnke. A general discussion of the septic tank, showing the conditions under which it may be useful. 3500 w. Gesundheits-Ingenieur—Jan. 15, 1901.

Sewage Disposal and Water Purification. John N. McClintock. Read before the Am. Soc. of Munic. Imp. Describes a septic tank system for sewage disposal, and explains its working, applying also the same principle to the purification of water. 4800 w. Dom Engng—March 15, 1901.

The Antecedents of the Septic Tank. Leonard Metcalf. Treats of the evolution and antecedents of the septic tank in their bearing upon and relation to the collateral patent question and the claims being made. 5700 w. Pro Am Soc of Civ Engrs—May, 1901.

The Antecedents of the Septic Tank. Discussion of paper by Leonard Metcalf. 5200 w. Pro Am Soc of Civ Engrs—Nov., 1901.

The Purification of Sewage by Septic Tanks and Various Supplemental Processes. W. S. Shields. A paper, slightly condensed, read before the Illinois Soc of Engrs. & Surveyors. Gives experience with plants at Wauwatosa, Wis., and Lake Foust, Ill., with general remarks. 1800 w. Eng News—Jan. 30, 1902.

The Purification of Sewage. W. S. Shields. Slightly condensed from a paper read before the Illinois Soc. of Engrs. & Surv's. Describes the principles involved in the design of a number of American septic disposal systems. 2200 w. Eng Rec—Feb. 8, 1902.

The Purification of Sewage. W. S. Shields. Read before the Illinois Soc. of Civ. Engrs. & Surv's. Information from the writer's experience concerning septic tanks as a means for the purification of sewage. 2500 w. Munic Engng—June, 1902.

Management of the Septic Tank. Extracts from a paper read before the Royal Inst. of Public Health. Discusses the objects of careful management of septic tanks and contact beds. 3300 w. Dom Engng—April 15, 1902.

Residential Septic Tanks. Burton J. Ashley. Presented to the Am. Soc. of Munic. Imp. Describes an arrangement for sewer service which proved an excellent septic tank, and the application of the idea on the extensive scale with satisfactory results. 2200 w. Eng Rec—Oct. 11, 1902.

Sewage Purification by Septic Tanks. M. J. McGuigan. Gives an illustrated description of the successful septic tanks at Vancouver, B. C., their construction and operation. 1200 w. Munic Jour & Engr—Dec., 1902.

The Septic Tank: Its Place in the Treatment of Sewage. Leonard P. Kinnicutt. Explains the result of septic action on sewage, and the effect when used with intermittent filtration beds, considering that in most cases it is a valuable adjunct. 1700 w. Eng Rec—Jan. 3, 1903.

The Septic Treatment of Sewage. Benjamin H. Flynn. Reviews the operation of this system, giving details of construction. 2800 w. Munic Jour & Engr—Jan., 1903.

Design for Septic Tank (Vorschlag einer Faulkammer). H. Schnack. Plans for septic tank and filters for 10,000 liters of sewage in 24 hours by intermittent treatment. 1500 w. 1 plate. Gesundheits-Ingenieur—Jan. 10, 1904.

The Use of the Septic Tank in Connection with Sewage Disposal Works. Frank A. Barbour, with discussion. Refers to several plants, and concludes that facts justify the further use of this system. 18,000 w. Jour Assn of Engng Soc's—May, 1904.

Septic Tank Sewage Disposal. A record of the practical working of the system, based on six years' experience. 3000 w. Munic Jour & Engr—Dec., 1904.

See also **Acid Sewage; Automatic Regulators; Bacterial; Burnley; Columbus, O.; Draper Co.; Fond du Lac; Glencoe, Ill.; Greensboro; Holland, Mich.; Italy; Jail, Victoria, B. C.; La Grange; Manchester; Marion, Ia.; Massachusetts Experiments; Milton, Mass.; Pawtucket, R. I.; Soldiers' Home; Sydney, N. S. W.; Vancouver; Wauwatosa, Wis.; Woonsocket, R. I.; SEWERAGE.**

Septic Tank Experiments.—Experiments on Septic Tank Action at Cornell University. R. B. Williams, Jr. Illustrates and describes the experimental plant for the study of the effects of the various rest periods. 1200 w. Eng News—June 13, 1901.

Experimental Septic Tanks at Ithaca, N. Y. Facts from a thesis by R. B. Williams, Jr., concerning the principles governing the septic-tank method of sewage disposal. Ill. 2500 w. Eng Rec—Jan. 11, 1902.

Shelby, O.—Sewage Disposal at Shelby, Ohio. Benjamin H. Flynn. Illustrated description of the purification works which consists of two sludge pits, a settling basin and two intermittent filters of cinder and gravel. 1600 w. Eng News—Nov. 20, 1902.

Shone Ejector.—See **Worcester, Mass.**

Shone System.—See **Hampton, Eng.; SEWER VENTILATION—Fan System.**

Small Communities.—Sewage Purification Works for Small Populations. Arthur J. Martin. Read before the Inst. of San Engrs. States some difficulties met with in dealing with sewage of small communities and the requirements of such plants. 5300 w. Builder—Oct. 22, 1904.

Soldiers' Home, Santa Monica.—The Septic Tank for the Treatment of Sewage at the Soldiers' Home Near Santa Monica, Cal. James D. Schuyler. Illustrated description of the tank with statement of its operation. 3000 w. Munic Engng—Jan., 1904.

Stoddart Filter.—The Continuous Filtration of Sewage. Editorial reviewing the continuous sewage filter of F. Wallis Stoddart. 1600 w. Engng—Dec. 13, 1901.

The Stoddart Continuous Sewage Filter. Describes a continuous filter which, it is claimed, may be worked at unusual high rates, with no devices for artificial aeration. Gives results of experience. Ill. 2800 w. Eng Rec—Aug. 23, 1902.

Sydney, N. S. W.—The Mosman Septic Tanks, Sydney, N. S. W. Notes from the official report of L. A. B. Wade concerning the construction of four septic tanks, a grit chamber, eight filter beds and two gear chambers. 1000 w. Eng Rec—April 22, 1905.

See also **SEWERAGE.**

Tankage.—The Tankage of Sewage. F. Wallis Stoddart. Read before the Roy. Inst. of Pub. Health. A discussion of sewage treatment, describing experiments showing the effect of rate of flow, tank capacity, &c. 4200 w. Eng Rec—Nov. 18, 1905.

Testing Station, Columbus, O.—The Sewage Testing Station at Columbus, Ohio. John H. Gregory. An illustrated detailed description of the station and its equipment. 2400 w. Eng News—Oct. 20, 1904.

Vancouver, B. C.—The Vancouver, B. C., Septic Tanks. Illustrated description of tanks for treating the sewage before discharging it into salt water. 400 w. Eng Rec—Oct. 12, 1901.

Washington University Experiments.—The Proposed Septic Tank and Sewage Purification Studies at Washington University. Reviews the past work in this field, and the proposed further experiments. 2300 w. Eng News—Nov. 15, 1900.

Wauwatosa, Wis.—Sewage Disposal at Wauwatosa, Wis. Illustrated description of septic tank and filtration works containing a new system of automatic control of the flow to the several filter beds. 1300 w. Eng Rec—Dec. 14, 1901.

Winter.—Winter Treatment of Sewage Beds. Information from several sewage plants in various parts of the United States which have been successfully operated. Ill. 1800 w. Eng Rec—Nov. 14, 1903.

A Winter Visit to Some Sewage Disposal Plants in Ohio, Wisconsin, and Illinois. C. E. A. Winslow. Report on what was seen at about a dozen plants under the most unfavorable conditions of operation. Discloses inefficiency in the winter operation of many of the plants. General discussions. Ills. 11000 w. Jour Assn of Engng Socs—June, 1905.

Woonsocket, R. I.—Results Obtained with Large Experimental Septic Sewage Tanks and Rapid Filtration at Woonsocket, R. I. George A. Carpenter. Abstract of paper read before the League of American Municipalities at Charleston, S. C. 1200 w. Eng News—Dec. 20, 1900.

Worcester, Mass.—Shone Ejector Plant at Worcester, Mass. Harrison P. Eddy. Describes the schemes for disposal of sewage in this district, especially the plant for the Worcester Highlands. 1200 w. Eng Rec—Feb. 28, 1903.

Notes on the Sewerage System of Worcester, Massachusetts. Concerning the construction work carried on during 1903, and the maintenance and operation of the disposal plant. Ills. 2500 w. Eng Rec—April 23, 1904.

Extensions of the Worcester Sewage Disposal Works. Illustrates and describes these works, which are the largest in the United States, and probably marked by the greatest variety of methods. The sewage is of peculiar character due to the presence of iron salts from wire mills. 2500 w. Eng Rec—June 24, 1905.

See also **Acid Sewage; SEWERAGE.**

York, England.—Sewage Purification Experiments at York, England. A review of the report of Mr. Alfred Creer, concerning careful investigations made. 3300 w. Eng Rec—Sept. 6, 1902.

SEWAGE FARM.

See also **SEWAGE DISPOSAL; SEWERAGE.**

Aldershot, Eng.—Aldershot Camp Sewage Farm. Describes a sewage farm that has been both a success and a failure, while all the conditions remained the same excepting—the management. Ill. 5000 w. Engng—Nov. 30, 1900.

Burton-upon-Trent.—See **SEWAGE DISPOSAL.**

England.—Some Observations of Sewage Farming in England. A résumé of facts regarding sewage farming, describing some of the farms visited. 3800 w. Eng News—April 21, 1904.

Freiburg.—The Sewage Fields of Freiburg i. B. (Das Rieselfeld für die Städtischen Kanalwasser von Freiburg i. B.). Dr. P. Kresnik. An illustrated description of the sewage farms in operation since 1891. 2000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—June 25, 1904.

Melbourne, Australia.—See **SEWERAGE.**

Pasadena, Cal.—The Pasadena, Cal., Sewer Farm. T. D. Allin. A description of the simple method of sewage disposal which has proved satisfactory from a sanitary standpoint, and remunerative from a financial standpoint. 2200 w. Eng Rec—Feb. 11, 1905.

Reading, Eng.—Reflections on Sewage Farming Suggested by Experiences at Reading, England. Editorial on sewage treatment and a review of a report on the operation of the Reading sewage farm. 3000 w. Eng News—Nov. 16, 1905.

Tropical Countries.—The Use of Sewage for Irrigation After Treatment in Septic Tanks in Tropical Countries. E. O. Mawson. Deals with small schemes, suitable for medium-sized towns, showing how the sewage can be turned to profit. 3000 w. Feilden's Mag—Dec., 1903.

SEWAGE PUMP.

See **PUMP; PUMPING ENGINE; PUMPING STATION; SEWAGE DISPOSAL; SEWERAGE.**

SEWAGE PURIFICATION.

See **SEWAGE DISPOSAL; WATER PURIFICATION.**

SEWAGE WORKS.

See **SEWAGE DISPOSAL; SEWAGE FARM; SEWERAGE.**

SEWER

See also **DRAINAGE; MUNICIPAL ENGINEERING; PLUMBING; SANITARY ENGINEERING; SEWAGE; SEWAGE DISPOSAL; SEWERAGE; TUNNEL.**

Aberdeen.—See **SUBWAY.**

Altoona.—See **Cleaning.**

Body-Crazing.—Causes of Body Crazing in Sewer Pipe. Walter A. Hull. Abstract of a paper read before the Am. Ceramic Assn. Describes the clay used in the factory where the observations were made, and the trouble with body-crazing, giving a study of the causes and the preventive measures. 3800 w. Eng Rec—Aug. 19, 1905.

Boston, Mass.—American Sewer Design and Construction. John S. Hodgson. With special reference to the metropolitan main drainage works, of Boston, Mass. 7500 w. Munic Jour & Engr—Dec., 1905.

See also **Flow.**

Breakage.—Breakage in Sewer Pipes. Information from a paper by Mr. Alexander Potter, of New York, read before the Boston Society of Civil Engineers. 1600 w. Eng Rec—Oct. 28, 1905.

Breakage in Sewer Conduits: Its Cause, Effect and Prevention. Alexander Potter. Gives information based on a study of the Joint Trunk Sewer in New Jersey. Also discussion. 9500 w. Jour Assn of Engng Socs—Dec., 1905.

Bridge Pier.—Building a Sewer Under a Bridge Pier. Illustrated description of the method of supporting one column of a 4-post bent of a heavy viaduct while a 16 1-2 ft. sewer was built below it. 700 w. Eng Rec—Dec. 1, 1900.

Brooklyn, N. Y.—Sewer Tunneling in Fine Sand in Brooklyn. Illustrated description of the heavy timbering required for a 3 1-2 ft. brick sewer in running sand. 1900 w. Eng Rec—April 27, 1901.

The 14th Ave. Sewer and 60th St. Sewer Tunnel Work, Brooklyn, N. Y. Illustrates and describes interesting sewer work through fine sand carrying considerable water. Also deep manhole construction. 800 w. Eng News—Oct. 10, 1901.

Relief Sewer Extension in Brooklyn. An illustrated description of difficult sewer reconstruction. 800 w. Eng Rec—May 31, 1902.

The 64th St. Sewer Tunnel and Outlet Sewer, Brooklyn, N. Y. An illustrated description of this work and information relating to it. 3800 w. Eng News—Jan. 1, 1903.

A Difficult Sewer Crossing Under an Old Aqueduct in Brooklyn. Brief description of a delicate piece of engineering. A 36-inch pipe sewer was forced by means of hydraulic jacks, under the big Ridgewood aqueduct. Ill. 900 w. Eng Rec—May 30, 1903.

Construction of the Sixty-fourth Street Sewer Tunnel, Brooklyn. An illustrated description of a special arch-timber method of tunneling. Serial. 1st part. 3200 w. Eng Rec—Nov. 21, 1903.

Extensions of Brooklyn Sewerage System: Avenue G Trunk Sewer. An illustrated detailed description of deep-trench work and sewer construction. Serial. 1st part. 2800 w. Eng Rec—April 16, 1904.

Extensions of the Brooklyn Sewerage System: Ninety-second Street Trunk Sewer. Begins an illustrated detailed description of a large sewer under construction, which will drain a territory of about 1,904 acres. Serial. 1st part. 4000 w. Eng Rec—April 30, 1904.

Extensions of the Brooklyn Sewerage System: Sixtieth Street Sewer. Describes the construction of a sewer built in open cut, although the trench has a maximum depth of 43 ft., and the minimum depth is 34 ft. 2000 w. Eng Rec—May 21, 1904.

Extensions of the Brooklyn Sewerage System: Foster Avenue Trunk Sewer. Describes two sections extending eastward from the Sixtieth street sewer. 2400 w. Eng Rec—May 28, 1904.

The Scheme of the Extensions of the Brooklyn Sewerage System. Map, with a statement of the general scheme, based upon the report of the chief engineer. 3300 w. Eng Rec—June 11, 1904.

Large Relief Sewers in Brooklyn. Illustrates and describes improvements in the old sewer and the trap basin at the head of Gowanus Canal, and the construction of relief sewers. 4800 w. Eng Rec—July 16, 1904.

Sewer Construction in Brooklyn. Explains the complications that have made necessary a number of large relief sewers, and much reconstruction of the existing sewers. 1700 w. Ills. Eng Rec—Dec. 2, 1905.

See also **Siphon, Brooklyn.**

Cardiff, Eng.—The Design of a Main Outfall Sewer. Notes from a paper by W. H. Haigh, in the Pro. of the Inst. of Civ. Engrs, concerning a sewer leading to Bristol Channel from one of the three drainage districts of Cardiff. 4000 w. Eng Rec—Nov. 19, 1904.

Chicago.—Notes on Designing Chicago Sewers. C. D. Hill. Gives a table and diagram, compiled from the experience of the writer, giving much information of value; reviews the history of the development of Chicago sewers; considers the influence of slope, and presenting conclusions. General discussion follows. 10600 w. Jour W Soc of Engrs—Oct., 1902.

Suggested Improvement of the Sewer System of Chicago. Extracts from an address by George W. Jackson, relating to the present condition and proposed improvements. 1200 w. Eng News—Dec. 11, 1902.

The Chicago Intercepting Sewer System. An illustrated general description of the various sections and the present conditions of the work on the intercepting sewer system. 5000 w. Eng News—May 28, 1903.

Construction of Part of the Intercepting Sewers of Chicago. W. A. Shaw considers the section lying east of the Illinois Central railway tracks, between 39th and 51st Sts.; and a paper from the late Guy Miltimore considers the section between 51st and 63d Sts. Ills. Short general discussion. 10000 w. Jour W Soc of Engrs—Feb., 1905.

Progress in the Work of Turning Chicago's Sewage Away from Lake Michigan. Editorial review of the present situation, and the work in progress on the intercepting sewer system. 1400 w. Eng News—Nov. 9, 1905.

See also **Concrete; TUNNEL—Shield, Hastings, Chicago.**

Cleaning.—The Cleaning and Flushing of Sewers. From a discussion at the annual meeting of the Sanitary Section of the Boston Society of Civil Engrs. 1200 w. Eng Rec—April 30, 1904.

The Cleaning and Flushing of Sewers. Discussion by the Sanitary Section of the Boston Society of Civil Engineers at the meetings of March 2 and April 13, 1904. 23400 w. Jour Assn of Engng Socs—Oct., 1904.

Cleaning, Altoona.—Cleaning an Altoona Sewer. Illustrated description of the method employed on about a mile of 30-inch pipe sewer and 44x33-in. brick sewer. 900 w. Eng Rec—Feb. 8, 1902.

Cleaning, Columbus.—See **Maintenance.**

Cleaning, Hartford, Conn.—Cleaning a Large Brick Sewer in Hartford, Conn. Frederick L. Ford. Describes the methods and gives the cost of cleaning 9,300 ft. of 3 to 6 ft. sewers. 1000 w. Eng Rec—Feb. 16, 1901.

Cleaning Tools.—Tools Used in Cleaning Sewers. Ben. E. Briggs. Illustrates and describes tools used at Erie, Pa. 900 w. Munic Engng—Dec., 1904.

Cleveland, O.—A Large Concrete-Steel Sewer. Brief illustrated description of the Cleveland intercepting sewer, being built of concrete reinforced with steel rods. 1000 w. Eng Rec—Aug. 29, 1903.

The Main Intercepting Sewers of Cleveland, Ohio. Walter C. Parmley. An account of this undertaking and some of the engineering features and problems connected with it. Ills. 9500 w. Jour Assn of Engng Socs—Nov., 1904.

The Cost of Reinforced Concrete Sewers. Information given by Walter C. Parmley in a recent paper before the Boston Soc. of Civ. Engrs., referring to work done on sewers in Cleveland during the last three years. 1500 w. Eng Rec—April 8, 1905.

The Walworth Sewer, Cleveland, Ohio. Walter Camp Parmley. Complete description, very fully illustrated, of the largest sewer in Cleveland. 20,000 w. Pro Am Soc of Civ Engrs—Aug., 1905.

The Walworth Street Sewer Tunnel, Cleveland. Illustrates and describes difficult construction work in building a tunnel under the tracks of the Big Four R. R., through very soft, wet ground. 1000 w. Eng Rec—Sept. 28, 1901.

Sewer Tunneling with a Shield in Cleveland. J. M. Estep, in the "Polytechnic." An interesting account of the construction of a sewer under conditions that make the work very expensive. 1800 w. Eng Rec—May 6, 1905.

Coldwater, Mich.—See **Concrete.**

Columbus, O.—See **Maintenance; SEWAGE DISPOSAL.**

Concrete.—Concrete Sewer Construction at Coldwater, Mich. Harry V. Gifford. Illustrated description of the methods used, and a report of tests of materials and other information. 2400 w. Eng News—Jan. 30, 1902.

The Use of Concrete in Sewer Construction. Harry V. Gifford. Read before the Mich. Engng. Soc. Describes a sewer built at Coldwater, Mich., giving a full account of the work with illustrations. 3000 w. Munic Engng—March, 1902.

Heavy Sewer Construction in Concrete. E. J. McCaustland. Illustrated description of work carried out as a part of the preliminary construction made necessary by the location of the Chicago Clearing Yards. 5000 w. Trans Assn of Civ Engrs of Cornell Univ—1902.

Concrete in Sewer Construction. W. C. Parmley. Discusses the advantages of concrete as a material aid in comparative cost, and gives notes from personal experience. 4500 w. Cement Age—May, 1905.

The Use of Concrete in Sewer Construction. W. C. Parmley. States the advantages of concrete sewers over brick masonry, and gives notes and observations of personal experience in the construction of concrete sewers. Illustrations and general discussion. 12,000 w. Jour Ass'n of Engng Socs—June, 1905.

See also **Concrete Reinforced; Truro, N. S.**

Concrete, Brick Arch.—See **Medford, Mass.**

Concrete Reinforced.—A Reinforced Concrete Sewer. Illustrated description of an 8x14-ft. sewer wholly of concrete, the roof being strengthened by concrete-steel beams. 800 w. Eng Rec—April 12, 1902.

Concrete Sewers. Walter C. Parmley. Illustrates and describes a system of concrete and steel construction devised by the writer. 1000 w. Engng—April, 1903.

A New Form of Reinforced Concrete Block Sewer Construction. An explanation of the construction and a statement of the advantages claimed. Ills. 1200 w. Eng News—Jan. 5, 1905.

See also **Cleveland, O.; Harrisburg, Pa.; Wilmington, Del.; CONCRETE REINFORCED—Pipes.**

Connections.—Making Sewer Connections. Discusses the connecting of house drains, intercepting traps, air inlets, &c. Ill. 2500 w. Met Work—Feb. 1, 1902.

See also **Details; PLUMBING.**

Contractor's Records.—Sewer Contractor's Records. Ernest McCullough. Describes a method developed by the writer. 900 w. Eng News—May 19, 1904.

See also **COST-KEEPING.**

Cost.—The Computation of the Cost of Pipe Sewers by Formulae. W. G. Kirchoffer. Demonstration showing that the average cost of pipe sewers varies as the square of the depth of the trench in which it is laid. 3000 w. Wis Engr—Jan., 1901.

Estimation of the Cost of Sewer Construction. Emmett Steece. Read before the Am. Soc. of Munic. Imp. Gives an estimate of the cost of various kinds of work required in the construction, with diagrams. 2400 w. Munic Engng—Dec., 1901.

Darmstadt, Germany.—The Design and Construction of the Proposed Sewer System for Darmstadt (Der Bau von Entlastungs Kanälen und die Grundlagen des Neuprojektes der Kanalisation von Darmstadt). H. Heyd. With map, showing the location of collectors, and the details of drainage. 6000 w. 1 plate. Gesundheits-Ingenieur—April 30, 1904.

The Proportioning of Municipal Sewerage Plants (Die Berechnung Städtischer Kanalisationsanlagen). H. Heyd. A general discussion of the provision for rainfalls of various force and duration, illustrated by the sewer system of the City of Darmstadt. 4000 w. 2 plates. Gesundheits Ingenieur—July 16, 1905.

Design.—The Design of Sewers (Beitrag zur Berechnung von Kanalisationsleitungen). Hr. Hecker. Graphical and other methods for calculating sewer systems adequate for any possible rainfall. Tables. Serial. 2 parts. 3 plates. 4000 w. Gesundheits Ing—Dec. 15, 31, 1901.

Diagram Giving Dimensions of Conduits of Equal Capacity. Gives a convenient diagram for determining quickly the dimensions of horse-shoe shaped cross sections of equivalent discharging capacity to given circular sections, and vice versa. 1100 w. Eng Rec—Oct. 8, 1904.

The Principles for the Determination of a Municipal Sewerage System (Die Grundlagen zur Berechnung von Städteentwasserungsanlagen). H. Heyd. A discussion of the fundamental principles for determining the amount of storm water and sewage to be carried off from a given locality. 3000 w. Gesundheits-Ingenieur—Jan. 20, 1905.

See also **Cardiff; Darmstadt; Rainfall.**

Design, Tables.—Tables for the Computation of Sewers and Drain Pipes (Vereinfachte Tabellen zur Berechnung von Kanal oder Rohrquerschnitten für Kanalisationsanlagen). Max Schendera. Tables for circular pipes and for egg-shaped sewers, with diagrams for the determination of coefficients. 3500 w. Gesundheits Ingenieur—June 30, 1905.

Details of Construction.—Some Details of Sewer Construction. Extracts from a paper by J. C. Meem, read before the Brooklyn Engrs.' Club, giving valuable illustrated descriptions of details of sewer construction. 2000 w. Munic Engng—Aug., 1902.

See also **Conections.**

Detroit.—Detroit Sewer System. W. C. King. Brief description of the gravity system in use, and the construction. 1400 w. Jour Assn of Engng Socs—Jan., 1903.

Flow, Massachusetts.—Flow in the Sewers of the

North Metropolitan Sewerage System of Massachusetts. Theodore Horton. Describes three series of observations made in the channels below the Charlestown and East Boston pumping stations, and the methods used. Ill. 2700 w. Pro Am Soc of Civ Engs—Jan., 1901.

Flow in the Sewers of the North Metropolitan Sewerage System of Massachusetts. Continued discussion of paper by Theodore Horton. 500 w. Pro Am Soc of Civ Engrs—May, 1901.

Flow in the Sewers of the North Metropolitan Sewerage System of Massachusetts. Continued discussion of paper by Theodore Horton. 800 w. Pro Am Soc of Civ Engrs—Aug., 1901.

Flow, Toronto.—Discharge of Sewage from Toronto Sewers in 1900. Cecil B. Smith. Describes the method of taking a record of the flow of sewage in dry weather, to establish data on which to base the design of interceptors, trunk sewers, and disposal works. Plates and tables. 1600 w. Can Soc of Civ Engs—Adv. Proof.

Flushing.—See also **Cleaning.**

Flushing, Mexico.—Some Specialties of the System for Flushing the New Sewers of the City of Mexico. Roberto Gayol. Detailed description of sewers and sewerage system, with many illustrations and plans. 4000 w. Pro Am Soc of Civ Engrs—Aug., 1905.

Framingham, Mass.—Crossing Under the Sudbury Aqueduct with a Sewer Pipe. Charles W. Sherman. Describes two plans submitted, and gives detailed description of the work of construction of the accepted plan. Ill. 1700 w. Eng Rec—Feb. 28, 1903.

Gas.—See **SEWER GAS; SEWER VENTILATION.**

Gravity System.—See **Detroit.**

Ground Water Infiltration.—See **Infiltration.**

Harrisburg, Pa.—A Concrete-Steel Sewer. Describes and illustrates an interesting work to be constructed in Harrisburg, Pa. The sewer is to intercept the ordinary flow of a system of combined sewers in a district lying on both sides of a small stream which has been receiving these liquids. 3200 w. Eng Rec—Oct. 11, 1902.

A Concrete-Steel Sewer at Harrisburg, Pa. An illustrated description of the design and construction of the Paxton Creek intercepting sewer, with report of cost. 3500 w. Eng Rec—Oct. 15, 1904.

The Harrisburg Sewer. S. M. Neff. Illustrated description of a concrete-steel intercepting sewer. 1600 w. Cement Age—Jan., 1905.

High-Level.—See **Massachusetts.**

Indianapolis.—Northwestern Avenue Sewer, Indianapolis. Walter Buehler. An illustrated detailed description of interesting construction work. 3500 w. Pro Indiana Engng Soc—1903.

Infiltration.—Infiltration of Ground Water into Sewers. J. N. Haslehurst. Shows the desirability and the difficulty of securing better joints, that infiltration may be reduced. Gives report of X. H. Goodnough bearing on this subject. 2500 w. Eng News—Aug. 27, 1903.

Perviousness of Sewers. Abstract of a paper read by Prof. A. Prescott Folwell at the convention of the Am. Soc. of Munic. Imp. Gives reports of measurements made at several places, and briefly discusses the advantages and disadvantages of infiltration. 2800 w. Eng Rec—Nov. 7, 1903.

Inlet Plan.—A Sewer Inlet Plan. H. M. Miles. Illustrates and describes the construction of highly satisfactory catch-basins, easily kept clean. 700 w. Munic Engng—Jan., 1901.

Intercepting System.—See **Chicago.**

Invert, Concrete.—A Traveling Form for Constructing the Invert of Concrete Sewers. Robert R. Evans. Illustrated description, giving information in regard to its use, advantages and cost of work where it was used. 2000 w. Eng News—March 9, 1905.

Invert Wear.—The Wear of Sewer Inverts. E. A. Hermann. Explains the cause of the wear and the effect on various types and materials, the information being based largely on the sewers of St. Louis, Ill. 1500 w. Eng. News—Feb. 4, 1904.

Joint Sulphur.—A Sulphur-Sand Composition for Pipe Sewer Joints. Alexander Potter. Reports the writer's use of this material, and tests made. Also states other advantages, and gives information concerning cost. 1500 w. Eng Rec—March 12, 1904.

The Use of Sulphur for Sewer-Pipe Joints in Wet Trenches. E. S. Rankin. Describes a plan used by Alexander Potter, of joining pipes with a mixture of melted sulphur and fine sand, and since used by the writer experimentally for securing water-tight work. 1700 w. Munic Engng—Nov., 1904.

Joint Trunk, N. J.—See **Breakage; New Jersey.**

King's Lynn, Eng.—Sewer Trenching and Gas Mains. Notes based upon a paper read before the Eastern Counties Gas Managers' Association, by E. G. Smithard, concerning difficulties met with in constructing a sewerage system at King's Lynn. 2000 w. Eng Rec—Oct. 22, 1904.

Lake Bluff, Ill.—The Sewer System of Lake Bluff, Ill. W. T. Griffith. Illustrated description of a combined system of sanitary and storm water sewerage. 1700 w. Eng News—June 6, 1901.

London Storm Water.—Extension of the London Main Drainage System. An account of added facilities for the disposal of storm water. 1000 w. Engr, Lond—Feb. 26, 1904.

Los Angeles, Cal.—See **SEWERAGE.**

Magdeburg, Germany.—The Sewerage System of the Old Part of Magdeburg (Die Kanalisation der Altstadt von Magdeburg). An illustrated description of the new system of sewers installed in this German city, on the Elbe River. Serial. Part I. 2800 w. Zentralblatt d Bauverwaltung—March 21, 1903.

Maintenance, Columbus, O.—Inspecting and Cleaning an Intercepting Sewer at Columbus, O. From the last annual report of Julian Griggs, Chief Engineer of the Dept. of Public Works. Describes interesting work. 1000 w. Eng News—Dec. 27, 1900.

Sewer Maintenance in Columbus, Ohio. George W. Lilly. Read before the Engrs' Club of Columbus. Illustrated paper on the methods and cost of cleaning catch-basins, manholes and sewers. 4600 w. Eng Rec—April 27, 1901.

Massachusetts.—The High-Level Sewer of the Metropolitan Sewerage District of Massachusetts. John S. Hodgson. Map showing the various systems of sewers and profile of the outfall pipe of the high-level sewer, with descriptive notes. 1800 w. Ill. Eng Rec—Aug. 15, 1903.

See also **Flow, Massachusetts.**

Medford, Mass.—Methods and Cost of Constructing a Concrete Sewer Having a Brick Arch, at Medford, Mass. Description from report of William G. Taylor, with illustrations. 1000 w. Eng News—Nov. 19, 1903.

Memphis, Ten.—The Early History of the Memphis Sewers. Extracts from a paper by A. T. Bell, describing the separate sewers built between 1880 and 1897, which first established in the United States the correct principles to follow in designing such work. Also editorial comment. 3300 w. Eng Rec—Feb. 15, 1902.

Minneapolis.—Difficult Sewer Construction in Minneapolis. Illustrations, and brief description of sewers of concrete construction laid through land which was formerly the bed of the Mississippi River, and later a public dump ground. 600 w. Eng Rec—Dec. 2, 1905.

Newark Storm.—A Large Concrete and Brick Storm Sewer in Newark, N. J. Illustrates and describes important sewer work to provide additional capacity for storm water. 1400 w. Eng Rec—March 12, 1904.

New Jersey Joint Trunk.—Construction of a Joint Trunk Sewer System in the Valleys of the Rahway and Elizabeth Rivers, New Jersey. An illustrated description of an extensive sewer system serving ten municipalities and having a length of over 23 miles. 5200 w. Eng Rec—March 5, 1904.

Difficulties of Construction in an Outlet Sewer. From a report by Alexander Potter; concerning the unusual difficulties encountered in the construction of the joint outlet sewer of Essex and Union counties, New Jersey. 4000 w. Eng Rec—Aug. 19, 1905.

Joint Trunk Sewer of Eleven New Jersey Municipalities. Gives statistics of construction and illustrated description of notable details of this great work. 1800 w. Munic Engng—Dec., 1905.

See also **Breakage; RIVER POLLUTION; SEWAGE DISPOSAL—Connecticut Commission; New York Bay.**

Newton, Mass.—Difficult Sewer Construction at Newton, Mass. Brief illustrated description of difficulties met and overcome in the recent extension through Hemlock Gorge, due to the physical features. 600 w. Eng Rec—Nov. 29, 1902.

Timber Tunneling in Quicksand. Rufus K. Porter. Describes in detail the method employed in constructing a sewer in the city of Newton, Mass., 500 ft. of which was built in timbered tunnels. Also general discussion. 5500 w. Jour Assn of Engng Soc's—Aug., 1905.

See also **Siphon Inverted.**

Newton Highlands.—Tunneling for a Sewer Beneath the Cochituate Aqueduct. J. H. Kimball. Describes a difficult piece of work at Newton Highlands. 800 w. Eng Rec—Nov. 14, 1903.

New York Bronx.—The Broadway Outfall Sewer, Borough of the Bronx, New York. Illustrates and describes the twin sewer built to carry the combined sewage and storm water flow from the watershed of Tibbitt's Brook. Describes the construction. 2500 w. Eng Rec—Nov. 11, 1905.

New York Bay Outlet.—See **New Jersey Joint Trunk; SEWAGE DISPOSAL.**

New York Underground Ry.—Rapid Transit and Sewerage. An account of the changes in sewers in New York, made necessary by the building of the underground road, and the difficulties encountered. 1000 w. Fire & Water—April 27, 1901.

Sewer Reconstruction in Connection with the New York Rapid Transit Subway. An account of the difficult work of diverting and replacing the sewers on the line of the subway. 2700 w. Eng Rec—Dec. 17, 1904.

Outlet.—See **New Jersey; New York Bronx; Siphon and Overflow; Spring Lake, N. J.; SEWERAGE—Los Angeles.**

Passaic Valley Trunk.—See **New Jersey; SEWAGE DISPOSAL—New York Bay.**

Philadelphia.—Difficult Sewer Reconstruction. Harrison Souder. Illustrates difficult work in Philadelphia, where great care had to be exercised to prevent caving, and the operations were rendered more difficult by the presence of many gas, water, and drainage pipes. 500 w. Eng Rec—Aug. 31, 1901.

The Aramingo Drainage System, Philadelphia. George E. Datesman. States the problem presented and gives an illustrated description of a sewer system in a low lying part of Philadelphia. 3000 w. Eng Rec—Dec. 28, 1901.

Some Examples of Recent Main Sewer Construction by the City of Philadelphia. C. H. Ott. Illustrates and describes the types of construction. Discussion. 2200 w. Pro Engrs' Club of Phila—Oct., 1904.

Pipe Joints.—See **Joints.**

Pipe Strength.—The Strength of Sewer Pipe. Letter from Prof. W. K. Hatt, in reply to an inquiry concerning the strength of sewer pipe and the proper methods of testing. Ill. 1700 w. Brick—June, 1902.

Quemador, Cuba.—Engineering in Cuba. C. J. Carlson. An extract from a field order, dealing with the water and sewage systems of the army camp at Quemador, Cuba. 2000 w. Wis Engr—April, 1902.

Rainfall.—Storm Flows from City Areas and their Calculation. Ernest Wilder Clarke. Discusses methods of calculating the size of sewer needed to carry off surface water. 4200 w. Eng News—Nov. 6, 1902.

The Measurement of Rainfall and Run Off (Ueber Regenhöhen und Abflussmengen). Prof. Bising. A discussion of the probable rainfall in cities and the volume of storm water to be provided for by the sewage systems. 5000 w. Gesundheits-Ingenieur—Feb. 28, 1903.

Rainfall and Run Off (Regenabfluss und Abflussverzögerung). W. Krawinkel. A study of the surface and underground run-off for various conditions, with data for the proportions of sewers and drainage channels. Two articles. 4500 w. Gesundheits-Ingenieur—May 10, June 10, 1905.

Rainfall and Run-Off in Sewer Design. Charles Emerson Gregory. Extracts from a lecture before the Engng. School of Union College, Schenectady, N. Y., and a discussion before the Am. Soc. of Civ. Engrs., giving the latest advances in this subject. 4500 w. Munic Engng—Sept., 1905.

See also **Darmstadt; Design; London; RAINFALL.**

Reinforced Concrete.—See **Concrete Reinforced.**

Relief.—See **Brooklyn.**

Rochester, N. Y.—The Sewerage of Rochester, N. Y. W. J. Stewart. Read before the Am. Soc. of Munic. Imp. Brief illustrated description of the sewers, and their construction, the materials used, etc. 700 w. Munic Engng—Nov., 1902.

Run-Off.—See **Rainfall; RAINFALL.**

St. Louis.—Sewer Construction in St. Louis. Curtis Hill. Illustrates and describes interesting features of the sewer construction, the "combined system" being the method used. 3000 w. Trans Assn of Civ Engrs of Cornell Univ—1905.

See also **Invert Wear.**

Sand.—See **Brooklyn; Newton; TUNNEL.**

Separate System.—Early History of the Separate Sewerage System. States facts concerning early failures of separate sewers of too small diameter. 1000 w. Eng Rec—March 8, 1902.

The Separate System of Sewerage. J. Gust Richert, in "The Surveyor," London. Describes some of the advantages, disadvantages and defects of this system which is considered more expensive but more efficient. 1400 w. Ill. Munic Jour & Engr—Jan., 1903.

See also **Memphis; SEWERAGE—Nahant, Mass.**

Siphon and Overflow.—A Combined Siphon and Overflow. Illustrated description of a short siphon making separate provision for storm water and sewage and having one of the entrance chambers designed to serve as an overflow outlet. 600 w. Eng Rec—June 8, 1901.

Siphon, Brooklyn.—Sewer Siphons in Brooklyn, N. Y. Illustrates and describes some interesting details of design and construction made necessary in rearranging the sewers on the line of the rapid transit subway. 1400 w. Eng Rec—Dec. 3, 1904.

Siphon Inverted.—Inverted Siphons in the Sewage System of Newton, Mass. Irving T. Farnham. Explains why these siphons were necessary and their essential features. Ill. 1000 w. Munic Engng—Dec., 1903.

Spring Lake, N. J.—The Ocean Outlet Sewer at Spring Lake, N. J. Illustrated description of an outfall of a sewerage system, where an earlier outfall became clogged with sand. 500 w. Eng Rec—Dec. 29, 1900.

Storm Flow.—See **London; Newark; Rainfall; Separate; Truro.**

Subway, Reconstruction.—See **New York Underground Ry.; Siphon, Brooklyn.**

Sudbury Aqueduct.—See **Framingham, Mass.**

Tile Vitrified.—Vitrified Tile Sewers as House Drains in Chicago. Perry L. Hedrick. States the conditions in Chicago, quoting from plumbing ordinances, and showing that a careful workman can lay a tile sewer so as to make it water tight and to withstand the specified pressure. 2000 w. Eng News—Nov. 2, 1905.

Trenching and Gas Mains.—See **King's Lynn; EXCAVATION.**

Truro, Nova Scotia.—A 27 and 30-inch Concrete Sewer. Illustrated description of the methods of construction of an unusual type of storm-water sewer recently completed at Truro, Nova Scotia. 1500 w. Eng Rec—Aug. 30, 1902.

Ventilation.—See **SEWER GAS; SEWER VENTILATION.**

Walworth.—See **Cleveland, O.**

Waring Small Pipe.—See **SEWERAGE.**

Wear.—See **Invert Wear.**

Wilmington, Del.—A Reinforced Concrete Sewer at Wilmington, Delaware. T. Chalkley Hatton. Illustrated description of the sewer and its construction. 2500 w. Eng Rec—May 21, 1904.

Reinforced Concrete Sewers in Wilmington, Del. Photographs and drawing, with description of the work. 1200 w. Munic Engng—Oct., 1904.

SEWERAGE.

See also **DRAINAGE; MUNICIPAL ENGINEERING; PLUMBING; SANITARY ENGINEERING; SANITATION; SEWAGE; SEWAGE DISPOSAL; SEWAGE FARM; SEWER.**

Baden, Austria.—See **SEWAGE DISPOSAL; WATERWORKS.**

Baltimore Commission.—The Investigations of the Baltimore Sewerage Commission. Kenneth Allen.

A description of projects proposed for constructing the best possible sewerage system. States the conditions to be met. Map. 6500 w. Trans Assn of Civ Engrs of Cornell Univ—1903.

Bedford, Ind.—See **SEWAGE DISPOSAL.**

British.—See **SANITARY ENGINEERING; SEWAGE DISPOSAL.**

British Law.—See **London By-Laws; SEWAGE.**

Brookfield, Mo.—The Brookfield, Mo., Sewerage System. R. P. Garrett. Illustrated description of a small system requiring some sewage purification, but entailing the utmost economy in first cost. 1200 w. Eng Rec—Dec. 22, 1900.

Brooklyn, N. Y.—See **SEWER.**

Chattanooga, Tenn.—See **MUNICIPAL IMPROVEMENT.**

Chicago.—See **SEWER.**

Coal-Mine Subsidences.—See **COAL MINE—Subsidence.**

Connecticut Commission.—See **SEWAGE DISPOSAL.**

Design.—See **SEWER.**

Douglas, Isle of Man.—The Sewerage of Douglas, Isle of Man. Edmund Herbert Stevenson, and Edward Knaston Burstal. A brief history of the sewerage of Douglas, with a description of the existing system recently carried out by the authors. Discussion. Ills. 14,000 w. (No. 3510). Inst of Civ Engrs.

Feldsberg, Austria.—See **WATERWORKS.**

German Industrial Works.—See **FACTORY WASTE—Germany.**

Glasgow.—An Important Main Drainage Scheme for Glasgow. A. B. McDonald. Notes describing the important scheme for the collection and treatment of sewage. 2000 w. Arch't, Lond—Oct. 3. 1902.

New Sewage Works at Glasgow. Illustration, with description of some of the interesting features of this plant, which is the second largest in the world. 2000 w. Engr, Lond—June 3, 1904.

The Glasgow Main Drainage System. A. B. McDonald. Illustrated description of a very large sewerage and sewage disposal system. 2500 w. Public Works—Aug. 15, 1904.

Hanover.—See **WATERWORKS.**

Havana.—The Proposed Sewerage and Drainage Systems of Havana. Reviews the report submitted by Samuel M. Gray, in June, 1900, and the specifications for the work, on the outlines finally adopted. Ill. 2400 w. Eng Rec—June 22, 1901.

The Sewerage System of Havana. Illustrates and describes modifications in the plans originally prepared and the introduction of novel features. 2000 w. Eng Rec—July 20, 1901.

The Sanitation and Proposed Sewerage System of Havana, Cuba. A. E. Carter. Describes the conditions found when the U. S. army entered in 1898, and what has since been accomplished. The water supply and sewerage systems. 2500 w. Sch of Mines Qr—Nov., 1903.

See also **MUNICIPAL ENGINEERING; SANITARY ENGINEERING; SANITATION.**

King's Lynn, Eng.—See **SEWER.**

Liernur System.—Liquid Sewage (Vloeibar Afval). D. J. Sanches. A comparison of the Liernur pneumatic system of sewage removal with the liquid bacterial purification method. 4000 w. De Ingenieur—Oct. 31, 1903.

A Recent Installation of a Liernur Sewerage System. Brief description of this system as recently applied in England. 1300 w. Eng Rec—Dec. 31, 1904.

Little Rock, Ark.—The Sewerage System of Little Rock, Ark. Walter F. Reichardt. Explains the method of making improvements in this city, and the present condition of the sewerage system. 2200 w. Munic Engng—Nov., 1904.

The Sewers of Little Rock, Ark. E. A. Kingsley. Concerning the sewerage system and drainage. 1000 w. Munic Engng—Dec., 1904.

London By-Laws.—The New "Drainage By-Laws" of the London County Council. A review of the by-laws recently adopted. 3200 w. Builder—Sept. 28, 1901.

Los Angeles, Cal.—Converting Portions of the Los Angeles Outfall Sewer Into a Septic Tank. Detailed description of a method of solving a serious engineering difficulty. 4000 w. Eng News—Nov. 8, 1900.

The New Outfall Sewer at Los Angeles. Illustrated detailed description of work under construction. 1800 w. Eng Rec—May 13, 195.

Manila.—See **SANITATION.**

Massachusetts.—See **SEWAGE DISPOSAL; SEWER—Flow, Massachusetts; Massachusetts.**

Melbourne, Australia.—The Sewerage System and Sewage Farm of the Melbourne and Metropolitan Board of Works. Describes this great piece of sewerage work, giving related information regarding cost, connections, and other matters of interest. 3200 w. Eng News—Jan. 24, 1901.

The Melbourne and Metropolitan Sewerage System. Illustrated description of the leading features of a separate system for an area of 200 sq. miles and an ultimate population of 1,000,000. The manholes, flushing apparatus, sewer construction, tunneling and sewage disposal by irrigation are the principal subjects taken up. 3000 w. Eng Rec—Dec. 21, 1901.

Nahant, Mass.—The Sewerage of Nahant, Massachusetts. E. W. Bowditch. Illustrated description of the separate sewerage system, and means taken to prevent further soil pollution. 1800 w. Dom Engng—April 15, 1901.

New Jersey Commission.—See **RIVER POLLUTION; SEWAGE DISPOSAL—Connecticut Commission; New York Bay.**

New Orleans.—The Sewerage of New Orleans. W. T. Crotts. Describes the conditions existing, the various schemes presented at different times, the final plan and its design. Ill. 5700 w. Jour Assn of Engng Soc's—Nov., 1901.

The New Drainage and Sewerage System of New Orleans. Frederick Moore. An illustrated description of an installation presenting many difficult problems. 1300 w. Sci Am—Dec. 7, 1901.

Notes on New Orleans Drainage. I. W. McConnell. An illustrated account of this work which is nearing completion. 2000 w. Trans Assn of Civ Engrs of Cornell Univ—1902.

Sewerage and Plumbing in New Orleans. Editorial on the system employed. 1500 w. Eng Rec—Nov. 14, 1903.

Progress of Construction of the New Orleans Drainage System. Information from the last semi-annual report of the Sewerage and Water Board in regard to the progress. 1800 w. Eng Rec—April 30, 1904.

See also **PUMPING STATION—Sewage, New Orleans.**

Omaha City.—See **Waring Small Pipe, Failure.**

Panama.—See **WATER SUPPLY.**

Paris.—Paris Drainage and Water Supply. On the great sums spent on these undertakings and the unsatisfactory results. 2000 w. Engr, Lond—Dec. 14, 1900.

New Sewage Works in Paris. Concerning measures in progress for solving the sewage question. 1200 w. Engr, Lond—Jan. 11, 1901.

See also **WATER SUPPLY.**

Paris Exposition.—Sewerage and Sewage Disposal at the Paris Exposition (Canalisationswesen und Abwasserreinigung auf der Pariser Weltausstellung 1900). Josef Ruiss. A general review of the exhibits of the various countries, with a well illustrated and comprehensive description of the Paris sewerage works. Serial. 2 parts. 16,000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 10, 17, 1902.

Pneumatic System.—See **Liernur.**

Rahway and Elizabeth Valleys.—See **SEWER—New Jersey Joint Trunk.**

Separate System.—See **SEWER.**

Septic Tank.—See **Wheaton, Ill.; SEWAGE DISPOSAL.**

Shelby, O.—The Shelby, Ohio, Sewerage System. J. B. Weddell. Abstract of paper read before the Ohio Soc. of Surv. and Civ. Engs. Illustrated description of sewerage and sewage disposal works for 5,000 people. The sewage is received in tanks and passed through intermittent filters. 600 w. Eng Rec—March 9, 1901.

Swampscott.—Swampscott Sewerage System. Describes a system for this town on Massachusetts Bay. All the sewage is collected in a receiving basin and pumped through an 18-in. cast-iron pipe 2,200 feet to the shore, and from there directly out to sea, 3,600 ft. further. Ill. 1400 w. Eng Rec—May 23, 1903.

Sweden.—See **WATERWORKS.**

Sydney, N. S. W.—The Sewerage Systems of Sydney, N. S. W. Brief description of the various compressed air, electric, and steam pumping plants, mechanical and biological sewage treatment works, and other features of the sewerage systems employed. 1600 w. Eng Rec—Feb. 15, 1902.

See also **SEWAGE DISPOSAL.**

Toronto.—See **SEWER—Flow, Toronto.**

Waring Small Pipe, Failure.—A Failure of the Waring Small-Pipe Sewage System. Full decision of Judge Letton, of the Supreme Court, of Nebraska, in the case of Shannon v. City of Omaha. 1600 w. Eng Rec—June 3, 1905.

Wheaton, Ill.—The Sewerage and Drainage Systems of Wheaton, Ill. William B. Ewing. An account of the construction of a system of sewerage and drainage with a septic tank. 1500 w. Eng News—Feb. 2, 1905.

Woking, Eng.—The Main Drainage of Woking, England. Nicholas Maughan. Abstract of a paper published by the Inst. of Civ. Engrs. Describes the scheme of main drainage of this parish in Surrey, Eng., and the system of sewage purification. 3500 w. Eng Rec—Aug. 24, 1901.

Worcester, Mass.—Recent Sewerage Work in Worcester, Mass. Illustrates and describes recent difficult sewerage construction, sewage interceptors, and full notes on the operation of a disposal plant, employing chemical precipitation, intermittent filtration and a septic tank. 3600 w. Eng Rec—Oct. 26, 1901.

See also **SEWAGE DISPOSAL.**

SEWER GAS.

See also **SEWER VENTILATION.**

The Air of Buildings and Sewers. J. S. Haldane. Read at the Bolton Congress of the San. Inst. of Gt. Britain. Gives results of recent experimental researches and the conclusions reached. Serial. 1st part. 2600 w. Dom Engng—Jan. 15, 1901.

SEWER VENTILATION.

See also **SEWER GAS; TUNNEL VENTILATION; VENTILATION.**

New System of Sewer Ventilation. Illustrates and describes a system which claims not only to give continuous and efficient ventilation to any class of sewer, but to remove all obnoxious gases, and to prevent any bacteria being taken into the air. 1300 w. Engr, Lond—Feb. 8, 1901.

England.—Ventilation of Sewers and Drains. R. Read. Read at Birmingham meeting of the English Assn. of Munic. & Co. Engrs. Describes the practice in English cities, and some of the difficulties overcome. 3500 w. Munic Jour & Engr—April, 1903.

Fan System.—An English Fan System of Sewer Ventilation. From a paper by E. George Mawbey, read before the English Assn. of Munic. and Co. Engrs. Describes the writer's experience with the new system of sewer ventilation devised and patented by Messrs. Shone & Ault, with satisfactory results. 2000 w. Eng Rec—Aug. 27, 1904.

The Shone System of Fan Ventilation of Sewers at Darley Abbey and at Leicester, England. Describes a system of sewer ventilation by means of a fan on an extraction shaft and specially designed air inlets at the top of vertical shafts. 2500 w. Eng News—Nov. 24, 1904.

Leicester.—Sewer Ventilation Experiments at Leicester, England. Review of paper by E. G. Mawbey, giving the results of nearly 3000 experiments with different systems of sewer ventilation. 1800 w. Eng Rec—Oct. 12, 1901.

Shone & Ault.—See **Fan System; SEWAGE DISPOSAL.**

Winnipeg, Man.—Sewer Ventilation at Winnipeg, Man. A report of particular interest, made by Mr. Allen Hazen, in which he recommends that the sewers be ventilated through the house soil pipes, as investigated have shown that disease cannot be carried by the air of sewers. 1800 w. Eng News—March 9, 1905.

SEWING MACHINE.

See also **STITCHING MACHINE.**

Needle Plate.—Making a Sewing Machine Needle Plate. H. Robinson. Illustrates and describes in detail the machine work. 500 w. Am Mach—March 24, 1904.

SHAFT.

See also **CRANK SHAFT; HOISTING; MINE; MINE SHAFT; MINING; POWER TRANSMISSION; PROPELLER; SHAFTING; SHAFT SINKING; STEEL FORGING.**

Angular Velocity.—See **SPEED VARIATION—Marine Shafting.**

Bearings.—Improvements in Propeller Shaft Bearings. A. Scott Younger. Read before the Inst. of Naval Archts. The objects of the paper are to record some results of experiments, and present some improvements in propeller shaft bearings, and other improvements. Ill. 3300 w. Engr, Lond—March 28, 1902.

See also **Stern Tube; BEARING.**

Bending.—See **Torsion.**

Breakages.—Causes of Breakage of Propeller Shafts. Discusses the causes of failure under poor material, unforeseen straining and corrosion. Ill. 2300 w. Marine Engng—Nov., 1901.

Cardan Drive.—See **AUTOMOBILE GEAR—Propeller Shaft Drives.**

Corrosion.—On Screw Shafts. John List. Read at the Engng. Con. of the Inst. of Civ. Engrs. Also discussion. Considers the wear or corrosion of shafting, and matters related. 2400 w. Marine Engng—Aug., 1903.

Corrosion Prevention.—A Simple Method of Preventing Corrosion of Tail Shafts. James M. Thornton. Read before the N. E. Coast Inst. of Engrs. & Shipbuilders. Illustrates the method the writer has adopted, by which tail shafts can be preserved and made to last for years without breaking. 1200 w. Engrs' Gaz—June, 1901.

A Simple Method for Preventing the Corrosion of Tail Shafts. James M. Thornton. Describes the author's method of protection and preservation, which experience has shown will make them last for years without breaking. Also discussion and plate. 2700 w. Trans of N. E. Coast Inst. of Engrs. & Shipbuilders—July, 1901.

Suggestions as to the Prevention of Corrosion of Tail-End Shafts. John Boddy. Read before the Inst. of Marine Engrs. Describes appliances used for the prevention of corrosion, and a system of lubricating such shafts, giving results attained. Also discussion. Serial. 1st part. 2500 w. Marine Engng—Oct., 1902.

Coupling.—See **COUPLING—Lovekin Outboard; Shaft.**

Crank.—See **CRANK SHAFT.**

Flexible.—See **Theory.**

Governor.—See **GOVERNOR—Shaft.**

High Speed.—Calculation for Loaded Shafts Rotating at High Speeds (Méthode de Calcul des Arbres Chargés Animés de Grandes Vitesses de Rotation). M. Delaporte. Mathematical discussion of the forces acting on and the stresses in shafts of steam turbines, etc. Diagrams. 4000 w. Rev de Mécanique—June 30, 1903.

Hollow.—Some Reasons for Making Hollow Shafts. H. F. J. Porter. Answers to questions relating to this subject. 1000 w. Am Mach—Dec. 6, 1900.

Is a Hollow Shaft as Strong and Durable as a Solid Shaft of the Same Diameter? If so, what is the Method of Manufacture and Proportion of Bore to Size of Shaft? Illustrated paper by Robert McF. Doble on the forging and treatment of steel, and discussion and letters by others. 10,000 w. Pro Pacific Coast Ry Club—July 16, 1904.

Lining.—See **SHAFTING.**

Phosphorus Segregation.—See **METALLOGRAPHY.**

Propeller.—Tail Shafting for Marine Engines. J. P. Badenhausen. Discusses the causes of breakage in propeller shafting, under the heads of poor material, strains, and corrosion. Ill. 2000 w. Marine Engng—July, 1902.

On Screw-Shafts. John List. Read at Engng. Con. of the Inst. of Civ. Engrs. A discussion of present practice and recent improvements, and of points of special interest. 1200 w. Engng—June 26, 1903.

See also **Corrosion; Stern Tube; Straightening; Torpedo Boat; Torsion.**

Propeller, Brass Liners.—See **BRASS CASTING.**

Recessing Lathe.—See **LATHE—Recessing.**

Repairing.—Repairing a Propeller Shaft. An illustrated account of the repairs executed at sea to the tail shaft of the steamship Milton. 1800 w. Engr, Lond—April 14, 1905.

Robinson's Governor.—See GOVERNOR—Shafts.

Steel.—See STEEL FORGING.

Stern Tube.—Propeller Shafts and New Form of Stern Tube. Extract from the presidential address of Mr. John Corry, at a recent meeting of the Inst. of Marine Engrs., discussing tail shafts and stern tube bearings. 1800 w. Marine Engng—Feb., 1902.

See also Tunnel.

Straightening.—A Great Feat in Shaft Straightening. Describes the method used in straightening the tail shaft of the "Illinois." Ills. 800 w. Am Mach—June 2, 1904.

Strength.—A Chart for Calculating the Strength of Shafts and Pins. Gilbert S. Walker. Gives a draft intended to simplify the calculations, with explanatory notes. 2200 w. Am Mach—Nov. 26, 1903.

Strength of Shafts and Pins. George A. Lister. Gives formulas and diagrams, explaining method of ascertaining size to fulfil any given conditions. 500 w. Mech Engr—March 18, 1905.

Tail.—See Corrosion; Propeller; Stern Tube; Straightening.

Theory.—Theory of Stiff and Flexible Shafts and Critical Speeds. Sanford A. Moss. A detailed mathematical study of this theory. Ill. 2500 w. Power—Sept., 1903.

Torpedo Boat.—Installing a Propeller Shaft Without Docking. H. Webster. Illustrated account of the method used in the torpedo-boat "Shubrick." The stern of the vessel was raised and the work carried on from floats. 800 w. Marine Engng—Nov., 1901.

See also CRANK SHAFT.

Torsion.—Torsional Vibrations of Shafts. L. Gümbel. Read before the Inst. of Naval Archts. A study of the torsional vibrations of the shafts of marine engines by the aid of Fourier's Theorem. 4600 w. Engng—April 11, 1902.

Torsional Vibrations of Shafts. L. Gümbel. Read before the Inst. of Naval Archts. A mathematical demonstration of the application of Fourier's theorem to the study of torsional vibrations of shafts of marine engines. 4200 w. Jour Am Soc of Nav Engrs—May, 1902.

Investigations upon the Dynamic Conditions in Propeller Shafts (Neue Untersuchungen über die Dynamischen Vorgänge in den Wellenleitungen von Schiffsmaschinen). H. Frahm. Describing apparatus and methods employed for the experimental record of torsional vibrations in propeller shafts. Serial. Part I. 3000 w. Zeitschr d Ver Deutscher Ing—May 31, 1902.

Torsion and Torsional Stresses in Propeller Shafts. Translations of a portion of a recent discourse by Mr. Hermann Frahm describing some interesting and novel experiments made investigating the dynamic forces acting in revolving propeller shafts. Ill. 3300 w. Engng—Feb. 6, 1903.

The Torsional Vibration of Screw Propeller Shafts (Vibrazioni Torsionali degli Alberi delle Macchine Marine). Pietro Enrico Brunelli. An examination of the influence of the torsion of the shaft of a marine engine upon the period of vibration of the machinery. 4000 w. 1 plate. Rivista Marittima—Jan., 1904.

Combined Bending and Torsion in Shafts. George A. Lister. Explains method of proportioning in designing shafts subjected to both bending and twisting moments. 800 w. Mech Engr—March 4, 1905.

The Strength of Shafts Subject to Small Forces Rhythmically Applied. Charles Chree, Capt. Henry Riall Sankey and William Ernest Wyatt Millington. A study of the effects of longitudinal and of torsional vibrations, illustrating by examples. 7800 w. Inst of Civ Engrs (No. 3558).

Tunnel.—The Strength of Tunnels for Propeller Shafts (Festigkeit von Wellentunneln). F. Kretzschmar. An analytical examination of the stresses and strains in the shaft tunnels of screw steamers. Serial. Part I. Schiffbau—Oct. 23, 1902.

See also Stern Tube.

Turning Machine.—See LATHE—Shaft.

Unloading.—Unloading a Heavy Shaft. Illustrated directions for safely unloading a crank shaft, skidded and lying on a flat car. 3000 w. Power—June, 1901.

Vibrations.—See Torsion; MARINE ENGINE.

SHAFTING.

See also BELTING; POWER TRANSMISSION; PULLEY; SHAFT.

Shafting Hints. Charles Herrman. Calls attention to difficulties arising in connection with shafting, and gives suggestions for overcoming them. Ill. 2000 w. Power—July, 1902.

Shafting Hints. Charles Herrman. Suggestions, with illustrations, for the installation, maintenance and repair of shafting. 3400 w. Power—Aug., 1902.

Shafting Hints. Charles Herrman. Suggestions for remedying troubles. Ill. 3000 w. Power—Feb., 1903.

Shafting Out of Line. D. B. Dixon. Calls attention to the great waste of power due to imperfect shafting and imperfectly lined up shafting, and gives rules for determining the diameter needed to transmit a given horse power, and other rules for speed, etc. 2000 w. Am Mfr—Nov. 20, 1902.

Aligning.—See Lining.

Capacity.—The Capacity of Shafting. A. G. Holman. Gives a graphic representation of the usual formula for horse-power laid out on a logarithmic scale, with rules for its use. 600 w. Power—Oct., 1902.

Concrete Steel Structures.—The "Slot System" of Attaching Shaft Hangers and Fixtures to Concrete-Steel Structures. Henry Parsons Jones. A statement of the general conditions and illustrated description of the work as carried out in attaching shaft hangers, stringers for counter shafts and other fixtures to a concrete-steel floor system. 2800 w. Eng News—March 3, 1904.

Construction.—Construction of Line Shafting. H. E. Raabe. Suggestions for improving the form of shafts, showing the weakness of several designs. 1200 w. Marine Engng—Feb., 1904.

Strength of Countershafts. Frank B. Kleinhans. Discusses the causes of accidents from countershafts, principally the failures due to the shaft being too long between hangers. 1000 w. Mach, N Y—April, 1903.

Design.—See MACHINE DESIGN—Shafting.

Hanger Attachment.—See Concrete Steel Structure.

Hanging.—See SHAFTING—Lining.

High-Speed.—See BELTING.

Lining.—Hanging New and Lining Up Old Shafting. D. B. Dixon. Directions for this work with remarks on care needed in determining the diameter of the shafting, the bearings, etc. 2200 w. Am Mfr—Dec. 4, 1902.

Lining Up Shafts. H. J. Teiper. Gives suggestions for the lining up of shafting, favoring the lining up by the couplings. Suggestions apply not only to marine engines, but to stationary engines also. 2000 w. Power—Jan., 1903.

A Handy Tool for Locating and Aligning Shafting and Machinery. William H. Brooks. An illustrated description of the tool and the principle of its operation. 1000 w. Eng Rec—Oct., 1904.

Precise Lining of Large Shafting. W. I. Fleck. Describes a particular setting which illustrates the more important features of the method, giving a drawing of the relative position of the horizontal and vertical boxing, shafting, gearing, &c., necessary for the transmission of 1,600 H. P. from four water wheels. 700 w. Min & Sci Pr—May 20, 1905.

SHAFT SINKING.

See also BORING; COAL MINE; COAL MINING; MINE; MINE SHAFT; MINING.

Recent Developments in Shaft Sinking. Paper read by Oberingenieur Riemer at the meeting of the German Min. Assn. at Dortmund. An illustrated account of recent improvements in old methods, and the introduction of new processes. Serial. 1st part. 2200 w. Col Guard—Oct. 4, 1901.

The Latest Progressive Shaft Sinking. Chief Engineer Riemer. Translated from the "Report of the Eighth General German Mining Congress at Dortmund." A discussion of the advances that have been made. Ill. 14,000 w. Sch of Mines Qr.

Arrangements for Keeping a Borehole Clear

During Shaft Sinking (Verfahren und Einrichtung beim Abteufen von Schächten ein Vorhandenen Bohrloch behufs Ungestörter Wasserlosung, Intact zu Erhalten). Eduard Grosse and Josef Srb. The borehole is kept open in order to permit water to drain off by inserting an inner tube, through which water is pumped. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 21, 1901.

Improvements in Apparatus for Shaft-Sinking. A. Gobert. From "Annales des Travaux Publics de Belgique." Drawings and description of improvements to remedy the inconveniences arising from defective circulation. 800 w. Col Guard—March 21, 1902.

Shaft Sinking (Schachtabteufen). A review of compressed air, freezing and other recent processes. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 14, 1902.

Description of Primary Operations and Temporary Plant Required for a Sinking Pit. Harold T. Foster. Describes the order in which the operations of setting out and erecting the surface arrangements should be approached, and the progress of the undertaking. Ill. 1700 w. Ir & Coal Trds Rev—July 4, 1902.

Ardeer, Scotland.—Shaft Sinking Through Sand. T. H. Mottram. Abstract of a paper before the Mining Inst. of Scotland, describing the sinking of shafts through sand at Ardeer, Ayrshire, by the pneumatic process. 2800 w. Col Guard—Dec. 29, 1905.

Atchison, Kan.—Sinking a Deep Coal Shaft at Atchison, Kansas. William R. Crane. Describes the sinking plant, and method of sinking. 2000 w. Eng & Min Jour—July 26, 1902.

Bascoup Caving.—The Caving of Shaft No. 7 of the Bascoup Colliery (L'Eboulement du Puits No. 7 de la Société Charbonnière de Bascoup). A. Robert. Describing the manner in which the caving was checked and the shaft repaired. 3500 w. 1 plate. Rev Univ des Mines—Nov., 1901.

British.—Modern Methods in Shaft Sinking. James Tonge. An illustrated account of some recent improvements in shaft-sinking methods in Great Britain. 2500 w. Mines & Min—Dec., 1905.

Bruch, Bohemia.—The Deepening of Two Ventilating Shafts of the Bruch, Bohemia, Coal Mines (Ueber das Abteufen Zweier Wetterschachte im Brucher Grubenfelde). A. Padour. A description of the method employed in deepening two ventilating shafts without interruption of the air flow, with log of the progress of the work. Three articles, 2 plates. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 17, 24, 31, 1903.

California.—Small Things in Mining. W. H. Storms. Describes devices recently introduced in California for expediting matters in shaft-sinking. 1500 w. Min & Sci Pr—Dec. 26, 1901.

Cost of Shaft-Sinking and Drifting at the Lincoln Gold Mine, California. Detailed statement of cost, taken from the report of E. C. Voorheis, with some additional facts. 800 w. Eng News—March 19, 1903.

Compressed Air.—The Removal of Water in Sinking the Schöller-Shaft at Libuschin near Kladno (Die Wasserhaltung beim Abteufen des Schöllerschachtes in Libuschin bei Kladno). V. Kadainka. Describing the use of compressed air to clear a mine shaft of water during the operation of deepening. 1800 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 26, 1901.

Clearing a Shaft of Water During Sinking. V. Kadainka in "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrated description of the method used. 1500 w. Col Guard—Dec. 6, 1901.

Sinking a Shaft by Compressed Air. Bergassessor Lüthgen, in "Glückauf." States the conditions and describes the work and the difficulties encountered. Ill. 1800 w. Col Guard—Jan. 9, 1903.

See also **Ardeer.**

Dawdon, Eng.—The New Winning at Dawdon Colliery. A report of progress at the Thereau pit and the Castlereagh pit. These shafts are to be sunk to a depth of 1800 ft. and are 20 ft. in diameter. 1200 w. Col Guard—Nov. 18, 1904.

New Methods of Deep Boring. Illustrated discussion of devices invented by J. Howarth, and W. Pruszkowski, and W. Wolski. 2600 w. Aust Min Stand—Oct. 23, 1902.

See also **Atchison; BORING.**

Detroit, Mich.—Noteworthy Shaft Sinking at Detroit. An account of conditions that made the work very difficult, and the final success in sinking a shaft, where for 20 years every attempt had proved a failure. 1200 w. Ir Age—Nov. 16, 1905.

Dover, Eng.—See Kind-Chaudron.

Düsseldorf Exposition.—See Water-Bearing Strata.

Freezing Process.—The Sinking of a Shaft at the Maria Mine, Near Aix-la-Chapelle, by the Freezing Process (Das Abteufen eines Schachtes Mittelst des Gefrierverfahrens auf Mariagrube bei Aachen). H. Stegemann. By the use of freezing apparatus a ventilating shaft 130 ft. was successfully sunk through sand. 2500 w. 1 plate. Glückauf—Jan. 5, 1901.

Difficulties in Congelation for Sinking and Deepening an Abandoned Shaft. An illustrated account of the difficulties and the means of overcoming them. 2800 w. Col Guard—Jan. 25, 1901.

The Application of the Freezing Method in Shaft Sinking at Limburg (De Toepassing der Bevriesmethode bij het Maken van Schachten in Limburg). J. Koster. Describing the application of the Honigmann process for sinking a shaft 320 feet deep in sand. 5000 w. De Ingenieur—July 18, 1901.

Shaft Sinking at Ronnenberg, Hanover (Das Schachtabteufen bei Ronnenberg, Hannover). H. Wiese. Describing the application of the Poetsch freezing process to deep shaft sinking. 2000 w. Glückauf—Aug. 24, 1901.

Shaft Sinking by the Freezing Process (Les Nouveaux Fonçages par Congélation). H. Schmerber. An illustrated description of shaft sinking at two French mines and at the Ronnenberg Alkali Works, Hanover. Serial. 3 parts. 6000 w. Génie Civil—Jan. 18, 25, Feb. 1, 1902.

Recent Shaft Sinking in Europe by the Freezing Method. Description of three shafts, 447, 456 and 787 feet deep, respectfully, sunk by means of the Poetsch method. 1700 w. Eng Rec—June 14, 1902.

Sinking by the Freezing Method at Washington, County Durham. Mark Ford. Abstract of a paper read before the N. of England Inst. of Min. & Mech. Engrs. Detailed description of sinking through alluvial deposits to the stone-head. 2500 w. Ir & Coal Trds Rev—Dec. 19, 1902.

Sinking a Shaft of a Coal Mine, at Eygelshoven, Holland, by the Freezing Process (Das Abteufen des Schachtes I der Bergwerkgesellschaft Laura und Vereenigung zu Eygelshoven, Holländisch Limburg, mittels Gefrierverfahrens). R. Pierre. An illustrated description of the sinking of a shaft through 300 feet of watery sand. 2 plates. 3500 w. Glückauf—May 23, 1903.

Sinking by the Freezing Method and Its Difficulties. Translated from "Glückauf." Particulars given by R. Pierre of the difficulties met with in sinking by this process at the Laura and Vereeniging Colliery, in Holland. Ill. 4200 w. Ir & Coal Trds Rev—June 5, 1903.

Refrigeration in Shaft Sinking. Gives details of a difficult shaft put down in Holland, the machinery and apparatus used. Ill. 3800 w. Ice & Refrig—Dec., 1903.

Recent Application of the Freezing Process to the Augusta Victoria Mine, Westphalia (Die Neueste Anwendung des Gefrierverfahrens auf der Zeche Auguste Victoria i. W.). H. Joosten. A successful application of the Poetsch freezing process for deepening a shaft through 20 metres of quicksand. Two articles. 2 plates. 8000 w. Glückauf—Dec. 10, 17, 1904.

Sinking a Shaft by the Freezing Process. From an article by Herr Joosten, in "Glückauf." Illustrated description of the work. 3500 w. Ir & Coal Trds Rev—Jan. 13, 1905.

See also **Dawdon; Water Bearing Strata; EXCAVATION; FOUNDATION; TUNNEL.**

Frieh and Nöllenburg.—New Shaft-Boring Apparatus. Illustrates and describes an interesting invention shown at the Liége Exhibition. The inventors are Messrs. Frieh and Nöllenburg. 1200 w. Col Guard—Oct. 20, 1905.

Gold Mine.—See California.

Hardy.—A New System of Sinking Shafts. Illustrates and describes a method suited to all kinds of soil, devised by the Hardy Patent Pick Co., of Sheffield, England. It claims speed of boring, and immunity from accident. 900 w. Sci Am—Sept. 6, 1902.

Heringen, Germany.—See Tomson Hoisting.

Hibbing, Minn.—Sinking Through Quicksand at the Susquehanna Mine. H. B. Sturtevant. Read before the Lake Superior Min. Inst. Describes the methods used and progress made. Ils. 1500 w. Eng & Min Jour—Sept. 1, 1904.

Shaft Sinking Through Quicksand. H. B. Sturtevant. From Pro. of L. Sup. Min. Inst. A description of methods, employed at Susquehanna mine, Hibbing, Minn. 1800 w. Mines & Min—Nov., 1904.

Holland.—See **Freezing Process.**

Hydraulic Machine.—High Speed Rotary Hydraulic Shaft-Boring Machine. G. Schneiders, in "Glückauf." Illustrated description of the machine and its operation. 1100 w. Col Guard—Aug. 2, 1901. See also **Kind-Chaudron.**

Ironwood, Mich.—Sinking and Equipping No. 9 Shaft at Ashland Mine, of the Cleveland-Cliffs Iron Company, at Ironwood, Michigan. H. F. Ellard. Read before the Lake Superior Min. Inst. An illustrated detailed description of the work. 3200 w. Mines & Min—Oct., 1903.

Jetting Process.—Shaft Sinking by the Jetting Process. George C. McFarlane. Outlines a plan for sinking a round shaft lining of steel jacketed concrete, provided at the lower end with a cutting shoe. Ils. 1700 w. Eng & Min Jour—May 11, 1905.

Kind-Chaudron.—The Future of Shaft Sinking (Zukunft und Ziele der Schachtbohrtechnik). G. Schneiders. Discussing the Kind-Chaudron system and also an improved system with hydraulic removal of material. 5000 w. Two plates. Glückauf—July 27, 1901.

The Sinking of Shafts in Water-Bearing Strata (Creusement de Puits à Niveau Plein). Marcel Tock. A detailed account of the sinking of two shafts in water-bearing strata at Quesnoy, Bois du Luc, Belgium. The Kind-Chaudron process was employed. 8000 w. 6 plates. Rev Univ des Mines—Oct., 1902.

Progress at the Dover Colliery: Shaft Sinking by the Kind-Chaudron System. An illustrated account of the progress made at No. 2 pit, where great quantities of water were encountered. 1200 w. Col Guard—Sept. 25, 1903.

Dover Colliery. An illustrated account of a system of percussive boring on an enormous scale, lining with complete rings of tubbing—the Kind-Chaudron system. Serial. 1st part. 2500 w. Engr, Lond—Aug. 19, 1904.

The Kind-Chaudron Method of Shaft-Sinking. L. Ramakers. Illustrates and describes this method, which is particularly applicable to sinking through strata where there is a great influx of water. 1300 w. Min Mag—April, 1905.

See also **Ruhr District, Germany; COAL GEOLOGY—Kent.**

Kladno, Bohemia.—See **Compressed Air.**

Metal Mines.—Shaft Sinking. C. K. Colvin. Points from the writer's experience on the subject of sinking and timbering perpendicular cage shafts for the working of metalliferous mines. 1800 w. Min & Sci Pr—Oct. 4, 1902.

Mud Raising.—See **Silesia.**

New Zealand.—Sinking Through Swamp, Clay and Sand at Huntly, Waikald District. William Tottley. Describes the difficulties met in a New Zealand coal field. 2200 w. N Z Mines Rec—May 16, 1901.

Pattberg Process.—The Pattberg Boring Process and Its Application to Shaft Sinking (Das Stossbohrverfahren von Pattberg und seine Anwendung beim Abteufen der Schächte der Zeche Rheinpreussen in Lockerem Gebirge). L. Hoffmann. An illustrated description of a method of sinking shafts in soft ground, in which a frame, armed with a boring edge, loosens the soil, water is forced in and the mud is removed by a pump. 1 plate. 2000 w. Glückauf—June 14, 1902.

Shaft-Sinking at the Rheinpreussen Colliery with the Pattberg Drill. L. Hoffman, in "Glückauf." Illustrates and describes the sinking of two new shafts to depths of 140 and 165 metres respectively. The important feature is the percussive action of the drilling tools being effected by means of a swinging drum, and the continuous removal of the debris. 1600 w. Col Guard—Nov. 14, 1902.

See also **Water Bearing Strata.**

Plumb Line.—See **PLUMB LINE.**

Pneumatic.—See **Ardeer, Scotland; Compressed Air.**

Poetsch Process.—See **Freezing Process.**

Quesnay, Belgium.—See **Kind-Chaudron.**

Quicksand.—See **Freezing Process; Hibbing; Scranton; Silesia; Water-Bearing Strata; Westphalia.**

Refrigeration.—See **Freezing Process.**

Rheinelbe and Alma, Germany.—Deepening the No. 2 Shaft of the Rheinelbe and Alma Colliery. Illustrates and describes work attended with exceptional difficulty, as other uses of the shaft could not be interrupted. 2800 w. Ir & Coal Trds Rev—Nov. 9, 1900.

Rheinpreussen Coal Mine.—See **Pattberg Process.**

Ronchamp.—See **COAL MINE.**

Ruhr District, Germany.—Recent Shaft Sinking in the Ruhr District (Neuere Schachtbohrungen im Ruhrbezirk). L. Hoffmann. With details of the work of sinking shafts to depths of 450 to 1200 feet deep. 2000 w. 1 plate. Glückauf—April 27, 1901.

Some Recent Shaft Borings in the Ruhr District. L. Hoffmann. Translated and condensed from "Glückauf." Information concerning a shaft of the Scharnhorst Colliery, and one at the Preussen II. Colliery. Ill. 2200 w. Ir & Coal Trds Rev—May 24, 1901.

Methods and Cost of Shaft Sinking in the Ruhr District (Leistungen und Kosten beim Schachtabteufen im Ruhrbezirk). L. Hoffmann. Giving tabulated data concerning effectiveness and cost of deepening and lining shafts by various methods; including the Kind-Chaudron system. 4000 w. 1 plate. Glückauf—Sept. 7, 1901.

Shaft Sinking in the Ruhr Coal District, Germany (Schachtabteufen im Ruhrkohlenbezirk). An account of various methods of sinking shafts for coal mines and their cost, in Westphalia. 3000 w. Zeitschr d Oesterr Ing u Arch Vereines—June 5, 1903.

Salt Mine, Louisiana.—A Piece of Difficult Shaft Sinking in Developing the Salt Mines of Grand Cote Island, Louisiana. J. N. Haslehurst. A report of this property, its geography, history and development, with an illustrated description of the execution of this work. 3900 w. Eng News—Nov. 7, 1901.

Sandwell, Eng.—See **COAL MINE.**

Scranton, Pa.—Richmond No. 3 Shaft. Frank G. Wolfe. Illustrates and describes methods employed in sinking through quicksand near Scranton to connect with workings below. 1500 w. Mines & Min—Nov., 1904.

Sherwood, Eng.—Sherwood Colliery Sinking. J. W. Fryar. Describes the sinking to a depth of 1,302 ft., the diameter of the shaft being 20 ft. The time occupied was 54 weeks. Discussion. 5000 w. Col Guard—Oct. 2, 1903.

Silesia.—Shaft Sinking at the Dubensko Coal Mine in Upper Silesia (Das Schachtabteufen des Junghannschachtes II auf der Dubenskogrube in Oberschlesien). E. Langer. Abstract of a paper before the International Meeting of Boring Engineers at Karlsbad, giving an account of shaft sinking through watery quicksand. Ill. 900 w. Glückauf—March 1, 1902.

Report upon the Methods of Transportating Material in the Mines of Upper Silesia (Bericht über das Schlammversatzverfahren auf den Oberschlesischen Bergwerken). K. Müller & H. Hussmann. A description of the methods employed for raising mud, saud and semi-fluid materials in sinking mine shafts. 6000 w. 1 plate. Glückauf—Sept. 26, 1903.

Suspended Steam Pump.—The Application of Suspended Steam Pumps to the Sinking of Deep Shafts. W. Price Abell. An illustrated article endeavoring to show the advantages when suitable pumps, tackle, winches, etc., are used. 1800 w. Ir & Coal Trds Rev—July 25, 1902.

See also **PUMP.**

Susquehanna Mine.—See **Hibbing, Minn.**

Surveying.—See **SURVEYING—Mine Shaft.**

Sydney Harbor, N. S. W.—Deep Shaft Sinking. J. L. C. Rae. Relates the circumstances and events which had a bearing on the work, and describes the shaft-sinking of Sydney Harbor Colliery. Serial. 1st part. 4200 w. Aust Min Stand—Nov. 8, 1900.

The Deep Sinking of Shafts at the Sydney Harbor Colliery. Interesting particulars concerning the work near Sydney, New South Wales, with illustrations. 4400 w. Col Guard—Feb. 1, 1901.

Tamarack, Mich.—Sinking No. 5 Shaft at the Tamarack Mine, Michigan. William E. Parnall, Jr. Read before the Lake Superior Min. Inst. Illustrates and describes the work of sinking a shaft 4,684 feet deep, which occupied 4 1-2 years. 3000 w. Eng & Min. Jour—April 13, 1901.

See also **PLUMB LINE.**

Tomson Hoisting.—The Deepening of the Shafts of the Wintershall Mine, near Heringen (Das Abteufen des Schachtes der Gewerkschaft Wintershall bei Heringen an der Werra). H. Klose. Describing the use of the Tomson hoisting method for deepening shafts through water-bearing strata. 2000 w. Glückauf—Jan. 9,1904.

See also **Water Bearing Strata.**

Transvaal.—Note on the Cost and Speed of Sinking the East Shaft of the New Kleinfontein Co., Benoni, South Africa. Edward J. Way. Tabulated data. 300 w. Trans Am Inst of Min Engrs—Feb., 1904.

Notes on Vertical Shaft-Sinking on the Witwatersrand. H. Fraser Roche. On the methods employed for sinking vertical shafts by machinery, describing an ideal method. 4000 w. Jour Chem, Met & Min Soc of S Africa—Feb., 1905.

See also **GOLD MINING.**

Unwatering.—See **Compressed Air; MINE DRAINAGE.**

Up-Over Method.—Sinking by the Up-Over Method. William Belfitt. Explains the conditions and describes the method adopted. Ills. 1200 w. Ir & Coal Trds Rev—Dec. 22, 1905.

Water-Bearing Strata.—The Sinking of Shafts in Water-Bearing Strata (Les Creusements de Puits en Morts-Terrains). A. Habets. Discussing especially the devices for sinking shafts shown at the Düsseldorf exposition including the methods of Tomson, Sassenberg and Clermont, and Pattberg. 8000 w. 3 plates. Rev Univ des Mines—July, 1902.

Shaft-Sinking Through Water-Bearing Strata. Indicates various methods that have been adopted or proposed for dealing with exceptional quantities of water under difficult circumstances. 5000 w. Ill. Col Guard—Jan. 30, 1903.

Shaft Sinking Through Water-Bearing Permian, Triassic and Cretaceous Strata. Considers the methods used in sinking shafts through the more consolidated secondary rocks, which are generally very water-bearing. Ills. 4300 w. Col Guard—March 4, 1904.

See also **Freezing Process; Kind-Chaudron; Silesia; Tomson.**

Westphalia.—The Deepening of a Double Shaft at the Königsgrube Mine at Röhlinghausen in Westphalia (Das Abteufen eines Doppelschachtes der Zeche Königsgrube bei Röhlingshausen i. W.). H. Bonacker. Describing a difficult piece of shaft sinking through quicksand. 1200 w. Glückauf—Jan. 14, 1905.

SHALE.

See also **GEOLOGY; SHALE OIL; STONE.**

Kansas.—Shale Mine at La Harpe, Kansas. W. R. Crane. An illustrated article describing an instance of underground mining for brick making material. 2500 w. Mines & Min—Dec., 1902.

SHALE OIL.

See also **BITUMEN; PETROLEUM.**

Australia.—Kerosene Shale in Australia. John Plummer. Information concerning these deposits, the products derivable, etc. Ills. 2800 w. Eng & Min Jour—July 14, 1904.

Lothian, Scotland.—See **ELECTRIC EQUIPMENT—Shale Oil Mine.**

New Zealand.—New Zealand Coal and Oil Company. Brief account of how the shale-works at Orepuki are to be carried on. 1500 w. N Z Mines Rec—June 17, 1901.

Oakland Co., Scotland.—See **ELECTRIC EQUIPMENT—Shale-Oil Works.**

Tasmania.—See **COAL—Cannel.**

SHAPER.

See also **MACHINE TOOL.**

Back Geared.—A New Design of Back-Geared Shaper. Illustrated description of this tool. Mech Engr—April 2, 1904.

Bauer.—See **Propeller Blades.**

Mechanism.—See **KINEMATICS—Quick Return.**

Milling Machine.—See **BORING MACHINE—Cylinder.**

Propeller Blades.—The Bauer Propeller-Blade Shaping Machine. An illustrated description of an important improvement for cutting or shaping the blades of ships' propellers. 1600 w. Engng—Oct. 9, 1903.

Rack.—The Fellows Rack Shaper. Illustrated description. 700 w. Am Mach—Nov. 28, 1901.

Rapid Grooving.—A Shaper Arranged for a Rapid Grooving Operation. Illustration, with brief description. 500 w. Am Mach—Dec. 10, 1903.

SHARPENER.

Rock Drill.—See **ROCK DRILL—Sharpener.**

SHEARS.

See also **CRANE; HYDRAULIC MACHINERY; MACHINE TOOL.**

Blades.—Designing. Fitting and Tempering Shear Blades. T. Foot. An illustrated article showing the proper design of shear blades and their fittings for easy setting and adjustment. 1800 w. Am Mach—May 5, 1904.

Block.—Improved Electric Block Shears (Neue Elektrisch Betriebene Blockscheren). A. Schwarze. Illustrating and describing shears for cutting hot billets and blocks of steel, arranged for electric driving. Serial. Part I. 3000 w. 1 plate. Stahl u Eisen—Oct. 15, 1905.

Circular.—See **MACHINE TOOL—Power Consumption.**

Flying.—The Flying Shear. V. E. Edwards Photographs and sectional drawings of the different styles of shears are give with description of operation and work accomplished. 1600 w. Trans Am Soc of Mech Engrs, No. 0936—May, 1902.

German.—Electric. Steam and Hydraulic Shears at German Steel Works. Frank C. Perkins. Illustrates and describes various types. 1600 w. Mod Mach—Nov., 1903.

Heavy German Shears and Presses. Frank C. Perkins. Illustrated descriptions of large machines operated by hydraulic and steam power. 2400 w. Ir Age—Aug. 17, 1905.

Hydraulic. — See **HYDRAULIC MACHINERY—Punching and Shearing.**

SHEATHING.

See also **SHIP—Corrosion; Hull Protection.**

War Vessels.—The Question of Sheathing War Vessels. Harry Phelps. Notes showing the opinions abroad; discussing the advantages and disadvantages of sheathing, etc. 2500 w. Naut Gaz—Oct. 10, 1901.

See also **NAVY**; and under different classes of war vessels.

SHEAVES.

See also **HOISTING; POWER TRANSMISSION; PULLEY; ROPE DRIVING; WIRE ROPE.**

Friction.—See **FRICTION—Sheave.**

Wire Rope.—See **WIRE ROPE—Sheaves and Drums.**

SHED.

Fore River Shipbuilding.—See **SHIPYARD.**

Pier.—See **PIER; PIER SHED.**

Train.—See **RAILWAY STATION; RAILWAY TERMINAL.**

SHEET IRON.

See **MAGNETIC TESTING; SHEET METAL.**

SHEET METAL.

See also **BOILER MANUFACTURE; CHIMNEY—Steel; DIE; HOPPER—Cone Intersection; METAL WORKING; PRESS; PUNCHING.**

A Job of Piercing. Blanking and Forming Sheet Metal. William Doran. Illustrated description of the punch and dies used and their construction. 1700 w. Am Mach—Sept. 5, 1901.

Cold Working.—Cold Workiug Sheet Metal in Dies. John D. Riggs. Dies operated by presses are described and information concerning their use and economy given. Ill. 3000 w. Trans Am Soc of Mech Engrs, No. 0939—May, 1902.

Corrugated.—See **CORRUGATED METAL.**

Curling Tool.—Curling and Wiring Processes. Joseph V. Woodworth. Illustrates and describes press tools and fixtures for sheet metal work.

The article is confined to tools for curling and wiring. 1000 w. Am Mach—Feb. 5, 1903.

See also **Punching and Curling.**

Die Feed.—Feeding Sheet Metal to Dies. Joseph V. Woodworth. Illustrates and describes the various devices. Serial. 1st part. 1500 w. Am Mach—Dec. 25, 1902.

Electric Apparatus.—Manufacturing Armature Disks and Segments. Joseph V. Woodworth. Illustrated description of dies, presses and special machinery for this work. 1800 w. Mach, N Y—May, 1903.

The Manufacture of Sheet-Iron used in Dynamo Construction (Die Herstellung der im Dynamobau Gebrauchten Bleche). K. Frucht. An illustrated description of the machinery for cutting, stamping, slotting and performing other operations on iron sheets for armature cores and other purposes in dynamo construction. 3000 w. Zeitschr d Ver Deutscher Ing—May 30, 1903.

See also **MAGNETIC TESTING; PUNCHING.**

Forming.—Improved Methods of Forming Hollow Vessels of Sheet Metal (Neuerung in der Ausbrauchung von Blechhohlkörpern). Karl Musiol. Illustrating workshop methods of rolling and forming sheet metal in the lathe, with the aid of moulds and patterns. 2000 w. Stahl u Eisen—July 1, 1905.

See also **HYDRAULIC FORMING.**

Horning.—Horning and Seaming Processes. Joseph V. Woodworth. Illustrates and describes some of the devices and fixtures used. 1300 w. Am Mach—Jan. 1, 1903.

Hydraulic Forming.—See **HYDRAULIC FORMING.**

Hydraulic Press.—See **HYDRAULIC FORMING; HYDRAULIC MACHINERY.**

Ornamental Work.—Blanking and Forming a Fancy Shell. Joseph V. Woodworth. Illustrates and describes the method of making, and dies used. 1200 w. Am Mach—Nov. 7, 1901.

Perforating.—Perforating Flat and Cylindrical Sheet Metal. Joseph V. Woodworth. An illustrated description of dies and fixtures used and methods of operating. 1600 w. Am Mach—Nov. 27, 1902.

Sheet-Metal Perforating. Edward F. Chandler. Illustrates and describes a complete punch and die equipment. 600 w. Am Mach—Vol. 28, No. 18.

Punching and Curling.—A Punching and Curling Job. Joseph V. Woodworth. Illustrated description of methods of producing sheet metal parts of unusual shape. 1100 w. Am Mach—June 4, 1903.

Radiation.—See **HEAT RADIATION—Sheet Metal.**

Seaming.—See **Horning.**

Shell Drawing.—The Drawing of Deep Shells from Sheet Metal. Joseph V. Woodworth. An illustrated article showing what has been accomplished. 600 w. Am Mach—Sept. 18, 1902.

See also **DIE.**

Shovel Handle.—Manufacturing Sheet Metal Shovel Handle. W. W. Patterson. Illustrated description of a difficult piece of work. 1000 w. Am Mach—Dec. 31, 1903.

Stamping.—See **PUNCHING—Slitting Rolls; STAMPING MACHINE.**

Sub-Press.—The Manufacture of Accurate Sheet Metal Parts in the Sub-Press. Joseph Woodworth. Illustrated description of the sub-press and of the approved methods for constructing dies for it. 1600 w. Ir Trd Rev—Dec. 3, 1903.

See also **PUNCHING.**

Swaging.—See **SWAGING MACHINE.**

Twisting.—A Twisting Operation. C. H. Rowe. Illustrates and describes the essential features of a recently constructed punch and die for twisting the ends of sheet metal. 700 w. Am Mach—Nov. 1, 1900.

Welding.—See **WELDING—Sheet Iron.**

Wiring Tool.—See **Curling Tool.**

SHEET PILING.

See **COFFERDAM; FOUNDATION; PILE.**

SHELL.

See also **ARMOR PLATE; EXPLOSIVE; GUN.**

Armor Piercing.—See **Capped; ARMOR PLATE—Artillery; History; Trials.**

Capped.—Capped Armor-Piercing Projectiles. P. M. Staunton. Deals with the development of each successive type, stating what it was intended to effect, and to what extent the expectations have been justified. 5200 w. Engng—March 15, 1901.

Capped Armor-Piercing Projectiles. Discusses briefly the penetration of plates, and the action of capped projectiles. 1500 w. Engr, Lond—June 27, 1902.

The Action of Capped Armor-Piercing Shell. Eugen Kodar v. Thurnwerth. Capt. George Blakely. Translated from the German. Examines the increased penetration of capped projectiles, on the basis of tests made with a variety of plates. Ills. 4300 w. Eng News—Oct. 5, 1905.

Capped and Uncapped.—Capped and Uncapped Projectiles. Illustrations showing the effect of the impact of capped and uncapped projectiles with particulars of the test. 900 w. Engr, Lond—Jan. 2, 1903.

Casting.—See **CASTING—Shell.**

Coast Artillery.—Coast Artillery Projectiles. Describes the function of armor-piercing projectiles, their design, manufacture, etc. 4800 w. Jour U S Art—May, 1905.

Gathmann.—See **ARMOR PLATE—Trials.**

High Explosive.—High Explosive Shells. Editorial concerning some experiments made by Sir Hiram Maxim, with discussion of other explosives. 2700 w. Engng—Aug. 2, 1901.

See also **ARMOR PLATE—Trials.**

Hydraulic Machinery.—See **HYDRAULIC MACHINERY.**

Manufacture.—High-Speed Steel and the Manufacture of Armor-Piercing Projectiles. Illustrates and describes the processes through which a shell passes in manufacture. 1700 w. Am Mach—July 7, 1904.

Sheet Metal.—See **DIE; SHEET METAL.**

Weldless.—See **PIPE MANUFACTURE; TUBE MANUFACTURE.**

SHIELD.

Gun.—See **ARMOR PLATE; GUN; NAVY.**

Tunnel.—See **TUNNEL—Shield.**

SHIP.

See also **NAVAL ARCHITECTURE; NAVY; SAILING VESSEL; SHIPBULIDING; SHIPPING; SHIP PROPULSION; SHIP RESISTANCE; SHIP STABILITY; STEAMSHIP;** and under specific types of vessels.

American Full-Rigged.—The American Full-Rigged Ship. An illustrated article giving facts of interest in regard to a type of vessel rapidly disappearing. 2000 w. Naut Gaz—Aug. 4, 1904.

See also "Great Republic;" **SAILING VESSEL.**

Ballasting.—See **SHIP STABILITY.**

Boston.—See **SHIPPING.**

Capacity.—See **STEAMSHIP.**

Chart.—See **NAVAL ARCHITECTURE—Strength.**

Classification Rules.—See **SHIPPING.**

Cleaning and Painting.—See **PAINTING—Ship.**

Corrosion.—Notes on the Serious Deterioration of Steel Vessels from the Effects of Corrosion. George Johnstone. Lecture delivered at the opening meeting of the Inst. of Engrs. & Shipbuilders in Scotland, 1901. A record of the writer's experience. 3000 w. Naut Gaz—Dec. 19, 1901.

Cost.—The Cost of Ships. Theodore Lucas. Discusses points affecting the first cost of ships. 1400 w. Naut Gaz—July 11, 1901.

See also **SHIPBUILDING.**

Displacement.—The Displacement and Dimensions of Ships. J. A. Normand. Read before the Glasgow Congress. Gives approximate rules for the determination of the displacement and dimensions of a ship in accordance with a given programme of requirements. 2000 w. Engng—Sept. 6, 1901.

See also **NAVAL ARCHITECTURE—Weight; Weight Distribution; SHIPPING—Tonnage.**

Draft.—The Draft of Vessels in Motion in Shallow Channels Compared with Their Stationary Draft. Henry N. Babcock. A record of observations upon the actual draft of large steamships when under way, as compared with their draft at their piers, with inferences. 2500 w. Eng News—Aug. 4, 1904.

See also SHIP RESISTANCE—Depth of Immersion.

Electric Repairs.—See ELECTRIC EQUIPMENT—Ship Repairs.

Fire Apparatus.—See FIRE APPARATUS—Clayton.

Fire Prevention.—See FIRE PROTECTION—Ship.

Freeboard.—On Freeboard. Archibald Denny. Read before the Inst. of Naval Archts. Short historical paper placing on record important facts in connection with the work with the Load Line Regulations. 1700 w. Engng—July 5, 1901.

Freeboard. Gives details connected with its origin and subsequent official application in Great Britain as one of the means to prevent overloading. 4500 w. Marine Engng—Dec., 1904.

"Great Republic."—Details of Construction of the Famous American Clipper Ship "Great Republic." Reprint of a description of this vessel written at the time of her construction, about fifty years ago. Ill. Serial. 1st part. 2000 w. Marine Engng—Aug., 1901.

History.—From Raft to Steamship. Randolph I. Geare. The present article illustrates and describes the earliest forms of vessels. 1300 w. Sci Am Sup—April 5, 1902.

See also MARINE ENGINEERING.

Hull Protection.—The Protection of the Hulls of Iron Ships (Comment on Peut Proteger les Coques des Navires en Fer). From the "Chemiker Zeitung." A brief review of sheathing and protective paints, particularly the Rahtjen composition. 900 w. Rev Technique—March 10, 1902.

Ships' Compositions. A. C. A. Holzapfel. Discusses the large number of compositions for the protection of ships, details of their manufacture, and the chemical processes upon which their efficacy depends, and other attempts at protecting vessels. Serial. 1st part. 3800 w. Engng—April 8, 1904.

See also Corrosion; PAINT—Submarine; SHEATHING.

Hull Weights.—See NAVAL ARCHITECTURE—Weight.

Load Line.—Determination of the Line of Flotation of a Ship for Variable Loading (Bestimmung der Schwimmlinie eines Schiffes bei Trimänderungen). J. Meyer. A mathematical investigation in rectangular co-ordinates, with diagrams for various forms of hulls. 2000 w. Schiffbau—Aug. 8, 1901.

See also Freeboard.

Non-Sinkable.—See LIFE-BOAT; WATER-TIGHT COMPARTMENT.

Philippines.—See BOAT; SHIPPING.

"Preussen."—The Five-Masted Ship "Preussen" Das Fünfmast-Vollschiff "Preussen"). W. Kaemmerer. Details of construction of full-rigged ship of five masts of 11,150 tons displacement. Steam steering and hoisting gear are used. 2500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Aug. 20, 1904.

Rolling.—See SHIP STABILITY.

Running Lights.—See NAVIGATION.

Sailing vs. Steaming.—Steamers and Sailing Vessels (Vapeurs et Voiliers). M. Kerlago. A comparison between steam and sail navigation and transportation. 3000 w. Revue Technique—Jan. 25, 1902.

See also SAILING VESSEL.

School.—See SCHOOL SHIP.

Seaworthiness.—"Seaworthiness." B. Goldsmith. Discusses the importance to passengers, and also to underwriters, of the seaworthiness of vessels, especially for long voyages. Serial. 3 parts. 10500 w. Aust Min Stand—Jan. 23 and 30, Feb. 6, 1902.

Sheathing.—See Corrosion; Hull Protection; SHEATHING.

Stability.—See SHIP STABILITY.

Strength.—See NAVAL ARCHITECTURE.

Stresses.—See NAVAL ARCHITECTURE; SHIP STABILITY—Rolling.

Subsidy.—See SHIPPING SUBSIDY.

Training.—See TRAINING SHIP.

Ventilation.—See HEATING AND VENTILATION—Ship; VENTILATING COWL; VENTILATION—Ship.

Water-Tight Compartment.—See WATER-TIGHT COMPARTMENT.

Weight.—See Displacement; NAVAL ARCHITECTURE; SHIPPING—Tonnage.

SHIP BOAT.

See BOAT; LIFEBOAT.

SHIPBUILDER.

Education.—The Education of a Shipbuilder. Prof. J. H. Biles. From a lecture delivered before the Glasgow and West of Scotland Technical College Scientific Society. 2000 w. Naut Gaz—Feb. 7, 1901.

SHIPBUILDING.

See also MARINE ENGINEERING; NAVAL ARCHITECTURE; NAVY; SAILING VESSEL; SCHOONER; SHIP; SHIPPING; SHIP PROPULSION; SHIP RESISTANCE; SHIP STABILITY; SHIPYARD; STEAMSHIP; and under specific types of vessels.

Notable Shipbuilding Abroad. Mainly a review of this industry in the United States, with notes also on Germany and Holland. 1400 w. Engr, Lond—Feb. 21, 1902.

Modern Shipway Equipment and Its Future Development. Tjard Schwarz. Translated from the "Jahrbuch der Schiffbautechnischen Gesellschaft." Illustrates and describes cranes and other recent devices for handling materials, while a ship is being built, and for machine work. Serial. 1st part. 8000 w. Marine Engng—July, 1902.

American.—Shipbuilding in the United States During the Past Year. A review of this industry, with a list of all steam vessels, sailing vessels, and sea-going barges of over 500 tons which have been launched in the United States during the past year. Ill. 9500 w. Naut Gaz—Jan. 3, 1901.

New Vessels Under Construction. A record of the craft under construction in United States shipyards. 7000 w. Naut Gaz—Jan. 10, 1901.

Ship Building in the United States. A discussion of the subject based upon the output at Cleveland as compared with other districts of the country. 1200 w. Marine Rev—March 21, 1901.

Naval and Merchant Ship Construction in the United States During the Past Year. Abstracted from the introduction to the "Blue Book of American Shipping." 1500 w. Eng News—Aug. 15, 1901.

The Development of American Ship-building in the Last Decade (Die Entwickelung des Amerikanischen Schiffbaues im Letzten Jahrzehnt). Prof. Oswald Flamm. Abstract of a paper by Tjard Schwarz before the "Schiffbau-technische Gesellschaft" on shipbuilding, and cranes and other shipyard appliances in the United States. Ill. 1200 w. Stahl u Eisen—Jan. 1, 1902.

Shipbuilding in the United States. Alexander R. Smith. Introduction to the Census Report on Shipbuilding with continuation of last week's article. Serial. 8200 w. Naut Gaz—May 29, 1902.

See also Great Lakes; SHIPPING; SHIPPING SUBSIDY; SHIPYARD.

American Cost.—The Cost of Shipbuilding in America. Editorial discussing the Subsidy Bill before the U. S. Congress. 1600 w. Engr, Lond—Dec. 14, 1900.

American Navy.—Why It Takes So Long Time to Build and Equip a Naval Vessel for the United States. George W. Dickie. Points out the chief causes of delay in building these vessels, introducing a discussion on methods of design and construction. 4000 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 3—Nov., 1902.

See also NAVY; and under various types of war vessels.

American vs. British and German.—Can the American Shipbuilder Under Present Conditions Compete with the British and German Shipbuilders on the Production of the Largest Class of Ocean Passenger and Freight Steamships? George W. Dickie. Presents a comparison in skill in design, cost of labor, and cost of material. 3800 w. Trans Am Soc of Nav Archts & Marine Engrs—Nov., 1900.

Battleship.—Rapid Battleship Building. Waldon Fawcett. Discusses the time economy in battleship construction made during the past two years, particularly in British and American yards. 1800 w. Pop Sci M—Nov., 1900.

See also **American Navy; BATTLESHIP; NAVY.**

Berlin School.—Naval Architecture and Marine Engineering at the Berlin Technical High School (Die Entwickelung der Abteilung für Schiff- und Schiffsmaschinenbau an der Königlichen Technischen Hochschule zu Berlin). Prof. Oswald Flamm. A general review of the development of the courses of instruction, the growth in the number of students, and the need for more instructors. Curves and tables. 3800 w. Schiffbau—Jan. 8, 1902.

Boats.—See **Small Vessels; BOAT.**

British.—Shipbuilding and Marine Engineering in 1900. A review of the statistics of this industry in the Unted Kingdom. Serial. 1st part. 3500 w. Engng—Jan. 4, 1901.

Shipbuilding and Marine Engineering During 1900. A review of this industry, the present article being confined to the volume of work accomplished during the last year in the United Kingdom. Serial. 1st part. 2700 w. Engr, Lond—Jan. 25, 1901.

Decline in British Shipbuilding. Reports this branch of trade, as well as other lines, in anything but a prosperous condition. 2400 w. Naut Gaz—March 14, 1901.

Shipbuilding and Marine Engineering in 1901. A review of the ship tonnage constructed in the works of the United Kingdom. Serial. 1st part. 3700 w. Engng—Jan. 3, 1902.

Shipbuilding and Marine Engineering During 1901. A review of the year; the present article dealing with the volume of work and its broad general features, as well as with the measure of activity in the several districts of the United Kingdom. Serial. 1st part. 3500 w. Engr, Lond—Jan. 10, 1902.

Shipbuilding and Marine Engineering, 1903. Begins a review of the year just ended. Serial. 1st part. 4000 w. Engng—Jan. 1, 1904.

See also **German vs. British; White Address; NAVY; SHIPPING.**

British History.—The Romance of Applied Science in the United Kingdom. Reviews the record of the Inst. of Naval Architects, and the development of the shipbuilding industry. Serial. 1st part. 2700 w. Ir & Coal Trds Rev—June 14, 1901.

British Navy.—Progress of Warships and Machinery Building in England. A record of what has been accomplished in ship-yards and engine-works during the past half year ending June 30th. 2300 w. Engr, Lond—July 3, 1903.

Progress of Warships and Machinery Building in England. A record of the work in these fields during the last half year. 2500 w. Engr, Lond —July 8, 1904.

Shipbuilding for the Navy. Lord Brassey. Discusses the naval requirements of Great Britain, favoring the building of smaller vessels, distributing the guns in more ships. Abstract of discussion. 20,500 w. Inst of Civ Engrs (No. 3562).

See also **Battleship; NAVY.**

Cellular Construction.—See **WATERTIGHT COMPARTMENT.**

Cleveland, O.—See **American.**

Clyde.—The Development of Ship and Engine Building (Streifzüge durch das Gebiet des Schiff-und Schiffmaschinenbaues). A review of shipbuilding on the Clyde in connection with the Glasgow Exhibition. Two articles. 600 w. Zeitschr d Ver Deutscher Ing—Sept. 14, Oct.1 2, 1901.

The Clyde and Naval Work. Begins a detailed account of the warship work in hand, done, and proposed to be done on the Clyde. Serial. 1st part. 1500 w. Engr, Lond—July 17, 1903.

See also **SHIPYARD.**

Cost.—See **American Cost; SHIP.**

Electric Tools.—See **Tools; ELECTRIC EQUIPMENT—Shipyard.**

Framing.—See **NAVAL ARCHITECTURE.**

German vs. British.—The Development of British and German Shipbuilding (Einiges aus der Entwickelung des Deutschen und des Englischen Schiffbaues). With comparative outlines of many vessels, and diagrams of dimensions and performances. 3000 w. Glasers Annalen—Dec. 15, 1900.

Germany.—Ship Building Resources of Germany. From "N. Y. Sun." Full text of M. Edouard Lockroy's letter on the merchant marine of Germany and the remarkable industrial growth of the nation. 3300 w. Marine Rev—March 21, 1901.

Shipbuilding in Germany, and the Imperial German Navy. Information compiled from various sources. 1800 w. Jour U S Art—March-April, 1901.

Germany's Progress as a Shipbuilding Nation. Edouard Lockroy. An account of the rapid development and the causes. 4000 w. Naut Gaz—May 9, 1901.

German Shipbuilding in 1901 (Die Schiffbauthätigkeit im Jahre 1901). Statistical tables of the Germanic Lloyd showing number and tonnage of vessels built and building in German yards. 800 w. Schiffbau—Jan. 8, 1902.

The Iron Industry and Shipbuilding in Germany (Eisenindustrie und Schiffbau in Deutschland). E. Schrödter. Abstract of a paper before the Schiffbautechnische Gesellschaft at Düsseldorf, giving an account of the growth of the German shipbuilding and iron industries, and comparisons with other countries. Diagrams and tables. Serial. Part I. 5000 w. Stahl u Eisen—July 1, 1902.

German Shipbuilding Progress on the Weser. Briefly reviews the recent progress in size, number, speed and comfort of German ships, and the shipyards where they are built. 1200 w. U S Cons Repts, No. 1556—Jan. 28, 1903.

The Development of the German Shipbuilding Industry (Die Entwickelung der Deutschen Schiffbauindustrie). Hr. Stellter. Paper before the Schleswig-Holstein branch, giving history and statistics, with curves and table. 2500 w. Zeitschr d Ver Deutschr Ing—Aug. 26, 1905.

The Development of the German Shipbuilding Industry (Die Entwickelung der Deutschen Schiffbau Industrie). F. Stellter. A review of the growth of the industry since 1873, with tables and diagrams. Serial. Part I. 3000 w. Schiffbau—Oct. 11, 1905.

Glasgow Exhibition.—Shipbuilding in the Nineteenth Century. Brief account of the beautiful collection of models shown at the Glasgow exhibition. 1800 w. Marine Rev—May 30, 1901.

Great Lakes.—Present Tendencies of Lake Shipbuilding. Waldon Fawcett. Comments on the return to normal size, instead of building the large vessels introduced at the close of the last century. Also notes other tendencies in the most recent vessels. Ill. 1700 w. Am Mfr—Jan. 23, 1902.

Recent Operations in the Shipyards on the Great Lakes. Waldon Fawcett. An illustrated article reviewing the work since the opening of the year 1901. 2200 w. Marine Engng—April, 1902.

Recent Development of Lake Ship Building. Waldon Fawcett. An illustrated article discussing recent vessels for the lakes, and the change of policy made evident in the four new steel steamers under contract. 2200 w. Marine Engng —April, 1905.

See also **American; NAVY; SHIPPING; STEAMSHIP.**

Hongkong.—Steel Shipbuilding in Hongkong. J. W. Graham. Confined to the actual steel portions of a vessel. Discusses the best methods to adopt with Chinese labor to get desired results. Also a description of a new shipbuilding plant at Hongkong. 7700 w. Far-East Rev—Feb., 1905.

Japan.—See **HARBOR—Nagasaki; SHIPPING; SHIPYARD.**

Lake George.—See **STEAMBOAT—"Sagamore."**

Lake Titicaca.—See **STEAMBOAT.**

Lengthening "Iroquois."—Lengthening of the S. S. "Iroquois." An illustrated description of work of cutting and lengthening a steamship, carried out at the Erie Basin, New York. 1000 w. Sci Am—Aug. 31, 1901.

Liner.—The Construction of a Great Liner. A half-dozen illustrations showing clearly a great ocean steamship in the earlier stages of construction, with comments. 800 w. Engr, Lond—Dec. 8, 1905.

Material Specifications.—A Comparison of Specifications for Shipbuilding Material. E. Schroedter. Abstract of a paper read before the International

Shipbuilding Congress at Düsseldorf. A comparison between the conditions in Germany and Great Britain. 2000 w. Ir & Coal Trds Rev—June 13, 1902.

Metallography. — See **METALLOGRAPHY** — Naval Construction.

Metric System.—See **WEIGHTS AND MEASURES**—Metric System, Shipbuilding.

Mold Work.—Practical Mold Work in Shipyards. Sidney H. McLane. On the advantages of mold work, illustrating by example. 1500 w. Marine Engng—Oct., 1903.

Motor oBats.—See Small Vessels; **BOAT**—Construction; Design; **BOAT, GASOLINE.**

Nagasaki.—See **HARBOR; SHIPYARD**—Japan.

New London, Conn.—See **STEAMSHIP**—"Minnesota."

"New York."—See **STEAMSHIP.**

Pneumatic Tools.—See Tools; **PNEUMATIC TOOL**—Shipbuilding.

Puget Sound.—See **SHIPPING.**

Reconstruction.—Rebuilding a Steamer on the Tyne. the reconstruction of the Italian passenger steam- Describes the reconstruction of the Italian passenger steamer "Savoia." 600 w. U S Cons Repts, No. 874—Oct. 31, 1900.

See also Lengthening; **REPAIRING; BATTLESHIP**—"Messoudieh"; **STEAMSHIP**—"Saale."

Repairing.—See also **BATTLESHIP**—"Oregon"; **STEAMSHIP**—McPherson.

Repairing Destroyer.—See **TORPEDO-BOAT DESTROYER**—"Salmon."

Repairing "Etruria."—The Repairing of the Steamship "Etruria." From some unknown cause the vessel lost her rudder, rudder-post, propeller and the external portion of the propeller shaft in mid-ocean. By the use of pneumatic power the repairs were executed in about two weeks. Illustrated description of the work. 1100 w. Engr, Lond—June 6, 1902.

Rivet Holes.—Drilled Holes. A discussion of Mr. Yarrow's paper on "Drilled v. Punched Rivet Holes in the Hulls of Ships." 3000 w. Engr, Lond—July 24, 1903.

Riveting.—See also Steel Steamers.

Rivet Spacing.—Rivet Spacing in Merchant Vessels Classed at Lloyds. Gives a classification based on the best practice. 1200 w. Feilden's Mag—Oct., 1903.

"Saale."—See **STEAMSHIP.**

Small Vessels.—The Building of Small Vessels (Klein-Schiffbau). E. Misch. An illustrated description of the yards of R. Holtz at Harburg on the Elbe, which are devoted chiefly to the building of boats, steamboats and small steamships. Serial. Part I. 1800 w. Schiffbau—Jan. 23, 1902.

The Construction of Small Sailboats for Inland Waters (Mittheilungen über den Bau Kleiner Segelboote für Binnenseen). W. E. Ernst. With diagrams of stability and lines of hull construction. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 12, 1902.

See also **BOAT; SAILBOAT; YACHT.**

Specifications.—Suggestions to American Shipbuilders. Remarks on the lack of system in specifications accepted by builders, and the advantage of standard specifications. 1400 w. Marine Engng—July, 1903.

See also **Material Specifications.**

Steel Steamers.—Some Points in the Construction of Large Steel Steamers and the Riveting of Lapped Butts. Archibald Hogg. Read before the N. E. Coast Inst. of Engrs. & Shipbuilders. The object of the paper is to call attention to the structural strength of large and full-formed steamers, and to suggest a new principle of lap butt riveting. 2500 w. Engrs' Gaz—May, 1903.

See also **SHIPYARD**—American Steel.

Stern Frame.—Building a Stern Frame. Richard L. Tappenden. Illustrates and describes the building of an ordinary L-shaped frame. 800 w. Ir Age—March 27, 1902.

See also **ALUMINOTHERMY.**

Structural Details.—Experiments on Some Structural Details. An illustrated account of deviations from normal arrangements, tested to destruction under the authority of Lloyd's, to determine the actual efficiencies of some of the proposals made to effect economies or to obtain more space. 1400 w. Engr, Lond—Nov. 25, 1904.

Tools.—Electric and Pneumatic Portable Tools in Shipbuilding. Frank C. Perkins. An illustrated article describing the operation of various tools. 800 w. Marine Engng—Feb., 1905.

See also **ELECTRIC EQUIPMENT**—Shipyard; **PNEUMATIC TOOL**—Shipbuilding.

Transferring Machine.—See **NAVAL ARCHITECTURE.**

United States.—See American; Great Lakes.

United States Steel.—See **SHIPYARD**—American Steel.

Warships.—See Battleship; British Navy; **NAVY.**

White Address.—The Progress of Shipbuilding. Editorial review of the address of Sir William White. 4500 w. Engng—Nov. 20, 1903.

Presidential Address before the Institution of Civil Engineers. Abstract of the address of Sir William Henry White, on naval and mercantile marine matters in Great Britain. A review of progress during forty-four years. Serial. 1st part. 5000 w. Engng—Nov. 6, 1903.

SHIP CANAL.

See **CANAL; NAVIGATION; RIVER REGULATION; WATERWAY.**

SHIP DISPLACEMENT.

See **NAVAL ARCHITECTURE; SHIP; SHIPPING**—Tonnage; **SHIP RESISTANCE; SHIP STABILITY.**

SHIPPING.

See also **HARBOR; NAVIGATION; PORT; SHIP; SHIPBUILDING; SHIPPING SUBSIDY; STEAMSHIP; SALVAGE; TRANSPORTATION; WRECK.**

The World's Merchant Marine and Shipbuilding. Facts from an article published in the "Frankfurter Zeitung" are discussed. 500 w. U S Cons Repts, No. 967. Feb. 20, 1901.

Foreign Competition in Shipping and Shipbuilding. An interesting article showing progress made in the different countries, giving diagrams and tables. 3000 w. Engng—Sept. 27, 1901.

The End of Prosperity for the Ship Owner. Editorial discussion of the changes during recent years and the present situation. 1300 w. Eng News—Nov. 7, 1901.

The Merchant Marine (La Marine Marchande). Marcel Plessix. The first installment of a serial devoted to the development of merchant vessels and their influence upon international trade. Serial. Part I. 2000 w. Revue Technique—April 10, 1904.

The World's Ocean-Going Trade. Brysson Cunningham. An examination of the shipping statistics, with especial reference to British shipping and a comparison of other nations. Ill. 8000 w. Cassier's Mag—Nov., 1904.

African Service.—Need of Direct Steamship Service to Africa. Criticises the methods of American manufacturers in introducing their products where the English language is not understood, explains European methods, and iscusses the need of American steamships. 3500 w. U S Cons Repts, No. 1209—Dec. 9, 1901.

American.—Address before the National Association of Manufacturers. Theodore C. Search. Extract referring to the upbuilding of the American merchant marine. 4000 w. Marine Rev—June 6, 1901.

Restoration of the American Merchant Marine. Richard P. Joy. Reviews the early history and the present position, and urges the taking of such measures as will restore the country's flag to its former glory on the seas. 2500 w. Marine Rev—Nov. 14, 1901.

The Development of Shipping in the United States. Lewis Nixon. Printed also in the "Cosmopolitan Magazine." Discusses points in the oversea commerce, and the importance of American shipowning. 2800 w. Naut Gaz—Feb. 13, 1902.

The American Merchant Marine. A review of the present condition, with comparison with former record, and description of notable passenger steamers recently constructed. 2500 w. Sci Am—Dec. 13, 1902.

The Future of Our Merchant Marine. Edwin

Maxey. A discussion of the prospects of the United States as shipbuilder and ship-owner. 2500 w. Gunton's Mag—May, 1903.

The Merchant Marine. George W. Dickie. Address, at Portland, before the Trans-Mississippi Commercial Congress. Also editorial. Discusses the difficulties with which American shipbuilders must contend, and the shipping interests of the United States. 6000 w. Marine Engng—Nov., 1905.

Upbuilding of Our Merchant Marine. F. W. Hibbs. Urging the establishing of the American merchant marine on an equal footing with other nations. 3800 w. Marine Rev—Dec. 28, 1905.

See also **SHIPBUILDING; SHIPYARD.**

American Coast.—Coastwise Steamship Lines of the United States. Illustrates and describes types of vessels belonging to the domestic marine and gives information relating to the service. Also information in regard to the domestic trade. 4000 w. Naut Gaz—Nov. 2, 1905.

Boston.—Boston Ships: Past and Present. R. G. F. Candage. Concerning the ships built in, owned and sailed into and out of the port of Boston from its settlement to the present time. 5500 w. Naut Gaz—April 4, 1901.

British.—The Present Position of British Shipping. Benedict W. Ginsburg. Discusses the rise and progress of British shipping with special reference to the Atlantic Shipping Trust and the effect of foreign subsidies. Serial. 1st part. 4000 w. Page's Mag—March, 1903.

Free Trade and British Shipping. W. H. Renwick. Discusses the restrictions imposed by Parliament, and compares with foreign competition; considers subsidies and other matters affecting the shipping interests. 6000 w. Nineteenth Cent—Feb., 1904.

Progress of Steam Navigation. Robert Caird. Presented before the Royal Philosophical Soc., Glasgow. A review of the progress from 1802 to 1902. The present article considers mainly British merchant shipping of the largest size. Serial. 1st part. 4500 w. Naut Gaz—June 16, 1904.

The Making of the British Mercantile Marine. Brysson Cunningham. Information based on shipbuilding statistics of the last half-century, comparing the activity in England with other countries, and illustrating vessels, shipbuilding yards and appliances. 2500 w. Cassier's Mag—Jan., 1905.

See also **COMMERCE; SHIPBUILDING.**

City Line.—See **STEAMSHIP.**

Classification.—Classification Rules. Theodore Lucas. Remarks on the influence of classification regulations for the guidance of underwriters on the development of our merchant marine. Gives Lloyd's Rules, and the proposed standard specifications of the Am. Soc. of the International Assn. for Testing Materials. 6000 w. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

Bureaus for the Classification of Ships (Les Offices de Classification de Navires). An account of the origin and operations of the Bureau Veritas and of Lloyds, in the classification and registry of vessels. 3000 w. Génie Civil—Dec. 30, 1905.

See also **Tonnage.**

Combination.—See **International Mercantile Marine Co.**

Cunard.—The Cunard Agreement. W. R. Lawson. A discussion of the British agreements with the Cunard Company, and the Shipping Combine established by J. Pierpont Morgan; the agreement with the German government, etc. 5800 w. Contemporary Rev—Nov., 1902.

Britain's Supremacy on the Atlantic. Editorial on the Cunard Steamship Company's argument with the government, and the German high-speed vessels. 3300 w. Engng—Aug. 7, 1903.

The New Cunard Steamship Contract. Eugene Tyler Chamberlain. Considers this contract, and the agreement of the British Government with the International Marine Assn., and the effect on the future of American shipping. 4500 w. N Am Rev—Oct., 1903.

Position of the Cunard Steamship Co. Considers in detail the position of this company which has recently been granted a large subsidy by the British Government. 3000 w. Marine Rev—Dec. 31, 1903.

See also **STEAMSHIP.**

Europe.—The Progress of the Continental Merchant Marine. Information concerning various continental shipyards, and the work in progress. 3000 w. Engr, Lond—Dec. 28, 1900.

France.—Merchant Marine of France. Résumé of a report made by Mr. Thierry, Deputy from Marseilles, in the name of the budget committee of 1900 of the Chamber of Deputies. 3300 w. U S Cons Repts, No. 927—Jan. 5, 1901.

The French Mercantile Marine. A statement of the decadence and present condition, and the difficulties in the attempts at revival. 2900 w. Engr, Lond—Dec. 6, 1901.

Freeboard.—See **SHIP.**

German.—German Merchant Marine. Reviews the history and development, describing the character of the German shipping and giving much information. 6000 w. U S Cons Repts—May, 1904.

Great Lakes.—The New Fleet on the Great Lakes. Ralph D. Williams. Gives information showing how the trade of the Great Lakes is growing and giving a list of this year's orders for new ships. Ills. 1300 w. R R Gaz—Vol. XXXIX. No. 5.

See also **Lake Superior; SHIPBUILDING.**

History.—A Brief Sketch of the Origin and Development of the World's Shipping. Lawrence Irwell. An interesting review, giving some idea of the immense carrying trade, and the part taken by the different countries of the world. 2200 w. Marine Engng—Feb., 1901.

Insurance.—See **INSURANCE—Marine.**

International Mercantile Marine Co.—A Great Steamship Combination. Information obtained from Clement A. Griscom concerning the recent combination of six lines by J. Pierpont Morgan, and what they propose to accomplish. 2200 w. Marine Rev—April 24, 1902.

The American Shipping Combine. Editorial discussion of the proposed arangement for the control of the Atlantic shipping trade. 3500 w. Engng—May 2, 1902.

The Atlantic Shipping Combination. Editorial discussion of the schemes of J. Pierpont Morgan in this field. 1200 w. Engr, Lond—May 2, 1902.

The Shipping Combine. Editorial discussion of the recent arrangements under the leadership of Mr. J. P. Morgan, and the effect on British trade. 3000 w. Engng—May 16, 1902.

British and American Shipping. Benjamin Taylor. A discussion of the recent developments in maritime affairs, known as the "shipping combine." 6200 w. Nineteenth Cent—July, 1902.

The Steamship Merger and American Shipbuilding. Charles H. Cramp. Briefly reviews the history of transatlantic construction and navigation, showing the conditions which existed and the effect which the merger is likely to have, and considering the probable effect upon shipbuilding. 4500 w. N Am Rev—July, 1902.

The Atlantic Shipping Trade. Editorial discussion of the recently formed association to be known as the International Mercantile Marine Company, considering mainly its naval aspect. 3000 w. Engng—Oct. 10, 1902.

British Subsidies and American Shipping. Charles H. Cramp. Discusses the policy of the British government in regard to its merchant marine, and the effect upon the United States shipping industry. 2200 w. N Am Rev—Dec., 1902.

The Great Ship Combine. Winthrop L. Marvin. An account of the International Mercantile Marine Company, giving details of the organisation, its aims, etc. Ill. 4500 w. Rev of Revs—Dec., 1902.

Transatlantic Shipping Business. A discussion regarding the effect of the Morgan combine and Cunard agreement with the British Government, with criticisms of the Cunard agreement. 5000 w. Marine Rev—Feb. 19, 1903.

See also **British; Cunard; Leyland.**

Japan.—Shipping and Shipbuilding in Japan. Condensed information from recent publication by the Mercantile Marine Bureau. 600 w. Engng—Feb. 1, 1901.

See also **SHIPYARD.**

Lake Superior.—Early Days on Lake Superior. An account of conditions which existed before the opening of the Sault Ste. Marie canal. 4800 w. Marine Rev—Feb. 21, 1901.

See also **Great Lakes; CANAL—Sault Ste. Marie.**

Leyland Line Purchase.—The American Shipping Purchase. Editorial discussion of the purchase their piers, with inferences. 2500 w. Eng News—Aug. 4, 1904.

See also SHIP RESISTANCE—Depth of Immersion.

Electric Repairs.—See ELECTRIC EQUIPMENT—Ship Repairs.

Fire Apparatus.—See FIRE APPARATUS—Clayton.

Fire Prevention.—See FIRE PROTECTION—Ship.

Freeboard.—On Freeboard. Archibald Denny. Read before the Inst. of Naval Archts. Short historical paper placing on record important facts in connection with the work with the Load Line Regulations. 1700 w. Engng—July 5, 1901.

Freeboard. Gives details connected with its origin and subsequent official application in Great Britain as one of the means to prevent overloading. 4500 w. Marine Engng—Dec., 1904.

"Great Republic."—Details of Construction of the Famous American Clipper Ship "Great Republic." Reprint of a description of this vessel written at the time of her construction, about fifty years ago. Ill. Serial. 1st part. 2000 w. Marine Engng—Aug., 1901.

History.—From Raft to Steamship. Randolph I. Geare. The present article illustrates and describes the earliest forms of vessels. 1300 w. Sci Am Sup—April 5, 1902.

See also MARINE ENGINEERING.

Hull Protection.—The Protection of the Hulls of Iron Ships (Comment on Peut Proteger les Coques des Navires en Fer). From the "Chemiker Zeitung." A brief review of sheathing and protective paints, particularly the Rahtjen composition. 900 w. Rev Technique—March 10, 1902.

Ships' Compositions. A. C. A. Holzapfel. Discusses the large number of compositions for the protection of ships, details of their manufacture, and the chemical processes upon which their efficacy depends, and other attempts at protecting vessels. Serial. 1st part. 3800 w. Engng—April 8, 1904.

See also Corrosion; PAINT—Submarine; SHEATHING.

Hull Weights.—See NAVAL ARCHITECTURE—Weight.

Load Line.—Determination of the Line of Flotation of a Ship for Variable Loading (Bestimmung der Schwimmlinie eines Schiffes bei Trimänderungen). J. Meyer. A mathematical investigation in rectangular co-ordinates, with diagrams for various forms of hulls. 2000 w. Schiffbau—Aug. 8, 1901.

See also Freeboard.

Non-Sinkable.—See LIFE-BOAT; WATER-TIGHT COMPARTMENT.

Philippines.—See BOAT; SHIPPING.

"Preussen."—The Five-Masted Ship "Preussen" Das Fünfmast-Vollschiff "Preussen"). W. Kaemmerer. Details of construction of full-rigged ship of five masts of 11,150 tons displacement. Steam steering and hoisting gear are used. 2500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Aug. 20, 1904.

Rolling.—See SHIP STABILITY.

Running Lights.—See NAVIGATION.

Sailing vs. Steaming.—Steamers and Sailing Vessels (Vapeurs et Voiliers). M. Kerlago. A comparison between steam and sail navigation and transportation. 3000 w. Revue Technique—Jan. 25, 1902.

See also SAILING VESSEL.

School.—See SCHOOL SHIP.

Seaworthiness.—"Seaworthiness." B. Goldsmith. Discusses the importance to passengers, and also to underwriters, of the seaworthiness of vessels, especially for long voyages. Serial. 3 parts. 10500 w. Aust Min Stand—Jan. 23 and 30, Feb. 6, 1902.

Sheathing.—See Corrosion; Hull Protection; SHEATHING.

Stability.—See SHIP STABILITY.

Strength.—See NAVAL ARCHITECTURE.

Stresses.—See NAVAL ARCHITECTURE; SHIP STABILITY—Rolling.

Subsidy.—See SHIPPING SUBSIDY.

Training.—See TRAINING SHIP.

Ventilation.—See HEATING AND VENTILATION—Ship; VENTILATING COWL; VENTILATION—Ship.

Water-Tight Compartment.—See WATER-TIGHT COMPARTMENT.

Weight.—See Displacement; NAVAL ARCHITECTURE; SHIPPING—Tonnage.

SHIP BOAT.

See BOAT; LIFEBOAT.

SHIPBUILDER.

Education.—The Education of a Shipbuilder. Prof. J. H. Biles. From a lecture delivered before the Glasgow and West of Scotland Technical College Scientific Society. 2000 w. Naut Gaz—Feb. 7, 1901.

SHIPBUILDING.

See also MARINE ENGINEERING; NAVAL ARCHITECTURE; NAVY; SAILING VESSEL; SCHOONER; SHIP; SHIPPING; SHIP PROPULSION; SHIP RESISTANCE; SHIP STABILITY; SHIPYARD; STEAMSHIP; and under specific types of vessels.

Notable Shipbuilding Abroad. Mainly a review of this industry in the United States, with notes also on Germany and Holland. 1400 w. Engr, Lond—Feb. 21, 1902.

Modern Shipway Equipment and Its Future Development. Tjard Schwarz. Translated from the "Jahrbuch der Schiffbautechnischen Gesellschaft." Illustrates and describes cranes and other recent devices for handling materials, while a ship is being built, and for machine work. Serial. 1st part. 8000 w. Marine Engng—July, 1902.

American.—Shipbuilding in the United States During the Past Year. A review of this industry, with a list of all steam vessels, sailing vessels, and sea-going barges of over 500 tons which have been launched in the United States during the past year. Ill. 9500 w. Naut Gaz—Jan. 3, 1901.

New Vessels Under Construction. A record of the craft under construction in United States shipyards. 7000 w. Naut Gaz—Jan. 10, 1901.

Ship Building in the United States. A discussion of the subject based upon the output at Cleveland as compared with other districts of the country. 1200 w. Marine Rev—March 21, 1901.

Naval and Merchant Ship Construction in the United States During the Past Year. Abstracted from the introduction to the "Blue Book of American Shipping." 1500 w. Eng News—Aug. 15, 1901.

The Development of American Ship-building in the Last Decade (Die Entwickelung des Amerikanischen Schiffbaues im Letzten Jahrzehnt). Prof. Oswald Flamm. Abstract of a paper by Tjard Schwarz before the "Schiffbau-technische Gesellschaft" on shipbuilding, and cranes and other shipyard appliances in the United States. Ill. 1200 w. Stahl u Eisen—Jan. 1, 1902.

Shipbuilding in the United States. Alexander R. Smith. Introduction to the Census Report on Shipbuilding with continuation of last week's article. Serial. 8200 w. Naut Gaz—May 29, 1902.

See also Great Lakes; SHIPPING; SHIPPING SUBSIDY; SHIPYARD.

American Cost.—The Cost of Shipbuilding in America. Editorial discussing the Subsidy Bill before the U. S. Congress. 1600 w. Engr, Lond—Dec. 14, 1900.

American Navy.—Why It Takes So Long Time to Build and Equip a Naval Vessel for the United States. George W. Dickie. Points out the chief causes of delay in building these vessels, introducing a discussion on methods of design and construction. 4000 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 3—Nov., 1902.

See also NAVY; and under various types of war vessels.

American vs. British and German.—Can the American Shipbuilder Under Present Conditions Compete with the British and German Shipbuilders on the Production of the Largest Class of Ocean Passenger and Freight Steamships? George W. Dickie. Presents a comparison in skill in design, cost of labor, and cost of material. 3800 w. Trans Am Soc of Nav Archts & Marine Engrs—Nov., 1900.

Battleship.—Rapid Battleship Building. Waldon Fawcett. Discusses the time economy in battleship construction made during the past two years, particularly in British and American yards. 1800 w. Pop Sci M—Nov., 1900.

See also **American Navy; BATTLESHIP; NAVY.**

Berlin School.—Naval Architecture and Marine Engineering at the Berlin Technical High School (Die Entwickelung der Abteilung für Schiff- und Schiffsmaschinenbau an der Königlichen Technischen Hochschule zu Berlin). Prof. Oswald Flamm. A general review of the development of the courses of instruction, the growth in the number of students, and the need for more instructors. Curves and tables. 3800 w. Schiffbau—Jan. 8, 1902.

Boats.—See **Small Vessels; BOAT.**

British.—Shipbuilding and Marine Engineering in 1900. A review of the statistics of this industry in the Unted Kingdom. Serial. 1st part. 3500 w. Engng—Jan. 4, 1901.

Shipbuilding and Marine Engineering During 1900. A review of this industry, the present article being confined to the volume of work accomplished during the last year in the United Kingdom. Serial. 1st part. 2700 w. Engr, Lond—Jan. 25, 1901.

Decline in British Shipbuilding. Reports this branch of trade, as well as other lines, in anything but a prosperous condition. 2400 w. Naut Gaz—March 14, 1901.

Shipbuilding and Marine Engineering in 1901. A review of the ship tonnage constructed in the works of the United Kingdom. Serial. 1st part. 8700 w. Engng—Jan. 3, 1902.

Shipbuilding and Marine Engineering During 1901. A review of the year; the present article dealing with the volume of work and its broad general features, as well as with the measure of activity in the several districts of the United Kingdom. Serial. 1st part. 3500 w. Engr, Lond—Jan. 10, 1902.

Shipbuilding and Marine Engineering, 1903. Begins a review of the year just ended. Serial. 1st part. 4000 w. Engng—Jan. 1, 1904.

See also **German vs. British; White Address; NAVY; SHIPPING.**

British History.—The Romance of Applied Science in the United Kingdom. Reviews the record of the Inst. of Naval Architects, and the development of the shipbuilding industry. Serial. 1st part. 2700 w. Ir & Coal Trds Rev—June 14, 1901.

British Navy.—Progress of Warships and Machinery Building in England. A record of what has been accomplished in ship-yards and engine-works during the past half year ending June 30th. 2300 w. Engr, Lond—July 3, 1903.

Progress of Warships and Machinery Building in England. A record of the work in these fields during the last half year. 2500 w. Engr, Lond —July 8, 1904.

Shipbuilding for the Navy. Lord Brassey. Discusses the naval requirements of Great Britain, favoring the building of smaller vessels, distributing the guns in more ships. Abstract of discussion. 20,500 w. Inst of Civ Engrs (No. 3562).

See also **Battleship; NAVY.**

Cellular Construction.—See **WATERTIGHT COMPARTMENT.**

Cleveland, O.—See **American.**

Clyde.—The Development of Ship and Engine Building (Streifzüge durch das Gebiet des Schiff-und Schiffmaschinenbaues). A review of shipbuilding on the Clyde in connection with the Glasgow Exhibition. Two articles. 600 w. Zeitschr d Ver Deutscher Ing—Sept. 14, Oct. 12, 1901.

The Clyde and Naval Work. Begins a detailed account of the warship work in hand, done, and proposed to be done on the Clyde. Serial. 1st part. 1500 w. Engr, Lond—July 17, 1903.

See also **SHIPYARD.**

Cost.—See **American Cost; SHIP.**

Electric Tools.—See **Tools; ELECTRIC EQUIPMENT—Shipyard.**

Framing.—See **NAVAL ARCHITECTURE.**

German vs. British.—The Development of British and German Shipbuilding (Einiges aus der Entwickelung des Deutschen und des Englischen Schiffbaues). With comparative outlines of many vessels, and diagrams of dimensions and performances. 3000 w. Glasers Annalen—Dec. 15, 1900.

Germany.—Ship Building Resources of Germany. From "N. Y. Sun." Full text of M. Edouard Lockroy's letter on the merchant marine of Germany and the remarkable industrial growth of the nation. 3300 w. Marine Rev—March 21, 1901.

Shipbuilding in Germany, and the Imperial German Navy. Information compiled from various sources. 1800 w. Jour U S Art—March-April, 1901.

Germany's Progress as a Shipbuilding Nation. Edouard Lockroy. An account of the rapid development and the causes. 4000 w. Naut Gaz—May 9, 1901.

German Shipbuilding in 1901 (Die Schiffbauthätigkeit im Jahre 1901). Statistical tables of the Germanic Lloyd showing number and tonnage of vessels built and building in German yards. 800 w. Schiffbau—Jan. 8, 1902.

The Iron Industry and Shipbuilding in Germany (Eisenindustrie und Schiffbau in Deutschland). E. Schrödter. Abstract of a paper before the Schiffbautechnische Gesellschaft at Düsseldorf, giving an account of the growth of the German shipbuilding and iron industries, and comparisons with other countries. Diagrams and tables. Serial. Part I. 5000 w. Stahl u Eisen—July 1, 1902.

German Shipbuilding Progress on the Weser. Briefly reviews the recent progress in size, number, speed and comfort of German ships, and the shipyards where they are built. 1200 w. U S Cons Repts, No. 1556—Jan. 28, 1903.

The Development of the German Shipbuilding Industry (Die Entwickelung der Deutschen Schiffbauindustrie). Hr. Stellter. Paper before the Schleswig-Holstein branch, giving history and statistics, with curves and table. 2500 w. Zeitschr d Ver Deutschr Ing—Aug. 26, 1905.

The Development of the German Shipbuilding Industry (Die Entwickelung der Deutschen Schiffbau Industrie). F. Stellter. A review of the growth of the industry since 1873, with tables and diagrams. Serial. Part I. 3000 w. Schiffbau—Oct. 11, 1905.

Glasgow Exhibition.—Shipbuilding in the Nineteenth Century. Brief account of the beautiful collection of models shown at the Glasgow exhibition. 1800 w. Marine Rev—May 30, 1901.

Great Lakes.—Present Tendencies of Lake Shipbuilding. Waldon Fawcett. Comments on the return to normal size, instead of building the large vessels introduced at the close of the last century. Also notes other tendencies in the most recent vessels. Ill. 1700 w. Am Mfr—Jan. 23, 1902.

Recent Operations in the Shipyards on the Great Lakes. Waldon Fawcett. An illustrated article reviewing the work since the opening of the year 1901. 2200 w. Marine Engng—April, 1902.

Recent Development of Lake Ship Building. Waldon Fawcett. An illustrated article discussing recent vessels for the lakes, and the change of policy made evident in the four new steel steamers under contract. 2200 w. Marine Engng —April, 1905.

See also **American; NAVY; SHIPPING; STEAMSHIP.**

Hongkong.—Steel Shipbuilding in Hongkong. J. W. Graham. Confined to the actual steel portions of a vessel. Discusses the best methods to adopt with Chinese labor to get desired results. Also a description of a new shipbuilding plant at Hongkong. 7700 w. Far-East Rev—Feb., 1905.

Japan.—See **HARBOR—Nagasaki; SHIPPING; SHIPYARD.**

Lake George.—See **STEAMBOAT—"Sagamore."**

Lake Titicaca.—See **STEAMBOAT.**

Lengthening "Iroquois."—Lengthening of the S. S. "Iroquois." An illustrated description of work of cutting and lengthening a steamship, carried out at the Erie Basin, New York. 1000 w. Sci Am—Aug. 31, 1901.

Liner.—The Construction of a Great Liner. A half-dozen illustrations showing clearly a great ocean steamship in the earlier stages of construction, with comments. 800 w. Engr, Lond—Dec. 8, 1905.

Material Specifications.—A Comparison of Specifications for Shipbuilding Material. E. Schroedter. Abstract of a paper read before the International

Wasserbewegung Während der Fahrt von Schiffen und Ihr Einfluss auf den Schiffswiderstand). R. Haack. A paper giving a discussion of experiments on the Dortmund-Ems canal, and of the question of ship resistance particularly in canals and shallow waters. Illustrations and diagrams. Serial. 2 parts. 8000 w. Zeitschr d Ver Deutscher Ing—May 16 and 30, 1903.

See also **Depth of Water; CANAL NAVIGATION.**

Depth of Immersion.—The Influence of Depth of Immersion Upon Speed (De l'Influence de la Surimmersion sur la Vitesse). J. A. Normand. Developing formulas for computing the effect of changes in draught upon the speed of vessels. 2000 w. Comptes Rendus—Dec. 28, 1903.

See also **SHIP—Draft.**

Depth of Water.—Further Notes on the Influence of Shoal-Water Upon the Speed of Ships. Alfred E. Luders. Calls attention to experiments which bear out, more or less, the conclusions to be formed from a study of Captain Rasmussen's investigations. 1500 w. Marine Engng—April, 1903.

The Influence of Depth of Water on the Resistance of Ships. Charles P. Paulding. A study of the limiting economical speed of vessels in shallow water, and the determination of the least permissible depth for the contract trial of a given vessel required to make a given speed. 2000 w. Marine Engng—May, 1903.

I. The Relation of Depth of Water to Speed and Power of Ships. An account of the German torpedo vessel experiments. II. A General Discussion of Resistance and Power Consumption of Ships in Different Depths of Water. D. W. Taylor. Suggested by the I. article. 5000 w. Eng News—March 16, 1905.

The Influence of Depth of Water on Speed. W. W. Marriner. Read before the Inst. of Naval Archts. Gives deductions drawn from recent and former experiments, especially investigating surface disturbance or wave making resistance. 2000 w. Engng—July 21, 1905.

The Influence of Depth of Water on the Speed of Destroyers. Harold Yarrow. Read before the Inst. of Naval Archts. An illustrated article discussing trials and experiments, having special reference to recently built destroyers. 1800 w. Engng—July 21, 1905.

The Influence of Depth of Water on the Speed of Torpedo Boats (Versuche sur Ermittlung des Einflusses der Wassertiefe auf die Geschwindigkeit der Torpedoboote). H. Paulus. A discussion of trials of torpedo boats in deep and shallow water, with curves showing the results. 5000 w. Zeitschr d Ver Deutscher Ing—Dec. 10, 1904.
See also **Canal.**

Froude's Constant.—The Theory of Froude's Constant for the Determination of Ship's Resistance (Beitrag sur Theorie der Konstanten Froude's sur Bestimmung des Schiffswiderstandes). A mathematical examination of the derivation of Froude's Constant. 1800 w. Schiffbau—Oct. 26, 1904.
See also **Model Experiments.**

High Speed.—The Criterion of High Speeds of Ships (Criterium des Navires à Grandes Vitesses). Vice Admiral Fournier. Showing that the resistance of the water at increasingly high speeds tends to become proportional to the square of the speed. 1500 w. Comptes Rendus—Dec. 5, 1904.

Hydraulics.—The Hydraulics of the Resistance of Ships. Edgar C. Thrupp. Read before the Glasgow Congress. An investigation of the discovery that there is an enormous divergence from the laws of stream line motion when the dimensions of the channels or pipes are such as to have hydraulic radii exceeding 1 in. or 2 ins. 3300 w. Engng—Dec. 20, 1901.

Tubes With Sides and Without, in Ship Resistance—An Example from Lord Kelvin. Marston Niles. A study of hydromechanics, with diagrams, giving theoretical conclusions. 5800 w. Sci Am Sup—Feb. 1, 1902.

See also **HYDRAULICS; HYDRODYNAMICS.**

Lateral.—See **NAVAL ARCHITECTURE.**

Model Experiments.—Some Results of Model Experiments. R. E. Froude. Describes a series of resistance experiments on systematic variations in form of hull, giving results. 4200 w. Engng—April 1, 1904.

Some Results of Model Experiments. R. E. Froude. A description of general experiments on systematic variations in form of hull, with results. 3700 w. Engr, Lond—May 6, 1904.

Model Experiments on Hollow versus Straight Lines. R. E. Froude. Read before the Inst. of Naval Archts. Describes the special apparatus and mode of experiment employed. 5800 w. Engng—April 21, 1905.

Laws of Variation of Resistance of Ships. D. W. Taylor. Discusses the model basin experiments, and other calculations for obtaining an approximate method or formula of value in practice, representing the resistance of a vessel. 2800 w. Marine Engng—July, 1905.

Experiments on Resistance of Ships' Models. G. Rota. Read before the Inst. of Naval Archts. Reports experiments with models of constant length and form of cross-sections, but with varying breadth and draught. 1500 w. Ills. Engng—Aug. 4, 1905.

See also **MODEL BASIN; PROPELLER.**

Powering.—See **SHIP PROPULSION.**

Screw, Steamboat.—Experiments upon the Resistance of a Screw Steamboat (Versuche mit einem Schraubendampfer Hinsichtlich des Widerstandes im Freien Wasser). H. Enno van Gelder. Data and results of dock trials of a steamboat at Kinderdyk, near Rotterdam. Two articles. 4000 w. 1 plate. Schiffbau—Dec. 23, 1902.

Experiments on the Resistance of a Screw Steamer in Free Route. H. Enno van Gelder. Translated from "Schiffbau." An account of dock experiments to measure the reaction of the pressure of the propeller on the water at different speeds, made at Kinderdyk, with the steamer "Vlaardigen." Ill. Serial. 1st part. 2000 w. Marine Engng—Aug., 1903.

Shallow Water.—See **Canal; Depth of Water; CANAL NAVIGATION; SHIP—Draft; SHIP PROPULSION.**

Torpedo Boat.—See **Depth of Water.**

Waves.—The Resistance Due to Accompanying Waves (Résistance Due aux Vagues Satellites). M. de Bussy. A mathematical discussion of ship resistance due to the accompanying waves. 1500 w. Comptes Rendus—April 14, 1902.

On the Reduction of Wave-Making Resistance by a New Method. A letter from Walter Child, offering suggestions of a new method of reducing the wave-making resistance of vessels. 2800 w. Engng—May 1, 1903.

SHIP SIGNAL.

See **ELECTRIC EQUIPMENT—Ship; FOG SIGNAL; NAVIGATION; SEA SIGNAL; SIGNAL; SHIP TELEGRAPH.**

SHIP STABILITY.

See also **NAVAL ARCHITECTURE; SHIP; SHIPBUILDING.**

Stability of Ships. Theodore Lucas. Discusses methods of measuring the stability, means of increasing the leverages, as well as the range of the stability, etc. Ill. 2200 w. Naut Gaz—Dec. 5, 1901.

Some Problems on the Surfaces of Buoyancy and of Water Lines. C. H. Peabody. A study of the geometry of the surfaces of buoyancy and water lines as related to the stability of ships. 7500 w. Plate. Trans Am Soc of Nav Archts & Marine Engrs, No. 7—Nov., 1902.

A New Interpretation of Experiments upon the Stability of Ships (Sopra una Nuova Interpretazione della Esperienza di Stabilita delle Navi). A. Scribanti. Deriving new equations for the curve of stability for use with experimental data. 6000 w. Rivista Marittima. Aug.-Sept., 1904.

The Gyration of Ships (Sur la Giration des Navires). E. Bertin. A study of the forces tending to capsize a vessel, and the statical moments by which they are resisted. 2000 w. Comptes Rendus—Feb. 6, 1905.

Ballast.—The Ballasting of Modern Tramp Steamers. E. C. Chaston. Read before the North-East Coast Inst. of Engrs. and Shipbuilders. Shows the short-sighted policy of sending vessels to sea without sufficient ballast. 1800 w. Naut Gaz—Feb. 13, 1902.

A Special Trim Calculation. B. A. Sinn. Gives calculations made necessary by the arrangement of the interior. 800 w. Marine Engng—May, 1903.

The Ballasting of Steamers. S. J. P. Thearle. Read before the Inst. of Nav. Archts. States some of the experiences which show the importance and necessity of ballasting, and considers methods which have been adopted. Ill. 4500 w. Engng—April 17, 1903.

Ballast, Water.—Rolling of Ships and the Effect of Water-Ballast. Bernard C. Laws. Read before the Inst. of Engs. & Shipbuilders in Scotland. Discusses the placing of the ballast so as to secure stability best for the particular vessel, and least calculated to produce excessive rolling. 3300 w. Engs' Gaz—March, 1901.

Bilge Keels.—The Influence of Bilge Keels on the Resistance and the Rolling of Vessels in Still Water. Johann Schuette. Translated from a paper read before the Schiffbautechnische Gesellschaft, Berlin. An account of experimental investigations with a model, and the interesting results. 1800 w. Marine Engng—Feb., 1903.

Calculation.—Displacement and Stability Calculations by Improved Methods. Prof. W. S. Leland. Explains forms arranged for class-room use, in the hope they may be of practical use. 2000 w. Trans Am Soc Nav Archts & Marine Engrs, No. 17—Nov., 1903.

See also **Diagram.**

Centre of Gravity.—See **NAVAL ARCHITECTURE.**

Diagram.—Curve of Stability. George Crouse Cook. Explains the practice of Scotch shipbuilders in this problem of ship design. Ill. 2000 w. Marine Rev—June 6, 1901.

A Stability Diagram. George Crouse Cook. A practical method of calculating and plotting a series of curves of the centers of buoyancy, from which the curve of statical stability may be deduced for any variations in displacement or loading. 1200 w. Naut Gaz—Jan. 2, 1902.

The Graphical Determination of the Stability of Ships (Graphische Ermittelung der Stabilitat des Schiffes). M. H. Bauer. A study of the method of replacing cumbersome analytical methods by a simple graphical construction. Serial. 1st part. Schiffbau—June 8, 1901.

A Graphic Method for the Calculation of the Stability of Ships. M. H. Bauer. Explains this method in detail. 3500 w. Trans Am Soc Nav Archts & Marine Engrs—Nov. 18, 1903.

Notes on the Construction of Stability Cross Curves from Balanced Paper Sections. John H. Heck. An explanation of methods of calculating the stability of ships. Short discussion. 5 plates. 4200 w. Trans N E Coast Inst of Engrs and Shipbuilders—March, 1904.

Gyroscopic Action.—The Gyroscopic Effect of Flywheels on Board Ships. Herr Otto Schlick. Read before the Inst. of Naval Archts. Describes an appliance, proposed by the writer, the employment of which makes it possible not only to increase the period of oscillation of a vessel, but also to lessen her angle of heel. It depends in principle on the gyroscopic action of a rapidly rotating flywheel. Ills. 5300 w. Engng—April 1, 1904.

Gyrostats and Gyrostatic Action. Prof. Andrew Gray. Describes examples of gyrostatic action, and discusses the fundamental principles and their explanation, and related subjects, considering various devices and the action of steamers in which the main propelling engine are of the steam turbine type. 15,000 w. Ills. Trans Inst of Engrs & Shipbuilders in Scotland—March 21, 1905.

Some Notes on the Effects Likely to Be Produced by the Gyroscopic Action of Steam Turbines on Board Vessels Pitching in a Sea. J. Blacklock Henderson. An examination of possible effects. 1200 w. Trans Inst of Engrs & Shipbldrs in Scotland—March 21, 1905.

See also **GYROSCOPE; GYROSTATIC ACTION.**

Initial.—On the Heeling and Rolling of Ships of Small Initial Stability. A. Scribanti. Investigations of the influence which a varying amount of initial stability can exert on some mechanical features of a given ship. Serial. 1st part. 2800 w. Engng—May 27, 1904.

Leaking.—Stability of Passenger Steamers After Collision at Sea, with Discussion of Means to Prevent Capsizing. M. Bertin. Read before the Paris Congress of Naval Archts. Discusses the different methods of foundering, and the means of securing stability. 2800 w. Marine Engng—June, 1901.

Variations in Initial Stability (Variazioni della Stabilita Iniziale). R. Levati. Discussing the changes in stability in the case of the filling of one or more compartments. 2000 w. 2 plates. Rivista Marittima—Feb., 1902.

The Position of Equilibrium of Undamaged and of Leaking Ships (Die Gleichgewichtslage des Unverletsten und des Lecken Schiffes). Ernst Zetsmann. A discussion of the stability of ships under various conditions, and the mathematical treatment of problems in the trim and stability of ships when in normal condition and with one or more compartments filled with water. Diagrams and curves. Serial. 5 parts. 3500 w. Schiffbau—May 8, 23, June 8, 23, and July 8, 1903.

The Stability of a Modern Steamship with a Leak in the Starboard Engine Room (Untersuchung über die Stabilität eines modernen Schnelldampfers beim Leckwerden des Steuerbord-Maschinenraumes). Matthias Esser. A graphical analysis of the stability of a twin-screw steamship when one engine room is filled with water. Serial. Part 1. 2000 w. Schiffbau—Aug. 23, 1903.

Navipendulum.—The Navipendular Method of Experiments, as Applied to Some Warships of Different Classes. G. Russo. Read before the Inst. of Naval Archts. Gives results of experiments and comparative tests. of the rolling of certain battleships. Serial. 1st part. 6400 w. Engng—April 18, 1902.

The Navipendular Method of Experiment as Applied to Some Warships of Different Classes. (Il Methodo degli esperimenti Navipendulari Applicato ad Alcune Navi da Guerra). G. Russo. The full Italian text of the author's paper presented in English at the meeting of the Institution of Naval Architects in March, 1902. 10,000 w. 8 plates. Rivista Marittima—Dec., 1902.

Rolling.—The Rolling of Ships (Roulis sur Houle). H. Chaigneau. A mathematical study of the stresses upon the hulls of ships under the rolling action of waves. Two articles. 7500 w. Revue Technique—May 25, June 10, 1902.

Rolling Indicator.—An Instrument for Measuring the Rolling of Ships. A. Mallock. Read before the Brit. Inst. of Naval Archts. Illustrated description of a rolling indicator, which is said to give very accurate measure of the rolls in all circumstances. 3400 w. Engng—March 29, 1901.

See also **Navipendulum.**

Schlick Cycle.—The Theory of the Schlick Cycle (Die Theorie des Schlickschen Schiffskreisels). A. Föppl. An examination into the theory of Otto Schlick concerning the periodical effect in the rolling of ships. 4500 w. Zeitschr d Ver Deutscher Ing—April 2, 1904.

See also **Gyroscopic Action.**

Tank Steamer.—Stability of an Oil-Tank Steamer. P. F. Walker. Investigations of the effect of liquids in a ship when the containing tanks or compartments are not completely filled. 2500 w. Marine Engng—Oct., 1902.

Tramp Steamers.—See **Ballast.**

Trim.—See **Ballast.**

Water Ballast.—See **Ballast, Water.**

Yacht.—The Stability Calculation for a Modern Sailing Yacht. Gives method, describing the operations. Diagrams. 2000 w. Marine Engng—May, 1905.

SHIP SUBSIDY.

See **SHIPPING SUBSIDY.**

SHIP TELEGRAPH.

See also **ELECTRIC EQUIPMENT—Ship; NAVIGATION.**

Electric.—A New System for the Electric Operation of Dial Indicators (Ein neues System zur Elektrischen Uebertragung von Zeigerstellungen). W. Thiermann. An improved device for transmitting orders from the bridge or conning-tower of a ship to the engine room. 1800 w. Glasers Annalen—March 15, 1904.

Naval Telegraph Instruments. Reviews various means of communication, principally electrical, between the bridge, engine room and other parts of a ship. 1600 w. Elec Rev, Lond—Aug. 19, 1904.

Union Co.—The New Signal Apparatus of the Union Electrical Company (Die Neuen Signalapparate der Union Elektricitäts Gesellschaft). E. Henbach. An illustrated description of an improved electrical apparatus for signalling from the bridge of a vessel to the engine room. 5000 w. Elektrotech Zeitschr—April 3, 1902.

Vialet-Chabrand.—The Vialet-Chabrand Ship Telegraph (Transmetteur d'Ordres, Système Vialet-Chabrand). G. Dary. An illustrated description of an improved electric dial telegraph for the transmission of orders from the bridge of a vessel to the engine-room. 1800 w. L'Electricien—Dec. 29, 1900.

Whistle.—The Electric Automatic Whistle Operator and Telegraph. Illustrates and describes apparatus designed as an adjunct to the ordinary hand pull for opening the valve in the whistle pipe. 1500 w. Marine Engng—Nov., 1902.

SHIP TRIALS.

See also **SHIP PROPULSION; STEAMBOAT RACE**; and under specific types and names of vessels.

Speed and Power Trials of Ships. W. F. Durand. A brief discussion of a simple speed or speed power trial, without involving the detailed analysis of the general propulsion performance. 2000 w. Sib Jour of Engng—April 1, 1901.

Methods of Conducting Speed Trials. J. J. Woodward. Remarks on contract trial requirements, and a description of the methods of concluding speed trials under present conditions. Tables and plates. 20,000 w. (No. 18). Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

"Carnarvon."—See **ARMORED CRUISER.**

"Caronia."—See **STEAMSHIP.**

"Pennsylvania."—See **ARMORED CRUISER.**

Tidal Corrections.—Some Notes on Tidal Corrections. Edwin A. Stevens. Tidal calculations made on progressive trial runs, with methods used. 1500 w. Soc Nav Archts & Marine Engrs, No. 11—Nov., 1901.

SHIPWRECK.

See **NAVIGATION; SALVAGE; SCUTTLING; WRECK.**

SHIPYARD.

See also **DRY DOCK; MARINE ENGINEERING; NAVY YARD; SHIP; SHIPBUILDING; YACHT YARD.**

American Steel.—New American Steel Shipbuilding Plants. Waldon Fawcett. A review of the new plants and improvements greatly increasing the American facilities. 2800 w. Ir Age—March 14, 1901.

The Steel Shipyards of the United States. Waldon Fawcett. Illustrated article giving information concerning the shipyards of the South. 1400 w. Am Mfr—Aug. 8, 1901.

Armstrong.—See **GUN WORKS.**

Beardmore, Clyde.—Messrs. Beardmore's New Shipyard and Engine Works. Illustrated description of fine new works on an ideal site on the River Clyde, and their equipment. 5000 w. Engng—Oct. 7, 1904.

British vs. American.—Notes on the Equipment of Foreign Shipyards. C. C. Thomas. Describes the appliances used in British shipyards, comparing them with the American yards. 3000 w. Marine Engng—Jan., 1902.

Camden, N. J.—Camden's Great Shipbuilding Plant. Describes the works of the New York Shipbuilding Co., the novel labor-saving appliances, the power, railroad connections, etc. 7500 w. Naut Gaz—March 21, 1901.

Works of the New York Ship Building Co. An illustrated description of the works, power producing appliances, and contracts under way. 10,000 w. Marine Rev—June 13, 1901.

Plant of the New York Ship Building Company. Waldon Fawcett. An account of this new yard at Camden, N. J., and its equipment. 2500 w. Am Mfr—Sept. 5, 1901.

The Works of the New York Shipbuilding Company. Illustrated detailed description of this fine plant on the Delaware River, opposite Philadelphia. 4500 w. Marine Engng—Dec., 1901.

The New York Shipbuilding Company's Plant, Camden, N. J. Begins an illustrated description of a modern plant equipped for the construction of modern steel commercial and battleships. Serial. 1st part. 3000 w. Eng Rec—Jan. 3, 1903.

Clydebank.—The Clydebank Shipbuilding and Engineering Works. The present article describes the general arrangements of the works, the building berths and launching ground, the ship platers and fitters' department, mechanics' shop, woodworking department, etc. Ill. Serial. 1st part. 3800 w. Engng—Aug. 23, 1901.

Clyde, Scotland.—Clydeside Industrial Development. The first of a series of illustrated articles giving a general account of the most important of the many transferences of industries recently effected. Serial. 1st part. 2300 w. Engr, Lond—Jan. 2, 1903.

See also **Beardmore; Clydebank; SHIPBUILDING.**

Commercial Organization.—Some Remarks on the Commercial Organisation of Shipyards. Walter Scott. Considers the correspondence, estimating, buying cost-keeping, bookkeeping, commercial staff, etc. 4500 w. Naut Gaz—April 18, 1901.

Some Remarks on the Commercial Organisation of Shipyards. Walter Scott. Considers the subject under the headings of correspondence, estimating, buying, cost-keeping, bookkeeping, commercial staff, and development. Also general discussion. 7700 w. Trans of N E Coast Inst of Engrs & Shipbuilders—May, 1901.

See also **Management; WORKS MANAGEMENT.**

Cramp's, Philadelphia.—Expansion of the Cramps. Statement of Charles H. Cramp concerning the plans of his company. Will probably add armor and armament to their plant. 1400 w. Marine Rev—Dec. 13, 1900.

See also **MACHINE SHOP.**

Cranes.—See **CRANE—Shipyard.**

Drawing Rooms.—See **DRAWING ROOM—Shipyards.**

Eastern Shipbuilding Co.—See **New London; STEAMSHIP—"Minnesota."**

Economics.—See **Commercial Organization; Management.**

Electric Driving.—See **ELECTRIC DRIVING—Shipyard.**

Electric Equipment.—See **ELECTRIC EQUIPMENT—Shipyard.**

Equipment.—The Arrangement and Equipment of Shipbuilding Works. James Dunn. Discusses the general principles dominating the plan of shipbuilding works, tools and their arrangement, closed-in versus open berths and the cranes serving them, etc. Tables and 12 plates. 7700 w. Inst Mech Engrs—Aug., 1901.

See also **Mechanical Equipment; ELECTRIC EQUIPMENT.**

Europe.—Notes on Recent Improvements in Foreign Shipbuilding Plants. H. G. Gillmor. The paper is based on observations made during recent visits, as compared with visits made several years ago. 2300 w. Trans Am Soc of Nav Archts & Marine Engrs—Nov., 1900.

Fore River.—The Fore River Shipbuilding Shed. Illustrated description of a roof with 185 ft. clear span and 60 ft. overhang on either side and rising about 100 ft. above the floor. 1200 w. Eng Rec—July 26, 1902.

Fore River Ship and Engine Works, Quincy, Mass. Illustrations, with description, of cranes and the fixed structure in use. A separate rapid crane of small capacity is provided for each side of each ship. 1200 w. Engng—Sept. 11, 1903.

See also **ELECTRIC EQUIPMENT—Shipyard; MACHINE TOOL—Shipyard.**

Germany.—See **SHIPBUILDING.**

Great Lakes.—See **SHIPBUILDING.**

Handling Steel.—See **MECHANICAL HANDLING—Shipyard.**

Harlan & Hollingsworth.—Harlan & Hollingsworth Co., Wilmington, Del. Illustrates and describes some of the vessels constructed by this company. 2200 w. Marine Rev—Feb. 7, 1901.

Japan.—Japanese Shipyards. Editorial on the progress Japan is making toward the supply of her own fleet. 2500 w. Engng—Jan. 3, 1902.

The Dockyards and Shipbuilding Plants of Japan. Charles Albertson. A fully illustrated description of the facilities for shipbuilding at present existing in Japan. The first paper deals with the government yards. 3000 w. Engineering Magazine—Sept., 1906.

The Dockyards and Shipbuilding Plants of Japan. Chas. Albertson. The second part of this review, dealing with the private establishments for ship-building and repair work, with illustrations and a map. 4500 w. Engineering Magazine—October, 1905.

See also **Mitsu Bishi; DRY DOCK; HARBOR—Nagasaki.**

Kawasaki.—See **MACHINE SHOP.**

Keyham, Eng.—Keyham Dockyard Extension. Illustrated description of a great extension scheme, to cost over £8,000,000 sterling, now under construction. It consists of a tidal basin, a closed basin with an entrance lock and three graving docks. 2800 w. Transport—March 1, 1901.

Kobe, Japan.—See **DRY DOCK.**

Management.—Organization of Ship Yards. Theodore Lucas. Considers points relating to the organization to adapt it to its natural run of business. 2000 w. Naut Gaz—May 8, 1902.

How to Plan, Organize and Operate a Modern Shipyard. Theodore Lucas. Discusses the organisation, and ship-yard draughting rooms, and the general superintendence. 7500 w. Naut Gaz—Jan. 1, 1903.

Shipyard Economies. R. S. Hubbard. Considers the practical economies of ship construction under the headings of labor, labor control, organisation, plant and materials. Serial. 1st part. 3400 w. Marine Engng—Jan., 1904.

See also Commercial Organization; **WORKS MANAGEMENT.**

Mechanical Equipment.—The Mechanical Equipment of the Shipyard. Prof. J. H. Biles. A clear explanatory discussion of the processes of shipbuilding, devoted particularly to the framing of the vessel and the punching and shearing machines used in the work. Ill. Serial. 1st part. 3000 w. The Engineering Magazine—May, 1901.

The Mechanical Equipment of the Shipyard. Prof. J. H. Biles. The second section of Prof. Biles' paper is devoted mainly to a discussion of the tools for working and securing the plating of a ship. 3000 w. Engineering Magazine—June, 1901.

The Mechanical Equipment of the Shipyard. Prof. J. H. Biles. The third paper of the series discusses the general arrangement of the plant and the economic advantages of portable electric and pneumatic tools. 3500 w. Engineering Magazine—July, 1901.

See also Equipment; **CRANE; ELECTRIC EQUIPMENT; MECHANICAL HANDLING; PNEUMATIC TOOL.**

Mechanical Handling.—See **CRANE; ELECTRIC EQUIPMENT; MECHANICAL HANDLING—Shipyards.**

Mitsu Bishi, Japan.—Dockyard and Engine Works at Nagasaki. Illustrated detailed description of these docks and shipbuilding works, with interesting information concerning this port. 1500 w. Engng—Jan. 9, 1903.

The Mitsu Bishi Dockyard and Engine Works, Nagasaki, Japan. Illustrated description of these recently improved works, showing their capacity. 1500 w. Marine Engng—March, 1904.

One of Japan's Dock Yards. Illustration, with description of the Mitsu Bishi dockyard and engine works at Nagasaki. 1500 w. Stevens Ind—Oct., 1904.

See also Japan.

Mold Work.—See **SHIPBUILDING.**

Moran Bros., Seattle.—See **BATTLESHIP—Nebraska.**

Nagasaki, Japan.—See **Japan; Mitsu Bishi; HARBOR.**

New London, Conn.—Eastern Ship Building Co., New London, Conn. Illustrated description of interesting features of vessels undergoing construction, and of the company's plant. 2200 w. Marine Rev—Feb. 7, 1901.

The Eastern Shipbuilding Company. Gives an account of the organization of this company, and an illustrated description of its yard and plant near New London, Conn. 3000 w. Marine Engng—March, 1902.

See also **STEAMSHIP—"Minnesota."**

Newport News, Va.—Newport News Ship Building and Dry Dock Co. Illustrated description of improvements at this plant, and some of the vessels in process of construction. 2700 w. Marine Rev—Feb. 7, 1901.

Notes Taken at the Works of the Newport News Shipbuilding and Drydock Co., Newport News, Va. General information with illustrated description of the shops, important tools, special work, etc. 3000 w. Mach, N Y—March, 1901.

See also **MACHINE TOOL—Shipyards.**

New York Co.—See **Camden, N. J.**

Organization.—See Commercial Organization; Management; **WORKS MANAGEMENT.**

Quincy, Mass.—See **Fore River.**

Risdon, San Francisco.—Risdon Iron Works, San Francisco. General illustrated description of this new shipbuilding plant, and its equipment. 4000 w. Marine Engng—Feb., 1902.

San Francisco.—Ship Yards and Shipping of San Francisco. An illustrated review of the shipbuilding yards, with illustrations of some of the vessels. 2300 w. Marine Rev—March 17, 1904.

See also **Risdon; Union Iron Works.**

Shooter's Island, N. Y.—Shooter's Island Shipyard. Illustrated description of the works covering this island, at the mouth of Newark Bay. 1000 w. Marine Engng—Aug., 1901.

See also **MARINE RAILWAY.**

Stettin.—See **Vulcan.**

Swan and Hunter.—Messrs. Swan and Hunter's Shipyard. Illustrates and describes this interesting plant at Wallsend-on-Tyne, and the work done there. 3000 w. Engng—Aug. 8, 1902.

Tershana.—Tershana. A Turkish Shipyard. An interesting description, showing the worthlessness of the yard, the financial condition, etc. 1300 w. Engr, Lond—Dec. 8, 1905.

Trigg, Richmond.—Great Virginia Shipyard. Illustrated description of the plant of the William R. Trigg Company, at Richmond, Va. 1500 w. Naut Gaz—Jan. 17, 1901.

Union Iron Works.—Union Iron Works, San Francisco. Gives an illustrated general description of the shops, ways and slips; vessels under construction, and of the novel features introduced. 5000 w. Marine Rev—Feb. 7, 1901.

United States.—See **American.**

Vulcan, Stettin.—The Slips of the Vulcan Works at Stettin (Die Hellinge der Stettiner Maschinenbau—A. G. Vulcan). A description of the ways and overhead travelling crane equipment over the shipbuilding slips at the Vulcan Works. 1800 w. Zeitschr d Ver Deutscher Ing—Oct. 1, 1904.

Steel Ship Building Berths. F. H. Rudolph. Illustrates and describes the steel ship-building slips at Vulcan plant at Stettin. 1600 w. Marine Rev—May 4, 1905.

Wallsend.—The Wallsend Slipway and Engineering Company. An illustrated description of British works for ship repairing and the building of marine engines and boilers. Also gives information concerning the important tools and some of the work undertaken. 2700 w. Engng—Nov. 28, 1902.

See also **Swan and Hunter; CRANE, ELECTRIC.**

Yachts.—See **YACHT YARD—English.**

Yarrow.—Messrs. Yarrow and Co.'s New Works. Illustrated description of the new works at Poplar. 1100 w. Engng—April 5, 1901.

SHOE MACHINERY.

Beverly, Mass.—The Shops of the United Shoe Machinery Co., Beverly, Mass. Illustrated detailed description of shops for the manufacture of light machinery. Serial. 1st part. 2700 w. Eng Rec—April 1, 1905.

SHOP.

See **CAR SHOP; ELECTRIC RAILWAY SHOP; LOCOMOTIVE SHOP; MACHINE SHOP; RAILWAY SHOP; WORKS; WORKS MANAGEMENT.**

SHORE PROTECTION.

See also **BREAKWATER; DRAINAGE; FLOOD PROTECTION; HARBOR; RIVER REGULATION; SAND DUNE; SEA WALL.**

The Sea Coast. A review of a recent book, by W. H. Wheeler, containing a wonderful amount of information concerning coasts, defensive works, sea walls, groynes, etc., especially as regards the coasts of England. Ill. 5400 w. Builder—Sept. 6, 1902.

The Protection and Improvement of Foreshores by the Utilisation of Tidal and Wave Action. Discussion of paper by R. G. Allanson-Winn.

Ill. 3500 w. Pro Am Soc of Civil Engrs—Nov., 1902.

Foreshore Protection and Travel of Beaches. William Tregarthen Douglass. Read at the Engng. Con. of the Inst. of Civ. Engrs. Discusses points of importance in sea-defence. 1400 w. Engng—June 19, 1903.

Australia.—See **Marram Grass.**

East Cambridge, Mass.—See **SEA WALL.**

Essex, Eng.—The Essex Levels and Sea Walls. An illustrated article describing marsh protection and giving the history of the Essex levels, and the method of building new walls or dikes. 4500 w. Public Works—Jan., 1905.

Europe, North Western.—The Coast Erosion and Sea Defences of North-Western Europe. Abstract of three articles by M. Bonnin, in "La Nature," supplemented by observations. 1600 w. Engr, Lond—Dec. 1, 1905.

Galveston.—Plans of the Protection of Galveston from Floods. Gives the principal features of the plan adopted, and abstract of the engineers' report, with drawings. 2500 w. Eng News—April 24, 1902.

The Galveston Sea Wall. An illustrated description of structures at Galveston, Tex. The concrete wall is protected by a mass of heavy granite rip rap and backed by an earth fill to the level of the top of the wall, and formed into a driveway about 70 ft. wide. 2000 w. Eng Rec—July 4, 1903.

Raising the Grade of Galveston. An interesting illustrated description of the work of building a sea-wall, and raising the grade of the flooded portion of the city above high water, after the almost total destruction in September, 1900. 2000 w. R R Gaz—Jan. 1, 1904.

Raising the Grade of Galveston. Map, with description of unusual hydraulic dredging and filling work. 2200 w. Eng Rec—March 11, 1905.

The Great Sea Wall at Galveston. W. S. Hudson. Brief illustrated description of this recently completed great sea wall. 1000 w. Sci Am—Aug. 26, 1905.

Galveston's Great Seawall. Brief illustrated description of this great engineering work. 1200 w. Marine Rev—Aug. 31, 1905.

Groynes.—Beard's Contour System of Groynes. Brief illustrated description of this system which is designed to take advantage of the action of the sea to build up a beach that will form a permanent natural protection. 1200 w. Engng—Feb. 22, 1901.

The Protection and Improvement of Foreshores by the Utilization of Tidal and Wave Action. R. G. Allanson-Winn. Discusses how to permanently safeguard a line of frontage from the erosive action of the sea at low cost, commending the system of groyning discovered by Edward Case. Ill. 7000 w. Pro Am Soc of Civ Engrs—Aug., 1902.

Groynes. A. T. Walmisley. Illustrated article describing various forms of construction used, and discussing the systems, their good and ill effects. 4200 w. Public Works—Oct. 15, 1904.

Hodbarrow, Eng.—See **SEA BARRIER.**

Holland.—The Dikes of Holland. Gerard H. Matthes. Reviews the history of the building of the dikes, the reclaiming of the land, formation of lakes, and the engineering problems connected with the work. Ill. 7000 w. Nat Geog Mag—June, 1901.

Shoe Protection Works in Holland (Seeuferbauten in Holland). H. v. Horn. Illustrating and describing the dikes and protection works at the island of Walcheren, and the dunes at Pettem. 1800 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 17, 1904.

Hull, Mass.—See **SEA WALL.**

Jamaica.—Some Notes on Sea Protective Works on the North Coast of Jamaica. J. Monk Fletcher. An explanation of conditions and description of repair work. 1500 w. Eng Rec—Aug. 5, 1905.

Lowland.—The Practical Building of Lowland Protections. Percy H. Wilson. Abstract from a thesis presented to the Civ. Engng. Dept. of the Univ. of Penn. The practical building of banks with their protections, with sketches showing detailed plans of constructions in each class, noting their advantages and disadvantages. 7300 w. Pro Engrs' Club of Phila—Oct., 1901.

Marram Grass.—Marram Grass as a Sand-Binder, in Victoria-Australia. A report of the writer's experience and the method adopted. 800 w. Eng News—Oct. 23, 1902.

Philadelphia.—See **PIER.**

River Banks.—See **PIER; RIVER REGULATION—Bank Protection; SEA WALL.**

Sandy Coasts.—Grasses as Sand and Soil Binders. Abstract of a paper by Prof. H. Lamson-Scribner, giving the best available data upon the protection of sandy coasts from waves and winds. Ill. 1500 w. Eng News—April 24, 1902.

St. Louis, East.—See **FLOOD.**

Yorkshire.—I. Coast Erosion. Alfred Edward Carey. (No. 3493.) II. Erosion on the Holderness Coast of Yorkshire. Ernest Romney Matthews. (No. 3495). With an abstract of the discussion on the two papers. In the first paper the author considers from an administrative rather than from an engineering standpoint, the measures to be adopted for defence against such encroachment. The second paper describes the remedial works executed or suggested. Ills. 5400 w. Inst of Civ Engrs.

SHORING.

See **BUILDING CONSTRUCTION.**

SHOT.

See **AMMUNITION WORKS; SHELL.**

SHOT FIRING.

Coal Mine.—See **BLASTING.**

SHOT IRON.

See **FOUNDRY—Shot Iron.**

SHOVEL.

Steam.—See **STEAM SHOVEL.**

SHOVEL HANDLE.

Sheet Metal.—See **SHEET METAL—Shovel Handle.**

SIBERIA.

See **GOLD; MINERAL REGION; RAILWAY; RUSSIA.**

SIDE-LEVELER.

A Contractor's Side-Leveler. George W. Lee. Illustrates and describes a very useful machine in roadbed construction, which can be quickly built at moderate cost. 800 w. Eng News—June 15, 1905.

SIDEWALK.

See also **MUNICIPAL IMPROVEMENT; PAVEMENT; STREET.**

Brick.—See **BRICK PAVEMENT.**

Brick and Stone.—Stone and Brick Sidewalks. J. C. Herring. Directions for the construction of natural stone sidewalks, brick sidewalks, and hexagon block sidewalks. 1800 w. Munic Engng—Feb., 1905.

Cement.—See **CEMENT PAVEMENT—Sidewalk.**

Small Towns.—Sidewalk Building and Sidewalk Grades in Small Towns. Ernest McCullough. An account of experience of a small town, with report of the work as finally carried out by the writer. 2300 w. Eng News—July 9, 1903.

Sidewalk Construction for Small Cities. J. C. Herring. Notes on the methods of construction, materials used, grading, etc. 2500 w. Munic Engng—Jan., 1905.

SIDING.

Lap.—See **RAILWAY OPERATION.**

SIGNAL.

See also **ELECTRIC SIGNAL; FOG SIGNAL; NAVIGATION; RAILWAY SIGNAL; SEA SIGNAL; SHIP TELEGRAPH.**

Electric Stations.—See **ELECTRIC STATION MANAGEMENT—Signalling.**

Locomotive Cab.—See **RAILWAY SIGNAL.**

Mine.—See **MINE SIGNAL.**

Station.—See **STATION INDICATOR.**

Submarine.—See **SUBMARINE SIGNAL.**

Time.—See **TIME SIGNAL.**

Train.—See **RAILWAY SIGNAL; TRAIN INDICATOR.**

SILICON.

See also IRON ALLOY; METALLOGRAPHY; STEEL ALLOY.

Copper.—See COPPER ALLOY—Silicon.

Metallography.—See METALLOGRAPHY—Silicon.

SILVER.

See also GOLD; GOLD MINE; MINERAL REGION; PRECIOUS METAL; SILVER METALLURGY.

Standard Silver: Its History, Properties and Uses. Ernest A. Smith. Serial. 1st part. 1200 w. Sci Am Sup—June 8, 1901.

Arizona.—See GOLD.

Assay.—See ASSAYING; GOLD ASSAYING.

Bingham, Utah.—Mines and Aerial Tramways of the U. S. Mining Co., at Bingham, Utah. W. P. Hardesty. An illustrated detailed description of silver-gold-lead mines and Bleichert cableway. 5000 w. Eng News—Feb. 11, 1904.

Bohemia.—The Occurrence of Lead, Cobalt and Nickel Ores Containing Silver, near Pressnitz, Bohemia (Die Vorkommen von Silberhaltigem Bleiglans, Kobalt und Nickelerz bei Pressnitz im Böhmischen Erzgebirge). Josef Lowag. A general description of the geological conditions. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 26, 1903.

The Mine Workings at Katharinaberg in Bohemia (Der Erzbergbau zu Böhmisch-Katharinaberg im Erzgebirge). Viktor Zeleny. A general account of the geology of the district, lying between the frontiers of Bohemia and Saxony. The ore is a copper glance containing silver. Two articles. 1 plate. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 18, 25, 1905.

British Columbia.—The North Star Mine and Nickel Plate Mine of British Columbia. J. M. Turnbull. Read before the Applied Science Soc. of McGill Univ. Details of the operation of these silver mines. 4000 w. Can Engr—April, 1901.

Silver Lead. Memoranda, showing the urgent need of legislation in favor of this industry in British Columbia, presented by a deputation of mine owners to the Canadian Government. Ill. 4800 w. Can Min Rev—April 30, 1901.

Dry Silver-Lead Ores in the Slocan. Illustrated description of the Hewitt mine, Silverton, the ore, methods of mining, etc. 1500 w. B. C. Min Rec—July, 1901.

The St. Eugene Mine. E. Jacobs. A description of this mine, which is the largest silver-lead producer in British Columbia. 1500 w. Eng & Min Jour—June 16, 1904.

See also Kootenay; GOLD; GOLD MINE; LEAD; MINERAL REGION.

Broken Hill, N. S. W.—The Broken Hill (N. S. W.) Deposits. Discusses the correct geological classification of the lodes, and the accuracy of hypotheses advanced. 2000 w. Aust Min Stand—July 3, 1902.

Broken Hill. Donald Clark. An illustrated review of this noted mining region, yielding gold, silver and lead. Serial. 1st part. 1700 w. Aust Min Stand—June 9, 1904.

Geology of the Broken Hill Lode. F. S. Mance. An explanation of the geology of these mines in New South Wales, giving views of various investigators, supporting the opinion that the lode is a saddle. 1500 w. Eng & Min Jour—Dec. 1, 1904.

Broken Hill Proprietary Co. A review of the 20 years' record of this Australian mine, especially the half-yearly statement for the period ending May 31, 1905. Silver-lead mining. 2200 w. Aust Min Stand—Aug. 23, 1905.

See also SILVER METALLURGY; ZINC METALLURGY.

Buckhorn, Colo.—The Buckhorn Mine and the San Luis Park, Colo. Arthur Lakes. Illustrates and describes peculiar formations which contain some ores and present a striking appearance. Manganese and silver ores, with a little pure gold and other metals. 1700 w. Mines & Min—Feb., 1902.

California, 1903.—See MINING INDUSTRY.

China.—The Tien Pan Shan Mines. John C. Shengle. Illustrated description of the Chinese method of working these silver mines. 700 w. Eng & Min Jour—June 1, 1905.

See also Mongolia.

Coeur d'Alene, Idaho.—The Mining Industry of Coeur d'Alenes, Idaho. J. R. Finlay. Illustrates and describes this silver-lead district, its geology and resources; the veins and ore deposits; methods of operation, etc. Map. 6500 w. Trans Am Inst of Min Engrs—Feb. & May, 1902.

The Coeur d'Alene District. F. L. Ransome. An illustrated article giving much information in regard to this lead-silver district in Idaho and Montana, which supplies more than one-third the lead mined in the United States. 2000 w. Min Mag—July, 1905.

Ore Deposits of the Coeur d'Alene, Idaho. F. L. Ransome. Abstracted from Bul. 260 of the U. S. Geol. Survey. Describes the geology of this silver-lead region. Serial. 1st part. 3000 w. Min & Sci Pr—July 8, 1905.

Colorado.—The Yankee Girl Ore Body. T. E. Schwarz. Illustrated description of the deposits of silver and copper at Red Mountain, near Ouray, Colorado, discussing the interesting features. 1100 w. Eng & Min Jour—April 27, 1905.

See also Buckhorn; Creede; Homestake; Silver Ledge; GOLD MINE; MINERAL REGION.

Colorado Caves.—See ORE DEPOSIT.

Comstock Lode.—Structure and Genesis of the Comstock Lode. John A. Reid. (Abstract.) Describes the formation, showing evidence of successive deposition in the Virginia City portion of the lode, and giving information of interest. 2500 w. Min & Sci Pr—Oct. 7, 1905.

See also GOLD.

Coppabella.—See New South Wales.

Creede, Colo.—Creede Mining Camp. Prof. Arthur Lakes. Describes these valuable silver mines operated through the Nelson and Humphreys tunnels, and also the Humphreys mill. 2500 w. Mines & Min—May, 1903.

Guanajuato.—See Mexico.

Homestake, Colorado.—The Tragedy of the Homestake Mine, Colorado. W. H. C. Butler. Historical account of the discovery and early working. Ill. Serial. 1st part. 1500 w. Min Rept—Sept. 19, 1901.

Idaho.—The Silver City District, Idaho. A description of the mines and their development. Ill. 2000 w. Eng & Min Jour—June 2, 1904.

See also Coeur d'Alene.

Japan.—See MINING INDUSTRY.

Kootenay, B. C.—The So-Called "Sand Carbonates" at the Paradise Mine, Windmere District. Charles F. Nicholson. Describes the development work. The "Sand Carbonates" carry about 50 per cent. lead and 60 oz. silver. Ill. 1100 w. B C Min Rec—Oct., 1901.

Lake Superior.—See Ontario.

Melting Point.—See GOLD.

Mercur.—See GOLD GEOLOGY.

Mexico.—The Sierra Mojada, Coahuila, Mexico, and Its Ore-Deposits. James W. Malcolmson. Gives the history and development of the Sierra Mojada mines, the character and extent of the ore deposits, and the methods of mining. Ill. 10,600 w. Trans Am Inst of Min Engrs—Nov., 1901.

The Mining District of Pachuca, Mexico. Ezequiel Ordonez. Historical and descriptive account of this silver mining district. 3500 w. Eng & Min Jour—Nov. 30, 1901.

The Etzatlan Mining District, Mexico. E. B. Van Osdel. Describes a newly developed silver and copper district. Ill. 1000 w. Eng & Min Jour—Feb. 15, 1902.

The Mining District of Guanajuato, Mexico. A condensed account of historical, political and statistical matters that affect the standing of this gold and silver mining district. Ill. 6000 w. Eng & Min Jour—Feb. 8, 1902.

The Guanajuato Mining District in Mexico. Henry Russell Wray. An illustrated article briefly reviewing the history, formation and general conditions of this district. 800 w. Min Rept—March 6, 1902.

The Guanajuato Mining District. Robert T. Hill. Map, illustrations, history and description of recent progress. Serial. 1st part. 2500 w. Eng & Min Jour—April 14, 1904.

The Guanajuato Mining District. Carl Henrich. An illustrated historical account of these silver mines, which have the largest output in the world. Serial. 1st part. 3000 w. Min Mag—July, 1904.

Guanajuato. James W. Malcolmson. Information concerning methods past and present; in this field more silver is said to have been mined than in any other district in the world. Gold is also found. 1200 w. Eng & Min Jour—Sept. 23, 1905.

The Prieta Mine of Parral, Mexico. S. M. Terry. Gives the history of this noted silver mine and an account of its reopening after being flooded for many years. Ill. 1200 w. Eng & Min Jour—Dec. 6, 1902.

The Mining District of Parral, State of Chihuahua, Mexico. G. A. Burr and Louis S. Cates. The first of a series of articles aiming to give a concise review of this promising region, which has been mined for several centuries for gold and silver ores. Map. Serial. 1st part. 1800 w. Eng & Min Jour—Feb. 7, 1903.

Minas Nuevas, Parral, Mexico. G. A. Burr and Louis S. Cates. Gives a plan showing the mines of the Veta Colorado, and begins a detailed report of their working and output. Mainly producers of silver. Serial. 1st part. 2000 w. Eng & Min Jour—March 14, 1903.

The Ocampo District, Mexico. Arthur K. Townsend. An account of this silver-bearing region, the methods of mining, etc. 2500 w. Eng & Mining Jour—March 31, 1904.

La Mina Santa Francisca, Mexico. Edward H. Cook. An illustrated description of this silver mine, with a review of its history. 2000 w. Min Mag—May, 1905.

The Hostotipaquillo District, Jalisco. William N. Cummings. Map and description of this silver-gold district in Mexico. 2000 w. Eng & Min Jour—May 18, 1905.

Santa Eulalia Mines. Prof. Arthur Lakes. A trip to the ancient and very rich silver-lead mines in the Santa Eulalia mountains, near Chihuahua, Mexico, is illustrated and described. 2300 w. Mines & Min—July, 1903.

The Mines of Santa Eulalia, Mexico. P. B. Aiken. Brief notes on the geology, history and character of the ore in these silver mines. 1200 w. Ill. Min & Sci Pr—Dec. 19, 1903.

The Method Used in Working the Silver-Lead Mines of Santa Eulalia, Chihuahua, Mexico. Edward G. Cahill. Explains the conditions of these mines when undertakne by modern engineers, and describes the successful working of a deep mining camp, most of the shafts being below the 1,500 foot level. 2500 w. Cal Jour of Tech—May, 1904.

The Method Used in Working the Silver-Lead Mines of Santa Eulalia, Chihuahua, Mexico. Edward G. Cahill. Description of deep mining below abandoned upper workings, with illustrations of crystal formation in limestone caves. 2200 w. Cal Jour of Tech—May, 1904.

The Yaqui River Country of Sonora, Mexico. George J. Bancroft. An illustrated description of this district which is essentially a silver mining country, and of the country and mining conditions. 2700 w. Eng & Min Jour—Aug. 1, 1903.

See also GOLD; MINERAL REGION.

Mongolia.—Silver Mining and Smelting in Mongolia. Yang Tsang Woo. Describes the methods employed by the natives. Ill. 1200 w. Trans Am Inst of Min Engrs—Feb. & May, 1902.

Silver-Mining and Smelting in Mongolia. Benjamin Smith Lyman. A discussion of Mr. Y. T. Woo's paper. 1200 w. Trans Am Inst of Min Engrs—Feb. and May, 1902.

Silver Mines in Mongolia (Mines d'Argent de Mongolie). Yang Tsang Woo. A description of mines at Jehol, near Jehof, and of primitive methods of ore treatment. Illustrated. 1400 w. Revue Minéralurgique—June, 1903.

Nevada.—The Silver Peak Region, Nevada. J. E. Spurr. An illustrated description of this arid district, with report of the silver and gold mines. 1700 w. Eng & Min Jour—May 12, 1904.

See also Tonopah; GOLD GEOLOGY; ORE DEPOSIT.

Nevada and Utah.—The Delamar and the Horn-Silver Mines: Two Types of Ore-Deposits in the Deserts of Nevada and Utah. S. F. Emmons. Illustrated description of deposits in an arid climate presenting interesting structural peculiarities. 7000 w. Trans Am Inst of Min Engrs—Feb., 1901.

Newbury, Mass.—See LEAD.

New Mexico.—See GOLD.

New South Wales.—The Bora Creek Silver District, New South Wales. An account of this new district, which seems to be an important one, and of the development of the Conrad mine. 1100 w. Eng & Min Jour—Jan. 26, 1901.

Australia's New Silver Field. John Plummer. Information concerning the recent discoveries of a silver-lead field at Coppabella, in New South Wales. 800 w. Min Wld—Sept. 23, 1905.

Coppabella Mining Field. Joseph E. Crane. A report to the New South Wales Mines Department on this silver-lead field. Serial. 1st part. 3000 w. Aust Min Stand—Dec. 6, 1905.

Ontario.—Silver Mining in Ontario. An account of an important consolidation of some of the mines of Lake Superior, with notes on their past history. Ill. 3200 w. Can Min Rev—Aug. 30, 1902.

On the Discoveries of Cobalt Silver Ores in Ontario. A brief account of the discovery, describing the deposits, and giving information of the present operating properties. Ills. 1500 w. Can Min Rev—April, 1905.

See also COBALT.

Oregon.—See GOLD GEOLOGY.

Parral.—See Mexico.

Production.—See GOLD.

Queensland.—See TIN.

Sahuayacan, Mexico.—See GOLD.

Santa Eulalia.—See Mexico.

Shasta, California.—See COPPER.

Silver Lake, Colo.—See also GOLD MINE.

Silver Ledge, Colo.—The Silver Ledge Mill. W. G. Swart. Illustrated detailed description of a mine and mill in Colorado. The ore consists of galena, blende and pyrite, with a little chalcopyrite. 2000 w. Min Rept—Jan. 19, 1905.

Sonora.—See also Mexico; GOLD.

Tasmania.—North Mount Farrell Silver-Lead Mine. An illustrated account of the discovery and development. 1800 w. Aust Min Stand—June 27, 1901.

Texas.—The Silver Mine of Texas. Henry M. Adkinson. An illustrated account of the Presidio mine, reviewing its history. 1500 w. Eng & Min Jour—Aug. 2, 1902.

Tonopah, Nev.—Tonopah. An illustrated descriptive article telling the story of this rich mining district in Nevada. 3000 w. Min & Sci Pr—Nov. 9, 1901.

The Mines of Tonapah Lake, Nevada. Describes a district recently discovered situated in a country very hard to prospect on account of lack of water. The ratio of gold and silver is about 89 per cent. gold and the rest silver. 1200 w. Eng & Min Jour—Dec. 14, 1901.

The Geologic and Economic Aspect of Tonopah, Nevada. Describes the unusual conditions of this mining district, which gives promise of proving a large producer of bullion. 1800 w. Min & Sci Pr—Jan. 10, 1903.

The Ore Deposits of Tonopah, Nevada. J. E. Spurr. An illustrated description of the geology, mineralization, occurrence, etc. The mines are worked for the silver, though other minerals of value are found. 1800 w. Eng & Min Jour—Nov. 21, 1903.

Ore Deposits of Tonopah, Nevada. J. E. Spurr. Taken from report of U. S. Geol. Survey. Describes the character of the silver sulphide ores and the deposits. 1600 w. Min Rept—Jan. 7, 1904.

See also GOLD.

United States.—See GOLD.

Utah.—See Bingham; Nevada and Utah.

World Production.—See GOLD—Production.

Zinc Ores.—See ASSAYING.

SILVER ALLOY.

Gold.—See ALLOY—Gold and Silver.

SILVER GEOLOGY.

See GEOLOGY; GOLD GEOLOGY; MINERAL REGION; ORE DEPOSIT; SILVER.

SILVER METALLURGY.

See also GOLD METALLURGY; GOLD MILLING;

LEAD METALLURGY; METALLURGY; ORE TREATMENT; SILVER; SMELTING.

Ainsworth, B. C.—A Modern Coarse Concentration Plant for Silver Lead Ore. Ernest R. Woakes. Read before the Inst. of Min. & Met. An illustrated detailed description of the Highland Concentrator at Ainsworth, B. C., with information of the capacity and cost of operation. 5400 w. Can Min Rev—Jan. 31, 1903.

Amalgamation.—Effect of Salt and Bluestone on Mercury in Pan Amalgamation. A. E. Drucker. Explains the reactions which show the need of bluestone and salt in the treatment of silver ores when silver sulphide is present. 1000 w. Min & Sci Pr—May 20, 1905.

The Separation of Silver from Sulphide in Amalgamation Processes (Ueber die Abscheidung des Silbers aus Schwefelsilber in Amalgamationsverfahren). Tosio Watanabe. A review of practice in Europe and America in comparison with results at Sado, in Japan. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 11, 1905.

See also **Patio Process; GOLD METALLURGY.**

Broken Hill, Australia.—See Concentration; BRIQUETTING; ORE TREATMENT; SILVER; ZINC METALLURGY.

Carmichael—Bradford.—See LEAD METALLURGY.

Colorado.—Mills of the San Juan Region, Colorado. Frank Hartman. Illustrated description of the means by which the great low-grade silver deposits have been made profitable. 2300 w. Mines & Min—Jan., 1902.

Concentration.—Concentration of Silver-Lead Ores. V. F. S. Low. Abstract Trans. Aus. Min. Engrs. Applies to the concentration of the silver-lead ores of Broken Hill, N. S. W., especially to the ores in Block 10 mine. Ills. Serial. 1st part. 3000 w. Min & Sci Pr—July 15, 1905.
See also ORE TREATMENT.

Concentration Iron Bottoms.—See GOLD METALLURGY.

Cyanide Process.—See CYANIDE PROCESS—Silver.

Electric.—See GOLD METALLURGY.

El Oro, Mexico.—See GOLD METALLURGY.

Furnace Feeding.—Mechanical Feeding of Silver-Lead Blast Furnaces. Arthur S. Dwight. Considers the present state of the art and describes devices which have come under the personal observation of the writer, recording his results in the practical working of one of the systems. Ill. 12,800 w. Trans Am Inst of Min Engrs—Nov., 1902.

Highland Mill, B. C.—See LEAD METALLURGY.

Mexico.—Milling of Silver Ores at Pachuca. Henry F. Collins. Abstract from paper on "Amalgamation and Other Wet Processes for Silver Ores in Mexico," read before the Inst. of Min. and Met. London. Describes the processes of treatment employed. 8500 w. Eng & Min Jour—Dec. 31, 1903.

Chloridizing Roasting of Silver Ores in Mexico. Ernest Stein. Describes the working of the reverberatory furnaces. 2300 w. Eng & Min Jour—Sept. 1, 1904.

See also **Patio Process; SILVER; SMELTING.**

Patio Process.—The Patio Process for Amalgamation of Silver-Ores. Manuel Valerio Ortega. Notes offered as a contribution to the discovery of an exact theory concerning the patio process. 8500 w. Trans Am Inst of Min Engrs—Nov., 1901.

Mexican Methods of Silver Ore Treatment. J. Nelson Nevins. An illustrated description of the patio process, developed in the middle of the sixteenth century. 800 w. Eng & Min Jour—Oct. 18, 1902.

See also GOLD METALLURGY; ORE TREATMENT.

Refractory Ores.—See GOLD METALLURGY.

Silver Lead.—See also LEAD METALLURGY; ORE TREATMENT; SMELTING.

Smelting.—See also SMELTING—Mexico.

South America.—Treating Non-Smelting Ores in South America. Describes the methods of treating silver ores in use in South America. 1400 w. Min & Sci Pr—Jan. 5, 1901.

Trail, British Columbia.—See GOLD METALLURGY; SMELTING—Silver-Lead.

SILVER MINE.

See GOLD MINE; MINERAL REGION; SILVER; SILVER METALLURGY.

SILVER MINING.

See GOLD MINING; SILVER; SILVER METALLURGY.

SILVER PRODUCTION.

See GOLD—Production.

SILVER REGION.

See SILVER.

SINGLE RAIL.

See also SUSPENDED RAILWAY.

Baltimore.—An Experimental Mono-Rail Line. Day Allen Willey. Brief illustrated description of a railway on the mono-rail system which has been in operation for experimental purposes near Baltimore. 700 w. Sci Am—Dec. 6, 1902.

Behr.—Express Passenger Traveling in the Future. H. C. Fyfe. An illustrated discussion of the monorail (Behr) system, and of the suspended railway system as solutions of the problem of conveying passengers at high speed. 4800 w. Page's Mag—March, 1903.

See also **Manchester—Liverpool.**

Double Rail Compared.—A Comparison of Single and Double Rail Track (Chemins de Fer à Une et à Deux Files de Rails Comparés). R. Philippe. An examination of the resistance of double rail track upon curves of various radii, in comparison with the various monorail systems. 8000 w. 1 plate. Ann des Ponts et Chaussées. 2 Trimestre 1901.

Lehmann.—The Lehmann Single-Rail Road (Die Einschienenbahn von A. Lehmann). Prof. A. Birk. A well-illustrated description of this single-rail system for industrial and field tramways, principally for freight. 1 plate. 1800 w. Oesterr Wochenschr f d Oeffent Baudienst—April 6, 1901.

Improvements in A. Lehmann's Single-Rail System (Neuerungen an A. Lehmann's Einschienenbahn). Illustrated description of a single-rail road, at ground levl, and cars for hauling freight and passengers by man or animal power. 700 w. Oesterr Wochenschr f d Oeffent Baudienst—May 8, 1902.

Manchester-Liverpool.—The Proposed High-Speed Electrical "Monorail" Between Liverpool and Manchester. F. B. Behr. Describes the system and claims that it possesses the advantages of cheapness and safety as well as its adaptability for high-speed passenger traffic. 7800 w. Jour Soc of Arts—March 15, 1901.

The High-Speed Electric Railway between Manchester and Liverpool (Elektrische Schnellbahnen Zwischen Manchester und Liverpool). F. B. Behr. A full account of the proposed Behr high-speed mono-railway from Manchester to Liverpool. Two articles. 10,000 w. Zeitschr d ver Deutscher Ing—April 5, 12, 1902.

The Manchester and Liverpool Express Railway. Editorial discussion of the proposed thirty-five mile line on the mono-rail system, which is to cover the distance in twenty minutes. 1500 w. Engr, Lond—May 24, 1901.

The Monorail Railway. Editorial discussion of the scheme to construct a mono-rail between Liverpool and Manchester. 3000 w. Engng—May 31, 1901.

The Manchester and Liverpool Electric Express Railway. Illustrated description of a proposed railway on the monorail system, to be operated at high speed by electricity. 5400 w. Tram & Ry Wld—Nov. 13, 1902.

Mine Haulage.—See MINE HAULAGE—Single Rail.

Wetterhorn, Switzerland.—See SUSPENDED RAILWAY.

SIPHON.

See also SEWER; WATER PIPE.

Bar Harbor, Me.—A Successful Siphon. Robert S. Hale. Describes the solution of a problem for supplying water to Schooner Head, Bar Harbor, Me. Used an air-tight siphon at a cost of about $250. Ill. 1500 w. Jour Assn of Engng Socs—Nov., 1900.

Canal, Morris.—See CANAL—Morris, Crossing Lackawanna.

Inverted.—See **SEWER—Siphon Inverted.**

Morris Canal.—See **CANAL.**

Mystic River, Mass.—See **WATER PIPE—Chelsea, Mass.**

Paris.—See **WATER SUPPLY.**

Philadelphia, Torresdale.—See **WATER PIPE.**

Plumbing.—Siphons: Their Action and Uses in Plumbers' Work. J. Wright Clarke. An illustrated explanation of siphon action and its limit in plumbing work. Serial. 1st part. 2500 w. Plumb & Dec—Sept. 1, 1904.

See also **PLUMBING—Siphon.**

Sewer.—See **SEWER—Siphon and Overflow.**

Waterworks.—Siphons for Waterworks. Illustrated description by Heinrich Adolf, from the "Zeitschrift d. Oest. Ing. u. Arch. Ver., of the principles governing the design and operation of long siphons. 2700 w. Eng Rec—July 27, 1901.

See also **WATER PIPE; WATER SUPPLY; WATERWORKS.**

SKELETON CONSTRUCTION.

See **BUILDING CONSTRUCTION; FRAMEWORK; STEEL CONSTRUCTION; WAREHOUSE.**

SKETCHING.

See **DRAWING.**

SKYLIGHT.

Train Sheds.—See **RAILWAY STATION—Skylights.**

SLAG.

See also **BLAST FURNACE; BRICK MANUFACTURE; CEMENT—Portland.**

The Formation of Slags in Metallurgical Operations (La Formation des Scories dans les Operations Métallurgiques). W. Mathesius. An examination of the chemical composition of various slags, their formation, and some of their useful applications. 4000 w. Rev Gen des Sciences—Oct. 15, 1904.

Analysis.—The Analysis of Slags and Cinders. C. H. Joüet. A paper intended as a guide for the analysis of the various slags and cinders from blast and reverberatory furnaces, producing pig and refined lead, copper and iron. 5800 w. Sch of Mines Quar—Nov., 1900.

A Study of Slags (Zur Kenntniss der Schlacken). H. v. Jüptner. A chemical study of the furnace slags and their relation to the metallic products. Two articles. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—March 29, April 5, 1902.

See also **Sulphur.**

Car.—See **CAR—Slag.**

Castings.—See **CASTING—Slag.**

Cement.—See **Granulation; CEMENT—Portland; Slag; Zulkowski Theory.**

Composition.—The Composition of Blast Furnace Slag (Ueber die Constitution der Hochofenschlacke). Karl Zulkowski. A review of the theory of Jüptner, with formulas indicating the reactions involved in the formation of furnace slag. Two articles. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 6, 1902.

The Composition of Blast Furnace Slag (Zur Constitution der Hochofenschlacke). L. Blum. With nalyses of various slags, and a discussion of the conditions of their formation. 2000 w. Stahl und Eisen—Oct. 1, 1901.

See also **Tri-Axial Diagram.**

Conveyor.—See **CONVEYOR—Slag.**

Copper, Blast Furnace.—A Slag Calculation. Charles S. Palmer. Gives a method for the calculation of copper blast-furnace slag. 1000 w. Eng & Min Jour—June 29, 1905.

Disintegrating.—Disintegrating Blast Furnace Slag. A. D. Elbers. Explains the phenomenon of slag disintegrating by its own heat. 1800 w. Am Mfr—Sept. 5, 1901.

Ferromanganese.—The Constitution of Ferromanganese Slags (Ueber die Zusammensetzung der Schlacken bei der Ferromanganerzeugung). F. Wittman. Giving a table of analyses of various slags, and a curve showing the relative percentages. 1000 w. Stahl u Eisen—Jan. 1, 1904.

Fertilizer.—Blast Furnace Slag for Fertilizing. Alexander D. Elbers. On the value of this material and the way of preparing it for use. 900 w. Am Mfr—Jan. 3, 1901.

Fusibility.—Experiments on the Fusibility of Blast Furnace Slags. O. Boudouard. Read before the Iron & Steel Inst. Reports of a systematic investigation of the fusibility of silicates of lime, and of the alumino-calcic silicates. Ills. 7000 w. Ir & Coal Trds Rev—May 12, 1905.

The Melting Point of Slags and Other Members of the Series SiO_2—Al_2O_3—CaO. Clifford Richardson. Calls attention to the fact that many of the melting points and conclusions drawn from them are erroneous. 1000 w. Ir & Steel Mag——Oct., 1905.

Granulation.—The Granulation of Blast-Furnace Slag (Zur Granulierung der Hochofenschlacke). R. Schöffel. A discussion as to the influence of the water upon the granulation of slags discharged into it. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 20, 1904.

Recent Investigations upon Blast-Furnace Slag (Neue Untersuchungen über Hochofenschlacke). Dr. Hermann Passow. Experiments upon the granulation of slag for the manufacture of cement. 1500 w. Stahl u Eisen—Oct. 1, 1905.

Melting Point.—See **Fusibility.**

Structural Material.—Blast Furnace Slag as a Structural Material. Jos. A. Shinn. Reviews the uses that have been made of blast-furnace slag, and reports tests made of slag sand. General discussion. 6500 w. Pro Engrs' Soc of W Penn—April, 1904.

Sulphur.—The Sulphur Content of Slag and Other Furnace Products (Der Schwefelgehalt von Schlacken und Hüttenproducten). H. von Jüptner. An examination of the distribution of sulphur in slag and metal in connection with the solution theory. Two articles. 4000 w. Stahl u Eisen—April 1, 15, 1902.

Tri-Axial Diagram.—The Use of the Tri-Axial Diagram in the Calculation of Slags. Ernest A. Hersam. Presents a method of graphic calculation. The example selected deals with the calculation of a blast-furnace slag. 7000 w. Trans Am Inst, of Min Engrs—June, 1901.

Slag-Constitution Studied by Means of the Tri-Axial Diagram with Rectangular Co-ordinates. Harrison Everett Ashley. A discussion suggested by Prof. H. M. Howe's paper, "The Tri-Axial Diagram," and Prof. H. O. Hofman's paper, "The Temperatures at which Certain Ferrous and Calcic Silicates are Formed in Fusion." 7000 w. Trans Am Inst of Min Engrs—Nov., 1901.

The Utilization of Blast Furnace Slag. E. R. Sutcliffe. Abstract of a paper read before the West of Scotland Ir. & Steel Inst. Describes the methods of making building bricks and artificial paving materials. Ills. 4800 w. Ir & Coal Trds Rev—April 15, 1904.

SLATE.

See also **QUARRY; STONE.**

Angers.—See **French Quarries.**

Ardennes, France.—See **French Quarries.**

Blasting.—See **BLASTING—Slate Quarries.**

French Quarries.—The Slate Quarries of Angers (Notes sur les Ardoisiéres d'Angers). J. Kersten. A discussion of the geology of the region and an account of the working of the quarries in Anjou. 3000 w. Rev Univ des Mines—Dec., 1900.

The Underground Slate Workings of France. Illustrates and describes methods of operating at Angers and at Ardennes, and gives information from a recent work by Mr. Watrin, Chief Inspector of Mines at Mézières. 2000 w. Stone—June, 1902.

Improvements in the Methods of Quarrying Slate. Translated from "La Nature." Describes the old methods and the new. Ill. 1800 w. Sci Am Sup—Dec. 6, 1902.

Electricity in French Slate Quarries. Describes the former methods of working, and the recent method of working by electric power. Diagram. 2700 w. Engng—May 22, 1903.

Lake District, Eng.—The Green Slates of the Lake District. T. Mellard Reade and Philip Holland. A study of these roofing slates of the English Lake District. Describes specimens examined. Ill. 6000 w. Quarry—Jan. 1, 1902.

Liguria, Italy.—The Slate Quarries of East Liguria. An account of the slate quarries of Northern Italy and the improved methods of working made necessary by competition. 2000 w. Quarry—June, 1903.

Quarrying.—See French Quarries; Liguria; QUARRYING—Helicoidal Wire.

Wales.—See BLASTING—Slate Quarries.

SLATE PICKERS.

See also COAL PREPARATION.

American.—American Slate Pickers. Briefly describes some of the machines which have given good results. 1500 w. Col Guard—Jan. 17, 1902.

SLAUGHTER HOUSE.

See ABATTOIR.

SLEEPER.

See CROSS TIE; RAIL FASTENING; RAILWAY PERMANENT WAY; TRACK.

SLIDE RULE.

See also CALCULATING MACHINE; OMNIMETER.

The Precision of the Slide Rule. Louis Derr. Gives some precision tests which show that more accurate results than usually credited can be obtained. 900 w. Tech Quar—March, 1901.

The Use of Calculating Machines. Charles A. Holden. Urging the use of the slide rule to a greater extent. 900 w. Eng News—May 30, 1901.

The Execution of Computations with the Slide Rule (Berekeningen Uitvoerbaar met de Rekenlinaal). F. J. Vaes. Giving numerous examples of the ease and accuracy with which problems of actual importance may be solved by the slide rule. 3500 w. De Ingenieur—Feb. 14, 1903.

Short Cuts on the Slide Rule. Carl P. Nachod. Explains the use of the slide rule for calculations, showing its value. 900 w. Am Mach—Vol. 28, No. 46.

Circular.—An Instrument for Use with Screw-Cutting Lathes (Sur un Instrument Destiné à Faciliter l'Emploi du Tour à Fileter). M. Moeblenbruck. A form of circular slide rule with double runner, enabling the various change gears for screw-cutting to be selected without computation. 800 w. Comptes Rendus—May 24, 1904.

Gear Computing.—See Circular.

Hazen-Williams.—See WATER FLOW.

Hydraulic.—See WATER FLOW—Hazen-Williams.

Machine Shop.—Slide Rules for the Machine Shop as a Part of the Taylor System of Management. Carl G. Barth. Explains the slide rule method of solution of various problems. 3800 w. Trans Am Soc of Mech Engrs, No. 018—Dec., 1903.

Omnimeter.—See OMNIMETER.

Proell.—Mechanical Aids to Computation (Einige Hulpmiddelen voor het Rekenen). F. J. Vaes. A description of the improved slide rule and tables of Proell for facilitating numerical computations. 3000 w. De Ingenieur—Feb. 7, 1903.

Speed Changes.—Calculating Cone Steps and Back-Gearing Ratios by the Slide Rule. Robert A. Bruce. Description and diagrams showing use of slide rule in machine-tool design. 1500 w. Am Mach—Vol. 27, No. 33.

Calculating Cone Steps and Back-Gearing Ratios by the Slide Rule. W. Owen. Deals with the application of the slide rule to calculations necessary in designing machine tools. 1000 w. Am Mach—Oct. 20, 1904.

Stadia.—See SURVEYING.

Temperature Calculations.—Calculating Temperature Rises With a Slide Rule. Miles Walker. Describes a method which takes into account the changes of temperature coefficient with temperature. 600 w. Elec Jour—Nov., 1905.

Topographic.—The United States Geological Survey Topographic Slide Rule. Gerald H. Matthes. Illustrated description of this slide rule, designed by the writer, with an outline of problems demonstrating its use. 3300 w. Tech Qr—Sept., 1902.

SLIP.

Earth.—See EARTHWORK—Slips; LANDSLIDE.

SLIPWAY.

Tucacas, Venezuela.—See MARINE RAILWAY.

Wallsend, Eng.—See SHIPYARD.

SLOPE WALLS.

Quarrying.—See QUARRYING.

SLOT MACHINE.

See GAS METER—Prepayment.

SLOTTING MACHINE.

See also MACHINE TOOL.

Slotting Machine with Screw Driving Gear (Stossmaschine mit Schraubenantrieb des Stössels). Alexander Klehe. An illustrated description of a tool for machining the pole seats of large dynamo frames. 800 w. Zeitschr d Ver Deutscher Ing—Jan. 18, 1902.

Turret Heads.—The Use of Turret Heads on Slotting Machines. R. W. Gulick. Illustrated description of the method used in the works of the Westinghouse Co., resulting in accurate, rapid work of good finish. 700 w. Am Mach—April 7, 1904.

SLUICE.

See GOLD MINING—Sluicing.

SLUICE GATE.

See CANAL; DAM; HYDRO-ELECTRIC PLANT; RIVER REGULATION; SPILLWAY; WATER POWER; WEIR.

SLUICING.

See GOLD MINING—Sluicing; HYDRAULIC MINING—Centrifugal Sluicing.

SMALL TOOL.

See TOOL.

SMELTING.

See also BLAST FURNACE; COPPER METALLURGY; FURNACE; GOLD METALLURGY; IRON METALLURGY; LEAD METALLURGY; METALLURGY; ORE TREATMENT; SILVER METALLURGY; TIN METALLURGY; ZINC METALLURGY.

Anaconda.—See Copper; Flue Dust; COPPER METALLURGY.

Arizona.—See ORE TREATMENT.

Arsenical Ores.—Smelting Arsenical Ores in Blast Furnaces. Herbert Lang. Outlines the method of treatment of arsenical gold and silver ores, and reports the success. 2300 w. Min & Sci Pr—March 29, 1902.

Australia.—Customs Smelting in Australia. Explains the circumstances that prevent the business from becoming profitable. 1600 w. Eng & Min Jour—May 11, 1905.

Bormettes-Method.—The Bormettes-Method Lead and Copper Smelting. Alfredo Lotti. Illustrated description of this system, comparing it with other methods. 1600 w. Eng & Min Jour—Sept. 30, 1905.

British Columbia.—Improvements in Cheap Copper Matting for British Columbia. Ronald C. Campbell-Johnston. States the conditions and suggests improvements in the smelting, and describes a furnace designed by the writer. 2000 w. Min & Sci Pr—Jan. 9, 1904.

Smelters and Smelting Practice in British Columbia. William M. Brewer. An illustrated review of the rapid growth and expansion of the smelting industry in the last fifteen years. 4000 w. Engineering Magazine—Dec., 1904.

The Smelting Works of British Columbia. Notes on the changes and improvements made at the various smelters during the year 1905. Serial. 1st part. 3000 w. B C Min Rec—Dec., 1905.

See also Grand Forks; Lead and Silver; MINERAL REGION; ORE TREATMENT.

Bully Hill, Cal.—The New Bully Hill Smelter. Illustration, with description of the works, in California, the deposits, etc. The ores carry copper, gold and silver. 1700 w. Eng & Min Jour—Dec. 6, 1902.

Chlorine.—See ORE TREATMENT.

Chloro-Electrolytic.—See ORE TREATMENT.

Colorado.—See CYANIDE PROCESS.

Copper.—Late Improvements in Copper Smelting. Herbert Lang. From Trans. California Miner's Assn. On the changes and improvements of recent years; the pyritic process and what it has effected; other processes, and cost. 2800 w. Min & Scie Pr—April 11, 1903.

Treatment of Lake Copper. J. B. Cooper. Read before the Lake Superior Min. Inst. A history of some of the difficulties experienced in the early efforts to smelt Lake ores and the final success. 2500 w. Mines & Min—May, 1903.

Copper Smelting at Anaconda. A. P. Mallon.

A description of how the ores are treated. 1200 w. Pacific C Min—Nov. 14, 1903.

The Constitution of Mattes Produced in Copper-Smelting. Allan Gibb and R. C. Philp. Report of research work, both from a chemical and physical standpoint, of the constitution of mattes produced in copper smelting, the investigation involving both synthesis and analysis. 5200 w. Am Inst of Min Engrs—Nov., 1905.

See also **COPPER METALLURGY.**

Denver, Colo.—Notes and Freehand Sketches Around the Omaha and Grant Lead Smelter at Denver, Colo. Prof. Arthur Lakes. A pictorial description of the principal processes. 2000 w. Mines & Min—Dec., 1903.

Electric.—See **ELECTRIC FURNACE, ELECTRO-METALLURGY; GOLD METALLURGY.**

El Paso, Texas.—New Smelting Plant at El Paso, Texas. C. W. Arthur. An illustrated description of what is said to be one of the largest and best equipped smelters in the world. 1400 w. Min & Sci Pr—Nov. 15, 1902.

Flue Dust.—Flues and Flue Dust at Anaconda. C. H. Dougall. Read before the Can. Soc. of Civ. Engrs. Sketches and description of arrangements of the plant which are giving most satisfactory results, and related matters of interest in connection with this copper smelter. 4000 w. Can Min Rev—Feb., 1905.

Fumes.—The Smelter-Fume Problem. A. W. Warwick. Remarks on changes due to the consolidation of the smelting plants under one management, particularly discussing the damage from smelter-fumes, showing that it is not nearly as great as alleged, and not easy to solve. Ills. 8300 w. Min Mag—Aug., 1905.

Gold from Copper.—See **GOLD METALLURGY—Copper Separation.**

Grand Forks, B. C.—Modern Smelting Equipment. Illustrated description of the power plant, smelting furnaces, sampler and auxiliary buildings of the Granby Consolidated Mining and Smelting Co.'s copper works at Grand Forks, B. C. 1800 w. Mod Mach—May, 1901.

Hot Blast.—Consideration Favorable to Hot-Blast Smelting. Abstract from a pamphlet issued by the Colorado Iron Works Co., dealing with details of smelting practice and equipment. 2500 w. Min & Sci Pr—Aug. 15, 1903.

Huntington, Heberlein Process.—See **Lead.**

Ingot, Colo.—See **Pyritic.**

Laboratory.—The Equipment of a Laboratory for a Smelting Plant. Hubert Haas. Describes a laboratory for metallurgical chemistry and technical analyses built by the writer in California. 2000 w. Trans Am Inst of Min Engrs—Sept.,1904.

Lagos, W. Africa.—A West African Smelting House. C. V. Bellamy. Illustrated account of methods now in use in the Colony of Laggos, West Africa, which are believed to be the same as those practiced by the earliest workers in this metal. 6000 w. Iron & Steel Inst—Oct., 1904.

Lead.—Lead Smelting Works at Monteponi, Sardinia. Erminio Ferraris. An illustrated article describing the works, their equipment and operation. 1400 w. Min Mag—Sept., 1904.

The Lead Smelting Plant at Monteponi, Sardinia (Die Bleihütte zu Monteponi). E. Ferraris. Illustrated description of furnaces and other parts of plant, and operating results. 1 plate. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 2, 1905.

The New Methods of Desulphurizing Galena. W. Borchers. Translation from "Metallurgie." Also editorial. Discusses critically the reactions involved in the new methods given in the processes of Huntington-Heberlein, Savelsberg, and Carmichael-Bradford. 4200 w. Eng & Min Jour—Sept. 2, 1905.

The Huntington-Heberlein Process at Friedrichshütte. A. Biernbaum. Translated from "Zeitschrift für das Berg-Hütten- und Salinenwesen." An account of the introduction of this process at Tarnowitz, Prussia, where it has completely displaced the old processes of local smelting. 4000 w. Eng & Min Jour—Sept. 23, 1905.

See also **Tap Jackets; LEAD METALLURGY.**

Lead and Silver, Canada.—Lead and Silver Refining at the Canadian Smelting Works, Trail, B. C. E. Jacobs. A brief description of the general plan and operations of the smelter, with illustrated detailed description of the electrolytic lead refinery. 8300 w. B C Min Rec—Dec., 1904.

Lead-Copper, Mexico.—Smelting of Siliceous Lead-Copper Ores (Carbonates) at Llano, Sonora, Mexico. Arthur Hauman. Gives the composition of ores and fluxes, explains the peculiarities of available labor, and the methods used. 1200 w. Min & Sci Pr—July 6, 1901.

Lead, Mexico.—See **LEAD METALLURGY—Mexican Furnace.**

Mexico.—Views of an Old Smelter in the State of Morelos, Mexico. C. W. Pritchett. Illustrations and brief notes. 600 w. Trans Am Inst of Min Engrs—Nov., 1901.

The Custom Smelting Industry in Mexico. Jas. W. Malcolmson. A statement of the present situation and of the changes being made to relieve it. Treatment rates are discussed and the advantages which copper matte has over lead as a vehicle for the concentration of gold and silver contained in silicious ores. 1800 w. Eng & Min Jour—July 7, 1904.

The Custom Smelting Industry in Mexico. James W. Malcolmson, in the "Lead and Zinc News." On the growth of the silver-lead smelting industry in Mexico, and the advantages of copper matte over lead as a vehicle for the concentration of gold and silver contained in silicious ores. 1500 w. Can Min Rev—Aug. 31, 1904.

Michigan.—The Michigan Smelter. R. T. White. Gives a ground plan of the works, describing the treatment of the ore and the methods. 2400 w. Eng & Min Jour—May 4, 1905.

Mongolia.—See **SILVER.**

Montana.—See **MECHANICAL ENGINEER—Mining and Smelting.**

Monteponi, Sardinia.—See **Lead.**

Mt. Lyell, Tasmania.—See **COPPER METALLURGY.**

Oil Fuel.—Use of Crude Oil in Smelting. A. von der Ropp. Read before the California Miners' Assn. A discussion of the practical side of the subject. 2300 w. Min & Sci Pr—Nov. 29, 1902.

See also **LIQUID FUEL—Smelting.**

Omaha and Grant.—See **Denver, Colo.**

Pyritic.—Pyritic Smelting in the Black Hills. Franklin R. Carpenter. An account of experimental work. 4800 w. Trans Am Inst of Min Engrs—Aug., 1900.

Pyritic Smelting in the Black Hills. Franklin R. Carpenter. Discussion of this paper by H. Van F. Furman. 1000 w. Trans Am Inst of Min Engrs—April, 1901.

Pyritic Smelting in the Black Hills. Continued discussion of Prof. Carpenter's paper, presented at the Canadian meeting. 1700 w. Trans Am Inst of Min Engrs—June, 1901.

Pyritic Smelting. Franklin R. Carpenter. Condensed from Bul. of Colorado Sch. of Mines. A discussion of the process or processes. Serial. 1st part. 1200 w. Min & Sci Pr—March 14, 1903.

Pyritic Smelting. Franklin R. Carpenter. Trans. Am. Min. Cong., Deadwood, S. D. Describes a process of smelting applicable to any raw ores not carrying lead, but especially to sulphide ores carrying copper. Serial. 1st part. 1100 w. Min & Sci Pr—Sept. 12, 1903.

Pyritic Smelting and Hot Blast. S. E. Bretherton. Considers questions relating to pyritic smelting, the ores suitable, etc. 2300 w. Eng & Min Jour—Dec. 29, 1900.

Hot Blast Pyritic Smelting. S. E. Bretherton. Discusses what ores are suitable for pyritic smelting, and the advantages of a hot blast over a cold blast; also describing the author's apparatus. 2500 w. Ores & Met—July, 1901.

The Province of Pyritic Smelting. Herbert Lang. A reply to an editorial in this journal, wherein the ground was taken that pyritic process is not of general application. The writer thinks differently, and discusses the points brought up in the editorial. Serial. 1st part. 3000 w. Eng & Min Jour—May 11, 1901.

Pyrite Smelting. A Review. Edward D. Peters. A review of a series of papers on this subject, appearing in this journal since October 10, 1903, with the object of presenting in a concise form the results and opinions reached, to draw general deductions and to discuss points needing consideration. 2800 w. Eng & Min Jour—June 2, 1904.

Pyritic Smelting. Abstract of the presidential address of Robert C. Sticht, before the Aust. Inst. of Min. Engrs. Gives an outline of its history. Serial. 1st part. 2500 w. Aust Min Stand—June 7, 1903.

A New Pyrite Smelter. Herbert Haas. Illustrated description of the copper smelter of the Great Western Gold Co., at Ingot, Col. 1200 w. Eng & Min Jour—June 3, 1905.

See also Copper; **GOLD METALLURGY; ORE TREATMENT**—Sulphide Ores.

Pyrrhotite.—Smelting of Raw Sulphide Ores at Ducktown. W. H. Freeland. Describes work of the writer at Isabella, Tenn. The ore is a pyrrhotite, carrying less than 3 per cent. copper, and no precious values. The practice consisted in the smelting of raw ore to low grade matte, and the reconcentration of the low-grade, to a 50 per cent. matte. Ill. 1800 w. Eng & Min Jour—May 2, 1903.

Rapid City, S. D.—Sulphide-Smelting at the National Smelter of the Horseshoe Mining Co., Rapid City, S. D. Charles H. Fulton and Theodor Kuntsen. Describes the smelting of dry siliceous ores, extracting the gold and silver values in a matte of low copper-percentage. 3500 w. Trans Am Inst of Min Engrs—Feb., 1904.

Rio Tinto, Spain.—See **COPPER METALLURGY.**

Salida, Col.—The New Smelter at Salida, Colorado. Etienne A. Ritter. An illustrated description of a large smelting works for treating lead and copper and other ores. 800 w. Eng & Min Jour—Dec. 20, 1902.

Sante Fe, Mexico.—See **ORE TREATMENT.**

Silver, Mongolia.—See **SILVER—Mongolia.**

Tap Jackets.—The Evolution of Tap Jackets and Spouts. Hiram W. Hixon. Describes the tap jackets used in lead smelting; and the furnace spouts used in copper smelting. 1200 w. Eng & Min Jour—Oct. 14, 1905.

Tavener Process.—See **GOLD METALLURGY—Lead Smelting.**

Transvaal.—Notes on Smelting and Cupellation. F. L. Piddington. Describes the method generally used in the treatment of small parcels of rich material. 1500 w. Jour of Chem, Met & Min Soc of So Africa—Dec., 1903.

See also **GOLD METALLURGY.**

Val Verde.—See **COPPER METALLURGY.**

Vancouver.—Inauguration of the Smelting Industry on Vancouver Island, British Columbia. William M. Brewer. An illustrated description of the plant recently put in operation, giving reasons for believing the plant to be advantageously located. 2400 w. Eng & Min Jour—Sept. 6, 1902.

The New Smelter Plant at Crofton. W. M. Brewer. Illustrated description of this plant, on the east coast of Vancouver Is. 1500 w. B C Min Rec—Oct., 1902.

Smelting on Vancouver Island, B. C. Illustrated description of the smelter built at Crofton, and its operation. 1600 w. Min & Sci Pr—Nov. 8, 1902.

Britannia Smelting Co.'s Smelting Works at Crofton, Vancouver Island, B. C. Illustrated description of the works and their equipment. 2500 w. B C Min Rec—Oct., 1905.

Washoe.—See **COPPER METALLURGY—Anaconda, Mon.**

Zinc, America.—See **ZINC—America; ZINC METALLURGY.**

Zinc Ores.—See **ZINC METALLURGY.**

SMOKE.

See also **SMOKE PREVENTION.**

Density.—Smoke and the Determination of its Density. Albert A. Cary. Abstract of a paper read before the New England Cotton Mfrs. Assn. Describes the production of coal gas, showing why soot is greasy and sticky, and the cause of smoke, in the present number. Serial. 1st part. 3000 w. Elec Rev, N Y—May 23, 1903.

Vegetation.—The Effect of Smoke and Gas upon Vegetation. W. A. Buckhout. Considers the elements that cause injuries and the difficulties in determining their presence in many cases. 4800 w. Mines & Min—May, 1903.

SMOKEBOX.

See **LOCOMOTIVE SMOKEBOX.**

SMOKE PREVENTION.

See also **BRIQUETTING; CHIMNEY—Smoky; COMBUSTION; FIRING; GRATE; LOCOMOTIVE OPERATION; MECHANICAL DRAFT; MECHANICAL STOKING; POWDERED COAL.**

Smoke and Grit From Electric and Factory Chimneys. Discusses the subject of recording and diminishing smoke, etc. Serial. 1st part. 1800 w. Elec Rev, Lond—May 17, 1901.

Smoky Furnaces and How to Avoid Them. W. H. Booth. The first of a series of articles proposing to deal with a few furnaces in use, with a view to showing how far they are constructed upon correct lines and in what points they may fail to effect perfect combustion. Serial. 1st part. 2400 w. Elec Rev, Lond—July 25, 1901.

The Smokeless Combustion of Bituminous Fuels. W. H. Booth. Read at Belfast meeting of the Brit. Assn. A study of the conditions required for smokeless combustion. 2700 w. Elec Rev, Lond—Sept. 26, 1902.

The Treatment of Smoke. W. N. Shaw. Lecture before the Sanitary Inst. (England). Discussing the problem of smoke abatement and suggesting the erection of municipal chimneys, or orifices for the delivery of the smoke of a number of chimneys, and thus making it possible to deprive the smoke of its soot. Serial. 1st part. 3000 w. Archt, Lond—Sept. 12, 1902.

The Treatment of Smoke. A Sanitary Parallel. W. N. Shaw. Discusses the problem of smoke abatement. 7300 w. Jour San Inst—Oct., 1902.

The Prevention of the Smoke Nuisance and Waste of Fuel (Rauchplage und Brennstoffverschwendung und deren Verhutung). A study of the chemical combustion of fuel, discussing the practicability of its successful accomplishment. 3000 w. Gesundheits-Ingenieur—Sept. 30, 1902.

The Suppression of Smoke in Steam Plants Using Bituminous Coal. Albert A. Cary. Discusses the theory of smoke suppression, various methods of firing and furnace developments, and gives short descriptions of some special hand fired furnaces designed to suppress smoke and promote fuel economy. Serial. 1st part. 4000 w. Ir Age—Oct. 2, 1902.

Smoke Abolition. T. T. Parker. Discusses points in a recent article by W. H. Booth, and suggests inexpensive changes that give good results in small plants. Ill. 1500 w. Am Mach—Oct. 16, 1902.

The Smoke Problem and Its Possibilities. W. C. Popplewell. A discussion of the methods for preventing smoke, and an illustrated description of several mechanical stokers. 6000 w. Feilden's Mag—Dec., 1902.

The Smoke Problem (Die Rauchfrage). F. Haier. A discussion of the relation of smoke production to fuel economy, together with the best methods of reducing the evolution of smoke in boiler firing; data from experimental investigations. Serial. Part I. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 7, 1905.

The Smoke Question. F. Haier. Lecture delivered before the Hamburg and Berlin branches of the Soc. of German Engrs. Discusses the relation between smoke development and utilization of fuels, and the ways and means of smoke abatement during firing. Ills. 12,800 w. Jour Am Soc of Nav Engrs—Aug., 1905.

The Smoke Nuisance. R. P. King. Read before the Toledo convention of the League of Am. Municipalities. Considers the causes and remedies. 2000 w. Munic Jour & Engr—Oct., 1905.

Beilby Paper.—Smoke Abatement. George Thomas Beilby. Read at Engng. Con. of the Inst. of Civ. Engrs. Refers to subjects now being investigated which will have a bearing on the question, and suggests that a tax be levied on the use of smoke-producing fuel. Gives interesting information. 1400 w. Engng—June 26, 1903.

Benjamin Paper.—Smoke and Its Abatement in Large Cities. C. H. Benjamin. Considers the nature of soft coal smoke and the devices which cause complete combustion and so prevent smoke. Ill. 1800 w. Tech Qr—Sept., 1902.

The Prevention of Smoke from Bituminous Coal. Charles H. Benjamin. A discussion of ways of securing the conditions necessary for perfect combustion, the devices tried and the results attained, favoring mechanical stokers. 3000 w. Engr, U S A—April 1, 1903.

Smoke and Its Abatement. Charles H. Benjamin. A discussion of the problem of abating the smoke from bituminous coal. 6500 w. Trans Am Soc of Mech Engrs, No. 060—June, 1905.

Chicago Bridge Works.—Successful Smoke Prevention. Illustrated description of a device in use at the shops of the Chicago Bridge & Iron Works. An application of the steam jet, automatic in its operation. 800 w. Ry & Engng Rev—Feb. 8, 1902.

Coal Mine Engines.—See BOILER—Lancashire.

Denver.—The Smoke Problem of Denver. Thomas L. Wilkinson. The present article gives a survey of what has been done in other cities to abate the smoke nuisance. It will next consider combustion in boiler furnaces, showing how the smoke may be overcome. Serial. 1st part. 2200 w. Min Rept—Dec. 10, 1903.

Dosch.—Smoke Prevention by Admission of Air Above the Fire (Rauchvermeidung durch Zuführung von Luft ueber dem Feuer). A. Dosch. With illustrations of a form of grate adapted to admit heated air to aid in the combustion of the gases. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 1, 1904.

Electrical Deposition.—The Possibilities of Electrical Smoke Deposition. J. Wright. Recalls some early experiments in this direction, as given in a paper by Prof. Lodge, and offers suggestions. 1200 w. Elec Rev, Lond—Nov. 23, 1900.

Experiments.—Two Experiments in Smoke Preventing Furnaces. Illustrates and describes two devices for securing improved combustion in boiler furnaces. One the invention of J. B. Harris; the other of Robert L. Walker. 1900 w. Eng News—May 21, 1903.

Gas Manufacture.—See GAS—Smoke.

Gasoline Automobiles.—See AUTOMOBILE, GASOLINE—Smoke Prevention.

Harris.—See Experiments.

Hartmann Paper.—Notes on Burning Bituminous Coal. John M. Hartman. A study of this subject with an account of investigations of the problem of preventing smoke. General discussion. 8200 w. Pro Engrs' Club of Phila—April, 1904.

Illinois Coal.—Burning Illinois Coal Without Smoke. L. P. Breckenridge. From a paper read before the Commercial Club of Chicago. Discusses the lines to be followed in the construction of new plants for burning bituminous coals, and what can be done to improve existing plants. 2000 w. Eng News—June 11, 1903.

Locomotive.—See ECONOMIZER.

London Conference.—Conference of Smoke Abatement. Explains the objects and work of the Coal Smoke Abatement Society, and reviews the work of the conference held at Westminster. 7000 w. Engr, Lond—Dec. 15, 1905.

Municipal Control.—Municipal Control of Smoke. R. P. King. Condensed paper read before the League of Am. Municipalities. A review of municipal smoke prevention, with many suggestions of value. 2800 w. Eng News—Aug. 31, 1905.

Paris.—The Smoke of Paris (Les Fumées de Paris). An examination of the pollution of the air of Paris by smoke and a discussion of the measures taken for smoke prevention. 1800 w. Génie Civil—May 25, 1901.

Porcelain Furnace.—The Prevention of Smoke in Porcelain Furnaces (Rauchbelästigung durch den Betrieb von Porzellanbrennöfen). Johann Trnovsky. Discussing the especial conditions which exist in the firing of porcelain, with designs of furnaces for the prevention of smoke. 5000 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—Aug. 2, 1902.

Rowan's Paper.—The Smoke Problem. F. J. Rowan. Considers the production, estimation, and prevention of smoke and the subject of municipal control. Discussion. 2 plates. 11,000 w. Trans Inst of Engrs & Shipbuilders in Scotland—Oct. 25, 1904.

Discussion of F. J. Royan's Paper on "The Smoke Problem." 6000 w. Trans Inst of Engrs & Shipbuilders—Nov. 22, 1904.

Sabourain Furnace.—Smoke Consuming Furnaces (La Fumivorité des Foyers). V. Belugou. An illustrated description of the Sabourain smoke-consuming furnace and account of experience with it at the shops of the pneumatic tube company of Paris. 1200 w. Génie Civil—June 14, 1902.

St. Louis.—Smoke Abatement in St. Louis. William H. Bryan. A review of the history of the smoke movement in St. Louis, discussing the methods that have proved successful and what may yet be accomplished. Ill. 6800 w. Jour Assn of Engng Soc's—Dec., 1901.

Schulz-Knaudt System.—The Schulz-Knaudt Smoke Prevention Apparatus (Rauchverhütungsvorrichtung der Firma Schulz-Knaudt in Essen). Hr. Trnovsky. A short, illustrated description abstracted from the "Zeitschrift des Baierischen Dampfkessel-Revisionsvereines." There is a combustion chamber behind the grate, fed with air from above. Results of successful tests are given. 600 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 14, 1901.

Sinclair System.—Coal Consumption. R. B. Starbuck. Read before the Toledo Div. of the Cent. Assn. of R. R. Officers. An account of success attained in burning soft coal without smoke according to the Sinclair system. 1000 w. St Louis Ry Club—Oct. 10, 1902.

Steam Jet.—Steam Jets for Preventing Smoke. R. H. Palmer. Illustrates and describes a blower in use at the works of William Allen & Sons Co., Worcester, Mass., and its satisfactory working. 700 w. Am Mach—July 2, 1903.

See also Chicago Bridge Works.

Tobiansky d'Altoff.—See GAS—Smoke.

Vienna.—The Smoke Nuisance and Its Abatement (Die Rauchplage und Ihre Bekämpfung). Eduard Meter. A general discussion of the smoke problem in Vienna. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—July 21, 1905.

Walker.—See Experiments.

Wegener.—Smokeless Combustion and Economy of Fuel. William Mayner. Illustrates and describes the mechanical stoker and smoke consumer invented by Charles Wegener, a German engineer. 1800 w. Sci Am Sup—Aug. 26, 1905.

Wilskemp.—The Wilskemp Smoke Consumer. Illustrated description of a recent English invention. 1000 w. Engr, Lond—May 8, 1903.

Wilson.—The Prevention of Smoke. John S. Raworth. Abstract of a paper read at Belfast meeting of the Brit. Assn. Concerning the Wilson process, which consists in squirting a mixture of air and nitrate of soda solution on the fire. Also report of a series of tests. 1400 w. Elect'n, Lond—Sept. 26, 1902.

SMOKE STACK.

See CHIMNEY; LOCOMOTIVE STACK.

SNOW.

See also SNOW PLOW; STREET CLEANING.

Winter Obstacles to Transportation. Waldon Fawcett. Considers the various devices used in the United States for clearing tracks of snow and ice. Also the breaking of ice in the pathway of steamers. Ill. 1600 w. Sci Am—Jan. 3, 1903.

Buffalo.—Snow Fighting in Buffalo. Illustrates and describes the snow-fighting apparatus used. 1800 w. St Ry Jour—March 28, 1903.

Compressing Machine.—A Novel Snow Compressing Machine. Illustrates and describes a machine for dealing with snow in city streets. 1400 w. Eng News—July 27, 1905.

New York City.—Removal of Snow and Ice in the Borough of Manhattan. W. Boardman Reed. Read at convention of the N. Y. State St. Ry. Assn. An account of the methods used in New York city to keep the tracks and streets clear of snow. 2000 w. St Ry Jour—Sept. 13, 1902.

Removal of Snow and Ice in the Borough of Manhattan, N. Y. W. Boardman Reed. An account of past and present arrangements and methods. 2000 w. St Ry Rev—Nov. 20, 1902.

The Removal of Snow in New York City. An explanation of the form of contract by which the snow is to be removed this winter, which differs greatly from any previous contract; discusses the advantages of the system. 2000 w. Eng Rec—Dec. 13, 1902.

Removal of Snow from City Streets. Leicester Allen. Discusses the cost of snow removal in New York City, and suggests the designing of a snow-melter that would lessen the expense. 2200 w. Eng Rec—Jan. 21, 1905.

Railways.—Snow Upon Railways. From L'Illustration. Brief account of the methods employed for removing the accumulation of snow. Ill. 1700 w. Sci Am Sup—March 30, 1901.

Street Railways.—Snow Clearance. On the methods employed to keep street railways open where the fall of snow is large. 2000 w. Elec Rev, Lond—June 21, 1901.

Equipment and Organisation for Properly Handling Snow Storms. J. F. Conway. Read at meeting of New England St. Ry. Club. Suggestions and directions. 4000 w. St Ry Jour—Nov. 29, 1902.

Syracuse.—Snow Removal in Syracuse. E. G. Connette. Brief illustrated account of methods found successful in a city subject to heavy snow fall. 600 w. St Ry Jour—Jan. 28, 1905.

Third Rail.—See **THIRD RAIL—Sleet Removal.**

SNOW FLANGER.

See **SNOW PLOW.**

SNOW PLOW.

See also **SNOW.**

The Use of Snow Plows and Flangers. Illustrates and describes appliances used by different railways for keeping the line open, or clearing it when blockaded by snow. 1200 w. Eng News—Jan. 31, 1901.

Novel Swiss Combination Snow-Plow and Sweeper. Illustrated description of an efficient apparatus for the removal of snow. 500 w. St Ry Jour—Nov. 4, 1905.

Self-Turning.—Self-Turning Snow Plow on the Delaware, Lackawanna & Western R. R. Illustrates and describes a car with a self-contained turntable arrangement for turning the plow end for end at any point without having to use a stationary turntable. 5000 w. Ry & Engng Rev—Feb. 22, 1902.

SNOW SHED.

Central Pacific.—Telescopic Snow Sheds on the Central Pacific. An illustrated article describing the conditions making snow sheds necessary, and the various designs that have been used, especially the recent telescopic sheds. 1200 w. R R Gaz—Jan. 22, 1904.

SNOW SWEEPER.

See **SNOW; SNOW PLOW.**

SOAPSTONE.

Norwegian.—Norwegian Soapstone. An illustrated article describing this stone, and the quarries. It is valued as a building stone. 1800 w. Quarry—Nov., 1903.

SODA.

Electrolytic.—See **ELECTRO-CHEMISTRY.**

Helbling Process.—See **ELECTRO-CHEMISTRY—Soda.**

SODA NITRATE.
See **NITRATE.**

SODIUM.

Electro-Chemistry.—See **ELECTRO-CHEMISTRY.**

SOIL.

Colorado.—See **GEOLOGY.**

SOLAR MOTOR.

Pasadena, Cal.—A Solar Motor. Brief illustrated description of a device for utilising the sun's heat, recently erected in South Pasadena, Cal. 450 w. Ry & Engng Rev—Feb. 23, 1901.

Solar Motors. Charles F. Holder. An illustrated description of a solar motor at work near Los Angeles, Cal., with history of its development. 1500 w. Sci Am—March 16, 1901.

SOLDER.

See also **PLUMBING; SOLDERING; SPELTER.**

Brazing.—Brazing Solder. John Findlay. From "The Indian Textile Journal." Describes the methods in use for making brazing solder, and gives the best mixtures for brazing brass, copper and steel. 600 w. Prac Engr—March 15, 1901.

Tests Made on Solders for Steel Brazing. Describes the tests and gives the results. 700 w. Engng—Oct. 28, 1904.
See also **BRAZING.**

SOLDERING.

See also **PLUMBING; SOLDER.**

Burning and Blow Pipe Soldering. An illustrated article on the use of the oxy-hydrogen flame for lead burning. 2500 w. Met Work—Dec. 15, 1900.

Autogenous.—See **WELDING—Blowpipe.**

Electric Iron.—How to Make an Electric Soldering Iron. Arthur B. Weeks. Directions, with design, and remarks on its use. 1000 w. Sci Am—April 8, 1905.

Machine Shop.—Machine Shop Soldering. C. H. Wilcox. On uses made of solder, and methods. Ill. 1000 w. Am Mach—May 2, 1901.

SOLENOID.

See **ELECTROMAGNET—Solenoids.**

SOLUTION THEORY.

See **ALLOY; IRON; METAL.**

SORTING.

See **GOLD MILLING—Sorting; SAMPLING.**

SOUDAN.

See **SUDAN.**

SOUNDING.

See also **NAVIGATION; SURVEYING—Hydrographic.**

Acoustic Method.—The Acoustic Method of Sounding (Procédés Acoustiques pour le Sondage). Ch. Dantin. A review of experiments made in the United States, England and Denmark for determining the depth of water by acoustic methods, and for submarine signalling between vessels. 1800 w. Génie Civil—July 22, 1905.

Automatic.—A New Method of Automatic Sounding for Measuring Dredging. Brief illustrated description. 700 w. Eng News—June 18, 1903.

Berggraf Apparatus.—A Leadless Sounding Apparatus. Dr. Alfred Gradenwitz. Describes an apparatus invented by H. Berggraf, a Norwegian engineer, for determining the depth of water under a vessel and continuously recording it. Ills. 900 w. Sci Am—April 22, 1905.

Chronograph.—A Chronograph for Sounding (Der Sonden-Chronograph). Rudolf Reich. Paper giving an illustrated description of a chronograph for recording the instant when soundings are taken in hydrographical surveying and an account of methods for hydrographical surveying of rivers. 4000 w. Zeitschr d Oesterr Ing u Arch Vereines, April 24, 1903.

Danube.—Rapid River Soundings on the Survey of the Danube. Brief description of a method used by the Austrian government engineers. 900 w. Eng News—July 16, 1903.

Deep Sea.—Modern Methods of Deep Sea Sounding and Dredging. Harry C. Martin. Brief description, with illustration of a sounding machine. 900 w. Yale Sci M—Nov., 1900.

Steamer.—See **STEAMSHIP—"Fathomer."**

Tachymetric.—A Tachymetric Sounding Apparatus (Der Sondiertachygraph). Rudolf Reich. A description of the Reich-Ganser Stadia apparatus for the rapid conduct of hydrographic sounding and surveying. Two articles. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—June 16, 23, 1905.

See also **SURVEYING.**

SOUTH AFRICA.

See also **GOLD; MINERAL REGION; RAILWAY.**

South Africa from an Engineer's Point of View. The present article is a review of some recent investigations by a general trade commission. Serial. 1st part. 900 w. Engr, Lond—Sept. 5, 1902.

South African Business. F. J. Frank. Considers some of the mistakes which have been made and which should be avoided, and the opportunities for manufacturers. 2500 w. Mines & Min—July, 1903.

SPACE CONTROL.

See **SPACE TRANSMISSION.**

SPACE TELEGRAPHY.

See also **COHERER; ELECTRIC INVENTION; ELECTRO-PHYSICS; SPACE TELEPHONY; SPACE TRANSMISSION; TELEGRAPH—Developments.**

Wireless Telegraphy. G. W. de Tunzelmann, in "Knowledge." Illustrates and describes the apparatus of Prof. A. Popoff, and of Guglielmo Marconi. 2700 w. Sci Am—Dec. 29, 1900.

Wireless Telegraphy. S. M. Kintner. Briefly explains the three forms of wireless telegraphy under the heads of conduction, induction, and radiation, and discusses the particular points of the various theories advanced and the development of the systems in use. Ill. 10,000 w. Pro Engs' Club of W Penn—March, 1901.

Wireless Telegraphy. Arthur V. Abbott. Reviews briefly the discoveries that have made wireless telegraphy possible and its present standing. 2500 w. Elec Wld & Engr—Jan. 5, 1901.

Wireless Telegraphy. A summary of progress made by the various nations during the past year. 2500 w. Marine Rev—Oct. 17, 1901.

The Actual State of Wireless Telegraphy with Hertzian Waves (Sur l'Etat Actuel de la Télégraphie sans il par Ondes Hertziennes). Capt. Ferrié. An illustrated paper giving a good general review of the whole subject. 1100 w. Bull Soc Internationale d'Electriciens—Jan., 1902.

Wireless Telegraphy. H. W. Sullivan. Notes on the history, and present and future prospects of the new enterprise as an industry. 1400 w. Elec Rev, Lond—Feb. 14, 1902.

Space Telegraphy (Rundschau). An editorial on Marconi's recent work, on the practicability of transoceanic operation, and on the necessity to the improvement of details in short and medium distance work. 800 w. Elektrotech Zeitschr—March 13, 1902.

On Some Phenomena Affecting the Transmission of Electric Waves Over the Surface of the Sea and Earth. H. B. Jackson. Read before the Royal Soc. Describes results of phenomena observed during experiments, and gives conclusions drawn as to their cause. Serial. 1st part. 2400 w. Elec Rev, Lond—Aug. 22, 1902.

Telegraphy Without Wires (La Télégraphie sans Fil). G. Espitallier. A general study of the practical apparatus for the use of magnetic waves for telegraphing through space. Serial. Part I. 3000 w. Génie Civil—Sept. 6, 1902.

Signaling Through Space Without Wires. A. Frederick Collins. Discussing the various claims made by investigators as to priority. 2000 w. Elec Wld & Engr—Sept. 27, 1902.

A Review of Wireless Telegraph Engineering Practice. A. Frederick Collins. A discussion of the basic principles of space telegraphy followed by fully illustrated descriptions of the principal systems. 6000 w. Engineering Magazine—November, 1902.

Analysis of Wireless Telegraph Systems in 1902. A. Frederick Collins. An illustrated description and classification of the principal systems of wireless telegraphy. 3500 w. Elec Wld & Engr—Jan. 3, 1903.

Wireless Telegraphy. A. Frederick Collins. A review of what has been accomplished in this field, the stations established, and the present status of cableless messages. 2800 w. Rev of Revs—Feb., 1903.

The Present State of Wireless Telegraphy. Maurice Solomon. A review of the subject with the object of forming an estimate of how far expectations have been fulfilled and what hopes may be entertained of a future of wide utility. Ill. 2500 w. Nature—Dec. 11, 1902.

The Present Position of Wireless Telegraphy. Charles Bright. Considers what has been accomplished in this field, the efficiency, difficulties etc., and points out the great service it can render in the transmission of social, or comparatively unimportant messages, which high rates have kept from the cables. 2800 w. Nineteenth Cent—Feb., 1903.

Wireless Telegraphy. C. Arldt. Gives a summary of the first principles of electricity and magnetism, needed to understand the subject; illustrated descriptions of apparatus and instruments used; a brief account of Marconi's first wireless telegraph and its operation; of the Slaby, Braun, and other systems; noting the stations already established and what they have accomplished. 11,000 w. Trac & Trans—March, 1903.

The Development of Spark Telegraphy (Die Entwickelung der Funkentelegraphie). Lieut. Arthur Lengnick. An illustrated historical and descriptive review of the various systems of wireless telegraphy. 3 plates. Serial. 3 parts. 14,000 w. Oesterr Wochenschr f d Oeff Baudienst—April 18, 25, and May 2, 1903.

The Present Status of Wireless Telegraphy (L'Etat Actuel de la Télégraphie sans Fil). C. Tissot. A general review of the fundamental principles involved in magnetic space telegraphy and a description of the detailed devices actually in use. 7000 w. Rev Gen des Sciences—Oct. 15, 1903.

Wireless Telegraphy. R. B. Blaine. The introduction gives a review of the history of wireless telegraphy, to be followed by a study of the various systems. Serial. 1st part. 3200 w. Elec Engr, Lond—Jan. 29, 1904.

The Development of Wireless Telegraphy. Samuel J. Plimpton. An outline aiming to show how the physicist has been related to the engineer in developing space telegraphy. 2000 w. Yale Sci M—Jan., 1905.

Recent Developments in Wireless Telegraphy. Translated from "Prometheus." An illustrated review of improvements, showing the present standing of wireless telegraphy. 3500 w. Sci Am Sup—June 17, 1905.

Some Problems in the Wireless Transmission of Signals. L. H. Walter. The present article discusses the present standpoint of the transmission of energy; the improving of the transmitter efficiency, etc. Serial. 1st part. 1600 w. Elec Mag—June 27, 1905.

"Wireless" Telegraphy. Sir Wm. H. Preece. Paper before the British Assoc., giving a general review. 5000 w. Elect'n, Lond—Sept. 1, 1905.

Recent Advances in Wireless Telegraphy. J. Erskine-Murray. Abstract of a paper before the Glasgow Sec. of the Inst. of Elec. Engrs. Explains the Marconi untuned coherer system, the modern tuned systems, the more recent systems, the transmitters, limit of distance, &c. 5800 w. Elect'n, Lond—Dec. 15, 1905.

Aerial Wire.—The Part Played by the Antenna in Wireless Telegraphy. E. Guarini and F. Poncelet. In the opinion of the writers the part played by the antenna is deduced from the mode of propagation of the electro-magnetc wave. The subject is discussed and conclusions stated. 2000 w. Elec Rev, Lond—April 5, 1901.

Phenomena of the Antennae in Wireless Telegraphy (Sur les Phénoménes de l'Antenne de la Télégraphie sans Fils). MM. Broca and Turchini. A description of investigations made, with a form of electro-dynamometer especially devised for the study of the action of the currents in the antennae. 1200 w. Comptes Rendus—June 29, 1903.

The Variation of Potential Along the Transmitting Antenna in Wireless Telegraphy. C. A. Chant. A detailed account of an examination of the aerial wire used to radiate the waves in wireless telegraphy. 5000 w. Am Jour of Sci—Jan. 1904.

Wireless Telegraph Aerial Wires and Earths. A. Frederick Collins. From advance sheets of a work in press. Gives illustrated descriptions of the forms of ordinary aerials, with explanation of the theories advanced. 3600 w. Elec Wld and Engr—Oct. 15, 1904.

Earthed and Unearthed Radiators in Wireless Telegraphy. W. H. Eccles. A statement of the reasons and facts that have made the use of the earthed radator almost universal and the use of one unearthed rather exceptional. 1800 w. Elect'n, Lond—Oct. 27, 1905.

Agriculture.—Wireless Telegraphy and Agriculture. Emile Guarini. An account of applications of wireless telegraphy being made in France as a means of communication in isolated farming districts, and for announcing weather predictons. Ill. 1200 w. Elec, N Y—Nov. 4, 1903.

Alaska.—See SUBMARINE CABLE.

A. E. G., Berlin.—The Large Wireless-Telegraph Station of the Allgemeine Elektricitäts-Gesellschaft at Oberschönweide (Die Grosse Funkenstation der Allgemenen Elektricitäts-Gesellschaft in Oberschönweide). A description of a wireless-telegraph station near Berlin, where the aerial wires are attached to four tall chimneys of an electric power station. 1200 w. Ill. Zeitschr f Klein u Strassenbahnen—April 16, 1903.

Amsterdam.—The Installation of Wireless Telegraphy at the Marine Yard at Amsterdam (De

Inrichtung voor Draadlooze Telegrafie aan de Marinewerf te Amsterdam). J. C. van Iterson. A general review of the present status of space telegraphy, with special reference to the Amsterdam installation. 3000 w. De Ingenieur—Sept. 10, 1904.

Antennae.—See **Aerial Wire; Tree.**

Apparatus Constructon.—How to Construct an Efficient Wireless Telegraph Apparatus at a Small Cost. A. Frederick Collins. Description dealing only with the practical side of the subject. Ill. 2000 w. Sci Am—Sept. 14, 1901.

How to Construct an Efficient Wireless Telegraph Apparatus at a Small Cost. A. Frederick Collins. Illustrated description. 1500 w. Sci Am Sup—Feb. 15, 1902.

Arco.—See **Slaby-Arco.**

Armorl.—Some Experiments with Wireless Telegraphy. Experiments made with the Armorl system are illustrated and described. 2000 w. Sci Am—Jan. 18, 1902.

Armstrong-Orling.—The Armstrong-Orling System of Wireless Telegraphy. Drawings, with brief explanatory extract, and unfavorable comment. 1000 w. Elec Engr, Lond—Dec. 6, 1901.

The Orling-Armstrong system of Wireless Telegraphy and Telephony. A. Frederick Collins. Illustrated detailed description of this system. 1500 w. Elec Wld & Engr—Dec. 30, 1905.

See also **SUBMARINE TELEGRAPH.**

Arno Detector.—See **Magnetic Detector.**

Artom.—Artom Selective System of Wireless Telegraphy. A. Frederick Collins. An account of experiments made with this new wireless system of telegraphy with elliptical or circular rays of electric power. 1800 w. Elec Wld & Engr—April 22, 1905.

The Artom System of Directed Wireless Telegraphy (Richtfähige Telegraphie ohne Draht nach Artom). Describing the successful application of the principle of Righi for projecting electrical oscillations in a single right-line direction. 1500 w. Elektrotech Zeitschr—Aug. 3, 1905.

See also **Blondel.**

Automobile.—See **AUTOMOBILE—Wireless Telegraphy.**

Baviera.—Wireless Telegraphy in Spain. E. Guarini. An account of the experimental work of Señor Julis Cervera Baviera, with description of the instruments used, tests, &c. Ill. 2300 w. Elect'n, Lond—April 18, 1902.

Belgian Steamships.—Wireless Telegraphy on Mail Steamers. Emile Guarini. An account of how secrecy is secured on the Belgian mail packets. 1700 w. Elec Rev, N Y—Sept. 19, 1904.

Blochmann.—Telegraphing by Electric Rays (La Télégraphie par Rayons Electriques). Dr. R. Blochmann. Describing experiments made with dielectric lenses for concentrating and directing the magnetic waves for space telegraphy. 1200 w. Rev Gen des Sciences—Aug. 15, 1903.

Blochmann Radio-Telegraph System. A. Frederick Collins. Shows how this system is the outcome of experiments of Henrich Hertz in refracting electric waves, and briefly describes the invention. Ill. 1800 w. Elec Wld & Engr—Jan. 16, 1904.

See also **Theory.**

Blondel.—Wireless Telegraphy Theory. An explanation of phenomena, showing the propagation at great distances resolves itself into hemispherical waves. Discusses views of Prof. Blondel. 1300 w. Elec Wld & Engr—Jan. 2, 1904.

A New System for Securing Secrecy in Wireless Telegraph Signaling. Emile Guarini. Discusses the transmtting and receiving system devised by M. Blondel, in France, and Prof. Artom, in Italy. 2200 w. Sci Am Sup—Sept. 17, 1904. See also **Thermo-Electric Receiver.**

Branly.—See **COHERER; SPACE TRANSMISSION.**

Branly-Popp.—Popp-Branly Aerial Telegraphy Systems. Information concerning a project in Paris to establish a subscribers' system covering the city to give the important news of the day. Ill. 1400 w. Sci Am—Nov. 22, 1902.

Branly-Popp Aerial Telegraphy System. Brief illustrated description of this system and an account of the schemes in Paris to operate it. 1500 w. Elec Wld & Engr—May 16, 1903.

See also **COHERER—Branly.**

Braun.—Wireless Telegraphy. Dr. F. Braun. Substance of lectures delivered before the Strasburg scientific societies on experiments in this field. 1800 w. Elect'n, Lond—March 15, 1901.

Wireless Telegraphy (Ueber Drahtlose Telegraphie). Dr. F. Braun. A description, with diagrams, of the author's method, in which the oscillations in his sending wire are excited through an induction coil, instead of directly; and a comparison of his method with Marconi's. 1500 w. Elektrotech Zeitschr—March 21, 1901.

Variable Transmitters for Wireless Telegraphy (Ueber Einige Sendervarianten für Drahtlose Telegraphie). Dr. F. Braun. Discussing the various methods of tuning transmitter and receivers to obtain varied syntonism. 1500 w. Elektrotech Zeitschr—June 6, 1901.

Directed Wireless Telegraphy. Brief account of experiments made by Dr. Ferdinand Braun, at Strasburg. Also editorial. 1800 w. Elec Rev, N Y—Sept. 16, 1905.

See also **Telefunken; Transmitter Energy.**

Braun, Germany.—Wireless Telegraphy (Drahtlose Telegraphie). Dr. Franke. A review of the present status of wireless telegraphy in Germany, with especial reference to the Braun system. 4500 w. Glasers Annalen—Jan. 15, 1903.

Braun-Siemens-Halske.—The Braun and Siemens and Halske Wireless Telegraph System. A. Frederick Collins. Illustrates and describes Dr. Braun's invention, explaining the general points. Of interest because of a recent suit in which the Braun contentions have been sustained. 3000 w. Elec Wld & Engr—June 14, 1902.

The Braun-Siemens-Halske System Wireless Telegraphy. A detailed description of this system with illustrations of apparatus used. 2500 w. Sci Am Sup—July 5, 1902.

Apparatus of the Braun-Siemens & Halske System of Wireless Telegraphy. Illustrated detailed description. 2000 w. Elec Wld & Engr—Oct. 4, 1902.

The Braun-Siemens and Halske System of Wireless Telegraphy. Frank C. Perkins. An illustrated description of the apparatus used at the Cuxhaven station, on the North Sea. 900 w. Elec Engr, Lond—Jan. 2, 1903.

Recent Application of the Braun-Siemens & Halske System of Wireless Telegraphy. E. Guarini. An illustrated account of German shore stations and military apparatus for the German Army, and a short discussion of the distinctive features of the Braun and the Slaby systems. 1200 w. Elec Rev, Lond—March 20, 1903.

Experiments on the Reception by Wires of Electric Waves. C. A. Chant. An account of experiments made in connection with the receiving antenna as used in the Braun, Siemens & Halske system of wireless telegraphy, the radiation from transmitters, the effect on resonance of inserting a coherer in an open wire, etc. 3000 w. Am Jour of Sci—Dec., 1904.

See also **Military; Telefunken.**

Braun's Military.—See **Military.**

Braun, Strasburg Experiments.—The Strasburg Experiments upon Directed Wireless Telegraphy (Die Strassburger Versuche über Gerichtete Drahtlose Telegraphie). Dr. Ferdinand Braun. Describing the use of two sets of waves of very slight phase difference to enable the direction of the transmission to be controlled. 2000 w. Elektrotech u Polytech Rundschau—Nov. 1, 1905.

British Navy.—Wireless Telegraphic Installation in H. M. Ships. Illustrations showing the manner in which the instruments are set up, with descriptions. 1500 w. Elec Rev, Lond—Nov. 15, 1901.

Bull Selective.—A Tuning System for Wireless Telegraphy. Anders Bull. An explanation of the principle of a system invented by the writer, for preventing the interception of messages by stations for which they were not intended. 2200 w. Elect'n, Lond—Feb. 8, 1901.

A Method for Multiplex Wire and Space Telegraphy (Eine Methode für Mehrfache Draht und Funkentelegraphie). Anders Bull. A paper before the Electro-technical Society, suggesting a system of variable wave impulses, applicable to telegraphy with or without wires. 3000 w. Elektrotech Zeitschr—Jan. 31, 1901.

Experiments on Selective Wireless Telegraphy. Anders Bull. Illustrated description of a system using a series of signals consisting of a fixed number of wave impulses, succeeding each other at prearranged short intervals of time. 2500 w. Elect'n, Lond—Jan. 2, 1903.

Bull's Electric System of Wireless Telegraphy. A. Frederick Collins. Illustrates and describes the system of Mr. Anders Bull, which operates mechanically and in which a fixed number rate of wave impulses actuate different receiving instruments in accordance with prearranged time intervals. 2000 w. Sci Am—March 21, 1903.

Experiments on Selective Wireless Telegraphy. Anders Bull. An account of recent tests made of the author's system. 1200 w. Elect'n, Lond—Oct. 2, 1903.

Cables Compared.—Wireless Telegraphy v. Submarine Cables. Discusses Mr. Marconi's recent experiments and his claim of having received a signal across the Atlantic; also its possible effect on the cable system, quoting from many authorities as to the outlook. Serial. 1st part. 2000 w. Elec Rev, Lond—Jan. 17, 1902.

Wireless Telegraphy and Submarine Cables. Emile Guarini. Discusses various sides of the question relating to the practical use of wireless telegraphy across the oceans, making comparisons with the cable. 3800 w. Elec Rev, Lond—Feb. 28, 1902.

Wireless Telegraphy and Submarine Cables. E. Guarini. An illustrated article discussing Mr. Mervyn O'Gorman's idea, that the coherer might render valuable service to submarine cables. Serial. 1st part. 1200 w. Elec Rev, Lond—March 21, 1902.

Wireless Telegraphy and Submarine Cables. Emile Guarini. Briefly explains syntony and discusses multi-communication in submarine telegraphy, and in space telegraphy. Ill. Serial. 1st part. 1100 w. Elec Rev, Lond—June 27, 1902.

"Wireless" Telegraphy. Ed. C. de Segundo. Discusses the present position of cables and "wireless" telegraphy from a commercial point of view, and the probability of long-distance cables being superseded by any wireless system. 4500 w. Page's Mag—April, 1903.

See also **Telegraph Compared.**

Cape Breton.—The New Marconi Wireless Telegraph Station at Cape Breton. An illustrated description of the four great towers for carrying the vertical wires, to be used for transmission across the ocean. 1000 w. Sci Am—Aug. 9, 1902.

"Carlo Alberto."—Radio-Telegraphy (Radio-Telegrafia). Luigi Solari. The official report of the voyages of the Carlo Alberto to Cronstadt and to Spezia, with logs showing the maintenance of wireless communication with the Poldhu Station, and details of the vessel's equipment. 10000 w. 10 plates. Rivista Marittima—Oct., 1902. Supplement.

The Radio-Telegraphic Expedition of H. I. M. S. "Carlo Alberto." Lieut. Luigi Solari. Gives a map of the course taken, a description of the installation on the vessel, and an account of the experiments, with other information of interest. Ill. 5200 w. Elect'n, Lond—Oct. 24, 1902.

See also **Intereference; Marconi.**

Coherer.—See **COHERER.**

Collins.—See also **Synthetic.**

Collins Receiver.—A Simple and Efficient Wireless Telegraph Receiver. A. Frederic Collins. Illustrates and describes a receiver consisting of only three parts, a coherer, an ordinary telephone receiver, and a dry cell; while supplementary to these are the vertical wire and the earthed connection. 1200 w. Sci Am—July 5, 1902.

Condenser.—See **ELECTRIC CONDENSER—High Voltage.**

Cooper Hewitt Interrupter.—The Cooper Hewitt Mercury Vapor Current Interrupter. Illustrates and describes the application of the mercury vapor tube as an interrupter for use in space telegraphy. Also Dr. Michael I. Pupin's estimate of its importance. 2200 w. Elec Rev, N Y—Feb. 21, 1903.

See also **MERCURY VAPOR LAMP.**

Cuxhaven, Germany.—See **Braun-Siemens-Halske.**

Daylight Effect.—The Effect of Daylight Upon the Propagation of Electro-Magnetic Impulses Over Long Distances. G. Marconi. Describes results obtained in a series of tests, giving a brief description of apparatus used. 1200 w. Elect'n, Lond—July 18, 1902.

De Forest.—Long Distance Wireless Telegraphy and Hertzian Waves. Lee De Forest. Describes what takes place in the transmission. 600 w. Elec Wld & Engr—July 5, 1902.

The De Forest System of Wireless Telegraphy. An illustrated historical account of this system which is in operation between the Battery and Staten Island, N. Y. 1600 w. Sci Am—Aug. 16, 1902.

The De Forest Wireless Telegraph System. Illustrates and describes features of this system. 1000 w. Elect'n, Lond—Oct. 3, 1902.

Wireless Telegraphy by the De Forest System. A. Frederick Collins. Illustrated description of apparatus used in this American system, with particulars relating to it. 1500 w. Elec Rev N Y—Oct. 25, 1902.

De Forest Wireless Telegraph System. A. Frederick Collins. An illustrated description of this system, and particularly of the receiving apparatus which employs an electrolytic responder, whose resistance increases upon the impact of the electric waves. 1000 w. Elec Wld & Engr, —April 11, 1903.

De Forest Wireless Telegraph on the Steam Yacht Erin. Illustrated detailed description of the installation and report of its working. 2000 w. Marine Engng—Sept., 1903.

De Forest System of Wireless Telegraphy. A. S. McLean. A brief illustrated explanation of this system and its operation. 1600 w. Yale Sci M—Oct., 1903.

See also **Electrolytic Detector; Fessenden; Irish Channel; St. Louis Exposition; Transmitter; War Correspondence.**

Detector.—Some New Detectors for Wireless Telegraphy. A. Frederick Collins. Illustrates and describes various new types, stating the advantages claimed. 1800 w. Sci Am—Oct. 4, 1902.

See also **Electrolytic Detector; Magnetic Detector; Receiver;** and under names of inventors and systems.

Detector, Arno.—See **Magnetic Detector.**

Development.—The Progress in Wireless Telegraphy. William Maver, Jr. A brief review of progress made. 2000 w. Cassier's Mag—June, 1903.

The Metamorphosis of Wireless Telegraph Apparatus. A. F. Collins. A review of the changes and improvements which have been made in space telegraphy during the past seven years. 5000 w. Engineering Magazine—June, 1904.

Directed.—See **Artom; Blochmann; Braun, Strasburg Experiments; Stone; Theory.**

Dolbear.—See **Patent Suit.**

Ducretet.—See **Holland; Telephone Receiver.**

Duddell Lecture.—Wireless Telegraphy. W. Duddell. Condensed lecture delivered at Olympia, reviewing the history and referring to the work of various investigators. 3000 w. Elec Engr, Lond—Oct. 6, 1905.

See also **Measurements.**

Earth Condenser.—The Earth as a Condenser and Its Role in Wireless Telegraphy. Reviews a recent article in Dingler's "Polytechnische Journal" setting forth the views of Dr. A. Koepsel. 1800 w. Elec Wld & Engr—Aug. 29, 1903.

Edison.—Wireless Telegraphy in the United States. E. Guarini. An account of Edison's system, presented in 1891; and of the designs of Phelps, Gilliland, and Tesla for communication between trains, are given in the present article. Ill. Serial. 1st part. 1500 w. Elec Rev, Lond—April 17, 1903.

See also **Induction.**

Education.—See **EDUCATION—Wireless Telegraphy.**

Eiffel Tower.—Wireless Telegraphy Experiments at the Eiffel Tower. Emile Guarini. Brief account of experiments made and proposed. Ills. 1700 w. Sci Am Sup—Feb. 25, 1905.

Electrolytic Detector.—Electrolytic Receivers in Wireless Telegraphy. Dr. Lee De Forest. Briefly reviews the field of cohering indicators of electric waves, and calls attention to researches leading to forms of sensitive receivers, adaptable to most of the demands of wireless telegraphy. 6000 w. Int Elec Cong of St. Louis—Sept., 1904.

Electrolytic Receivers in Wireless Telegraphy. Dr. Lee De Forest. Briefly reviews the field of cohering indicators of electric waves, and considers recent investigations leading to forms of receivers based on the electrolytic principle which are attracting much attention. General discussion. 7000 w. Jour Fr Inst—Oct., 1904.

An Electrolytic Wireless Telegraph Detector. Dr. James E. Ives. An account of experimental investigations to determine the precise nature of the action of the electrolytic oscillation detector, described by Dr. Lee De Forest in a paper before the Int. Elec. Cong. of St. Louis. 3000 w. Elec Wld & Engr—Dec. 10, 1904.

The Metallic Point Electrolytic Detector (Le Détecteur Electrolytique à Pointe Métallique). G. Ferrié. Showing the manner in which a device consisting of a platinum point in imperfect contact with an electrolyte such as sulphuric acid may be used to receive Hertzian waves. 1000 w. Comptes Rendus—July 31, 1905.

"Erin" Steam Yacht.—See De Forest.

Ewing Detector.—See Magnetic Detector.

Fessenden.—Fessenden System of Wireless Telegraphy. Report of the testing of this system at Roanoke Island, N. C., by the U. S. Weather Bureau. 1500 w. Elec Wld & Engr—May 3, 1902.

Wireless Telegraphy. Reginald A. Fessenden. Compares some of the results obtained by the U. S. Weather Bureau, with those of Marconi, noting where they go along parallel lines, differences in methods and results as published, and also work not known to have been duplicated. 2600 w. Elec Wld & Engr—June 29, 1901.

Recent Progress in Wireless Telegraphy. Briefly describes the patents of Reginald A. Fessenden and of Lee de Forest, granted June 9, 1903. 1700 w. Elec Wld & Engr—June 20, 1903.

Fessenden's Work in Wireless Telegraphy. A. Frederick Collins. Reviews Prof. Fessenden's work, noting the fundamental differences from other systems, and illustrating and describing some of the devices used. 2800 w. Elec Wld & Engr—Sept. 19, 1903.

The Fessenden Wireless Telegraph System. A. Frederick Collins. Illustrates and describes the essential parts of this system. 1800 w. Sci Am —Jan. 3, 1903.

Wireless Telegraphy by the Fessenden System. A. Frederick Collins. An illustrated description with report of some of the most important results achieved. 2200 w. Elec Rev, N Y—Feb. 21, 1903.

The Fessenden System of Spark Telegraphy (Die Funkentelegraphie nach Fessenden). H. Lindow. An abstract of the Fessenden wireless telegraphy patents. 6000 w. Elektrotech Zeitschr—July 23, 1903.

See also **Telegraph Compared.**

Fessenden Patents.—The Fessenden Wireless Telegraph Patents. A. Frederick Collins. An illustrated review of the work of Prof. Reginald A. Fessenden in the field of wireless telegraphy. 1800 w. Elec Wld & Engr—Aug. 23, 1902.

See also **Fessenden.**

Fire Alarm.—Guarini's Wireless Fire Alarm Apparatus. Brief illustrated description of a device recently experimented with at Brussels. 600 w. Sci Am—Sept. 5, 1903.

Fleming.—Hertzian Wave Telegraphy. Abstract of the first of a series of lectures before the Soc. of Arts. Aims to give a summary of the present state of knowledge on the subject. An exposition of the principles of the Hertzian wave telegraphy. 4500 w. Engng—March 6, 1903.

Hertzian Wave Wireless Telegraphy. Dr. J. A. Fleming. The first of a series of articles giving an account of the present conditions of electric wave telegraphy. The discussion is limited to an account of the scientific principles underlying the operation of this particular form of wireless telegraphy. Serial. 1st part. 10,700 w. Ill. Pop Sci M—June, 1903.

Hertzian Wave Telegraphy. Dr. J. A. Fleming. Cantor lectures. The first lecture of a series on the variety of telegraphy without continuous wires in which Hertzian electric waves are employed; deals with the appliances used and the theory of their operation. Serial. 1st part. 11,500 w. Jour Soc of Arts—July 24, 1903.

Hertzian Wave Telegraphy. Dr. Fleming's second paper, dealing with transmitting arrangements and transmitters. Ill. 3200 w. Sci Am Sup—July 11, 1903.

Hertzian Wave Telegraphy. Dr. Fleming's third paper, dealing with receiving arrangements and receivers. Ill. 4200 w. Sci Am Sup—July 18, 1903.

Hertzian Wave Telegraphy. Dr. Fleming's fourth paper discussing the question of wireless telegraphy in view of the problem of privacy. Ill. 3700 w. Sci Am Sup—July 25, 1903.

The Present State of Wireless Telegraphy. Prof. J. A. Fleming. A broad general statement of the present state of the art. 12,000 w. Int Elec Cong of St. Louis—Sept., 1904.

See also **Interference; Patents.**

France.—Wireless Telegraphy in France. E. Guarini. An illustrated review of the work in this field. Serial. 1st part. 1200 w. Elec Rev, Lond —Nov. 28, 1902.

Future.—The Future of Wireless Telegraphy. P. T. McGrath. Gives a survey of the whole field of possible operations, noting the scientific, mechanical and competitive difficulties, its utilitarian features, and the outlook. 4200 w. N Am Rev—Aug., 1902.

German Regulations.—Regulations for Space Telegraphy in the German Empire (Regelung der Funkentelegraphic im Deutschen Reich). A reprint of the official regulations, in force since April 1, 1905. 1500 w. Elektrotech Zeitschr—April 27, 1905.

Germany.—See A. E. G.; Braun; Slaby; Telefunken.

Guarini.—Experiments on Hertzian Telegraphy with a Telephone Receiver. An account of some experiments by M. Guarini. Ill. 500 w. Elect'n, Lond—Nov. 9, 1900.

Wireless Telegraphy with Repeaters. E. Guarini and Lieut. Poncelet. Remarks on successive Guarini relays. 500 w. Elec Rev, Lond—Nov. 16, 1900.

Some Experiments on the Propagation of Hertzian Waves Along a Wire, and Through the Air. Emile Guarini. An account of experiments made with a simple telephone as a receiver. Serial. 1st part. Elec Rev, Lond—Jan. 11, 1901.

Present Condition of Wireless Telegraphy. Data received from Emile Guarini regarding wireless telegraphy; the system at present most popular; various systems in different lands; describing that employed by Mr. Guarini. 3300 w. U. S. Cons Repts, No. 977—March 6, 1901.

Experiments in Wireless Telegraphy with the Guarini Automatic Repeater. Gives the report laid before the Paris Congress, Sept., 1900, in regard to land communication, and then a summary of recent results of experiments by M. Guarini between populous towns. Serial. 1st part. 1500 w. Elec Rev, Lond—May 24, 1901.

Wireless Telegraph Experiments Between Brussels, Malines and Antwerp. Emile Guarini. An illustrated detailed account of these interesting experiments by the writer. 2300 w. Elec Wld & Engr—Aug. 3, 1901.

Experiments with Wireless Telegraphy Between Brussels-Mechlin-Antwerp (Versuche mit Drahtloser Telegraphie zwischen Brüssels-Mecheln-Antwerpen). E. Guarini. A brief description of the apparatus and résumé of the results; the distances ranged from 21 to 41 kilometers. 1800 w. Elektrotech Zeischr—Aug. 8, 1901.

Wireless Telegraphy Up to Date. Fernand Poncelot. An account of experiments between Brussels, Malines and Antwerp (January to March, 1901), especially dealing with the work of M. Guarini, but reviewing the work of others in this field. Ill. Serial. 1st part. 2800 w. Elec Engr, Lond—July 12, 1901.

The Guarini Repeating Wireless Telegraph System. A. Frederick Collins. Illustrated description of the system of M. Emile Guarini and his repeating device. 2000 w. Sci Am—March 8, 1902.

The Guarini Automatic Wireless Telegraph Repeater. A. Frederick Collins. Illustrates and describes the construction of this apparatus. 2500 w. Elec Wld & Engr—May 31, 1902.

See also **Aerial Wire; Telephone.**

Guarini-Caesar.—Communication with Trains by Wireless Telegraphy. Describes the Guarini-Caesar system, which employs existing lines of telegraph wires. Ill. 1000 w. Sci Am—Sept. 26, 1903.

History.—The Paternity of Wireless Telegraphy. Discusses the claims of Dr. E. Branly, of France, and shows that many have contributed to the discovery and perfection of wireless telegraphy. Ill. 2500 w. Elec Engr, Lond—Feb. 21, 1902.

Wireless Telegraphy Invention. A summary by Prof. Sylvanus P. Thompson published in the London "Saturday Review." Also editorial. 1000 w. Elec Rev, N Y—May 10, 1902.

The Genesis of Wireless Telegraphy. A. Frederick Collins. A record of the efforts and facts that are responsible for the spark-gap and coherer system of wireless telegraphy. Ill. 3800 w. Elec Wld & Engr—May 10, 1902.

Wireless Telegraphy. Brief review of the history of this discovery. Ill. 1800 w. Can Engr —June, 1902.

Wireless Telegraphy. E. Rutherford. Considers the history and development of the Marconi system. Ill. Serial. 1st part. 3000 w. Can Engr—July, 1902.

Wireless Telegraphy. Jno. Gordon Gray. Reviews the early attempts at telegraphing without wires, and the history of modern wireless telegraphy from the visit of Marconi to England in 1896, describing various methods. Discussion. 8200 w. Pro Engrs' Club of Phila—July, 1902.

See also **Development; Edison; Induction.**

Holland.—The Wireless Telegraph Station at the Hook of Holland (Het Draadloose Telegraafstation aan den Hoek van Holland). L. Bleekrode. A description of the Ducretet apparatus operating between the Hook of Holland and the lightship "Maas," 15 kilometers out. 2000 w. De Ingenieur—Nov. 1, 1902.

Induction.—Induction Wireless Telegraphy V. H. Emerson. A brief account of this system as operated on the Lehigh Valley and other railroads. 1000 w. Elec Wld & Engr—Feb. 15, 1902.

See also **Edison.**

Induction Coil.—See **INDUCTION COIL.**

Interference.—The Effect of Wireless Radiation on Aerial Conductor Systems. Joseph B. Baker. Refers to the troubles on telephone and telegraph lines when electric railways were first operated, and discusses some of the effects that may be caused by the energy radiated through space. 1800 w. Elec Rev, N Y—March 21, 1903.

Electrical Syntony and Wireless Telegraphy. Nevil Maskelyne. An account of the intereference in connection with the experimental lecture of Prof. Fleming at the Royal Institution. Also gives reprint of letters from Dr. Fleming and the author as published in the London "Times." 4000 w. Elect'n, Lond—June 19, 1903.

A Supplement to Lieut. Solari's Report on "The Radio-Telegraphic Expedition of H. I. M. S. "Carlo Alberto." Nevil Maskelyne. An account of the interference at Porthcurnow at the time of these experiments, with details of interest, and a query as to the possibility of securing privacy. 2400 w. Elect'n, Lond—Nov. 7, 1902.

See also **Selective; Syntonic; Stone.**

International Conference.—The Wireless Protocol. Text of the final protocol of the international wireless telegraph conference. 600 w. Sci Am Sup—Oct. 10, 1903.

The International Preliminary Conference to Formulate Regulations Governing Wireless Telegraphy. John I. Waterbury. Outlines the circumstances which led to this conference, and the work accomplished. 4500 w. N Am Rev—Nov., 1903.

Inventors.—See **History; Patents;** and under names of inventors.

Irish Channel.—The De Forest Wireless Tests Across the Irish Channel. An illustrated account of a series of experiments conducted under the auspices of the British post-office. 900 w. Sci Am—Jan. 16, 1904.

Italian Navy.—Some New Experiments in Syntonic Wireless Telegraphy in the Italian Navy. Describes experiments of considerable interest. 3700 w. Sci Am Sup—Nov. 28, 1903.

See also **"Carlo Alberto."**

Kamm Typewriter.—The Kamm Typewriter for Use with Wireless Telegraphy. Illustrates and describes this ingenious instrument used for transmitting or receiving messages, explaining the "modus operandi." 1800 w. Sci Am—Oct. 17, 1903.

Karpen Receiver.—Improved Receiver for Wireless Telegraphy (Nouveau Récepteur pour la Télégraphie Sans Fil). N. Vasilesco Karpen. A communication to the French Academy describing a form of suspended needle which responds to the passage of electric waves. 1000 w. Comptes Rendus—Feb. 22, 1904.

King.—A New American System of Wireless Telegraphy. A. Frederick Collins. Describes the system of James Foster King. Ills. 2500 w. Elec Wld & Engr—Jan. 21, 1905.

New American System of Wireless Telegraphy. James Foster King. A statement of the transmitting formula of the writer's system. 1000 w. Elec Wld & Engr—April 15, 1905.

See also **Spark Gap.**

Lenses.—See **Blochmann.**

Licence, British.—Wireless Telegraph Licences. Full text of the "Commercial" licence prepared by the British Postmaster-General in accordance with the terms of the Wireless Telegraph Act, 1904. Also editorial. 5700 w. Elect'n, Lond—March 17, 1905.

Light Telephony.—See **LIGHT TELEPHONY.**

Lodge-Muirhead.—The Lodge-Muirhead Wireless Telegraph System. H. C. Marillier. An illustrated description of a system based on scientific principles. One of the valuable features is the direct application of ordinary telegraphic signaling apparatus, both at the sending and receiving ends. 2000 w. Elect'n, Lond—March 27, 1903.

The Lodge-Muirhead System of Wireless Telegraphy. H. C. Fyfe. An illustrated detailed description of the installation in Kent, England. 1500 w. Sci Am—April 18, 1903.

The Lodge-Muirhead System of Wireless Telegraphy. Maurice Solomon. Illustrates some of the instruments and discusses features of this system. 2500 w. Nature—July 16, 1903.

The Lodge-Muirhead System of Wireless Telegraphy. A. Frederick Collins. An account of the development of this system, with illustrated description of its novel features. 3000 w. Elec Wld & Engr—Aug. 1, 1903.

Magnetic Detector.—Marconi Telegraphy. An editorial review of Mr. Marconi's recent lecture before the Royal Institution, in which he describes his new magnetic detector which replaces the coherer. Ill. 2200 w. Engng—June 20, 1902.

A Magnetic Detector of Electric Waves Which Can Be Employed as a Receiver for Space Telegraphy. G. Marconi. Read before the Royal Soc. Describes a detector based upon the decrease of magnetic hysteresis which takes place in iron when, under certain conditions, it is exposed to the effect of high-frequency waves. 1700 w. Elect'n, Lond—July 18, 1902.

Magnetic Detectors in Space Telegraphy. Ernst Wilson. Read at the Belfast meeting of the British Assn. Describes experimental investigations. 1100 w. Elec Engr, Lond—Sept. 19, 1902.

A Magnetic Apparatus Adapted for the Detection of Electric Waves (Sur un Appareil à Effet Magnétique propre à Servir de Détecteur d'Ondes Electriques). C. Tissot. An account of the detector of Marconi, and the experiments of Rayleigh and Rutherford. 1200 w. Comptes Rendus —Feb. 9, 1903.

A Form of Magnetic Detector for Hertzian Waves, Adapted for Quantitative Work. Prof. J. A. Fleming. Read before the Royal Soc. Describes a form of detector constructed by the writer for the purpose of quantitative experiments in connection with Hertzian waves. 1600 w. Elect'n, Lond—June 5, 1903.

A New Magnetic Wave Detector (Neuer Magnetischer Wellenempfänger). W. Peukert. Describing the application of a detector using the principle of the hysteresis of iron in a varying magnetic field to the reception of waves in space telegraphy. 1200 w. Elektrotech Zeitschr—Nov. 24, 1904.

A New Method of Detecting Electrical Oscillations. J. A. Ewing and L. H. Walter. Read before the Royal Society. An account of experimental investigations and a description of instrument. Ill. 1200 w. Elec Rev, N Y—March 26, 1904.

Notes on the Effect of Electric Oscillations on Magnetism. L. H. Walter. Notes relating to magnetic detectors, based upon experimental work. Reference is also made to work of other investigators. 1800 w. Elect'n, Lond—May 5, 1905.

A Ferraris Field Detector of Hertzian Waves. Prof. Riccardo Arno. Describes work performed in the electrical laboratory of the R. Institute Tecnico Superiore of Milan. 1700 w. Elect'n, Lond—June 3, 1904.

See also **Marconi.**

Marconi.—Wireless Telegraphy: Mr. Marconi's Short-Distance Work in Europe and America. Wilfrid Blaydes. A brief account of the extent to which this part of the work has been developed. Ill. 2400 w. Elec Wld & Engr—April 5, 1902.

The Progress of Space Telegraphy. G. Marconi. Lecture delivered before the Royal Institute. Describes the various problems which have recently been solved, especially the development of the writer's own work in the field. Shows it is now possible to work a number of wireless stations in vicinity of each other without interference; and describes his magnetic detector of electric waves. 8800 w. Elect'n, Lond—June 27, 1902.

The Practicability of Wireless Telegraphy. G. Marconi. From the "Fortnightly Review." An account of the earliest paid messages transmitted, the report of yacht races, the United States Navy trials, and other proofs of practicability. 4800 w. Sci Am Sup—June 28, 1902.

Commercial Wireless Telegraphy. Lawrence Perry. An illustrated article describing the sending and receiving of a message by the Marconi system, with an account of the commercial success, and what has been thus far accomplished. 4200 w. World's Work—March, 1903.

The Development of Marconi's System of Wireless Telegraphy. Emile Guarini. An illustrated historical review of Marconi's work in this field. Serial. 1st part. 1300 w. Sci Am Sup—April 25, 1903.

See also **History; Magnetic Detector; Patents; Patent Suit; Portable Apparatus; Syntonic.**

Marconi Atlantic.—Mr. Marconi's Latest Achievement in Ocean Wireless Telegraphy. Wilfrid Blaydes. A report of the recent trip of the "Philadelphia" with a reproduction of the signal received 2099 miles. 1200 w. Elec Wld & Engr—March 8, 1902.

Marconi, Canada.—The Marconi Wireless Telegraph System in Canada. Wilfrid Blaydes. An account of the agreement, considering the fourteen clauses seriatim. 2000 w. Elec Wld & Engr—March 29, 1902.

See also **Cape Breton.**

Marconi Co.—Marconi's Wireless Telegraph Company. Gives Mr. Marconi's address to the shareholders at a recent meeting in England. 4800 w. Elec Rev, Lond—Feb. 28, 1902.

Marconi-Lloyds.—Marine Wireless Telegraphy. Editorial on the agreement between the Marconi International Marine Communication Co. and Lloyds. 1800 w. Elect'n, Lond—Oct. 25, 1901.

Marconi School.—The Marconi School of Wireless Telegraphy. H. J. Shepstone. Illustrated account of a school opened at Frinton-on-Sea, in Essex, England, for the teaching of wireless telegraphy. 800 w. Sci Am—Feb. 1, 1902.

Marconi Transatlantic.—Marconi Signals Across the Atlantic. An account of the recent experiments made in signaling between St. Johns, Newfoundland, and Cornwall, England. Ill. 3000 w. Elec Wld & Engr—Dec. 21, 1901.

Marconi's Achievement. Remarks on his recent success in signaling from Cornwall, England, to Newfoundland. 1200 w. Mach, N Y—Feb., 1902.

Long-Distance Telegraphy and Marconi's Latest Experiments. Fernand Poucelet. An examination of Marconi's experiment in sending a signal between the Lizard and Newfoundland, with the aim of judging what will be the future of wireless telegraphy over the ocean. Ill. Serial. 1st part. 3500 w. Elec Engr, Lond—April 18, 1902.

Marine.—The Work of a Wireless Telegraph Man. Winthrop Packard. An illustrated article explaining how messages are sent and received at sea, and how wind and weather affect transmission. 2000 w. World's Work—Feb., 1904.

Present Problems in Space Telegraphy (I Problemi Attuali della Radiotelegrafia). Vincenzo Leone. A review of the progress made during the past year, with especial reference to the applications of space telegraphy to marine and naval service. 7500 w. Rivista Marittima—June, 1905.

Martinique.—Wireless Telegraph Systems at Martinique. Emile Guarini. An illustrated article concerning the wireless station recently established to give the island means of communication in case of dangerous manifestations of Mont Pelée. 1000 w. Elec, N Y—July 22, 1903.

Maskelyne.—A Recent Wireless Telegraph Patent. Describes an "Improved Mode of and Apparatus for Producing and Detecting Hertzian Oscillations," patented by J. Nevil Maskelyne. 3000 w. Elect'n, Lond—Oct. 14, 1904.

See also **Interference.**

Massie.—The Massie Wireless Telegraph System. A. Frederick Collins. Illustrated detailed description. 1800 w. Sci Am Sup—May 20, 1905.

Massie System of Wireless Telegraphy. A. Frederick Collins. An illustrated description of the apparatus used. The chief features relate to the receptor and a controlling device for switching in and out simultaneously the oscillophone, the transformer and the motor-generator. 1800 w. Elec Wld & Engr—July 29, 1905.

Mast.—The Erection of a 180-Foot Mast for Wireless Telegraphy and Telephony. Joseph B. Baker. An account of the erection of a mast built of three wood spars, near Boston. Ills. 2400 w. Elec Wld & Engr—Dec. 24, 1904.

See also **Aerial Wire.**

Maxwell's Theory.—See **Theory.**

Measurements.—Wireless Telegraphy Measurements. W. Duddell and J. E. Taylor. Read before the Inst. of Elec. Engrs. A report of tests made to measure the R. M. S. value of the current in the receiving air wire and to determine how this current depends on the arrangement of the transmitting and receiving apparatus and the distance between them. Serial. 1st part. 3000 w. Elect'n Lond—June 2, 1905.

Wireless Telegraphy Measurements. W. Duddell and J. E. Taylor. Read before the Inst. of Elec. Engrs. an account of preliminary tests made by the authors for the Postal Telegraph Department to measure the R. M. S. value of the current in the receiving air wire and to determine, as far as possible, how this current depends on the arrangement of the transmitting and receiving apparatus and the distance between them. Ills. Serial. 1st part. 2500 w. Elec Engr, Lond—Aug. 11, 1905.

Mercadier.—Mercadier's System of Attuned Telegraphy. An explanation of the tuning-fork system for manifold telegraphy. Ills. 2500 w. Sci Am Sup—Oct. 8, 1904.

Meteorology.—Wireless Telegraphy in Meteorology. Emile Guarini. An illustrated article describing observations, and apparatus used, investigating atmospheric electrical phenomena. 2500 w. Elec Wld & Engr—Aug. 2, 1902.

See also **Agriculture.**

Military.—Portable Station for Wireless Telegraphy (Fahrbare Stationen für Drahtlose Telegraphie). Arthur Wilke. An illustrated description of the portable Braun apparatus made by Siemens & Halske for use in the German army. 3500 w. Elektrotech Zeitschr—Jan. 15, 1903.

Wireless Telegraphy for Military Purposes. Arhur Wilke. Abstract of an article in the "Elektrotechnische Zeitschrift." An illustrated description of Braun's Apparatus for military signaling. 2000 w. Elec'n, Lond—Feb. 27, 1903.

Portable Wireless Telegraph Equipments in the German Army. A. Frederick Collins. Illustrated description of the special apparatus constructed by the Braun-Siemens & Halske Co., to withstand the harsh treatment and strenuous conditions of army service. 900 w. Sci Am Sup—Feb. 28, 1903.

See also **Portable; Slaby-Arco; Telefunken; War Correspondence.**

Montana.—See **ELECTRIC TRANSMISSION.**

Movable Apparatus.—See **Military; Portable; Slaby-Arco.**

Multiplex.—See **Bull; Mercadier; Slaby; TELEGRAPH.**

Multiplier Rod.—See **Slaby-Arco; Slaby Multiplier; Wave Meter.**

Murgas.—The Murgas Sysem of Wireless Telegraphy. Illustrates and describes this system which is in operation between Wilkesbarre and Scranton, Penn., discussing the difficulties that were overcome, with view of apparatus. 900 w. Sci Am—July 8, 1905.

The Murgas System of Wireless Telegraphy. Joseph Murgas. Illustrated description of this invention for transmitting intelligence. The main object is to produce different spark frequencies from a source of current without the employment of interrupters. 1500 w. Elec Rev, N Y—Dec. 2, 1905.

Naval.—See "Carlo Alberto;" Marine; U. S. Navy.

Navy School.—See U. S. Navy School.

1902.—Record of the Year in Wireless Telegraphy. A. Frederick Collins. A review of the important events in space telegraphy in 1902. 1500 w. Elec Rev, N Y—Jan. 10, 1903.

1903.—Major Wireless Telegraph Progress for the year 1903. Joseph B. Baker. Reviews the work of various experimenters during the year. 3300 w. Elec Rev, N Y—Jan. 9, 1904.

Olympia Lecture.—See Duddell.

Ondometer.—See Wave Meter.

Optical.—See Braun; Blochmann; Selective; LIGHT TELEPHONY.

Orling-Armstrong.—See Armstrong-Orling.

Pacific Coast, U. S.—Government Wireless Telegraphy on the Pacific Coast. Waldon Fawcett. An account of recent extensions, and report of successful long-distance transmission, and some idea of the commercial messages transmitted. Ills. 800 w. Elec Rev, N Y—Aug. 5, 1905.

Paris.—See Branly-Popp.

Paris Automatic.—Electrical Notes from Europe. Illustrates and describes the automatic wireless telegraph post at Paris, and the new Blondel-Carpentier hysteresimeter. 2500 w. Elec Rev, N Y—Dec. 5, 1903.

Patents.—Some Recent Wireless Telegraphy Patents. Illustrated descriptions of inventions patented by Prof. J. A. Fleming and Marconi's Wireless Telegraph Co. Serial. 1st part 2500 w. Elect'n, Lond—Nov. 14, 1902.

Some Wireless Telegraph Patents. Gives illustrated descriptions of recent patents granted in Great Britain. Serial. 1st part. 2500 w. Elect'n, Lond—Nov. 6, 1903.

See also Fessenden Patents; History.

Patent Suit.—The Marconi-Dolbear Infringement Suit. E. Frederick Collins. An account of this legal controversy, giving a comparison of the theoretical claims and construction of the apparatus. 1600 w. Elec Wld & Engr—April 13, 1901.

Popp-Branly.—See Branly-Popp.

Poncelet.—See Guarini.

Portable Apparatus.—Movable Wireless Telegraphy Apparatus. Brief description of recent experiments by Mr. Marconi. Huge cylinders are used as receivers in place of the high wire, the apparatus being carried by an automobile which makes a speed of 12 to 14 miles an hour. 400 w. Elec Rev, N Y—Nov. 2, 1901.

See also Military; Slaby-Arco; Telefunken.

Progress.—See Development; History.

Protocol.—See International Conference.

Radiator.—See Aerial Wire.

Railway.—See Trains.

Receiver.—Can the Receiver Distinguish Between the two Forms of Transmitted Waves? (Lässt sich in der Drathlosen Telegraphie der Empfänger auf die Beiden Wellen des Senders Abstimmen). Dr. George Seibt. A discussion of the behavior of various forms of receivers for space telegraphy. 2500 w. Electrotech Zeitschr—Dec. 29, 1904.

See also Detector; Fleming; and under names of inventors and systems.

Receiver Testing.—A Method of Testing Wireless Receivers. Greenleaf W. Pickard. Describes a method used by the writer. Diagram. 1000 w. Elec Wld & Engr—Nov. 25, 1905.

Repeaters.—See Guarini.

Rochefort.—The Oudin Bipolar Resonator.—Wireless Telegraphy (Le Resonateur Oudin Bipolaire.—La Télégraphie sans Fils). M. O. Rochefort. An article describing, first, an electro-therapeutic apparatus, and, second, a space telegraphy system, with various details. Ill. 1 plate. 3800 w. Mem d l Soc Civils—Feb., 1901.

The Rochefort System of Wireless Telegraphy. A. Frederick Collins. Illustrated detailed description. 2500 w. Elec Wld & Engr—July 16, 1904.

St. Louis Exposition.—Wireless Telegraphy at the St. Louis Exposition. Lloyd Marshall. An illustrated article describing the stations and their working. 1000 w. Cassier's Mag—Oct., 1904.

Schloemilch Detector.—A New Wave Detector for Wireless Telegraphy (Ein Neuer Wellendetekor für Drahtlose Telegraphie). W. Schloemilch. Describing a new form of electrolytic detector, using a polarized cell. 2000 w. Elektrotech Zeitschr—Nov. 19, 1903.

The Schloemilch Wave Detector. Illustrated description of an apparatus devised by W. Schloemilch based on the sensitiveness of polarization cells to electric waves. 1400 w. Sci Am Sup—Feb. 18, 1905.

The Schloemilch Electrolytic Detector. A. Frederick Collins. Describes this instrument for use as a transmitter, with a telephone receiver for space telegraphy. 900 w. Elec Wld & Engr—March 11, 1905.

Sea.—See Marine.

Selective.—Wireless Telegraphy. Edmund A. N. Pochin. Read before the Engng. Con. of the Inst. of Civ. Engrs. Brief consideration of syntonic and optical methods of securing isolation. General discussion. 4500 w. Elec Engr, Lond—June 26, 1903.

Recent Advances in Selective Wireless Telegraphy. Editorial reviewing recent progress in sending messages in a given direction, and inventions of importance in this field. 1100 w. Sci Am—Oct. 17, 1905.

See also Bull Selective; Directed; Syntonic.

Slaby.—Tuned and Multiple Spark Telegraphy (Abgestimmte und Mehrfache Funkentelegraphie). Prof. A. Slaby. A review of the writer's experiments, with especial reference to space telegraphy between determinate points. 6000 w. Elektrotech Zeitschr—Jan. 10, 1901.

Prof. Slaby's Tuned and Multiple Spark Telegraphy. Abstract of a lecture delivered before the German Emperor, at Berlin. 1100 w. Elect'n, Lond—Jan. 18, 1901.

Multiple Spark Telegraphy. Editorial review of Prof. Slaby's lecture upon the practicability of using wireless telegraphy without interference of messages. 2500 w. Engng—Feb. 8, 1901.

The Slaby Systems of Wave-Selective Wireless Duplex Telegraphy. Illustrates and describes this system which has proved successful, and explains the method of transmitting and receiving messages without interference with other stations. Also editorial. 2000 w. Sci Am—March 9, 1901.

Multiplex Wireless Telegraphy with Tuned Apparatus. Discusses Prof. Slaby's experiments for using wireless telegraphy without interference of messages, and the solution of the problem, also the work of others in this field. Serial. 1st part. 2300 w. Elec Rev, Lond—March 15, 1901.

Recent Progress in Spark Telegraphy (Die Neuesten Fortschritte auf dem Gebiete der Funkentelegraphie). A. Slaby. An address before the Verein deutscher Ingenieure, reviewing the work of Marconi, Slaby, Tesla, and others. 5000 w. Zeitschr d Ver Deutscher Ing—July 27, 1901.

Recent Progress in Wireless Telegraphy (Les Derniers Progrès de la Télégraphie sans Fil). An abstract translation of the lecture of Professor Slaby, recently delivered at Charlottenberg, Berlin. 3000 w. Revue Technique—Sept. 25, 1901.

The Tuning of Space Telegraphic Transmitters (Die Abstimmung Funkentelegraphischer Sender). A. Slaby. Discussing methods of increasing the energy capacity of the transmitter wires, and means of regulating the wave-lengths emitted. Two articles. 10,000 w. Elektrotech Zeitschr—Aug. 18, Sept. 8, 1904.

The Tuning of Transmitters for Space Telegraphy (Die Abstimmung Funkentelegraphischer Sender). A. Slaby. A discussion of the selective tuning of directly excited transmitters by a regulation of the spark gap resistance. 7500 w. Elektrotech Zeitschr—Dec. 22, 1904.

The Effect of Subdivision of Space Gap and Capacity upon Damping (Ueber den Einfluss der Unterteilung einer Funkenstrecke und der Kapacität auf Funkenentladungen). Dr. G. Benischke. An examination of Slaby's method of tuning in-connection with the behavior of insulators and lightning arresters. 3000 w. Elektrotech Zeitschr—Jan. 5, 1905.

See also **Slaby-Arco; Slaby Multiplier; Syntonic; Theory.**

Slaby-Arco.—A New Method of Tuning Spark-Telegraphy Stations (Ueber ein Neues Verfahren zur Abstimmung Funkentelegraphischer Stationen). Count Arco. A discussion of the use of the multiplicator in connection with the Slaby-Arco system for maintaining selective communication. 6000 w. Elektrotech Zeitschr—Jan. 1, 1903.

On a New Process for Tuning Spark Telegraph Stations. Count Arco. Abstract from "Elektrotechnische Zeitschrift." Treats of a method of standardisating the sets of apparatus supplied to ships desirous of communicating with differently-tuned shore stations. Ill. 1700 w. Elect'n, Lond—Feb. 27, 1903.

On a New Process for Tuning Spark Telegraph Stations. Count Arco. Abstract translation from the "Elektrotechnische Zeitschrift." Reference is made to high frequency systems only. Descriptive. Ill. 1600 w. Sci Am Sup—June 6, 1903.

Some Wireless Telegraph Stations of the Allgemeine Elektricitäts Gesellschaft (Einige Funkentelegraphische Installationen der Allgemeinen Elektricitäts Gesellschaft). Count Arco. An illustrated description of wireless telegraph installations on the Slaby-Arco system on board the "Deutschland," at Cuxhaven, and on a lightship and at a lighthouse near Esbjerg, Denmark. 1000 w. Elektrotech Zeitschr—Jan. 30, 1902.

New Slaby-Arco Wireless Telegraphy Installation. From "Elektrotechnische Zeitschrift." Describes some installations of this system. 900 w. Elect'n, Lond—Feb. 21, 1902.

Slaby-Arco Wireless Telegraph Apparatus. A. Frederick Collins. Illustrated description of this system and the apparatus used. 1800 w. Elec Wld & Engr—March 1, 1902.

Wireless Telegraphy by the Slaby-Arco System. A. Frederick Collins. Illustrated detailed description of the apparatus used and of the theory of syntonised and multiplex spark telegraphy. 2500 w. Elec Rev, N Y—Sept. 27, 1902.

The Slaby-Arco Portable Field Equipment for Wireless Telegraphy. A. Frederick Collins. An illustrated article discussing improvements made in this system. 2100 w. Sci Am—Dec. 28, 1901.

The Slaby-Arco System of Space Telegraphy (Apparecci Slaby-Arco per Radio-telegrafia). A general description of the system, with illustration of the apparatus at Bremerhaven and on the "See Adler," and fac simile of received message. Two articles. 2000 w. L'Elettricita—Sept. 21, 28, 1902.

Wireless Telegraphy in Germany. An illustrated detailed description of the apparatus used in the Slaby-Arco system. 3000 w. U S Cons Rept, No. 1457—Sept. 30, 1902.

See also **Slaby; Slaby Multiplier; Telefunken; Theory.**

Slaby Multiplier.—The Theory of the Multiplier for Rapid Electric Oscillations (Zur Theorie des Multiplikators für Schnelle Elektrische Schwingungen). G. Seibt. A mathematical examination of the multiplier used in space telegraphy by Professor Slaby. 5000 w. Elektrotech Zeitschr—July 18, 1901.

The Multiplicator Rod as a Wave Measurer for Space Telegraphy (Der Multiplikationsstab ein Wellenmesser für die Funkentelegraphie). A. Slaby. A discussion of the author's methods for syntonizing apparatus for selective space telegraphy, and a description of coils wound on insu-
w. Elektrotech Zeitschr—Dec. 10, 1903.
w. Elektrotech eZitschr—Dec. 10, 1903.

A Novel Wave Meter for Wireless Telegraphy. An illustrated description of the "multiplier rod" designed by Prof. Slaby, explaining the principle underlying the apparatus. 1200 w. Sci Am—Aug. 6, 1904.

Snow.—The Snow Wireless Telegraph System. Dr. Louis Duncan. An account of the fundamental principles of this system. 1800 w. Elec Wld & Engr—Oct. 24, 1903.

Spain.—See **Baviera.**

Spark Gap.—Spark Gaps. James Foster King. Gives briefly a history of conditions existing in the spark gap in a space telegraph transmitter. 1800 w. Elec Wld & Engr—Sept. 23, 1905.

See also **King; Slaby.**

Steamship.—See **Marine.**

Stone.—The Stone Wireless Telegraph System. An illustrated article describing Mr. Stone's work in selective wireless telegraphy. 2200 w. Elec Rev, N Y—Oct. 24, 1903.

Stone Wireless Telegraph System. A description covering recent developments, and dealing especially with the practical features of the apparatus. 1700 w. Elec Wld & Engr—July 8, 1905.

Interference in Wireless Telegraphy. John Stone. Read before the Canadian Soc. of Civ. Engrs. Discusses interference due to static charges and interference due to electromagnetic waves. 4800 w. Elec Rev, N Y—March 25, 1905.

Interference in Wireless Telegraphy. John Stone Stone. Abstract of a paper read before the Canadian Soc. of Civ. Engrs. An explanation of the manner of developing persistent trains of simple harmonic electro magnetic waves of one frequency to the exclusion of waves of other frequencies. 3500 w. Sci Am Sup—Oct. 7, 1905.

See also **Theory.**

Strasburg.—See **Braun; Braun-Strasburg.**

Submarine Cables Compared.—See **Cables Compared; Telegraph Compared.**

Synthetic.—Synthetic Wireless Telegraphy. A. Frederick Collins. Describes a synthetic transmitter and receiver which the writer considers would combine all the essential improvements of all workers in this field. 2800 w. Elec Wld & Engr—July 30, 1904.

Syntonic.—Syntonic Wireless Telegraphy. Guillielmo Marconi. Describes fully the successful efforts of the author to tune or syntonise the wireless system, and the recent progress of this system. Ill. 10,000 w. Jour Soc of Arts—May 17, 1901.

Syntonic Wireless Telegraphy. A. Frederick Collins. Reviews the various systems, discussing them in detail. Ill. 5300 w. Elec Wld & Engr—Nov. 9, 1901.

Electrical Resonance and Its Relation to Syntonic Wireless Telegraphy. A. Frederick Collins. Explains the fundamental principles underlying wireless telegraphy, upon which the art of syntonic methods is based, and discusses the working out of these laws as related to syntonic wireless telegraphy. Ill. Serial. 1st part. 1700 w. Sci Am—Aug. 23, 1902.

Tuned Wireless Telegraph Circuits. A. V. Thiessen. Extract from a paper in the U. S. "Monthly Weather Review," dealing with tuned circuits. 1000 w. Elec Wld & Engr—March 7, 1903.

Some Problems in Space Telegraphy. Joseph B. Baker. Discusses principally the subject of tuning, and the progress made. 2000 w. Elec Rev, N Y—May 16, 1903.

The Application of Resonance Transformers in Space Telegraphy (Ueber Resonanzinduktoren und ihre Anwendung in der Drathlosen Telegraphie). Dr. Georg Sebt. A mathematical examination of the process of tuning transmitters and receivers. 7500 w. Elektrotech Zeitschr—April 7, 1904.

The Limiting Factors of Syntonic Wireless Telegraphy. J. Hettinger. Aims to show a method which permits the discussion of the practical value of syntony when the resonance curves are experimentally determined, and to prove that the resonance method, as utilised now, may be a partial solution for avoiding interference, but never can be a general one. 2000 w. Elec Engr, Lond—Dec. 22, 1905.

See also **Italian Navy; Mercadier; Receiver; Selective;** and under names of inventors and systems.

Telefunken.—The Spark System of the Wireless Telegraph Company (Das System Telefunken der Gesellschaft für Drahtlose Telegraphie). H. Pfitzner. A description of the improved apparatus of the company controlling the united Slaby-Arco and Braun systems. 5000 w. Elektrotech Zeitschr—June 23, 1904.

Wireless Telegraphy in Germany. A. Frederick Collins. Information from a pamphlet written by Count Arco in regard to the System Telefunken, as the combined systems are called. 2800 w. Elec Wld & Engr—May 27, 1905.

Design of the Telefunken System. A. Frederick Collins. Gives additional interesting features relating to this system. 2200 w. Elec Wld & Engr—July 22, 1905.

Subsidiary Apparatus of the Telefunken System. A. Frederick Collins. Describes changes that were necessary in the devices used in this combination system of wireless telegraphy, illustrating the field outfit, and other apparatus. 2000 w. Elec Wld & Engr—Aug. 12, 1905.

See also Braun; Military; Slaby-Arco; Wave Meter.

Telegraph Compared.—The Relative Reliability of Wireless and Wire Telegraph Systems. Reginald A. Fessenden. Reports results of tests made during the past four years. 1500 w. Elec Wld & Engr—Nov. 14, 1903.

See also Cables Compared.

Telephone Receiver.—Application of a Telephone Receiver to Wireless Telegraphy (Application Directe d'un Recepteur Telephonique à la Telegraphie sans Fil). MM. Popoff and Ducretet. Showing how the distance over which space telegraphy can be operated is materially increased by the use of telephone receivers. 1000 w. Comptes Rendus—Dec. 31, 1900.

The Telephone in Wireless Telegraphy. Emile Guarini. Part first gives illustrated descriptions of various methods of wireless signaling. Serial. 1st part. 1200 w. Elec Wld & Engr—April 5, 1902.

See also Guarini; SPACE TELEPHONY.

Tesla.—See SPACE TRANSMISSION.

Tesla vs. Marconi.—Tesla's Work and Marconi's. From the "New York Sun." Quotes from a lecture by Tesla delivered in 1893, and notes the acknowledgment by Prof. A. Slaby that Tesla is the inventor of the process of wireless telegraphy. 2500 w. Elec, N Y—April 9, 1902.

Theory.—The Action of Apparatus for Wave Telegraphy (Ueber die Richtfähigkeit der Wellentelegraphischen Apparate). Dr. R. Blochmann. An examination of the propagation of electrical waves and the manner in which they may be employed to transmit messages. 2500 w. Elektrotech Zeitschr—Jan. 24, 1901.

A New Theory of Wireless Telegraphy Ideas advanced by M. Rudolf Blochmann, in the "Revue Générale des Sciences," which give light on points not previously explained. 700 w. Elec Rev, Lond—May 17, 1901.

The Scientific Foundations of Spark Telegraphy (Die Wissenschaftlichen Grundlagen der Funkentelegraphie). Prof. A. Slaby. An illustrated review of the theory and fundamental experiments of wireless telegraphy. 3000 w. Elektrotech Zeitschr—Feb. 27, 1902.

The Scientific Basis of Spark Telegraphy. Abstract of a paper by Dr. A. Slaby, in the "Elektrotechnische Zeitschrift." An account of the scientific basis of the writer's method of wireless telegraphy. Serial. 1st part. 2000 w. Elect'n, Lond—April 25, 1902.

On the Elevation of the Electrically-Conducting Strata of the Earth's Atmosphere. A. E. Kennelly. Interesting reasoning explanatory to the propagation of the waves in wireless telegraphy. 500 w. Elec Wld & Engr—March 15, 1902.

Long-Distance Wireless Telegraphy and Hertzian Waves. Edward P. Thompson. An argument tending to prove that long-distance wireless telegraphy is not operated by aerial Hertzian waves. 1800 w. Elec Wld & Engr—June 14, 1902.

Wireless Telegraphy and Maxwell's Theory. Frederick K. Vreeland. On the value of Maxwell's theory in furnishing an explanation of the greater facility of transmission over water than over land, and of other perplexing problems. 2800 w. Elec Wld & Engr—Sept. 13, 1902.

Hertzian Waves and Wireless Telegraphy. A. Frederick Collins. Gives a summary of opinions regarding the nature of the waves employed, the writer advocating the "rectilinear propagation of free waves." Also editorial notes. 4800 w. Elec Wld & Engr—Aug. 2, 1902.

The Theory of Wireless Telegraphy. Dr. John Stone Stone. Presented before the Int. Elec. Cong. at St. Louis. Gives the popular theory and the working theory of that form of wireless telegraphy in which electrical vibrations are set up in electrical oscillators whose axes are normal to the earth's surface, and which are connected to the earth's surface at their lower extremities. 5000 w. Elec Rev, N Y—Oct. 15, 1904.

See also Aerial Wire; De Forest.

Thermo-Electric Receiver.—Thermo-Electric Receivers for Wireless Telegraphy and Telephony. Illustrates and describes some new and interesting arrangements devised by Prof. André Blondel. 2000 w. Sci Am Sup—Nov. 12, 1904.

Time Distribution.—The Distribution of Time by Wireless Telegraphy (Sur la Distribution de l'Heure à Distance au Moyen de la Telegraphie Electrique sans Fil). G. Bigourdan. Describing successful experiments in the distribution of timed impulses through space by electric discharges, made at Paris. 1000 w. Comptes Rendus—June 27, 1904.

Torpedo Steering.—See TORPEDO—Space Telegraphy.

Trains.—The Application of Space Telegraphy to Moving Trains (Ueber die Anwendung der Drahtlosen Telegraphie in Fahrenden Zügen). Wilhelm Biscan. Describing successful experiments in communicating with moving trains on the Aussig-Teplitz railway. 2500 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—June 18, 1904.

See also Edison; Guarini-Caesar; Induction.

Transatlantic.—See Marconi Transatlantic.

Transmitter.—Concerning Wireless Telegraph Transmitters. Lee de Forest. Discusses some of the causes of failure, and reviews points that should be observed in the erection of apparatus. 1800 w. Elect'n, Lond—Nov. 27, 1903.

See also Spark Gap; and under names of inventors and systems.

Transmitter Energy.—Methods for Increasing the Transmitter Energy of Wireless Telegraph Systems. Prof. Ferdinand Braun. Discusses increasing the energy by increasing the capacity, and also by raising the charging voltage, and describes improved methods. 2000 w. Elect'n, Lond—April 22, 1904.

Tree Antennae.—Trees as Antennae in Wireless Telegraphy. A. Frederick Collins. Illustrations with description of experiments by George O. Squire, Major Signal Corps, U. S. A. 1600 w. Sci Am—Feb. 11, 1905.

Tuning.—See Selective; Syntonic; and under names of inventors and systems.

Unconsidered Aspects.—Some Unconsidered Aspects of Wireless Telegraphy. Charles T. Child. Discusses considerations arising from Mr. Marconi's work and their results, and their practical utilisation. 1100 w. Elec Rev, N Y—Jan. 11, 1902.

U. S. Navy.—Wireless Telegraphy—United States Navy. Lieut. A. M. Beecher. Explains how electric waves are produced, and gives a brief description of the apparatus employed in wireless telegraphy by different inventions. Also reviews what has been accomplished in this field and what is expected in regard to naval vessels. 3000 w. Trans Am Inst of Elec Engrs—Oct., 1902.

U. S. Navy Report.—The Government Wireless Report. Abstract of U. S. Navy Dep't report, recommending that the navy have control of all the wireless systems along the coasts of the United States and its outlying possessions. 700 w. Elec Wld & Engr—Aug. 20, 1904.

U. S. Navy School.—The Navy Wireless School. Walter L. Beasley. An illustrated account of the wireless school established at the Brooklyn navy yard for training young sailors for this branch of service. 1000 w. Sci Am—July 15, 1905.

U. S. Signal Corps.—See TELEGRAPH.

Vegetable Absorption.—Absorption of Electromagnetic Waves by Living Vegetable Organisms. George O. Squire. Discusses some of the difficulties met in transmitting electromagnetic waves over land, describing experiments, giving results, and much interesting information. Ills. 9500 w. Jour of Elec—June, 1905.

Walter Detector.—See Magnetic Detector.

War Correspondence.—Wireless Telegraphy and War Correspondence. Captain Lionel James. An account of the excellent results obtained with the De Forest system in reporting incidents of the war in the East. General discussion. 7500 w. Jour Soc of Arts—Jan. 20, 1905.

Wave Lengths.—On the Wave Length of Free Vibrations in Antennae and Closed Oscillating Circuits. Dr. James E. Ives. Describes experimental investigations. 1000 w. Elec Wld & Engr—Feb. 6, 1904.

See also Slaby; Slaby-Arco; Slaby Multiplier; ELECTRIC WAVE; ELECTRO-PHYSICS.

Wave Meter.—A Wave Meter. Johannes Dönitz.

From "Elektrotechnische Zeitschrift." Discusses methods of measuring wave lengths in space telegraphy, describing instrument. Ill. 1500 w. Elect'n, Lond—Jan. 1, 1904.

The Telefunken Ondometer for the Measurement of Wireless Telegraphy. Illustrates and describes an apparatus for measuring wave lengths. 900 w. Sci Am Sup—June 25, 1904.

See also Slaby; Slaby Arco; Slaby Multiplier; ELECTRIC WAVE.

Wilkesbarre-Scranton, Penn.—See Murgas.

SPACE TELEPHONY.

See also LIGHT TELEPHONY; SPACE TELEGRAPHY.

Armstrong-Orling.—See SPACE TELEGRAPHY.

Collins.—Wireless Telephony. A. Frederick Collins. Explains five distinct methods for transmitting speech without wires at varying distances. 1200 w. Elec Wld & Engr—April 5, 1902.

The Collins Wireless Telephone. A. Frederick Collins. Briefly describes five methods by which speech may be transmitted electrically without wires, giving illustrated description of the method invented by the writer. 1500 w. Sci Am—July 19, 1902.

The Present and Future Status of Wireless Telephony. A. Frederick Collins. Reviews what has been accomplished in this field, discussing the uses to which it could be applied, and related matters. 1400 w. Elec Wld & Engr—June 28, 1902.

Wireless Telephony by the Collins System. A. Frederick Collins. Reviews work in this field and gives an illustrated description of the writer's system, and an account of what he has accomplished. 2500 w. Elec Rev, N Y—Nov. 29, 1902.

Wireless Telephonic Communication Between Moving Ferry Boats. Dr. T. Bayard Collins. An illustrated account of the experiments made by A. Frederick Collins in New York Harbor. 1100 w. Sci Am—May 23, 1903.

Ducretet.—Wireless Telephony Through the Earth (Téléphonie sans Fil, par la Terre). E. Ducretet. Notes on experiments with the transmitter connected to earth plates and the receiver to a small sphere on the floor of the catacombs. Speech was well reproduced. 400 w. Comptes Rendus—Jan. 13, 1902.

Light.—See LIGHT TELEPHONY.

Orling-Armstrong.—See SPACE TELEGRAPHY—Armstrong-Orling.

Ruhmer.—See LIGHT TELEPHONY.

SPACE TRANSMISSION.

See also SPACE TELEGRAPHY.

Branly.—The Control of Action at a Distance by Means of Electric Waves (Distribution et Controle d'Actions Produites à Distance par les Ondes Electriques). Edouard Branly. Discussing the practicability of employing the methods of space telegraphy for starting motors, igniting explosives, and similar actions at a distance. 1200 w. Comptes Rendus—March 20, 1905.

Kubitzki.—The Production of Mechanical Effects by the Electric Current at a Distance (Production à Distance des Effects Mécaniques du Courant Electrique sans Fil de Ligne). C. D. Kubitzki. An illustrated description of the apparatus of Branly for controlling distant electrical devices by electro-magnetic waves. 2000 w. Revue Technique—Oct. 25, 1905.

Montana.—See ELECTRIC TRANSMISSION.

Tesla.—The Transmission of Electric Energy Without Wires. Nikola Tesla. An account of the writer's work and expectations. Ills. 2500 w. Elec Wld & Engr—March 5, 1904.

The Transmission of Electrical Energy Without Wires as a Means for Furthering Peace. Nikola Tesla. A lengthy article explaining the writer's views and his belief in the possibility of the economic transmission of power without wires. 4800 w. Elec Wld & Engr—Jan. 7, 1905.

See also SPACE TELEGRAPHY.

Torpedo Steering.—See TORPEDO—Space Telegraphy.

SPACING.

See DIVIDING; INDEXING; MILLING.

SPARK ARRESTER.

Locomotive.—See LOCOMOTIVE SMOKEBOX.

SPARKING.

See COMMUTATION—Sparking; ELECTRIC DISCHARGE.

SPECIFICATIONS.

See also BRIDGE SPECIFICATIONS; CONTRACT ENGINEER; STEEL SPECIFICATIONS; and under other specific headings.

Engineers, Contractors and Specifications. Editorial discussing the troubles arising from prevailing practice. 2500 w. Eng News—Sept. 18, 1902.

A Schedule of General Clauses to Be Used as a Guide in Drawing Specifications. 3000 w. Eng News—April 21, 1904.

The Influence of Specifications on Commercial Products. Review of the presidential address of Dr. Charles B. Dudley, to the American Society of Testing Materials. 2500 w. Eng Rec—July 9, 1904.

Recent Work in Unifying Specifications for Engineering Materials. J. Parker Snow. An account of the work being done on these lines in this and other countries. 800 w. Jour Assn Engng Soc's—Jan., 1905.

Air Compressor.—See AIR COMPRESSOR—Specifications.

Bridge.—See BRIDGE SPECIFICATIONS.

Cast-Iron.—See CASTING; FOUNDRY; PIG IRON; TESTING.

Contractor's Hardship.—Engineers' Specifications. Observations on specifications in general and the legal effect of clauses of particular hardship to contractors. 3200 w. Engr, Lond—Dec. 30, 1904.

Dry Dock.—An Instructive Study of Specifications. Extracts from a specification recently issued by the Bureau of Yards and Docks of the U. S. Navy, for the building of a masonry dry dock at Charleston, S. C., to cost about one million dollars, with comment. 3700 w. R R Gaz—Sept. 12, 1902.

Engineers' Fault.—See CONTRACT.

Foundry.—See FOUNDRY—Specifications.

Hoisting Engines.—See HOISTING ENGINE—Specifications.

Influence.—The Influence of Specifications on Commercial Products. C. B. Dudley. Address before the Am. Soc. of Test. Materials. Considers the influence of the consumer, and the various phases of the stimulating effect of specifications. 3800 w. Ir Age—June 23, 1904.

Lancashire Boiler.—See BOILER—Lancashire.

Pennsylvania Railroad.—The Making of Specifications. Dr. C. B. Dudley. President's address before the Am. Soc. for Test. Materials. On the making of specifications for materials, describing the methods practiced at Altoona in connection with the laboratory of the Pennsylvania R. R., and giving the writer's views. 5700 w. Ir Age—July 9, 1903.

Pig Iron.—See CASTING; FOUNDRY; PIG IRON; TESTING.

SPECIFIC HEAT.

See also HEAT; PHYSICS; THERMODYNAMICS; and under specific materials.

Superheated Steam.—See SUPERHEATED STEAM—Specific Heat.

SPECTRA.

See also ELECTRIC DISCHARGE; PHOTOMETRY.

Arc.—See ARC LIGHT—Spectrum.

Bessemer Flames.—See BESSEMER PROCESS—Spectra of Flames.

Electrodes.—See ELECTRODE—Spectra.

SPEED CHANGING.

See AUTOMOBILE GEAR; BICYCLE—Gear; MACHINE TOOL; PULLEY—Cone; SPEED VARIATION; VARIABLE SPEED.

SPEED CONE.

See PULLEY—Cone.

SPEED INDICATOR.

See also LOG; SPEED RECORDER; SPEED VARIATION.

Accelerometer.—See ACCELEROMETER.

Automobile.—The Controller Speed Indicator (Le

Controleur Indicateur de Vitesse). J. A. Montpellier. Describing a device for indicating continually the speed of an automobile. 1500 w. L'Electricien—Oct. 31, 1903.

Speed Indicators for Automobiles. Illustrates and describes new types. Serial. 1st part. 2500 w. Auto Jour—Oct. 15, 1904.

See also **Krauss**; **CHRONOGRAPH**; **SPEED RECORDER.**

Centrifugal.—A Centrifugal Speed Indicator (Note sur un Compteur de Vitesse à Force Centrifuge). J. Carlier. A device employing the action of a centrifugal ball-governor to indicate the speed of a machine at any instant. Two articles. 2500 w. Revue Industrielle—Dec. 3, 17, 1904.

Dettmar.—A New Speed Indicator (Ein Neuer Geschwindigkeitsmesser). G. Dettmar. Describing a device for indicating directly the speed of a railway train, or the like. A small dynamo is arranged so that the voltage varies directly as the speed, and is connected to a voltmeter graduated to read the speed directly. 2000 w. Glasers Annalen—March 1, 1903.

The Dettmar Electric Speed Indicator. An illustrated description of an electric tachometer for measuring the speed of vehicles that have a rectilinear motion, such as cars, automobiles, etc. 1400 w. Sci Am Sup—Sept. 12, 1903.

Electric.—Technical Notes (Technische Mitteilungen). Dr. G. Benischke. An illustrated paper before the Elektrotechnischer Verein, giving descriptions of electric speed measuring apparatus, and of experiments on the division of the alternating current in an electric arc into two direct currents. 1400 w. Electrotech Zeitschr—May 21, 1903.

Electrical Speed Indicators—Some Unsuccessful Attempts. A. S. Cubitt. Gives an illustrated description of experimental investigations made by the writer, stating the reasons for their proving more or less unsuccessful. 3500 w. Elec Engr, Lond—Jan. 1, 1904.

See also **Dettmar**; **SPEED RECORDER**; **LOG.**

Fan Testing.—See **DYNAMOMETER.**

Frahm.—The Frahm Speed-Measuring Device (Frahm's Geschwindigkeitsmesser). Friedrich Lux. The vibrations set up in the mass of the observed body are determined by a selective series of vibrating springs. 1800 w. Zeitschr d Ver Deutscher Ing—Oct. 15, 1904.

Speed Indicators. Prof. Clarence P. Feldmann. General remarks on these devices and their defects, with illustrated description of the present form of the indicator invented by Hermann Frahm. 2500 w. Elec Wld & Engr—Nov. 19, 1904.

Hoisting Engines.—See **Karlick.**

Karlick.—The Karlick Tachygraph for Winding Engines. H. Hubert, in "Revue Universelle des Mines." Illustrated description of a speed-indicator for colliery engines, which is extensively used in Austria. 500 w. Col Guard—June 5, 1903.

Krauss.—The Krauss Speedometer. Illustrated description of a tachometer especially designed for automobiles. 1500 w. Sci Am Sup—Feb. 18, 1905.

Manufacture.—See **MACHINE TOOL—Speed Indicator.**

Railway.—See **Dettmar**; **ACCELEROMETER.**

Variable Motion.—See **SPEED VARIATION.**

SPEED RECORDER.

See also **SPEED INDICATOR**; **SPEED VARIATION.**

Automobile.—Recorders for the Protection of Automobolists (Selbstschutz Gegen Unrichtige Polizeiliche Denunziationen Durch Geschwindigkeits-Registratoren). An illustrated description of a speed recorder which marks the maximum speed attained and of the "velograph" which traces a continuous record of the motion of a vehicle. See also **CHRONOGRAPH**; **SPEED INDICATOR.** 2500 w. Zeitschr d Mitteleuropäischen Motorwagen-Ver—No. 6, 1903.

Electric.—Electrical Speed Recording Instrument. Frank B. Rae. An illustrated description of an instrument designed by the writer for recording the performance of cars on electric, steam, or other roads, and which draws a reasonably true acceleration, running, drifting and braking curve. Also valuable for other uses 900 w. Elec Wld & Engr—April 27, 1901.

New Electrical Speed Recorder. H. C. Dinger. An illustrated description of the Monitor Speed Recorder, which aims to indicate accurately the rate of speed of a vessel. 4500 w. Jour Am Soc of Nav Engrs—Nov., 1905.

See also **LOG**; **SPEED INDICATOR.**

Governor.—See **GOVERNOR—Speed Recorder.**

Marine Engines.—See **LOG**; **SPEED INDICATOR**; **SPEED VARIATION.**

SPEED REGULATION.

See **ELECTRIC GENERATING SET**; **ELECTRIC GENERATOR**; **ELECTRIC GENERATOR, ALTERNATING**; **GOVERNOR**; **SPEED VARIATION**; **STEAM ENGINE**; **TURBINE**; **WATER WHEEL.**

SPEED TRIAL.

Automobiles.—See **AUTOMOBILE COMPETITION**; **AUTOMOBILE RACE.**

Electric Railways.—See **ELECTRIC RAILWAY—High Speed**; **Speed-Time Cures**; **Zossen.**

Locomotives.—See **LOCOMOTIVE PERFORMANCE**; **LOCOMOTIVE TEST.**

Ships.—See **SHIP PROPULSION**; **SHIP TRIAL**; and under specific types and names of vessels.

Trains.—See **TRAIN, FAST.**

SPEED VARIATION.

See also **ELECTRIC GENERATOR—Parallel**; **ELECTRIC GENERATOR, ALTERNATING—Parallel**; **FLYWHEEL**; **STEAM ENGINE—Parallel**; **Speed Regulation**; **VARIABLE SPEED.**

Angular Variation in Steam Engines. P. O. Keilholtz. Report of investigations. Mathematical. 5800 w. Trans Am Inst of Elec Engrs—Oct., 1901.

The Determination of the Irregularities of Prime Movers (Ueber die Bestimmung des Ungleichförmigkeitsgrades von Kraftmaschinen). Dr. R. Franke. Discussing especially the variations of speed during a single revolution and describing an apparatus for the investigation of speed variations. 5000 w. Elektrotech Zeitschr—Oct. 24, 1901.

On the Determination of the Irregularity Factor of Engines. Dr. Rudolf Franke. A paper read before the Verband Deutscher Elektrotechniker at Dresden. Translated from the "Elektrotechnische Zeitschrift." Considers the disturbances to which the irregularity gives rise, the methods for determining the degree of irregularity and the meaning of this term to the electrical engineer. Serial. 1st part. 2200 w. Elec Rev, Lond—May 30, 1902.

The Experimental Determination of the Regulation of Steam Engine Speeds (Une Methode de Mesure Expérimentale de la Régularité des Machines à Vapeurs). M. L. E. F. David. The angular variations of a single revolution are measured by the vibrations of a tuning fork. 1200 w. 23 plates. Bull Soc Internationale Electriciens, and Atlas Nos. 9 & 9 bis—Nov., 1901.

A New Apparatus for Measuring the Variation of Speed of a Flywheel During One Revolution. E. W. Mix. Describes an ingenious electro-mechanical apparatus for measuring the pulsation and also the angular variation of the moving parts involved. Ill. 800 w. Elec Wld & Engr—Feb. 8, 1902.

The Measurement of Variations in Angular Velocity (Ueber ein Neues Verfahren zur Messung des Ungleichförmigkeitsgrades und der Winkelabweichung). F. Klönne. The variations of the revolving shaft are plotted upon a uniformly revolving drum in the form of waves. 4500 w. Elektrotech Zeitsch—Aug. 14, 1902.

A Method for Rendering Speed Variations Visible (Ein Verfahren zur Sichtbarmachung der Ungleichförmigkeit bei Kraftmaschinen). Dr. P. Berkitz. The rotations of the engine shaft are compared with a uniformly rotating disc. 1000 w. Zeitschr f Elektrotechnik—April 17, 1904.

Steam Engines for the Parallel Driving of Alternators (Die Dampfmaschinen für den Antrieb Parallel Arbeitender Wechselstromgeneratoren). H. Holtze. An examination of the periodical speed variations of various combinations of reciprocating engines in connection with their influence upon the action of parallel-connected alternators. 6000 w. Elektrotech Zeitschr—Dec. 15, 1904.

Anglemeter.—An Indicating Anglemeter. C. E. Sargent. Illustrated description of a device designed to determine at sight the maximum variation in engine flywheels. Its chief use is in running alternators in parallel. 1000 w. Trans Am Soc of Mech Engrs—June, 1903.

See also **Stroboscope.**

Angular Displacement.—Determination of the Angular Displacement of Prime Movers. Lionel Fleischmann. Mathematical demonstration showing that the angular displacement is not only dependent upon the maximum change in speed, but also determined by the general character of the velocity curve. 800 w. Elec Wld & Engr—June 1, 1901.

Crank Engines.—The Angular Speed Variations of Crank Engines (Ungleichförmigkeitsgrad und Winkelabweichung bei Kurbel Kraftmaschinen). F. Klönne. A mathematical investigation of the angular variations of steam and gas engines, when used for driving electric generators. 5000 w. Elektrotech Zeitschr—April 3, 1902.

Gas and Oil Engines.—See **Stroboscope; GAS ENGINE—Speed Variations.**

Kinemometer.—A Differential Recording Kinemometer (Sur un Cinemometre Differentiel Enregistreur). J. Richard. Illustrating and describing a recording apparatus capable of showing speed variations to the thousandth part of a second. 1200 w. Comptes Rendus—Jan. 18, 1904.

Machine Tools.—See **PULLEY—Cone; VARIABLE SPEED.**

Marine Shafting.—Recording Angular Velocities of Marine Shafting. John H. Heck. Read before the Inst. of Naval Archts. Notes on the variation of angular in the shafting of marine engines, giving results of many experiments. Ills. 2800 w. Engng—May 26, 1905.

See also **MARINE ENGINE—Balancing; SHAFT—Torsion.**

Ondograph.—See **Stroboscope; ONDOGRAPH.**

Paralleling Alternators.—Theoretical Estimation of the Internal Speed Variation of a 3500 Horse-Power Vertical Cross-Compound Engine. W. L. Abbott. Investigation to determine the amount of variation which would occur in the relative positions of the armatures of alternating current dynamos, and to see if it would be great enough to put the dynamos out of step, or if the amount of cross current would be objectionable. 2700 w. Technograph, No. 15—1900-1901.

Speed Variations of Engines Direct-Connected to Alternators. A. H. Kruesi. A discussion of difficulties and means of overcoming them. The present article considers principally the calculation of crank effort, velocity and displacement. Serial. 1st part. 2000 w. Elec Wld & Engr—April 13, 1901.

Angular Velocity in Steam Engine in Relation to Paralleling of Alternators. Walter I. Slichter. Discusses variation due to irregularities in the applied force and transmission of that force. 3000 w. Trans Am Inst of Elec Engrs—Oct., 1901.

Speed Regulation of Prime Movers and Parallel Operation of Alternators. C. P. Steinmets. Read before the Am. Inst. of Elec. Engrs. A discussion of the effect of permanent variations of rotative speed due to a change of load, temporary variations and periodic changes. 1200 w. Eng Rec—Nov. 2, 1901.

Speed Regulators for Steam Engines (Etude des Regulateurs de Vitesse des Moteurs à Vapeur). The program of a section of the Société Internationale des Electriciens, a paper by C. F. Guilbert, on driving alternators in parallel, and notes by various other members. Diagrams. 13,000 w. Bull Soc Internationale d Electriciens—April, 1902.

A New Method of Determining the Angular Variation of a Rotating System (Neue Methode zur Bestimmung der Winkelabweichung eines Rotierenden Systems). Joseph Sartori. A discussion of the angular variation of alternators operated in parallel, discussing the stroboscopic and other methods of measurement. 1800 w. Zeitschr f Elektrotechnik—Aug. 23, 1903.

See also **ELECTRIC GENERATING SET; ELECTRIC GENERATOR; ALTERNATING.**

Sartori.—See **Anglemeter; Stroboscope.**

Stroboscope.—Stroboscopic Study of the Variations in the Angular Velocity of the Fly-Wheel of an Otto Gas Engine (Etude des Variations de la Vitesse Angulaire du Volant d'une Machine à Gas Otto à l'Aide de la Méthode Stroboscopique). A. Cornu. A paper giving an account of experiments, with photographic records. 1500 w. Bull Soc Internatinale d'Electriciens—Jan., 1902.

The Sartori Stroboscopique Method of Measuring the Variations in the Angular Velocity of a Machine (Sur les Procédés de Mesure de l'Ecart Angulaire d'une Machine Procédé Stroboscopique de M. Sartori). M. Blondin. A paper giving an illustrated description of an optical method, using Bode-Moler disks, one revolved by the machine, the other by a constant speed electric motor. 2000 w. Bull Soc Internationale d'Electriciens—Jan., 1902.

See also **Anglemeter; ONDOGRAPH.**

SPEEDWAY.

Charles River.—See **ROAD.**

SPELTER.

See also **FOUNDRY; SOLDER; ZINC; ZINC METALLURGY.**

Brazing.—Making Brazing Spelters. Walter J. May. Suggestions for making spelter by one operation with one heating. 400 w. Prac Engr—June 19, 1903.

See also **BRAZING.**

Castings.—Spelter Castings and Some Difficulties Encountered in Their Manufacture. Winslow Goodwin, in "The Metal Industry. Discusses the question of why spelter is not more generally used. 2000 w. Foundry Aug., 1903.

SPILLWAY.

See also **DAM; IRRIGATION; RESERVOIR; WEIR.**

Spillways and Drainage Areas. E. Sherman Gould. A discussion of Mr. Frizell's formula and of the subject of drainage areas in their relation to length and capacity of spillways in dams. 2200 w. Eng News—Nov. 14, 1901.

Pribram.—See **RESERVOIR.**

SPINDLE.

See also **DRILL; DRILLING MACHINE; MACHINE TOOL; TEXTILE MACHINERY.**

Lathe.—See **LATHE—Spindle.**

Machine Tool.—Spindle Construction. Howard P. Fairfield. A detailed discussion of modern methods of making spindles for drill presses and other machine tools. Ills. Serial. 1st part. 2200 w. Mach, N Y—June, 1904.

SPIRE.

See also **ARCHITECTURE; CATHEDRAL; CHURCH; DOME.**

Design.—See **DOME.**

SPIRAL GEAR.

See **GEAR—Helical; Spiral.**

SPLICING.

Leather Belts.—See **BELTING—Splicing.**

Transmission Rope.—See **ROPE TRANSMISSION.**

SPONTANEOUS COMBUSTION.

Coal.—See **COAL—Spontaneous Combustion.**

SPRING.

See also **GEAR—Teeth; GROUND WATER; MACHINE SHOP—Gears; MECHANICAL ENGINEERING—Topical Discussion.**

Springs and Their Use. Ivar Kirkegaard. Remarks on the extensive use of springs, and discusses the use and manufacture of furniture springs, spiral springs, hot wound springs, jig springs, and flat wire springs. Ill. 5500 w. Ir Age—June 4, 1903.

Altoona Plant.—The Pennsylvania Railroad's Spring Plant at Altoona. Illustrates several of the machines used, and gives description of their operation. 3500 w. R R Gas—Jan. 25, 1901.

Automobile.—Springs for Autombiles. M. C. Krarup. Discusses this subject, considering the rules for the design of springs for railway coaches, and horse-drawn carriages, and the factors to be considered in springs for automobiles. Ill. Serial. 1st part. 2200 w. Horseless Age—Jan. 30, 1901.

See also **AUTOMOBILE—Wheel Springs; AXLE; TIRE.**

Car.—Revision of Recommended Practice for Springs, including Design for Springs for 100,000-Pound Cars. Committee report to the M. C. B. Assn. Ill. 1000 w. Am Engr & R R Jour—July, 1901.

See also **Locomotive.**

Car Buffers.—The Computation of Evolute Springs (Die Berechnung der Evolutfeder). Victor Meyer. Developing formulae and tables for use in proportioning evolute spiral springs such as are used for buffers for railway carriages. 2000 w. Zeitschr d Ver Deutscher Ing—Dec. 29, 1900.

See also **DRAFT GEAR.**

Colorado.—See **GROUND WATER.**

Design.—See **Semi-Elliptic.**

Elliptic.—Construction of Elliptical Springs. Charles A. Lindstrom. Calls attention to the methods that should be followed in the calculations of elliptical and semi-elliptical springs so as to guard against an excessive deflection. Also discussion. Ill. 7600 w. Pro W Ry Club—April 18, 1902.

An Important Test of Elliptic Springs. S. A. Bullock. Describes tests made for the Interborough Rapid Transit railway to determine permanent set and proper working fiber stress. 800 w. Am Engr & R R Jour—June, 1904.

See also **Semi-Elliptic.**

Governor.—See **GOVERNOR—Springs.**

Hardening and Tempering.—Hardening and Tempering Coil Springs. E. R. Markham. Suggestions helpful in securing success. 1300 w. Mach, N Y—May, 1902.

Helical.—A Diagram for Helical Springs. George F. Summers. Gives a chart for finding the size of helical springs, having given the properties, with explanation of its use. 700 w. Am Mach—Dec. 18, 1902.

On the Transverse Vibrations of Helical Springs. Howard L. Bronson. A study of this subject, describing apparatus and methods of investigation, giving results. 3000 w. Am Jour of Sci—July, 1904.

See aso **Spiral.**

Hot.—See **GROUND WATER.**

Indicator.—See **INDICATOR—Spring.**

Laminations.—The Strength of Laminated Springs. H. E. Wimperis. An investigation made to determine results of a degree of accuracy sufficient to yield true deflections for all practical cases of springs. 2800 w. Engr, Lond—Sept. 15, 1905.

Locomotive.—Underhung Springs. J. P. Kelley. On the method of hanging the driving springs and the equilisers of locomotives, and related subjects. Ill. 1300 w. Loc Engng—March, 1902.

Springs. William Metcalf. Read before the Am. Soc. for Test. Materials. Gives a short history of conditions and changes of the past 30 years in car and locomotive springs; the first specifications; those now used; the treatment, classes of springs, testing, etc. 5000 w. Ir Age—July 9, 1903.

Manufacture.—Springs and Spring Making. C. A. Miller. Presented before the Nat. Ry. Mas. Blacksmiths' Assn. Considers points of importance in regard to the material and manufacture. 1600 w. Ry Mas Mech—Nov., 1902.

Motor.—The Motor Spring and Its Calculation. Emil Riedel. Translated from "Allgemeine Uhrmacher Zeitung." An explanation of the essential and ruling features of so-called mainsprings. 1700 w. Sci Am Sup—April 22, 1905.

See also **SPRING MOTOR.**

Plate.—Plate Springs. Results of extensive investigations are given, with a table allowing of their practical application. 1400 w. Engr, Lond—Feb. 14, 1902.

Safety Valve.—Safety Valve Springs. H. K. Spencer. Gives formulas for both round and square steel and considers how such springs are proportioned. 600 w. Marine Engng—Feb., 1903.

See also **SAFETY VALVE.**

Scherrer Impounding.—See **GROUND WATER.**

Semi-Elliptic.—Diagrams for Semi-Elliptic Plate Springs. Lawford H. Fry. Gives charts embodying the formulas used in the design of semi-elliptic plate springs such as are used on railroad rolling stock, with method of operation. 1700 w. Am Mach—Nov. 20, 1902.

See also **Elliptic.**

Somme Valley, France.—See **GROUND WATER.**

Spiral.—Experiments on Spiral Springs. Charles H. Benjamin and Roy A. French. Describes a series of experiments on open springs in compression, made after the permanent set had been removed by forcing them closed solid in a testing machine. Load and deflection were measured, and conclusions stated. 1100 w. Trans Am Soc of Mech Engrs, No. 918—Dec., 1901.

Springs. A. A. Cary. Abstract of Mr. Cary's remarks in discussion of Prof. Benjamin's paper before the recent meeting of the A. S. M. E. and of his contribution to the topical discussion on "A Spring Testing Machine." 2500 w. Am Mach—Feb. 20, 1902.

See also **Helical.**

Toggle Joint.—The Modification of Spring Action by Toggle Joint. E. H. Fish. Illustrated description of a combined spring and toggle joint mechanism. 1000 w. Am Mach—Vol. 28, No. 43.

SPRING BALANCE.

Surveying Tape.—See **SURVEYING INSTRUMENT—Spring Balance.**

SPRING MOTOR.

Pfeiffer.—The Pfeiffer Spring Motor. Illustrated description of spring and gear mechanism for equalizing the input and output of energy, designed primarily for use with automatic piano players. 1600 w. Ir Age—April 7, 1904.

SPROCKET-CHAIN MACHINE.

See **BICYCLE MANUFACTURE; CHAIN—Locke; MACHINE—Steel Belt; MACHINE TOOL**—Bicycle Manufacture.

SQUARE.

See also **STRAIGHTEDGE.**

The Making of a Real Square. Theodore H. Miller. Illustrates and describes a square made for very accurate work, and the manner of testing. 3000 w. Am Mach—Jan. 3, 1901.

SQUIRTING PROCESS.

Dick.—See **BRASS—Hot Working.**

STABLE.

Automobile.—See **AUTOMOBILE GARAGE; GARAGE.**

Cars.—See **ELECTRIC CAR HOUSE.**

Concrete Reinforced.—See **CONCRETE REINFORCED.**

STACK.

See **CHIMNEY; LOCOMOTIVE STACK.**

STADIA.

See **SOUNDING — Tachymetric; SURVEYING — Stadia.**

STADIUM.

Harvard.—The Concrete-Steel Stadium on the Athletic Field of Harvard University. Illustrations and description of a structure being erected for open-air games. 2200 w. Eng Rec—Dec. 12, 1903.

The Design of the Steel-Concrete Work of the Harvard Stadium. Lewis J. Johnson. An illustrated article discusing this work in detail. General discussion. 5 plates. 11,500 w. Jour Assn of Engng Socs—June, 1904.

STAFF.

See also **EXPOSITION; PAN-AMERICAN EXPOSITION; PARIS EXPOSITION; ST. LOUIS EXPOSITION.**

Staff—Its Use and Treatment. J. S. Crawford. An illustrated article giving facts of interest in regard to the treatment of this material, which is extensively used in exposition buildings and their ornamentation. 3000 w. Sci Am—Dec. 5, 1903.

STAGE MECHANISM.

See **ELECTRIC EQUIPMENT—Theatre; MECHANICAL PLANT; THEATRE.**

STAIRWAY.

Concrete Reinforced.—See **CONCRETE REINFORCED—Stairway.**

Moving.—See **MOVING STAIRWAY.**

Suspended Winding.—See **CONCRETE REINFORCED—Stairway.**

STAMPING.

See **DIE; METAL WORKING; PRESS; PUNCHING; SHEET METAL; STAMPING MACHINE.**

STAMPING MACHINE.

See also **PUNCH; SHEET METAL.**

Armature Plate.—Armature Plate Machines. Illustrated description of modern machines intended for dealing with armature stampings for dynamos and motors. 700 w. Engng—April 19, 1901.

STAMP MILL.

See also **CRUSHING; GOLD MILLING; GOLD MINING; METALLURGY; ORE TREATMENT.**

Battery Frames.—A Cantilever Battery Frame. Ira C. Boss. Drawing and description of this design. of stamp mill, with information concerning it. 1300 w. Eng & Min Jour—March 10, 1904.

Capacity.—Stamp Mill Capacity. Discusses methods that have been tried to reach the maximum of capacity with the minimum of loss. 1900 w. Min & Sci Pr—April 15, 1905.

Construction.—Stamp Mill Construction. J. J. Deming. Discusses the improvement made and the important principles of good construction. 4000 w. W Min Wld—Aug. 17, 1901.

Stamp Mill Construction. J. J. Deming. Condensed from a paper read before the Mining Congress. On the need of adapting mills to the requirements of the ore to be treated, considering important factors. 4000 w. Min & Sci Pr—Oct. 4, 1902.

Copper.—The Baltic Stamp Mill: Lake Superior Copper Region. Illustrated detailed description of a recently completed mill at Redridge, Mich. 2500 w. Eng News—March 23, 1905.

Duty.—The Duty of Stamp Mills in Crushing and Amagamation. Courtenay De Kalb. Read before the Can. Min. Inst. Suggestions on important points, urging the frequent and critical study of the pulp. 2500 w. Can Min Rev—April 30, 1901.

Electric Driving.—Electric Driving of Stamp Batteries. L. Wilms. Gives points in favor of central station supply of power, showing that an increase in efficiency and saving in cost can be obtained. Discussion. 7000 w. Jour S African Assn of Engrs—Feb., 1905.

Gravitation.—A High-Speed Gravitation Stamp Mill. Edgar Smart. Illustrates and describes new type recently tried in Johannesburg. The results are a marked advance in existing practice. 3800 w. Page's Mag—March, 1904.

Guanajuato, Mex.—Stamp Mill Practice at Guanajuato. From the "University of Arizona Monthly." Description. 1400 w. Min Rept—June 13, 1901.

See also **SILVER—Mexico.**

History.—The Pachuca Stamp-Battery and Its Predecessors. M. P. Boss. An outline of the evolution of the stamp-battery and description of one at Pachuca, Mexico. 1400 w. Trans Am Inst of Min Engrs—Nov., 1901.

Melones, Cal.—Mill of the Melones Mining Co. at Melones, Calaveras County, Cal. Walter W. Bradley. Illustrates and describes the milling equipment. The plans call for 120 stamps and 60 have been in operation since April, 1902. 1500 w. Min & Sci Pr—Jan. 24, 1903.

Power Required.—Power Required by Stamps. A. W. Warwick. Calculations for determining this power, showing that the not taking into account of the inertia factor has been the cause of discrepancy between the calculated and actual power required by the stamp head. 2500 w. Min & Sci Pr—Feb. 23, 1901.

Rocking Mortar.—How to Cure a Rocking Mortar in a Stamp Mill. Paul J. Johnson. Discusses the cause of rocking mortars, and explains the writer's method of remedying the trouble. Ill. 900 w. Min Rept—Oct. 26, 1905.

Stem Retapering.—Retapering the Broken Ends of Stamp Stems. Paul J. Johnson. Sketch and explanation which will enable one to retaper the stems on the floor of the mill. 500 w. Min Rept—May 25, 1905.

Steam Direct.—Direct Steam Ore Stamps. Charles H. Fitch. Describes some of these stamps, calling attention to some of their disadvantages. 1700 w. Min & Sci Pr—July 11, 1903.

Steam Practice.—Stamp Mill Steam Practice. A. W. Warwick. Remarks on the power plants of 5 and 10-stamp mills, and the increase of cost due to lack of care in design or in running the steam plant of a stamp mill. 2000 w. Min & Sci Pr—March 2, 1901.

Swinging Feeders.—An Improvement on Swinging Feeders in Stamp Mills. Paul J. Johnson. Gives a sketch and explanatory notes of a scheme for improving the action of such feeders. 500 w. Min Rept—Nov. 23, 1905.

Transvaal.—See **Gravitation; GOLD MILLING.**

Water Feed.—New Method of Feeding Water to the Battery. Bernard MacDonald. Describes a novel method of introducing the feed water into the mortar of the stamp mill. Ill. 1500 w. Pacific C Min—Aug. 1, 1903.

STANDARDIZATION.

See also **ELECTRIC APPARATUS; INTERCHANGEABILITY; SCREW THREAD; STEAM ENGINE.**

Electric Railways.—See **ELECTRIC RAILWAY—Standards.**

Great Britain.—Standardisation in Great Britain. An editorial from the London "Times" dealing with the subject of standardization of engineering and mechanical details. 1700 w. Am Mach—July 31, 1902.

STANDARDS.

National Bureau.—See **LABORATORY; WEIGHTS AND MEASURES.**

STANDPIPE.

See also **RAILWAY WATER SERVICE; TANK; WATER TOWER; WATERWORKS.**

Attleboro, Mass.—A Large Reinforced Concrete Standpipe. George W. Blodgett. Describes a standpipe 110 ft. high and 50 ft. in diameter built in the town of Attleboro, Mass. 1000 w. R R Gaz—Vol. XXXIX. No. 11.

Cobourg, Ont.—Damage by Ice to the Standpipe at Cobourg, Ont., and the Repairs Thereto. H. C. Hodgkins. Illustrated description of bursting of sheets by water in standpipe freezing, and method of repairing. 700 w. Eng News—Aug. 18, 1904.

Concrete Reinforced.—See **Attleboro, Mass.; Hull, Mass.**

Cupola Blowing.—See **FOUNDRY.**

Experiment.—A New Hydraulic Experiment. A. F. Nagle. Experimental investigations of the rise of water in a small experimental standpipe having a long supply pipe, when the draft suddenly ceases. Ills. 1200 w. Trans Am Soc of Mech Engrs, No. 1067—Dec., 1904.

Hull, Mass.—Description of Concrete-Steel Water Tower and Standpipe at Fort Revere, Hull, Mass. Leonard S. Doten. Read before the N. E. W.-Wks. Assn. Illustrates and describes this structure, constructed by the Government in connection with the water supply system for this military post. 1800 w. Cement Age—Feb., 1905.

Description of Concrete-Steel Water Tower and Standpipe at Fort Revere, Hull, Mass. Leonard S. Doten. Illustrated detailed description of unusual concrete steel construction. Discussion. 2500 w. Jour N Eng W-Wks Assn—March, 1905.

Ice Damage.—See **Cobourg, Ont.**

Lincoln, Neb.—Wind Damage to Waterworks Standpipe at Lincoln, Neb. An illustrated account of the accident. 600 w. Eng News—May 15, 1902.

Madison, Neb.—A Wrecked Wooden Water Tank and a New Steel Standpipe at Madison, Neb. Arnold C. Koenig. An account of a failure of an elevated water tank and details of construction of a new standpipe. 900 w. Eng News—Dec. 18, 1902.

Peoria Deterioration.—Deterioration of the Peoria Standpipe. A. B. Herrick. Extracts from paper by D. H. Maury are given, with the writer's views, and instances of similar deterioration before electric railways were located near. Ill. 3000 w. St Ry Jour—Dec. 1, 1900.

Deterioration of the Peoria Standpipes. Dabney H. Maury. Reply to a review by Albert B. Herrick of a paper by the writer on "Electrolysis of Underground Metal Structures." Aso a note from A. A. Knudson. Ill. 2800 w. Eng News—Jan. 24, 1901.

See also **STRAY CURRENTS.**

Quincy, Mass.—See **RESERVOIR.**

Sanford, Me.—A Standpipe Failure at Sanford, Me. Charles W. Sherman. An illustrated account of the failure of a 40x80 ft. steel standpipe on Nov. 17, 1904. 1000 w. Eng News—Dec. 1, 1904.

Stresses.—See WATER TOWER.

Wind Pressure.—See WIND PRESSURE.

STANDPIPE FAILURE.

See STANDPIPE; WATER TOWER.

STARTING.

Automobile.—See AUTOMOBILE, GASOLINE—Starting.

Electric Motors.—See CONTROLLER; ELECTRIC MOTOR; ELECTRIC SWITCH; HOISTING; RHEOSTAT.

Gasoline Engine.—See GASOLINE ENGINE—Starting.

Steam Engine.—See STEAM ENGINE—Starting.

STARTING BOX.

See CONTROLLER; ELECTRIC SWITCH; RHEOSTAT.

STATE OWNERSHIP.

See GOVERNMENT OWNERSHIP; MUNICIPAL OWNERSHIP; RAILWAY.

STATION.

See ELECTRIC STATION; ELECTRIC RAILWAY STATION; ELEVATED RAILWAY STATION; RAILWAY STATION; STREET RAILWAY STATION.

STATION INDICATOR.

See also TRAIN INDICATOR.

Station Indicators for Subway, Elevated and Other Railway Systems. Ernest K. Adams. Brief illustrated descriptions of a number of mechanical and electrical appliances on cars, operated by the guard on the platform, to announce stations. 2000 w. Elec Wld & Engr—July 11, 1903.

STATISTICS.

See under specific headings.

STATUE.

Australian.—See CASTING—Statue.

STAVE PIPE.

See WATER PIPE—Wood Stave.

STAYBOLT.

See also BOILER; BOILER MANUFACTURE—Bracing; LOCOMOTIVE BOILER; LOCOMOTIVE FIREBOX.

A Chapter on Crown Bolts. D. P. Kellogg. Illustrated descriptions of some of the many forms of these bolts. 800 w. Loc Engng—July, 1901.

Locomotive Firebox Stays. Francis William Webb. An illustrated description of a number of trials made, with conclusions. Also a summary of the discussion. Serial. 1st part. 5000 w. Bul Internat Ry Cong—Aug., 1903.

Staybolts. H. A. Ferguson. Discusses some of the most frequent causes of staybolt failures, and the means of minimizing the trouble. General discussion follows. 7000 w. W Ry Club—Nov. 17, 1903.

Locomotive Water Space Stays. B. E. D. Stafford. A comparison of flexible and rigid stay bolts, illustrating types. Discussion. 6500 w. Pro Ry Club of Pittsburg—April, 1905.

The Quality and Utility of Solid, Flexible and Hollow Staybolts, in Iron and Copper. John Livingstone. A discussion of this subject giving much information of value, and followed by a short general discussion. 13,000 w. Pro N Y R R Club—Sept. 15, 1905.

Adjustable.—Stays of Adjustable Length for Locomotives of the Danish State Railways. O. Busse. Translated from "Organ für die Fortschritte des Eisenbahnwesens." Illustrates and describes a new system applied on these locomotives which allows the tube plate to expand freely. 700 w. Bul Int Ry Cong—Jan., 1904.

Barnes.—Another Improvement in Staybolts. An illustrated detailed description of an important improvement devised by J. B. Barnes. 1500 w. Am Engr & R R Jour—Dec., 1900.

Brace Pin.—See BRACE PIN.

Breakage.—Staybolt Breakage. A report kept during the year 1901 by a Southwestern railroad of the breakage of staybolts in order to determine the influence of the water on this breakage. Illustrations showing the location of the broken staybolts. 2000 w. R R Gaz—June 13, 1902.

Manganese Bronze.—Firebox Staybolts of Manganese Bronze (Entretoises de Foyer en Bronze Manganèsé). M. Rodrigue. Results of experiments with manganese bronze staybolts in fireboxes of locomotives of the Northern Railway of France. 2000 w. Rev Gen des Chemins de Fer—March, 1901.

Steel.—The Use of Steel Staybolts in Locomotive Fireboxes (Ueber Verwendung von Flusseisernen Stehbolzen zu den Feuerkisten der Lokomotiven). Hr. Meunnert. An illustrated account of favorable experience with steel staybolts on German railways. 1000 w. Glasers Annalen—May 1, 1903.

"Stone" Slotted.—Locomotive Firebox Staybolts (Les Entretoises de Foyers de Locomotives). Discussing the practice of the Northern Railway of France with the "Stone" slotted staybolts, designed to secure flexibility with minimum reduction in strength. 1800 w. Revue Technique—Aug. 25, 1901.

Water Legs.—See BOILER.

STAY MACHINE.

Copper Stay-Making Machines. Illustrates and describes an ingenious automatic tool. 1200 w. Engr, Lond—July 4, 1902.

STEAM.

See also STEAM ENGINEERING; THERMODYNAMICS; and under the various STEAM main headings.

Steam: An article suggested by Mr. Stromeyer's paper on "Distortion of Boilers due to Overhauling." Considers the existing state of the theory of the formation and nature of steam. 4800 w. Engr, Lond—May 30, 1902.

Steam. A reply to an article published in this paper on May 30. States existing theories of the nature of steam and examines observed phenomena. 4200 w. Engr, Lond—June 20, 1902.

Curves.—See Expansion.

Disinfection.—See SUPERHEATED STEAM.

Dry.—See STEAM SEPARATOR.

Energy Conversion.—Theory of a New Method of Converting the Energy in Steam into Mechanical Work (Theoretische Betrachtung über eine Neue Art der Umsetzung von Dampfenergie in Mech. Arbeit). Eugen Dolder. A discussion of the theoretical possibility of utilising the kinetic energy of a discharge of steam to a higher degree than heretofore. With comments by Prof. Stodola. 1200 w. Schweiz Bauzeitung—Jan. 16, 1904.

Exhaust.—The Quality of Exhaust Steam. C. V. Kerr. Gives formulae for determining the quality of the exhaust, and their application. 1200 w. Stevens Ind—Oct., 1904.

See also HEATING—Central Station; STEAM ENGINEERING — Exhaust Utilization; Rateau's Accumulator; STEAM TURBINE.

Expansion.—The Expansion of Steam. O. P. St. John. Presented before the Caandian Assn. of Stationary Engrs. Discusses the laws governing expansion and their results as affecting the efficiency. 2900 w. Engr, U S A—Sept. 1, 1901.

Steam Curves. W. H. Booth. A discussion of the curves used to show the action of expanding steam. 1800 w. Elec Rev, Lond—May 27, 1904.

See also Wet; STEAM FLOW; THERMODYNAMICS—Adiabatic Expansion.

Expansion, Adiabatic.—See THERMODYNAMICS—Adiabatic Expansion.

Flow.—See Expansion; HOT WATER; INDICATOR DIAGRAM; STEAM FLOW; STEAM WATER; STEAM TURBINE.

Heat Emission.—The Relation of Heat Emission to Steam Pressure (Zur Generellen Regelung der Wärmeabgabe der Heizkörper bei Niederdruck durch die Höhe der Dampfspannung). O. Hunaeus. A discussion of Rietschel's formula, showing its applicability to steam and hot-water heating. 2500 w. Gesundheits-Ingenieur—Nov. 15, 1902.

The Relation of Heat Emission to Steam Pressure (Zur Generellen Regelung der Wärmeabgabe der Heizkörper bei Niederdruck durch die Höhe der Dampfspannung). Prof. Rietschel. A review of the use of his formula by Herr Hunaeus. 2500 w. Gesundheits-Ingenieur—Nov. 30, 1902.

Meter.—See **STEAM METER.**

Power.—Power Steam. D. B. Dixon. On the nature and properties of steam. 2500 w. Mod Mach—Aug., 1901.

Priming.—The Measurement of the Water Entrained in Steam (Mesure de la Quantité d'Eau Entrainée par la Vapeur des Géneraterurs). M. Emanaud. Describing especially the Brocq apparatus and also the method of dissolving salt in the water. 2500 w. Génie Civil—Aug. 12, 1905.

Regeneration.—Steam Regeneration: Its History. H. J. Barron. Reviews the work in this field. 1200 w. Sci Am Sup—March 12, 1904.

Regnault's Experiments.—See **Thermal Properties.**

Superheated.—See **SUPERHEATED STEAM.**

Tables.—Steam Tables. Charles L. Hubbard. Explains some of the principles of heat and steam and the application of steam tables to practical examples in engineering. 2500 w. Am Elect'n—Sept., 1901.

Thermal Properties.—The Pressure of Steam Above 100 degrees (Die Spannung des Wasserdampfes über 100 degrees). H. F. Wiebe. An examination of Regnault's experiments, with minor corrections. 1500 w. Zeitschr d Ver Deutscher Ing—Feb. 27, 1904.

The Thermal Properties of Saturated and Superheated Steam Between 100 and 180 Degrees (Die Thermischen Eigenschaften des Gesättigten und des Ueberhitzten Wasserdampfes zwischen 100 und 180 C.). O. Knoblauch, R. Linde and H. Klebe. An account of researches repeating the work of Regnault, at the Technical High School at Munich. Two articles. 10,000 w. Zeitschr d Ver Deutscher Ing—Oct. 21, 28, 1905.

Waste Utilization.—See **STEAM ENGINEERING—Exhaust Utilization.**

Wet.—The Expansion, Separation and Compression of Wet Steam. Robert H. Smith. A study in thermodynamics suggested by the paper read by Prof. W. H. Watkinson in Gasgow, on Feb. 17, 1903. 3500 w. Engr, Lond—May 29, 1903.

The Expansion of Wet Steam. Prof. Robert H. Smith. Explains a new law for the calculation of the work done during expansion. It is not exact, but has a very high order of accuracy, and is extremely simple and suited for practical calculation. 3300 w. Engr, Lond—Oct. 20, 1905.

Wiredrawing.—See **STEAM ENGINEERING; SUPERHEATED STEAM.**

STEAMBOAT.

See also **BARGE; BOAT, STEAM; FERRYBOAT; GUNBOAT; MARINE ENGINE; STEAM LIGHTER; STEAMSHIP; STEAM YACHT; TOWBOAT.**

"Alianza."—The Stern-Wheel Steamer Alianza. Drawings and description of a steel steamer built for service in Venezuela. 700 w. Marine Engng Aug., 1902.

Anatolian Railway.—See **Constantinople.**

"Asbury Park."—New Steamer "Asbury Park," for the New York-Sandy Hook Route. An illustrated detailed description of this steamer and its equipment. 2200 w. Marine Engng—Oct., 1903.

Atlantic Coast.—River and Bay Steamers of the Atlantic Coast. Theodore Lucas. The first of a series of articles to treat on various important subjects of interest to shipbuilders, owners and students of naval architecture. Ill. 1500 w. Naut Gas—Feb. 7, 1901.

"Basra."—See **Constantinople.**

"Boston."—New Twin-Screw Freight Steamer "Boston" of the Fall River Line. Illustration, with brief description. 1200 w. Marine Engng—Sept., 1904.

Boston Harbor.—See **"Old Colony."**

"Brandon."—New James River Night Boat. Illustration with description of the "Brandon," the first of two new passenger steamers. 800 w. Naut Gas—Feb. 20, 1902.

"C. W. Morse."—Steamboat C. W. Morse, for the Hudson River. Illustrated description of a large side-wheel steamboat for the People's line between New York and Albany. 1800 w. Marine Engng—June, 1904.

Hudson River Steamboats. An illustrated article, especially describing the latest addition to this fleet—the C. W. Morse, a million-dollar craft for the People's Line. 4500 w. Naut Gas—June 2, 1904.

Chain Towing.—The Steamers of the Bavarian Chain Towing Company (Die Kettendampfer der Kgl. Bayerischen Kettenschleppschiffahrt). With details of the engines and chain drum of these powerful towboats. 3000 w. 1 plate. Zeitschr d Ver Deutscher Ing—April 27, 1901.

Chain-Steamer of the Royal Bavarian Line Upon the Upper Main River, Germany. Abstracted from an article by Eduard Weiss, in "Zeitschrift des Vereines Deutscher Ingenieure." Illustrated detailed description of sprocket-wheel type of ship, with turbine propellers, its equipment and operation. 2200 w. Eng News—Aug. 1, 1901.

Chain Boats on the River Elbe. An account of the use of a chain for propelling steamers, which has proved an economical and successful means of navigating the swift current of this river. Ill. 1700 w. U S Cons Repts, No. 1384—July 5, 1902.

See also **CANAL HAULAGE; FERRYBOAT.**

"City of Fayetteville."—Stern Wheel River Steamer. An illustrated description of the fine steel steamer, "City of Fayetteville," built for service on the Cape Fear River of North Carolina, and representing the latest type of shallow draft river steamers. 600 w. Marine Engng—June, 1902.

Clyde River.—Clyde River Passenger Steamer. George C. Cook. Illustrated description of a special type of speedy vessel developed to meet local conditions. 1800 w. Marine Rev—March 28, 1901.

See also **"King Edward."**

Coal Transportation.—See **COAL TRANSPORTATION.**

Congo River.—See **"Livingstone."**

Connecticut.—See **OSCILLATING ENGINE.**

Constantinople.—Paddle Steamer for the Anatolian Railway Company of Constantinople (Passagier-Raddampfer für die Anatolische Eisenbahn-Gesellschaft in Konstantinopel). Description and illustrations of the passenger steamer "Basra," built at the Howaldts Works at Kiel. 1800 w. Schiffbau—Nov. 9, 1904.

Paddle Steamers (Raddampfer). W. Kaemmerer. A description of the hull and engines of the paddle steamers built at Kiel for use in connection with the service of the Anatolian railway. 1500 w. Zeitschr d Ver Deutscher Ing—Nov. 12, 1904.

"Corona."—See **Nigeria.**

"Coya."—See **Lake Titicaca.**

Delaware River.—New Fast Light-Draft River Propellers. Illustration and description of two fine passenger boats now being built for service on the upper Delaware. 1300 w. Naut Gas—March 14, 1901.

Detroit River.—See **FERRYBOAT.**

Detroit—Toledo.—Handsome Excursion Steamboat. Illustrated description of a new 285-ft. vessel for the Detroit and Toledo route. 1100 w. Naut Gas—May 2, 1901.

Disinfecting.—See **FIREBOAT—"Clayton."**

"Eastern States."—See **"Western States."**

Explosion.—See **BOILER EXPLOSION.**

Fall River Line.—See **"Providence."**

Fishing.—Fishing Steamer. Description and plan of a unique fishing steamer for service in Southern waters, to be used in gathering the catch from the fishing fleet and bringing it to market. 450 w. Marine Engng—Sept., 1902.

Fishing, Norwegian.—Norwegian Fishing Steamer. Illustrations and description of the latest type of smaller 75-foot fishing steamers used on the north and west coasts of Norway. 1200 w. Marine Engng—Feb., 1904.

"General Pando."—River Steamer, "General Pando." Illustrated description of a large stern-wheel steamer for service on the Amazon and its tributaries. 800 w. Engr, Lond—May 3, 1901.

General Pando Hoodoo. E. Cockburn Johnstone. An interesting account of the fate of a stern-wheel river steamboat built for Bolvia, for service on the Amazon, which never reached its destination. 1800 w. Marine Rev—Aug. 3, 1905.

"General Putnam."—New Passenger Propeller. Illustrated description of the "General Putnam," built for the New York and Greenwich route. 3800 w. Naut Gas—July 10, 1902.

Great Lakes.—Magnificent Lake Steamboats. Illustration and description of two large passenger vessels for service on Lake Erie. 1100 w. Naut Gas—April 11, 1901.

Old-Time Lake Steamboats. Illustrated account of two famous vessels that plied on Lake Erie before the Civil War. 1500 w. Naut Gas—April 11, 1901.

Pioneer Screw Vessels of the Lakes. Illustrations and notes from Samuel R. Kirby, concerning early vessels. 800 w. Marine Rev—Aug. 8, 1901.

See also **Detroit-Toledo**; **STEAMBOAT RACE**; **STEAMSHIP**.

History.—Contributions to the History of the Invention of the Steamboat (Zur Geschichte der Erfindung des Dampfschiffs). D. H. Claus. With especial reference to the early work of Papin about 1700, also of Symington and Fulton. 5000 w. Glasers Annalen—Aug. 1, 1902.

See also **Great Lakes**; **New York History**; **MARINE ENGINEERING**; **PROPELLER**; **STEAMBOAT RACE**; **STEAMSHIP**.

India.—River Steamers and Inland Navigation in India. Information concerning the improvements made in the river steamers since the days of the pioneer vessels. Ill. Serial. 1st part. 2000 w. Ind & East Engr—May, 1901.

Iron and Steel.—See **STEAMSHIP**.

Kanawha River.—See **Paddle vs. Screw**.

"King Edward."—Turbine Propulsion for a New Clyde Passenger Steamer. An account of a vessel to do service between Fairlie and Campbelltown. 1200 w. Engr, Lond—Jan. 11, 1901.

The "King Edward." Ilustration with description of the latest Clyde passenger steamer; built for the purpose of trying the working of the Parsons' steam-turbine machinery for mercantile purposes. 1300 w. Engng—July 5, 1901.

Turbine Steamer "King Edward" a Success. Illustration and general information. 1200 w. Marine Rev—July 18, 1901.

Turbine Steamer "King Edward." W. Cartile Wallace. An illustrated article giving information concerning this boat and the general impression her arrangements made on the writer. 3000 w. Marine Engng—Jan., 1902.

See aso **STEAM TURBINE—Marine**.

King's Lynn.—Screw Steamer for Towing, Salvage, and Fire Purposes. Illustrated detailed description of a substantial single-screw vessel built for the King's Lynn Conservancy Board, Eng. 2-page plate. 1000 w. Engng—April 17, 1903.

Lake Constance.—The Baden Steamboat "Stadt Meersburg" (Der Badische Bodensee-Dampfer "Stadt Meersburg"). H. Courtin. An ilustrated description of a new side-wheel boat for use on the Lake of Constance in connection with the service of the Baden State Railways. 3500 w. 1 plate. Zeitschr d Ver Deutscher Ing—July 18, 1903.

The German Lake Steamer "Stadt Meersburg." Translated from "Zeitschrift des Vereins Deutscher Ingenieure." Illustrated description of a paddle wheel steamer recently placed on Lake Constance to connect the railways of the German shore with the Swiss cities on the lake. 2000 w. Naut Gaz—Nov. 5, 1903.

Lake Titicaca.—A Remarkable Shipbuiding Feat, 13,000 Feet Above the Sea Level. An account of the construction and delivery of a steamship to be used on Lake Titicaca, 13,000 ft. above the sea. Ill. 1700 w. Sci Am—July 12, 1902.

Light Draft.—Shallow Water Navigation. William H. Crawford, Jr. Remarks on the designs of boats for the shallow rivers of the United States and how well they accomplish the work required of them. 1800 w. Marine Engng—Sept., 1901.

See also **Delaware River**; **Lake Titicaca**; **Nigeria**; **"Sayhueque;"** **Sectional**; **"Thomas A. Edison;"** **Turbine**; **Yarrow**; **BOAT—Nile**; **GUNBOAT—Teal**.

Lighter.—See **STEAM LIGHTER**; **TRANSPORTATION—Harbor Lighterage**.

"Livingstone."—The Mission Stern-Wheel Steamer "Livingstone." Illustrated description of a steamer for missionary work on Stanley Pool. 600 w. Engr, Lond—May 24, 1901.

Long Island Sound.—Long Island Sound Steamboats. Illustrated detailed description of the recently completed steamboat "Providence," with illustrations of many of the Sound boats, and a tabulated list of these boats. 4000 w. Naut Gas—June 1, 1905.

Maryland.—New Steamboat Maryland. Illustration and description of a fine passenger vessel just completed for service on Chesapeake Bay. 1600 w. Naut Gaz—Oct. 2, 1902.

"Middlesex."—New Steamboat "Middlesex," for the Rappahannock River. Illustrates and describes a paddle steamer built for service between Baltimore and Fredericksburg, Va. 1000 w. Marine Engng—July, 1903.

Mississippi River.—Steam Navigation on Western Rivers. An illustrated article describing the early boats used on the Mississippi and other Western rivers. 2300 w. Naut Gaz—Dec. 1, 1904.

See also **TOWBOAT—Sprague**.

"Molesey."—See **LIFEBOAT—Steam**.

"Mona."—See **Tyne Ferry**.

Monmouth Co., N. J.—The Steamboats of Monmouth County. C. B. Parsons. A review of the history of the Shrewsbury River boats, and others in service from Monmouth County, N. J., to New York. Serial. 1st part. 2500 w. Naut Gaz—June 22, 1905.

"Nantasket."—New Excursion Steamboat. Brief description, with illustration, of the Nantasket, latest addition to the fleet in Boston harbor. 700 w. Naut Gas—July 24, 1902.

"Naparima."—See **Trinidad**.

New York History.—New York Steamboats of 1851. An account of the early steamboats of the Hudson River and Long Island Sound, with reprints of articles published in the papers of that time. Serial. 2 parts. 3500 w. Naut Gaz—July 18 and 25, 1901.

Nigeria.—Twin-Screw Steamer "Corona" for Northern Nigeria. Illustrated description of vessel of galvanized steel built on the tunnel principle, for service as a yacht. 1,000 w. Engng—Jan. 29, 1904.

Nile.—See **BOAT**.

Ohio River.—See **COAL TRANSPORTATION**.

"Old Colony."—The Boston Steamer Old Colony. An illustrated description of a new excursion boat for service in Boston harbor. 1200 w. Naut Gaz—Nov. 19, 1903.

Handsome Excursion Steamer. Illustrated description of the Old Colony, built for the Boston and Plymouth route. 1000 w. Naut Gas—July 14, 1904.

Paddle vs. Screw.—The Paddle vs. the Screw. From the Charleston, W. Va., "Daily Gazette." An account of an interesting power test between new and old style steamers on the Kanawha river. Ill. 2000 w. Naut Gaz—April 2, 1903.

Penobscot River.—Steamboating on the Penobscot. A review of the boats navigating this river; the first appearing on May 26, 1824. 8700 w. Marine Rev—Dec. 25, 1902.

Pilot Boat.—See **PILOT BOAT**.

"Providence."—Side-Wheel Passenger Steamer "Providence." Illustrated detailed description of a sound steamer to run between Providence and New York. 2900 w. Marine Rev—March 30, 1905.

The Fall River Line Steamer "Providence." Illustrated detailed description of this new ship, the most luxuriously fitted of the Fall River line. 1500 w. Marine Engng—July, 1905.
See also **Long Island Sound**.

"Puritan."—See **STEAMSHIP**.

"Queen Alexandra."—See **STEAM TURBINE—Marine**.

Racing.—See **BOILER EXPLOSION—Steamboat Racing**; **STEAMBOAT RACE**.

River Plate.—See **NAVIGATION**.

"Sagamore."—Steamboat Building Under Difficulties. Edwin B. Sadtler. Illustrated description of the building of the hull of the new steel steamer "Sagamore," which has been constructed on the shores of Lake George, in the village of Caldwell. 2200 w. Marine Engng—July, 1902.

"Sayhueque."—The "Sayhueque," a Light Draught Steamer. Illustrated description of the first of three vesses ordered for the Argentine Government, for cargo and passenger service on the Rio Negro. 800 w. Engng—Jan. 4, 1901.

Sectional.—A Sectional Steamer for Our Colonial Possessions. Illustrates and describes a vessel of novel construction, designed to meet special requirements. 900 w. Sci Am—Dec. 19, 1903.

Shrewsbury River.—See **Monmouth Co., N. J.;** "Thomas Patten."

Speed Trial.—See **SHIP TRIAL; STEAMBOAT RACE.**

"Stadt Meersburg."—See **Lake Constance.**

Stern Wheel.—See "Alianza;" "City of Fayetteville;" "Livingstone."

Tabasco, Mexico.—Steam Navigation on the Rivers of Tabasco. Abstract of a contract to establish regular steam navigation on the rivers of the State of Tabasco. 500 w. U S Cons Repts, No. 1139—Sept. 14, 1901.

Test.—Boiler and Engine Test of a Small Steamboat. Warren Johnson. Paper before the Louisiana Engineering Society, giving data and results of short test of propeller boat having 17-horsepower engines, on the Mississippi. 800 w. Jour Assn of Engng Socs—July, 1904.

Thames River.—The New Thames Passenger Steamers. An account of the steps taken to establish a passenger steamboat service on the Thames River, and an illustrated description of the recommended design, with information concerning cost. 1700 w. Engr, Lond—Dec. 2, 1904.

Thames Paddle-Steamer for the London County Council. Brief illustrated description of one of two recently launched steel vessels. 300 w. Engng—May 5, 1905.

London County Council Steamboat Service. Brief description of the vessels for the new Thames steamboat service and their engines. 1500 w. Engng—June 16, 1905.

The Thames Steamboat Service. Arnold F. Hills. Reviews the history of the Thames Steamboat Company and the special conditions to which the service is subject; discussing also what remains to be accomplished. General discussion follows. 9000 w. Jour Soc of Arts—May 3, 1901.

"Thomas A. Edison."—Light-Draft River Steamer. Illustration and description of the "Thomas A. Edison," built for service on the Caloosahatchee in Florida. 800 w. Naut Gaz—Dec. 12, 1901.

"Thomas Patten."—Elegant Excursion Steamer. Illustration with an account of the trial trip of the "Thomas Patten," built for service on New York Bay. 1300 w. Naut Gaz—July 4, 1901.

Trinidad.—Twin-Screw Passenger and Cargo Steamer. Illustrations and description of the shallow draught steamer "Naparima," and her machinery. This vessel is to be run in conjunction with the Trinidad Government Railways. 1600 w. Engng—April 28, 1905.

Tunnel.—See **"Nigeria;" Yarrow; PROPELLER; SHIP PROPULSION—Shallow Draft.**

Turbine.—Design for a Light Draught Double Turbine Boat (Entwurf eines Flachgehenden Zwei-Turbinenschrauben-Bootes). O. Lienau. Plans and details of a flat-bottomed light-draught steamboat with turbine propellers, for river inspection service. Two articles. 4000 w. Schiffbau—Oct. 26, Nov. 9, 1904.

Design of a Shallow-Draft Boat Driven by Twin-Turbine Propellers. O. Lienau, in "Schiffbau." An illustrated article explaining method of designing a vessel with a draft not exceeding 16 inches, having a speed of 13 knots in slack water. 2000 w. Marine Engng—April, 1905.

See also **"King Edward;" STEAMSHIP; STEAM TURBINE; TORPEDO-BOAT DESTROYER.**

Tyne Ferry.—The Tyne General Ferry Co.'s Twin-Screw Passenger Steamer "Mona." Brief illustrated description. 700 w. Engng—Dec. 18, 1903.

Vera Cruz.—Twin-Screw Combined Fire, Tug and Police Boat. Illustrates and describes a seaworthy vessel built for the Mexican Government. 900 w. Engng—Jan. 11, 1901.

"Vermont."—Side-Wheel Passenger Steamer for Lake Champlain. Brief illustrated description of the Transportation Co.'s steamboat "Vermont." 700 w. Marine Engng—July, 1901.

Victoria Nyanza.—The Twin-Screw Steamers "Winifred" and "Sybil." Illustrated description of sister-boats built for the Uganda Railway, and intended to ply on the Lake of Victoria. 1300 w. Engng—June 20, 1902.

"Virginia."—Chesapeake and Ohio Railroad Passenger Steamer "Virginia." Illustrated detailed description of a twin-screw passenger boat of about 700 tons displacement. 2300 w. Marine Engng—June, 1902.

The New Inland Passenger and Freight Steamboat "Virginia." Illustrated description of a medium size boat operating on Chesapeake Bay. 1500 w. Naut Gaz—July 2, 1903.

Warships.—See **BOAT, STEAM.**

Western States.—Notable New American Lake Steamboats. Illustrated description of the two latest passenger boats for the Great Lakes, the "Western States" and the "Eastern States." 1000 w. Naut Gaz—Aug. 28, 1902.

"William G. Payne."—New Passenger Steamboat. Illustration with description of the William G. Payne, the latest addition of the Long Island Sound fleet, built for service between New York and Bridgeport. 2500 w. Naut Gaz—June 5, 1902.

Yangtse.—See **RIVER.**

Yarrow & Co.—Shallow Draught Steamer. Illustrates and describes a hinged flap, preventing the ingress of air into propeller tunnel introduced by Yarrow & Co. into screw-propelled boats of this type by reason of which great economy is claimed. 600 w. Engr, Lond—Aug. 22, 1902.

See also **PROPELLER—Tunnel; SHIP PROPULSION—Shallow Draft.**

STEAMBOAT INSPECTION.

Rules.—New Steamboat Rules and Regulations. Full text of the amended rules prepared under the direction of James N. Dumont. 2200 w. Naut Gaz—Feb. 21, 1901.

U. S. Service.—The United States Inspection Service. James A. Dumont. Gives a comparative statement of the work of the service for the years 1871 and 1900 inclusive, discussing the sinking of the Staten Isand ferryboat Northfield, and other matters. 3800 w. Naut Gaz—Oct. 31, 1901.

STEAMBOAT RACE.

See also **BOILER EXPLOSION—Steamboat Race.**

American.—Notable Trials of Speed Between Early American Steamboats. J. H. Morrison. An interesting account of races previous to the year 1852, on the Hudson River, on Long Island Sound, and other waters. Ill. 4500 w. Naut Gaz—July 31, 1902.

Lake Erie.—A Great Steamboat Race. An account of a race on Lake Erie in which the "City of Erie" beat the "Tashmoo" in a run of nearly 100 miles by only 45 seconds. 2000 w. Marine Rev—June 6, 1901.

Official Reports on Erie-Tashmoo Contest. Data taken on each boat is given. Illustrates the indicator cards taken. 1200 w. Marine Rev—June 13, 1901.

Trial of Speed Between the Steamers "City of Erie" and "Tashmoo." Frank E. Kirby. Illustrations with descriptions of steamers and an account of the trial on Lake Erie on June 4, 1901. 1300 w. Soc Nav Archts & Marine Engrs, No. 1—Nov., 1901.

STEAM CALORIMETER.

See **CALORIMETRY—Steam.**

STEAM CAR.

See **CAR, MOTOR-DRIVEN; STEAM TRAMWAY.**

STEAM CONSUMPTION.

See **MARINE ENGINE; STEAM ENGINEERING; STEAM ENGINE TEST.**

STEAM CUTTER.

See **BOAT, STEAM.**

STEAM DISTRIBUTION.

See **HEATING—Steam; PIPING; STEAM ENGINEERING; STEAM LOOP; STEAM PIPE; VALVE; VALVE GEAR.**

STEAM DRIP.

See **STEAM ENGINEERING—Drips.**

STEAM ENGINE.

See also **BLOWING ENGINE; ELECTRIC GENERATING SET; MARINE ENGINE; PUMPING ENGINE; ROLLING-MILL ENGINE; STEAM ENGINEERING; STEAM-ENGINE TEST; STEAM PLANT.**

Ailments.—See **MOTOR—Longridge Report.**

Air Buffers.—The Air Buffer. Ernest R. Briggs. Illustrates and describes the air buffer of the Willans engine, and discusses various applications. 2400 w. Am Mach—April 30, 1903.

Allen.—An Allen High-Speed Triple-Expansion Engine. Description, with diagram and test figures taken from the official trial. 1400 w. Elect'n, Lond—Feb. 26, 1904.

See also **ELECTRIC GENERATING SET—Bedford, Eng.**

Allis Chalmers.—The Engines of the Interborough Station. Illustrated detailed description of the horizontal vertical twin compound Allis-Chalmers engines in the N. Y. Subway power house. 2500 w. Power—Sept., 1905.

See also **Glasgow Tramways.**

Allis-Chalmers, St. Louis.—See **ELECTRIC GENERATING SET.**

Alsacienne.—See **ELECTRIC GENERATING SET.**

Angular Displacement.—See **SPEED VARIATION.;**

Assistant Cylinder.—See **MARINE ENGINE.**

Atlas.—The Atlas Four-Valve Engine. Illustrated description of a new type of four-valve engine of medium size. 1500 w. Engr, U S A—Aug. 15, 1905.

Augsburg-Nuremberg.—See **ELECTRIC GENERATING SET; ELECTRIC GENERATOR—Paris Exposition; ENGINE; STEAM ENGINE TEST.**

Automobile.—See **AUTOMOBILE, STEAM—Small Engines.**

Back Pressure.—See **VALVE—Anderson.**

Balancing.—Counterweights for Large Engines. D. S. Jacobs. Discusses the effects from the application of counterweights to an exceptionally large engine to lessen the vibration, with satisfactory results. An investigation of the action of the counterweights, and their effect on other electrical problems. Ills. 4500 w. Trans Am Soc of Mech Engrs, No. 069—June, 1905.

See also **Bever; Wizzell; LOCOMOTIVE; MARINE ENGINE; VALVE GEAR—Inertia Stresses.**

Belleville at St. Louis.—The Belleville Exhibit at the St. Louis Exposition (Die Ausstellung der Société Anonyme des Etablissements Delaunay-Belleville). Fr. Frolich. An illustrated review of the latest types of Belleville engines and boilers as shown at the St. Louis exposition. 1800 w. 1 plate. Zeitschr d Ver Deutscher Ing—June 10, 1905.

Belliss.—See **High Speed.**

Bever Balanced.—Generating Plant, Wolverhampton Exhibition. Illustrated description of a balanced high-speed steam engine representing the latest development of Bever's patent balanced engine, in which all the working parts are absolutely balanced both as regards weights and pressures. 1500 w. Engr, Lond—Aug. 1, 1902.

Blowing Engine.—See **BLOWING ENGINE.**

Bodman.—See **AUTOMOBILE, STEAM.**

Bollinckx.—See **ELECTRIC GENERATING SET.**

Boujour.—The Boujour Engine. Illustrates and describes a 75-horse power condensing engine shown at the Liége Exhibition. 2000 w. Engr, Lond—July 28, 1905.

Bourdon.—See **Quadruple Expansion.**

Brand and L'Huillier.—The Brand and L'Huillier Compound Engine of 150 Horse Power (Machine à Vapeur Compound de 150 Chevaux Système Brand et Huillier. A. Bourdon. Illustrated description of Corliss and poppet-valve cross-compound engine exhibited at Paris. 1000 w. 1 plate. Génie Civil—Feb. 9, 1901.

Breakdowns.—See **MOTOR—Longridge Report.**

British Electric Station.—See **STEAM PLANT.**

Brooklyn Power House.—See **ELECTRIC GENERATING SET.**

Brunn.—See **Wannieck; ELECTRIC GENERATING SET.**

Budapest Electric Station.—Verticle Triple-Expansion Engine (Stehende Dreifachsexpansions-Dampfmaschine). S. Iglauer. Brief illustrated account of 1000 h. p. engine forming part of generating set in the generating station at Budapest, Hungary. 1000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Jan. 16, 1904.

Builders' Association.—See **Standardization.**

Cail.—See **ELECTRIC GENERATING SET.**

Carels.—600-Horse Power Carels Compound-Condensing Engine. Illustrated description of an engine shown at the Liége Exhibition. 1500 w. Engng—Aug. 11, 1905.

See also **ELECTRIC GENERATING SET.**

Carels-Sulzer.—750 Horse-Power Sulzer-Carels Engine. Illustrates and describes this horizontal compound condensing engine, shown at the Liége Exhibition. 1000 w. Engr, Lond—June 30, 1905.

Central Valve.—An American Central Valve Engine. E. T. Adams. Describes the valve gear of an engine, the result of an effort to work the central valve idea in a form to meet existing conditions in America. 1800 w. Trans Am Soc of Mech Engs, No. 874—Dec., 1900.

Choice.—See **Selection.**

Colwell.—See **ROTARY ENGINE.**

Compound Reversing.—Compound Reversing Engines. Willibald Trinks. Presents the advantages of compound condensing reversing engines, discussing the cross compound and twin tandem compound, etc. Also discussion. Ills. 4200 w. Pro Engrs Soc of W Penn—June, 1905.

Connecting Rod.—See **CONNECTING ROD.**

Corliss.—700 Horse-Power Engines. Illustrations and account of the leading points in three sets of Corliss engines built recently in England by Cole, Marchant & Morley. 1500 w. Engng—July 11, 1902.

The Early History of the Corliss Engine in the United States. George R. Phillips. Read before the Engine B'ld'rs Assn. 4800 w. Ir Age—Dec. 4, 1902.

Corliss Engines. George C. Phillips. A fully illustrated account of this great invention, with descriptions of the types made by the numerous manufacturers, and much information of interest. 3700 w. Engr, U S A—June 15, 1903.

Corliss Engine Design. L. L. Willard. The first of a series of illustrated articles aiming to show how these engines are being built, and how to proportion the parts to secure the best results at a reasonable cost. Serial. 1st part. 1200 w. Engr, U S A—Oct. 1, 1904.

Compound Corliss Spinning Mill Engine. Illustrated description of a fine example of a modern British mill engine. 2400 w. Engr, Lond—March 3, 1905.

1500-I.-H.-P. Corliss Engine for the Transvaal. Illustrated description of an engine recently built for the Premier Diamond Mining Co., Ltd., of the Transvaal. 700 w. Engng—May 19, 1905.

150-I.-H.-P. Corliss Engine at the Liége Exhibition. Illustrations with brief description. 400 w. Engng—Sept. 8, 1905.

See also **VALVE GEAR**; and under names of engine builders.

Corliss Adjustments.—Adjusting Clearance and Setting the Valves of Corliss Steam Engines. John L. Plock. Describes method, giving illustration. 1500 w. Power—Nov., 1903.

Corliss-Bates.—New Design of Bates-Corliss Engine. An illustrated description of this new design, calling attention to the improvements. 1200 w. Engr, U S A—Sept. 15, 1904.

Corliss French.—A French Corliss-Type Steam Engine. Illustrated detailed description of a horizontal triple expansion engine driving 1,000 kw. alternator. 1100 w. Am Elect'n—May, 1901.

Corliss-Hamilton.—New Hamilton-Corliss Vertical Cross Compound Engine. Illustrated detailed description of a new design. 1200 w. St Ry Jour—June 18, 1904.

Corliss-Markham.—500 Horse-Power Compound Engine and Electric Generator. An example of a British-built engine, by Markham & Co., on the lines as laid down by American practice, for the generating of electric energy for tramway purposes with British Westinghouse dynamo. Illustrated description. 900 w. Engng—Nov. 22, 1901.

Corliss, Mesta.—A Notable Mesta Corliss Engine. Illustrated detailed description of the 44 and 72x60 inch horizontal-vertical Corliss compound engine built for the Tennessee Coal, Iron & R. R. Co., by the Mesta Machine Co., of Pittsburg. 2000 w. Ir Age—Dec. 21, 1905.

Corliss, Old.—An Old Corliss Engine. Illustrations, with description, of an engine built in 1851 and erected in 1857, which is still in service and likely to continue working for many years more. 1000 w. Power—April 1, 1905.

Corliss, Scottdale.—The Scottdale Corliss Engine. Illustrated escription of a new design having several novel features. 2000 w. Ir Age—Dec. 8, 1904.

Corliss-Westinghouse.—See **Westinghouse.**

Cornwall.—See **History.**

Crepelle and Garand.—See **ELECTRIC GENERATING SET.**

Crimmitschau.—Horizontal Triple-Expansion Engine (Liegende Dreifachexpansions-Dampfmaschine). M. Schmidt. An illustrated description of an engine of 2,000 to 2,500 h. p., with rope drive. An illustration is given of the special car for the transport of the 24 ft. fly wheel. 1200 w. 1 plate. Zeitschr d Ver Deutscher Ing—April 20, 1901.

Curves of Performance. — Curves of Performance. W. H. Booth. Some points in regard to the sizes and economies of engines. 1000 w. Power—Sept., 1904.

Cylinders.—The Proportions of Cylinders for Multiple Expansion Engines. Alfred Hanssen. A mathematical explanation of the writer's method of finding the actual area of the cylinders. 2200 w. Engng—May 3, 1901.

Cylinders for Steam Engines. W. H. Wakeman. Explains plans for determining the diameters of steam engine cylinders for various conditions, presenting examples. 2300 w. Elec, N Y—Oct. 30, 1901.

Delaunay-Belleville.—See **ELECTRIC GENERATING SET.**

Design.—Freaks and Fallacies in Steam Engine Design. Egbert P. Watson. Accounts of some of the fallacious designs which have been brought out to revolutionize steam engineering practice; showing the only true tests to be fuel consumption and accurate power measurement. 2500 w. Engineering Magazine—January, 1903.

See also **Cylinder; Internal Surfaces; MACHINE DESIGN; STEAM ENGINEERING.**

Development.—See **History.**

Diesel Motor Compared.—See **POWER COST—Steam Engine vs. Diesel Motor.**

Drop Valve.—Tandem Compound Drop-Valve Steam Engine. Illustrated description of a new type of engine. The special features are a positive valve-gear motion of a simple type, with very strong construction. 700 w. Engr, Lond—Sept. 2, 1904.

Dujardin.—See **ELECTRIC GENERATING SET.**

Düsseldorf Exposition.—Steam Engines at the Düsseldorf Exposition (Die Industrie und Gewerbeausstellung in Düsseldorf 1902. Die Dampfmaschinen). H. Dubbel. A well illustrated and comprehensive review of the steam engines exhibited at this large German exposition. Serial. Part I. 1 plate. 3000 w. Zeitschr d Ver Deutscher Ing—May 3, 1902.

3,000 Indicated Horse-Power Vertical Triple-Expansion Engine. Illustrations and dimensions of the largest engine in the Düsseldorf exhibition. 250 w. Engng—Aug. 8, 1902.

3,000 Indicated Horse-Power Vertical Triple Expansion Engine. Illustrates and describes further interesting details of this very large engine. 900 w. Engng—Aug. 15, 1902.

Steam Engines at the Düsseldorf Exposition (Les Machines à Vapeur à l'Exposition de Düsseldorf). P. Dujardin. A general review of the engines exhibited at Düsseldorf, with tabular view of the whole. 2500 w. 1 plate. Génie Civil—Sept. 20, 1902.

Steam Engines at the Düsseldorf Exposition (Les Machines à Vapeur à l'Exposition de Düsseldorf). P. Dujardin. With illustrations of the more important engines, and a plate showing the large mine pumping engine by Haniel & Lueg. 2000 w. 1 plate. Génie Civil—Nov. 1, 1902.

Steam Engines at the Düsseldorf Exposition (Les Machines à Vapeur à l'Exposition de Düsseldorf). P. F. Dujardin. An illustrated description of some steam engines and auxiliary apparatus exhibited at Düsseldorf, in 1902. 1 plate. 2200 w. Génie Civil—April 25, 1903.

Recent Progress in Steam Engines (Quelques Progrès Récemment Réalisés dans les Machines à Vapeur). P. Arrachart. A general review, with particular reference to the Paris and Düsseldorf Expositions, and illustrated descriptions of improvements and new features in steam engines and of steam turbines. 1 plate. 8000 w. Mem Soc Ing Civils de France—April, 1903.

See also **BOILER; EXPOSITION.**

Dynamics.—Dynamics of Reciprocating Engines. M. E. Cooley. Considers the forces to which the crank-pin is subjected, showing graphically the effect of the angularity of the connecting-rod and of the acceleration of the reciprocating parts. The discussion is confined to horizontal engines. 5200 w. Technic—1902.

Early.—See **High Speed; History.**

Economic Production.—The Relation of the Steam Engine to Modern Economic Production. F. R. Hutton. A critical examination of the influence of the development of steam power upon the industrial problems of the day, with especial relation to the subject of works management. 3500 w. Engineering Magazine—Jan., 1901.

Economy.—See **STEAM ENGINEERING; STEAM GENERATION; SUPERHEATED STEAM—Engine Economy.**

Efficiency.—Proposed Methods for Improving the Efficiency of the Steam Engine (Beschouwingen over de Middelen Aangewend ter Verhooging van het Rendement der Stoommachine). G. Brouwer. Discussing especially the advantages of compounding and the use of highly superheated steam. 4000 w. De Ingenieur—Sept. 30, 1905.

See also **COAL—Misuse; EFFICIENCIES; MOTOR; STEAM ENGINEERING; STEAM ENGINE TEST.**

Electric Generation.—The Steam Engine of To-day in the Field of Electrical Engineering Practice. R. H. Thurston. A study of the progress of the later years of the nineteenth century. 6000 w. Elec Wld & Engr—Jan. 5, 1901.

Recent Types of American and European Engines. Illustrates and describes the new engines for the Brooklyn Edison plant, and a Russian engine for electric lighting service. 2500 w. Am Elect'n—March, 1901.

The Application of Steam Power to the Generation of Electrical Energy. John S. Raworth. Paper read before the Inst of Elec Engrs, England, with discussion on the recent development of steam engines due to this use. 4500 w. Elec Rev, Lond—March 22, 1901.

Engines for Driving Large Dynamos. Charles Day. Read before the Manchester Assn. of Engrs. Discusses the use of high-speed engines in England, describing a Ferranti engine and considering its advantages and disadvantages. Ill. 4000 w. Elect'n, Lond—Oct. 25, 1901.

The Correct Type of Engine for Large Generating Stations. A. A. Day. Read before the Incor. Munic. Elec. Assn. at Islington, England. Favors the low-speed type of engine, a horizontal compound or triple-expansion engine with direct-coupled generator between cranks, stating its advantages. Discussion. 7700 w. Elec Engr, Lond—July 11, 1902.

The Choice of Engines for Traction Stations. E. Kilburn Scott. Considers the importance of simplicity of design, and states the advantages of the ordinary tandem—compound single-crank engine and the employment of high superheat. 800 w. Elec Rev, Lond—Feb. 27, 1903.

American Steam Engines for Electric Light and Power Service. H. F. Schmidt. Illustrated descriptions of many modern types. 16,500 w. Am Elect'n—June, 1903.

Notes on Engine Driving in Electric Light Stations. F. T. Callis. Remarks on the changes in design and building of stationary engines, types, methods of lubrication, starting and stopping, &c. Serial. 1st part. 2000 w. Elec Rev, Lond—Dec. 11, 1903.

See also **Compound; Lentz; N. Y. Electric Station; ELECTRIC GENERATING SET; ELECTRIC PLANT; ELECTRIC STATION;** and under sub-headings of builders and places.

Elsass Machine Works.—See **Piston Valve.**

Erection.—The Erection of High-Speed Center-Crank Engines. H. V. Hunt and C. G. Robbins. Aims to give clear and concise directions for the erection of a high-speed center crank engine. Ill. 2800 w. Power—Sept., 1902.

Setting Up a Vertical Engine. John F. Nagle. Directions concerning the proper method. 1800 w. Power—May, 1904.

Preparation for the Erection of an Engine. W. T. Edwards. Deals with the foundations, the anchor bolts, flywheels, the handling of the bed plate, &c. Ills. 3200 w. Am Elect'n—May, 1904.

European.—Continental Engine Construction. Two articles presenting some of the leading features of heavy stationary engine construction for electric traction, lighting, and power transmission. Serial. 2 parts. 4500 w. Engr, Lond—May 29 and June 5, 1903.

Ewing.—See **SUPERHEATED STEAM.**

Experimental Study.—The Experimental Study of the Steam Engine. John T. Nicholson. Lecture before the Engng Soc of the Owens College Union. Serial. 1st part. 4000 w. Prac Engr—Aug. 2, 1901.

See also **STEAM ENGINE TEST.**

Farcot.—See **ELECTRIC GENERATING SET.**

Fencing.—See **SAFETY APPLIANCE.**

Ferranti.—The Ferranti Vertical Compound Engine. Abstract of paper by Mr. Charles Day, presented to the Manchester (England) Assn. of Engrs. Illustrates and describes the type of engine which the firm is building for use with large direct-connected electrical units. 4200 w. Power—April, 1902.

Vertical Compound Engine for Cape Town. Illustrated description of Ferranti engine for the new supply station, calling attention to interesting features. 1800 w. Engr, Lond—May 9, 1902.

See also **Electric Generation.**

Fleming.—See **ELECTRIC GENERATING SET.**

Foundation.—See **FOUNDATION—Steam Engine.**

Foundation Bolts.—Foundation Bolts for Steam Engines. W. H. Wakeman. Suggestions helpful in the proper setting of engines, illustrating some defects. Serial. 1st part. 1000 w. Elec, N Y—Dec. 16, 1903.

Four-Valve.—See **Atlas; ELECTRIC GENERATING SET—Fleming.**

Frame Boring.—See **BORING MACHINE—Engine Frames.**

Frame Stresses.—Stresses in Vertical Engine Frames (Die Ermittlung der Spannungen in den Ständern Stehender Dampfmaschinen). G. Schwarz. An analytical and graphical discussion of the stresses in the framework of vertical engines of the marine type. 3000 w. Zeitschr d Ver Deutscher Ing—May 17, 1902.

See also **MARINE ENGINE—Stresses.**

Francois.—300 H.-P. Double-Piston (Francois Type) Compound Condensing Engine. Illustrations of an engine built by the Cockerill Company, and exhibited at Liége. 200 w. Engng—July 7, 1905.

Double-Piston Francois Engines. Gives particulars in regard to these engines, illustrated in a previous issue, and some results obtained with them. 2000 w. Engng—July 14, 1905.

Franco Tosi.—See **Tosi.**

French Corliss.—See **Corliss, French.**

Friction.—See **FRICTION—Engine.**

Friedenthal.—A New Type of Steam Engine (Nouveau Type de Machine à Vapeur). A discussion of an ideal type of steam engine suggested by M. Friedenthal in which a combustible vapor should be used first to develop its expansive force and then burned. 2000 w. Revue Technique—Nov. 10, 1903.

Gas Combined.—See **GAS ENGINE—Steam Combined.**

Gas Engines Compared.—Fundamental Differences in the Construction of Gas and Steam Engines. P. Plantinga. Shows the difference in working conditions calls for entirely different designs and constructions. 1500 w. Eng News—Jan. 15, 1903.

See also **GAS ENGINE—Steam Compared.**

Germany.—The Development of the Steam Engine in Germany (Die Einführung der Dampfmaschine in Deutschland). Conrad Matschoss. A historical review of steam engineering in Germany, with portraits of engineers and illustrations of old engines. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—June 3, 1905.

Glasgow Exhibition.—Steam Engines at the Glasgow Exhibition. The present article describes Robey & Co.'s horizontal cross-compound engine. Ill. Serial. 1st part. 2200 w. Engr, Lond—May 31, 1901.

See also **GLASGOW EXHIBITION.**

Glasgow Incline.—A Wonderful Old-Time Engine in Scotland; Still Working After Sixty Years' Constant Service. Benjamin Taylor. An illustrated description and historical account of a standing engine for hauling trains up an incline at Glasgow, on the North British Railway. 1100 w. Power—Sept., 1902.

Glasgow Tramways.—The Glasgow Electric Tramways Engines. The engines for this project were divided between English and American makers. This article describes the two English built engines. 1500 w. Engng—Feb. 1, 1901.

The Engines of the Glasgow Tramways. Editorial comment on the engines furnished by the three firms and their trials. 1600 w. Engng—Aug. 22, 1902.

English and American Engines for the Glasgow Tramways. An editorial severely criticizing the Allis engines, and the reports concerning them which have appeared in the British and American papers. 2400 w. Elec Rev, Lond—Aug. 29, 1902.

English and American Engines for Glasgow Tramways. A copy of the figures obtained by Prof. Barr when making his official tests on the Pinkston engines, with brief remarks. 500 w. Elec Rev, Lond—Sept. 12, 1902.

The Glasgow Tramway Engines. Editorial reviewing the leading points in the story of the two types of main engines and their tests. 3300 w. Engng—Sept. 12, 1902.

Tramway Traction Engines for Glasgow. Drawing and descriptive notes of the 800 H. P. engines which have done admirable service in connection with these tramways. 600 w. Engr, Lond—Dec. 5, 1902.

See also **ELECTRIC RAILWAY; ELECTRIC STATION.**

Görlitz.—See **ELECTRIC GENERATING SET—Berlin Power House.**

Görlitz Exposition.—See **STEAM ENGINEERING.**

Governing.—See **Speed Regulation; GOVERNOR.**

Greenwich, London.—The Engines for the London County Council Tramway Power-Station of Greenwich. An illustrated description of these engines, with information concerning the cost and requirements. 3000 w. Tram & Ry Wld—Dec. 10, 1903.

Grevenbroich.—2000-Horse-Power Twin Tandem Steam Engine. An illustrated description of an engine exhibited at Düsseldorf which was built by the Grevenbroich Company. 700 w. Engng—Jan. 9, 1903.

Hamilton-Corliss.—See **Corliss-Hamilton.**

Haniel & Lueg.—See **VALVE GEAR—Cut Off.**

High-Speed.—A Record of the Early Period of High-Speed Engineering. Charles T. Porter. Reminiscences of John F. Allen, and of the infancy of high-speed steam engineering. 1400 w. Trans Am Soc of Mech Engs, No. 877—Dec., 1900.

High-Speed Steam Engines. John Davidson. Read before the Liverpool Engng. Soc. Deals generally with engines of the quick-revolution type, setting forth their advantages over the slow revolution type. Serial. 1st part. 1200 w. Engr, Lond—Jan. 3, 1902.

Vertical High-Speed Engines Abroad. Frank C. Perkins. Illustrated descriptions of power plants containing installations of some of the leading foreign builders. 2500 w. Steam Engng—April, 1902.

High-Speed Engines. Discusses the merits and advantages of high rotary speeds, and the troubles. 1500 w. Engr, Lond—April 4, 1902.

Recollections of the Early Days of the High Speed Engine Industry. John E. Sweet. Read before the Engine B'ldrs. Assn. of the U. S. 3500 w. Ir Age—Dec. 11, 1902.

High-Speed Engines. Charles T. Porter. Discusses the development and probable future changes of these engines, and gives illustrated descriptions of many types, and of matters relating to their operation. 30,000 w. Engr, U S A—June 15, 1903.

Modern High-Speed Steam Engines. Considers the development of the high-speed engine, describing the "Willans" as representing the single-acting type, and the "Belliss" engine for the double-acting type. 2000 w. Engr, Lond—April 15, 1904. Serial. 1st part.

Design of High-Speed Enclosed Steam Engines. An illustrated series of articles dealing with some of the main points to be considered in the design of the details, and mentioning some of the difficulties. Shows the development of the high-speed engine as used for electric lighting and traction. Serial. 1st part. 2800 w. Engr, Lond—Oct. 21, 1904.

Modern British High-Speed Steam Engines. Leo H. Jackson. Gives description of the standing and running parts of a typical engine, considering deviations made by different makers. Serial. 1st part. 4500 w. Cassier's Mag—Aug., 1905.

See also **Electric Generation; Hoy's; Lentz; Sisson.**

History.—The Evolution of the Stationary Steam Engine. Andrew Robert Robertson. From Trans. Inst. C. E. Reviews the history of the development. 5200 w. Prac Engr—Dec. 21, 1900.

The Stationary Engine. An illustrated review of the various stages in the development of this class of steam engine. 6500 w. Engr, U S A—Jan. 15, 1901.

Growth and Development of the Steam Engine. Prof. A. W. Richter. Lecture delivered at the Buttermakers' Assn. Illustrated historical review. 4500 w. Wis Engr—May, 1902.

Wis Engr—May, 1902.

The Reciprocating Steam Engine—Its Status, Its Rivals, and Its Apparent Future. R. H. Thurston. Reviews the development of the steam engine and the wide field it has occupied, commenting briefly on the rivalry of gas engines and steam turbine. 2800 w. Engr, U S A—Jan. 1, 1903.

The Prime Mover and Its Influence on the World's Progress. John E. Sweet. Reviewing the development of the steam engine, and the effects upon civilization and material progress; with numerous illustrations. 4000 w. Engineering Magazine—March, 1904.

Early Steam Engines. A. R. Bell. An illustrated article considering some of the earliest work of inventors. 1800 w. Mach, N Y—June, 1904.

Some Old Engines in Cornwall. Illustrates and describes engines of ancient design. 1000 w. Engr, Lond—Oct. 14, 1904.

Links in the History of the Steam Engine. Gives particulars of some old prints recently found at the British Museum. Illustrations, with reprint of "A Description of the Engine for Raising Water by Fire," with remarks. 4000 w. Engr, Lond—Aug. 11, 1905.

Design and Construction of Steam Engines. Reviews the development briefly, and the improvements of the last 150 years in the present number. Serial. 1st part. 1800 w. Mech Engr—Aug. 19, 1905.

The First Steam Engines out of England (Die Ersten Dampfmaschinen ausserhalb Englands). Conrad Matschoss. A review of early installations of Newcomen and Savery engines on the Continent, from 1715 to 1763, with illustration of a Newcomen engine built by Potter for the Königsberg coal mine in Hungary, in 1722. 3500 w. Zeitschr d Ver Deutscher Ing—Dec. 9, 1905.

See also **Glasgow Incline; High Speed; Newcomen; MARINE ENGINEERING; STEAM ENGINEERING; STEAMSHIP.**

Holland.—Some Steam Engine Installations at Twente (Eenige Machine-Installaties Uitgevoerd in Twente). E. Looman. With illustrations of compound engines recently installed in textile works of Gronau, Ryssen, and Borne, Holland. 2500 w. 3 plates. De Ingenieur—Jan. 24, 1903.

Horizontal.—The Modern Horizontal Steam Engine as Exemplified in British Practice. Leo. H. Jackson. Gives illustrated descriptions of designs manufactured as standard types by British makers. Serial. 1st part. 3500 w. Cassier's Mag—March, 1905.

Horse-Power.—Horse-Power of Steam Engines. Irving A. Taylor. Gives a simple method of arriving at an approximate result in computing the power from the dimensions and other apparent data. 800 w. Elec Wld & Engr—April 23, 1904.

Measuring the Indicator Diagram and Computing the Horse-Power of an Engine. H. H. Kelley. Describes methods employed by engineers. Ills. 1700 w. Engr, U S A—May 1, 1904.

See also **HORSE POWER; STEAM ENGINE TEST—Indicating.**

Hoy.—A New High-Speed Engine. Illustrated description of Hoy's high-speed, single-acting, compound engine, which is extensively used on the Lancashire and Yorkshire Railway. 800 w. Engr, Lond—Jan. 30, 1903.

Hoyois.—The "Hoyois" Steam Engine. Illustrates and describes a single-cylinder engine exhibited at the Liége Exhibition. 500 w. Engng—July 21, 1905.

Hult.—See **ROTARY ENGINE.**

Humboldt.—See **ELECTRIC GENERATING SET.**

Improvements.—Improvements in the Steam Engine. W. H. Wakeman. Practical problems in design and construction, installation and operation met in every day experience. Ill. Serial. 1st part. 2500 w. Mod Mach—Jan., 1901.

Indicating.—See **INDICATOR; INDICATOR DIAGRAM; STEAM ENGINE TEST.**

Inertia.—See **INERTIA.**

Inspection.—The Inspection of a High-Speed Engine after Overhauling. Describes a method of examination recommended before running up an engine after it has left the fitters' hands. 2000 w. Elec Rev, Lond—Dec. 2, 1904.

See also **MOTOR—Longridge Report.**

Internal Surface.—The Internal Surfaces of Steam Engines. W. H. Booth. Discusses points in designing with a view to diminishing the internal surfaces to a minimum, and the question of superheated steam. 2500 w. Engr, U S A—April 15, 1904.

Jacket.—See **STEAM JACKET.**

Lahmeyer Compound Tandem.—500 Horse-Power Horizontal Compound Tandem Engine. Illustrations and brief description of an engine at the Düsseldorf Exhibition, built by the Lahmeyer Co. 500 w. Engng—June 27, 1902.

Leeds Tramway Plant.—See **ELECTRIC STATION.**

Lefèvre, Four-Cylinder.—The Lefèvre Four-Cylinder High-Speed Engine. Illustrates and describes an ingenious type of steam-engine. 1000 w. Engng—Aug. 28, 1903.

A New Four-Cylinder Portable Steam Engine. Translated from "La Nature." Illustrates and describes the Lefèvre motor having four cylinders which make it possible to run it as a compound engine in two different manners, or as a triple expansion engine. It is easily applied to automobile carriages and boats. 1200 w. Sci Am Sup—Sept. 23, 1905.

Lentz.—High-Speed Steam Engine and Governor (Schnellaufende Ventildampfmaschinen und Flachregler). Fr. Freytag. An illustrated description of the Lentz high-speed steam engine, using poppet valves and shaft governor. 4500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Oct. 27, 1900.

Improved Poppet-Valve Engine (Neuerungen an Dampfmaschinen mit Ventilsteuerungen). Fr. Freytag. Illustrated description of the Lentz steam engine, using a combined eccentric and cam valve gear with poppet valves. 8500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Dec. 20, 1902.

Lentz Steam Engines for Driving Electric Generators (Ueber Dampfmaschinen für Elektrische Betriebe, Bauart Lentz). Fr. Freytag. A paper before the Elektrotechnischer Verein, giving an illustrated description of the Lentz steam engines and their piston-valve gear, particularly adapted to the driving of electric generators. 3000 w. Elektrotech Zeitschr—June 11, 1903.

Modern Continental Steam Engines. L. Ramakers. Illustrates and describes engines on the Lentz system. 1500 w. Prac Engr—April 7, 1905.

The Lentz Engine. Illustrated description of a large compound engine for coupling direct to a dynamo, working with superheated steam of high temperature. 800 w. Engr, Lond—April 21, 1905.

Liége Exposition.—See **ELECTRIC GENERATING SET; EXPOSITION; GAS ENGINE;** and under names of steam engines.

Load Diagram.—Load Diagram of a Mill Engine. F. H. Pember. Gives a diagram showing how the data derived from indicator cards may be so arranged that they will present a graphic record of the all-day variations of load. 2000 w. Power—Nov., 1905.

Longridge's Lecture.—See **MOTOR.**

Lubrication.—See **LUBRICATION—Steam Engine.**

McLaren.—Triple-Expansion Engines, South Shields. Illustrated description with report of tests of a surface-condensing, electric-lighting engine. 1800 w. Engr, Lond—Oct. 18, 1901.

Manchester, Eng.—6,000-I.H.-P. Engines for the Manchester Corporation. Illustrated description of a pair of vertical slow-speed engines, which are believed to be the largest at present existing in Europe. 800 w. Engng—April 28, 1905.

Manhattan Power Station.—See **New York Electric Station; ELECTRIC STATION—New York Elevated.**

Manograph.—See **MANOGRAPH.**

Manufacture.—See **Standardization; Westinghouse; ENGINE WORKS; STEAM ENGINE MANUFACTURE.**

Marine.—See **MARINE ENGINE; STEAMBOAT; STEAMSHIP.**

Markham-Corliss.—See **Corliss-Markham.**

Maximum Power.—See **STEAM ENGINEERING—Economy.**

Mechanical Operation.—A Study of the Mechanical Operation of Reciprocating Engines (Contribution à l'Etude du Fonctionnement Mécanique des Machines Alternatives). R. Lelong. A mathematical and graphical discussion of the laws underlying the operation of reciprocating engines, with a view to indicating the directions for improvements. Diagrams. Serial. Part I. 8000 w. Rev de Mécanique—May 31, 1903.

Mechlin Locomotive Works.—600 Horse-Power Horizontal Tandem Compound Condensing Engine. Illustrated description of an engine for driving directly a Jaspar dynamo. The combined plant is ordered for the Mechlin Locomotive Works. 1500 w. Engr, Lond—Nov. 10, 1905.

Melbourne.—Triple-Expansion Engine for Melbourne Corporation. Brief illustrated description. 1200 w. Elec Engr, Lond—June 30, 1905.

Mesta-Corliss.—See **Corliss-Mesta.**

Modern Practice.—Modern Practice in Steam Engine Construction. Illustrates and describes recent improvements, with general remarks. The illustrations are mostly of horizontal engines, but only because this type offers a wider range of examples and practice. 5700 w. Am Elect'n—June, 1901.

Mulhouse Electric Station.—See **Piston Valve.**

Murray.—See **ROLLING-MILL ENGINE.**

Naval College, Dartmouth.—See **MARINE ENGINE.**

Newcastle Electric Station.—Triple-Expansion Engine for Newcastle Tramways. An illustrated detailed description of a recently completed engine for driving one of the generators. 1400 w. Engng—Nov. 27, 1903.

Newcomen.—The Newcomen Engine. Henry Davey. Facts of interest in regard to the invention and construction of the first steam engine—the Atmospheric Engine of Newcomen. Illustrations, with ten appendices. 13,000 w. Inst of Mech Engrs—Oct. 16, 1903.

A Century-Old Colliery Engine—Last Survivor of the Newcomen Type. Benjamin Taylor. Illustrated description of an engine plant at Farme Collieries installed in 1810. 2800 w. Power—March, 1904.

New York Electric Station.—Eight Thousand Horse Power Engines for the Manhattan Power Station. Illustrated detailed description of these powerful engines for driving electric generators. 1700 w. Power—June, 1901.

The Engines of the New York Edison Power Station. Briefly descries this plant, located between 38th and 39th Sts., First Ave. and the East River, and particularly describes the remarkable features of the engines, giving illustrations. 900 w. Sci Am—March 22, 1902.

Engines at the Power Stations, and at the St. Louis Exhibition. Alfred Saxon. Notes on two of the large power stations in New York, and on the engines exhibited at St. Louis. Ills. 2000 w. Inst of Mech Engrs—Jan. 20, 1905.

N. Y. Gas & Electric Co.—See **Westinghouse.**

North British Railway.—See **Glasgow Incline.**

Oscillating.—See **OSCILLATING ENGINE; STEAMSHIP—Ireland.**

Pan American Exposition.—The Engines of the Pan-American Exposition. Illustrated descriptions of engines exhibited in operation. 6000 w. Power—Aug., 1901.
See also **POWER PLANT.**

Parallel.—see **Angular Displacement; Speed Regulation; ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; SPEED VARIATION.**

Paris Exposition.—Steam Engines at the Paris Exposition, 1900 (Die Dampfmotoren an der Weltausstellung in Paris, 1900). A. Stodola. The first installment treats of the exhibits of Gebrüder Sulzer, of Zurich. 1800 w. 1 plate. Schweizerische Bauzeitung—Oct. 27, 1900.

Steam Engines at the Exposition of 1900. From "La Nature." Brief summary of the striking peculiarities among the exhibits, with illustrations. 2700 w. Sci Am Sup—Nov. 17, 1900.

Steam Engines at the Paris Exposition (Die Dampfmaschinen der Pariser Weltausstellung). L. Czischek. The first of a series of illustrated articles describing the various steam engines exhibited at Paris, with critical comments. Serial. Part I. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—July 19, 1901.
See also **Düsseldorf Exposition; Quadruple Expansion; BOILER;** and under sub-headings of builder and places.

Piston Acceleration.—See **PISTON—Acceleration.**

Piston Rods.—Piston Rods of High-Speed Engines. Ernest R. Briggs. Discussion of the use of Prof. Barr's formulae in engine design, and particularly describing design of piston rods, with diagrams. 800 w. Am Mach—Vol. 27, No. 33.

Piston Valve.—Piston-Valve Engine at the Mulhouse Electric Station (Machines à Vapeur a Pistons-Valves de la Nouvelle Centrale d'Electricité de Mulhouse). Fr. Lamey. Describing a cross-compound engine of which each cylinder is provided with four independently operated piston valves. 1800 w. 1 plate. Génie Civil—Nov. 19, 1904.

Steam Engine with Piston Valves (Dampfmaschinen mit Kolbenschiebersteuerung). F. Lamey. Illustrated description of tandem compound condensing engine of 1000 H. P., with piston valves and Frikart valve gear, exhibited at St. Louis by the Elsass Machine Works, of Mulhouse. 2500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Dec. 10, 1904.

See also **Van den Kerchove; VALVE.**

Poppet-Valve.—An American Poppet-Valve Engine. Illustrated description of an engine of special interest from the fact that it is practically the first designed and built in the United States for electric station work with poppet valves. 4000 w. Power—May, 1902.

See also **Lentz; VALVE.**

Portable.—Portable Steam Engines (Lokomobilen). H. Dübbel. A discussion of the agricultural type of portable engines, especialy with a view to fuel economy. 2000 w. Zeitschr d Ver Deutscher Ing—May 11, 1901.

Portable Engine and Saw Bench. Illustrates and describes an engine and self-acting saw bench for pioneer work in forests, light enough to be easily transported. 500 w. Engr, Lond—Feb. 12, 1904.

Portable Steam Engines of To-Day. J. C. R. Adams. The present article discusses some of the theoretical considerations which have played an important part in the development. Ills. Serial. 1st part. 2700 w. Page's Mag—July, 1904.

See also **Lefevre; Wolf; BOILER—Temperature; STEAM ENGINE TEST.**

Port Area.—See **STEAM ENGINEERING—Steam Ports.**

Pounding.—Some Causes and Remedies for Pounding in Engines. W. E. Crane. Calls attention to errors that cause this trouble, and way to remedy. Ills. 1200 w. Power—May, 1904.

Power Increase.—How to Increase the Horse-Power of a Steam Engine. D. B. Dixon. Discusses ways in which the horse-power can be increased. 1800 w. Am Mfr—Aug. 8, 1901.

Power Station.—See **Electric Generation; N. Y. Electric Etation; ELECTRIC GENERATING SET; ELECTRIC STATION.**

Quadruple Expansion.—Quadruple Expansion Steam Engine (Machine à Vapeur à Quadruple Expansion). G. Eude. A description of the Bourdon trunk quarduple expansion engine, exhibited at Paris. 1800 w. Génie Civil—June 8, 1901.

Reavell, Ipswich.—See **ELECTRIC GENERATING SET.**

Rebuilding.—Rebuilding an Engine. W. H. Wakeman. Describes details in connection with the repair of a second-hand engine. Ill. Serial. 1st part. 2200 w. Engr, U S A—Aug. 1, 1903.

Regulation.—See Speed Regulation; ELECTRIC GENERATING SET; ELECTRIC GENERATOR; ELECTRIC GENERATOR, ALTERNATING; GOVERNOR; SPEED VARIATION.

Reheaters.—See STEAM ENGINEERING; SUPERHEATED STEAM—Compound Engines.

Relay.—See GOVERNOR.

Repairs.—An Emergency Engine Repair. Lewis F. Lyne. Illustrated description of repairs made to an engine of the center crank type, which had been wrecked by the breaking of a rod strap on the cross-head and of the connecting rod. 1100 w. Power—Sept., 1904.

Reynolds Corliss.—See Allis; Corliss, Markham.

Ringhoffer.—See ELECTRIC GENERATING SET.

Robb-Armstrong.—The Robb-Armstrong Engine for Electric Traction. Illustrated description of an engine much used in Canada and foreign countries. 1800 w. Tram & Ry Wld—Oct. 8, 1903.

Robb-Armstrong Corliss Engines. Illustrates and describes the interesting features of these engines for slow and medium speeds. 1500 w. Can Engr—July, 1903.

Robey.—See Glasgow Exhibition; ELECTRIC GENERATING SET.

Rolling Mill.—See ROLLING-MILL ENGINE.

Rotary.—See ROTARY ENGINE.

Routin Regulator.—See Speed Regulation; ELECTRIC GENERATING SET—Regulation.

St. Louis Exposition.—Some Large Engines in the Power Plant of the St. Louis Exhibition. An illustrated article dealing with details of the Reynolds-Corliss, Hamilton-Corliss, Willans, and Greenwald Four-Valve Engines. 2500 w. Eng News—Dec. 8, 1204.

See also New York Electric Station; ST. LOUIS EXPOSITION.

Scott Cornish Cycle.—12 Horse-Power "Scott" Cornish Cycle Engine. Illustrated description of an engine constructed for driving the automatic stokers at the Battersea electric lighting station. 800 w. Engng—March 29, 1901.

Selection.—The Selection of a Steam Engine. William D. Ennis. Considers points that should receive careful attention before purchasing. 1200 w. Am Elect'n—July, 1901.

Choosing an Engine for an Isolated Plant. H. S. Knowlton. Discusses points to be considered in the selection of engines for certain work. 2700 w. Cassier's Mag—July, 1905.

Semi-Portable.—See Wolf; STEAM ENGINE TEST; SUPERHEATED STEAM—Wolf Engine.

Sisson High Speed.—Sisson High Speed Compound Steam Engine (Machine à Vapeur Compound, a Grande Vitesse Système Sisson). A well illustrated description of a vertical engine, built by Wm. Sisson, of Gloucester, Eng., and exhibited at Glasgow, 1901. 1 plate. 800 w. Génie Civil—March 1, 1902.

Sleeper.—The Sleeper Patent Steam Engine. G. D. Hartley. Illustrates an engine recently invented by Frank H. Sleeper, of Montreal, that has many novel features. 1800 w. Can Elec News—Dec., 1902.

Slow.—Low and Medium-Speed Engines. J. W. Thompson. An illustrated detailed description of slow and medium rotative speeds; the characteristics of the various styles; their adjustment, etc. 1700 w. Engr, U S A—June 15, 1903.

South Shields.—See McLaren.

Specifications.—Specifications for Steam Engines. William H. Bryan. Letter on the best method of writing specifications for engines for any service. 1000 w. Eng Rec—Nov. 3, 1900.

Steam Consumption and Maximum Horse-Power. Discusses the requirements in the specifications of condensing engines. 1100 w. Power—Sept., 1902.

Speed Changing.—Changing the Speed of Engines. W. H. Wakeman. An explanation of the principles involved. Ill. 900 w. Power—Feb., 1903.

Speed Recorder.—See GOVERNOR; SPEED RECORDER.

Speed Regulation.—The Design of Steam Engines with Respect of Regulation (Détermination de Certains Elements des Moteurs à Vapeur en Vue de la Régulation). M. Delaporte. Showing the influence of the dimensions of ports, steam chests, receivers, etc., upon the regulation, and deriving formulas for their proportion. 3000 w. Revue de Mécanique—Dec. 31, 1900.

The Regulation of Steam Engines (Der Reguliervorgang bei Dampfmaschinen). Dr. B. Rülf. A graphical and mathematical analysis of the conditions affecting the speed variations of reciprocating engines, and the action of regulating devices. Two articles. 5500 w. Zeitschr d Ver Deutscher Ing—Aug. 30, Sept. 13, 1902.

On the Governing of Engines for Alternating Current-Supply. G. R. J. Parkinson. Remarks applying more particularly to the method of connecting alternators directly to a medium-speed engine. 1000 w. Elec Rev, Lond—Dec. 5, 1902.

Regulation of Engines for Driving Dynamos (Régulation des Moteurs Appliqués à la Commande des Machines Dynamo-Electriques). R. V. Picou. A discussion of the causes of speed variation in electrical generating sets and the modifications in the governing apparatus devised to improve the regulation. 3000 w. Mem Soc Ing Civ de France—Oct., 1903.

Routin's Electro-Mechanical Compounding System (Das Elektromechanische Compoundirungssystem von Routin). F. Brock. Description, with diagram, of a system for governing dynamos driven by steam or water, in which the admission valve and the field excitation are simultaneously and instantaneously regulated. 1200 w. Elektrotech Zeitschr—Jan. 14, 1904.

A Graphical Treatment of the Prolem of Speed Regulation (Das Regulierproblem in Vorwiegend Graphischer Behandlung). Dr. A. Koob. An exhaustive graphical treatment of the forces acting in steam engines with regard to the control and regulation of speed. Serial. Part I. Zeitschr d Ver Deutscher Ing—Feb. 27, 1904.

Steam Engine Speed Regulation. J. J. M'-Guire. Explains the purpose of the governor, describing types. 1500 w. Am Elect'n—May, 1904.

Electrical vs. Mechanical Speed Control. Notes the most common mechanical methods used, and the methods used for electrical control, comparing the working, cost, advantages, &c. 4800 w. Engr, U S A—Oct. 16, 1905.

See also ELECTRIC GENERATING SET; GOVERNOR; SPEED VARIATION.

Speed Variation.—See Speed Regulation; SPEED VARIATION.

Standardization.—Papers Read at the Annual Meeting of the Engine Builders' Association. Official abstracts of papers by H. C. Ebert, H. G. Reist, and E. J. Armstrong. 5300 w. Eng News—Dec. 20, 1900.

See also ELECTRIC APPARATUS; ELECTRIC GENERATING SET; STEAM ENGINE TEST.

Starting.—Starting a Cross Compound Condensing Engine. Detailed directions of the method to be followed. 4000 w. Power—Nov., 1901.
See also STEAM TURBINE.

Steam Consumption.—See STEAM ENGINEERING; STEAM ENGINE TEST.

Steam Turbine Compared.—See STEAM ENGINEERING; STEAM TURBINE—Reciprocating Engine Compared.

Stearns Compound.—See AUTOMOBILE, STEAM.

Steel Works.—Heavy Duty Engines in Steel Plants. Arthur L. Strickland. Read before the Ohio Soc. of Mech., Elec., and Steam Engrs. Briefly describes the exterior process of manufacturing Bessemer steel, and the heavy duty engine service, explaining the kinds of engines used and the work expected of them. 1500 w. Ir Trd Rev—Dec. 1, 1904.

Stork.—See ELECTRIC GENERATING SET.

Stuffing Boxes.—Engines and Pumps Without Stuffing Boxes. Andrew Watson. A paper read before the Min. Inst. of Scotland, on stuffing boxes without glands. Also abstract of discussion. Ill. 2000 w. Mech Engr—Aug. 29, 1903.
See also PACKING; STUFFING BOX.

Sulzer.—See Carels-Sulzer; ELECTRIC GENERATING SET—Berlin Power House; STEAM ENGINE TEST.

Superheated Steam.—A Remarkable English Engine. Illustrated article, reporting a remarkable performance of a steam engine of moderate size, built by Easton & Co. for the British Xylonite Co. and using the Schmidt system of superheating. 1200 w. Am Elect'n—April, 1903.

See also Portable; Wolf Portable; **LOCOMOTIVE; STEAM ENGINE TEST; SUPERHEATED STEAM.**

Test.—See also **Efficiency; Experimental Study; STEAM ENGINEERING—Economy; STEAM ENGINE TEST; SUPERHEATED STEAM—Piston Engines.**

Three-Cylinder Compound.—New Standard Three-Cylinder Compound Engine. Illustrated description of an engine designed for high speeds, uniform turning moment, and efficiency under varying conditions of load. 1400 w. Elec Rev, Lond —Nov. 22, 1901.

Tosi.—The Tosi Engines. Illustrated description of horizontal tandem engines made in Italy for the Milan-Verese Electric Railway. 1000 w. Elec Engr, Lond—April 25, 1902.

The Franco Tosi Engines. A. H. Allen. Illustrated detailed description of types made in Italy. 1300 w. Engr, U S A—Nov. 2, 1903.

Tosi at Paris.—Horizontal Steam Engine of 1200 Horse Power (Machine à Vapeur de 1200 Chevaux). Illustrated description of the triple-expansion, poppet-valve engine exhibited at Paris by F. Tosi, of Legnano, Italy. 1200 w. 1 plate. Génie Civil—March 2, 1901.

Triple Expansion.—A Pacific Coast Engine. Illustrates and describes interesting features of a triple-expansion engine built to drive an alternating-current generator of 3,500 kw. capacity. 1200 w. Am Mach—Vol. 28, No. 41.

See also **MARINE ENGINE**; and under names of builders and places.

Triple-Expansion vs. Compound.—Possible Advantages of the Triple-Expansion Engine Over the Compound. E. F. Williams. Explains the merits and advantages of triple-expansion engines. 1800 w. Engr, U S A—Oct. 16, 1905.

Truck Propelling.—See **AUTOMOBILE, STEAM—Trucks.**

Twentieth Century.—The Steam Engine at the Beginning of the Twentieth Century (Die Dampfmaschine bei Beginn des 20. Jahrhunderts). Hr. Straube. A paper before the Karlsruhe branch of the Ver. Deutsch Ing., giving a general review of steam engineering. 5000 w. Zeitschr d Ver Deutscher Ing—April 6, 1901.

Vacuum.—See **CONDENSER; STEAM ENGINEERING.**

Valve Replacing.—See **VALVE—Replacing.**

Variety.—Variety in Steam Engines. Remarks on the great variety of engines for different uses, with a review of the advantages and disadvantages of horizontal and vertical reciprocating steam engines and horizontal and vertical steam turbines. Serial. 1st part. 2000 w. Mech Engr —Oct. 8, 1904.

Van den Kerchove.—The Van den Kerchove Piston-Valve Engine. Illustrated description of a horizontal compound tandem steam engine with piston-valves, exhibited at the Liege Exhibition. 1500 w. Engng—June 30, 1905.

See also **ELECTRIC GENERATING SET; STEAM ENGINE TEST.**

Vibrating.—See **Sleeper.**

Vibrations.—See **Balancing; LOCOMOTIVE; MARINE ENGINE—Balancing.**

Walker-on-Tyne.—Steam Engine for Walker-on-Tyne Electric Station. Illustrated description of a 1400 indicated horse-power set of triple-expansion engines, specially interesting in view of the great economy attained in steam consumption. 700 w. Engng—June 14, 1901.

Wannieck.—Compound Engine of 150 Horse-Power for Electric Driving (Verbunddampfmaschine von 150 Ps. für Dynamobetrieb). L. Kliment. Giving sectional drawings showing special valves, valve gear and governor of engine built by Fried. Wannieck & Co., of Brünn, Austria. 1800 w. Zeitschr d Ver Deutscher Ing—Dec. 29, 1900.

Westinghouse.—The Westinghouse-Corliss Engine. Illustrates and describes in detail this vertical cross compound engine. 1700 w. Power—March, 1901.

6000-H. P. Westinghouse Engines for the New York Gas and Electric Light, Heat and Power Company. Illustrated description. 2000 w. Eng News—May 23, 1901.

Large Work by the Westinghouse Machine Company. Illustrates some of the recent work of this firm on large vertical Corliss engines, giving description. 1200 w. Am Mach—Oct. 3, 1901.

Modern Engine Building. Notes taken at the shops of the Westinghouse Machine Company. Ill. 3000 w. Mach, N. Y.—Jan., 1902.

Willans.—See **Air Buffer; High Speed.**

Williams.—The Williams Engine. Illustrated description of a new type of vertical compound engine. 1500 w. Power—Jan., 1903.

Wizzell Balanced.—The Wizzell Balanced Engine. R. J. Isaacson. Illustrated description with statement of advantages claimed. 2300 w. Mech Engr—April 26, 1902.

Wolf Portable.—Modern Portable Engines (Moderne Lokomobilen). Describing especially the portable and semi-portable engines of Wolf, of Magdeburg, which have given excellent economical performances. Three articles. 7500 w. Oesterr Wochenschr f d Oeffent Baudienst—May 27, June 3, 10, 1905.

See also **STEAM ENGINE TEST; SUPERHEATED STEAM; VALVE GEAR.**

Youngstown, O.—See **ROLLING-MILL ENGINE.**

STEAM ENGINE ACCIDENT.

See also **MOTOR—Longridge Report; STEAM PLANT.**

Water in Cylinder.—Water in Engine Cylinders. An account of accidents due to this cause, with suggestions for avoiding them. Ill. 1600 w. Power —August, 1901.

STEAM ENGINEERING.

See also BOILER; COMBUSTION; CONDENSER; FUEL; INDICATOR; INDICATOR DIAGRAM; MARINE ENGINEERING; MECHANICAL DRAFT; MECHANICAL STOKING; NAVAL ENGINEERING; STEAM; STEAM ENGINE; STEAM-ENGINE TEST; STEAM GENERATION; STEAM JACKET; STEAM PLANT; STEAM SEPARATOR; SUPERHEATED STEAM; THERMODYNAMICS.

Power Plant Engineering, Past and Present. Editorial review of the progress in this field during the last century. 2700 w. Engr, U S A—Jan. 15, 1901.

The Utilization of Heat in the Steam Engine (Die Ziele und die Erfolge in der Wärmeausnutzung bei der Dampfmaschine). W. Lynen. A paper before the Aachen branch of the Ver Deutsch Ing, giving an illustrated and clear exposition of the principles of thermodynamics, steam engineering, cylinder condensation, etc. Serial. Part I. 6000 w. Zeitschr d Ver Deutscher Ing—March 23, 1901.

Some Notes on the Generation of Steam and Its Economical Application. H. A. Clark. Abstract of a paper presented to the Yorkshire College Engng Soc. 2100 w. Horseless Age—Jan. 8, 1902.

Accumulator.—See **Rateau Accumulator.**

Blow-Off Tanks.—See **BLOW-OFF TANK.**

British.—The Present Condition of Steam Engineering in Great Britain. W. H. Booth. Reviews the changes of the past twenty years, criticising some points. 4300 w. Power—Dec., 1902.

Calorimetry.—See **CALORIMETRY; SUPERHEATED STEAM—Wiredrawing.**

Clearance.—A Test of Cylinder Clearance. An account of an exhaustive test to determine the effect of clearance upon the question of steam economy. 4500 w. Power—May, 1901.

An Experiment on the Effect of Clearance on the Economy of a Small Steam Engine. Albert Kingsbury. Describes experimental work undertaken to determine the effect of varying clearance upon the steam consumption of a small automatic engine. 1800 w. Trans Am Soc of Mech Engrs, No. 923—Dec., 1901.

Effect of Cylinder Clearance upon Steam Economy. Ira C. Hubbell. Illustrates graphically and demonstrates the important relation between cylinder clearance and steam consumption. 4300 w. St. Louis Ry Club—Dec. 31, 1901.

Effect of Cylinder Clearance Upon Steam Economy. Ira C. Hubbell. Discusses some interesting practical experiments made during the last two years. 1800 w. St. Louis Ry Club—March 14, 1902.

The Effect of Clearance and Compression of Steam Consumption. C. H. Benjamin. Reviews the results of various experimental investigations. 1200 w. Engr, U S A—April 15, 1905.
See also **Compression; LOCOMOTIVE CYLINDER.**

Coal vs. Gas.—See **Heating Surface.**

Comparative Practice.—English, American and Continental Steam Engineering. Philip Dawson. The first of a series of papers treating of modern power-house practice. The present one is devoted to the characteristics of British engine types and practices. 3500 w. Engineering Magazine—November, 1901.

English, American and Continental Steam Engineering. Philip Dawson. Mr. Dawson's second paper treats specifically of British lighting and traction plants and their equipment, with illustrations of many important stations. 4500 w. Engineering Magazine—Dec., 1901.

English, American and Continental Steam Engineering. Philip Dawson. Mr. Dawson's third paper discusses Continental practice, giving illustrations of numerous important power plants in various parts of Europe. 4500 w. Engineering Magazine—Jan., 1902.

English, American and Continental Steam Engineering. Philip Dawson. Mr. Dawson's concluding paper is devoted to American engines and traction power houses, with numerous illustrations. 4000 w. Engineering Magazine—Feb., 1902.

Compression.—The Influence of Clearance and Compression Upon Steam Consumption (Ein fluss des Schädlichen Raumes und der Kompression auf den Dampfverbrauch). H. Dübbel. A review of the researches of Zeuner, Doerfel, Dwelshauvers, and others, showing little or no loss due to compression, and attributing the results of Dwelshauvers to leaky valves and piston. 4000 w. Zeitschr d Ver Deutscher Ing—Feb. 9, 1901.

The Laws of Expansion and Compression (Sur les Lois de la Détente es de la Compression). V. Dwelshauvers-Dery & A. Duchesne. An examination of the principles involved in the compression of steam in an engine cylinder, with experiments sustaining the author's opinion of the wastefulness of clearance. 4000 w. Revue de Mécanique —July 31, 1901.

Compression in Steam-Engine Cylinders. C. L. Browne. An examination of the experiments showing losses with high compression, comparing these with the better results obtained in actual practice with modern large engines. 3500 w. Elec Engr, Lond—March 27, 1903.

Tests upon the Influence of Compression upon Steam Engine Economy (Versuche über den Oekonomischen Einfluss der Kompression bei Dampfmaschinen). Dr. Herbert Klemperer. Discussing experiments made at the laboratory of the Dresden Polytechnic, showing the conditions under which compression may partially overcome the evils of clearance. 5000 w. Zeitschr d Ver Deutscher Ing—May 20, 1905.

Efficiency in Compression in Steam Engines. Prof. Robert H. Smith. Discusses the most efficient limit of compression, the efficiency being measured by horse-power per unit quantity of steam used per hour. 2500 w. Engr, Lond—Nov. 3, 1905.

Condensation.—Condensation Losses in Engine Cylinders. George T. Hanchett. Explains what is known as Hirn losses, gives the method of determining the economy of an engine by the use of the formula of Robert C. Heck, which gives satisfactory results. 1600 w. Cent Sta—June, 1905.

Condenser Tubing.—See **CONDENSER—Tubing.**

Cotton Mill.—Possible Additional Economics at the Steam End of the Mill. Abstract of a paper by O. C. Woolson, before the New England Cotton Mfrs. Assn., on the economy attainable by careful attention to methods of handling coal and ashes. 1800 w. Eng Rec—May 4, 1901.

Cut-Off.—See **INDICATOR.**

Cycle Analysis.—See **THERMODYNAMICS.**

Cylinder Clearance.—See **Clearance; LOCOMOTIVE CYLINDER.**

Cylinder Dimensions.—See **CYLINDER—Dimensions.**

Donkin Revealer.—Theory of the Steam Engine and the Donkin Revealer (La Théorie de la Machine à Vapeur et le Révélateur Donkin). Joseph Nadal. A discussion of cylinder condensation as modified by the results obtained with the Donkin revealer. 4500 w. Revue de Mécanique—Dec. 31, 1900.

Drips.—The Disposal of Drips. C. G. Robbins. Considers the handling of "low-pressure" and "high-pressure" drips of condensed steam. Ill. 2500 w. Power—Dec., 1902.

Economiser.—See **ECONOMIZER.**

Economy.—Economy in Steam Engine Practice. John Goodman. Read at Inst. of Min. Engs., England. Considers what should be avoided, and the essentials details. 2800 w. Naut Gas—Dec. 27, 1900.

The Economical Production and Utilization of Steam (Note sur les Dispositions à Prendre pour Arriver a la Production et a l'Emploi Economique de la Vapeur). Walther Meunier. From the "Bul de la Soc Ind de Mulhouse," giving advice on the equipment and management of steam plants. 2000 w. Métallurgie—Jan. 15, 1902.

Heat Economy of the Steam Engine. Translated from Prof. Lynen's "Die Wärmeausnutzung bei der Dampfmaschine." Ill. 5600 w. Stevens Inst —Oct., 1903.

The Best Economy of the Piston Steam Engine at the Advent of the Steam Turbine. J. E. Denton. Read before the Int. Cong. of Arts and Sciences at St. Louis. Reviews the development of steam-engine economy in engines of various types, showing that the turbine is already a formidable competitor. 5000 w. Eng News—Dec. 8, 1904.

The Best Economy of the Piston Steam Engine at the Advent of the Steam Turbine. Prof. J. E. Denton. Read before the Mech. Sec. of the Int. Cong. of Arts and Sciences. Traces the development of economy in marine and stationary engines, comparing the economy of the piston engine and the steam turbine, &c. 5500 w. Eng Rec—Feb. 25, 1905.

Suggestions for Steam Economy. Wm. McKay. Read before the Can. Elec. Assn. A discussion of some of the principles upon which economy in the use of steam depends. 2800 w. Can Elec News —June, 1905.

Suggestions for Steam Economy. William McKay. Read before the Canadian Elec. Assn. Discusses some of the principles upon which economy in the use of steam depends. 2500 w. Sci Am Sup—Oct. 14, 1905.

See also **BOILER PLANT; STEAM GENERATION; STEAM PLANT.**

Electric Stations.—Steam Practice in American Electric Light and Power Plants. George H. Barrus, George I. Rockwood, H. C. Meyer, Jr., and Charles W. Oliver. Articles by the above authors, dealing with boiler practice, piping, engines, etc. Ill. 9500 w. Am Elect'n—June, 1903.

See also **BOILER; BOILER PLANT; ELECTRIC GENERATING SET; ELECTRIC STATION; POWER PLANT; STEAM ENGINE; STEAM PLANT.**

European.—Modern Steam Engine Practice Abroad. Frank C. Perkins. Considers methods and general design in modern central stations in England, France, Belgium, Germany and Austria. Ill. 1700 w. Am Mfr—March 6, 1902.

Steam Engineering in Continental Europe. A. Bollinckx. Reports an unsettled period, and reviews the improvements in course of trial. 900 w. Power—Dec., 1902.

Exhaust.—See **Exhaust Utilization; Rateau Accumulator; Wheaton Exhaust; HEATING—Central Station; Exhaust.**

Exhaust Pipes.—Exhaust Pipes for Condensing Engines. Discusses the faults in the design of exhaust pipes. 1000 w. Eng Rec—Nov. 7, 1900.

Exhaust Utilization.—Heating Value of Exhaust Steam at Electric Stations. Alton D. Adams. A discussion of the various methods of utilizing the exhaust steam and so adding very materially to the present revenues. 3200 w. Elec Rev, N Y—Nov. 14, 1900.

Utilizing Waste Steam in Shops. Illustrated description of the method adopted in the Grand Trunk shops, in Montreal. 1800 w. Ir Age—April 27, 1905.

Increasing Profits of a Central Station. George E. Walsh. Calls attention to methods of economizing by utilizing exhaust steam, hot water circulating systems, etc. 2500 w. Am Elect'n—Nov., 1905.

See also **HEATING—Central Station; Exhaust Steam; HOISTING ENGINE.**

Flue Gases.—See **ECONOMIZER.**

Görlitz Exposition.—Steam Boilers and Engines at the Görlits Industrial Exposition (Die Dampfkessel und Dampfmaschinen auf der Niederschlesischen Gewerbe—und Industrie Ausstellung Görlits 1905). Dr. Forster. An illustrated review, describing water-tube boilers, steam fittings, and engines of recent German design. 4000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Nov. 18, 1905.

Heating Surfaces.—The Relations Between Heating Surfaces with Coal and Gas Fuel (Das Verhältniss der Heizflächen Zwischen Kohlen und Gasheizung). M. Grellert. A comparison of the relative advantages of coal and gas for generating steam and heating water. Ill. 1800 w. Gesundheits Ing—Nov. 15, 1901.

History.—A Century of Progress in Steam Engineering. A. F. Nagle. Considers the position one hundred years ago, the progress during the century, and what remains to be accomplished. 3000 w. Am Elect'n—Jan., 1901.

Steam Power Generation. G. Croydon Marks. A review of the earliest attempts at the generation of steam power. Ill. Serial. 1st part. 1600 w. Prac Engr—Nov. 22, 1901.

See also United States History; MARINE ENGINEERING; STEAM ENGINE; STEAM PLANT; STEAMSHIP.

Joy.—See LOCOMOTIVE; MARINE ENGINE—Assistant Cylinder.

Loop.—STEAM LOOP.

Marine.—See MARINE ENGINE; MARINE ENGINEERING.

Mean Effective Pressure.—A Graphical Determination of Mean Effective Pressure. Sidney Graves Koon. A series of curves, with explanation, of mean effective pressure in steam-engine cylinders, for the purpose of facilitating the preliminary design of engines. 800 w. Sibley Jour Mech Engng—Dec. 1, 1902.

Naval.—See NAVAL ENGINEERING.

Paper and Pulp Mills.—See PAPER MANUFACTURE—Steam Engineering.

Piston Speed.—Piston Speed. The first of a set of tables dealing with horse-power and other calculations connected with indicator diagrams, and steam engine capacities and efficiencies. It is desired that their accuracy shall be above question. Serial. 1st part. 1000 w. Power—Feb., 1901.

A Piston Speed Chart. Sanford H. Fry. A chart designed to give the piston speed corresponding to various rotative speeds in engines having strokes from 10 to 36 inches in length, with the method of working with it. 900 w. Am Mach—June 27, 1901.

Pressure.—See Compression; BOILER.

Pressure Reduction Valves.—See VALVE.

Rateau Accumulator.—Note on a Regenerative Accumulator and Its Application for Using Exhaust Steam. M. A. Rateau. Illustrates and describes a new apparatus intended to allow the use of exhaust steam from machines having intermittent action, such as winding engines or the reversible engines of rolling mills. 700 w. Inst of Mech Engrs—Glasgow Congress, 1901.

Note on a Regenerative Accumulator and Its Application for Using Exhaust and Its Application for Using Exhaust Steam. M. A. Rateau. Read before the Glasgow Congress. Illustrates a new apparatus intended to allow the use of the exhaust steam from machines having intermittent action. 700 w. Elec Engr, Lond—Nov. 8, 1901.

A Regenerative Accumulator for Exhaust Steam. Illustrated description of an apparatus receiving exhaust steam from engines having intermittent duty and furnishing low-pressure steam to engines requiring a steady supply. 500 w. Eng Rec—Nov. 9, 1901.

The Rateau Steam Accumulator (Accumulateur de Vapeur Système Rateau). Ch. Dantin. Describing and illustrating devices for equalizing the pressure of exhaust steam from pumps and other high-pressure machines, enabling it to be used in steam turbines. 3500 w. 1 plate. Génie Civil—March 12, 1904.

Utilising the Exhaust of Intermittently-Working Engines. J. Walter Pearse. Illustrates and describes Prof. Rateau's system of steam accumulator regenerator and low-pressure steam turbine for utilizing waste steam. 4000 w. Engng Rev—March, 1904.

The Steam Turbine as an Exhaust-Steam Utiliser. From "Le Génie Civil." Describes an installation in the mines at Bruay, where a combination of accumulator and turbine is used as brought out by Prof. Rateau. 2000 w. Eng Rec—April 23, 1904.

The Utilization of Exhaust Steam, from Engines Acting Intermittently, by Means of Regenerative Steam Accumulators and of Low-Pressure Turbines on the Rateau System. Emile Demenge. An illustrated description of this system and the applications already in operation. 5600 w. Iron & Steel Inst—Oct., 1904.

Utilization of Exhaust Steam in Connection with Low Pressure Steam Turbines. Mons. Leonce Battu. Presents the advantages of the Rateau system and some of its applications. Discussion and illustrations. 12,000 w. Jour W Soc of Engrs—Oct., 1904.

The Utilisation of the Exhaust Steam of Intermittent Motors (Abdampf-Verwertung Intermittierender Maschinen in Berg-und Hüttenwerken). W. Küppers. With especial reference to the use of the Rateau steam accumulator for equalizing exhaust steam pressures for use with the low-pressure steam turbine. 1800 w. Glasers Annalen—Nov. 15, 1904.

The Utilization of Exhaust Steam (L'Utilisation des Vapeurs d'Echappement). P. Chaleil. A review of the Rateau steam accumulator, and its application to the regulation of exhaust steam for use in the low-pressure steam turbine. 3500 w. Rev Gen d Sciences—Nov. 30, 1904.

The Utilization of Exhaust Steam by Means of Rateau Heat Accumulators and Low-Pressure Steam Turbines (Die Verwertung des Abdampfes durch Anwendung von Akkumulatoren und Niederdruckdampfturbinen. System Rateau). Fritz Krull. Paper before the Mining and Metallurgical Congress at Liége, giving a description of system for utilizing the exhaust steam from steam engines, working intermittently, particularly winding engines. 12,500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 2, 1905.

See also STEAM TURBINE—Exhaust Steam; Rateau.

Receivers.—Something About Receivers. W. H. Wakeman. Considers points in piping receivers of steam plants. Ills. 1200 w. Power—Sept., 1905.

See also STEAM ENGINE TEST—Compound Receiver Drop.

Regenerative Accumulator.—See Rateau Accumulator.

Reheaters.—The Use of Reheaters in Compound Engines. Abstract of a paper by George H. Barrus, read before the New England Cotton Mfrs. Assn., giving valuable data based on tests by the author. 1700 w. Eng Rec—May 9, 1903.

The Use of Reheaters in Compound Engines. George H. Barrus. Abstract of a paper presented to the New England Cotton Mfrs. Assn. Gives results of tests made by the writer, discussing the effects noticed. 2000 w. Power—Sept., 1903.

On the Economy of Reheaters. Ernest R. Briggs. An examination of the principal reheater cycles in use on various engines. 2500 w. Engr, Lond—Feb. 10, 1905.

See also SUPERHEATED STEAM—Compound Engines.

Safety Valve.—See SAFETY VALVE.

Separators.—See STEAM SEPARATOR.

Slide Valve.—See VALVE—Slide.

Steam Ports.—The Dimensions of Steam Ports and Passages for Engines (Die Abmessungen der Steuerkanäle der Dampfmaschinen). M. F. Gutermuth. An examination of the influence of the point of cut-off upon the proportions of steam passages. 3500 w. Zeitschr d Ver Deutscher Ing—March 5, 1904.

On Port Areas for Steam Engines. M. F. Gutermuth. Translated from the "Zeitschrift des Vereines Deutscher Ingenieure." An illustrated study of the behavior of the flow of steam and the influence of the point of cut-off upon the proportions of steam passages. 3500 w. Jour Am Soc of Nav Engrs—May, 1904.

Superheated Steam.—See SUPERHEATED STEAM.

Thermal Diagrams.—Thermal Diagrams and Their Practical Use. Hugo Diemer. Gives methods for constructing thermal diagrams, which with information given by indicator cards and other data usually taken during an engine test, will disclose all heat interchanges and heat relationship. 2500 w. Bul Univ of Kansas. Vol. II., No. 6—Nov., 1903.

See also **THERMODYNAMICS.**

Trap.—See **STEAM TRAP.**

Turbine vs. Reciprocating.—See **STEAM TURBINE—Reciprocating Engine Compared.**

United States History.—Steam Engineering in the United States in 1838. An abstract of a report by the secretary of the treasury containing a census of the stationary, locomotive and marine engines in use up to that time in the U. S., and an account of the accidents in steam plants. 2400 w. Eng Rec—March 16, 1901.

Vacuum Condensing.—See **CONDENSER—Vacuum.**

Valve.—See **VALVE.**

Valve Gear.—See **VALVE GEAR.**

Wastes.—Neglected Heat Wastes. R. A. Douglass. Discusses losses from radiation, leakages, excessive use of the blow-off for flushing, etc. 2000 w. Am Elect'n Nov., 1901.

See also **Exhaust Utilization.**

Water in Steam.—Water in Steam. James Andrews. Read before the Glasgow Tech. Col. Sci. Soc. Gives rules for calculating the rate of expansion, the dimensions of cylinders, mean pressure, etc., and discusses steam jackets, and means of securing economy in steam consumption in the present article. Serial. 1st part. 2000 w. Mech Engr—May 16, 1903.

Wheaton Exhaust.—The Wheaton Variable Exhaust. Brief illustrated description with statement of advantages claimed. 400 w. Ry & Loc Engng—Sept., 1905.

Wiredrawing.—See **SUPERHEATED STEAM.**

STEAM ENGINE EXHIBITION.

See **ELECTRIC GENERATING SET; EXPOSITION; STEAM ENGINE; STEAM ENGINEERING.**

STEAM ENGINE MANUFACTURE.

See also **ENGINE WORKS; STEAM ENGINE.**

Some Factors Affecting the Economical Manufacture of Steam Engines. William Thompson. Read at the Glasgow Congress. The points discussed are the premium system, tools, arrangement of tools, shops, standardisation, etc. 3500 w. Engs' Gas—Nov., 1901.

Machine Tools. — See **MACHINE TOOL—Engine Builders'.**

Westinghouse.—See **STEAM ENGINE.**

STEAM ENGINE TEST.

See also **BOILER TEST; INDICATOR; STEAM ENGINE; STEAM ENGINEERING; STEAM PLANT.**

Steam Engine Trials. Editorial commending a set of rules, issued by a Continental firm, for the occasional testing of engines to see whether they are falling away from their early excellence. 1400 w. Engng—Feb. 14, 1902.

Experiments on a Steam Engine. Bryan Donkin. An account of experiments made to test an engine in working conditions, while varying within certain limits the speed, power, pressure of steam, and amount of vacuum, and to determine the effect on the consumption and economy of the engine. 2800 w. Engr, Lond—May 23, 1902.

Some Experiments on Steam-Engine Economy. R. L. Weighton. Records the results of two separate and distinct sets of experiments bearing upon the economical performance of the steam-engine. 2 plates. 3000 w. Inst of Mech Engrs—July 30, 1902.

Engine Tests. H. F. Schmidt. Remarks applying to practical tests that should be frequently made by the engineer in charge. 1800 w. Am Elect'n—Aug., 1902.

A Few Points on Engine Testing. An interview with Mr. George H. Barrus. 3000 w. Engr, U S A—Aug. 1, 1903.

Am. Soc. M. E. Report.—See **Standard.**

Augsburg-Nuremberg.—One Hundred Steam Engine Tests (Ein Hundert Dampfverbrauchversuche). J. Krumper. A tabulated discussion of economy tests upon a large number of steam engines of various types, built by the United Augsburg and Nürnberg Works. Serial. Part I. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 12, 1905.

Bates-Corliss.—Test of a 65 H.-P. Bates-Corliss Engine. Charles A. Happin. Tests made at the plant of the Twin City Water Works, Urbana, Ill. 1300 w. Technograph, No. 15—1900-1901.

Bessbrook Spinning Co., Ireland.—See **STEAM PLANT.**

Charlottenburg.—See **SUPERHEATED STEAM—Test, Charlottenburg.**

Compound.—Test of a Compound Engine. Report by Michael Longridge of a test made on a vertical two-crank engine, with general description of the engine, boiler and superheater, in which all previous records were beaten. Ills. 3500 w. Engr, Lond—June 2, 1905.

Compound Receiver Drop.—The Effects of Receiver Drop in a Compound Engine. Joseph W. Hayward. Read before the British Assn. Deals with the results of four experiments, undertaken to demonstrate the effects of varying the point of cut-off in the low-pressure cylinder of a compound engine, other conditions being maintained constant. 700 w. Engr, Lond—Aug. 26, 1904.

Cooper-Corliss.—An Economical Mill Engine. Data and results of the feed water tests of a 16 and 40x48 inch Cooper-Corliss engine, and coal test of the plant connected therewith, as given in report of George H. Barrus, with information related. 2200 w. Eng Rec—Nov. 8, 1902.

Hardill Compound.—Tests of the Hardill Compound Engine. W. J. Childs and O. W. Bodler. Illustrated description of the special features of the engine, with account of tests. 1100 w. Sib Jour of Engng—May, 1901.

Hicks.—See **STEAM JACKET.**

Indicating.—Measuring the Horse-Power of Steam Engines. E. C. Oliver. Gives results of a series of tests which were intended to show the effect on the average horse-power of taking indicator cards at various intervals simultaneously and at various intervals in rotation. 1200 w. Power—Sept., 1903.

Indicating Westinghouse Engines. H. L. Strong. Describes method. 1500 w. Power—Feb., 1905.

How to Indicate the Engine. George P. Pearce. Directions to aid a beginner in taking his first cards. 1500 w. Marine Engng—June, 1905.

See also **INDICATOR; INDICATOR DIAGRAM.**

Jacketing.—See **STEAM JACKET.**

Longridge.—See **Compound; MOTOR.**

Misburg, Hanover.—Test of a Three-Cylinder Steam Engine (Untersuchung einer Dreicylinder-Dampfmaschine). H. Lorenz. Details of test of 600 h. p. triple-expansion engine, with and without steam-jackets, at the Portland cement works, at Misburg, near Hanover. 2000 w. Zeitschr d Ver Deutscher Ing—May 11, 1901.

Navy Yard, Brooklyn, N. Y.—Test of a Compound Engine. E. F. Williams. Gives briefly the results of preliminary enconomy tests of a vertical compound engine at the New York Navy Yard. 900 w. Power—Oct., 1903.

Non-Condensing.—Losses in Non-Condensing Engines. James B. Stanwood. An extension of the discussion upon the relation of these losses, especially such as occur in non-condensing engines, with analysis of tests of a few leading types of these engines. 5400 w. Trans Am Soc of Mech Engrs. No. 034—Dec., 1904.

Recording Machine.—See **INDICATOR—Automatic Recording; RECORDING MACHINE.**

Reeves.—Interesting Results of the Tests of a Reeves Simple Engine. H. Diedrichs. Condensed report of a series of tests made to determine the steam consumption, mechanical efficiency and general behavior of the engine under various conditions of load. 1000 w. Sib Jour of Engng—Nov., 1904.

Interesting Results of the Tests of a Reeves Simple Engine. Prof. R. C. Carpenter, assisted by Prof. H. Diedrichs. Describes tests made at Sibley College. 1200 w. Wis Engr—Dec., 1904.

Rice-Sargent Compound.—Water and Heat Consumption of a Compound Engine at Various Powers. D. S. Jacobus. Describes test of the Rice & Sargent horizontal cross-compound type, provided with a Corliss valve gear. Gives method of testing, conditions, and results. 1400 w. Trans Am Soc of Mech Engrs—June, 1903.

Rochester, N. Y.—Test of the Engines of the Rochester Gas and Electric Company. Illustrations of the station, with report of tests. 2000 w. Power—May, 1904.

Rolling-Mill Engine.—See **ROLLING-MILL ENGINE.**

Rugby.—The Systematic and Accurate Testing of Steam Engines. H. R. Sankey and C. H. Wingfield. Describing the very complete laboratory and methods of the Victoria Works at Rugby, and a review of the development of testing methods and appliances. 5000 w. Engineering Magazine—Nov., 1904.

Standard.—Preliminary Report of the Committee Appointed to Codify and Standardize the Methods of Making Engine Tests. 19500 w. Trans Am Soc of Mech Engrs, No. 891—May, 1901.

Final Report of the Committee Appointed to Standardize a System of Testing Steam Engines. The final revision of the report made after embodying the discussions. 25000 w. Trans Am Soc of Mech Engrs, No. 0943—May, 1902.

Final Report of the Committee Appointed to Standardize a System of Testing Steam Engines. 20000 w. Ill. Trans Am Soc of Mech Engrs, No. 0957—Dec., 1902.

Discussion on Report of Committee on Standardizing Engine Tests. All discussion that has been offered on the report at meeting and in writing. 19600 w. Ill. Trans Am Soc of Mech Engrs, No. 0958—Dec., 1902.

See also **ELECTRIC APPARATUS; ELECTRIC GENERATING SET; ELECTRIC INDUSTRY—Regulations; STEAM ENGINE.**

Steam Consumption.—The Estimation of the Steam Consumption of Engines. Explains methods of determining the quantity of steam required to develop any given horse-power. Serial. 1st part. 1800 w. Prac Engr—May 23, 1902.

The Steam Consumption of Piston Engines. T. Stevens and H. M. Hobart. Gives a table of the steam consumption of 33 piston-engines, with report of tests made. 1000 w. Power—Dec., 1905.

Sulzer.—Investigations upon a 1000 H. P. Tandem Compound Engine (Untersuchung einer Tandem-Verbundmaschine von 1000 PS.). M. Schröter. Data and results of a test upon a Sulzer engine, using saturated and superheated steam. A steam consumption of 11.3 pounds per h. p. hour is shown. Serial. Part I. 3000 w. 1 plate. Zeitschr d Ver Deutscher Ing—May 31, 1902.

Superheated Steam.—A Remarkable Steam Engine Test. Report of a series of tests made by Prof. J. A. Ewing on an engine supplied with superheated steam. 1300 w. Engr, Lond—Jan. 9, 1903.

Tests of a Compound Engine Using Superheated Steam. Prof. D. S. Jacobus. Report of tests made to determine whether the builder's gurantee was fulfilled. 2500 w. Trans Am Soc of Mech Engrs, No. 08—Dec., 1903.

See also **Sulzer; Van den Kerchove; SUPERHEATED STEAM—Test.**

Test House.—The Equipment of an Engine Test House. R. K. Morcom. Read before the Birmingham Loc. Sec. of the Inst. of Elec. Engrs. Gives a brief account of the evolution of a plant for testing combined sets for electricity stations, and of some of the results obtained. Also discussion. 6300 w. Elect'n, Lond—March 4, 1904.

The Equipment of an Engine Test House. R. K. Morcom. A brief account of the evolution of a plant for testing combined sets for electricity stations, and of some of the more interesting results obtained. Also discussion. 4200 w. Elec Rev, Lond—March 25, 1904.

Thermal Diagrams.—See **STEAM ENGINEERING.**

Van den Kerchove.—Tests of a Steam Engine. Abstract of a report by Prof. Schröter, of Munich, in regard to a series of interesting trials made by him on a Van den Kerchove engine exactly similar in construction to the one they exhibited at Paris, in 1900. 1200 w. Engr, Lond—Feb. 20, 1903.

Tests of a Belgian Engine Using Superheated Steam. Reports a series of tests made by Prof. M. Schröter of Munich on a Van den Kerchove engine. The object was to study the behavior of the engine with saturated and superheated steam under different conditions. Ill. 1600 w. Am Elect'n—May, 1903.

Test of Superheated Steam. Prof. M. Schröter. A report of trials made at Ghent, on a horizontal tandem engine, driving a continuous current dynamo, to examine the economy at different degrees of cut-off and at different temperatures of superheating. 2700 w. Power—June, 1903.

Test of a 250 H. P. Tandem Compound Engine Built by Van den Kerchove, of Ghent (Untersuchung einer von Van den Kerchove in Gent gebauten Tandemmaschine von 250 P S.). Prof. M. Schröter and A. Koob. Data and results of tests with saturated and superheated steam, showing a gain of 17 per cent. by superheating. Serial. Part I. 4000 w. Zeitschr d Ver Deutscher Ing—Sept. 5, 1903.

Weyher and Richemond.—Test of a Steam Engine (Expériences sur une Machine à Vapeur). J. Hirsch. A detailed account of the elaborate test by Prof. Hirsch of the improved steam engine of MM. Weyher & Richemond. Serial. Part I. 5000 w. Revue de Mécanique—Aug. 31, 1901.

Wolf Portable.—Tests of the Wolf Compound Portable Engine (Bremsversuche an einer von R. Wolf Gebauten Heissdampf-Verbundlokomobile). Data and results of test of a compound portable engine using superheated steam. 2500 w. Zeitschr d Ver Deutscher Ing—July 27, 1901.

Efficiency Tests of the Wolf Superheated Steam Portable Engine (Leistungensversuche an Wolfschen Heissdampf-Locomobilen). M. F. Gutermuth. Data and results of tests with superheating up to 140 degrees C., showing a result of 9 1-4 pounds of steam per horse-power hour. 4000 w. Zeitschr d Ver Deutscher Ing—Feb. 11, 1905.

Tests of a Superheating System with Utilisation of Waste Gases (Untersuchung einer Dampfkraftanlage mit Zweifacher Ueberhitzung durch Abgase). E. Josse. Data and results of tests upon the Wolf semi-portable tandem compound engine, using superheated steam. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing. July 15, 22, 1905.

A Study of a Semi-Portable Compound Engine with Double Superheating (Etude sur un Type de Locomobile Demi-Fixe Compound avec Double Surchauffe). Ch. Dantin. A report of tests on the Wolf compound engine with intermediate superheater. The thermal efficiency was 19.5 per cent. 2000 w. Génie Civil—Oct. 28, 1905.

See also **STEAM ENGINE.**

STEAM ENGINE WORKS.

See **ENGINE WORKS; STEAM ENGINE MANUFACTURE.**

STEAMER.

See **STEAMBOAT; STEAMSHIP.**

STEAM FITTING.

See also **HEATING—Steam; PIPE FITTING; PIPING; STEAM PIPE.**

Steam Fitting. Warren E. Willis. Notes and suggestions upon erecting piping. 1800 w. Mach, N Y—May, 1902.

STEAM FLOW.

See also **GAS FLOW; HOT WATER; INDICATOR DIAGRAM; STEAM—Expansion; STEAM METER; STEAM TURBINE.**

Gehre Meter.—See **STEAM METER.**

Gutermuth Experiments.—Researches Upon the Discharge of Steam (Versuche über den Ausfluss des Wasserdampfes). M. F. Gutermuth. With tables and curves giving the discharges from various kinds of orifices based on recent experiments made at the technical high school at Darmstadt. 4000 w. Zeitschr d Ver Deutscher Ing—Jan. 16, 1904.

Experiments on the Outflow of Steam. Prof. M. F. Gutermuth. Translated from the "Zeitschrift des Vereines Deutscher Ingenieure." An account of experiments at the mechanical laboratory of the Technical High School at Darmstadt on the outflow of steam through openings of various cross-sectional shapes. Ills. 4500 w. Jour Soc of Nav Engrs—May, 1904.

High-Speed.—High-Speed Outflow of Steam and Gases. Robert H. Smith. Discusses the subject in connection with the design of turbines, developing in tables and diagrams the law connecting variation of velocity and of section with the gradual fall of pressure along the axial line of the flow. Serial. 1st part. 3000 w. Engr, Lond—Dec. 22, 1905.

Nozzles.—Flow of Steam or Gases Through a Nozzle. Sanford A. Moss. An explanation of the expansion of gases, the effect of the shape of nozzles, etc. 1800 w. Engr, U S A—Oct. 15, 1903.

The Flow of Gases and Steam through Tubes of Variable Section (Die Stationäre Strömung von Gasen und Dämpfen durch Rohre mit Veränderlichem Querschnitt). H. Lorenz. With especial reference to the action in nozzles of steam turbines and similar machines. 2500 w. Zeitschr d Ver Deutscher Ing—Oct. 31, 1903.

The Flow of Steam and Gases through Tubes of Varying Cross Section (Strömung von Gasen und Dämpfen durch Rohre mit Veränderlichem Querschnitt). A. Stodola. Comments on the investigations of Prof. Lorens. 1200 w. Zeitschr d Ver Deutscher Ing—Dec. 5, 1903.

Phenomena of Flow in the Nozzles of Steam Turbines (Die Strömungserscheinungen in den Düsen der Dampfturbinen). Dr. A. Koob. An examination of pressures and velocities in nozzles of various forms for use in steam turbines. 2500 w. Zeitschr d Ver Deutscher Ing—Feb. 20, 1904.

The Phenomena of Flow in the Nozzles of Steam Turbines (Les Phénomènes d'Encoulement dans les Tuyères des Turbines à Vapeur). A. Koob. A translation of the paper of Koob from the German, showing the application of the temperature-entropy diagram to turbines. 3500 w. Revue de Mécanique—Jan. 31, 1905.

Notes on the Flow of Steam Through Nozzles (Beiträge sur Theorie der Dampfströmung durch Düsen). Dr. Prandtl. An examination of the theory of Prof. Lorenz, with comments by Dr. Proell. 2000 w. Zeitschr d Ver Deutscher Ing —March 5, 1904.

The Flow of Steam Through Nozzles. A. M. Levin. Gives a method for the solution of problems relating to this subject. 2000 w. Am Mach—June 30, 1904.

The Nozzles of the De Laval Steam Turbine (Zur Frage der Lavalschen Turbinendüsen). Karl Büchner. An examination of the manner in which the form of the nozzle affects the expansion of the steam, discussing the experiments of Moller, Fliegner, Rosenhain and the author. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing —July 9, 1904.

Pressures and Temperatures in Free Expansion. A. Borsody and R. Campbell Cairncross. Tables and diagrams, obtained experimentally, on the pressures in nozzles. Trans Am Soc of Mech Engrs. No. 1059—Dec., 1904.

The Theory of the Flow of Elastic Fluids and the Divergent Nozzle. M. Blieden. A mathematical study. Serial. 1st part. 3000 w. Engr, Lond—Feb. 17, 1905.

Flow of Steam Through Turbine Nozzles. Newton Wright. Gives formulas for calculating the energy of 1 lb. of steam. 3000 w. Prac Engr —May 12, 1905.

Experiments Upon the Flow of Gases in the Laval Type of Nozzle (Untersuchung der Gasströmung in der Laval Düse). Adolf Langrod. A study of experiments in cases in which the pressure in the most contracted portion is higher than the critical value. Two articles. 4000 w. Zeitsch d Oesterr Ing u Arch—Oct. 20, 27, 1905.

Rateau Experiments.—Experiments on the Escape of Steam Through Orifices. M. A. Rateau. An illustrated report of results obtained in experimental investigations. 1100 w. Inst of Mech Engrs—Glasgow Congress, 1901.

The Flow of Steam Through Orifices. A review of experiments undertaken by A. Rateau at St. Etienne. 500 w. Eng Rec—Oct. 26, 1901.

Turbines.—See **Nozzles.**

STEAM GAUGE.

Construction, Calibration and Care of Steam Gauges. C. W. Obert. Illustrates and describes the principal types, the standards for calibrating and correcting, ways of injuring gauges, etc. 1900 w. Am Elect'n—July, 1901.

Dreyer, Rosenkranz & Droop.—See **INDICATOR.**

STEAM GENERATION.

See also **BOILER; BOILER PLANT; COMBUSTION; FUEL; MECHANICAL DRAFT; STEAM ENGINE; STEAM ENGINEERING; STEAM PLANT.**

The Science of Steam Generation. F. J. Rowan. An illustrated article considering the many sides of the problem of designing a steam generator, and indicating possible improvements. 8000 w. Cassier's Mag—Dec., 1903.

A Study of Steam Generation (Etude sur la Production de la Vapeur). A. Lencauchez. An examination of the principles involved in steam generation, and a discussion of the extent to which they are realized in existing steam boilers. 1200 w. 3 plates. Mem Soc Ing Civ de France —March, 1904.

Economy.—Economy in Fuel Combustion and Steam Generation. W. W. Christie. A study of boiler and furnace design, with reference to the production of steam with highest economy. The principles of furnace and chimney design are discussed. 4000 w. Engineering Magazine—March, 1901.

Economy in Steam Production. C. W. Obert. Discusses the important factors in the cost of steam production. 2300 w. Am Elect'n—May, 1901.

See also **BOILER PLANT; STEAM ENGINEERING.**

Efficiency.—Actual Efficiency in Steam Generation. A. Bement. A study of the conditions involved in the attainment of high efficiency, including the difficult personal element. 3000 w. Engineering Magazine—June, 1901.

Fire Pumps.—The Time Required to Raise Steam for Fire Pumps from Cold Boilers and the Cost of Banked Fires. Gives conclusions drawn from tests made by inspectors of the Associated Factory Mutual Fire Insurance Co., at Fall River, Mass., to determine whether it would be safe for the mills to allow the fire to be drawn from their fire-pump boilers during a shut-down. 1500 w. Eng News—Nov. 3, 1904.

Flash.—See **BOILER, WATER-TUBE.**

Hoffman System.—The Hoffman System of Steam Generation. Jos. W. Jones. An illustrated description of a system in which the steam is generated by the combustion of explosive mixtures ignited as in a gas engine. 1000 w. Horseless Age—Dec. 25, 1901.

Parker.—See **BOILER, WATER-TUBE.**

Rapid.—Rapid Steam Raising. G. W. Worrall. Discusses the rapid steam-raising qualities of a boiler, and the methods of heating, fuel, etc. 1800 w. Horseless Age—July 9, 1902.

STEAM HAMMER.

See also **HAMMER; PILE DRIVING.**

Design.—Notes on the Design of Steam Hammers. W. M. Park. Gives a rational solution of some of the mechanical problems involved in the design. 1600 w. Technography, No. 18—1903-4.

Diagrams.—Steam Hammer Diagrams (Dampfhammer-Diagramme). Prof. Georg Lindner. A well-illustrated account of experiments on a steam hammer at Karlsruhe, Germany, with many indicator diagrams and discussion of them. 2400 w. Zeitschr d Ver Deutscher Ing—Jan. 11, 1902.

Elevator Buckets.—Making Elevator Buckets with the Steam Hammer—A Special Reaming Machine. S. A. Worcester. Brief illustrated descriptions. 900 w. Am Mach—Dec. 17, 1903.

STEAM HEATING.

See **HEATING; HEATING AND VENTILATION; MECHANICAL PLANT; POWER PLANT; STEAM ENGINEERING—Exhaust Utilization; STEAM PIPE.**

STEAM JACKET.

See also **STEAM ENGINEERING—Water in Steam.**

Steam Jackets and Their Influence Upon the Efficiency of the Steam Engine. Discusses the conditions under which steam jackets give economical results. 4000 w. Marine Engng—July, 1901.

Jacketing of Steam Cylinders. Editorial reviewing investigations in this field and giving suggestions for preventing loss of heat from cylinder condensation. 1500 w. Loc Engng—Dec., 1901.

Economical Use.—The Economical Use of the Steam Jacket. A. H. Gibson. Considers under what conditions a steam jacket may or may not conduce to economy. 3000 w. Engng Rev—Feb., 1904.

Hicks Engine.—Performance of an Engine Designed for Maximum Jacketing Effects. W. F. M. Goss. Describes a steam engine designed by Hicks, of Cincinnati, to secure an arrangement by means of which the cylinder walls can at all times be maintained at a temperature closely approaching that of the initial steam. Reports tests. Ill. 1500 w. R R Gaz—June 19, 1903.

Inst. of Mech. Engrs.—First Report to the Steam Engine Research Committee. Prof. David S. Capper. Giving results of experiments at King's College, London, on jacketed and unjacketed cylinders. 13300 w. Diagrams. Inst of Mech Engrs—March 17, 1905.

Steam Jackets and Valve Leakage. Prof. R. H. Smith. Reviews the report of the Steam Engine Research Committee of the Institution of Mechanical Engineers. 2700 w. Engr, Lond—June 23, 1905.

An Investigation to Determine the Effects of Steam-Jacketing upon the Efficiency of a Horizontal Compound Steam Engine. A. L. Mellanby. Read before the Inst. of Mech. Engrs. A report of experimental investigations and results. Serial. 1st part. 1800 w. Engr, Lond—June 30, 1905.

Leakage.—See **VALVE.**

Locomotives.—See **LOCOMOTIVE—Superheaters and Steam Jackets.**

Misburg, Hanover.—See **STEAM-ENGINE TEST.**

STEAM LAUNCH.

See **BOAT, STEAM.**

STEAM LIGHTER.

See also **TRANSPORTATION—Harbor Lighterage.**

"Rocket."—Stanch Steam Lighter. Description with illustration, of the "Rocket" being built for the U. S. Government. 700 w. Naut Gaz—April 4, 1901.

STEAM LOOP.

See also **STEAM ENGINEERING; STEAM PIPE; STEAM TRAP.**

The Steam Loop (Der Selbstthätige Dampfkreislauf). Gustav Huhn. Paper before the Verein Deutscher Maschinen-Ingenieure, giving an illustrated description of the system of piping for automatically returning the water of condensation to the boiler. 1100 w. Glasers Ann—Jan. 15, 1902.

A Few Points on the Steam Loop. H. H. Kelley. Read before the Ohio Soc. of Mech., Elec. and Steam Engrs. Explains this arrangement of piping and its principle of operating, illustrating by examples. 2000 w. Engr, U S A—July 1, 1903.

STEAM METER.

See also **STEAM FLOW.**

Bayntun.—A Steam Meter. R. S. Bayntun. Illustrates and describes an invention for measuring and recording the weight of quantity of steam passing through a pipe. 1400 w. Elec Rev, Lond—Feb. 5, 1904.

Gehre.—The Gehre Steam Meter (Der Dampfmesser von Gehre). L. C. Wolff. The apparatus acts by recording the difference in pressure upon two sides of a contracted passage, giving the flow at any instant and the total quantity in a given period. 2000 w. Zeitschr d Ver Deutscher Ing—Dec. 8, 1900.

The Gehre Steam Meter. Illustrated description of a meter with autographic register, working on the throttling principle. 1000 w. Eng Rec—April 13, 1901.

The Gehre Steam Meter (Compteur de Vapeur, Système Gehre). Ch. Dantin. A description of the Gehre Meter for measuring the flow of steam by regulating the opening, according to Napier's law. A recording attachment is included. 2000 w. Génie Civil—Aug. 31, 1901.

A Meter for Measuring the Flow of Steam (Dampfgeschwindigkeitsmesser). Describing the velocity of steam in a pipe by taking the pressure on both sides of a contracted neck. 1500 w. Glückauf—Dec. 9, 1905.

Sargent.—An Indicating Steam Meter. C. E. Sargent. Describes a device designed by the writer, which is believed to overcome many of the difficulties which have hitherto been obstacles to success. Ill. 2500 w. Trans Am Soc of Mech Engrs, No. 028—Dec. 28, 1904.

STEAM MOTOR CAR.

See **AUTOMOBILE, STEAM; CAR, MOTOR-DRIVEN.**

STEAM NAVIGATION.

See **MARINE ENGINE; MARINE ENGINEERING; NAVAL ENGINEERING; STEAMBOAT; STEAMSHIP.**

STEAM NAVVY.

See **STEAM SHOVEL.**

STEAM PACKING.

See **PACKING.**

STEAM PIPE.

See also **HEATING—Steam; PIPE; PIPE FITTING; PIPE THREAD; PIPING; STEAM FITTING; STEAM LOOP.**

Practical Notes on Steam Piping (Praktische Erfahrungen und Mitteilungen über Rohrleitungen). Max Westphal. An extensive discussion of pipes, pipe joints, expansion joints, and other details; also flow of steam in pipes, etc. 5000 w. Zeitschr d Ver Deutscher Ing—April 23, 1904.

Steam-Pipes. F. H. Davies. Discusses recent practice in steam-pipe work and changes due to increase in steam pressures. 2700 w. Elec Engr, Lond—Dec. 23, 1904.

Arrangement.—The Arrangement of Steam Pipes. R. T. Strohm. Illustrates and describes methods of providing for expansion and contraction. 2000 w. Am Elect'n—April, 1905.

Steam-Pipe Arrangements. William H. Fowler. A discussion of the leading principles that should govern the design and arrangement of steam-pipe installations. Serial. 1st part. 2000 w. Mech Engr—Nov. 4, 1905.

Bends.—Pipe Bends in the Power Plant. Illustrated discussion of the advantages of the use of bends in place of elbows. 3200 w. Power—Dec., 1900.

Cast vs. Wrought Iron.—Cast vs. Wrought Iron Steam Mains. C. G. Robbins. Favoring cast mains, discussing the objections urged against them, and considering other methods of constructing steam mains. Ill. 3800 w. Power—Oct., 1902.

Connections.—Connecting Boilers to Steam Mains. W. E. Snyder. Gives sketches of a number of connections from boilers in actual service, with discussion of practice. 1700 w. Power—July, 1902.

Pipe Connections (Ueber Rohrleitungen). A general discussion of steam piping and pipe connections together with plans of mains for batteries of steam boilers, according to the recommendations of the Dortmund boiler inspection association. 4500 w. Glückauf—July 30, 1904.

See also **STEAM FITTING.**

Covering.—See **Outdoor; Underground; STEAM-PIPE COVERING.**

Düsseldorf Exposition.—The High-Pressure Steam Piping at the Düsseldorf Exhibition (Die Hochdruck-Dampfrohrleitungen auf der Ausstellung in Düsseldorf). W. Stahl. With plans of the steam mains and general management of the connections to the boilers. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—Aug. 15, 22, 1903.

Electric Stations.—Pipe Work for Electric Lighting Stations. Suggestions for the arrangement of steam-pipe work of small or medium sized stations, recommending the header system. Ill. 2500 w. Elec Engr, Lond—March 27, 1903.

The Steam Piping of a Small Lighting Station. R. T. Strohm. Describes the two systems in general use, explaining the advantages of each. 1600 w. Am Elect'n—May, 1905.

See also **PIPING.**

Electric Stations, N. Y.—A Comparison of the Steam Piping Systems of the Four Large Electrical Stations of New York. C. G. Robbins. Presents, in a manner for easy comparison, the steam plants of te N. Y. Edison Co. (Waterside), the Manhattan El. Ry. Co., the Third Ave. St. Ry. Co. and the Metropolitan St. Ry. Co. Ill. 3700 w. Am Elect'n—June, 1902.

High and Low Pressure Steam Piping of the New York Subway Power House. Franz Koester. An illustrated detailed description of the pipe lines for distributing steam through this plant. 1800 w. Engr, U S A—Dec. 1, 1904.

Explosion.—See **STEAM PIPE EXPLOSION; WATER HAMMER.**

German Standards.—Standard Pipe Dimensions for High-Pressure Steam (Normalien zu Rohrleitungen für Dampf von Hoher Spannung). A discussion of the standard pipe and flange dimensions adopted by the "Verein Deutscher Ingenieure." 3500 w. 1 plate. Gesundheits-Ingenieur—April 15, 1901.

Heating Systems.—Steam Piping (Die Dampfleitung). H. O. Ritschel. A general discussion of the proportions of steam pipes in connection with the distribution of steam from a central station for heating purposes. 4500 w. Gesundheits-Ingenieurs—July 31, 1902.

See also **HEATING.**

Heat Losses.—The Loss of Heat from Bare Steam Pipes. Charles P. Paulding. Showing that Péclet's theory of the loss of heat from a surface maintained at constant temperature gives results in agreement with practical tests of the loss of heat from bare steam pipes. 1200 w. Stevens Ind—Oct., 1902.

See also **Outdoor; Underground; STEAM-PIPE COVERING; SUPERHEATED STEAM—Conveying Losses.**

High-Pressure.—Piping Materials for Steam Plants. John B. Berryman. Gives the results of a series of tests, principally covering the field of high-pressure steam piping. 8300 w. Ir Trd Rev—May 29, 1902.

High Pressure Steam Piping. William Andrews. Read before the Engine Builders Assn. of the U. S. Reviews briefly the development of the past 20 years, and discusses the design, material, and the disposing of the water. 2400 w. Ir Age—Dec. 11, 1902.

High Pressure Steam Piping. William Andrews. Real before the Engine Builders' Assn. Discusses the design, the quality of the material, and the disposing of the water. 2400 w. Met Work—Feb. 14, 1903.

High Pressure Steam Piping. William Andrews. Read before the Engine Builders' Assn. of the U. S. Reviews the progress during the last twenty-one years, and describes present practice, considering design, quality of material and the method of disposing of the water of condensation. 2200 w. Power—July, 1903.

High Pressure Steam Pipe Systems. Franz Koester. An illustrated review and comparison of late practice on the continent of Europe and in America. 3300 w. St Ry Rev—Oct. 20, 1904.

See also **PIPE JOINT.**

Hoboken, Electric Station.—See **ELECTRIC STATION.**

Joints.—See **PIPE JOINT.**

Live Steam.—Live Steam Piping: What Constitutes Good Design and What Should Be Avoided. Charles K. Stearns. Gives a few of the principles underlying good design, discussing details. 2000 w. St Ry Rev (Daily Ed.)—Oct. 14, 1904.

Long Lines.—Long Steam Line Construction. G. W. Barrager. Discusses the covering and the construction of the line. The size of pipe, the route and grading of the line, and other matters of importance are considered. Ills. 2500 w. Power—Nov., 1905.

Losses.—See **Heat Losses; Outdoor; Underground; STEAM-PIPE COVERING; SUPERHEATED STEAM—Conveying Losses.**

Main.—Steam Pipes. R. T. Strohm. Considers only the main steam pipes to and from the engines, discussing the selection of material and its erection, method of determining the loss of pressure to be expected, arrangements, tight joints, etc. 1800 w. Am Elect'n—March, 1905.

Marine.—Notes on the Arrangement and Construction of Steam Pipes and Their Connections. Robert C. Monteagle. Points out some of the causes of failure, describing points in design, and considering material. Ill. 4000 w. Trans Am Soc Nav Archts & Marine Engrs, No. 8—Nov., 1903.

Notes on Steam Pipes (Betrachtungen über Dampfrohrleitungen). E. Kühne. A discussion of the stresses on steam pipes, both internal and external, including the arrangement of flexible and expansion joints. 1500 w. Schiffbau—May 10, 1905.

See also **PIPE JOINT; PIPING.**

Mica Insulation.—See **STEAM-PIPE COVERING.**

N. Y. Interborough.—See **Electric Station, N. Y.**

Outdoor.—Outdoor Steam Pipes. William D. Ennis. Considers the best method of supporting, protecting and insulating pipes carried between two detached buildings. Ill. 2000 w. Power—April, 1901.

Pittsfield Electric Station.—See **ELECTRIC STATION.**

Public Buildings.—See **STEAM PLANT.**

Sizes.—Steam Pipe Sizes. Charles L. Hubbard. Gives methods of computing pipe sizes to meet the usual requirements in low and high pressure work. 2500 w. Engr, U. S. A.—Oct. 15, 1902.

Specifications.—See **PIPING.**

Standardization.—See **German Standards; FLANGE.**

Stresses.—Transverse Stresses in Steam Pipes. A. S. Mann. The problem of calculating these stresses is discussed, and the factor of expansion that the writer has found from repeated measurements to be safe is given with explanation. 2000 w. Am Elect'n—Nov., 1901.

Transverse Stresses in Steam Pipes. A. S. Mann. Discusses the relative length of various mains and branches. 1800 w. Am Elect'n—Dec., 1901.

See also **Marine.**

Underground.—Losses of Heat from Underground Pipes. Alton D. Adams. Discusses pipe coverings, and the methods of calculating losses. 4000 w. Elec Wld and Engr—No. 40209.

Water Hammer.—See **WATER HAMMER—Steam Pipos.**

STEAM-PIPE COVERING.

See also **PIPING; STEAM PIPE.**

Pipe Coverings. R. T. Strohm. Discusses in the order of their importance the special requirements of a good pipe covering. 2500 w. Am Elect'n—May, 1903.

Value of Non-Conducting Coverings. William H. Fowler. Discusses the loss of heat which takes place in uncovered steam pipes, and the saving effected by non-conducting coverings. 1800 w. Mech Engr—Nov. 25, 1905.

Mica.—Mica Insulation for Steam Boilers and Pipes. Gives some figures showing the loss of heat in steam boilers and steam pipes, and the results obtained in experiments with various coverings, showing that 90 per cent. is saved by the use of mica insulation. 1600 w. Engng—Feb. 22, 1901.

Test.—The Loss of Heat from Covered Steam Pipes. Charles P. Paniding. Considers the tests of results of Péclet, Barrus and others, analyzing the results and giving applications of the theory. 5000 w. Stevens Ind—April, 1902.

See also **STEAM PIPE—Heat Losses.**

Test, Barrus.—Test of Pipe Covering. George H. Barrus. Read before the Mechanical Engineers and others at the Manhattan Ry. Power House, N. Y., on Nov. 12, 1901. 2800 w. Am Mfr—Dec. 5, 1901.

Tests of Steam Pipe Coverings. George H. Barrus. Read before the Mechanical Engineers scale and in most careful manner, with conclusions. Ill. 12600 w. Trans Am Soc of Mech Engrs, No. 0952—May, 1902.

Test, Davies.—Note on the Relative Efficiency of Heat Insulating Media. S. H. Davies. An account of experimental investigations with the object of finding a suitable covering for pipes conveying highly superheated steam. 1600 w. Engr, Lond—May 27, 1904.

Steam Pipe Coverings. S. H. Davies. From the "Jour. of the Soc. of Chem. Ind." Results of an interesting series of experiments made by S. H. Davies. 2000 w. Mech Engr—June 4, 1904.

Test, Edinburgh.—Experiments on the Efficiency of Non-Conducting Coverings for Steam Piping. W. N. Bolam and T. Grieve. An account of experiments carried out in the engineering laboratory of Edinburgh University, with summary of results. 1500 w. Engng—Aug. 7, 1903.

Test, Electrical.—Testing Pipe Coverings. George

T. Hanchett. A brief description of a simple electrical method of testing. 1000 w. Cent Sta—Aug., 1904.

See also Test, Stott.

Test, Jacobus.—Tests of Non-Conductive Coverings for Steam Pipes. D. S. Jacobus. An account of tests made to determine the qualities of a German covering, but giving comparative results with coverings in use in the United States. Also describes apparatus used. 2700 w. Stevens Ind—July, 1901.

Test, Stott.—Steam Pipe Covering and Its Relation to Station Economy. H. G. Stott. Read before the Assn. of Edison Ill. Co.'s. Results of a series of tests made in the interest of the Manhattan Ry. Co. Describes method of testing and discusses results. 3300 w. Elec Rev, N Y—Nov. 29, 1902.

Underground.—See **STEAM PIPE.**

STEAM-PIPE EXPLOSION.

See also **BOILER EXPLOSION; LOCOMOTIVE EXPLOSION; STEAM PLANT—Accident; WATER HAMMER.**

"Orizaba."—Steam-Pipe Explosion on Board the Steamship "Orizaba." Report of Board of Trade Inquiry, by David G. Watson and Thomas Carlton. The explosion occurrred on Nov. 25, 1904. Ills. 4500 w. Mech Engr—July 1, 1905.

"Ventura" Steamship.—Steam Pipe Explosion on S. S. Ventura Instantly Kills Five Men. An illustrated article giving an account of the mishap and the invetsigation into the causes. 2000 w. Marine Engng—March, 1901.

STEAM PLANT.

See also **BOILER; BOILER PLANT; ELECTRIC PLANT; MECHANICAL PLANT; POWER PLANT; STEAM ENGINE; STEAM-ENGINE TEST; STEAM GENERATION.**

The Modern Plant. W. H. Wakeman. Practical directions and suggestions concerning steam plant design and operation, and means of determining the size of a plant to develop a given power. 2000 w. Mod Mach—Jan., 1903.

Accidents.—Accidents Due to Faulty Piping and Incorrect Methods of Starting and Stopping Engines. Thomas Hall. Illustrated review of accidents due to faulty construction. 2400 w. Power—Nov., 1905.

Auburn, N. Y.—The Power Plant of the Columbian Cordage Company. Illustrates and describes a steam power plant at Auburn, N. Y., interesting because of its remarkably rapid construction in view of the magnitude of the establishment. 2000 w. Eng Rec—Oct. 15, 1904.

Baltimore Electric.—The New Boiler Plant of the United Railways & Electric Company, Baltimore. Illustrated description of a very large steam generating station, the notes describing particularly the special details of the boiler plant, coal and ash handling apparatus, and structural steel work. 3200 w. Eng Rec—Nov. 2, 1901.

Bellows Falls, Vt.—The Steam Plant of the Fall Mountain Electric Light and Power Company. Illustrated description of a 500-H.-P. stand-by plant with vertical boilers using induced draft, and a special concrete coal bin, built to supplement a hydraulic plant. 800 w. Eng Rec—Oct. 19, 1901.

Bessbrook Spinning Co., Ireland.—Design and Test of a Modern Steam Power Plant. Edward G. Hiller. Abstract of paper before the Institution of Mech. Engrs., giving an illustrated descriptive test of boilers and engines at the mills of Bessbrook Spinning Co., County Armagh, Ireland. 3500 w. Mech Engr—Aug. 6, 1904. Also Prac Engr—Aug. 5, 12 and 19, 1904.

Carpenter Steel Co.—The Steam Plant of the Carpenter Steel Company, Reading, Pa. Illustrates and describes a 1200 h. p. plant. 1500 w. Eng Rec—Sept. 6, 1902.

Development.—Development of a Steam Plant of the Fifties. Alfred H. Schlesinger. Description of a plant and the additions made to the original installation, which gives results in efficiency about equal to those of modern construction. 1000 w. Stevens Ind—July, 1901.

The Development of Steam Power Plants. George H. Barrus. Discusses the important changes during the last twenty-five years. 2500 w. Eng Rec—Jan. 3, 1903.

Economy.—See **Efficiency; Fuel Economy; Washington; BOILER PLANT; STEAM ENGINEERING; STEAM GENERATION.**

Efficiency.—Some Notes on the Efficiency of Steam Plant. Walter A. Vignoles. Discusses points in connection with the running of central stations, based on tests made, and giving conclusions. 4000 w. Elect'n, Lond—April 28, 1905.

Electric Station.—The Steam Features of Electrical Power House Design. F. W. Dean. Considers the boiler plant and the use of water-tube boilers, and things of importance to secure economy; the choice of engines, the steam pipes, and related equipments. 4600 w. P R Gaz—June 14, 1901.

The Choice of a Steam Plant, with Special Reference to American Electric Power Installation. George H. Barrus. Briefly considers steam turbines, the choosing of a reciprocating engine, the selection of boilers, etc. 3000 w. Cassier's Mag—July, 1904.

The Tendency of Practice in Power Station Engine and Boiler Plant. Francis H. Davies. Reviews the development of steam and electricity supply in England, particularly noting the difference that has existed in horse power installed between the leading types of boilers and engines at various periods during the last few years. 1200 w. Elec Rev, Lond—Dec. 30, 1904.

Steam Power. E. P. Roberts. Read before the Ohio Interurban Ry. Assn. Discusses the power needed for interurban electric railways, the operating conditions, and the importance of making comparisons on the basis of operating conditions. 5000 w. St. Ry Jour—Feb. 11, 1905.

Steam Power for Electric Railways. E. P. Roberts. Read before the Ohio Interurban Ry. Assn. Discusses the factors to be considered in deciding upon a prime mover, giving a special study of steam power, the effects of grades, cost, etc. 4500 w. Eng Rec—Feb. 18, 1905.

See also **Baltimore; Hanover; ELECTRIC STATION; STEAM ENGINE.**

Factory.—Design and Test of a Modern Steam Power Plant. Edward G. Hiller. Particulars of the construction and test of a modern factory steam plant, designed with the object of obtaining good commercial economical results. 9000 w. Ills. Inst of Mech Engrs—July 22, 1904.

Fuel Economy.—Fuel Economy in Steam Plants. John B. C. Kershaw. A discussion from the chemist's point of view, considering the fuel supply, the combustion, and the waste gases. 4300 w. Cassier's Mag—May, 1904.

Fuel Economy in Steam Power Plants. William H. Booth and John B. C. Kershaw. Considers the analysis and treatment of feed-water, the sampling and testing of fuel, air supply, types of boilers and furnaces, steam superheating and condensation, waste gases, draught, etc. Ills. 12800 w. Inst of Elec Engrs (England)—Jan. 12, 1905.

See also **FUEL—Economy; LIQUID FUEL—Power Plant Economy; POWER—Coal Economy; STEAM ENGINEERING—Economy; STEAM GENERATION—Economy.**

Fuel Losses.—Fuel Losses in Steam Plants, and How to Determine Them. George H. Barrus. Outlines methods of testing and sources of waste that may be determined by observation. 3000 w. Cassier's Mag—Nov., 1903.

Gas Producer Compared.—See **GAS PRODUCER—Economy.**

Hanover Electric Station.—The Steam-Power Plant of the Hanover Electric Station (Die Dampfmaschinenanlage des Drehstromwerkes der Stadt Hannover). Gustav ter Meer. With plan of the engine room, details of the machinery, and data and results of tests of engines and boilers. 4000 w. Zeitschr d Ver Deutscher Ing—Jan. 21, 1905.

History.—See **Development.**

Large Buildings.—Modern Boiler-House Plant. F. J. Warden-Stevens. Discusses the considerations requiring care in the construction of steam-raising plants for large buildings. 2200 w. Archt, Lond—Nov. 7, 1902.

See also **MECHANICAL PLANT.**

Large Units.—Problems in the Designing of Large Steam Units. Discusses modern methods and the enormous units in engines and turbines, considering especially boilers and superheaters and their limitations. 1800 w. Ir Age—Jan. 7, 1904.

Liquid Fuel.—See **LIQUID FUEL.**

Mechanical Auxiliaries.—Mechanical Auxiliaries to the Economy of the Fireroom. Reginald Pelham Bolton. Including coal and ash conveyors, mechanical stokers, and the detailed appliances of the modern boiler house. 4000 w. Engineering Magazine—March, 1904.

National Cash Register Co.—New Power Plant of the National Cash Register Company. Illustrated description of the new steam plant recently built at Dayton, O. 1200 w. Eng Rec—Nov. 30, 1901.

New York Electric Stations.—See **ELECTRIC STATION; STEAM ENGINE; STEAM PIPE.**

Piping.—See **PIPING; STEAM PIPE.**

Public Buildings.—Steam Boilers and Pipes. The first of a series of articles on essential points which must come before architects who are required to make provision for steam-producing plants in hospitals, asylums, schools, hotels, and other buildings. Serial. 1st part. 2400 w. Builder—July 1, 1905.

Richmond, Va.—See **ELECTRIC STATION.**

Test.—See **BOILER TEST; STEAM ENGINE TEST; SUPERHEATED STEAM.**

Test, Berlin.—Test of a Steam Plant (Untersuchung einer Dampfanlage). K. Vogel. Data and results of test of Steinmuller boiler and Lentz steam engine at the works of Siemens & Halske in Berlin. 1200 w. Zeitschr d Ver Deutscher Ing—Feb. 13, 1904.

Tests, Cambridge, Mass.—Test of the Power Plant of the Cambridge Electric Light Company. Lionel S. Marks. Gives results of tests made for determining whether the guarantees of the steam engine builders were fulfilled. Ills. 3500 w. Harvard Engng Jour—Jan., 1905.

Washington.—Economies Obtainable by Various Uses of Steam in a Combined Power and Heating Plant. A discussion of economies obtainable at the isolated plant in Washington, reported by B. R. Green and S. Homer Woodbridge. Critical review. 4000 w. Eng Rec—Feb. 18, 1905.

STEAM PLOW.

See **AGRICULTURAL MACHINERY.**

STEAM POWER.

See also **POWER; POWER COST; STEAM ENGINE; STEAM ENGINEERING; STEAM GENERATION; STEAM PLANT.**

British.—See **WATER POWER.**

Cost.—See **ELECTRIC TRANSMISSION—Coal Transportation Compared; POWER COST; STEAM ENGINEERING; STEAM GENERATION; STEAM PLANT.**

Gas Power Compared.—See **GAS PRODUCER—Economy.**

STEAM PUMP.

See **PUMP; PUMPING ENGINE; PUMPING STATION.**

STEAM ROLLER.

See **EARTHWORK—Rollers; ROAD ROLLER.**

STEAM SEPARATOR.

See also **OIL SEPARATOR; STEAM—Priming.**

Talk on Dry Steam and Steam Separators. James Bonar. Recommends the use of separators, discussing their utility, and points in their selection and location. 1400 w. Am Mfr—Dec. 12, 1901.

Devices for the Purification of Steam and Its Water of Condensation (Appareils pour l'Epuration de la Vapeur et de son Eau de Condensation). An exhaustive review of the various types of separators for removing water from live steam and oil from the exhaust. Serial. Part I. 4500 w. Revue de Mécanique—Sept., 1904.

The Separation of Moisture from Steam. R. T. Strohm. Explains why it is desirable to remove the moisture, and discusses methods of accomplishing the separation. Ills. 2300 w. Am Elect'n—June, 1905.

Internal.—Internal Separators for Steam Boilers. R. T. Strohm. Illustrates and describes various devices for drying the steam, discussing their advantages and disadvantages. 1800 w. Am Elect'n—Aug., 1903.

Oil.—See **OIL SEPARATOR.**

Potter Mesh.—The "Potter" Mesh Separator and Superheater. Frederick A. Scheffler. Describes the construction of this separator, which is made of a series of copper wire screens in a casing and placed inside the boiler on the outlet. Ill. 900 w. Trans Am Soc of Mech Engrs, No. 921—Dec., 1901.

STEAMSHIP.

See also **MARINE ENGINE; MARINE ENGINEERING; NAVAL ARCHITECTURE; NAVAL ENGINEERING; NAVY; SHIPBUILDING; SHIPPING; STEAMBOAT; STEAM YACHT;** and other specific types of vessels.

"Africa."—The Austrian Lloyd's Steamer "Africa." Illustrated description of a recently built twin-screw steamer for the East African line. Serial. 1st part. 1000 w. Engng—Sept. 2, 1904.

"Alaskan."—Large American Freighter. Illustration, with description of the "Alaskan," a vessel of 8671 tons, now on her way from the Pacific to the Atlantic. 1300 w. Naut Gaz—June 19, 1902.

"Alaskan" and "Arizonian."—Ocean Freighters "Alaskan" and "Arizonian" Building at Union Iron Works. Describes two interesting ships under construction at San Francisco, representing the most advanced practice of ocean going freighters. 1100 w. Marine Engng—March, 1901.

American Coast.—A Review by Decades of American Deep Water Steamers in the Atlantic Coastwise Service. Ray Morris. An illustrated article showing the tendencies of traffic and of design. 6500 w. R R Gaz—Aug. 15, 1902.

"Amerika."—The New Trans-Atlantic Steamship "Amerika." Illustrates this great new ocean passenger steamship of the Hamburg-American line, describing its novel features. 1400 w. Naut Gaz—Oct. 26, 1905.

The Twin-Screw Liner "Amerika." Illustrations, with brief description of this new Hamburg-American steamship. 1500 w. Sci Am—Nov. 4, 1905.

The New Hamburg-American Liner "Amerika." An illustrated detailed description of this large and luxurious steamer recently put in service. 1200 w. Marine Engng—Dec., 1905.

"Amur."—Twin-Screw Steamship "Amur" (Doppelschhraubendampfer "Amur"). Illustrated description of a new steamer constructed for operation in connection with the terminus of the Eastern Railway of China. 2000 w. 2 plates. Zeitschr d Ver Deutscher Ing—Oct. 18, 1902.

Antarctic Service.—See **"Discovery;" "Gauss."**

Arctic Service.—See **"Roosevelt."**

"Argo."—New Lake Superior Passenger Boat. Illustration with brief description of the new steel passenger and freight propeller "Argo." 600 w. Naut Gaz—April 18, 1901.

"Athenic."—The White Star Liner "Athenic." Illustration with brief description of one of three exactly similar ships to be added to those sailing from London to New Zealand via the Cape. 350 w. Engr, Lond—Feb. 14, 1902.

Atlantic.—Atlantic Steamships—Present and Failure. Drawings and comparative data of the two classes of vessels now in favor, as represented by the "Ivernia" and the "Deutschland." Also editorial. 3200 w. Sci Am—Nov. 10, 1900.

The Growth of the Trans-Atlantic Steamship. Interesting diagrams, with notes on the development. 2000 w. Sci Am—May 3, 1902.

Trans-Atlantic Steamships. Reviews briefly the history of steam navigation on the Atlantic, giving an idea of the immense amount of money invested, the cost of a single passage for the large liners, and much interesting information. Ills. 5700 w. Naut Gaz—May 5, 1904.

See also under names of vessels and lines.

"Augustus B. Wolvin."—Steamer Augustus B. Wolvin of the Great Lakes. An illustrated description of the largest vessel ever built to navigate fresh waters. 1200 w. Marine Engng—May, 1904.

Ballast.—See **SHIP STABILITY.**

"Baltic."—The New White Star Liner "Baltic." Illustration, with brief description. 500 w. Engr, Lond—Nov. 27, 1903.

The New White Star Liner "Baltic"—the Largest Vessel in the World. Brief illustrated description, with account of the maiden trip. 1100 w. Sci Am—July 16, 1904.

Twin-Screw Steamship Baltic, of the White

Star Line, the Largest Ship Afloat. An illustrated detailed description of this large vessel and its equipment. 2800 w. Marine Engng—Aug., 1904.

"Baltic." Electric Equipment. — See ELECTRIC EQUIPMENT—Ship "Baltic."

Bending Moments.—See NAVAL ARCHITECTURE.

"Benjamin Taylor."—See "Victoria."

"Bermudian."—The New Steamship Bermudian. Illustrated detailed description of a fine steamship in service between New York and Bermuda. 1000 w. Marine Engng—June, 1905.

Boiler Arrangement.—See BOILER, WATER TUBE—Arrangement.

Boston Steamship Co.—Large Ocean Freighters. Illustrated description of two new vessels under construction for the Boston Steamship Co. 1200 w. Naut Gaz—Feb. 7, 1901.

New Ships of the Boston Steamship Company. Illustrates and describes two 11,000 ton freight steamships now under construction. 1100 w. Marine Engng—Jan., 1902.

British vs. German.—Modern Ocean Liners. Editorial on the present position of England in this field, especially comparing it with Germany. 2700 w. Engng—Aug. 22, 1902.

"Brussels."—Great Eastern Railway Company's Steamer "Brussels." Illustrates and describes this vessel which represents the latest practice in channel steamers. 2000 w. Engr, Lond—Jan. 9, 1903.

"Bulysses."—Liquid Fuel Burning Steamer "Bulysses." Illustration and description of a tank steamer of nearly 8,500 tons, and the appliances for burning the liquid fuel. 1000 w. Engng—Dec. 28, 1900.

Cable.—See CABLE SHIP.

"Calvin Austin."—New Steamer "Calvin Austin," for the Eastern Steamship Company. Illustrates and describes a new vessel for the Boston-Portland service. 1500 w. Marine Engng—Aug., 1903.

Capacity.—Useful or Earning Capacity of Ships. Theodore Lucas. A discussion of points to be carefully considered to insure the money earning capacity of ships. 2200 w. Naut Gaz—June 6, 1901.

The Economy of Large Ships. A. W. Robinson. Considers the limitations that govern the increase in size, the present stage of development, and the future outlook. 2800 w. Can Soc of Civ Engrs—Adv Proof—Nov., 1902.

The Size of Steamships: Its Relation to Speed and Cargo-carrying Capabilities. Sidney Graves Koon. Discusses the characteristics of cargo steamers which might be designed for service between New York and London, describing a typeship and discussing the economical performance. 2200 w. Sib Jour of Engng—Feb., 1903.

"Cape Verde."—The Screw Steamer "Cape Verde" (Der Schraubendampfer "Cap Verde"). Illustrated description of a fine new steamer engaged in the Hamburg-South American trade, and built at Flensburg. 3000 w. 2 plates. Zeitschr d Ver Deutscher Ing—June 29, 1901.

"Captain Thomas Wilson."—Lake Steamer Captain Thomas Wilson. An illustrated description of a single deck bulk cargo steamer and its equipment. 1500 w. Marine Engng—Dec., 1901.

"Carmania."—Triple-Screw Turbine-Driven Cunard Liner "Carmania." A fully illustrated detailed description of this large vessel for service on the Atlantic, with report of trials. 15,000 w. Engng—Dec. 1, 1905.

The Turbines of the "Carmania." Illustration of this new steamship, with description of the turbine machinery. 1500 w. Sci Am—Dec. 23, 1905.

"Caronia."—The Cunard Liner "Caronia." An account of this new vessel, giving an idea of the arrangement and comfort made possible, and the features of special interest. 2000 w. Engr, Lond—Jan. 27, 1905.

The New Cunard Liner "Caronia." Illustrated of the "Caronia" and "Carmania," and their machinery. Ills. 3000 w. Engng—Feb. 10, 1905.

Cunard Liner "Caronia." Illustrated description of this Cunard liner, her engines and her speed trials. 1400 w. Marine Rev—March 2, 1905.

The New Cunard Liner "Caronia." Description of steamship recently launched on the Clyde, with gross tonnage of 21,000 and to have 21,000 horsepower. Illustration and diagram showing comparative sizes of Cunard liners. 1500 w. Prac Engr—Aug. 12, 1904.

The New Cunard Liner "Caronia." Illustrated detailed description of this very large ship. 1800 w. Engng—July 15, 1904.

Launch of the Cunard Liner "Caronia." Two illustrations with detailed description of the largest ship thus far built on the Clyde. 2000 w. Engr, Lond—July 15, 1904.

See also Turbine.

"Carpathia."—Steamship "Carpathia." Illustrates and describes this new vessel of the Cunard Line. 1000 w. Marine Engng—Oct., 1903.

"Cedric."—The Launch of the White Star Liner "Cedric." Harold J. Shepstone. Illustrations with brief description of this vessel the largest ship ever built. 900 w. Sci Am Sup—Oct. 11, 1902.

New White Star Line Steamship "Cedric." A fully illustrated article describing in detail the interesting features of this new vessel. 1500 w. Marine Engng—April, 1903.

"Celtic."—"Celtic," Largest Vessel Ever Built. Brief description of a large vessel launched recently, designed to carry an immense cargo, but with ample accommodations for passengers. 1200 w. Marine Rev—April 11, 1901.

The White Star Liner "Celtic." Illustrates and describes the structural features, which are particularly interesting because of the size of the vessel and the great strength of her scantlings. 2700 w. Engng—April 12, 1901.

Launch of the New White Star Steamship "Celtic." Fine illustrations, with brief description. 850 w. Marine Engg—May, 1901.

The White Star Liner "Celtic." Illustrations and interesting information concerning this vessel, the largest yet built. 1400 w. Sci Am—Aug. 17, 1901.

Channel.—The Cross-Channel Passenger Steamship Services. Historical review of the channel-service from the earliest use of steamships. Ill. Serial. 1st part. 2200 w. Engr, Lond—March 29, 1901.

High-Speed Channel Steamers. Information concerning the design of fast channel steamers, their weight, fittings, etc. 2200 w. Engr, Lond—Nov. 7, 1902.

Cross-Channel Steamers. Prof. J. H. Biles. Read before the Inst. of Nav. Archts. Considers the points of difference between channel and ocean-going steamers, giving a summary of the lines and tonnage employed, etc. 2200 w. Engng—July 10, 1903.

See also "Dieppe;" "Queen;" Turbine.

Chicago-Europe.—See Great Lakes.

City Line.—A Great Vessel Organization. From "Fairplay." History of the City line purchased for the Indian trade. 2400 w. Marine Rev—Sept. 12, 1901.

Cold Storage.—See REFRIGERATION—Shipboard.

Collision.—See FERRYBOAT COLLISION; WRECK.

Columbia.—New Anchor Liner "Columbia." Diagram with brief description of a vessel, which has completed her maiden voyage. 1500 w. Marine Rev—July 31, 1902.

"Commonwealth."—Transatlantic Liner "Commonwealth." Brief illustrated description of fine vessel for the Boston-Liverpool trade. 5000 w. Marine Engng—Nov., 1900.

See also History; SHIPBUILDING.

Cunard Line.—The New Atlantic Liners. Concerning the new fast vessels to be built by the Cunard Company, discussing the vessels already in service which have at different times lowered the record across the Atlantic. 3700 w. Engr, Lond—Oct. 17, 1902.

The New Cunard Flyers. Albert G. Hood, in the "Mid-Tyne Link." Brief review of the growth in size of vessels used to navigate the Atlantic. Diagrams. 2000 w. Marine Rev—July 28, 1904.

The Mammoth Cunard Liners. Describes interesting features of the two turbine-driven Cunarders now under construction, giving a cross-section. 1600 w. Sci Am—July 22, 1905.

See also "Carmania;" "Caronia;" "Carpathia;" Turbine; SHIPPING.

"Dakota."—See **"Minnesota" and "Dakota."**

"Denver."—Fine Coasting Steamship. Illustration, with brief description of the "Denver," a fine vessel of the Mallory line. 1000 w. Naut Gaz—Oct. 31, 1901.

"Denver" Launching.—Not an Ordinary Launching. Illustrated description of the launching of the "Denver," the largest vessel ever built at the Wilmington works, Delaware. 1000 w. Marine Rev—May 2, 1901.

Launch of the Mallory Steamer "Denver." Illustrates and describes a launch of more than ordinary interest because of the great dimensions and weight of the vessel, and the narrow stream into which she was launched. 3500 w. Marine Engng—Sept., 1901.

Design.—See **NAVAL ARCHITECTURE; SHIPBUILDING.**

"Deutschland."—The Twin-Screw Express Steamer "Deutschland" (Der Doppelschrauben Schnell dampfer "Deutschland"). A very complete account of the great Hamburg-American liner, with numerous details of hull and machinery. 10,000 w. 5 plates. Zeitschr d Ver Deutscher Ing—Nov. 3, 1900.

The Hamburg-American Atlantic Liner "Deutschland." A review of the progress in shipbuilding as typified by this vessel, with illustrated description of the machinery. Serial. 1st part. 3000 w. Engng—Nov. 23, 1900.

The Steamship "Deutschland" (Le Paquebot Transatlantique "Deutschland"). S. Gradler. A fully illustrated description of the Hamburg-American Line steamer. Two articles. 2 plates. 5000 w. Génie Civil—Feb. 16, 23, 1901.

The Hamburg-American Liner "Deutschland." An illustrated description of interesting details of this fine Atlantic liner. Serial. 1st part. 700 w. Engng—March 8, 1901.

See also **Atlantic; Tank "Deutschland;" MARINE ENGINE—Balancing.**

"Dieppe."—The Turbine-Driven Channel Steamer "Dieppe." Illustrated description of the vessel and its machinery, with results of the official trial and remarks. 2300 w. Engng—Aug. 18, 1905.

The Turbine-Propelled British Coasting Steamer "Dieppe." Illustrated description of the turbine machinery and its arrangement, with information concerning the vessel, and report of official trial. 2000 w. Naut Gaz—Sept. 14, 1905.

"Discovery."—The "Discovery." W. E. Smith. Read before the Inst. of Naval Archts. A record of the special features in the design of this Anarctic exploration vessel, describing details of construction. Ills. 8500 w. Engng—April 14, 1905.

"Donnacona."—New Foreign-Built Lake Steamer. Illustration, with description, of the new British-built steamship "Donnacona," constructed on the American plan and intended for service on the Great Lakes. 1200 w. Naut Gaz—Nov. 29, 1900.

Draft.—See **SHIP.**

Economical Speed.—See **NAVY—Steaming Radius; SHIP PROPULSION—Speed.**

Economy.—See **Capacity.**

"Ekliptika."—See **SALVAGE.**

"Elbert H. Gary."—The "Elbert H. Gary"—The Greatest of Ore-Carrying Steamers. W. Frank M'Clure. Illustrates and describes one of the four mammoth cargo steamers recently built for the Great Lakes. 700 w. Sci Am—Oct. 14, 1905.

Electric Equipment.—See **ELECTRIC EQUIPMENT.**

English Channel.—See **Channel.**

"Etruria."—See **SHIPBUILDING—Repairing.**

Express Steamers.—Express Steamers for Short Voyages. Albert Edward Seaton. Read at the Engng Con. of Inst. of Civ. Engrs. Considers the causes of differences in steamers for different routes between England and various points. 3000 w. Engng—July 3, 1903.

"Fathomer."—See **U. S. Coast Survey.**

Fishing.—See **STEAMBOAT.**

Freighters.—Types of Ocean Freighters for the Foreign Trade. Theodore Lucas. An illustrated review of types of steamships and sailing vessels. 1800 w. Naut Gaz—April 17, 1902.

Possibilities of Design in Cargo Steamers. George Nicol. Considers ways in which the first cost of vessels may be reduced, and the advantages gained by care in the design of these steamers. 2000 w. Cassier's Mag—March, 1904.

Recent Developments in Cargo and Intermediate Steamers. Edwin William De Russett. An illustrated article considering the type, size, construction, capacity, cargo appliances, and economy of working, showing the great progress made during the five years. 5000 w. Marine Rev—June 2, 1904.

Cargo and Intermediate Steamers. From a paper by Edwin W. De Russett, in the Pro. of the Inst. of Civ. Engrs., London. Considers recent developments in Great Britain in building these two types of steamships. 2400 w. R R Gaz—Vol. XXXVIII., No. 9.

The Development of the Freight Carrier in the Atlantic Coastwise Trade. Ray Morris. An illustrated article discussing the development of coastwise freight traffic. 4000 w. Marine Rev—June 2, 1904.

See also **Capacity.**

Gas Engine.—See **GAS ENGINE—Locomotive and Steamship; BOAT, GAS POWER.**

"Gauss."—The Steam Barkentine Gauss of the German Antarctic Expedition. George Crouse Cook. Illustrated description of this vessel for special service built at Kiel, Germany. 1300 w. Marine Engng—May, 1902.

"Gneisenau."—The Twin Screw Freight and Passenger Steamship "Gneisenau" (Der Doppelschrauben Fracht und Passagierdampfer "Gneisenau". Hermann Hildebrandt. A very complete description of a new 15,000-ton vessel of the North German Lloyds. 5000 w. 3 plates. Zeitschr d Ver Deutscher Ing—April 9, 1904.

"Grangesberg."—S.S. "Grangesberg." An illustrated description of an unusual vessel, designed for carrying ore, and fitted with twenty-four derricks. 330 w. Engrs' Gaz—June, 1903.

Novel Ore Carrier. Illustrated description of the steamer "Grangesberg," constructed by an English firm for the Baltic ore trade. She carries her own discharging gear with her. 1200 w. Marine Rev—Aug. 6, 1903.

Great Lakes.—Peculiarities of Lake Steamers. Theodore Lucas. Description, with illustrations of characteristics of construction, suggesting improvements and considering the fitness of this type for coast service. 1400 w. Marine Rev—Jan. 31, 1901.

The New Ore Carrying Fleet of 1901. Waldon Fawcett. Discusses the changed conditions and the effect on the fleet of vessels for the Great Lakes. 300 w. Ir Age—April 25, 1901.

Splendid Lake Passenger and Freight Steamer. Profile and deck plans of a new passenger and freight steamer, which has many original features, now in progress of construction. 800 w. Naut Gaz—Feb. 20, 1902.

Freight Carriers of the Great Lakes. Illustrated review of the types of vessels used on the Great Lakes at various times, especially cargo vessels, with some points in regard to their history. 3500 w. Marine Rev—June 2, 1904.

The 10,000-Ton Lake Vessels. An illustrated article on the three series of 10,000-ton vessels under construction, which present new and widely different features from any that have been previously built. 1000 w. Ir Age—March 16, 1905.

See also **"Argo;" "Augustus B. Wolvin;" "Captain Thomas Wilson;" "Donnacona;" "Elbert H. Gary;" "Puritan;" Stone Carrying; "Sylvania;" Toledo; Wilkes Barre;" CANAL—Sault Ste. Marie; IRON ORE TRANSPORTATION; NAVAL ARCHITECTURE — Bending Moments; STEAMBOAT.**

Great Lakes for Ocean.—A Chicago and European Steamship Line. An account of a line of freight carriers; the first vessel having sailed from Chicago on April 24. 800 w. Ir Age—April 20, 1901.

Lake-Built Ocean Tramps. Theodore Lucas. Considers the limitations of ships to be built on the lakes for ocean service and their effect on the earning possibilities of cargo steamers. 2000 w. Naut Gaz—Aug. 28, 1902.

See also **Great Lakes; "Minnetonka;" Northwestern; Toledo, O.**

"Grecian."—Steamship "Grecian" of the Boston and Philadelphia S. S. Co.'s Fleet. Illustrated description of a modern coast line vessel. 1500 w. Marine Engng—Feb., 1901.

"Hanoverian."—The Twin-Screw Steamer "Hanoverian." An illustrated description of a typical ship of the combined cargo and passenger type. 1000 w. Engng—Oct. 31, 1902.

"Haverford" and "Merion."—"Haverford" and "Merion." A description of two liners about to be launched in Scotland. Ill. 1500 w. Marine Rev—May 2, 1901.

Hawaiian.—New Steamer "Likelike." Illustrated description of a freight and passenger vessel designed for Hawaiian Inter-Island Trade. 600 w. Naut Gaz—March 24, 1904.

See also **SCHOONER—Steam.**

Hill.—See **"Minnesota and Dakota."**

History.—Ocean Steamships Half a Century Ago. The first of a series of articles reviewing the ocean steamships built at and running from the port of New York. Serial. 1st part. 3000 w. Naut Gaz—July 4, 1901.

A Brief History of Ocean Passenger Ships. Lawrence Irwell. An interesting review of this service from its beginning. Serial. 1st part. 6000 w. Marine Rev—Aug. 1, 1901.

Brief History of Ocean Steamships. Lawrence Irwell. An account of some of the earliest steamers of the world, and the process of development. 5900 w. Marine Rev—Sept. 11, 1902.

A Century of Steamship Building. From the "Monthly Review" (England). The present year is the hundredth anniversary of the use of steam as a motive power for ships, and a review of the development is given. 4200 w. Marine Rev—Aug. 22, 1901.

A Graphical Record of Progress in Steamship Construction. Chart prepared by Herr Otto Schlick showing typical steam vessels from the beginning of steam navigation to the present time all drawn to the same scale. Brief descriptions are given. 1000 w. Eng News—Nov. 14, 1901.

Developments in Means of Communication by Sea During the Nineteenth Century. Dr. Robert-Caird's lecture under the auspices of the Royal Philosophical Society of Glasgow. A review of steam navigation for the period from 1802 till 1902. Serial. 1st part. 3500 w. Sci Am Sup—Nov. 19, 1904.

See also **Iron and Steel; MARINE ENGINEERING; SHIPBUILDING—British History; STEAMBOAT.**

Holland-Friesland Line.—See **STEAM TRAMWAY—Lemmer-Joure.**

Housing Propeller.—See **CRUISER—Mercantile.**

"Hydrographer."—See **U. S. Coast Survey.**

"Inchdune" and "Inchmarlo."—See **MARINE ENGINE.**

Inspection.—See **STEAMBOAT INSPECTION.**

"Ireland."—Passing of the Oscillating Engine—Sale of the S.S. "Ireland." Illustrated description of the Irish mail steamer, with a record of her dimensions and performances. 1200 w. Marine Engng—May, 1901.

Iron and Steel.—Iron and Steel Hull Steam Vessels of the United States. J. H. Morrison. Reviews the history of iron and steel in hull construction. Serial. 1st part. 4200 w. Sci Am Sup—Oct. 21, 1905.

Italian.—New Steamships "Umbria" and "Liguria." Brief illustrated description of the last of five vessels of the Nav. Gen. Italiana Co. placed in American service. 900 w. Marine Engng—July, 1903.

"Ivernia."—See **Atlantic.**

"James C. Wallace."—See **LAUNCHING.**

"James S. Whitney."—Fine New Steamship. Illustration and description of the "James S. Whitney," one of the finest freighters on the Atlantic Coast. 2500 w. Naut Gaz—Dec. 13, 1900.

Kaiser Wilhelm II.—The New German High-Speed Liner "Kaiser Wilhelm II." Begins an illustrated detailed description of this new North German Lloyd high-speed Atlantic liner, which is not only the largest ship yet built, but is to be the fastest. Also considers the type, as a passenger carrier particularly. Serial. 1st part. 3800 w. Engng—Aug. 15, 1902.

The Launch of the Twin-Screw Steamer "Kaiser Wilhelm II." (Der Stapellauf des Doppelschrauben-Schnelldampfers "Kaiser Wilhelm II.") Description of the launch, with details of the dimensions of the vessel, the longest yet built, being 706 feet in length. 1500 w. 2 plates. Zeitschr d Ver Deutscher Ing—Aug. 16, 1902.

The Twin Screw Express Steamship Kaiser Wilhelm II. (Doppelschrauben-Schnelldampfer Kaiser Wilhelm II.) A general account of the new steamer of the North German Lloyd, with especial reference to the launch. 2000 w. Stahl und Eisen—Sept. 1, 1902.

The Latest of the Fast Transatlantic Liners. Illustrated description of the "Kaiser Wilhelm II." 1200 w. Sci Am—Dec. 13, 1902.

Mammoth Ocean Greyhound. Illustrations and brief description of the "Kaiser Wilhelm II.," the latest German built transatlantic express steamer. 700 w. Naut Gaz—April 30, 1903.

The Latest Atlantic Liner, "Kaiser Wilhelm II." Brief illustrated description of this recently completed vessel, notable for her great size and power. 700 w. Sci Am—May 2, 1903.

New North German Lloyd Express Steamship "Kaiser Wilhelm II." An illustrated detailed description of this fine vessel, remarkable for its size and expensive fittings for passenger service. 2800 w. Marine Engng—June, 1903.

The "Kaiser Wilhelm II." Gustav H. Schwab. An illustrated detailed description of the newest and largest Atlantic liner. 2500 w. Cassier's Mag—July, 1903.

T. S. S. "Kaiser Wilhelm II." An illustrated article giving a general idea of this largest high-speed liner that has yet been completed. Following articles will enter fully into details. Serial. 1st part. 5500 w. Engng—July 10, 1903.

The Twin-Screw Steamship "Kaiser Wilhelm II." (Der Doppelschraubendampfer Kaiser Wilhelm II."). W. Kaemmerer. A general illustrated description with numerous illustrations from working drawings of hull and engines. Two articles. 6000 w. 4 plates. Zeitschr d Ver Deutscher Ing—Aug. 1 and 8, 1903.

The Steamship "Kaiser Wilhelm II." (Le Paqueboat "Kaiser Wilhelm II." J. Bousquet). A general illustrated description of the German transatlantic steamship, showing the construction and interior finishing. Serial. Part I. 3000 w. Génie Civil—Oct. 3, 1903.

"King Edward."—See **STEAMBOAT; STEAM TURBINE.**

"Kong Haakon."—The Passenger and Freight Screw Steamer "Kong Haakon." Dr. Alfred Gradenwitz. Illustrates and describes a screw steamer built in Germany, for a Norway company, and is intended to convey passengers and mail between various coast stations. 1200 w. Marine Engng—Oct., 1905.

"Korea."—Launch of the Pacific Mail Liner "Korea." Brief illustrated description of the largest steamship ever built in America, which is to ply between San Francisco and Hong Kong, carrying freight and passengers. 700 w. Sci Am—April 13, 1901.

The Pacific Mail Steamship "Korea." Charles K. Mallory. Illustrated description of the vessel and its equipment with report of trial. 5000 w. Jour Am Soc of Nav Engrs—May, 1902.

"Korea" and "Siberia."—Pacific Mail Steamships "Korea" and "Siberia," built by the Newport News Shipbuilding and Dry Dock Co. Illustrated detailed description of the largest ships yet built in America. 4800 w. Marine Engng—May, 1902.

Notable New American Steamships. Illustrates and describes the "Siberia" and "Korea," two fine vessels intended for service on the Pacific, between San Francisco, Hawaii, Japan and China. 1400 w. Naut Gaz—Feb. 5, 1903.

"Kronprinz Wilhelm."—New North German Lloyd Atlantic Steamer "Kronpriz Wilhelm." Describes this vessel recently launched, making another high-speed steamer of great size for this company. 900 w. Engng—April 12, 1901.

The New German Atlantic Liner "Kronprinz Wilhelm." Describes this new high-speed liner and its equipment, reporting the trial. 1800 w. Engng—Sept. 13, 1901.

The New Atlantic Liner "Kronprinz Wilhelm." Brief illustrated description of this large, high-speed vessel. 700 w. Sci Am—Sept. 14, 1901.

A New Triumph of German Shipbuilding (Ein Neuer Triumph der Deutschen Schiffsbaukunst). A description of the new steamer "Kronprinz Wilhelm," of the North German-Lloyd Steamship line. 1500 w. Stahl und Eisen—Oct. 1, 1901.

Express Steamship Kronprins Wilhelm. Brief illustrated description of this new liner for the North German Lloyd Co. 1500 w. Marine Engng—Nov., 1901.

The New German Liner "Kronprins Wilhelm" (Der Neue Deutsche Schnelldampfer "Kronprins Wilhelm"'. An illustrated general account of this great North German Lloyd steamship. 1000 w. Glasers Ann—Jan. 1, 1902.

The "Kronprins Wilhelm." Illustrated description of this high-speed Atlantic liner. 1000 w. Sci Am Sup—March 15, 1902.

"Kroonland."—New Steamship "Kroonland" of the International Navigation Company. An illustrated detailed description of this largest ship yet built in American waters, noting features of interest in design and in construction work. 3300 w. Marine Engng—Sept., 1902.

Lake Erie Speed Trial.—See **STEAMBOAT RACE.**

Large.—See **Capacity.**

"Lichtenfels."—German-Built Cargo Steamer. Illustrated description of the cargo ship "Lichtenfels," showing latest practice. 600 w. Marine Engng—July, 1903.

Lighthouse Tender.—See **LIGHTHOUSE TENDER.**

"Liguria."—See **Italian.**

"Likelike."—See **Hawaiian; SCHOONER—Steam.**

Liquid Fuel.—Memoranda Regarding Fuel Oil Aboard Ship. Walter J. Goodenough. Suggestions relating to bunkers, ventilation, piping, electric light and furnace construction. 2500 w. Marine Engng—Jan., 1903.

See also **"Bulysses;" "Nebraskan;" "Nevadan;" LIQUID FUEL.**

"Lorraine."—See **"Savoie" and "Lorraine."**

"McPherson."—Building a New Bottom for a Wrecked Ship. Illustrated description of the extensive repairs to the U. S. transport "McPherson," which went ashore on the south coast of Cuba. 700 w. Marine Engng—Sept., 1902.

"M. S. Dollar."—The Steamship M. S. Dollar. Illustrated description of this recently launched vessel of the three deck type. Also describes the engines. 1200 w. Marine Engng—Aug., 1901.

"Maine."—See **"Missouri."**

Merger.—See **SHIPPING—International Mercantile Marine Co.**

Messageries Maritimes.—See **Paris Exposition; SHIPPING.**

"Minnesota and Dakota."—Mammoth Steamships. Illustration, with description of the new Hill passenger and freight boats, the largest craft ever built. They are intended for Trans-Pacific trade, and will be 21,000 tons gross register, costing $2,500,000 each. The product of an American Shipyard. 1400 w. Naut Gaz—Jan. 10, 1901.

Largest Vessels in the World. Illustrated description of the new vessels building for the Oriental service of the Great Northern Railway, which are in measurements a little larger than the "Celtic." 1700 w. Marine Rev—June 20, 1901.

The Two Great Freighters for the Pacific Trade. Illustrates and describes the interesting features of the 20,000-ton steamships building at New London, Conn., for the Pacific trade. 1400 w. Sci Am—Dec. 13, 1902.

The New American-Built Liner "Minnesota." Illustration, with description, of this mammoth freight and passenger steamship which will be used in the Pacific trade. 1000 w. Sci Am—April 18, 1903.

Giant Ships for Our Oriental Trade. F. N. Stacy. An interesting illustrated article describing the "Minnesota" and "Dakota." 2800 w. Rev of Revs—May, 1903.

Steamship "Minnesota," of the Great Northern Steamship Company, Built by the Eastern Shipbuilding Company. Illustrated description of interesting features of construction and equipment of this mammoth ship. 8800 w. Marine Engng—May, 1903.

Description of the Design and Building of the 21,000-Ton Steamships "Minnesota" and "Dakota." Charles R. Hanscom. Describes the yard and equipment of the Eastern Shipbuilding Co., near New London, Conn., and the difficult problems encountered. Ships built for the Pacific trade of the Great Northern Railway Co. Fully illustrated. 13,600 w. Trans Am Soc Nav Archts & Marine Engrs, No. 11—Nov, 1903.

The "Minnesota," the Largest Steamship Ever Built in America. Illustrated description of a large vessel built for the Pacific trade. 1000 w. Sci Am—Sept. 3, 1904.

Mammoth Steamship "Dakota." Large illustration with description of this vessel, its equipment and pumping machinery. 4000 w. Am Shipbuilder—Nov. 24, 1904.

Description of Steamship "Dakota" and Her Official Trial Performance. A. Gundersen. Illustrations, and description of this vessel built for trans-Pacific service. 10,500 w. Jour Am Soc of Nav Engrs—May 1, 1905.

The Great Northern Steamship "Dakota." Illustrated detailed description of this large ship, constructed for the American merchant marine for over-sea trade. 800 w. Marine Engng—June, 1905.

The Machinery of the Great Northern Steamship "Dakota." Illustrated detailed description. 1100 w. Marine Engng—July, 1905.

"Minnetonka" and "Minnewaska."—Built on the Lakes for Ocean Service. Illustrated descriptions of steamers "Minnetonka" and "Minnewaska" of 7,000 tons capacity each, which are to be taken in sections to the Atlantic seaboard. 1600 w. Marine Rev—Jan. 30, 1902.

Lake Built Ocean Tramp Steamers. Charles C. West. Illustrates and describes the design and construction of the "Minnetonka" and "Minnewaska" which are to be cut in two and towed to Montreal and there re-united. 2000 w. Marine Engng—March, 1902.

"Mississippi" and "Massachusetts."—Fine Transatlantic Freighters. Brief description with illustrations of the "Mississippi" and the "Massachusetts." 700 w. Naut Gaz—Aug. 6, 1903.

"Missouri."—Atlantic Transport Steamers "Missouri" and "Maine." Description and plans of vessels under construction, and their engines. 1700 w. Marine Engng—Jan., 1903.

"Mongolia."—S.S. "Mongolia"—Pacific Mail Steamship Company. L. D. Lovekin. A description of the largest ship yet completed in America, with report of trial. 3900 w. Jour Am Soc of Nav Engrs—Feb., 1904.

New Steamship "Mongolia," for the Pacific Mail Steamship Company. Illustrated description of a recently completed vessel. 6000 w. Marine Engng—April, 1904.

"Monroe."—Steamship "Monroe" of the Old Dominion Line. An illustrated detailed description of a recently completed vessel for service between New York and Norfolk. A steel screw steamer of the hurricane-deck type. 5500 w. Marine Engng—Aug., 1903.

"Morro Castle."—Magnificent American Steamship for Coasting Service. Illustration, with a complete description, of the "Morro Castle," a steamer displacing over 8000 tons, and finely fitted. 3000 w. Naut Gaz—Nov. 15, 1900.

"Nebraskan."—12,726-Mile Run of the Nebraskan Burning Oil. An account of the run from San Diego to New York, steaming with oil fuel. Illustrates and describes the machinery, oil-burning system, operation, performance, &c. 2000 w. Marine Engng—May, 1904.

"Neckar."—The Imperial Mail Steamship "Neckar" (Der Reichspostdampfer "Neckar"). A fully illustrated description of this North German Lloyd 18,700-ton steamship, and of its boilers, engines and fittings. 2 plates. 2500 w. Zeitschr d Ver Deutscher Ing—Jan. 4, 1902.

"Nevadan."—First Oil-Burning Steamship Built in the United States. Brief illustrated description of the "Nevadan," built at Camden, N. J., for Trans-Pacific trade. 500 w. Sci Am—July 19, 1902.

"New York," Reconstruction.—Reconstruction of the Steamship "New York." Illustrations and particulars of interesting reconstruction work. 900 w. Sci Am—Jan. 17, 1903.

The Reconstructed "New York." An interesting illustrated account of the work of bringing this well-known vessel up to the latest advances in marine engineering, and naval architecture, describing new features introduced. 1800 w. Marine Engng—May, 1903.

"Nikko-Maru."—New Australian Liner "Nikko-Maru." Illustrated detailed description of vessel built in Japan. 1800 w. Marine Engng—March, 1904.

"Northwestern."—Ocean-Going Steamship "Northwestern," Built on the Great Lakes. Illustration of the vessel and engines, with description. 1800 w. Marine Engng—June, 1901.

Oil Burning.—See "Bulysses;" Liquid Fuel; "Nebraskan;" "Nevadan;" **LIQUID FUEL.**

"Okean."—See **SCHOOLSHIP.**

"Old Dominion."—The Sidewheel Steamship Old Dominion." Illustrated description of the last example of a type of ocean steamer which at one time predominated. 3300 w. Naut Gaz—Feb. 2, 1905.

"Ontario."—New Coasting Steamship. Description, with illustration, of the "Ontario," built by the New York Shipbuilding Co. for the Merchants and Miners' Line, and brief history of this line. 1500 w. Naut Gaz—Aug. 11, 1904.

Ore Carrying.—See "Elbert H. Gary;" "Grangesberg;" Great Lakes; **IRON ORE HANDLING; IRON ORE TRANSPORTATION.**

"Orontes."—New Orient Liner "Orontes." Describes a new twin-screw steamer intended for the Australian trade. Ill. 1000 w. Engr, Lond—May 16, 1902.

Pacific Coast.—New Coasting Steamer. Illustrated description of a compact and well designed wooden propeller under construction at San Francisco. 1000 w. Naut Gaz—May 30, 1901.

See also **SCHOONER—Steam.**

Pacific Mail.—The New Pacific Mail Liners. Illustration, with brief description of large vessels, nearing completion at the Newport News shipyard. 900 w. Naut Gaz—Feb. 7, 1901.

Paddle Wheel.—See "Old Dominion;" **STEAMBOAT.**

Paris Exposition.—The Messageries Maritimes at the Paris Exhibition. Detailed description, with illustrations, of the exhibits and the pavilion containing them. 1800 w. Engng—Nov. 16, 1900.

"Pathfinder."—See **U. S. Coast Survey.**

Peary's Arctic.—See **"Roosevelt."**

Performance.—Steamship Performance. Comments on the performance of steamships hired as transports, and the inability of a vessel designed for a special voyage to maintain the same qualities for a totally different passage, with remarks on steam turbines. 1200 w. Engr, Lond—Jan. 11, 1901.

See also **SHIP PROPULSION.**

"Port Royal" and "Port Antonio."—The S. S. Port Royal" and "Port Antonio." Illustrated description of triple expansion engines for two new steamers built for the development of British trade with the West Indies. 1600 w. Engr, Lond—May 3, 1901.

The Steamships "Port Royal" and "Port Antonio." Illustrated description of the triple-expansion engines of two steamships constructed to be worked under a government subsidy for the development of U. S. trade with the West Indies. 1500 w. Sci Am Sup—June 29, 1901.

"Poseidon."—The Exploring Steamer "Poseidon" (Der Forschungsdampfer "Poseidon"). W. Kaemmerer. An illustrated description of a twin screw steamer built for the German government for the purpose of making scientific investigations at sea, particularly her fishery work. 1200 w. Zeitschr d Ver Deutscher Ing—June 6, 1903.

"Prinz Adalbert."—Twin-Screw Steamer "Prinz Adalbert," of the Hamburg-American Line (Doppelschrauben-Passagier- und Frachtpostdampfer der Hamburg-Amerikalinie, "Prinz Adalbert"). Prof. Oswald Flamm. A well-illustrated description of a passenger and express freight steamer of medium size, built at the Bremen Vulcan yard, in Vegesack, Germany, for the Brazil trade. Serial. 3 parts. 6 plates. 3300 w. Schiffbau—May 23, June 8 and 23, 1903.

"Prinz Sigismund."—The Freight and Passenger Steamer "Prinz Sigismund" (Der Fracht und Personendampfer "Prinz Sigismund"). W. Kaemmerer. Illustrating and describing a new vessel built for the South American trade of the Hamburg-American Line. 1200 w. 1 plate. Zeitschr d Ver Deutscher Ing—Sept. 24, 1904.

"Prinzessin Victoria Luise."—The Hamburg-American Yacht, "Prinzessin Victoria Luise." Illustrated description of a vessel specially designed for pleasure tours. 1100 w. Sci Am—Feb. 9, 1901.

The Twin-Screw Steam Yacht "Prinzessin Victoria Luise" Die Doppelschrauben-Dampfyacht "Prinzessin Victoria Luise"). A very complete and well-illustrated description of this fine new vessel of the Hamburg-American line, and of her engines and boilers. 4 plates. 4000 w. Zeitschr d Ver Deutscher Ing—April 6, 1901.

Twin Screw Pleasure Yacht "Prinzessin Victoria Luise." Illustrated description of a new type of pleasure steamer built for long cruises. 600 w. Marine Engng—Sept., 1901.

"Progresso."—See **EXPLOSION—Steamer "Progresso."**

"Provence."—Launch of the Steamship "La Provence" (Lancement du Paquebot "La Provence"). A. Dumas. Illustrated description of the launching of a new vessel for the French Transatlantic line. Displacement 19,160 tons; 30,000 H. P. 1800 w. Génie Civil—March 25, 1905.

New Passenger Steamer "La Provence." L. Ramakers. Illustrated description of a new passenger steamer for service between Havre and New York, which will be the fastest and largest of the French mercantile marine. 1400 w. Marine Engng—Aug., 1905.

"Puritan."—Passenger Steamer "Puritan." Illustrated detailed description of a steamer for the Great Lakes to ply between Holland, Mich., and Chicago. 1800 w. Marine Engng—Nov., 1901.

"Queen."—The New Turbine Channel Steamer "Queen." Illustration and brief description of a channel steamer for the South-Eastern and Chatham Ry. 1200 w. Engr, Lond—June 19, 1903.

Channel Steamship "The Queen." An account of the performance of this new turbine-propelled steamer on the Dover-Calais route. 1600 w. Engr, Lond—July 3, 1903.

The Turbine Steamship "Queen" (Le Paquebot à Turbines "Queen"). A. Dumas. An illustrated description of the new Parsons turbine steamer on the Calais-Dover service. 1200 w. Génie Civil—Aug. 1, 1903.

New Cross-Channel Turbine Steamer. Consular report concerning the steamship "The Queen," with articles from the Parsons Marine Steam Turbine Co. 1400 w. U S Cons Repts, No. 1736—Aug. 29, 1903.

See also **STEAM TURBINE.**

"Queen Alexandra."—See **Turbine.**

"Rainbow."—See **Channel.**

Refrigeration.—See **REFRIGERATION—Shipboard.**

Repairs.—See **"New York;" "Salvage; SHIPBUILDING.**

Revenue Cutter.—See **REVENUE CUTTER.**

"Roosevelt."—Peary's New Ship for Work in Arctic Seas. An illustrated description of this specially constructed vessel, designed to meet every emergency of the Arctic climate. 1500 w. Sci Am—Oct. 8, 1904.

Peary's Latest Arctic Ship, the "Roosevelt." Illustrated description of this vessel, giving design plans. It is technically described as a "three-masted, fore-and-aft, schooner-rigged steam vessel, with auxiliary sail power." It has features of unusual interest to meet the severe requirements. 2000 w. Marine Engng—May, 1905.

Peary's Arctic Exploration Ship. An illustrated detailed description of the "Roosevelt." 5400 w. Marine Rev—May 4, 1905.

Propelling Machinery for the Arctic Steamer "Roosevelt." An illustrated article giving a general description of the machinery designed to meet the severe conditions of working through the ice. 1800 w. Marine Engng—Aug., 1905.

"Saale."—The Reconstructed "Saale." Illustrated description of the extensive changes made in overhauling this vessel which was badly damaged by the Hoboken pier fire. 1000 w. Marine Engng—Aug., 1902.

Safety Precautions.—State Protection for Ocean Travelers. George W. Melville. Urging that all sea-going steamers shall be fitted with twin-screw engines and double bottoms, and with life-saving devices, and obliged to carry enough efficient men and officers to safely operate the vessel. Other suggestions are also given, and their economic advantages shown. 3800 w. N Am Rev—Aug., 1902.

See also **LIFE SAVING APPLIANCE.**

"San Jacinto."—Mallory Line Twin Screw Passenger and Freight Steamship "San Jacinto." Illustrated detailed description of a new vessel for service between New York and Galveston, Tex. 5400 w. Marine Engng—Nov., 1903.

"Savoie."—Express Steamship "La Savoie." Illustrated description of a fine new ship recently placed in service between New York and Havre. 900 w. Marin Engng—Dec., 1901.

"Savoie" and "Lorraine."—The New Liners of the French General Transatlantic Company. Two page plate, illustrations, and description of the two new liners, "Lorraine" and "Savoie," for service between France and New York. 800 w. Engng—March 14, 1902.

Schooners.—See Hawaiian; **SCHOONER—Steam.**

"Siberia."—See "Korea" and "Siberia."

Sidewheel.—See "Old Dominion; **STEAMBOAT.**

"Sithonia."—The Screw Steamship "Sithonia" (Der Schraubendampfer "Sithonia"). An illustrated description of the new steamer of 13,500 tons, built by the Flensburg Works for the Hamburg-America China trade. 2500 w. 1 plate. Zeitschr d Ver Deutscher Ing—April 12, 1902.

Size.—See Capacity; Freight.

South Africa Liners.—Three New Liners. Illustrations with brief descriptions of three vessels for the South African route. The "Arundel Castle," "Cluny Castle" and the "Miltiades." 1400 w. Engr, Lond—Aug. 21, 1903.

"Spokane."—Handsome New Coasting Steamship. Illustration, with description of the "Spokane" for the merchant marine of the Pacific coast. 1500 w. Naut Gaz—March 13, 1902.

Steaming Radius.—See **NAVY; SHIP PROPULSION—Speed.**

Stone Carrying.—Stone Handling Plant of the Lake Shore Stone Co., Belgium, Wis. Illustrates a stone-carrying steamer, equipped with mechanical conveyors for unloading the cargo, and describes the methods of loading at the quarry. 2000 w. Eng News—Jan. 19, 1905.

Strength.—See **NAVAL ARCHITECTURE.**

Subsidy.—See **SHIPPING.**

"Sylvania."—Modern Lake Cargo Carriers. Illustration, and description of the "Sylvania," one of this season's new boats. 1700 w. Naut Gaz—Oct. 19, 1905.

Tank.—The Carriage of Oil in Bulk. Describes the steamship "Clam," one of a fleet of vessels used in the oil-carrying trade. The boilers are worked with oil instead of coal. The boat contains a number of well holds, and is capable of stowing away 4500 tons of oil. Some of the vessels can be so cleansed as to carry the most delicate cargoes without taint. 1400 w. Engr, Lond—Dec. 6, 1901.

New Large Oil-Tank Steamer Captain A. F. Lucas. Illustrated description of an oil-carrying vessels now undec onstruction at Toledo, Ohio. Engng—Dec., 1902.

See also **LIQUID FUEL—Steamship; SHIPPING—Oil Carrying.**

Tank "Deutschland."—Tank Steamer "Deutschland." C. C. Thomas. Illustrates and describes one of the largest steamers carrying petroleum to German ports. 1600 w. Marine Engng—Oct., 1901.

Telephone, "Minnesota."—See **TELEPHONE—Steamship "Minnesota."**

Toledo, O.—New Lake-Built Ocean Passenger and Freight Steamships. Briefly describes two steel vessels now under construction at Toledo, Ohio. Ill. 1000 w. Naut Gaz—March 21, 1901.

Trunk Deck.—See **COAL TRANSPORTATION—Sea-Borne.**

Trust.—See **SHIPPING—International Mercantile Marine Co.**

Turbine.—Forthcoming Developments in the Marine Steam Turbine. Herbert C. Fyfe. A very well illustrated review of war ships, passenger steamers and pleasure yachts equipped with Parson's steam turbines. 5000 w. Page's Mag—Dec., 1902.

The First Cross-Channel Turbine Steamer. H. C. Fyfe. A description of a vessel now building which is expected to create a revolution in cross-channel passenger traffic. 1000 w. Sci Am—June 20, 1903.

Steam Turbines for High-Speed Cunarders. Editorial on the decision of the Cunard Company to adopt steam turbines on their two new high-speed liners. 2000 w. Engng—April 1, 1904.

The New Cunard Turbine Steamers. Illustrates and describes the exhibits of the Cunard Steamship Company at St. Louis, giving information of the most notable features of the turbine steamers. 1000 w. Sci Am—Sept. 10, 1904.

Recent Turbine Steamers. Illustrations and short descriptions of the "Manxman," "Princess Elisabeth," "Maheno" and a new vessel for King Edward VII. 2400 w. Marine Engng—Dec., 1905.

See also "Carmania;" "Caronia;" "Channel;" Cunard; "Dieppe;" "Queen;" "Victorian;" "Viking;" **STEAMBOAT; STEAM TURBINE.**

"Turbinia."—See **STEAM TURBINE—Marine.**

"Umbria."—See Italian.

"United States."—New Twin Screw Steamship "United States." Illustration with brief description of this new passenger and freight steamship of the Scandinavian-American line, for the New York and Copenhagen route. 700 w. Am Shipbuilder—June 18, 1903.

U. S. Coast.—See American Coast; **SHIPPING**; and under names of vessels and lines.

U. S. Coast Survey.—New Steamer for the Coast Survey. Illustrated description of a new single-screw steamer designed for the requirements of the duty. 500 w. Marine Rev—March 31, 1904.

U. S. Coast and Geodetic Survey Steamer "Fathomer" for Philippine Service. G. R. Putnam. Illustrations, with a brief outline of the principal features of interest from an engineering point of view. 1000 w. Eng News—Sept. 28, 1905.

The Steamer "Hydrographer." Illustrated description of the latest addition to the surveying vessels of the U. S. Coast and Geodetic Survey. 800 w. Marine Engng—Jan., 1902.

Coast & Geodetic Survey Steamer "Pathfinder." Illustrated description of this vessel and its equipment. 2500 w. Marine Engng—Jan., 1905.

"Vaderland."—Magnificent New Liner. Illustration and detailed description of the "Vaderland" of the New York and Antwerp Line. 2700 w. Naut Gaz—Dec. 27, 1900.

Red Star Liner "Vaderland." Illustrated description of the vessel and equipment. 2400 w. Marine Rev—Dec. 27, 1900.

New Transatlantic Liner "Vaderland" for the Red Star Line. Illustration, with description of the vessel and its equipment. 2000 w. Marine Engng—Jan., 1901.

Vibration.—See **MARINE ENGINE—Balancing; SHAFT—Vibrations.**

"Victorian."—How the "Victorian" Looks. Illustrations, with description of this turbine vessel built for service on the Atlantic, in the Canadian mail service. 2800 w. Marine Rev—Sept. 29, 1904.

The First Turbine Atlantic Liner. An illustrated description of the "Victorian," the first of two turbine-driven ships ordered by the Allan Line. 1100 w. Page's Mag—Oct., 1904.

The "Victorian," The First Turbine Atlantic Liner. Brief illustrated description. 900 w. Sci Am—April 8, 1905.

The Turbine Steamship "Victorian." Report by Com. A. B. Canaga, describing the equipment and operation. Ills. 5000 w. Jour Am Soc of Nav Engrs—May, 1905.

The Allen Line Turbine Steamers "Victorian" and "Virginian." Benjamin Taylor. General illustrated description of 19¼-knot, 12,000 horse power, 10,600-ton, 540-foot vessels, plying between Liverpool and Montreal. 1000 w. Marine Engng—Sept., 1905.

"Victory."—See **NAVAL ARCHITECTURE—Bending Moments.**

"Viking."—The Turbine-Driven Isle of Man Steamer "Viking." An illustrated detailed description of an interesting vessel in which the Parsons steam-turbine takes the place of the reciprocating engine. 1500 w. Engng—June 30, 1905.

Speedy English Turbine Steamer. Illustrates and describes the "Viking," plying out of the port of Liverpool. Speed about 27 miles an hour. 1500 w. Naut Gaz—Aug. 10, 1905.

The Turbine-Driven Steamer "Viking." L. Ramakers. Illustrated detailed description. 1100 w. Marine Engng—Nov., 1903.

"Virginian."—See "Victorian."

Water Cost.—The Cost of the Fresh Water Used on Board of Ocean Steamers (Kosten des an Bord von Seedampfschiffen Verbrauchten Frischwassers). Franz Schneider. A discussion of the cost of fresh water for all purposes, whether distilled from sea water or carried along in tanks. 2000 w. Schiffbau—April 23, 1903.

"Wilkes-Barre."—Splendid Lake Freighter. Illustration and brief description of the new steel steamship "Wilkes-Barre," built at the Union Dry Dock Company's plant, Buffalo. 700 w. Naut Gaz—Feb. 7, 1901.

World.—Steamship Lines of the World. An enumeration of the leading steamship lines of the most important countries, with illustrations of four representative American steamships. 5400 w. Naut Gaz—April 17, 1902.

See also **SHIPPING.**

"Yongala."—The Steamship "Yongala." Illustrates and describes a vessel designed for the Australian coasting and passenger trade. 900 w. Eng, Lond—Oct. 30, 1903.

STEAMSHIP CONSTRUCTION.

See **MARINE ENGINE; MARINE ENGINEERING; NAVAL ARCHITECTURE; SHIPBUILDING.**

STEAMSHIP CONTRACT.

See **SHIPPING.**

STEAMSHIP SERVICE.

See **SHIPPING; STEAMSHIP.**

STEAM SHOVEL.

See also **DREDGING; EXCAVATION; IRON MINE; MINING MACHINERY.**

Steam Shovels for Trench Excavation. Illustrated description of work upon which this method of excavation has been employed. 1400 w. Eng News—Nov. 7, 1901.

The Increasing Capacity of Power Shovels. George E. Walsh. Remarks on the great increase in capacity during the last year or two, and the effect on mining, excavating of canals, and general excavation work. 1400 w. Ir Trd Rev—Aug. 4, 1904.

Coal Stripping.—See **COAL MINING—Stripping.**

Dipper Dredge.—A Small "Home-Made" Dipper Dredge or Steam Shovel. Illustrated detailed description of a power excavator very useful where it is difficult and expensive to take a dredge or steam shovel. 1000 w. Eng News—May 14, 1903. See also **DREDGING.**

Excavating.—Mining and Other Excavating by Steam Shovels and Modern Electric and Steam Driven Dredges. Frank C. Perkins. An illustrated article describing systems now used, and giving examples of their application. 2500 w. Min Rept—June 11, 1903.

Excavation, N. C.—See **EXCAVATION—Steam Shovel.**

Improvements.—Improvements in Steam Shovels. Waldon Fawcett. Notes the increase in the capacities and other phases of the development. Ill. 2200 w. Sci Am—Aug. 1, 1903.

Mines.—Steam Shovels in Mines. George E. Cole. Illustrated description of these machines and their work in the Granby Co.'s ore quarries at Phoenix, B. C. 1500 w. B C Min Rec—Dec., 1903.

North Carolina.—Cost of Earth Excavation by Steam Shovel. Daniel J. Hauer. Gives an account of a month's work done in North Carolina, with remarks on factors affecting cost. 3500 w. Eng News—Dec. 31, 1903.

Novel Design.—A Steam Shovel of Novel Design. Illustrated description of a new type of excavating machinery which dispenses with the usual equipment of hoisting engine, drums, chains, clutches, &c. 1000 w. Eng News—Dec. 17, 1903.

Quarries.—Excavating Machinery for Quarry Use. An illustrated article giving particulars of the working of a steam navvy or excavator, taken from a paper read by A. L. Stevenson, before the North of England Inst. of Min. & Mech. Engrs. 3000 w. Quarry—Feb. 1, 1902.

Robinson.—A Railway Steam Shovel of New Design. Illustrates and describes a new shovel designed by A. W. Robinson, noting the important changes. 2800 w. Eng News—Aug. 4, 1904.

Thew.—The Thew Steam Shovel; Cleveland, Lorain and Wheeling Ry. Illustrated description of the machine. The chief novelty is in the construction of the swinging boom and the method of manipulating the dipper. 900 w. Eng News—April 11, 1901.

STEAM SUPERHEATING.

See **SUPERHEATED STEAM.**

STEAM TRAMWAY.

See also **STREET RAILWAY.**

Dutch East Indies.—See **RAILWAY.**

Lemmer-Joure, Friesland. — The Holland-Friesland Line and the Lemmer-Joure Steam Tramway (De Holland-Friesland-Lijn en de Stoomstram Lemmer-Joure). With description of the steamboats and dock at Lemmer, and an account of the opening of the new tramway line. 3000 w. De Ingenieur—Aug. 17, 1901.

STEAM TRAP.

See also **STEAM; STEAM ENGINEERING; STEAM LOOP; STEAM PIPE.**

Steam Traps. Walter W. Edwards. Illustrates and describes the various classes of steam traps according to their principle of operation. 2200 w. Engr, U S A—May 1, 1904.

Modern Steam Traps. W. T. Edwards. Brief illustrated descriptions of modern types of steam traps, their methods of operation, and in some cases the manner of piping recommended to obtain the best results. 3500 w. Am Elect'n—July, 1905.

Neilson.—Neilson's Steam Trap. Illustrates and describes a design in which the main delivery valve is operated by the energy of the steam. 700 w. Mech Engr—June 17, 1905.

West Point, N. Y.—The Trap Return System at the United States Military Academy, West Point, N. Y. Illustrates and describes the method of taking care of the condensation in an extensive system of supply pipe, by the use of Bundy return and tank traps which all feed into a common return main. 1200 w. Power—July, 1905.

STEAM TURBINE.

See also **ELECTRIC ENGINEERING—Europe; ELECTRIC GENERATING SET: MOTOR: ROTARY ENGINE—Hult: STEAMBOAT; STEAM ENGINE — Modern Practice; STEAMSHIP; STEAM YACHT; TORPEDO BOAT DESTROYER.**

The Steam Turbine: The Steam Engine of Maximum Simplicity and of Highest Thermal Efficiency. Robert H. Thurston. A summary of the work of the steam turbine to date, and a study of the sources of loss as it is now constructed and operated, and the principles of its correct design, construction and operation, with other related information. Ill. 18,500 w. Trans Am Soc of Mech Engs, No. 881—Dec., 1900.

Steam Turbines. Francis Hodgkinson. Discusses in detail this branch of steam engineering. Ill. 8200 w. Am Mfr—Dec. 20, 1900.

The Steam Turbine. An explanation of the action with proof of statements. Serial. 1st part. 1800 w. Power—May, 1901.

Some Notes on Steam Turbines. F. J. Warburton. Read before the Northeast Coast Inst. of Engrs. and Shipbuilders, at Newcastle. An illustrated article explaining the various powers of the steam turbine, and how the modern types differ from the earlier. 1800 w. Engr, Lond—Feb. 7, 1902.

The Coming of the Steam Turbine. Editorial reviewing the development. 1400 w. Loc Engng—May, 1902.

Steam Turbines. S. E. Fedden. Read before the Incor. Munic. Elec. Assn. at Islington, England. Calls attention to some of the advantages of the steam turbine in a power station, and gives information of interest. 2000 w. Elec Engr, Lond—July 11, 1902.

The Steam Turbine. Its Commercial Aspect. Edward H. Sniffin. Read before the St. Ry.

Assn. An inquiry into its commercial utility, giving detailed information of plants now in operation, discussing their cost, and the cost of operation as compared with steam plants. 5800 w. St Ry Rev—Oct. 11, 1902.

The Steam Turbine. Outlines the general principles of the leading types of steam turbines, paying more attention to their thermodynamic than to their constructive features. Ill. 2500 w. Mach, N Y—Nov., 1902.

The Steam Turbine and the Future of Heat Engines (Die Dampfturbinen und die Aussichten der Wärmekraftmaschinen). A. Stodola. A discussion of the thermodynamic and mechanical features of the steam turbine, showing its influence upon the development of heat motors. Serial. Part I. 4000 w. Zeitschr d Ver Deutscher Ing—Jan. 3, 1903.

Steam Turbines (Les Turbines a Vapeur). A. Abraham. Illustrated. General review. Serial. Part I. 1200 w. Rev Technique—July 10, 1903.

The Steam Turbine (Die Dampfturbinen). A general description of the different types of steam turbine now in the market, showing their numerous applications for electrical and general driving. Serial. Two articles. 6000 w. Glückauf—Aug. 15, 22, 1903.

Recent Steam Turbine Developments. W. L. R. Emmet. A discussion of design, with explanation of changes made, and report of tests. General discussion. 7500 w. St. Ry Rev (Daily Ed.).—Sept. 4, 1903.

Some Notes on the Steam Turbine. Homer M. Jaquays. Illustrations and information concerning various types, the existing conditions and future outlook. 4500 w. Can Soc of Civ Engrs, Adv Proof—Dec., 1903.

Notes on the Steam Turbine. Prof. Homer M. Jaquays. Read before the Canadian Soc. of Civ. Engrs. A review of modern turbines and the general principles of the chief types. Ill. 4800 w. Can Engr—Dec., 1903.

Some Noes on the Steam Turbine. Homer M. Jaquays. Aims to give information concerning types and their operation, in such a form that comparisons may be made. Ills. 4000 w. Canadian Soc of Civ Engrs, Adv Proof—Feb., 1904.

The Turbine Problem. H. F. Schmidt. Considers the principles and theories nnderlying the construction of vapor turbines. 5000 w. Am Elect'n—Feb., 1904.

The Steam Turbine. William Chilton. Abstract of a paper read before the Manchester Sec. of the Inst. of Elec. Engrs. An illustrated description of the principal types and their operation. Serial. 1st part. 3300 w. Prac Engr—Feb. 12, 1904.

The Steam Turbine. H. Boyd Brydon. An explantion of the laws under which the steam turbine operates, describing the principal types now on the market, the steam economy at present obtainable, and the applications of turbines as means of power production. Serial. 1st part. 1600 w. Engr, U S A—May 15, 1904.

Some Theoretical and Practical Considerations in Steam Turbine Work. Francis Hodgkinson. A discussion of special features of turbine work, which have a more or less intimate bearing upon the operation of a successful steam turbine. Considers types, giving illustrations, tests, &c. 10,000 w. Trans Am Soc of Mech Engrs, No. 031—June, 1904.

The Turbine: A New Era of Steam. Arthur Warren. An illustrated article calling attention to the great advance, and the changes it is making in the engineering world. 3800 w. Rev of Revs—June, 1904.

The Steam Turbine—the General Theory, and That of Its Special Types. M. Blieden. Extract from a paper on the methods of compounding, types, governing, efficacies, etc. 9000 w. Jour of So. African Assn of Engrs—April, 1904.

Simple Steam Turbine Engines. John Richards. Discusses the design, construction and operation of the various classes of these motors. Ills. 7500 w. Jour Assn of Engng Socs—Sept., 1904.

Steam Turbines (Dampfturbinen). M. F. Gutermuth. A review of the more recent steam turbines with diagrams showing the results of numerous tests. 4000 y. Zeitschr d Ver Deutscher Ing—Oct. 15, 1904.

Steam Turbines. A discussion, opened by Prof. H. W. Spangler. Ills. 10,500 w. Jour Fr Inst—May, 1905.

Steam Turbines (Ueber Dampfturbinen). Anton Kallus. A general review of the principles involved in the steam turbine, with descriptions of the various types. Two articles. 1 plate. 6000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 16, 23, 1905.

Steam Turbines (Stoomturbines). J. de Kuyser. A general description of the principal types now before the public, with illustrations. 5000 w. 2 plates. De Ingenieur—Sept. 30, 1905.

Design and Construction of Steam Turbines. Frank Foster. The articles are intended to go beyond the popular description of turbines, but not to be so deeply involved in mathematics as to be above the intelligence of the practical engineer. Serial. 1st part. 1800 w. Mech Engr—Oct. 28, 1905.

Simple Steam Turbine Engines. John Richards. Read before the Tech. Soc. of the Pacific Coast. Explains types now in use, the main distinction between steam and water turbines, the action, and briefly reviews various engines showing the development. Ills. Serial. 1st part. 4000 w. Am Mach—Vol. 28, No. 45.

Turbine Machinery. S. A. Everett. Abstract of a paper read before the S. Wales Inst. of Engrs. Briefly reviews the history of the turbine and describes the De Laval turbine in the present number. Ills. Serial. 1st part. 2300 w. Min Jour—Dec. 23, 1905.

Akron, O.—The Steam Turbine Installation of the B. F. Goodrich Company. Illustrated description of a plant at Akron, Ohio, in which the steam turbine and electric motor are the important factors in the economical generation and use of power. 4800 w. Eng Rec—Nov. 7, 1903.

All. Elek. Gesellschaft.—The Steam Turbine of the Allgemeine Elektricitäts Gesellschaft, Berlin (Die Dampfturbinen der Allgemeinen Elektricitäts-Gesellschaft, Berlin). O. Lasche. A detailed account of the construction and manufacture of the steam turbine and turbine generating sets of the General Electric Company of Berlin. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—Aug. 13, 20, 1904.

Steam-Turbine Construction. O. Lasche. A detailed account of experiments carried out by the Allgemeine Elektricitäts Gesellschaft, with illustrated description of various designs. Serial. 1st part. 3000 w. Engng—Aug. 19, 1904.

A. E. G. Test.—Test of a 500 K.W. Turbine Generating Set at the Preussen Mine (Untersuchung einer 500 K.W. Turbodynamo für die Zeche Preussen I). F. Schulte. Tests of an A. E. G. turbine dynamo, showing a steam consumption of 23.7 pounds per kilowatt hour. 1200 w. Glückauf—May 20, 1905.

Allis-Chalmers.—The Allis-Chalmers Steam Turbine. Illustrated description of the turbine outfit recently installed at Utica, N. Y. 1600 w. Ir Age—Dec. 14, 1905.

American.—American Steam Turbines (Amerikanische Dampfturbinen). Clarence Feldmann. An account of the De Laval, Westinghouse-Parsons, and Curtis steam turbines, as studied by the writer during a visit to the United States. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—Sept. 24, Oct. 1, 1904.

Steam Turbines in America. A review of the committee reports to the National Electric Light Assn. on the present condition of the steam turbine in the United States. 3500 w. Eng Rec—June 24, 1905.

See also Development; and names of makers.

"Amethyst" Trials.—The Economy of Steam Turbines in Cruisers. Editorial on the trials of H. M. S. "Amethyst," which demonstrated the economy of the Parsons steam turbine. 4000 w. Engng—Nov. 18, 1904.

Anderson's Paper.—See De Laval.

Auxiliaries.—Power Required for Condensing Auxiliaries in a Steam Turbine Plant. J. R. Bibbins. Gives results of tests made, describing methods of observation and calculation. 2200 w. Power—Feb., 1905.

Blowing and Exhausting.—The Steam Turbine as Applied to Blowing and Exhausting Apparatus. W. D. Child. Read before the Gas Inst. (England). A description of the construction and working of the apparatus. Ill. Discussion. 7700 w. Gas Wld—June 14, 1902.

Brady.—The Brady Steam Turbine. An illustrated description of a new steam turbine which derives its motive power from the expansive force of steam, the same as does the reciprocating engine. Its advantages are stated, and tests reported. 1000 w. Ir Age—Oct. 30, 1902.

Brown-Boveri-Parsons.—Notes on the Brown-Boveri-Parsons Steam Turbine (Mitteilungen über Dampfturbinen von Brown-Boveri-Parsons). O. Reidt. Data and results of tests upon Swiss-built Parsons turbines in various parts of Germany. 2000 w. Zeitschr d Ver Deutscher Ing—Jan. 23, 1904.

The Steam Turbine and Its Applications (Die Dampfturbinen und ihre Anwendungen). W. Boveri. Discussing especially the Parsons turbine as made by Brown, Boveri & Co., of Baden, Switzerland. 8000 w. Stahl u Eisen—July 1, 1904.

A Ten-Thousand Horse-Power Steam Turbine. Frans Koester. Illustration and description of the 10,000 horse-power Brown-Boveri-Parsons steam turbine at the Rhenanian-Westphalian electricity works, Essen, Germany. 1200 w. Power—July, 1905.

See also ELECTRIC STATION—Neuchatel.

Centrifugal Pump.—See PUMP—Centrifugal.

Clyde Steamer.—See STEAMBOAT—"King Edward."

Coal Mine Electric Plant.—See ELECTRIC EQUIPMENT—Coal Mine, Ackton Hall.

Comparison.—The Steam Turbine in Modern Engineering. W. L. R. Emmet. Gives a comparison of the Parsons and DeLaval types, and describes the Curtis turbine, giving illustrations. 2800 w. Trans Am Soc of Mech Engrs, No. 042—June, 1904.

A Comparison of Steam Turbines. R. M. Neilson. Read before the Manchester Assn. of Engrs. An illustrated article explaining the working of the various types of turbines for the purpose of comparison. Serial. 1st part. 3800 w. Mech Engr—Jan. 21, 1905.

Compound.—The Compound Steam Turbine. Aims to show that if the over-all internal efficiency is known, the frictional loss in each stage can be deduced, and if the total frictional losses per stage are determined, and the bucket speed, the losses can be divided between the guide-blades and the buckets. Serial. 1st part. 1000 w. Engng—Jan. 13, 1905.

See also Multiple; Seger Compound.

Condenser.—See Auxiliaries; CONDENSER—Steam Turbine.

Cork, Ireland.—See Curtis Test.

Courl Mine.—See Zoelly.

Curtis.—A New Steam Turbine. Brief illustrated description of the Curtis steam turbine. 800 w. Elec Rev, N Y—April 11, 1903.

The Curtis Steam Turbine. W. L. R. Emmet. An illustrated paper, read before the American Philosophical Society, giving description of a development based upon the original theories and inventions of C. G. Curtis. Claims important advantages over other types. 2500 w. St Ry Jour—April 11, 1903.

New Steam Turbine Developments. W. L. R. Emmet. Confined principally to the work and experiences of the past year with the Curtis turbine. Gives the results of an interesting series of tests recently made upon one of the first of these turbines that was put into practical operation. 5000 w. Pro Engrs' Club of Phila—April, 1904.

The Curtis Steam Turbine and Its Manufacture. Illustrated detailed description of this turbine, its manufacture and operation. 2500 w. Mach, N Y—Sept., 1903.

The Curtis Steam Turbine. Detailed drawing and description of general features. 2000 w. Elect'n, Lond—Nov. 20, 1903.

Notes on the Curtis Turbine. Reviews a portion of a paper by F. Samuelson, read before the Rugby Engng. Soc. Ill. 800 w. Elect'n, Lond—Feb. 5, 1904.

The Curtis Steam-Turbine. An illustrated description of this type and an explanation of its working. 2000 w. Engng—Feb. 5, 1904.

The Curtis Steam Turbine. Frank C. Smallpiece. From a paper before the Can. Elec. Assn. Describes this type, claiming advantages over other forms and giving results of tests made. 3500 w. Can Engr—July, 1904.

Steam Turbines. Richard H. Rice. Read before the convention of the Am. St. Ry. Assn. A discussion of types of the Curtis turbines, and the special problems that require solution. Gives a list of Curtis turbines of small size from 1½ to 300 kw., no gearing being used in the corresponding turbo-generators. 2300 w. Eng Rec—Oct. 15, 1904.

Operating Features of the Vertical Curtis Steam Turbines. August H. Kruesi. Read before the Nat. Elec. Lgt. Assn. Discusses balance, bearings and lubrication, valves and governor, clearance, low and high pressure turbines, etc. Ills. 4000 w. Eng Rec—July 1, 1905.

See also Naval Board Report; St. Louis Exposition; ELECTRIC STATION—Detroit; ELECTRIC WORKS—Thomson-Houston.

Curtis, Marine.—Marine Applications of the Curtis Steam Turbine. Charles G. Curtis. Information concerning vessels propelled by steam turbines of this type and the results obtained. 1500 w. (No. 12.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

See also Marine; Naval Board Report.

Curtis, Small.—Making a Small Curtis Turbine. H. J. Travis. Drawings and description of constructional details, discussing operative results, losses, bucket speeds, power available, and economy. 3700 w. Power—Feb., 1905.

Curtis Test.—Tests of Steam Turbines at the Newport Station of the Old Colony Street Railway. A report of tests of Curtis turbines, with conclusions. 1000 w. Eng Rec—May 14, 1904.

Test on 500-Kilowatt Curtis Turbine Set at Cork. Gives the principal results of a series of trials on steam consumption, made by Charles H. Merz. 500 w. Engng—Nov. 18, 1904.

Test of a 500-Kilowatt Curtis Steam Turbine at Ottumwa, Iowa. John Wishart. An account of a test made to determine the performance of the turbine plant and to ascertain its satisfactory operation under guaranteed test conditions. 1700 w. Engr, U S A—Dec. 1, 1905.

De Laval.—Steam Turbine: Its Development and Use. Abstract of a lecture by Konrad Anderson on the "De Laval Steam Turbine," given at Keightley Institute. 1100 w. Engr, Lond—March 15, 1901.

Steam Turbines: With Special Reference to the De Laval Turbine. Konrad Anderson. Read before the Inst. of Engrs. & Shipbuilders in Scotland. Illustrates and describes the construction and working of the Parsons, De Laval and Rateau turbines. Serial. 1st part. 2500 w. Mech Engr—Dec. 6, 1902.

The Steam Turbine. Illustrative description of the De Laval steam turbine, with an account of the results attained and related matter of interest. 1500 w. Sci Am Sup—Oct. 26, 1901.

The Steam Turbine. Illustrative description of the De Laval steam turbine, with an account of the results attained and related matter of interest. 1500 w. Sci Am Sup—Oct. 26, 1901.

A Study of the New de Laval Steam Turbine (Étude Générale du Rendement des Nouvelles Turbines de Laval). M. Delaporte. A mathematical discussion of the discharge of steam and its action upon the buckets of the steam turbine. Serial. Part 1. 4000 w. Revue de Mécanique—May 31, 1902.

The DeLaval Steam Turbine (Turbine à Vapeur De Laval). K. Sosnowski. An account of the latest developments of the De Laval steam turbine, with data as to performances of recent installations. 5000 w. Revue de Mécanique—July 31, 1902.

The Development of the Steam Turbine. An illustrated description of the Trenton, N. J., works of the De Laval Steam Turbine Co., and an account of recent tests of a 300-brake horse-power machine. 3400 w. Elec Rev, N Y—Aug. 9, 1902.

Steam Turbines for Power Stations and Factories. Abstract of a paper read before the Manchester Assn. of Engrs. The present article gives an illustrated description of the action of the De Laval steam turbine. Serial. 1st part. 2200 w. Prac Engr—Feb. 6, 1903.

The De Laval Steam Turbine. T. C. Porte. Abstract of a paper read before the Dublin Loc. Soc. of the Inst. of Elec. Engrs. Illustrates and describes the principle on which this turbine is founded, reporting its efficiency. 2500 w. Elect'n, Lond—March 4, 1904.

The De Laval Steam Turbine. Charles Garrison. An illustrated detailed description of the principal parts of the De Laval steam turbine, stating its advantages over the reciprocating engine, its economical operation, types, uses, &c. 5800 w. Tech Qr—March, 1904.

The De Laval Steam Turbine. E. S. Lea, and E. Meden. An illustrated detailed description of the present type, with remarks on the difficult theoretical and practical problems encountered, the applications, &c. 3500 w. Trans Am Soc of Mech Engrs, No. 085—June, 1904.

The De Laval Steam Turbine Company. An illustrated description of their works and product, with sketch of Carl Gustaf P. De Laval, the Swedish inventor. 3500 w. Mach, N Y—Oct., 1904.

The De Laval Steam Turbine and Its Manufacture. Illustrated article, describing details in the construction, and the methods of manufacture in the American works at Trenton, N. J. 4500 w. Mach, N Y—Nov., 1904.

The De Laval Turbine. W. S. Ford. A discussion of this steam turbine, its operation, efficiency, &c. Ills. 2000 w. Sib Jour of Engng—May, 1905.

The De Laval Steam Turbine in America. John L. Mohun. An illustrated article recording the progress which has been made in the use of steam turbines for direct connecting to other machinery than electrical. 1800 w. Cassier's Mag—June, 1905.

See also **CAR LIGHTING—Electric, Prussia; PUMP — Centrifugal; Centrifugal Testing; STEAM FLOW — Nozzle; SUPERHEATED STEAM—Wire Drawing.**

De Laval, Poughkeepsie.—Steam Turbine Power Plant at a Poughkeepsie Shop. Illustrated description of a plant furnishing the power and lighting to the works of the De Laval Separator Co., showing space economy, an interesting system of steam piping, and other unusual features. 2500 w. Eng Rec—April 22, 1905.

De Laval Test.—Test of a 300 Horse Power De Laval Steam Turbine (Versuche an einer 300 Pferdigen de Laval-Dampfturbine). W. Jacobson. Giving data and results of trials showing a consumption of 15 to 18 pounds of water per brake horsepower hour. 1200 w. Zeitschr d Ver Deutscher Ing—Feb. 2, 1901.

The Steam Consumption of the De Laval Steam Turbine (Dampfverbrauchsversuche mit de Lavalschen Dampfturbinen). A. Schmidt. Giving data and results of a careful test, showing a total steam consumption of 15.37 pounds per brake horse power, including the air pump resistance. 1800 w. Zeitschr d Ver Deutscher Ing—Nov. 28, 1901.

Test of a De Laval Steam Turbine Using Superheated Steam. Details of a series of remarkable tests made by Messrs. Dean & Main, of Boston, upon a 300-brake horse-power turbine operated at various loads and using saturated and superheated steam. 2300 w. Eng Rec—Aug. 2, 1902.

Tests of De Laval Steam Turbine. Thomas B. Morley. A report of an investigation carried out under the auspices of the Carnegie Trust. Explains the object, describing the apparatus and method of conducting trials, giving results. Ills. 2700 w. Engng—Dec. 29, 1905.

See also **Fan Blower; Superheated Steam; PUMP—Centrifugal; Centrifugal Testing.**

Design.—Graphical Computations for the Steam Turbine (Die Berechnung der Dampfturbinen auf Zeichnerischer Grundlage). A. Koob. Showing the application of the temperature-entropy diagram to the practical problems of steam turbine design. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—May 7, 1904.

Thermodynamic Diagrams for Steam-Turbine Computations (Thermodynamische Rechentafel für Dampfturbinen). Dr. R. Proell. Discussing straight-line diagrams for abridging the labor of computations, both for saturated and superheated steam. 2000 w. Zeitschr d Ver Deutscher Ing—Sept. 17, 1904.

Steam Turbines (Dampfturbinen). Johann Trnovksky. A general account of the principles of steam-turbine design, with illustrations of the leading commercial types. Two articles. 6000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 14, 21, 1905.

The Determination of the Elements of Steam Turbines (Determination des Eléments des Turbines à Vapeur). M. Kopp. Applying the method of Boulvin to the construction of the entropy diagram for the turbine in connection with problems of design and proportion. 7500 w. Revue de Mécanique—Feb. 28, 1905.

Mechanical Construction of Steam Turbines and Turbo-Generators. W. J. A. London. Abstract of a paper read before the Manchester Loc. Sec. of the Inst. of Elec. Engrs. Deals with the difficulties met in the successful design of steam turbine machinery. Ills. 5000 w. Elect'n, Lond—March 24, 1905.

Computation Tables for Steam Turbines (Abstufungstafel für Dampfturbinen). Donat Banki. A discussion of the determination of the best number of stages to be used in a multistage turbine for any given pressure drop. 2000 w. Zeitschr d Ver Deutscher Ing—March 25, 1905.

Detroit Edison.—New Steam Turbine Power Plant of the Detroit Edison Company. Illustrated detailed description of this large new central generating plant and its equipment. 5500 w. Eng Rec—Oct. 7, 1905.

Development.—Progress in the Introduction of the Steam Turbine. J. R. Bibbins. A review of the development of the various forms of steam turbine in actual use, with especial reference to work in the United States. 4000 w. Engineering Magazine—February, 1903.

Modern Development of the Steam Turbine. Frank C. Perkins. General remarks with brief accounts of the Rateau, Curtis, Parsons and other types. Ill. 2900 w. Sci Am—April 25, 1903.

The Steam Turbine (Les Turbines à Vapeur. G. Hart. A general review of the development of the steam turbine, discussing the theory, and reviewing the various types. 30,000 w. 1 plate. Mem Soc Ing Civ de France—June, 1904.

The Steam Turbine. F. G. Gasche. Abstract of a paper presented before the Steel Works Club of Joliet, Ill. A review of the development of types of turbines, and remarks on the advantages over the reciprocating engine. Ills. 2500 w. Engr, U S A—Feb. 15, 1905.

The Steam Turbine. Prof. Storm Bull. Briefly reviews the history of steam turbine development, discussing the classification of types, the rapid introduction and the advantages over the reciprocating steam engine, giving results of tests of several kinds of turbines. Ills. Discussion. 8000 w. Jour W Soc of Engrs—Aug., 1905.

See also **MOTOR—Josse Review.**

Discs.—The Design of Steam Turbine Discs. Frank Foster. A mathematical method for designing a wheel or disc capable of a very high speed of rotation. 1200 w. Engr, Lond—Jan. 8, 1904.

Steam Turbine Discs. Prof. Maurice F. FitzGerald. Discusses methods of calculating the stresses produced by rapid rotation in discs. 3500 w. Engr, Lond—May 13, 1904.

See also **MATERIALS' STRENGTH—Rotating Bodies.**

Economy.—Dynamic and Commercial Economy in Turbines. Robert H. Smith. The present article discusses the fundamental principles of turbines and the applications of these principles to steam or gas turbines. 3000 w. Engr, Lond—May 27, 1904.

See also **Reciprocating Engines Compared.**

Efficiency.—See **Economy; Test.**

Elberfeld, Germany.—Test of a Parsons Steam Turbine Driving a 1,000-Kilowatt Alternator. Illustrated abstract of a report of tests of such a unit for the city of Elberfeld, Germany, showing its economy and regulation at different loads. 1000 w. Eng Rec—Jan. 26, 1901.

The Parsons Steam Turbine in Connection with Alternators (Parsons Stoom-turbines als Beenheeden in Wisselstroom Centralen). H. F. Adams. A paper read before the Electrotechnical Section at Amsterdam, discussing mainly the Elberfeld tests. 7500 w. De Ingenieur—June 29, 1901.

Electra.—The Electra Steam Turbine. Walter Rappaport. Brief illustrated description of the method of working. 500 w. Elec Rev, Lond—Jan. 13, 1905.

Electric Station.—Some Notes on Steam Turbo-Electric Generating Plants. George Wilkinson. Read before the Leeds Local Soc. of the Inst. of Elec. Engrs. Gives the leading characteristics of various types of turbo-generators, with suggestions from the writer's experience. 4800 w. Elect'n, Lond—Oct. 23, 1903.

Effect of the Steam Turbine on Central Station Practice. W. L. R. Emmet. A discussion of the advantages claimed for the steam turbine, the conditions that lead to their adoption, and the points of greatest importance. 3800 w. Int Elec Cong of St Louis—Sept., 1904.

Steam Turbine Power Plants. J. R. Bibbins. Notes on their equipment and operation; discussing the economics of high vacua and superheat, condensers, cost, etc. Ills. 5500 w. St Ry Rev—Oct. 14, 1904 (Daily Ed.).

See also **Parsons; ELECTRIC GENERATING SET—Turbo; ELECTRIC STATION—Port Huron; Steam Turbine**; and under names of stations.

Escher, Wyss & Co.—See **Zoelly.**

Essen, Germany.—See **Brown-Boveri-Parsons; Union.**

Europe.—Steam Turbine Applications in Europe. Frank C. Perkins. An illustrated account giving information of uses made of the steam turbine at various places, showing its adaptability for certain classes of work. 4000 w. Jour of Elec—March, 1901.

Steam Turbines in Europe. Emile Guarini. An illustrated report of several installations and their performances. 1500 w. Power—Dec. 1, 1903.

Practical Data on European Practice with Steam Turbines. Frans Koester. Illustrations of types used, with notes. 1000 w. Eng Rec—Jan. 7, 1905.

Exhaust Steam.—Exhaust-Steam Turbines. Editorial review of the investigations of Prof. A. Rateau and his recently developed system, giving an illustrated description of a plant in working at the Bruay coal mines (Pas-de-Calais). 2200 w. Engng—June 5, 1903.

The Utilization of Exhaust Steam (Die Ausnutzung des Auspuffdampfes). Julius Divis. Discussing especially the Rateau steam accumulator and the use of exhaust steam in low-pressure steam turbines. Two articles. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 19, 26, 1903.

Utilization of the Exhaust Steam From Turbines. Frans Koester. A short illustrated description of the installation and operation of a steam turbine plant in a brewery at Rotterdam. 2000 w. Elec Wld & Engr—June 3, 1905.

See also **Low Pressure; Rateau; STEAM ENGINEERING—Rateau Accumulator.**

Expansive.—See **Brady.**

Fan Blower.—Efficiency Test of a Direct-Connected Steam Turbine Fan Blower Set. C. R. Waller. Illustrates and describes a test made recently at the testing-room of the De Laval Steam Turbine Co., Trenton, N. J., giving report of tests. 1800 w. Eng News—Jan. 19, 1905.

See also **PUMP—Centrifugal Testing.**

Forge.—The Steam Turbine in a Modest but Useful Aspect. J. E. Johnson, Jr. Illustrates and describes an installation for driving a forge for tool-sharpening. 1400 w. Am Mach—March 5, 1903.

Fractional Supply.—Improvements in Fractional Supply Steam Turbines. Aigidius Elling. Discusses the two types of turbines, those with parallel (or converging) nozzles, and those with diverging nozzles in the guide apparatus, showing the loss in working; and describes an innovation for diminishing the losses of efficiency. Serial. 1st part. 2700 w. Prac Engr—Oct. 14, 1904.

Future.—The Future of the Steam Turbine. W. E. Warrilow. A review of the advantages of the turbine over the reciprocating engine, with special reference to electric generating stations. 1200 w. Elec Rev, Lond—Nov. 15, 1901.

The Future of the Steam Turbine. Editorial on the future of the turbine in various ships, referring only to the Parsons system. 2400 w. Engng—Nov. 25, 1904.

Gas Manufacture.—See **Blowing and Exhausting.**

Generating Set.—See **Electric Station; ELECTRIC GENERATING SET—Turbo.**

German Warships.—See **Parsons Marine.**

Germany.—On the Steam Turbine in Germany. Dr. Alfred Gradenwitz. An illustrated short account of the status of the turbine question in Germany. The present article describes the Zoelly turbine. Serial. 1st part. 1300 w. Prac Engr—Oct. 21, 1904.

Goodrich Co.—See **Akron, O.**

Graphical Design.—See **Design.**

Hamilton - Holzwarth.—The Hamilton - Holzwarth Steam Turbine. Illustrated detailed description of a new steam turbine on exhibition at St. Louis. 4200 w. Ir Age—Sept. 29, 1904.

The Hamilton-Holzwarth Steam Turbine (Die Hamilton-Holzwarth Dampfturbine). A. Bantlin. A full detailed description of the Holzwarth steam turbine, as built at Hamilton, Ohio, and exhibited at St. Louis. 3500 w. Zeitschr d Ver Deutscher Ing—Jan. 28, 1905.

Hartford, Conn.—The Steam Turbine Generator of the Hartford Electric Light Company. An illustrated description of the largest turbine generating apparatus in the United States. 1800 w. Elec Rev, N Y—May 17, 1902.

The Steam Turbine at Hartford. Illustrates and describes briefly this turbine in the Hartford, Conn., Electric station. 1000 w. Power—July, 1902.

Tests of Steam Turbine Installed at Hartford, Conn. Prof. William Lispenard Robb. A summary of the tests made by the writer to determine the efficiency that would be obtained under the actual operating conditions at Hartford. 800 w. Elec Wld & Engr—Sept. 6, 1902.

Heavy Power.—Fitness of the Steam Turbine for Heavy Power Service. From a paper by J. R. Bibbins, read before the New England R. R. Club. Discusses the general principles, construction, &c. Ills. Serial. 1st part. 4000 w. Ry and Engng Rev—May 28, 1904.

History.—The Rotary Engine and the Steam Turbine. An illustrated review of the steam turbine. 1400 w. Engr, U S A—Jan. 15, 1901.

Steam Turbines to Date. R. H. Thurston. Abstract of a lecture before the N. Y. Elec. Soc. Brief review of the history of the steam turbine, with remarks on the present status and the trend of progress. 1800 w. Ir Age—March 26, 1903.

Steam Turbines (Le Turbine a Vapore). Alberto Pacchioni. An illustrated historical and descriptive review of steam turbines. 11,000 w. Rivista Marittima—March, 1903.

Notes on Steam Turbines. Frederick C. Bates. Read at meeting of the Engine Builders' Assn. Briefly reviews the history of the turbine, explaining the principle and describing modern types. 2200 w. Ir Trd Rev—Feb. 23, 1905.

The Evolution and Prospects of the Elastic Fluid Turbine. R. M. Neilson. Gives an historical review showing the progress made in utilizing elastic fluids other than air, with suggestions for future improvement. Discussion. 14,500 w. Trans Inst of Engrs & Shipbuilders in Scotland—Dec. 19, 1905.

See also **Development; Future.**

"King Edward."—See **Marine; STEAMBOAT.**

Liége Exposition.—See **GAS ENGINE.**

Lindmark.—The Lindmark Steam Turbine. An illustrated explanation of the features of this turbine as given in the patent records, explaining the purpose of the invention, its action, &c. 1300 w. Mach, N Y—Feb., 1905.

Losses.—Notes on the Steam Turbine. H. F. Schmidt. On the losses in a steam turbine, based on a study of the various curves, showing the results of tests, and attempting to find out the reason that the total steam consumption curve for all turbines is, for all practical purposes, a straight line. 2500 w. St Ry Jour—June 25, 1904.

Low Pressure.—Low-Pressure Steam Turbines for Mine Purposes. George E. Walsh. Describes an improved type of low-pressure steam turbine, and its application to mining operations. 2200 w. Min Wld—Jan. 28, 1905.

See also **Exhaust Steam; Rateau; STEAM ENGINEERING—Rateau Accumulator.**

Low's Lecture.—The Steam Turbine. A lecture by F. R. Low, with illustrations. Explains general principles governing steam turbines and describes the main characteristics of the several forms in use, especially with regard to their methods of using the steam. 4800 w. Power—Oct., 1905.

Machinery.—See **Design.**

Marine.—The Marine Steam Turbine and Its Application to Fast Vessels. C. A. Parsons. Briefly reviews the history of the steam turbine and its application to the propulsion of ships. General discussion. Ill. 8500 w. Trans Inst of Engr & Shipbuilders in Scotland—March, 1901.

Turbine Engines for Passenger Ships. Notes on the "King Edward." An illustrated article discussing the performance of the turbine engines, and concluding that they are destined to play an important part in the propulsion of steamships. 1500 w. Sci Am Sup—April 5, 1902.

Marine Steam Turbines. Comments on the experience gained with the turbo-motored steamers "King Edward" and "Queen Alexandra," and the probability of this class of engine being exclusively used. Ill. 600 w. Sci Am—July 19, 1902.

The Application of Turbine Propulsion to Passenger Vessels. Especially describes the "Queen Alexandra," with general discussion of the application to vessels. Ill. 1200 w. Sci Am—Dec. 13, 1902.

The Steam Turbine and Its Application to the Propulsion of Vessels. C. A. Parsons. Read before the Inst. of Nav. Archts. An interesting review of the work in this field. Ill. Serial. 1st part. 4500 w. Engng—July 10, 1903.

Steam Turbines, with a Special Reference to Their Adaptability to the Propulsion of Ships. Ernest N. Janson. Ills. 12,500 w. Jour Am Soc of Nav Engrs—Feb., 1904.

Steam Turbine Propulsion for Marine Purposes. Prof. A. Rateau. Considers the principal difficulties in applying turbines to the propulsion of ships, and the details of the two applications made of the Rateau steam turbines. 5700 w. Mech Engr—April 2, 1904.

The Steam Turbine and Its Field in Marine Work. Lieut. H. C. Dinger. Gives a brief résumé of the advantages of the turbine, in distinction from the reciprocating engine, and the types of craft that the turbine would be suitable for; also the types of turbines proposed for marine work. 2000 w. Sci Am—April 9, 1904.

Marine Steam Turbines. Reviews editorially the work already accomplished in adapting the steam turbine to marine use. 3000 w. Engng—May 6, 1904.

Reports on Turbine Installations. Reports of the installations on the steam yachts "Lorena" and "Tarantula," and steamer "Turbinia." Ills. 6700 w. Jour Am Soc of Nav Engrs—Nov., 1904.

Steam Turbines as Applied to Ocean Liners. J. Harvard Biles. Abstract of a paper read before the British Assn. Briefly reviews the results of turbine steamers thus far completed, giving the writer's opinion that the turbines will completely displace the reciprocating engine in all moderate and high-speed lines. 2000 w. Elect'n, Lond—Sept. 15, 1905.

Marine Steam Turbine Development and Design. E. M. Speakman. Reviews the rapid development that has taken place in Great Britain, compares turbines with reciprocating engines, and discusses their design. 30 plates. 8400 w. (No. 13.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

The Determination of the Principal Dimensions of the Steam Turbine with Special Reference to Marine Work. E. M. Speakman. Read before the Inst. of Engrs. & Shipbuilders in Scotland. Discusses the design of turbine installations, the necessary calculation for propeller dimensions, &c. Ills. Serial. 1st part. 3800 w Engr, Lond—Nov. 17. 1905.

Dimensions of Steam Turbines for Marine Work. E. M. Speakman. Read before the Inst. of Engrs. & Shipbuilders in Scotland. Discusses the steps necessary to determine the turbine efficiency and propeller efficiency, and the essentials for correct design. Serial. 1st part. 2500 w. Mech Engr —Nov. 25, 1905.

See also Curtis Marine; Merchant Steamers; Naval Board Report; "Viper;" SHIP PROPULSION—Turbine vs. Reciprocating Engines; STEAMBOAT—Turbine; STEAMSHIP—Turbine; STEAM YACHT; TORPEDO-BOAT DESTROYER.

Massachusetts Electric Companies.—See **Newport, R. I.**

Merchant Steamers.—The Steam Turbine in Large Merchant Steamers. Admiral George W. Melville. Gives personal views on the use of the turbine. Does not think it at present in a position to replace the reciprocating engine. 1400 w. Sci Am —Nov. 24, 1900.

Mexican Central Shops.—See **RAILWAY SHOP.**

Modern.—See **Development; Future; History; STEAM ENGINE.**

Multiple.—Multiple Steam Turbines. H. Melencovich. Read before the Inst. of Engrs. & Shipbuilders On the method of reducing high revolutions and circumferential velocities of steam turbines by passing the steam through a number of turbine wheels arranged in series. 3000 w. Mech Engr—April 8, 1905.

See also **Compound; Pressures;** and under names of systems.

Multiple Impact.—Multiple Impact Steam Turbine. A. M. Levin. Illustrates and describes a steam turbine of novel construction. 1000 w Power—May, 1904.

Naval Board Report.—Tests of Steam Turbines. Abstracts of the Naval Board reports of the Curtis and Parsons types. 3500 w. Ir Age—Dec. 3, 1903.

Report Concerning the Design, Installation, and Operation of the Turbine Engines of S. S. "Revolution." Also, Report of Board to Observe and Report Concerning the Efficiency of Turbine Engines. Ill. 4000 w. Jour Am Soc of Nav Engrs —Nov., 1903.

Newport, R. I.—Steam Turbines for the Massachusetts Electric Companies. Illustrates and describes details of the installation at Newport, R. I. 1800 w. Steam Engng—Feb. 10, 1903.

Steam Turbines of the Massachusetts Electric Companies. Plans and general description of this new steam turbine power plant. The first plant to receive the turbine equipment is at Newport, R. I. 1800 w. St Ry Rev—Feb. 20, 1903.

See also **Curtis Test.**

Nozzle.—See **STEAM FLOW.**

Orangeburg, N. Y.—The Steam Turbine in Power House Extensions. Illustrated description of an interesting application of the steam turbine at the station of the Rockland Light and Power Company, at Orangeburg, N. Y. 1800 w. Am Elec't'n—April, 1904.

Ottumwa. Iowa.—See **Curtis Test.**

Paris. St. Ouen.—The Steam Turbine Power Station at St. Ouen (Das Dampfturbinen Kraftwerk St. Ouen). Ludwig Troske. A very complete account of one of the power houses on the Paris Metropolitan, in which steam-turbine generating sets are used exclusively. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—April 1, 8, 1905.

Parsons.—The Parsons Steam Turbine (Turbine à Vapeur Parsons). M. Duchanoy. A review of the progress of the steam turbine, describing exhibit at Paris, and details of recent tests. 2000 w. Génie Civil—May 18, 1901.

Industrial Applications of Parsons' Steam Turbines (Applications Industrielles des Turbines a Vapeur Parsons). M. Duchanoy. A well illustrated account of various applications of steam turbines to dynamo-driving and ship propulsion. 5000 w. Génie Civil—Dec. 21, 1901.

Notes on the Parsons Steam Turbine (Mitteilungen über Parsons-Dampfturbinen). With especial reference to the Parsons turbine as built by Brown, Boveri & Co. for use in Switzerland. Two articles. 2500 w. Schweizerische Bauzeitung—May 31, June 7, 1902.

Recent Steam Turbine Applications with Data of Performances. Hon. G. L. Parsons. Outlines the improvements made in the Parsons turbines, and illustrates and describes recent applications. 3000 w. Cassier's Mag—May, 1903.

Notes on Parsons' Steam Turbines (Mitteilungen über Parsons-Dampfturbinen). Hans Dominik. An illustrated description of various steam turbine plants in Germany, France and Switzerland, and results of tests. 3000 w. Ill Zeitschr f Klein u Strassenbahnen—April 1, 1903.

The Steam Turbine (La Turbine a Vapeur). M. Raucour. A general review of steam turbines, principally of the Parsons type, for driving electric generators, with results of operation. 4000 w. Rev Technique—May 25, 1903.

The Parsons Steam Turbine. G. R. Dunell. Gives a description of the elementary principles upon which the design is based, traces the development, and shows views of the various departments in the works of the various departments in the works at Heaton, near Newcastle-on-Tyne, where the land turbines are made. Also gives an illustrated description of the marine type. 10,500 w. Trac & Trans—Sept., 1903.

The Parsons Steam Turbine (Die Parsons-Dampfturbine). Alfred Musil. Giving a historical review of the development of the Parsons turbine and an account of the latest construction; with especial reference to installations on the Continent. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—April 8, 15, 1904.

The Steam Turbine as Applied to Electrical Engineering. Charles A. Parsons, G. Gerald Stoney and C. P. Martin. Paper read before the Inst. of Elec. Engrs. Reviews the development of the steam turbine, giving reports of tests made, and discussing the improvements effected. Serial. 1st part. 4000 w. Elect'n, Lond—May 27, 1904.

The Steam Turbine as Applied to Electrical Engineering. Charles A. Parsons, G. Gerald Stoney and C. P. Martin. Read before the Inst. of Elec. Engrs. Gives the history of the development of the steam turbine as applied to electrical engineering, explaining details, and giving results obtained. 4000 w. Sci Am Sup—Aug. 12, 1905.

The Parsons Turbine (Die Parsonsturbine). F. Bauer. Paper before the "Oesterr. Vereinigung der Elektrizitätswerke," describing details and giving a comparative discussion of steam turbines. 2000 w. Zeitschr f Elektrotech—Sept. 3, 1905.

See also **Brown-Boveri-Parsons; Elberfeld; Future; Marine; Naval Board Report; Test; "Viper;" Westinghouse; STEAMBOAT—"King Edward;" TORPEDO-BOAT DESTROYER.**

Parsons-Brown-Boveri.—See **Brown-Boveri - Parsons; ELECTRIC STATION—Neuchatel.**

Parsons Marine.—The Parsons Steam Turbine on German Warships. Dr. Alfred Gradenwitz. Illustrates and describes particulars of the special arrangement chosen for two turbine-driven vessels. 1000 w. Sci Am Sup—July 8, 1905.

See also **Marine; STEAMBOAT; STEAMSHIP—Turbine; STEAM YACHT.**

Parsons Test.—A Test of a Steam Turbine. F. E. Cardullo. Reports a test on the Parsons steam turbine at Sibley College. Ill. 2000 w. Sib Jour of Engng—June, 1901.

Trial of a Turbo-Generator After Twelve Months Working. An interesting report by Prof. Ewing, giving particulars of a test of Parsons turbo-generator. 1400 w. Engng—June 14, 1901.

Trials of Steam Turbines for Driving Dynamos. Charles A. Parsons, and G. Gerald Stoney. Tabulated results of tests are given, with illustrations and description of latest improvements. 2200 w. Inst. of Mech Engrs—Glasgow Congress, 1901.

Determination of the Efficiency and Steam Consumption of Steam Turbines (Beiträge zur Bestimmung des Wirkungsgrades und Dampfverbrauches von Dampfturbinen). H. Anders. With numerous tabulated results of tests of Parsons turbines driving electrical generators. 6000 w. Glückauf—July 15, 1905.

Patents.—A Review of Steam Turbine Patents. Illustrates and describes types selected from the great number of patents, from 1827 to date. Serial. 1st part. 3800 w. Mach, N Y—Sept., 1904.

Pa. R. R. Tunnel.—Steam Turbine of 11,000 H. P. Illustration, with description of turbines under construction for the power station of the Pennsylvania Railroad tunnel from Jersey City to Long Island. 900 w. Sci Am—March 19, 1904.

Pressures.—Pressures at the Various Stages of Multiple-Stage Steam Turbines. A. M. Levin. An explanation of a ready means for the solution of questions of this class. 1000 w. Power—Dec., 1905.

Preussen Mine.—See **A. E. G. Test.**

Pump.—See **PUMP—Centrifugal.**

Rateau.—The Rateau Turbine. An illustrated description of this type which is extensively used abroad 1800 w. St Ry Jour—April 18, 1903.

Steam Turbines. Prof. Rateau. Remarks showing the possibilities of steam turbines, and describing some recent designs. 1000 w. Prac Engr—June 26, 1903.

Different Applications of Steam Turbines. A. Rateau. An account of the practical results of the writer's work in this field, describing the Rateau turbine, and giving results of various applications. Ills. 9500 w. Inst of Mech Engrs—June, 1904.

The Rateau Steam Turbine. Illustrations, with description of the construction of the machine, and an account of the principles and tests. 2000 w. Elec Wld & Engr—July 25, 1903.

The Rateau Steam Turbine. Walter Rappaport. Explains the action of the steam in various types of turbines, and claims that the Rateau turbine avoids the drawbacks shown in other types, describing and stating the advantages. Ills. 1200 w. Elec Rev, Lond—June 17, 1904.

The Rateau Steam Turbine (La Turbine à Vapeur du Systeme Rateau). J. Rey. An exhaustive review of the design and applications of the Rateau turbine, with data and results of tests. 20,000 w. 1 plate. Mem Soc Ing Civ de France—April, 1904.

The Rateau Steam Turbine and Its Applications. J. Rey. A monograph of the steam-turbine created by Mr. Rateau; giving also a classification of the different systems of steam turbines, and some historical facts regarding the invention. Ills. 24,500 w. Jour Am Soc of Nav Engrs—Nov., 1905.

See also **Exhaust Steam; Low Pressure; Marine; Theory; ELECTRIC GENERATING SET; PUMP—Centrifugal; PUMPING STATION — Wattenscheid; STEAM ENGINEERING.**

Rateau Paper.—Recent Developments of the Steam Turbine. A. Rateau. An illustrated discussion of the latest types of steam turbine, including the low as well as the high pressure machines. 3500 w. Engineering Magazine—Oct., 1903.

Reaction.—Notes on the Design of Reaction Turbines. Henry F. Schmidt. Explains the conditions preculiar to this type, discussing the principles of reaction, and the methods and calculations necessary. 5000 w. Power—Dec., 1905.

Reciprocating Engine Compared.—The Steam Turbine. H. M. Gleason. States the general advantages over the reciprocating engine, and the special advantages for the propulsion of ships. 1500 w. Sci Am—Feb. 21, 1903.

Steam Turbines v. Reciprocating Engines. J. H. Barker. Considers the advantages of turbines as compared with reciprocating engines, and concludes that reciprocating engines will be in demand for powers to 1,000 H P., and above such a power the trend is toward turbines. 4500 w. Engng Rev—March, 1904.

The Economy of Reciprocating Engines at Light Loads as Compared with that of Steam Turbines. J. A. Seymour. Gives results of tests made, with explanatory notes. 1800 w. Power—April, 1904.

The Steam Turbine. H. M. Gleason. Considers the advantages of the steam turbine over the reciprocating engine in general, and especially for the propulsion of ships. 1500 w. Sci Am Sup—April 30, 1904.

Modern Economical Steam Engines and Turbines. Gives results obtained with some of the most modern engines and turbines. Ills. Serial. 1st part. 1500 w. Engr, Lond—July 7, 1905.
See also **MOTOR**

Refuse Destruction Plant.—The Steam Turbine in a Refuse Destruction Plant. Dr. Alfred Gradenwitz. Describes the plant at Zurich, Switzerland. 1000 w. Munic Engng—Dec., 1904.

See also **REFUSE DISPOSAL—Zurich.**

Regenerator.—The Regenerator and Interheater System Applied to the Steam Turbine (Wärmerückführung und Zwischenheizung im Dampfturbinenbetriebe). J. Nadrowski and H. Dahlke. Describing the results obtained by the use of the regenerative principle in steam-turbine operation. Serial. Part I. 3500 w. Zeitschr d Ver Deutscher Ing—Nov. 11, 1905.

"Revolution."—See Naval Board Report; STEAM YACHT—Turbine.

Riedler.—New Forms of the Steam Turbine. Robert H. Smith. An examination in detail of the statements of Prof. Dr. Riedler in regard to steam turbines, their design, construction, &c. Serial. 1st part. 8500 w. Engr, Lond—Dec. 18, 1903.

See also PUMP.

Riedler-Stumpf.—The Riedler-Stumpf Steam Turbine. Abstract of a paper by Dr. A. Riedler, published by the 'Schiffbautechnische Gesellschaft.'' An illustrated account of an important German wheel in successful use. 3000 w. Mach, N Y—Feb., 1904.

Steam Turbines (Ueber Dampfturbinen). Dr. A. Riedler. A general review of the development of the steam turbine, with especial reference to the Riedler-Stumpf turbine. Two articles. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—March 25, April 1, 1904.

The Riedler-Stumpf Turbine and Its Applications. Abridged translation of a paper read by Dr. A. Riedler before the Oesterreichischen Ingenieur und Architekten Vereines. Illustrated description of his own turbine. 2500 w. Power—Oct., 1904.

The Riedler-Stumpf Steam Turbines. Illustrated description of the special features, with remarks. 3000 w. Engng—Feb. 12, 1904.

The Riedler-Stumpf Steam Turbine. Walter Rappaport. Briefly notes the different methods for utilizing the heat energy of steam, explaining the principle of the type named. Ills. 1800 w. Elec Rev, Lond—March 4, 1904.

Rotterdam.—See Exhaust Steam.

St. Louis Exposition.—The Steam Turbines of the St. Louis Exposition. Illustrated description of the Curtis steam turbine, and the Westinghouse-Parsons turbine. 2500 w. Power—Dec., 1904.

Seger Compound.—The Seger Compound Steam Turbine (Turbine à Vapeur Compound). A combination of two disks of the De Laval type, rotating in opposite directions. 1200 w. Génie Civil—March 9, 1901.

Sheffield, Neepsend.—Working Results of a Steam Turbine Plant. Gives interesting figures relating to the turbine plant at the new Neepsend generating station of the Sheffield Corporation. 600 w. Mech Engr—March 25, 1905.

Ship Propulsion.—See Marine; Reciprocating Engine Compared; SHIP PROPULSION; STEAMSHIP.

Starting.—Can a Steam Turbine be Started in an Emergency Quicker Than a Reciprocating Engine of the Same Power? A. S. Mann. Showing that the turbine can be brought up to speed much quicker than the engine. 1400 w. Trans Am Soc of Mech Engrs, No. 068—June, 1905.

Steamship.—See Marine; SHIP PROPULSION; STEAMSHIP.

Stodola.—See Thermodynamics.

Sulzer.—The Sulzer Steam Turbine Dampf-Turbine von Gebrüder Sulzer). Description, with sectional view, of the new steam turbine designed by Sulzer Brothers, of Winterthur, Switzerland. 1800 w. Schweiz Bauzeitung—July 1, 1905.

Superheated Steam.—Tests of the De Laval Turbine (Versuche an einer de Laval Dampfturbine). E. Lewicki. Especially comparing the results with saturated and with superheated steam, showing the advantage of the latter. 1800 w. Zeitschr d Ver Deutscher Ing—Nov. 30, 1901.

High Superheating with Steam Turbines (Die Anwendung Hoher Ueberhitzung beim Betrieb von Dampfturbinen). Ernst Lewicki. A very complete illustrated record, with diagrams and tables, of tests made at the Dresden technical high school on a de Laval steam turbine, using highly superheated steam. Serial. Three parts. 18,000 w. Zeitschr d Ver Deutscher Ing—March 28, April 4 and 11, 1903.

Turbines and Superheated Steam. W. H. Booth. Discusses the use of superheated steam in the turbine, its advantages, its steam leak losses, &c. 1600 w. Elec Rev, Lond—Feb. 26, 1904.

See also SUPERHEATED STEAM.

"Tarantula."—See Marine; STEAM YACHT.

Terry.—The Terry Steam Turbine. Illustrated description of a new form of steam turbine, which resembles in a measure the Pelton water wheel. 2000 w. Ir Age—March 17, 1904.

Test.—See A. E. G. Test; "Amethyst;" Curtis Test; De Laval Test; Elberfeld; Fan Blower; Hartford; Parsons Test; Superheated Steam; PUMP—Centrifugal; Centrifugal Testing.

Test, Providence, R. I.—Efficiency Tests of a 400-Kilowatt Steam Turbine. Report of an acceptance test made at Providence, R. I., the method of testing following as closely as possible the standard of the A. S. M. E. 1000 w. Power—August, 1905.

Textile Mills.—Advantages of Steam Turbines for Textile Mills. Austin R. Dodge. Condensed from paper read before the New England Cotton Mfrs.' Assn. Describes various types of turbines in use and considers their adaptability to the requirements of textile mills. 2000 w. Ill. Eng News—Oct. 22, 1903.

Theory.—Elementary Theory of the Steam Turbine (Théorie Elémentaire des Turbines à Vapeur). A. Rateau. Deriving the fundamental equations governing the action of fluid jets upon rotating wheels, with applications to impact and reaction steam turbines. 5000 w. Revue de Mécanique—Sept., 1903.

The Theory of Steam Turbines. Frank Foster. States the fundamental principles of turbines, describing briefly the different types, and considering the actions. Ill. Serial. 1st part. 3000 w. Engng Rev—May, 1904.

Thermodynamics.—The Steam Turbine and the Future of Thermal Motor (Les Turbines à Vapeur et l'Avenir des Moteurs Thermiques). A. Stodola. A translation of Stodola's exhaustive discussion of the thermodynamics of the steam turbine from the "Zeitschrift des Vereines Deutscher Ingenieure." Serial. Part I. 12,000 w. Revue de Mécanique—Nov. 30, 1903.
See also Design.

Torsion Meter.—See DYNAMOMETER; TORSION METER.

Union, Essen.—Steam Turbine Construction. O. Lasche. Illustrated description of experimental results obtained in the shops of the Union Elektricitäts-Gesellschaft. 1500 w. Power—Oct., 1904.

Steam Turbines (Dampfturbinen). A. Wenger. Describing especially the steam turbines made by the Union Company, of Essen, with tabulated results of tests on a 50-horse-power turbine. 2000 w. Zeitschr d Ver Deutscher Ing—June 24, 1905.

The Steam Turbines of the Union Machine Works of Essen (Die Dampfturbinen der Maschinenbau-Aktien-Gesellschaft Union in Essen a. d. Rhur). Fritz Krull. General details of the Union turbine, as exhibited at Liége. 3000 w. Schweiz Bauzeitung—Sept. 30, 1905.

Utica, N. Y.—See Allis-Chalmers.

Velocity vs. Pressure Stages.—Steam Turbines with Velocity and Pressure Stages (Dampfturbinen mit Geschwindigkeitsstufen und mit Druckstufen). Fritz Krull. Comparing the efficiency of multiple stage steam turbines with velocity drop and those with pressure drop in the successive stages, as discussed by Prof. Rateau at Liége. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 29, 1905.

"Viper."—Turbine Engines. Charles A. Parsons, in a letter to the London "Times." Statement of the inventor regarding the trials of the "Viper." 1400 w. Naut Gas—Nov. 8, 1900.

Warren-Crocker.—Warren-Crocker Steam Turbine. E. C. Crocker. Read before the Ohio Elec. Lgt. Assn. Describes the construction and governing and discusses the adaptation. 1500 w. Engr, U S A—Sept. 15, 1904.

Westinghouse-Parsons.—Westinghouse Steam Turbines for the Rapid Transit Subway. Illustrated description of the installation for use in connection with the lighting of the subway. 1800 w. Power—Oct., 1902.

The Westinghouse Steam Turbine. Edwin Yawger. Read before the Ohio Elec. Lgt. Assn. An illustrated description of mechanical details of the machine and of its action. 1900 w. Am Mfr—Oct. 23, 1902.

High-Power Westinghouse-Parsons Steam Turbines. Illustrated description of a 5,000-kilowatt turbo-generating unit of extreme compactness. 2000 w. Eng Rec—Jan. 2, 1904.

Description of Well-Known Types of Steam Turbines with Special Reference to the Westinghouse-Parsons. R. N. Ehrhart. Considers the different types of turbines now in use, giving illustrations and reports of tests. 4500 w. Pro Engrs Soc of W Penn—Nov., 1904.

See also **Yale & Towne Works.**

Westinghouse Test.—Testing Methods of the Westinghouse Machine Co. for Steam Turbines. Edwin Yawger. Read before the Cleveland Elec. Club. Explains the careful methods of this company, the systematic testing, and related matters. Ill. General discussion. 6500 w. Engr, U S A—June 1, 1903.

Efficiency Test of 1250 K. W. Steam Turbine for Interborough Company, New York City. A. M. Mattice. Gives important results of a series of performance tests upon a 1250 k. w. Westinghouse-Parsons steam turbine generating unit. Ill. 2500 w. Elec Wld & Engr—Feb. 20, 1904.

Efficiency Test of 1250-Kilowatt Steam Turbine for Interborough Rapid Transit Company, New York City. A. M. Mattice. Gives results of a series of performance tests conducted at the builder's works upon the first of the three units selected for the illumination of the New York subway. 3000 w. Power—March, 1904.

Methods and Results of Shop-Testing of Steam Turbines. J. R. Bibbins. Describes the tests made by the Westinghouse Machine Co. Ills. 2500 w. Eng News—March 3, 1904.

Brake Tests of a 400-kw Westinghouse-Parsons Steam Turbine. Gives interesting results of a series of tests made at East Pittsburg, Pa. 1500 w. St Ry Jour—June 11, 1904.

Yacht.—See **STEAM YACHT—Turbine.**

Yale & Towne Works.—The Steam Turbine from an Operating Standpoint. Frederick A. Waldron. Description and test of a 400 k. w. Westinghouse-Parsons turbo-generator at the Yale & Towne Works. Treats the subject not only from the operating standpoint, but includes data from the boiler room to the motor pulley. Ill. 4500 w. Trans Am Soc of Mech Engrs—June, 1903.

The Yale & Towne Mfg. Company's Power Plant. An illustrated description of the first plant in which the use of the steam turbine was commercially attempted outside of the works of the builders of the turbine. 1800 w. Ir Age—April 21, 1904.

Power Plant of the Yale & Towne Manufacturing Company. Illustrated description of a steam turbine installation in Stamford, Conn. 1200 w. Power—May, 1904.

Yawger's Paper.—The Present Development of the Steam Turbine. Edwin Yawger. Read at the Columbus meeting of the Ohio Elec. Assn. An illustrated article describing the action and mechanical details. 1500 w. Elec Wld & Engr—Dec. 6, 1902.

Zoelly.—The Zoelly Steam Turbine (Die Dampfturbine von Zoelly). J. Weishäupl. Detailed description of the machine, and data and results of tests. 3000 w. Zeitschr d Ver Deutscher Ing—May 14, 1904.

The Zoelly Steam Turbine (Die Dampfturbine System Zoelly). J. Weishäupl. A detailed description of the improved steam turbine built by Escher, Wyss & Co., of Zürich, Switzerland. Two articles. 3500 w. Schweiz Bauzeitung—June 18, 25, 1904.

The Zoelly Steam Turbine. Illustrated description of a steam turbine of the multi-stage impulse type, in which the expansion of the steam takes place in the passages in the stationary parts of the apparatus. 2000 w. Eng Rec—June 4, 1904.

The Zoelly Steam Turbine (Die Dampfturbine von Zoelly). Giving details of construction and regulation of the turbine built by Escher, Wyss & Co., of Zürich. 2500 w. Elektrotech Zeitschr—Sept. 8, 1904.

The New 1,000 K.W. Turbodynamo at the Courl Mine (Die Neue 1,000 K.W. Turbodynamo der Zeche Court). F. Schulte. Describing a 1,500 H. P. Zoelly steam turbine, coupled to a Siemens-Schuckert alternator, the current being used in the Courl mine, in the Dortmund district. 2000 w. Glückauf—Nov. 11, 1905.

Zurich.—See **Refuse Destruction Plant.**

STEAM TURBINE TEST.

See **STEAM TURBINE.**

STEAM TURBINE WORKS.

Hartlepool.—Messrs. Richardsons, Westgarth and Co.'s Steam-Turbine Works, Hartlepool. Illustrates and describes a new department recently completed at the Hartlepool Works, and some of the steam-turbines manufactured. 3500 w. Engng—Oct. 13, 1905.

Parsons.—See **STEAM TURBINE.**

Westinghouse.—See **STEAM TURBINE.**

STEAM VEHICLE.

See **AUTOMOBILE, STEAM; CAR, MOTOR-DRIVEN; LOCOMOTIVE; TRACTION ENGINE.**

STEAM YACHT.

See also **BOAT, STEAM; STEAMBOAT; STEAMSHIP; YACHT.**

American.—American Steam Yachts and Their Design. Theodore Lucas. Reviews the principal features of these yachts, the types being classified as fast, medium and slow. Ill. 2000 w. Naut Gaz—Oct. 3, 1901.

The American Steam Yachts. W. P. Stephens. An interesting illustrated article reviewing its evolution and discussing its future development. 4500 w. Rudder—May, 1903.

"Arrow."— S. Y. "Arrow," Designed to Steam at the Rate of 40 Knots. Illustration and description of a vessel designed to attain the highest possible speed. 3000 w. Marine Engng—Nov., 1900.

The "Arrow." Full illustrated description of this fine high-speed vessel. 3200 w. Naut Gaz—Nov. 1, 1900.

The Twin-Screw Steam Yacht "Arrow." Illustrated description of a boat and its machinery designed for the attainment of extreme speeds. 3500 w. Sci Am Sup—Nov. 3, 1900.

A Composite Torpedo Boat. Illustrated detailed description of Charles R. Flint's "Arrow," which can be transformed from a torpedo-boat carrying a complete armament, to a yacht, which may be used as a dispatch boat. 3500 w. Ir Age—Nov. 22, 1900.

The "Arrow," Fastest Steam Vessel in the World. Jefferson S. Briggs. An illustrated detailed description of this recently built twin-screw yacht, intended to attain the highest possible speed. The design and construction of the hull and machinery are of particular interest. 3800 w. Sta Engr—April 15, 1902.

The Steam Yacht "Arrow"—The Fastest Boat in the World. Illustrated description of this fine yacht which recently covered a nautical mile in 1 min. 32 sec. 1600 w. Sci Am—Sept. 20, 1902.

Design.—See **"Noma."**

"Emerald."—See **Turbine.**

"Fortuna."—Stern-Wheel Steam Yacht "Fortuna." An illustrated description of a boat which embodies the advantages of the house-boat and also permits of navigating shallow streams at a good speed. 1000 w. Marine Engng—Sept., 1903.

"Hatsukaze."—Japanese Imperial Yacht "Hatsukaze." Illustrated detailed description of the yacht and its equipment. 1800 w. Marine Engng—May, 1904.

"Helenita."—Steam Yacht "Helenita." Illustrated detailed description of a handsome new steel yacht built for Frank J. Gould. 1300 w. Marine Engng—July, 1902.

Interior Decorations of the "Helenita." Illustrated descriptions of the very fine interior of this yacht built for Frank J. Gould. 1000 w. Marine Engng—Aug., 1902.

"Hohenzollern."—The Palatial "Hohenzollern." Illustration, with brief description. 600 w. Naut Gaz—Feb. 20, 1902.

Below Decks on the "Hohenzollern." An illustrated article especially describing the mechanical equipment. 1200 w. Sta Engr—March, 1902.

"Kanawha."—H. H. Rogers' Steam Yacht "Kanawha." Illustrates and describes the vessel that holds the record as the fastest cruising steam yacht in America. 3500 w. Marine Rev—May 5, 1904.

"Lorena."—See **Turbine; STEAM TURBINE—Marine.**

"Louise."—A Steam Yacht for Lake Service. Description and drawings of the 75-foot steel steam yacht "Louise," to be used on Lake Geneva, N. Y. 2000 w. Marine Engng—Aug., 1902.

"Mayflower."—The U. S. S. "Mayflower." Illustrated description of a fine private yacht, purchased by the U. S. Government during the Spanish-American war. 450 w. Marine Engng—July, 1901.

The President's Sumptuous Yacht. Describes the refitting of the "Mayflower," the official yacht for the use of the President of the United States. 1000 w. Bul Am Ir & Steel Assn—July 25, 1902.

Morris Heights, N. Y.—Elegant Steam Yacht. Illustrated description and plans of the new craft for Leonard Lewisohn under construction at Morris Heights, N. Y. 700 w. Naut Gas—Jan. 31, 1901.

Yacht Construction During 1900. Illustrates and describes some of the yachts built at Morris Heights, N. Y. 1200 w. Marine Rev—Feb. 7, 1901.

"Noma."—Some Thoughts on the Design of Modern Steam Yachts. Clinton H. Crane. Gives plans of the steam yacht "Noma," built by the Burlee Dry Dock Co., of Staten Island, as an example of modern design. Ills. 1000 w. Trans Am Soc Nav Archts & Marine Engrs, No. 5—Nov., 1903.

"Oswegatchie."—Steam Yacht "Oswegatchie." Brief illustrated description of a yacht for the lake region. 900 w. Marine Rev—May 29, 1902.

"Prinzessin Victoria Luise."—See **STEAMSHIP.**

Stern Wheel.—See "Fortuna."

"Tarantula."—Turbine-Driven Steam Yacht "Tarantula." Illustrates and describes a very interesting yacht recently built, which is propelled by steam-turbine machinery, and fitted with Yarrow boilers. 3500 w. Engng—June 6, 1902.

See also **STEAM TURBINE—Marine.**

Turbine.—Turbine Steam Yachts. Brief illustrated description of the turbine yacht "Emerald," the largest pleasure yacht yet fitted with the Parsons turbines. 800 w. Engr, Lond—Oct. 31, 1902.

English Turbine-Propelled Yachts. Illustrations with particulars of the three high-speed yachts fitted with the Parsons marine steam turbine. 400 w. Sci Am—Dec. 13, 1902.

Turbine Yachts at the International Races. Illustrations, with brief notes, of the "Revolution," "Tarantula," "Lorena," and other boats driven by steam turbines, at the America Cup races off Sandy Hook. 900 w. Sci Am—Sept. 5, 1903.

See also "Tarantula;" **STEAM TURBINE—Marine.**

"Vixen."—High-Speed Twin-Screw Yacht "Vixen." Illustrated description of a private yacht built for service of the owner principally between Tarrytown and New York. 800 w. Sci Am—March 1, 1902.

"Wacouta."—Steam Yacht "Wacouta." William A. Fairburn. A detailed description of the vessel and its equipment, with report of steam trials. 4700 w. Jour Am Soc of Nav Engrs—Nov., 1902.

STEEL.

See also **ALLOY—Industrial; IRON; MATERIALS' STRENGTH; METALLOGRAPHY; METALLURGY; MINING AND METALLURGY; STEEL ALLOY; STEEL ANALYSIS; STEEL CASTING; STEEL CONSTRUCTION; STEEL INDUSTRY; STEEL INGOT; STEEL METALLURGY; STEEL SPECIFICATION; STEEL WORKS; TESTING.**

Analysis.—See **IRON ANALYSIS;—STEEL ANALYSIS.**

Annealing Effect.—The Effect of Annealing Upon the Physical Properties, and the Microstructure of a Low Carbon Steel. Henry Fay and Stephen Badlam. An account of experimental investigations, with discussion of results. Ill. 6800 w. Tech Quar—Dec., 1900.

Automobile Construction.—Special Steels for Automobile Construction (Spezialstähle für den Kraftwagenbau). Illustrating special shapes of steel of extreme strength and toughness especially intended for automobile construction. 2500 w. Stahl u Eisen—July 15, 1904.

Automobile Steel Specialties. George E. Walsh. On the amount of steel used for this industry, the quality, tests, &c. 1200 w. Sci Am—Oct. 15, 1904.

Steel as Applied to Motor Car Construction. J. S. Critchley. Excerpt from a paper read before the Automobile Club (London). The difficulties in annealing, testing, vanadium steel, &c. 1500 w. Auto Jour—March 11, 1905.

Steel Used for Motor Car Construction in France. Léon Guillet. Read before the Ir. & Steel Inst. Discusses in detail the chief special steels actually employed in the motor car industry. 4500 w. Ir & Coal Trds Rev—Sept. 29, 1905.

Steels Especially Used in Automobile Construction (Aciers Speciaux Employés en France dans la Construction des Automobiles). Léon Guillet. Discussing especially nickel, chrome, and silicon steels. 3000 w. Génie Civil—Oct. 7, 1905.

A Study of the Relations Between the Microstructure, the Heat Treatment, and the Physical Properties of Axle Steel. Henry Fay, A. W. Higgins, and F. W. Coburn. Reviews the work of other investigators, and describes tests made by the authors, discussing the results. Ill. 3000 w. Tech Quar—March, 1903.

Bending Tests.—See **TESTING—Bending.**

Bessemer.—See **BESSEMER PROCESS; STEEL METALLURGY.**

Bridge.—The Desirability of Using a Single Grade of Steel for Bridges. Abstracts of the discussion at meeting of the Am. Soc. for Testing Materials. 3500 w. Eng News—June 26, 1902.

A Single Grade of Steel for Bridges and Other Structures. Editorial discussion of the proposal to specify steel of 55,000 to 60,000 lbs. ultimate strength for all parts of bridges. 1300 w. Eng Rec—July 19, 1902.

See also **Structural; STEEL WORKS—Pencoyd.**

Bridge, Holland.—An Inquiry into the Bessemer Steel of Our Railway Bridges (Onderzoek van het Bessermerstaal in onze Spoorwegbruggen). J. Schroeder van der Kolk. Data and results of tests of steel used in the principal railway bridges of Holland. 20,000 w. 2 plates. Tidschr vh Kljk Inst van Ing—May 26, 1902.

Brittleness.—The Brittleness of Steel. H. le Chatelier. Remarks on the intermittent brittleness of steel, the causes, &c., discussing the nature of the metal, external conditions, and tests. 4000 w. Ir & Steel Met—Feb., 1904.

See also **TESTING—Bending; Brittleness.**

Calcium.—See **STEEL ALLOY.**

Cannon.—See **TESTING—Cannon Steel.**

Cementation.—See **STEEL METALLURGY.**

Chrome.—See **STEEL ALLOY.**

Classification.—See **IRON; STEEL METALLURGY; STEEL SPECIFICATION.**

Cleaning.—See **METAL PROTECTION; SAND BLAST.**

Cold Rolled.—Cold Rolled Steel. J. J. Crane. Considers the properties of this material, and its treatment. 1500 w. Pro Engrs' Soc of W Penn—June, 1903.

Commercial.—Properties of Steel. F. M. Thomas. Considers the properties of commercial steels, and the effects produced by various modifications in chemical composition and treatment. 5000 w. Mech Engr—Sept. 2, 1905.

Constitution.—The Constitution and Thermal Treatment of Steel. H. M. Howe. Reprinted from an article in the "Encyclopedia Britannica." Considers the microscopic entities which constitutes the different varieties of iron and their effect when subjected to thermal treatment. 3500 w. Metallographist—April, 1903.

The Constitution of Steel (L'Etat Actuel de Nos Connaissances sur la Constitution des Aciers au Carbone). Léon Guillet. A review of the constitution of steel, and the combinations of iron and carbon of which it is formed, illustrated by diagrams and micrographs. Serial. 2 parts. 5000 w. Génie Civil—April 4 and 11, 1903.

The Thermal Transformations of Carbon Steels. John Oliver Arnold and Andrew McWilliam. Read before the Iron & Steel Inst. Gives the composition of the three steels selected for the research work described, the methods, etc. Ills. 3500 w. Engng—Sept. 29, 1905.

See also **IRON; METALLOGRAPHY—Surface Constituents; STEEL ALLOY; STEEL CASTING.**

Copper Influence.—The Influence of Copper on Steel Rails and Plates. J. E. Stead and John Evans. Read before the Iron and Steel Inst. Gives results of previous investigations with report of experiments and conclusions. 2800 w. Ir & Coal Trds Rev—May 10, 1901.

The Effect of Copper on Steel for Wire-Making. J. E. Stead and F. H. Wigham. Abstract of a paper read before the Glasgow Congress. Gives analysis and a summary of the results of the author's work. 1900 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Corrosion.—See Diseases; **METAL CORROSION; STEEL CONSTRUCTION.**

Critical Point.—See Expansion; Segregation; **PYROMETRY**—Autographic.

Crucible.—Crucible Steel. Its Manufacture and Treatment. David Flather. Abstract of a paper read before the South Staffordshire Iron & Steel Inst. Briefly considers the process of manufacture, its uses and treatment by the consumer. Serial. 1st part. 7000 w. Ir & Coal Trds Rev—Dec. 20, 1901.

Crushed.—See **ABRASIVE**—Steel.

Crystallization.—See **IRON.**

Deterioration.—Deterioration of Steel from Vibration. A discussion of this subject concluding that the deterioration under vibration is less potent than the use of faulty materal. 2400 w. Engr, Lond—Sept. 19, 1902.

Diseases.—Diseases of Steel. C. H. Ridsdale. Read before the Iron & Steel Inst. Considers faults originating during manufacture, traced forward; and faults manifested, and traced backward. The prevention and cure. 16,500 w. Ir & Coal Trds Rev—Sept. 4, 1903.

Electric Conductivity.—Tests of Steel for Electric Conductivity, with Special Reference to Conductor Rails. J. A. Capp. Reports a series of tests made by the General Electric Co. on a wide range of steels, with a study of the results. 2800 w. Trans Am Inst of Min Engs—Oct, 1903.

See also **ELECTRIC RAILWAY**—Return Current; **ELECTRIC RESISTANCE**—Rails.

Engineering Material.—Steel as an Engineering Material. William Stuart Standiford. Considers steel as a material, its manufacture and the effect of different methods of treatment, the uses to which it has been applied, &c. 2000 w. Min Wld—Feb. 11, 1905.

Expansion.—The Expansion of Tempered Steel (Sur la Dilatation des Aciers Trempés). MM. Charpy & Grenet. A discussion of the effect of the carbon content upon the coefficient of expansion. 1000 w. Comptes Rendus—Jan. 12, 1903.

The Expansion of Steel at High Temperatures (Recherches sur la Dilatation des Aciers aux Températures Elevées). G. Charpy and L. Grenet. An illustrated account of elaborate researches on the expansion and other properties of steel at high temperatures, particularly about 700 degrees C., the "recalescence" point. Diagrams and tables. 8000 w. Bull Soc d'Encour—April 30, 1903.

I. Dilatation of Steels at High Temperature. Georges Charpy and Louis Grenet. II. Transformation of Steel by the Dilatometric Method. Two papers by the same authors from "Comptes Rendus Academie des Sciences." Experimental Studies. 1200 w. Metallographist—July, 1903.

The Transformation Temperatures of Steels (Sur les Températures de Transformation des Aciers). MM. G. Charpy and L. Grenet. Tabulated results of the determination of the temperatures by the measurement of the expansion, comparing these with the results of the thermo-electric method. 600 w. Comptes Rendus—Oct. 10, 1904.

Ferrite and Cementite.—On the Simultaneous Presence of Ferrite and Cementite in Steel. E. F. Lange. A critical note, showing that the statement that "structurally free ferrite and structurally free cementite never exist together in the same steel," is incorrect. 1500 w. Metallographist—Jan., 1903.

See also **METALLOGRAPHY.**

Forging.—See **STEEL FORGING.**

Foundry.—See **FOUNDRY**—Steel.

German Sections.—See Structural Sections.

Grading.—See **IRON; PIG IRON; STEEL SPECIFICATION.**

Gun Metal Finish.—Gun Metal Finish for Steel. B. L. Charles. Describes methods of producing this finish. 700 w. Am Mach—Feb. 12, 1903.

Hardening.—See **HARDENING; STEEL METALLURGY**

Hardness.—See **TESTING.**

Heat Treatment.—The Semi-Solid State in Metals. Thos. Turner. Read before the Staffordshire Iron & Steel Inst. With special reference to the strength of cast-iron and the heat treatment of steel. 5400 w. Ir & St Trds Jour—Jan. 30, 1904.

See also Constitution; Overheated; **IRON; STEEL ALLOY; STEEL METALLURGY.**

High Temperatures.—The Elastic Properties of Steel at High Temperatures. Bertram Hopkinson. Read before the Royal Society. Describes experimental investigations of the elastic properties of steel and iron, ranging up to 800 deg. Cent., and for stresses greatly below that required to rupture the material. 2200 w. Engng—Sept. 8, 1905.

Impact Tests.—See **TESTING**—Impact.

Ingot.—See **STEEL INGOT.**

Ingot Blow Holes.—See **STEEL INGOT**—Blow Hole.

Inspection.—See **INSPECTION**—Steel; **STEEL SPECIFICATION.**

Japan Sword.—See **IRON INDUSTRY**—Japan.

Jupiter.—Jupiter Steel. An illustrated description of the manufacture of an exceptionally high grade of cast-steel which is made from wrought-steel scrap, with a mixture of other metals. The patents of Andres G. Lundin. 1100 w. Sci Am—Oct. 12, 1901.

Krupp Exhibit.—The Krupp Exhibit at the Düsseldorf Exposition (Rheinisch-Westfälische Industrie-Ausstellung Die Krupphalle). An illustrated review of the Krupp exhibit of armor, turrets, cannon, shafts and all kinds of steel work at this large German Exposition. 1500 w. Stahl u Eisen—May 15, 1902.

Magnetic Testing.—See **MAGNETIC TESTING.**

Manganese.—See **STEEL ALLOY.**

Melting.—See **FOUNDRY; IRON; STEEL METALLURGY.**

Metallography.—See Constitution; Ferrite; **METALLOGRAPHY.**

Microstructure.—See **METALLOGRAPHY.**

Nickel.—See **NICKEL STEEL.**

Nitrogen.—See **IRON.**

Open Hearth.—The Influence of Carbon, Phosphorus, Manganese and Sulphur on the Tensile Strength of Open-Hearth Steel. H. H. Campbell. Gives an account of investigations made at the works of the Pennsylvania Steel Co., Steelton, Pa. 10,000 w. Iron & Steel Inst—Oct., 1904.

The Influence of Carbon, Phosphorus, Manganese and Sulphur on the Tensile Strength of Open-Hearth Steel. A discussion of Mr. Campbell's paper. 2000 w. Am Inst of Min Engrs—May, 1905.

The Influence of Carbon, Phosphorus, Manganese, and Sulphur upon the Strength of Open-Hearth Steel (Ueber den Einfluss von Kohlenstoff, Phosphor, Mangan und Schwefel auf die Bruchfestigkeit des Martinstahls). A review of Campbell's formulas for determining the strength of steel from its composition. Serial. Part I. 4500 w. Stahl u Eisen—Jan. 15, 1905.

See also **OPEN-HEARTH PROCESS**

Overheated.—The Overheating of Mild Steel. E. Heyn. Read before the Iron and Steel Inst. An account of the writer's experiences regarding the brittleness produced in mild steel by overheating. The experiments refer only to mild steel such as is employed in boiler plates, structural material, wire, etc. Serial. 1st part. 5000 w. Engng—Sept. 12, 1902.

The Burning and Overheating of Steel Alfred Stansfield. A study of the conditions under which the steel becomes "burnt," the nature of this so-called "burning," and the way it can be rendered suitable for use. 5200 w. Ir & Coal Trds Rev—Sept. 4, 1903.

Overheated Steel. Arthur Windsor Richards, and John Edward Stead. Reviews opinions of investigators of overheated steel, and gives further researches of the writers, emphasizing the fact that poor steel cannot be made into good steel by any kind of heat treatment, but that good steels heated short of incipient disintegration can be completely restored. 4500 w. Engr, Lond—Sept. 29, 1905.

Pack Hardening.—See **STEEL METALLURGY—Hardening.**

Paris Exposition.—See METALLURGY.

Phase Theory.—See Constitution; Segregation; IRON; METAL.

Plastic Yielding.—See MATERIALS' STRENGTH.

Pyromagnetic Properties.—See MAGNET—Temperature Effects; MAGNETISM—Heat Effects; NICKEL STEEL—Magnetic; PYROMETRY.

Rail.—The Quality of Steel for Rails. Notes from some of the reports presented at Paris, in Sept., 1900, in regard to foreign experience and practice. 1800 w. Eng News—March 7, 1901.

Rail Steel. With Especial Reference to Its Hardness. Sectional discussion from the "Bulletin" of the International Ry. Con., summarizing the reports on the "Nature of Metals for Rails," and giving views of eminent authorities. 5300 w. R R Gas—Aug. 23, 1901.

Notes on Rail Steel. Robert W Hunt. On the importance of the mechanical treatment of the metal forming a steel rail, during its manufacture. 1500 w. Trans Am Inst of Min Engrs—Feb., 1904.

See also Electric Conductivity; RAIL.

Segregation.—The Segregatory and Migratory Habit of Solids in Alloys and in Steel Below the Critical Points. J. E. Stead, in "Jour. of the Soc. of Chem. Ind. An illustrated study with conclusions reached. 6300 w. Ir & Steel Met—Feb., 1904.

Segregation and Diffusion in Steel. B. F. Weston. Considers the principle of segregation, and of diffusion, extreme cases, and results. 2000 w. Ir Age—May 19, 1904.

Segregation in Steel Ingots. B. Talbot. Read before the Ir. & Steel Inst. Gives tabulated results obtained from parallel tests made on ingots from the same heat, with and without the addition of a small amount of aluminum to the ingot, discussing the effects. 2800 w. Ir & Coal Trds Rev—Sept. 29, 1905.

See also IRON—Molecular Mobility; RAIL.

Selection.—The Selection of Steel for Various Articles. Begins a list of a series of articles, giving the carbon contents which have been found by experience to be the most suitable for the purpose to which the steel has been put. Serial. 1st part. 1800 w. Ir Age—July 10, 1902.

Mistaken Blaming of the Steel. E. R. Markham. Showing that the treatment of the steel, and the proper selection for the purpose, are often at fault. 1200 w. Am Mach—Dec. 3, 1903.

Silicon.—See IRON ALLOY; SILICON; STEEL ALLOY.

Solutions.—See Constitution; Segregation; IRON; METAL.

Sorbitic.—Sorbitic Steel. H. C. Boynton. An illustrated report of experimental researches, stating results. 2000 w. Ir & Steel Mag—May, 1904.
See also RAIL.

Special.—See Automobile; STEEL ALLOY.

Specifications.—See STEEL SPECIFICATIONS.

Specific Heat.—See MAGNETISM—Heat Effects.

Standard Specifications.—See IRON; STEEL SPECIFICATION.

Stressed.—The Behavior of Steel Under Stress. C. H. C. Wright. A discussion of the peculiar properties and behavior of this material and its possibilities in structural work. 3000 w. Can Archt—Jan., 1902.

Structural.—The Development of Rolled Structural Shapes. F. H. Kindl. Reviews the history of rolled material and its applications, discussing the principles upon which the present standards were founded. 4000 w. Ir Trd Rev—Nov. 14, 1901.

The Uses of Structural Steel for Mining, Milling and Smelting Purposes. E. M. Sprague. The practice of making mining plants practically fire-proof has led to the use of this material in the construction of buildings for smelters, cyanide mills, chlorination mills, stamp mills, reduction works, refineries, shaft houses, power houses, gallows frames, etc. 2000 w. Min Rept—Jan. 9, 1902. Special No.

The Adoption of a Single Grade of Steel in Structural Specifications. Albert J. Hines. Arguments favoring the adoption for all ordinary requirements, but allowing the making of special steels for unusual requirements. 1400 w. Eng News—Oct. 23, 1902.

Soft vs. Hard Steel as a Structural Material (Weiches und Hartes Flusseisen als Konstructionsmaterial). F. R. Eichhoff. An account of an elaborate series of tests which were made at the Krupp Works to determine the relative merits of soft steel and hard steel as structural materials. Tables. 5 plates. 5000 w. Stahl u Eisen—April 15, 1903.

Soft and Hard Steel as Structural Materials (Weiches und Hartes Flusseisen als Konstruktionsmaterial). Hr. Eichhoff. Paper before the Verein Deutscher Eisenhüttenleute on the use of mild steel for shipbuilding and other structural purposes. Discussion. Diagram. 4500 w. Stahl u Eisen—May 15, 1903.

See also Bridge; BEAM—Deep Section; STEEL CONSTRUCTION; STEEL SPECIFICATIONS; STEEL WORKS—Pencoyd.

Structural Sections.—New I-Beam Sections in the German Standard-Section Book of Rolled Shapes? (Neue Doppel-T-Reihe im Deutschen Normalprofilbuch für Walzeisen?). Discussion of new sections proposed by committee of the Verein Deutscher Ingenieure. 3 plates. 6000 w. Stahl u Eisen—Sept. 1, 1905.

The German Book of Standard Steel Sections for Structural and Shipbuilding Work (Deutsches Normalprofilbuch für Walzeisen zu Bau- und Schiffbau-Zwecken). Extracts from memoir by Prof. Heinzerling, giving a history of the committee of the Verein deutscher Ingenieure, on standard sections, and a report of the present committee, by F. Kinslé and E. Schroedter, with diagrams and tables. 10,000 w. Zeitschr d Ver Deutscher Ing—Sept. 9, 1905.

See also STEEL CONSTRUCTION.

Sulphur and Manganese.—The Influence of Sulphur and Manganese on Steel. J. O. Arnold and G. B. Waterhouse. A report of an examination, by micrographic analysis, of a series of heat-treated steels prepared by Mr. Brinell. 1000 w. Ir & Coal Trds Rev—May 8, 1903.

Taylor-White.—See STEEL METALLURGY; TOOL STEEL.

Tests.—See TESTING.

Time and Temperature.—The Effect of Time and Temperature on the Strength of Steel and Iron. Ernest George Coker. Extracts from a paper read before the Canadian Soc. of Civ. Engrs. An account of experimental investigations made in the Testing Laboratory of McGill Univ. 1600 w. Can Engr—Oct., 1901.

Titanium.—See STEEL ALLOY.

Tool.—See MACHINE TOOL; STEEL METALLURGY—Hardening; TOOL STEEL.

Transformation Temperatures.—See Expansion.

Transformer.—See TRANSFORMER—Sheet Steel.

Troostite.—Troostite. Henry Cook Boynton. Read before the Iron and Steel Inst. Gives results of experiments presenting material which positively confirms the existence of troostite, a constituent of steel, with new facts related. 3000 w. Ir & Coal Trds Rev—May 6, 1904.

The Nature of Troostite. Dr. Carl Benedicks. Abstract of a paper read before the Ir & Steel Inst. Examines arguments of other investigators, and gives the writer's conclusions. 1200 w. Ir & Coal Trds Rev—Sept. 29, 1905.

Vanadium.—See Automobile Construction; STEEL ALLOY; VANADIUM.

Vibration.—See Deterioration; TESTING.

STEEL ALLOY.

See also ALLOY; IRON ALLOY; METALLOGRAPHY; NICKEL STEEL; STEEL; STEEL ANALYSIS; VANADIUM.

Some Elements Used in Steel-Making. Considers the influence on steel of tungsten, molybdenum, vanadium, and uranium. 2500 w. Engr, Lond—Sept. 18, 1903.

Alloys Used for Steel Making. Dr. J. Ohly. Considers the compositions and effects upon the properties of steel of some alloys now in use. Serial. 1st part. 2200 w. Mines & Min—Oct., 1903.

Alloy Steels. William Metcalf. Read before the Am. Soc. of Test. Materials. Considers nickel steel, manganese steel, self-hardening or air hardening steel, and high-speed steel. 2000 w. Ir Age—June 23, 1904.

Special Steels (Aciers Speciaux). J. Malette. A general and systematic review of modern alloy steels, with tabular view of their composition and properties. 2000 w. Rev Technique—Feb. 25, 1905.

Aluminum.—Constitution and Properties of Aluminum Steels (Constitution et Propriétés des Aciers à l'Aluminium). Léon Guillet. A brief review of micrographic and mechanical examinations of steels containing up to 15 per cent. of aluminum. 1000 w. Comptes Rendus—July 3, 1905.

See also **ALUMINUM ALLOY.**

Automobile Construction.—See **STEEL.**

Calcium.—Calcium Steel, the New Rival of Ceramic Products. Information concerning this product, translated from "L'Echo des Mines et de la Metallurgie." 1500 w. Sci Am Sup—March 19, 1904.

Chromium.—Investigations of Chrome Steel (Recherches sur les Aciers au Chrome). Léon Guillet. Giving data and results of investigations into the physical and mechanical properties of chrome steels of various compositions, with microphotographs of etched surfaces. Two articles. 2500 w. Génie Civil—March 5, 12, 1904.

Properties and Constitution of Chrome Steels (Propriétés et Constitution des Aciers au Chrome). Léon Guillet. Giving results of a series of systematic tests, both mechanical and microscopic, showing the especial value of pearlitic chrome steels for tools. 1200 w. Comptes Rendus—Aug. 16, 1904.

Chrome Steel as a Commercial Product (Comment l'Acier Chromé est Devenu un Produit Industriel). A. Brustlein. Brief review of the history and applications of chrome steel. 3000 w. Rev De Métallurgie—July, 1905.

See also **STEEL ANALYSIS.**

Chromium-Vanadium.—Heat Treatment Experiments with Chrome-Vanadium Steel. H. Riall Sankey and J. Kent Smith. An account of tests made to determine the effect of the addition of vanadium in varying proportions to pure carbon steels and to steels containing small percentages of chromium and nickel. Describes apparatus used and methods of making the tests, comparing results. Ills. 8400 w. Inst of Mech Engrs—Dec. 16, 1904.

Cobalt.—See **Mechanical Properties.**

Copper Influence.—See **STEEL.**

Hardening.—The Steel Hardening Metals. Joseph Hyde Pratt. From a paper on "Mineral Resources of the United States," issued by the U. S. Geol. Survey. Gives a list of the metals included under this head, discussing the properties resulting from their additions. 3500 w. Mach, N Y—May, 1905.

Manganese.—A Study of Manganese Steel (Recherches sur les Aciers au Manganese). Leon Guillet. A study of the properties of manganese steel, making use of the methods of metallography. Two articles. 4000 w. Génie Civil—Aug. 22, 29, 1903.

The Properties and Constitution of Manganese Steel (Sur les Propriétés et la Constitution des Aciers au Manganese). Léon Guillet. A communication to the French Academy, giving the results of micrographic and mechanical investigations. 1000 w. Comptes Rendus—Sept. 21, 1903.

Manganese Steel (Aciers au Manganese). L. Guillet. A study of the different series showing the physical, chemical and industrial properties. 6000 w. Bull Soc d'Encour—Oct. 31, 1903.

The Researches of Guillet upon Manganese Steel (L. Guillets Untersuchungen über Manganstahl). E. Ledebur. Abstract and review of the investigations of Guillet, especially upon manganese steels of low carbon content. 2500 w. Stahl u Eisen—March 1, 1904.

Sulphides and Silicates of Manganese in Steel. J. E. Stead. A detailed description of experimental investigations. Ills. 2200 w. Ir & St Mag—Feb., 1905.

See also **IRON ALLOY; MANGANESE; STEEL—Sulphur and Manganese.**

Mechanical Properties.—Constitution and Properties of Steels Containing Tin, Titanium and Cobalt (Constitution et Propriétés des Aciers à l'Etain, des Aciers au Titane, et des Aciers au Cobalt). Léon Guillet. A brief note giving the mechanical properties of these alloy steels; at present of no practical value. 800 w. Comptes Rendus—June 26, 1905.

Molybdenum.—A Study of Molybdenum Steel (Recherches sur les Aciers au Molybdène). Léon Guillet. Data and results of a series of systematic tests, with micro-photographs of various alloys. 2000 w. Génie Civil—Aug. 13, 1904.

The Properties and Constitution of Molybdenum Steels (Propriétés et Constitution des Aciers au Molybdène). Léon Guillet. Experiments upon steels with various proportions of molybdenum, showing the strength, hardening, and tempering properties. 800 w. Comptes Rendus—Oct. 3, 1904.

See also **STEEL ANALYSIS.**

Nickel.—See **NICKEL STEEL.**

Silicon.—Influence of Silicon upon the Strength of Cast Steel (Einfluss des Siliciums auf die Festigkeitseigenschaften des Flussstahls). E. Heyn. A report upon the experiments of Wahlberg in Sweden, as investigated at the Charlottenburg laboratory. 2000 w. Stahl und Eisen—May 1, 1901.

The Economical Significance of High Silicon in Pig-Iron for the Acid Steel Processes. Axel Sahlin. Read before the Iron and Steel Inst. A plea for low silicon iron. 2200 w. Ir & Coal Trds Rev—May 10, 1901.

Ternary.—Properties, Classification and Utilization of Special Ternary Steels (Propriétés, Classification et Utilisation des Aciers Spéciaux Ternaires). L. Guillet. A discussion of alloy steels composed of iron, carbon, and one other metal, stating briefly the qualities of steels containing nickel, manganese, chromium, tungsten, molybdenum, vanadium, silicium, titanium, aluminum, cobalt and tin. 12,000 w. 1 plate. Mem Soc Ing Civ de France—July, 1904.

Special Steels. L. Guillet. Describes investigations made of certain ternary alloys and steels, particularly two grades, one containing only about 2 per cent. of carbon, and the other approximating to the eutectic and containing about 8 per cent. of carbon. 2300 w. Ir & Coal Trds Rev—June 30, 1905.

Notes upon the Properties, Tests and Classification of Ternary Steels (Comparaisons des Propriétés, Essais, et Classification des Aciers Ternaires). Léon Guillet. A brief note upon the steels consisting of iron, carbon, and a third constituent, such as nickel, manganese, etc. 800 w. Comptes Rendus—July 10, 1905.

Tin-Titanium.—See **Titanium—Tin.**

Titanium.—On the Influence of the Titanium on the Properties of Cast Iron and Steel. Auguste J. Rossi. An account of experimental investigations and the conclusions. 5000 w. Trans Am Soc of Mech Engrs. No. 895—May, 1901.

See also **Vanadium and Titanium; TITANIUM.**

Titanium-Tin.—Investigations upon Steels Containing Titanium and Tin (Recherches sur les Aciers au Titane et à l'Etain). Léon Guillet. Giving results of mechanical and metallographical tests of various carbon content, alloyed with titanium and with tin. 1800 w. Génie Civil—Sept. 17, 1904.

See also **Mechanical Properties.**

Tool Steel.—See **TOOL STEEL—Alloyed.**

Troostite.—See **STEEL.**

Tungsten.—Researches Upon Tungsten Steels (Recherches sur les Aciers au Tungstène). Léon Guillet. Data and results of a systematic study of tungsten steels, with microphotographs showing the effect of quenching and tempering. Serial. Part I. 1800 w. Génie Civil—May 7, 1904.

The Constitution and Properties of Tungsten Steels (Constitution et Propriétés des Aciers au Tungstène). Léon Guillet. Results of chemical and metallographical investigations of steels of various contents of carbon and tungsten, showing the conditions existing in tempering and air hardening. 1000 w. Comptes Rendus—Sept. 26, 1904.

See also **TUNGSTEN.**

Vanadium.—Later Researches Upon Vanadium Steel (Nouvelles Recherches sur les Aciers au Vanadium). Léon Guillet. Showing the behavior of vanadium steels under heat treatment and demonstrating that the only useful alloys are those containing less than 0.7 per cent. of vanadium. 1000 w. Comptes Rendus—Aug. 8, 1904.

Researches upon Vanadium Steels (Recherches sur les Aciers au Vanadium). Léon Guillet. A continuation of the author's investigations, with especial reference to the influence of vanadium to steels containing nickel. Serial. Part I 2000 w. Génie Civil—Jan. 7, 1905.

The Use of Vanadium in Metallurgy. Léon Guillet. Read before the Ir. & Steel Inst. Gives a summary of the author's researches and the conclusions. 4500 w. Ir & Coal Trds Rev—Sept. 29, 1905.

Applications of Vanadium in Metallurgy (Emplois du Vanadium en Métallurgie). Léon Guillet. An account of the sources of vanadium, the preparation of ferro-vanadium and the properties of vanadium alloy-steels. Serial. Part I. 1800 w. Génie Civil—Oct. 14, 1905.

See also Chromium-Vanadium; **IRON ALLOY; STEEL—Automobile Construction; VANADIUM.**

Vanadium and Titanium.—Vanadium and Titanium. Hans Goldschmidt. The first part of an article on the effect of vanadium and titanium on steel. The present number deals with vanadium. Serial. 1st part. 2000 w. Elec-Chem and Met Ind—May, 1905.

STEEL ANALYSIS.

See also **IRON ANALYSIS; STEEL.**

Basic Ingots.—See **STEEL INGOT—Basic.**

Carbon.—The Determination of Carbon. James A. Aupperle. With special reference to the stability of carbon compounds in steel. 2200 w. Ir Age—Oct. 6, 1904.

Chromium.—The Use of Ammonium Persulfate in the Determination of Chromium in Steel. Harry E. Walters. Gives an outline of method used by the writer, applicable for ordinary chrome steel, but not for tungsten or molybdenum steels. 1000 w. Pro Engrs' Soc of W Penn—Dec., 1905.

McKenna.—Critical Remarks on McKenna's Method of Analysis of Tungsten and Chrome Steels. The Determination of Tungstic Acid and Separation from Silica. Translation of criticism of Otto Herting, with reply from the author. 1800 w. Pro Engs Soc of W. Penn—April, 1901.

Manganese.—See **IRON ANALYSIS.**

Micrographic.—See **METALLOGRAPHY.**

Molybdenum.—The Rapid Determination of Molybdenum in Steel. George Auchy. A brief description of the method as now used. 600 w. Ir Age —Nov. 20, 1902.

Specifications.—Should Analysis Be Included in Steel Specifications? Extracts from an article by Herr Knaudt in "Stahl und Eisen," with remarks. 2400 w. Ir Age—Jan. 8, 1903.

See also **STEEL SPECIFICATION.**

Sulphur.—See **IRON ANALYSIS—Sulphur.**

Tool Steel.—The Analysis of High-Speed Steels. Suggests methods of analysis. 1500 w. Engng—Nov. 20, 1903.

The Analysis of High-Speed Steel. A brief résumé of the methods of analyzing high-speed steel. 1000 w. Engr, Lond—Dec. 11, 1903.

See also TOOL STEEL.

Variations.—Variations of Carbon and Phosphorus in Steel Billets. Axel Wahlberg. Abstract of paper read before the Glasgow Congress. Gives the plan of the researches, the results and conclusions. 2800 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Variations of Carbon and Phosphorus in Steel (Schwankungen von Kohlenstoff und Phosphor im Flusseisen). Axel Wahlberg. Paper before the Iron and Steel Institute giving the results of careful analyses made by eminent chemists, showing the variations. Tables. 4500 w. Stahl u Eisen —Jan. 15, 1902.

The Determination of the Value of Materials by Chemical Analysis (Die Chemische Analyse als Mittel Zur Bestimmung der Güte des Materials bei der Abnahme). O. Knaudt. A comparison of the results of chemical analysis of test samples of steel at various German laboratories, showing discrepancies. 1200 w. Zeitschr d Ver Deutscher Ing—Nov. 15, 1902.

Comparisons of Methods for the Determination of Carbon and Phosphorus in Steel. Baron H. Jüptner von Jonstorff, Andrew A. Blair, Gunnar Dillner, and J. E. Stead. Remarks by each member of this committee on the methods, with a summary of results. Ills. 15,400 w. Iron & Steel Inst—Oct., 1904.

STEEL BUILDING.

See **BUILDING; BUILDING CONSTRUCTION; STEEL CONSTRUCTION.**

STEEL CAR.

See also **CAR—Steel.**

Paint.—See **PAINTING—Steel Car.**

STEEL CASTING.

See also **CASTING; STEEL INGOT; STEEL METALLURGY.**

Steel Castings. George S. Willits. Describes an ideal plant, methods of manufacture, cleaning and testing, etc. 6200 w. Jour Am Soc of Nav Engrs—Feb., 1903.

Castings in Modern Construction. D. Macdougal. A short paper on the making of steel castings. 900 w. Pro Engrs Soc of W Penn—June, 1903.

Steel Castings. Arthur Simonson. Considers the importance of design, and the construction of the pattern; and also more than all else, the quality of the steel. 1600 w. Foundry—Oct., 1903.

Steel Castings. C. W. Gennet, Jr. Aims to correct false impressions and to give information concerning the material and its adaptations. 2500 w. R R Gaz—Feb. 26, 1904.

Steel Castings. W. A. Herron. Briefly describes the several processes in use for making cast steel, the cleaning, inspection, &c. Discussion. 10,000 w. Pro Ry Club of Pittsburg—Oct. 18, 1904.

The Production of Homogeneous Steel Castings Free from Internal Stresses (Ueber die Mittel zur Erzielung Dichter und Spannungsfreier Stahlformgussstücke). L. Treuheit. Discussing methods of moulding and pouring steel castings so as to avoid the production of blowholes and cooling stresses. Serial. Part I. 1800 w. Stahl u Eisen —June 15, 1905.

Annealing.—Annealing of Steel Castings. W. M. Carr. Considers such steel as is used in the ordinary branches of the manufacture of castings. Ill. 1000 w. Foundry—Oct., 1901.

Basic Open Hearth.—See **Open Hearth.**

Blow Hole.—See **Defects; STEEL INGOT.**

Constitution.—Steel Castings and the Constitution of Steel. Percy Longmuir. On the effect of carbon, manganese, silicon, sulphur, and phosphorus. Ills. 1500 w. Foundry—Oct., 1905.

Steel Castings and the Constitution of Steel. Percy Longmuir. Discusses the effect of various constituents and methods on the structure and qualities. Ills. 1500 w. Ir Trd Rev—Nov. 30, 1905.

See also **STEEL.**

Defects.—Defects in Steel Castings (Gussfehler an Stahlgussstücken). Paul Friem. An explanation of the causes for the production of cracks, blowholes, and other flaws, and methods for their prevention. 4500 w. Stahl u Eisen—Jan. 1, 1904.

Düsseldorf Exposition.—The Manufacture and Applications of Steel Castings (Stahlformguss und Seine Verwendung). Bernhard Osann. A discussion of the present state of the art of making steel castings in the light of the exhibits at the Düsseldorf exposition. Stahl und Eisen—Jan. 15, 1903.

Gelsenkirchen.—Annealed Steel Castings (Temperstahlguss). Bernard Osann. A description of the plant and methods of the Gelsenkirchen works, the largest establishment in Germany for the production of steel castings. 5000 w. Stahl u Eisen —Jan. 1, 1903.

Heat Treatment.—See **CASTING; STEEL; STEEL METALLURGY.**

Hot Cracks.—The Cracks in Steel Castings. Arthur Simonson. The causes of hot cracks are explained, and ways of overcoming the difficulties are considered. 1400 w. Foundry—Aug., 1905.

Hydraulic Press.—Strength of Hydraulic Press Castings. Frank B. Kleinhans. Describes the work of forming steel plates into various shapes by the hydraulic press. Diagrams. 700 w. Ir Trd Rev —Nov. 30, 1905.

Ingot.—See **STEEL INGOT.**

Molds.—The Preparation of Molds for Steel Castings. Arthur Simonson. Read before the Phila. Found. Foremen's Assn. Discusses molding materials, mixing, the mechanical properties of the mold, core making, &c. 2700 w. Ir Age—Oct. 19, 1905.

Open Hearth.—Basic Open-Hearth Steel Castings. L. L. Knox. Read before the Pittsburg Found. Assn. Claiming that basic open-hearth steel gives castings equally as good as acid open-hearth steel, giving a description of the process in an open-hearth furnace using producer gas. 2500 w. Foundry—March, 1904.

Open Hearth Steel Castings. W. M. Carr. The first of a series of articles treating of the important points of their manufacture by the acid and by the basic open hearth processes. Serial. 1st part. 3000 w. Foundry—Dec., 1905.

See also **OPEN-HEARTH PROCESS.**

Pit.—New Casting Pit at the "Angleur" Steel Works, Belgium. V. Firket. An illustrated description of the new pit in which the machinery is worked entirely by electricity. 1600 w. Ir & Coal Trds Rev—Nov. 14, 1902.

Properties.—The Properties of Steel Castings. John Oliver Arnold. Read before the Iron & Steel Inst. An illustrated account of researches commenced about six years ago in the steel works and laboratories of the Sheffield (Eng.) Univ. College. Serial. 1st part. 4800 w. Engng—June 7, 1901.

Small Converter.—See **BESSEMER PROCESS; STEEL METALLURGY—Tropenas.**

Small Plants.—See **CASTING.**

Specifications.—See **STEEL SPECIFICATION—Forgings and Castings.**

Strength.—See **TESTING—Steel Castings.**

Technics.—The Technics of Steel Castings (Stahlformguss und Stahlformgusstechnik). Bernhard Osann. A general discussion of the methods and processes of making steel castings. Serial. Part I. 3000 w. Stahl u Eisen—June 1, 1904.

Temperature.—See **CASTING—Heat Treatment.**

Tropenas Process.—See **STEEL METALLURGY.**

Use.—The Widening Use of Steel Castings in the United States. W. P. Barba. Reviews some of the newer uses of steel castings. Ills. 4000 w. Cassier's Mag—Feb., 1904.

STEEL CONSTRUCTION.

See also **BRIDGE; BUILDING CONSTRUCTION; FIREPROOF CONSTRUCTION; FRAMEWORK; METAL PROTECTION; STEEL—Structural; WAREHOUSE.**

Constructional Steel Work as Applied to Building. Archibald D. Dawnay. Read before the Brit. Soc. of Archts. Historical review, with some discussion of constructive questions. 9600 w. Builder—April 20, 1901.

The Steel Work in Skeleton Buildings. Extracts from a lecture by W. C. Furber, discussing rust prevention, fireproofing, and the design of columns. 3300 w. Eng Rec—Aug. 3, 1901.

Notes on Iron and Steel Construction. M. M. Sloan. The first of a series of articles aiming to give reliable and working data upon this subject. Serial. 1st part. 2800 w. Am Archt—Jan. 4, 1902.

Architectural and Constructional Engineering. T. C. Cunnington. Read bfore the British Archt. Assn. Describes a series of steel frame structures recently erected. Deals first with American tall structures, then with roofs executed to fill special requirements. 2000 w. Arch't, Lond—Jan. 14, 1902.

The Use of Steel in American Lofty-Building Construction. B. H. Thwaite. Read before the Iron & Steel Inst. Briefly reviews the history of the use of iron and steel in building construction, describing the system, and discussing its advantages and disadvantages. 3800 w. Ir & Coal Trds Rev—May 6, 1904.

Structural Steel Work. W. S. Smart. Abstract of a paper before the Midland Jun. Gas Engng. Assn. Discusses the materials, girders, roofs and roof-covering, columns, &c. 3500 w. Ir & Coal Trds Rev—Dec. 1, 1905.

Advance.—Advance in Modern Steel Construction. L. F. W. Hildner. A short paper on the improved methods in shops where structural steel is made. 2000 w. Pro Engrs' Soc of W Penn—June, 1903.

Apartment Hotel.—Structural Steel Work in the Ansonia Apartment Hotel, New York—Roof Trusses, Tower and General Construction. Begins an illustrated detailed description of the steel work in this recently completed apartment hotel in New York, which is one of the largest and most costly yet built. Serial. 1st part. 3300 w. Eng Rec—Jan. 10, 1903.

See also **BUILDING CONSTRUCTION.**

Ash Plant.—See **Electric Station, N. Y.**

Bank, Pittsburg.—See **BUILDING CONSTRUCTION.**

Boiler House.—Structural Steel Details of a Two-Story Boiler House. Illustrates and describes details of the new 16,000 H. P. boiler house of the United Railways and Electric Co. of Baltimore. 2500 w. Eng Rec—Feb. 1, 1902.

Bristol Power House.—See **ELECTRIC STATION—Bristol, Eng.**

British.—See **BUILDING CONSTRUCTION.**

Church.—See **CHURCH—Steel Frame.**

Coal Tipple.—See **COAL TIPPLE.**

Colonial Building, Boston.—See **GIRDER.**

Column Seat.—See **BUILDING CONSTRUCTION.**

Corrosion.—Corrosion of Steel. A report of experiments made at the Insurance Engineering experiment station, Boston, with comments on the lasting qualities of modern methods of construction. Ill. 5500 w. Ins Engng—Oct., 1902.

Corrosion of the Steel Frames of Buildings. Charles L. Norton. An illustrated account of tests made and their results with conclusions drawn. 2000 w. Tech Quar—Dec., 1902.

See also **Permanence; METAL CORROSION; STEEL; STRAY CURRENTS.**

Cost.—See **BRIDGE—Blackwell's Island, N. Y.**

Electric Station.—See also **ELECTRIC STATION.**

Electric Station, Minneapolis.—Steelwork in the Twin City Rapid Transit Company's Power House, Minneapolis. Describes the steel work of a building at present containing about 2,600 tons of structural steel, illustrating details. 2200 w. Eng Rec—May 13, 1905.

Electric Station, N. Y.—Steelwork of the Ash Plant of the New York Edison Co. Illustrated detailed description of this plant in New York, which contains 350 tons of structural steel. 1800 w. Eng Rec—Dec. 9, 1905.

Export Buildings.—Steel Buildings for Export. H. G. Tyrrell. Illustrated description of designs, giving approximate cost of material and shipping. 2400 w. Eng News—April 11, 1901.

Ferris Wheel.—See **FERRIS WHEEL—Erection.**

Ferry House.—The New Steel Ferry House of the Central R. R. of New Jersey. Illustrates and describes the new ferry house at the west end of 22d st., in New York. 3000 w. Eng Rec—Jan. 7, 1905.

See also **FERRY HOUSE—New York.**

Fireproof.—See **FIREPROOF CONSTRUCTION—Steel Construction.**

Foundry, Schenectady.—The Steel Framing of the General Electric Foundry, Schenectady, N. Y. Illustrates and describes particulars of the structural details. 1100 w. Eng Rec—Jan. 18, 1902.

Galleries, Church, N.Y.—Gallery Construction Christ Church Memorial Building, New York. Illustrates details of the steel work, describing the construction. 700 w. Eng Rec—Oct. 21, 1905.

Gas Works.—See **GAS WORKS—Steel Construction.**

Grandstand.—See **GRANDSTAND—Belmont Park.**

Grey Beams.—Broad Flanged I-Beams (Breitflanschige I-Träger). R. Cramer. A discussion of the advantages and manufacture of the beam of the section designed by Henry Grey, of Pittsburg, Pa., as made by the Differdingen works in Luxemburg. 1800 w. Zeitschr d Ver Deutscher Ing—Aug. 16, 1902.

Hippodrome, N. Y.—Steel Work in the New York Hippodrome. Illustrates and describes this feature in the construction of this large fireproof building for amusement purposes. 2000 w. Eng Rec—March 25, 1905.

The Erection of the New York Hippodrome Roof Trusses. Illustrates and describes the method of erection by means of a special timber tower and its booms. 1200 w. Eng Rec—March 18, 1905.

The New York Hippodrome. Harry D. Gue. Discusses the structural and protective features of this large amusement building. 2000 w. Ins Engng—June, 1905.

See also **THEATRE.**

Hotel Iroquois, Buffalo.—Structural Changes in the Hotel Iroquois. Illustrates and describes the method of adding three stories of steel cage construction on the top of the old walls of a Buffalo building. 450 k. Eng Rec—Nov. 24, 1900.

Liége Exposition.—Steel Structural Work for Railway Stations and Workshops (Die Lütticher Weltausstellung. Eisen Konstruktionen für Bahnhöfe und Werkstätten). Bruno Schwarze. Illustrated descriptions of roofs, cranes, etc., of railway shops and stations at the Liége Exposition. 1200 w. Glasers Annalen—Sept. 15, 1905.

Machine Shop, Cramp's.—See **MACHINE SHOP—Cramp's, Philadelphia.**

Machine Shop, Lynn.—See **MACHINE SHOP—General Electric, Lynn.**

Machine Shop, Schenectady.—Steel Work of the New General Electric Machine Shop. Begins an illustrated detailed description of this building at Schenectady which represents the best construction and latest features for buildings of its class. Serial. 1st part. 1300 w. Eng Rec—Aug. 12, 1905.

Macy Building, N. Y.—Structural Steel Work in the Macy Building, New York City. Illustrated detailed description of the framework of a recently built department store having nine stories, a basement and sub-basement. 2200 w. Eng Rec—Sept. 19, 1903.

Manhattan Power House.—See **ELECTRIC STATION—New York.**

Metal Protection.—See Corrosion; **FIREPROOF CONSTRUCTION; METAL PROTECTION.**

Mines.—Steel Construction for Mines. From an address by Mr. Jackson, at a meeting of mine managers in Ishpeming, on the use of steel instead of wood in buildings, shafts, &c. 3600 w. Marine Rev—April 4, 1901.

See also **HEAD FRAME; MINE; MINE BUILDING; TIMBERING.**

New York.—The New York Steel Buildings. From the "Birmingham Daily Post." Extract from an article giving a description of the latest manner of building in New York, as it appeared to an Englishman. 2500 w. Archt, Lond—Sept. 5, 1902.

Office Building.—The Steel Skeleton Construction of a Tall Office Building. J. S. Branne. An illustrated description of the construction; how the steel work is planned for a certain width, length and height of a building, etc., so as to combine strength and economy. 8000 w. Jour Assn of Engng Socs—Feb., 1901.

See also Tall Building; **BUILDING CONSTRUCTION.**

Office Building, N. Y.—Steel Details in the Alterations of the Judge Building. Brief illustrated description of extensive improvements carried out without disturbing the tenants of the building. The building was raised four additional stories, and a heavy interior wall which carried the ends of the floor beams was removed. 1000 w. Eng Rec—Nov. 11, 1905.

Structural Details in a Maiden Lane Building. Illustrates and describes details of a steel-cage building, eleven stories and basement, in New York. 1600 w. Eng Rec—Nov. 18, 1905.

See also **BUILDING CONSTRUCTION; FIREPROOF CONSTRUCTION; MECHANICAL PLANT.**

Orchestra Hall, Chicago.—Special Steel Work in Orchestra Hall, Chicago. Drawings, photographs and description. 3500 w. Eng News—Nov. 3, 1904.

Permanency.—The Permanency of Steel Skeleton Construction. J. K. Freitag. An examination of Gen. William Sooysmith's opinions, and of the causes, if any, which contribute to rapid deterioration. 4200 w. Br Build—May, 1902.

Relative Permanence of Steel and Masonry Construction. Informal discussion of whether steel is susceptible of being made as permanent a building material as masonry. 4000 w. Pro Am Soc of Civ Engrs—Aug., 1902.

See also Corrosion.

Pier Shed.—See **PIER SHED—New York.**

Prudential, Newark.—Steel Work in the Prudential Building, Newark. Illustrated detailed description of an interesting building. 1800 w. Eng Rec—Feb. 1, 1902.

Railway Shop.—See Liége Exposition; **RAILWAY SHOP.**

Railway Station.—See Liége Exposition; **RAILWAY STATION.**

Riding Academy, Scituate, Mass.—A Stel Frame Riding Academy Building. Brief illustrated description of a building recently erected at Scituate, Mass. 800 w. Eng Rec—Dec. 31, 1904.

Sayre Railway Shop.—See **RAILWAY SHOP.**

Schneider Paper.—The Structural Design of Buildings. C. C. Schneider. Submits a set of specifications, for the structural work of buildings, for discussion and criticism, explaining some of the more important clauses and giving the reasons which led the writer to adopt them. 11,000 w. Pro Am Soc of Civ Engrs—Sept., 1904.

The Structural Design of Buildings. Discussion of a paper by C. C. Schneider. 12,000 w. Pro Am Soc of Civ Engrs—Nov., 1904.

The Structural Design of Buildings. Continued discussion of paper by C. C. Schneider. 6000 w. Pro Am Soc of Civ Engrs—Dec., 1904.

The Structural Design of Buildings. Continued discussion of paper on this subject by C. C. Schneider. 7000 w. Pro Am Soc of Civ Engrs—Jan., 1905.

Shop Detailing.—See **DRAWING—Structural Details.**

Specifications.—See **STEEL SPECIFICATIONS.**

Tall Buildings.—Steel Framework for High Buildings. Charles Worthington. Considers the types, loads, design, wind-bracing, foundations, etc. Ill. 2700 w. Pro Engrs' Soc of W Penn—June, 1902.

See also Office Building; **BUILDING CONSTRUCTION.**

Theatre, N. Y.—The Steel Framing of the New Amsterdam Theatre, New York. Illustrated description of interesting structural features in a steel cage fireproof building covering about 17,500 sq. ft. of ground surface. Serial. 1st part. 1800 w. Eng Rec—Nov. 19, 1904.

See also Hippodrome.

Theatre, Vienna.—See **THEATRE—Vienna.**

Train Shed, Pittsburg.—See **RAILWAY STATION—Pittsburg.**

Wanamaker Store, Philadelphia.—Steel Work of the Wanamaker Building, Philadelphia. Begins an illustrated description of the steel work in one of the largest department stores ever erected. Serial. 1st part. 2000 w. Eng Rec—Sept. 2, 1905.

Warehouse.—See **WAREHOUSE.**

STEEL FORGING.

See also **FORGING; STEEL METALLURGY.**

Steel Forgings. T. D. Lynch. Notes some of the characteristics of steel forgings. 1500 w. Pro Engrs' Soc of W Penn—June, 1903.

Engine Parts.—Forgings for Engines. H. F. J. Porter. Read before the Engine Builders' Assn. Considers the steel-forging industry, the operations, annealing, changes in metal, crank shafts, hollow forgings, engine fittings, etc. 4500 w. Ir Trd Rev—May 29, 1902.

The Imperative Conditions for Forging Steel. From a paper by H. F. J. Porter, before the Engine Builders' Assn at Pittsburg. Briefly describes the processes considered necessary to manufacture the grade of forgings used by engine builders. 1800 w. Am Mach—July 3, 1902.

Imperative Conditions for Forging Steel. From a paper by H. F. J. Porter, before the Engine B'ldrs.' Assn. Outlines the processes considered necessary in the manufacture of high grade forgings. 2000 w. Am Mfr—Nov. 13, 1902.

Factory Engines.—Steel Forgings for Factory Engines. H. F. J. Porter. Abstract of a paper presented at the 1891 fall meeting of the New

England Cotton Mfrs.' Assn. Relates the difficulties that presented themselves when this metal was first put to this use, the final success, and the merits of the steel shaft, giving the standard specifications adopted. Ill. 4500 w. Power—Nov., 1901.

Oil Tempering.—The Oil Tempering of Mild-Steel Forgings. Thomas Burt. Read before the Shanghai Soc of Engrs & Archts. A report of tests showing the marked improvement of the steel by oil tempering, and general discussion of the subject. 3400 w. Engng—June 13, 1902.

Specifications.—See **STEEL SPECIFICATION—Forgings and Castings.**

STEEL INDUSTRY.

See also **COMMERCE; IRON INDUSTRY; STEEL METALLURGY; STEEL WORKS.**

American.—The Steel Situation in the United States. Editorial discussion of the present condition of the steel industry as shown by recent reports, and the need of a protective tariff. 1700 w. Engng—July 25, 1902.

The Steel Situation in the States. Editorial discussion of the present situation as revealed in the annual report of the American Iron & Steel Assn., and of the danger of over-production and the effect it will have on British trade. 2400 w. Engng—July 4, 1903.

See also Carnegie; Carnegie Article; U. S. Industrial Commission; U. S. Steel Corporation; **COMMERCE; IRON INDUSTRY.**

Austria-Hungary.—The Production of Steel during the Nineteenth Century in Austria-Hungary (Die Erzeugung von Flusseisen und Stahl im. XIX. Jahrhundert in Oesterreich-Ungarn). Frans Kupelwieser. Statistical tables, with discussion, showing the preponderance of basic open-hearth steel. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 14, 1901.

British.—See Dumping; **IRON INDUSTRY.**

British Raw Materials.—The Raw Materials Used in the British Steel Industry. The present article gives information concerning the industry in the north of England. Serial. 1st part. 1400 w. Ir & Coal Trds Rev—May 17, 1901.

Canada.—See **IRON INDUSTRY; STEEL METALLURGY; STEEL WORKS.**

Carnegie.—Andrew Carnegie: His Career and Work, his Methods, and his Achievements. J. Stephen Jeans. An outline of the development of the American iron industry and the Steel Corporation. Photographs of prominent men in this industry. 14,000 w. Ir & Coal Trds Rev—May 8, 1903.

Carnegie Address.—Steel Production Three Decades Ago and To-day. Andrew Carnegie. Presidential address, delivered before the Iron and Steel Inst., at Barrow-in-Furness, England. 1800 w. Eng News—Sept. 10, 1903.

See also **WORKS MANAGEMENT.**

Carnegie Article.—Development of Steel Manufacture in the United States. Extract from article by Andrew Carnegie in the "N. Y. Evening Post." 2000 w. Ir Trd Rev—Jan. 24, 1901.

Demand.—The Expanding Area of Demand for Iron and Steel. B. H. Thwaite. Calls attention to the use in architectural construction, tramway and autocar transit systems. 1200 w. Ir & Coal Trds Rev—May 1, 1903.

Dumping.—The Theory and Practice of Dumping. The first of a series of articles on the dumping of foreign iron and steel in British markets. Serial. 1st part. 4000 w. Ir & Coal Trds Rev—Nov. 27, 1903.

A Short History of German Dumping. A review of recent events in the iron and steel trade of Germany. Serial. 1st part. 1500 w. Ir & Coal Trds Rev—Jan. 8, 1904.

German Association.—The German Steel Makers' Association and Its Commercial Influence (Der Deutsche Stahlwerks-Verband und Seine Bedeutung für unser Wirtschaftsleben). Oscar Simmersbach. A review of the German steel industry with comparative diagrams and tables, and an examination of the influence of the combination upon the trade. 9000 w. Glasers Annalen—Oct. 1, 1905. See also **IRON INDUSTRY.**

Germany.—See Dumping; **IRON INDUSTRY; STEEL METALLURGY; STEEL WORKS.**

Great Lakes Exports.—The Pittsburg-St. Lawrence Route for Steel Exports. Waldon Fawcett. Discusses phases of the new steel transportation enterprise of the Carnegie Co. 1400 w. Eng & Min Jour—Dec. 22, 1900.

Japan.—The Steel Industry in Japan. Information in regard to the large steel works being erected by the Japanese Government. 800 w. Engng—April 19, 1901.

Nova Scotia.—See **IRON INDUSTRY; STEEL METALLURGY—Canada; STEEL WORKS.**

Railway Influence.—See **IRON INDUSTRY.**

Railway Rates.—Steel Rail Prices and Freight Rates on Steel Exports. Editorial, discussing the present situation between the steel makers and railway companies in the United States. 1800 w. Eng News—Oct. 18, 1900.

See also **RAILWAY RATES.**

Rhenish-Westphalia.—See German Association; **IRON INDUSTRY.**

Sheffield.—Sheffield Past and Present. An interesting review of the rise, progress and existing conditions of the steel industry. 10,500 w. Ir & Coal Trds Rev—Sept. 29, 1905.

Small Manufacturers.—The Problems of the Smaller Manufacturers of Rods and Merchant Bars. William Garrett. The writer's views on the prospects of getting raw material, and being able to compete with the United States Steel Corporation. Gives plans and discusses cost. 3800 w. Ir Trd Rev—March 5, 1903.

Sweden.—See Trust Expansion; **IRON INDUSTRY.**

Trust.—See German Association; U. S. Industrial Commission; U. S. Steel Corporation; **TRUST. Steel Corporation; TRUST.**

Trust Expansion.—Steel Trust Expansion. Comment on the earnings of the past year production in Sweden, and the purchase of the control of the Gellivara mines by an American combine. 1500 w. Engr, Lond—April 11, 1902.

U. S. Census Report.—See **IRON INDUSTRY.**

U. S. Industrial Commission.—President Schwab Before the Industrial Commission. An interesting report of testimony given. 9800 w. Ir Age—May 16, 1901.

The Federal Industrial Commission. Reports the testimony of three prominent men in the iron and steel business, chosen as representatives of the independent interests. 8200 w. Ir Age—May 23, 1901.

U. S. Steel Corporation.—The Great Consolidation. Concerning a movement to place practically the whole of the steel trade of the Central West in the United States under one control. 4800 w. Ir Age—Feb. 14, 1901.

The Great Steel Trust. Editorial discussion of the combination of the steel industries in America, and the outlook. 2200 w. Engng—Feb. 15, 1901.

The Giant Steel Trust. Editorial discussion of the recent combination of large steel producers in America. 1800 w. Engr, Lond—Feb. 15, 1901.

The United States Steel Corporation. Text of the articles of incorporation filed with the State Department of New Jersey on Feb. 25, 1901. 2500 w. Ir Age—Feb. 28, 1901.

The Great Consolidation. Discusses the basis of exchange of securities, fixed charges, advantages claimed, outside interests, prices, etc. 3800 w. Ir Age—Feb. 28, 1901.

American Trusts and British Industries. States the problems and discusses the purposes of trusts, the management, and methods of organized industry, etc. Also editorial. Serial. 1st part. 4900 w. Ir & Coal Trds Rev—March 1, 1901.

The United States Steel Corporation. Editorial discussion of this vast consolidation and the effect on many industries. 2000 w. Eng News—March 7, 1901.

The Great Steel Trust. Editorial discussion of the great consolidation recently consummated in the United States. 1200 w. Engr, Lond—March 8, 1901.

The United States Steel Trust (Der United States Steel Trust). A general review of the organization, aims and effect of this great corporation. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 25, 1902.

The United States Steel Corporation. A copy of the preliminary report to the stockholders. 3500 w. Ir Age—Feb. 6, 1902.

The United States Steel Corporation and the Outlook for the Steel Trade. Briefly reviews the development of the trust movement, methods, formation, &c., the danger that beset the U. S. Steel Corporation, and considerations favoring the combination. 4000 w. Ir & Coal Trds Rev—Oct. 2, 1903.

The United States Steel Corporation. Abstract of the third annual report. 3500 w. Ir Age—March 23, 1905.

See also **American; Carnegie; Trust Expansion; TRUST; WAGES—Profit Sharing; WORKS MANAGEMENT.**

STEEL INGOT.

See also **STEEL CASTING; STEEL METALLURGY; STEEL WORKS.**

Basic.—The Non-Homogeneity of Soft Basic Open-Hearth Ingots (Ueber Inhomogenität der Weichen Basischen Martinblöcke). Adolf Riemer. An account of experiences with small ingots with analyses of different charges and different parts of the same ingot, and explanations of the non-homogeneity. 2200 w. Stahl u Eisen—March 1, 1902.

Beikirch.—A Process for the Prevention of Piping in Large Steel Ingots (Verfahren zur Verhütung der Lunkerbildung in Schweren Rohstahlblöcken). F. O. Beikirch. Describing the use of a sinking head which is afterwards cut off, removing the piped portion. 1800 w. Stahl u Eisen—Aug. 1, 1905.

Preventing the Formation of Cavities in Steel Ingots. F. O. Beikirch in "Stahl und Eisen." Describes a method based on the formation of a waste head. Ills. 1200 w. Ir & Coal Trds Rev—Aug. 25, 1905.

Blow Holes.—Blow Holes and Pipes in Ingot Steel (Die Blasen und Lungerbildung des Flusseisens). A. v. Dormus. Illustrated descriptions of blow holes and pipes in steel, with mechanical and chemical methods for preventing them. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—April 11, 1902.

Blow Hole and Pipe Formation in Cast Steel. H. Diedrichs. An illustrated review of a paper by A. Von Dormus, describing methods used by the steel works at St. Etienne, and the work of J. A. Brinell. 1400 w. Sib Jour of Mech Engng—Jan., 1903.

Preventing Pipes and Blow Holes in Ingots and Castings. Dr. F. C. Weber. Describes the writer's work in this field, and comments on an article on this subject in "Stahl und Eisen." 1700 w. Ir Age—Nov. 12, 1903.

A New Process for Avoiding Piping in Steel Ingots. From "Stahl und Eisen." An illustrated account of a process which attempts to reduce the required volume by maintaining a high temperature in the head. 2300 w. Ir & Coal Trds Rev—Dec. 18, 1903.

A Study of the Causes of Blow Holes in a Steel Block (Untersuchung über den Ursprung eines Blasenraumes in einem Flusseisenblocke). Dr. H. Wedding. With micro-photographs showing the internal structure of the fractured metal, and data of chemical and physical examinations. 2500 w. Stahl u Eisen—July 15, 1905.

Methods for the Prevention of Piping in Steel Blocks (Die Verfahren zur Verhütung der Lunkerbildung in Stahlblöcken). R. M. Daelen. Describing fluid-compression methods, also methods of heating the molds, and the author's continuous process. 1800 w. Stahl u Eisen—Aug. 15, 1905.

Processes for Preventing the Formation of Blow Holes in Steel Ingots (Die Verfahren zur Verhütung der Lunkerbildung in Stahlblöcken). R. M. Daelen. Paper for the International Mining Congress at Liége, giving illustrated descriptions. 800 w. Zeitschr d Ver Deutscher Ing—Aug. 26, 1905.

See also **Beikirch; Harmet; Riemer; Sauveur.**

Brinell.—The Influence of Chemical Composition on Soundness of Steel Ingots. Axel Wahlberg. States the new theory based on recent researches, and gives the general principles of the formation of pipe and blow holes, describing the various types of ingot and Brinell's diagrams summarising the results of researches. Ill. 8000 w. Ir & Coal Trds Rev—May 9, 1902.

Chemical Composition of Steel Ingots. Alex. Wahlberg. Discusses the objects of piping and blow holes in ingots and their causes and prevention, giving a digest of Brinell's work, with which the writer agrees. Serial. 1st part. 4600 w. Am Mfr—Nov. 27, 1902.

The Influence of Chemical Composition Upon the Formation of Blow Holes in Low Steel Ingots (Der Einfluss der Chemischen Zusammensetzung auf die Blasenbildung in Flusseisenblöcken). Axel Wahlberg. A review of the investigations of Brinell, collecting his results into diagrams. 2500 w. Stahl u Eisen—Jan. 1, 1903.

Classifying Steel Ingots, and the Influence of Chemical Composition on Their Solidity. From "Stahl und Eisen." An illustrated article describing various types of ingot and giving the classification made by J. A. Brinell. 1500 w. Ir Age—Feb. 19, 1903.

Chemical Composition.—See **Brinell.**

Classification.—See **Brinell.**

Harmet Press.—Compressing Steel Ingots by Wire Drawing in the Ingot Mold. An illustrated description of apparatus as given in a paper by A. Harmet, read at Düsseldorf meeting of the Iron & Steel Inst. 2500 w. Eng News—Oct. 2, 1902.

The Harmet Steel Ingot Press (Presse pour la Compression de l'Acier par Tréfilage). Illustrated description of a press, worked by hydraulic or other power, for forcing steel ingots, during cooling, into the small end of a conical mold. Serial. 2 parts. 2000 w. Métallurgie—April 1 and 8, 1903.

Compression of Steel by Wire-Drawing During Solidification in the Ingot Mould. Examines the cases of ingots left to shrink freely, ingots subject to compression by the Whitworth system, and by compression by wire-drawing by the Harmet system, fully describing and illustrating the last method. 8400 w. Jour U S Art—March, 1905.

Heating Furnace.—See **FURNACE—Ingot Heating.**

Mold Durability.—The Durability of Ingot Molds (Haltbarkeit von Kokillen). P. Reusch. An illustrated discussion of the causes which affect the durability of ingot molds for steel works, such as their material and its treatment, their shape and thickness, and their handling. 2000 w. Stahl u Eisen—March 15, 1903.

The Durability of Ingot Molds. P. Reusch. Abstract translation of a recent article in "Stahl und Eisen" on the proper design and handling. Ill. 1200 w. Ir Age—April 23, 1903.

Open Hearth.—See **OPEN-HEARTH PROCESS—Ingot.**

Piping.—See **Blow Holes.**

Pit.—See **STEEL CASTING.**

Press.—See also **Harmet Press; HYDRAULIC MACHINERY—Steel Ingot.**

Riemer.—The Development of the Riemer Process for Preventing Piping of Steel Ingots (Weitere Entwickelung des Riemerschen Verfahrens zur Herstellung Dichter Stahlblöcke). Giving photographs of sections of ingots showing the great reduction in piping and porosity by use of the new process. 1000 w. Stahl u Eisen—April 1, 1904.

Sauveur Method.—Pipeless Ingots by the Sauveur Overflow Method. Albert Sauveur and Jasper Whiting. Read at meeting of Am. Soc. for Test. Materials. Brief illustrated description of a method believed to be practical for the casting of pipeless ingots. 2000 w. Ir Trd Rev—July 9, 1903.

Segregation.—See **STEEL.**

Stripper.—An Electric Ingot Stripper. An illustrated description of the machine in use at the Worcester (Mass.) Works of the American Steel & Wire Co., and the method of operating. 2600 w. Ir & Coal Trds Rev—June 7, 1901.

STEEL MANUFACTURE.

See **STEEL METALLURGY.**

STEEL METALLURGY.

See also **ARMOR PLATE; BESSEMER PROCESS; IRON INDUSTRY; IRON METALLURGY; METALLURGY; MINING AND METALLURGY; OPEN-HEARTH PROCESS; ROLLING MILL;**

STEEL; STEEL CASTING; STEEL FORGING; STEEL INDUSTRY; STEEL INGOT; STEEL WORKS.

The Correct Treatment of Steel. C. H. Ridsdale. Abstract of a paper read at Glasgow Congress. Gives the writer's views, discussing the responsibility of the maker and user tests, etc. 1100 w. Ir & Coal Trds Rev—Sept. 6, 1901.

The Correct Treatment of Steel. Read before the Glasgow Congress. The object of the paper is to help those who handle steel by describing in simple, practical terms such fixed principles as are known, and in what direction they may be applied in practice, and to obtain discussion on important points. 1300 w. Jour Am Soc of Naval Engrs—Feb., 1902.

New Methods in Steel Manufacture. Briefly outlines methods for the production of compound ingots, to shorten time in open-hearth process, and hydrogen treatment of Bessemer and open-hearth steel. 3000 w. Ir Trd Rev—March 27, 1902.

Steel: Its Manufacture and Classification, with Special Reference to Hardening and Tempering. R. B. Hodgson. The present article considers briefly the methods of manufacture, comparison, between Siemens and Bessemer steels, and crucible cast steel. Serial. 1st part. 2300 w. Prac Engr—May 5, 1905.

Acid Processes.—See OPEN-HEARTH PROCESS; STEEL ALLOY—Silicon.

Alloys.—See ALLOY; STEEL ALLOY.

American Practice.—The Steel Works Practice of the United States. Enoch James. Read before the Conference of the Brit. Ir. Trd. Assn. Calls attention to points where American practice may with advantage and profit be imitated by English manufacturers. 3500 w. Ir & Coal Trds Rev—April 3, 1903.

Baby Bessemer.—See Tropenas; BESSEMER PROCESS; FOUNDRY—Gruson, Magdeburg.

Bertrand-Thiel.—See OPEN-HEARTH PROCESS.

Bessemer.—The Synthesis of Bessemer Steel. F. J. R. Corulla. Read before the Iron & Steel Inst. Considers the proper employment of manganese the key to the Bessemer process, and discusses the proper proportion for different mixtures, and the value of the Bessemer process. 4500 w. Ir & Coal Trds Rev—May 6, 1904.

See also Converter Accessories; Tropenas; BESSEMER PROCESS; OPEN-HEARTH PROCESS.

Bessemer Open-Hearth.—The Talbot and the Combined Bessemer-Martin Process (Talbotverfahren und Combinirter Bessemer-Martin-Process). E. Holz. A paper before the "Eisenhütte Oberschlesien" on steel manufacture, particularly at Witkowitz, Austria, with discussion. 3500 w. Stahl u Eisen—Jan. 1, 1902.

The Production of Steel Without the Use of Scrap or Ore (Stahlerzeugung ohne Verwendung von Alteisen und Erz). Oskar Goldstein. Describing a combined converter and open-hearth process used in Mexico. 1000 w. Stahl u Eisen—March 15, 1904.

The Chemical Action in the Combined Bessemer-Open-Hearth Process at Witkowitz (Chemische Vorgänge beim Kombinierten Bessemer-Martin Verfahren zu Witkowitz). C. Canaris. Giving the composition of the charges, and the chemical and mechanical properties of the product. 2000 w. Stahl u Eisen—Oct. 1, 1905.

See also OPEN-HEARTH PROCESS.

Bessemer vs. Open-Hearth.—See OPEN-HEARTH PROCESS.

Billets.—The History of the 4-Inch Steel Billet in the United States. William Garrett. 3200 w. Ir & Coal Trds Rev—March 8, 1901.

Blow Hole.—See STEEL CASTING; STEEL INGOT.

British.—See IRON METALLURGY.

Canada.—A. J. Moxham on Steel Making in Canada. Address before the Canadian Mfrs.' Assn. On Canada's advantages in steel-making. 4400 w. Ir Trd Rev—Feb. 28, 1901.

See also IRON INDUSTRY; STEEL WORKS.

Cape Breton.—See Canada; IRON INDUSTRY; IRON METALLURGY; STEEL WORKS.

Cementation.—The Cementation of Iron (Sur la Cementation du Fer). Georges Charpy. An account of quantitative researches on the cementation of steel, with different carbonising materials, in electric furnaces at definite temperatures. 600 w. Comptes Rendus—April 27, 1903.

The Cementation of Special and Carbon Steels (La Cémentation des Aciers au Carbone et des Aciers Speciaux). Léon Guillet. Applying the methods of metallography to the study of cementation of steel showing the action of different materials. 3000 w. 1 plate. Mem Soc Ing Civ de France—Feb., 1904.

Recent Experiments upon the Cementation of Carbon and Special Steels (Nouvelles Recherches sur la Cementation des Aciers au Carbone et des Aciers Speciaux). Léciaux). Léon Guillet. Determinations of the rapidity of penetration of the carbon for different materials of cementation. 1000 w. Comptes Rendus—June 20, 1904.

The Surface Hardening of Steel. Illustrated description of the manner in which the operation of cementation is effected, as given in a paper by Léon Guillet. 2000 w. Ir & Coal Trds Rev—Dec. 9, 1904.

The Brittleness of Case-Hardened Soft Steel (Sur la Fragilité des Aciers Doux Cémentés). J. Lecarme. Account of researches to determine the real cause of the brittleness of steel due to the cementation process of surface hardening, with micrographs, and note by H. Le Chatelier. 3000 w. Rev de Métallurgie—July, 1905.

See also Hardening; ARMOR PLATE.

Cementation with Gas.—The Cementation of Steel and Iron with Gas. C. W. Bildt. From a paper before the Soc. of Swedish Engrs., Stockholm. An illustrated description of the process with statement of advantages. 1600 w. Ir Age—Oct. 3, 1901.

Cold Rolling.—See STEEL.

Continuous Methods.—Methods of Continuous Casting and Rolling for Light Sections. Theodore J. Vollkommer. An illustrated article reviewing what has been done in the work of continuously casting and rolling steel, discussing the possibilities. 5600 w. Ir Trd Rev—March 20, 1902.

Converter.—See Bessemer; Tropenas; BESSEMER PROCESS.

Converter Accessories.—Converter Accessories. C. H. Glasser. An illustrated article describing the machinery equipment of a converter plant. 2300 w. Eng & Min Jour—March 31, 1904.

Converter, Side Blown.—Side Blown Converters. N. Lilienberg. Read before the Philadelphia Found. Assn. Discusses the advantages and disadvantages, the construction, operation, &c. 6400 w. Ir Age—Jan. 14, 1904.

Side Blown Steel Converters. N. Lilienberg. Extract from a paper read before the Philadelphia Foundrymen's Association. Discusses the advisability of erecting such a plant from the manufacturer's point of view, the advantages and disadvantages. 5000 w. Foundry—Feb., 1904.

Cooling Rate.—Note on the Influence of the Rate of Cooling on the Structure of Steel. Albert Sauveur and H. C. Boynton. Gives a statement of interesting facts brought to light in the course of experiments at Harvard University. Ill. 2200 w. Trans Am Inst of Min Engrs—Feb., 1903.

Direct Process.—A New Direct Iron and Steel Process. Abstracts of papers describing a new direct process for the production of malleable iron and steel from the ore, invented by J. Rudolph and J. Landin. 1500 w. Col Guard—Nov. 15, 1901.

See also ELECTRO-METALLURGY.

Differdingen.—See ROLLING MILL; STEEL CONSTRUCTION—Grey Beams.

Electric.—See ELECTRIC FURNACE; ELECTRO-METALLURGY.

Electric Power.—See ELECTRIC DRIVING; ELECTRIC EQUIPMENT; ROLLING MILL; STEEL WORKS.

Faults.—See STEEL—Diseases; STEEL INGOT—Blow Holes.

Gas and Slag Elimination.—Eliminating Gases and Slags from Molten Steel. F. C. Weber. Remarks on the methods that have been devised for this purpose, and the work of the writer in this field. 900 w. Ir Trd Rev—May 28, 1903.

Germany.—Progress in Steel Works Practice in Germany since 1880. R. M. Daelen. Read at meeting of the Iron & Steel Inst. An account of the recent progress and the improvements which have been effected. 3800 w. Engng—Sept. 5, 1902.

Progress of German Steel and Rolling Mills since 1880 (Die Fortschritte in den Deutschen Stahl und Walzwerken seit 1880). R. M. Daelen. A brief review of German progress in steel making, showing especially the advance in the production of steel by the basic process. 2000 w. Stahl u Eisen—Sept. 15, 1902.

Gin.—See **ELECTRO-METALLURGY—Iron and Steel.**

Handling Machinery.— See **MECHANICAL HANDLING.**

Hardening.—Pack Hardening of Steel. E. R. Markham. Describes the method known as pack hardening and the necessary appliances. 1700 w. Loc Engng—Dec., 1900.

Preparation of Steel, and Points on Hardening. A. R. Markham. On the treatment of tool steel. 1600 w. Loc Engng—Feb., 1901.

Steel and Its Treatment. E. R. Markham. Discussing methods of heating of steel for hardening in the present article. Ill. 2700 w. Mach, N Y—Sept., 1902.

Shape as Affecting Hardening. Thomas Lovekin. Discusses the question of the effect of hardening upon the shape of steel articles, illustrating by an example where a slight change in construction made cracking impossible. 900 w. Am Mfr—Dec. 11, 1902.

See also **Cementation; Heat Treatment; HARDENING.**

Harmet Ingot Press.—See **STEEL INGOT.**

Heating.—The Transfer of Heat at High Temperatures. Frank C. Wagner. Describes experiments made to determine the time required to raise plates of iron and steel to a welding temperature in an open hearth regenerative furnace. 1700 w. Trans Am Soc of Mech Engrs, No. 075—June, 1905.

Heating Furnace.—See **FURNACE—Ingot Heating.**

Heat Treatment.—A Study of the Effect of Heat-Treatment on Crucible Steel Containing 1 per cent. of Carbon. George W. Sargent. Describes experiments and micro-structural investigations. Ill. 2000 w. Trans Am Inst of Min Engs—April, 1901.

The Heat Treatment of Steel. A review of information on this subject given in recently published papers, especially the investigations of Mr. Albert Sauveur. Ill. 2000 w. R R Gaz—May 31, 1901.

The Heat Treatment of Steel. M. E. Vanderheym. On the advantages of annealing and rapid cooling. 1800 w. Ir Age—Jan. 30, 1902.

The Restoration of a Dangerously Crystalline Steel by Heat Treatment. J. E. Stead and Arthur W. Richards. Read before the Iron & Steel Inst. An account of the authors' work in studying the effect of heat on the mechanical properties of steel. 5000 w. Engng—Sept. 4, 1903.

Sixth Report to the Alloys Research Committee on the Heat Treatment of Steel. Sir William C. Roberts-Austen and Prof. William Gowland. 39 plates. 28 tables. 26,800 w. Inst of Mech Engrs—Jan. 15, 1904.

Notes on the Production and Thermal Treatment of Steel in Large Masses. Cosmo Johns. Read before the Iron & Steel Inst. Describes briefly the practice of the works of Messrs. Vickers, Sons & Maxim, Ltd., giving much valuable information. Ills. 4500 w. Ir & Coal Trds Rev—May 6, 1904.

The Heat Treatment of Steel in Large Masses (Wärmebehandlung von Stahl in Grossen Massen). O. Bauer. A comparison of the conditions existing in laboratory tests with those obtaining in actual practice, especially as regards mass and time. 2500 w. Stahl u Eisen—Nov. 1, 1905.

See also **Hardening; Re-Heating; IRON METALLURGY; RAIL; STEEL.**

Heroult-Process.—See **ELECTRO-METALLURGY—Iron and Steel.**

Hydraulic Power.—See **HYDRAULIC MACHINERY—Steel Manufacture.**

Hydraulic Press.—See **HYDRAULIC MACHINERY; STEEL CASTING; STEEL INGOT.**

Ingot Press.—See also **HYDRAULIC MACHINERY—Steel Ingot; STEEL INGOT.**

Ingot Stripper.—See **STEEL INGOT—Stripper.**

Kernohan Process.—The Kernohan Steel Process. R. B. Kernohan. Illustrated description of a new method employing an inclined plane converter, intended to overcome some of the difficulties of the duplex process. 1800 k. Ir Age—Jan. 31, 1901.

Ladle Car.—See **LADLE CAR.**

Ladle Crane.—See **CRANE—Electric Ladle.**

Mechanical Handling.—See **ELECTROMAGNET; MECHANICAL HANDLING.**

Microscope and Pyrometer.—Unexplained Phenomena in Steel. Translated from the "Journal de l'Electrolyse." States some of the peculiarities whose causes are yet unknown, and the need of employing the pyrometer and the microscope in its manufacture. 1400 w. Am Mfr—Jan. 22, 1903.

Mixer Patent.—The Jones Mixer Decision. A review of the case of the Carnegie Steel Co., Ltd., against the Cambria Iron Co., interesting and valuable for the historical data furnished relative to the evolution of Bessemer practice in the United States. 4800 w. Ir Trds Rec—May 22, 1902.

See also **IRON METALLURGY.**

Nitrogen Influence.—See **IRON—Nitrogen.**

Open-Hearth Process.—See **Bessemer Open-Hearth; Kernohan; OPEN-HEARTH PROCESS.**

Overheating.—See **STEEL.**

Piping.—See **STEEL INGOT—Blow Hole.**

Rail.—See **RAIL; STEEL.**

Re-Heating.—The Effect of Re-Heating Upon the Coarse Structure of Over-Heated Steel. K. Frederik Göransson. States what has been accomplished in the study of this subject and reports personal investigations. 3000 w. Trans Am Soc of Min Engrs—Feb. and May, 1902.

Selection.—See **STEEL.**

Small Converters.—See **Tropenas; BESSEMER PROCESS.**

Soft Center.—The Manufacture of Soft Center Steel. G. F. Blackiston. Describes methods of making this steel which is used for plow shares, etc. 1400 w. Ir Age—July 31, 1902.

Sorbitic Rail.—See **RAIL.**

Special.—Twenty-five Years' Progress in the Use of Alloys and Metals in Steel Manufacture. Albert Ladd Colby. A general review of the difficulties which have been overcome in the manufacture and treatment of "special steels," with reference to the important uses. Analyses of the steels and ferro-alloys used are given. Also brief biographical sketches of men prominent in this field. 6300 w. Ir Trd Rev—Nov. 14, 1901.

See also **STEEL ALLOY.**

Sulphur and Manganese.—See **STEEL.**

Talbot Process.—See **Bessemer Open-Hearth; OPEN-HEARTH PROCESS.**

Taylor-White Process.—See **TOOL STEEL.**

Tempering.—Drawing the Temper. E. R. Markham. Explains the meaning of "temper" and "tempering," and considers points relating to tool hardening. 1000 w. Am Mach—Aug. 14, 1902.

Notes on the Tempering of Steel (Etudes sur la Trempe de l'Acier). Henry le Chatelier. A study of the effect of temperature, contact, composition, dimensions and manipulation upon the tempering of steel. 8000 w. Rev de Metallurgie, Bull Soc d'Encour—Sept., 1904.

Tempering Theory.—The Theory of the Temper of Steel (Au Sujet de la Théorie de la Trempe de l'Acier). André Le Chatelier. A discussion of the theory of tempering, and of the internal state of steel in general. 700 Comptes Rendus—March 10, 1903.

Theory vs. Practice.—Abstract of Lecture by Professor J. O. Arnold, University College, Sheffield, on "The Relation of Theory to Practice in Steel Metallurgy." Also discussion. 6500 w. Jour W of Scot Ir & Steel Inst—Jan., 1905.

Thermo Gauge.—See **PYROMETRY—Morse Thermo Gauge.**

Thermo-Magnetic Selector.—See **PYROMETRY—Magnetic Selector.**

Thomas vs. Bertrand-Thiel.—See **OPEN-HEARTH PROCESS—Bertrand-Thiel vs. Thomas.**

Tool Steel.—See **TOOL STEEL.**

Tropenas Process.—The Tropenas Steel Process. Edward L. Adams. Illustrated description of the installation of this process at the works of The Sargent Co., of Chicago Heights, Ill., with general remarks. 1800 w. Technograph, No. 15—1900-1901.

The Tropenas Converter Steel Process. A. Tropenas. Illustrated description of the process with information concerning it. 3200 w. Jour Am Found Assn—Sept., 1901.

The Small Converter Problem. Arthur Simonson. Information explanatory of the Tropenas Steel Process and its advantages. 2800 w. Foundry—Nov., 1904.

A Small Converter Process for the Manufacture of Steel Castings. Arthur Simonson. A description of the Tropenas process and plant, stating its usefulness and advantages. 2500 w. Foundry—July, 1903.

The Small Converter for Steel Castings. Arthur Simonson. On the advantages of the small converter processes, especially for small castings. 2200 w. Ir Trd Rev—July 30, 1903.

Steel Castings and the Tropenas Process. Arthur Simonson. Read at meeting of the New England Found. Assn. Considers steel and its characteristics, the manufacture of steel castings, and problems of the foundry, the sphere of the Tropenas process and the features of operation. 4000 w. Ir Trd Rev—Oct. 29, 1903.

Vanadium.—See **STEEL ALLOY; VANADIUM.**

Whitworth System.—See **STEEL INGOT—Harmet Press.**

Wire Products.—See **WIRE MANUFACTURE.**

STEEL PEN.

See **PEN.**

STEEL PIPE.

See **PIPE; TUBE; WATER PIPE.**

STEEL PLATE.

See **ARMOR PLATE; MATERIALS' STRENGTH; PLATE; SHEET METAL; STEEL METALLURGY; TESTING.**

STEEL PROTECTION.

See **METAL PROTECTION; STEEL CONSTRUCTION.**

STEEL SPECIFICATIONS.

See also **BRIDGE SPECIFICATIONS; INSPECTION; SPECIFICATION; TESTING.**

Specifications for Material and Workmanship for Steel Structures. T. L. Condron. Gives diagram, showing the variations in the physical and chemical requirements, and submits specifications based upon steel having an average tensile strength of 62,000 lbs. per sq. in., with discussion. 12,800 w. Jour W Soc of Engrs—June, 1903.

Analysis.—See **STEEL ANALYSIS—Specifications.**

Rail.—See **RAIL—Specifications; STEEL—Rail.**

Standard.—Proposed Standard Specifications for Steel for Bridges, Ships, Forgings and Railway Rails. A copy of the specifications for purposes named as formulated by a committee of the International Assn. for Testing Materials. 4000 w. Engr News—July 4, 1901.

Specifications for Steel Forgings, Steel Castings and Steel Boiler Plates. William R. Webster. The Standard specifications of the American section of the International Assn. for Testing Materials are presented for discussion. 2500 w. Trans Am Soc of Mech Engrs, No. 0948—May, 1902.

Specifications for Steel Forgings and Steel Castings. William B. Webster. Offers these specifications for discussion. Gives table from Mr. C. H. Ridsdale's paper, and in appendix, the Standard Specifications for Steel Forgings and Castings. 2200 w. Trans Am Inst of Min Engrs—May, 1902.

Discussion of Proposed Standard Specifications for Steel Forgings and Castings. Gus C. Henning. A critical discussion of the standard international specifications proposed. 4000 w. Trans Am Inst of Min Engrs—Sept., 1902.

Recent Advances in the Standardization of Steel Specifications. Concerning the revised specifications adopted, comparing them with the previous standards. 3500 w. Ir Age—April 30, 1903.

The Steel Manufacturers' Standard Specifications. Albert Ladd Colby. Abstract of a paper read before the Am. Soc. for Test. Materials. Information in regard to the revised "manufacturers' standard specifications" and their requirements. 1600 w. Eng Rec—July 18, 1903.

The Standardization of Specifications for Iron and Steel. Recent Progress in America and England. William R. Webster and Edgar Marburg. Outlines the history of the movement to secure uniformity on the part of technical societies in the United Societies, and gives a brief review of the present situation in England. 1800 w. Trans Am Inst of Min Engrs—March, 1904.

Structural.—Notes on Specifications for Bridge and Structural Steel. P. S. Hildreth. Notes covering some of the questions which arise in the practical carrying out of specifications. 2500 w. R R Gaz—July 19, 1901.

Structural Steel for Bridges, Ships and Buildings. A statement of the changes in the revised standard specifications for structural steel, recommended by a committee of the American Section of the International Assn. for Testing Materials. 600 w. Eng Rec—July 27, 1901.

See also **STEEL.**

STEEL TAPE.

See **SURVEYING—Massachusetts Boundary; SURVEYING INSTRUMENT.**

STEEL WORKS.

See also **BESSEMER PROCESS; BLAST FURNACE; IRON INDUSTRY; IRON METALLURGY; IRON WORKS; OPEN-HEARTH PROCESS; ROLLING MILL; STEEL CASTING; STEEL INDUSTRY; STEEL INGOT; STEEL METALLURGY.**

Alabama Company.—The New Works of the Alabama Steel and Shipbuilding Company. Archibald Potter Head. Illustrated description of large open-hearth works at Ensley, Ala., with history and other information. 5000 w. Ir & Coal Trds Rev—March 15, 1901.

Algoma.—See **Sault Ste. Marie; CHARCOAL—Retort Plant.**

Alliance, O.—See **American Steel Casting Co.; OPEN-HEARTH PROCESS.**

American.—See **IRON WORKS; ROLLING MILL; STEEL METALLURGY.**

American Steel Casting Co.—The American Steel Casting Company's New Plant at Alliance (Ohio). Illustrated detailed description. 2500 w. Ir Age—Sept. 25, 1902.

Antwerp.—Modern Electric Hoists and Cranes for Steel Works. Dr. A. Krebs. Illustrated description of an installation at the Société Anonyme des Aciéries d'Anvers, Belgium. 700 w. Elec Wld & Engr—March 29, 1902.

The Antwerp Iron and Steel Works. Illustrates and describes fine works in the course of erection, to consist of a blast furnace plant, a steel works and a complete roll train. It will include an iron and steel foundry, workshops, a large boiler house, smithy, etc. 3000 w. Ir & Coal Trds Rev—May 30, 1902.

The Antwerp Steel and Iron Works (Forges et Aciéries d'Anvers). A description of the new steel works under construction at Hoboken, near Antwerp. All the machinery, including the heavy rolls, is to be driven by electric power. 2500 w. Revue Technique—Sept. 10, 1902.

Electrical Equipment of Antwerp Iron and Steel Works. A brief illustrated account of an interesting plant in Belgium. The extent of the electric drive and the variety of uses to which it is put is a study in the shop equipment of a modern manufactory. 1600 w. Elec Wld & Engr—Oct. 18, 1902.

Electrical Equipment of the Antwerp Steel Works. An illustrated description of these large iron and steel works, which will require 30,000 horse power to operate them, electric motor driving being employed throughout.. 1600 w. Feilden's Mag—Jan., 1903.

Armstrong.—See **GUN WORKS.**

Barrow-Hematite.—A Description of the Bessemer Shop and Heating Pits at the Barrow Hematite

Steel Company's Works, Barrow-in-Furness. J. M. While. Read before the Iron and Steel Inst. 2500 w. Ir & Coal Trds Rev—May 10, 1901.

The Barrow-Hematite Steel Works. Arthur J. While. Read at Barrow meeting of the Inst. of Mech. Engrs. Illustrated detailed description of the works and their equipment. 2300 w. Engng —Nov. 22, 1901.

Belgian-Ougree.—See BLAST FURNACE.

Bell Brothers.—The Clarence Works of Bell Brothers, Limited. An illustrated historical sketch of these works and the successive steps by which this important business has been built. 3000 w. Ir & Coal Trds Rev—Jan. 10, 1902.

Bethlehem, Pa.—See ARMOR PLATE.

Birdsboro, Pa.—See MACHINE WORKS.

Bolckow, Vaughan & Co.—The Works and Operations of Messrs. Bolckow, Vaughan & Co., Limited. Illustrated description of the blast furnaces, converting plant, open-hearth steel plant, rail and plate mills, &c, in the Cleveland district, England. Serial. 1st part. 2500 w. Ir & Coal Trds Rev—Sept. 20, 1901.

Britannia, Middlesbrough.—Britannia Steel Works. Middlebrough. Gives an introductory description of the chief incidents in the formation of this firm, with a detailed account of the reconstructed works and the appliances with which they are equipped. Ill. Serial. 1st part. 4000 w. Engng —June 12, 1903.

Buckeye.—See FOUNDRY.

Buffalo, N. Y.—See Lackawanna.

Cambria, Johnstown, Pa.—The Cambria Steel Company's New Works. Illustrated description of recent improvements in these works at Johnstown, Pa. 2500 w. Ir Age—Feb. 6, 1902.

The New Structural and Car Shops of the Cambria Steel Company, Johnstown, Pa. History of the plant, with illustrated detailed description. Serial. 1st part. 4200 w. Eng Rec—June 18, 1904.

Canada.—See Sydney; IRON INDUSTRY—Canada East; IRON WORKS—American; STEEL METALLURGY.

Cape Breton.—See Sydney; IRON INDUSTRY—Canada East; IRON WORKS—American; STEEL METALLURGY—Canada.

Cargo Fleet, Eng.—The Cargo Fleet Works. Illustrations, with description of these reconstructed works which are intended to produce structural steel and to use up all the iron coming from their own blast furnaces. Serial. 1st part. 3000 w. Engr, Lond—May 12, 1905.

Carnegie.—The Huge Enterprises Built up by Andrew Carnegie. Chas. M. Schwab. A study of the Carnegie works as illustrative of the methods of one of the foremost industrial managers. 4000 w. Engineering Magazine—Jan., 1901.

The Duquesne Works of the Carnegie Steel Company. The present article gives an illustrated description of the open-hearth plant and the blooming and 14-inch Morgan continuous mills. Serial. 1st part. 3500 w. Ir Age—Jan. 1, 1903.

The Manufacture of Steel Rails. An illustrated description of the Edgar Thomson Works, as representative of the scale of these establishments in the United States, and the methods of labor-saving. 2300 w. Sci Am—Dec. 12, 1903.

See also STEEL INDUSTRY.

Casting Pit.—See STEEL CASTING—Pit.

Cette, France.—See Schneider.

Clairton, Pa.—Blast Furnaces and Steel Plant of the Clairton Steel Co., at Clairton, Pa. Illustrated detailed description of large works recently erected. 3000 w. Ir Trd Rev—Nov. 19, 1903.

Clarence.—See Bell Brothers.

Colorado Fuel & Iron Co.—The Colorado Fuel & Iron Company. An illustrated detailed description of additions and improvements to the Minnequa Works at Pueblo which will make this one of the largest steel plants in the United States. 5600 w. Ir Age—Aug. 14, 1902.

The Minnequa Works of the Colorado Fuel & Iron Company. Illustrated description of these large iron and steel works located at Pueblo, Colorado. 6000 w. Ir & Coal Trds Rev—Jan. 29, 1904.

Creusot.—See Schneider, France; ARMOR PLATE.

Crucible.—The Improvements of the Crucible Steel Company of America. Detailed description, with plans of new plants being built by this company. 2300 w. Ir Age—March 20, 1902.

Dominion.—See Sydney, Cape Breton.

Duquesne, Pa.—See Carnegie.

Durango, Mex.—See IRON WORKS.

Düsseldorf.—See Krieger.

Edgar Thompson.—See Carnegie; RAIL—Manufacture.

Electric Equipment.—See Antwerp; ELECTRIC DRIVING; ELECTRIC EQUIPMENT.

Essen.—See Krupp.

Gas Engine.—See GAS ENGINE—Iron Works.

Gelsenkirchen.—See STEEL CASTING.

Germany.—See STEEL METALLURGY.

Grand Crossing Tack Co.—See WIRE MANUFACTURE.

Granite City, Ill.—The Granite City Plant of the National Enameling and Stamping Company. Illustrated detailed description of a plant designed for a special product of open-hearth steel suitable for enameling, and for making granite ware. 3000 w. Ir Age—Jan. 10, 1901.

Gruson, Magdeburg.—See FOUNDRY.

Guérigny, France.—The New Open-Hearth Steel Works of the French Navy at Guérigny (Das Neue Martinstahlwerk der Französischen Marine in Guerigny. Illustrating and describing the new works for the manufacture of armor-plate steel, with especial reference to the furnaces. 1500 w. Stahl u Eisen—March 15, 1904.

Gutehoffnungs, Germany.—The Gutehoffnungs Works at Oberhausen (Die Gutehoffnungshütte bei Oberhausen). B. Osann. An historical and descriptive account of this famous works. Two articles. 9,000 w. 3 plates. Stahl u Eisen—April 15, May 1, 1904.

Harvester Co.—See South Chicago, Ill.

Hoops and Bars.—See IRON WORKS.

Illinois Steel Co.—The Illinois Steel Company's Additions. Illustrated description of the new open hearth steel works and blooming and structural mills and their equipment. 1500 w. Ir Age—March 2, 1905.

Indiana Harbor, Ind.—The Inland Steel Company's Indiana Harbor Works. Illustrated detailed description of these works and their equipment. 2000 w. Ir Age—Sept. 3, 1903.

Jessop, Washington, Pa.—The New Plant of the Jessop Steel Co. at Washington, Pa. H. G. Manning. Brief illustrated description of a plant consisting of a melting shop, rolling mill, power house and pickling shed. 1600 w. Eng News—Feb. 26, 1903.

See also ROLLING MILL—Power Chart.

Johnstown, Pa.—See Cambria.

Krieger, Düsseldorf.—The Krieger Steel Works, Düsseldorf (Stahlwerk Krieger, Actiengesellschaft, Düsseldorf). A general description of an important works devoted to the production of steel castings. 2000 w. 1 plate. Stahl und Eisen—Dec. 1, 1900.

Krupp.—The Krupp Works in 1900 (Les Etablissements Krupp en 1900). G. Bresson. A review of the development of the Krupp works up to the time of the Exposition of 1900, with statistics of production, etc. 1200 w. Génie Civil—Dec. 22, 1900.

The Founders of the Krupp Establishments. E. Schroedter. A historical review of the development of the great Krupp works, showing the results of skilled industrial management and organization. 3500 w. Engineering Magazine—Jan., 1901.

The Krupp Works. From "L'Illustration." Illustration of the proving grounds at Meppen, with information concerning the history and management of the works at Essen. 1800 w. Sci Am Sup—June 1, 1901.

Some Interesting Features of the Krupp Works at Essen. Henry L. Geissel. An illustrated article giving particulars of interest and showing the immense extent of the works. 1500 w. Sci Am—April 19, 1902.

Notes on the Krupp Works (Einiges über Krupp). A brief review of the development of the Krupp works at Essen, Germany, with plate of illustrations showing views in the works and plans and elevations of the workmen's houses. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen —Nov. 29, 1902.

The Krupp Works. Emile Guarini. Brief illus- The first of a series of illustrated articles describing these noted works in Germany. Serial. 1st part. 1800 w. Sci Am Sup—May 9, 1903.

The Krupp Works. Emile Guarini. Brief illustrated descriptions of the Krupp establishments in Germany, which consist of eight different groups, and employ nearly 150,000 people. 2800 w. Cassier's Mag—April, 1905.

See also **WORKS MANAGEMENT.**

Lackawanna, Buffalo.—The Works of the Lackawanna Steel Company. The present article gives a general illustrated description of the different parts of the plant at Buffalo, and their purposes. Serial. 1st part. 5500 w. Eng Rec—May 30, 1903.

W. W. Scranton on the Lackawanna Plant. An interesting letter to the Scranton "Times," largely in praise of the new plant at Buffalo. 1200 w. Ir Age—Nov. 10, 1903.

The Largest Steel Plant in the World. An illustrated detailed description of the great undertaking of the Lackawanna Steel Company, at Buffalo, N. Y. 12,800 w. Ir Age—Jan. 7, 1904.

The New Plant of the Lackawanna Steel Company, at South Buffalo. An illustrated detailed description of this mammoth plant, noting the novel features in construction and equipment. 12,300 w. Ir Trd Rev—Dec. 31, 1903.

Middlesbrough.—The Steel Works, Wireworks and Sheet Mills of Dorman, Long & Co., Middlesbrough. An illustrated account of important English works. 3200 w. Ir & Coal Trds Rev—April 5, 1901.

The Works and Operations of the North-Eastern Steel Company, Middlesbrough-on-Tees, England. An illustrated detailed description. 6500 w. Ir & Coal Trds Rev—May 15, 1903.

See also **Britannia.**

Minnequa.—See **Colorado Fuel & Iron Co.**

Monterey, Mexico.—The Steel Plant at Monterey, Mexico. William White, Jr. Describes the deposits and gives plan and description of the plant. 2500 w. Trans Am Inst of Min Engrs—Nov., 1901.

Newburn, Eng.—The Newburn Steel Works. History and description of these English works, with plan. 3000 w. Engn—Aug. 1, 1902.

Niederschelden, Germany.—The New Steel Works at Niederschelden on the Sieg (Die Neuen Stahlwerksanlagen zu Niederschelden a. Sieg). With photographs and plans of the new steel plant of the Charlottenhütte. 1800 w. Stahl u Eisen—July 15, 1901.

Open-Hearth.—See **Granite City; Guérigny; OPEN-HEARTH PROCESS.**

Pencoyd.—Manufacture of Bridge and Building Structural Shapes. An illustrated description of the Pencoyd Iron Works as representative of the United States plants and methods. 1500 w. Sci Am—Dec. 12, 1903.

See also **MACHINE SHOP.**

Port Talbot, South Wales.—The Port Talbot Steel Works and Their Equipment. Illustrated detailed description of these important works in South Wales. 2800 w. Ir & Coal Trds Rev—Feb. 6, 1903.

Rendsburg, Germany.—The Rendsburg Steel and Rolling Mills (Das Stahl und Walzwerk Rendsburg). A full detailed description of this important North German works, with numerous illustrations. 4000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Aug. 2, 1902.

A German Plate Mill and Open-Hearth Plant. From "Stahl und Eisen." An illustrated account of the plate mill and open-hearth plant of the Rendsburg Steel and Rolling Mill. 1500 w. Ir Trd Rev—Sept. 11, 1902.

Rheinische, Germany.—The Rheinische Steel Works. Describes these works as typical of the very best modern German practice. 3000 w. Engr, Lond—Sept. 19, 1902.

Sault Ste. Marie, Canada.—Plant of the Algoma Steel Co., Sault Ste. Marie. Illustrates and describes one of the most modern steel plants in Canada. The principal production is steel rails. 3500 w. Ir Trd Rev—Dec. 21, 1905.

See also **SAULT STE. MARIE.**

Schneider, France.—The Cette Iron Works (Les Haut Fourneaux et Forges de Cette). Ch. Dantin. An illustrated description of the new blast furnaces and forges of Messrs. Schneider & Co., at Cette, department of Hérault, France. 2500 w. 1 plate. Génie Civil—Oct. 11, 1902.

The Schneider Works in France, with Details of the Plants at Creusot and Havre. E. Guarini. Illustrated description with brief historical review. 3000 w. Ir Trd Rev—Sept. 1, 1904.

Sharon, Pa.—The Sharon Steel Company. An illustrated detailed description of extensive works. 6500 w. Ir Age—July 4, 1901.

Shears.—See **SHEARS.**

Shickle, Harrison & Howard.—New Steel Castings Plant of the Shickle, Harrison & Howard Iron Company. Description, plan and interior views. 1500 w. R R Gaz—Dec. 7, 1900.

South Chicago, Ill.—New Steel Plant and Merchant Bar Mills of the International Harvester Co., at South Chicago, Ill. Illustrated detailed description. 4400 w. Ir Trd Rev—Oct. 15, 1903.

Steam Engine.—See **STEAM ENGINE—Steel Works.**

Structural Shops.—See **Cambria; STEEL—Structural; STEEL METALLURGY.**

Sydney, Cape Breton.—The Dominion Iron & Steel Company, Limited. Illustrated detailed description of this plant at Sydney, C. B., and related matter. 4800 w. Ir Age—Nov. 8, 1900.

The Manufacture of Iron and Steel in Cape Breton. P. T. McGrath. An account of important newly developed industries which may play an important part in rising international competition. 4000 w. Engineering Magazine—July, 1901.

The Works of the Dominion Iron & Steel Co. at Sydney, Cape Breton. Illustrated detailed description of this recently completed plant. 3500 w. Eng News—July 25, 1901.

The Dominion Iron and Steel Company. An illustrated sketch of a great industrial enterprise at Sydney, Nova Scotia. 3400 w. Marine Rev—Jan. 2, 1902.

Plant of the Dominion Iron and Steel Company. Waldon Fawcett. Description of a new Canadian plant at Sydney, Cape Breton. 2000 w. Am Mfr—March 13, 1902.

See also **IRON INDUSTRY—Canada East; IRON WORKS—American; STEEL METALLURGY—Canada.**

Washington, Pa.—See **Jessop.**

Youngstown, O.—New Billet Mill at Youngstown. Illustrations and details of the Republic Iron & Steel Co.'s new mill. 1000 w. Ir Trd Rev—Oct. 9, 1902.

See also **ROLLING MILL.**

STEERING GEAR.

Automobile.—See **AUTOMOBILE—Steering Gear.**

Electric.—Electrical Steering Apparatus for Ships. George McQuilkin. An illustrated explanation of the operation of this apparatus. 2500 w. Marine Engng—Oct., 1902.

Electrical Steering Gear on the "Finland." Illustrated description of the apparatus, designed by M. Pfatischer, which is an application of the principle of the Wheatstone bridge to the control of a ship's rudder. 2200 w. Elec Wld & Engr—Nov. 29, 1902.

An Electric Steering Gear. An illustrated description of an electrically-controlled steering gear which Siemens Bros. & Co. have fitted on the large steam yacht "Valhalla." 1000 w. Elect'n, Lond—Dec. 12, 1902.

Modern Electric Steering Apparatus. Frank C. Perkins. Illustrates and describes various devices. 3000 w. Elec Rev, N Y—March 28, 1903.

Electric Steering Control of Ships. Illustrated detailed description of the installation on the naval ship "Baden." 1600 w. Marine Engng—Jan., 1905.

Details of Electric Steering Gear of the Turbine steamer "Manxman." Illustrated description of a combination of steam and electric steering gear fitted on board of this turbine-driven steamer. 1500 w. Engng—Feb. 17, 1905.

The Electric Steering Gear of the Turbine Steamer "Manxman." Illustrated description of the design and principle of the electrical equipment. The installation is a combination of steam and electric power, either being used as desired, or the vessel may be steered by hand. 1400 w. Sci Am Sup—Oct. 7, 1905.

Electric Steering. George E. Walsh. Information concerning the development of steering devices to be operated by electricity, and the fields where it has been successfully applied. 2000 w. Marine Engng—May, 1905.

See also ELECTRIC EQUIPMENT—Ships.

"Finland."—See Electric.

Klee's Tangential.—See AUTOMOBILE—Steering Gear.

"Manxman."—See Electric; STEAMSHIP—Turbine.

"Meteor."—Steering Gear of the Yacht "Meteor." Brief illustrated description of the novel steering gear designed especially for the Emperor's new yacht. 500 w. Eng News—Feb. 27, 1902.

Siemens.—See Electric.

Steam.—Steam Steering Gear. Arthur Masters. Considers the advantage of steam over hand gears, types of steam steering gear and methods of transmission. Ill. 3200 w. Mach, N Y—Sept., 1902.

"Valhalla."—See Electric.

STEREOSCOPE.

Surveying.—See SURVEYING—Photographic.

STEREOTYPING.

Automatic.—The Autoplate—An Automatic Stereotyping Machine. Illustrated detailed description of the machine and its operation. 1500 w. Sci Am Sup—Oct. 26, 1901.

STERILIZATION.

See FILTRATION; OZONE; SANITATION; SEWAGE DISPOSAL; WATER PURIFICATION.

STILL.

Coal Tar and Oil.—See TAR—Testing Still.

STITCHING MACHINE.

Hyatt.—The Hyatt Belt-Fabric Stitching Machine. Illustrated description of a machine for the making of belts, rugs, carpets, &c. Describes its action. 1600 w. Engng—July 15, 1904.

STOCK EXCHANGE.

New York.—The New York Stock Exchange. Percy C. Stuart. Briefly reviews the history of the N. Y. Stock Exchange, the buildings occupied, &c., and gives an account of the working out of the design for the new building, the adjustments found necessary, the engineering problems, the facilities for light, ventilation, telephoning, &c. Ill. 9800 w. Archt Rec—uly, 1901.

The New York Stock Exchange. An illustrated description of this imposing building, recently erected. 1200 w. Archt's & Builder's Mag—June, 1903.

See also BUILDING CONSTRUCTION; COOLING; PNEUMATIC TUBE.

STOCK YARD.

Railway.—Railway Stock Yards and Their Relation to the Train Department, Freight Department and Maintenance of Way Department. Also general discussion. 3000 w. Pro Iowa Ry Club—June 18, 1904.

STOKING.

See also COMBUSTION; FIRING; MECHANICAL STOKING.

Economy.—See FIRING—Mechanical vs. Hand.

Soft Coal.—See FIRING.

STOKING INDICATOR.

Kilroy.—Kilroy's Stoking-Indicators. An illustrated description of an apparatus which makes a signal at regular intervals, with the object of facilitating the uniform firing of boiler furnaces, particularly on ships. 1500 w. Engng—Oct. 2, 1903.

Kilroy's Stoking Indicator. An illustrated description of an electrical apparatus to aid in better and more regular stoking. 700 w. Elec Rev, Lond—Oct. 23, 1903.

STONE.

See also BUILDING MATERIAL; MINERAL REGION; MINING INDUSTRY; PAVEMENT; QUARRY; ROAD MATERIAL; and specific kinds of stone.

Analysis.—See British.

Artificial.—See also BRICK—Sand Lime; BRIQUETTING—Schorr.

Basalt.—See BASALT.

Boston.—A Descriptive Catalogue of the Building Stones of Boston and Vicinity. W. O. Crosby and G. F. Loughlin. A study with regard to the durability and adaptability. 9000 w. Tech Qr—June, 1904.

British.—Analyses and Particulars of British Stone. The first of a series of articles giving particulars and tests. Serial. 1st part. 1000 w. Quarry—Nov., 1903.

Buffalo Breakwater.—See QUARRY—Rubble.

Calcareous.—See BRICK—Sand Lime.

Colorado.—Building and Monumental Stones of Colorado. Arthur Lakes. Where some of the varieties are found, describing their various qualities and appearance. Ill. 2400 w. Mines & Min—Aug., 1901.

Sedimentary Building Stones of Colorado. Arthur Lakes. Illustrated article describing the valuable formations of limestone, sandstone, etc., and the uses to which their colors and qualities are suited. 3000 w. Mines & Min—Sept., 1901. See also MINERAL REGION.

Crushing.—See CRUSHING.

Decay.—See Weathering; MASONRY—Rigidity.

Decay and Preservation.—Decay and Preservation of Stone Work. W. R. Purchase. Remarks on the causes of decay and what may be done toward diminishing their effects. Serial. 1st part. 2500 w. Builder—June 17, 1905.

Decayed, Treatment.—Treatment of Decayed Stonework. A. H. Church. A memorandum upon the treatment of the decayed stonework of the Chapter House at Westminster. How to arrest the further process of decay. 2700 w. Quarry—March, 1904.

Discoloration.—Superficial Blackening and Discoloration of Rocks, Especially in Desert Regions. William P. Blake. Discusses the causes. 1600 w. Trans Am Inst of Min Engrs—Sept., 1904.

Exhibition.—Stone at the Royal Exchange Colonial Exhibition. Describes some of the noteworthy exhibits from various localities. 5400 w. Quarry—May 1, 1902.

Georgia.—The Mineral Resources of Georgia. Extract from a paper by Prof. S. W. McCallie giving information concerning the development of the quarrying industry, the valuable marbles, granites, etc.; the road building material is also reported. 3300 w. Stone—March, 1892.

The Crystalline Rocks of Georgia. S. W. McCallie. An illustrated article describing the road-building material of the state. 1600 w. Stone—April, 1902.

Granite.—See GRANITE.

Greece.—The Stone Mining Industry in Greece. A. Cordella, in "Zeitschrift für das Berg-, Hutten-, und Salinenwesen." Report of the mines of emery, magnesite, meerschaum, millstones, gypsum, marble, and various other deposits. 5000 w. Quarry—Feb. 1, 1902.

Havana.—See QUARRY.

Ireland.—The Building Stones and Marbles of Ireland. An illustrated article, giving information concerning the stone deposits, and development of the quarries. 2300 w. Stone—April, 1901. See also QUARRY.

Limburgite.—See LIMBURGITE.

London.—The Building Stones of London. Summary of an article in "The Quarry." The older structures used material of the limestone class, because of the great expense in working the harder varieties. Gives information relating to their wearing qualities, modern appliances for quarrying and working have caused granite to be used for more recent buildings. 3000 w. Stone—April, 1901.

See also Decayed, Treatment; Weathering.

Marble.—See **MARBLE; QUARRY.**

Mechanical Handling.—See **STEAMSHIP—Stone Carrying.**

Microscopic Structure.—The Microscopic Structure of Building Stones. Henry Leffmann. Discusses the rocks and rock-substitutes used in engineering construction, and the relation between laboratory observation and practical application, indicating results that have been obtained. Also general discussion. 7000 w. Pro Engrs' Club—of Phila—Oct., 1905.

Serpentine.—See **SERPENTINE.**

Slate.—See **SLATE.**

Soapstone.—See **SOAPSTONE.**

South Dakota.—The Stone Resources of South Dakota. An illustrated account of the quarrying industry of this state and facts in regard to the stone resources and building material. 1500 w. Stone—March, 1903.

Steamship.—See **STEAMSHIP—Stone Carrying.**

Testing.—The Testing of Building Stone. Edwin C. Eckel. Remarks on the desirability of securing uniformity in the methods of investigation, with discussion of tests by crushing, and suggestions of needed tests. 2400 w. Eng and Min Jour—June 20, 1903.

See also **CONCRETE.**

Texas.—Tests on Texas Building Stones. William B. Phillips. Gives results of experiments with certain building stones of Texas, carried out by the University of Texas Mineral Survey, during the last two years. Ills. 3500 w. Min Wld—June 24, 1905.

United States.—The Stone Industry in 1900. A review based on information given in a recently issued pamphlet of the U. S. Geol. Survey. 4800 w. Stone—Oct., 1901.

Washington.—The Stone Resources of Washington. The first of a series of illustrated articles giving an account of the building stones of this State, and their development. Serial. 1st part. 2200 w. Stone—June, 1902.

Weathering.—Heat and Frost in the Weathering of Stone. George Barnum. An article discussing the effects of extremes of heat and cold and dissenting from views of Mr. Halbert Powers Gillette. 2000 w. Stone—Sept., 1902.

The Weathering of Building Stone in London. An illustrated article on the decay of building stones in large cities, especially in London, with discussion of some of the causes. 2400 w. Quarry—Oct., 1903.

See also **Decayed, Treatment.**

Weight.—See **BUILDING MATERIAL.**

Westminster, London.—See **Decayed, Treatment.**

STONE CRUSHING.

See **CRUSHING; ORE TREATMENT; STAMP MILL.**

STONE WORKING MACHINERY.

Stone Working Machinery. Illustrated description of a new type of machine for surfacing stone; especially adapted for granite. 800 w. Engr, Lond—June 10, 1904.

STOPE.

See **COAL MINE; GOLD MINE; MINE; MINING.**

STOPE FILLING.

Coal Mine.—See **COAL MINING—Filling; FILLING.**

STORAGE BATTERY.

See also **AUTOMOBILE, ELECTRIC; BOOSTER; ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY—Accumulator; ELECTRO-CHEMISTRY.**

The Electric Accumulator. H. C. Schaerer. Read before the Elec. Assn. of N. S. W. Reviews the work in this field, explains the chemical action, and traces the progress made. 3200 w. Aust Min Stand—Nov. 29, 1900.

The Storage Battery. Augustus Treadwell, Jr. Historical review, with an account of the uses to which storage batteries have been applied and the success attained. 4000 w. Elec Wld & Engr—Jan. 5, 1901.

How to Determine the Best Conditions in Storage Battery Practice. Carl Hering. A discussion of the most economical commercial operation of accumulators, considering both first cost and operating expenses. 3000 w. Elec.-Chem. Ind—Dec., 1902.

The Storage Battery. J. Lester Woodbridge. A lecture delivered at Stevens Inst. of Tech. Deals with the history, present practice in battery construction, capacity, operation, troubles, applications, &c. 4300 w. Stevens Ind—July, 1904.

Storage Batteries. A discussion of the treatment they should receive, giving notes based on long experience. 2800 w. Elec Rev—July 22, 1904.

A Chat about Accumulators. S. R. Bottone. A consideration of the laws that govern the construction and action of a good accumulator. Serial. 1st part. 1300 w. Elec Mag—Aug. 29, 1905.

Acids.—Acids for Filling Electric Accumulators. Rudolf Heinz. Translated from "Centralblatt für Accumulatoren und Elementenkunde." On the importance of purity to prevent damage to the accumulators. 800 w. Elec, N Y—March 6, 1901.

See also **Electrolytes.**

Alkaline.—See **Edison; Edison-Jungner; Jungner; Nickel Peroxide.**

Automobile.—The Weight of an Electric Accumulator for the Propulsion of a Vehicle (Recherche du Poids d'Accumulateurs Electriques Nécessaires à la Propulsion d'un Vehicle). D. Dujon. A mathematical investigation, deriving formulas for practical application, with tables. 3000 w. Revue Technique—Jan. 25, 1901.

Tables of Comparative Data of Accumulators. The data refers chiefly to the cells exhibited in Paris, or to those which took part in the Automobile Club Competition of 1899. 1200 w. Elec Chem & Met—May, 1901.

Electric Automobilism (L'Automobilisme Electrique). Felix Colomer. An examination of the availability of electric accumulators for driving motor vehicles with especial reference to the Contal accumulator. 2000 w. Revue Technique—Aug. 10, 1901.

Automobile Storage Batteries. Illustrated description in detail of a number of storage batteries designed for automobile work. 5400 w. Elec Wld & Engr—Oct. 5, 1901.

The Storage Battery in the Commercial Operation of Electric Automobiles. W. H. Palmer, Jr. Describes briefly the progress that has been made and the means employed to obtain economy and reliability in operation. Ill. 5200 w. Elec Wld & Engr—April 12, 1902.

Some Modern Automobile Accumulators. Illustrations and descriptions of typical battery cells used in the electric vehicles at the present time. 1500 w. Sci Am—May 17, 1902.

The Possibilities for a Light Weight Storage Battery. A. L. Marsh. Points out some theoretical considerations which may throw a little light on this problem so important to the electric automobile industry. 2500 w. Elec Wld & Engr—June 7, 1902.

Accumulators for Automobiles at the Düsseldorf Exposition (Die Akkumulatoren für Elektromobilen auf der Ausstellung zu Düsseldorf). Hans Dominik. Giving details of the principal storage batteries used for electric vehicles in Germany and exhibited at Düsseldorf. 2500 w. Elektrochemische Zeitschr—Dec., 1902.

Electric Automobile Accumulator Cells for Quick Charge Rates. E. Kilburn Scott. Remarks on the Elieson plate cell, and a solidly-built cell designed by Mr. Niblett, in which the buckling trouble is done away with. 1400 w. Elec Engr, Lond—Nov. 13, 1903.

See also **De Dion; Edison; Leitner; Portable; Sperry; AUTOMOBILE, ELECTRIC.**

Automobile, Case.—On the Construction of Battery Cases in Electric Vehicles. Translation of article by Dr. Ernst Andreas in "Centralblatt fuer Accumulatoren-und-Elementenkunde." 2000 w. Horseless Age—Dec. 26, 1900.

Automobile, Charging.—Useful Hints and Tips on Recharging Accumulators. Deals with method, cost, and current taken in the present number. Serial. 1st part. 900 w. Autocar—Dec. 26, 1903.

Notes on Recharging Accumulators. On the mistake of charging a 4-volt accumulator with 5 or 6 volts at the terminals. 900 w. Motor Car Jour—June 18, 1904.

A New Method of Charging Accumulators. Illustrates and describes a small portable dynamo arranged on a base plate, together with the volt and ammeter. It is driven by means of a friction wheel rotated by one of the rear wheels of the car. 900 w. Autocar—March 11, 1905.

Auxiliaries.—See **Regulator**; **BOOSTER — Storage Battery.**

Boosters.—Some Points Relating to Storage Batteries and Boosters. L. Brockman. Read before the Dublin Sec. of Inst. of Elec. Engrs. Discusses features of present-day cells, their function and management, and various types of boosters and the work for which each is suited. 7000 w. Elec Engr, Lond—Dec. 15, 1905.

See also **Control**; **BOOSTER—Storage Battery.**

Capacity.—The Determination of the Capacity of Accumulators (Ueber die Vorausbestimmung der Erforderlichen Kapacität von Akkumulatorbatterien). C. A. Rossander and E. A. Forsberg. A mathematical discussion, giving a graphical construction, enabling the capacity to be determined for variable discharge. 2500 w. Elektrotech Zeitschr—Oct. 25, 1900.

Ampere-Hour Capacity of the Lead Storage Battery. A. L. Marsh. Deals particularly with lead peroxide, showing the present limitations of the lead storage cell in regard to weight and output. 1500 w. Elec Wld & Engr—Feb. 14, 1903.

See also **High-Capacity**; **Temperature Effect.**

Care.—See **Maintenance.**

Charging.—See **Automobile Charging**; **BOOSTER.**

Charging Rectifier.—See **ELECTRIC CURRENT RECTIFIER—Storage Battery Charging.**

Chicago Elevated Ry.—New Storage Battery Plant of the Northwestern Elevated Railroad, Chicago. Illustrated description of sub-station and method of operating battery. 1500 w. St Ry Jour—Aug. 13, 1904.

Connections.—The Proportions of Battery Connections (Dimensionirung von Zellenschalterleitungen). Discussing the most economical arrangement of accumulator cells and their connections, developing diagrams for practical use. 3000 w. Elektrotech Zeitschr—Dec. 5, 1901.

Contal.—See **Automobile**; **AUTOMOBILE, ELECTRIC.**

Control.—The Comparative Behavior of Floating and Booster Controlled Batteries on Fluctuating Loads. Lamar Lyndon. Considers the five methods of installing a storage battery to maintain the load on the generator reasonably constant. 7000 w. Trans Am Inst of Elec Engrs—Nov. 20, 1903.

Copper-Cadmium.—Some Notes on the Copper-Cadmium Storage Battery. J. K. Pumpelly. Gives the history of this type of battery. 700 w. W Elect'n—May 4, 1901.

De Dion-Bouton.—The De Dion-Bouton Accumulator (Accumulateur De Dion-Bouton et Cie.). J. A. Montpellier. An illustrated description of a storage battery especially adapted for automobile work, with the bars of the grids arranged so as to prevent the active material from being shaken out. 1000 w. Electricien—Dec. 14, 1901.

Design.—Calculating a Battery for a Given Output. Dr. K. Norden. On the calculation of storage batteries for given discharge rates, referring to two papers recently published in German journals, and giving a method devised by the writer. 900 w. Elec Wld & Engr—March 9, 1901.

Deterioration.—Deterioration of Storage Battery Plates. A. L. Marsh. Considers the principal defects which tend to shorten the life of lead batteries and also of other types, and suggests lines upon which improvements may be made. 3000 w. Elec Wld & Engr—Sept. 13, 1902.

Deterioration of Storage Battery Plates. M. U. Schoop. Notes referring to an article by Prof. A. L. Marsh, and report of evidence gathered during ten years' practical experience. 1000 w. Elec Wld & Engr—Oct. 25, 1902.

Secondary Cells: Their Deterioration and the Causes. G. D. Aspinall Parr. Abstract of a paper read before the Leeds Loc. Sec. of the Inst. of Elec. Engrs. Considers impurities present in cells in small quantities are the chief cause of unsatisfactory working and deterioration, and reports experiments designed to support the statement. 2000 w. Elect'n, Lond—Dec. 29, 1905.

Discharge Cut-Off.—Point of Cut-Off in a Battery Discharge. Carl Hering. A discussion as to when the discharge of a primary or a secondary battery shall be considered at an end in making a test. 1800 w. Trans Am Inst of Elec Engrs—Feb. 28, 1902.

Distribution Systems.—Storage Batteries on Electric Systems. Harold Seaman. Discusses the operation of the cells or units which make up the battery and its operation as a whole. 3500 w. Wis Engr—Dec., 1901.

The Use of Storage Batteries in Electric Distribution Systems. A. A. Dion. Read before the Canadian Elec. Assn. A plea for the due consideration of the storage battery as a possible factor in influencing the design of electrical installations, with a view to their efficient, economical and uninterrupted operations. 8300 w. Can Engr—July, 1902.

See also **Electric Power Station**; **Electric Station**; **ELECTRIC DISTRIBUTION**; **ELECTRIC SUB-STATION.**

Dry, Nickel.—See **Nickel Peroxide.**

Düsseldorf Exposition.—See **Automobile.**

Edison.—Edison's New Accumulator. Information based upon Edison's British specification. Description of the battery is given with critical remarks. Ill. 1100 w. Auto Jour—May, 1901.

The Edison Storage Battery. Dr. A. E. Kennelly. A statement of the method whereby the weight-efficiency of the accumulator has been increased two and one-half times. Also interview with the inventor. 5500 w. Elec Rev, N Y—May 25, 1901.

The New Edison Storage Battery. Discussion of paper by Dr. Arthur E. Kennelly. 7500 w. Trans Am Inst of Elec Engrs—June and July, 1901.

The Present Status of the Edison Storage Battery. A. E. Kennelly and S. E. Whiting. A brief synopsis of the results obtained with this battery up to the present date. Ills. 4800 w. Int Elec Cong of St. Louis—Sept., 1904.

On Mr. Edison's New Accumulator. W. Hibbert. A discussion of some of the facts given by Dr. Kennelly in his description of the cell. 1000 w. Elec Rev, Lond—June 21, 1901.

The Edison Accumulator for Automobiles. W. Hibbert. Read before the Inst. of Elec. Engrs., England. A favorable report, describing results of observation and experiments. Ill. 6500 w. Elect'n, Lond—Nov. 27, 1903.

On Theoretical Concentration Changes in the New Edison Battery. E. F. Roeber. Discusses the processes in the new Edison cell from the point of view of theory of the electrolysis of aqueous solutions. 5800 w. Elec Wld & Engr—June 29, 1901.

Theory of the Edison Nickel-Iron Cell. E. F. Roeber. Discusses the communication of Mr. Woolsey McA. Johnson, published in this magazine of Nov. 2, objecting to the conclusions. 2000 w. Elec Wld & Engr—Dec. 7, 1901.

The "Edison" Storage Cell. Briefly describes the cell and discusses its probabilities of satisfying the conditions aimed at by the inventor. 1600 w. Nature—July 4, 1901.

Edison's Alkaline Storage Batteries. E. J. Wade. From a forthcoming book. Discusses the specifications and information given in paper by Dr. A. E. Kennelly. 2000 w. Elect'n, Lond—Aug. 23, 1901.

The Edison Storage Battery. Henry F. Joel. Gives brief analysis of the four patents taken out in 1900 and 1901, with detailed descriptions and claims made. Ill. 2500 w. Elec Rev, Lond—June 20, 1902.

The Storage Battery and the Motor Car. Thomas A. Edison. An account of the writers' new battery and the tests it has undergone in its application to automobiles. 1300 w. N Am Rev—July, 1902.

Structural Details of the Edison Storage Battery. Illustration and cross-section with brief description. 600 w. Sci Am—Feb. 7, 1903.

The Edison Storage Battery (L'Accumulateur

Edison). P. Janet. A very complete account of the tests which have been made of the Edison alkaline battery at the "Laboratoire Central d'Electricité" in Paris. 10,000 w. Bull Soc Int des Electriciens—Nov., 1903.

The Edison Storage Battery. Hugh Dolnar. A report of the Edison iron-nickel battery. 4500 w. Automobile—Dec. 26, 1903.

The Edison Storage Battery. Hugh Dolnar. Information of interest with condensed report of W. Hibbert. 2500 w. Am Mach—Dec. 31, 1903.

The Edison Battery—Details of Construction. Gives the main constructional details of this new cell. Ill. 2500 w. Auto Jour—Jan. 2, 1904.

The Edison Storage Battery. An illustrated detailed description, stating the conditions Mr. Edison has aimed to fulfill. 5600 w. Engng—July 1, 1904.

Some Notes on the Edison Nickel-Iron Storage Battery. F. M. Davis. A report of tests made and the results of the investigation. General discussion. 12,000 w. Jour W Soc of Engrs—Oct., 1904.

See also **Jungner.**

Edison-Jungner.—An Alkaline Nickel-Oxide Cell. Prof. Albert L. Marsh. Remarks on experiments made by the writer, considering briefly the different oxides of nickel. 800 w. Elec Wld & Engr—July 27, 1901.

The Jungner-Edison Accumulator (Der Jungner-Edisonische Akkumulator). An article from "Elektrotechnisk Tidsskrift, discussing the question of priority in the invention of the iron-nickel-graphite-alkali storage battery, and taking the side of the Swede, Dr. W. Jungner. 2200 w. Elektrochem Zeitschr—May, 1903.

The Jungner-Edison Accumulator (Der Jungner-Edisonsche Akkumulator). M. U. Schoop. A comparison of the lead and the alkali accumulators, with data of tests, and a summing up of the advantages and defects of the respective types. 4500 w. Elektrotech Zeitschr—Aug. 6, 1903.

A Contribution to the Theory of the Jungner-Edison Accumulator with Constant Electrolyte. M. U. Schoop. An account of an investigation of the concentration changes and diffusion phenomena in the alkaline with constant electrolytic or "oxygen lifts cell." Also editorial. Serial. 1st part. 7000 w. Elec Chem Ind—July, 1904.

The Edison Nickel-Iron Storage Battery (Der Eisen-Nickelakkumulator nach System Edison). M. U. Schoop. A very full description of the latest type of Edison alkaline accumulator, with data and results of tests. 8000 w. Elektrotech Zeitschr—Aug. 17, 1905.

The Edison Iron-Nickel Accumulator. M. U. Schoop. Translated from the "Elektrotechnische Zeitschrift." An illustrated article giving data and test results of a cell experimented with by the writer. Serial. 1st part. 7700 w. Sci Am Sup—Dec. 23, 1905.

Recent Improvements in Portable Accumulators (Die Letzten Neuerungen auf dem Gebiete Transportabler Akkumulatoren). E. Sieg. Describing especially alkaline batteries of the Edison-Jungner type, showing the effective weight per unit of various types. 4000 w. Elektrotech Zeitschr—March 30, 1905.

Accumulator without Lead Plates (Ueber Nichtbleiakkumulatoren). Dr. Gräfenberg. Discussing the operative conditions of the nickel-iron battery, giving curves, showing the discharging pressures. 1500 w. Zeitschr f Elektrochemie—Oct. 27, 1905.

Accumulators without Lead Plates (Ueber Nichtbleiakkumulatoren). Dr. Karl Elbs. A discussion of the chemical reactions in storage batteries of the Edison and Jungner type, using an alkaline electrolyte and plates of other metals than lead. 1000 w. Zeitschr f Elektrochemie—Oct. 27, 1905.

The Chemical Composition of the Nickel Oxide Electrode in the Jungner-Edison Accumulator (Ueber die Chemische Zusammensetzung der Nickeloxyd-Elektrode im Jungner-Edison-Akkumulator). Julian Zedner. An examination of the chemical nature of the active material in the Edison storage battery. 2000 w. Zeitschr f Elektrochemie—Nov. 17, 1905.

See also Edison; Jungner.

Edison Patent.—The Edison Storage Battery. Reprint in full of the specification of the United States patent, issued July 16, 3000 w. Elec Wld & Engr—July 27, 1901.

Electric Locomotive.—See **ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY, ACCUMULATOR.**

Electric Plants.—See **Electric Power Station; Electric Station; ELECTRIC PLANT—Storage Battery.**

Electric Power Station.—Storage Batteries in Railway Power Stations. H. H. Morris. Read before the N. Y. State Ry. Assn. Considers the uses and advantages, and describes the Buffalo plant and the tests made, discussing the results. 4500 w. St Ry Rev—Dec. 15, 1900.

Influence of Storage Batteries Upon Railway Generating Apparatus. R. C. Hull. Showing how faithfully the storage battery can be made to perform its duty, and their use as applied to railway operation. 1600 w. Elec Rev, N Y—Jan. 19, 1901.

The Accumulator as a Source of Economy in Electric Traction. W. H. Booth. Gives approximate estimates of saving and cost, and arguments favoring their use. 2400 w. Elec Rev, Lond—Jan. 25, 1901.

On the Use of Storage Batteries in Connection with Electric Tramways. G. A. Grindle. Abstract of paper read before the Inst. of Elec. Engs. (Manchester). Briefly refers to the application of batteries to electric traction, and discusses the advantages by including a battery in the power system. Serial. 1st part. 2200 w. Elec Rev, Lond—March 8, 1901.

Storage Batteries in Electric Power Stations, Controlled by Reversible Boosters. J. S. Highfield. Read before the Inst. of Elec. Engrs., England. Discusses what seems to be the chief points in considering the designing of batteries for the work in central stations, and describes the subsidiary apparatus which may be found of use and convenience in operating batteries. Serial. 1st part. 4000 w. Elec Rev, Lond—June 14, 1901.

The Storage Battery in Railway Power Stations Service. Lamar Lyndon. Discusses the various applications with a view to furnishing data for determining the sizes of battery and booster necessary to cover requirements under given conditions. 4000 w. St Ry Jour—July 6, 1901.

Storage Batteries Located in Power Stations. W. E. Harrington. Read before the Am. St. Ry. Assn. Considers the conditions that will lead to economical results, and the questions to be considered. 2300 w. St Ry Rev—Oct. 12, 1901.

Storage Batteries and 60-Cycle Railway Rotaries. Edward L. Reynolds. Brief illustrated description of the use of batteries in conjunction with 60-cycle rotary converters by the Hamilton (Ont.) Light and Cataract Power Co. 900 w. St Ry Jour—Nov. 2, 1901.

Accumulators and Electric Traction Systems. Discusses the use of storage batteries in electric power stations and at end of feeders, especially as related to present conditions in England. 2200 w. Elec Rev, Lond—Dec. 13, 1901.

Some Results of a Secondary Battery in a Traction Station. States the conditions to be met and the successful results, giving cost. 1100 w. Elec Rev, Lond—Feb. 14, 1902.

See also **Electric Railway; Electric Station; ELECTRIC STATION; ELECTRIC SUB-STATION.**

Electric Power Station, Baltimore.—Storage Batteries in the Baltimore Belt Line Tunnel Power Plant. An illustrated article describing the battery installed and the service. 900 w. Elec Wld & Engr—Feb. 15, 1902.

Electric Power Station, Brooklyn.—The Application of Storage Batteries to the System of the Brooklyn Heights Railroad Company. Franklin B. Morse. Read before the N. Y. State St. Ry. Assn. Describes the storage-battery equipment explaining why it was installed and giving causes and particulars of its successful operation. 2800 w. St Ry Jour—Sept. 21, 1901.

Electric Power Station, Cleveland.—Storage Battery on the Cleveland & Chagrin Falls Railway. Illustrated description of a recently installed battery in a sub-station, where it was found almost impossible to operate the road between that point and the terminus. 1400 w. St Ry Jour—May 4, 1901.

The Cleveland & Chagrin Falls Railroad's Storage Battery Sub-Station. R. L. Palmer. A statement of facts concerning a recent storage battery installation. Ill. 900 w. Elec Rev, N Y—April 27, 1901.

Electric Power Station, Toronto.—The Toronto Railway Storage Battery. An illustrated description of the plant, with a statement of the advantages obtained. 1500 w. Can Elec News—Oct., 1904.

Electric Railway.—Storage Batteries on Electric Railways. Howard S. Knowlton. Explains the construction and installation of the storage battery, and its functions in the power house or on the line with "booster" service. 3000 w. The Engineering Magazine—Aug., 1903.

On the Calculation of Line Batteries. W. E. Winship. Discusses the calculation of storage-batteries used in railway work for the purpose of maintaining the line pressure at points distant from the generating stations, comparing the results with those obtained by the use of copper. 2200 w. Trans Am Inst of Elec Engrs—April, 1904.

The Storage Battery as Applied to Electric Railways. W. E. Winship. Considers their installations in central and sub-stations, showing their utility. 2200 w. Jour Fr Inst—Aug., 1904.

See also **Electric Power Station; Traction; ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY, ACCUMULATOR.**

Electric Station.—The Storage of Electricity. A. H. Allen. Read before the Civ. & Mech. Engrs. Soc. Considers the application of storage batteries to complete storage, partial storage, and fly-wheel storage. Ill. Serial. 1st part. 3300 w. Engr, Lond—May 31, 1901.

Storage Batteries in Central Stations. R. F. Schuchardt. An account of an accident in the Harrison St. station of the Chicago Edison Co., giving load curves showing how the load was dropped by section No. 1, and picked up by section No. 5 and the batteries, and pressure charts showing how quickly the changes were made. 500 w. Elec Wld & Engr—Aug. 17, 1901.

The Storage Battery in Central Stations. Otto E. Osthoff. Describes some of the details of these installations and discusses their application. 1800 w. Central Station—Feb., 1902.

Central Station Batteries. Indicating the general causes of trouble, with these batteries, and the best method of dealing with them. 1800 w. Elec Rev, Lond—July 4, 1902.

The Storage Battery in Small Central Stations. Describes the conditions in Milan, Mich., showing that by the installation of a storage battery a profitable twenty-four hour service was obtained. Ill. 1600 w. Central Station—June, 1902.

Storage Batteries in Electrical Supply. Alton D. Adams. Data concerning the operation of storage batteries in a large system of electrical supply during a period of more than three years. Tables. 1200 w. Elec Wld & Engr—Dec. 27, 1902.

The Storage Battery in Lighting and Power Work. J. M. S. Waring. Cites various applications of a battery to lighting and power work. Ill. 1800 w. Cent Station—June, 1903.

The Storage Battery in Small Central Stations. J. M. S. Waring. Read before the Northwestern Elec. Assn. Considers the application to small stations and features common to all central stations. 1500 w. Elec, N Y—March 23, 1904.

The Central Station Battery. R. W. Vicarey. Remarks on the care of batteries with suggestions. 1200 w. Elec Rev, Lond—Oct. 23, 1903.
See also **Electric Power Station; Maintenance.**

Electric Station, Detroit.—Installation, Operation and economy of Storage Batteries. Ernest Lunn. Considers the battery plant of the Edison Illuminating Co., of Detroit, Mich., giving also a description of the cell most commonly used in lighting and power stations. Ill. 5000 w. Jour Assn of Engng Socs—April, 1901.

Electric Station, Thiede.—A General Study of the Storage Battery as a Load Equaliser (Die Pufferbatterie im Allgemeinen). O. Hoppe. An examination of the advantages of the storage battery as an equaliser of the load, with reference to the power plant at Thiede, near Brunswick. 6000 w. 1 plate. Glückauf—June 1, 1901.

Electro-Chemistry.—The Accumulator as a Problem in Electrochemistry. (L'Accumulateur et l'Electrochemie). J. Izart. A consideration of the electrochemical principles on which the action of the accumulator is based with examples of computations. Two articles. 2000 w. Electricien—Jan. 24, Feb., 1903.

See also **ELECTRO-CHEMISTRY.**

Electrode Terminology.—See **ELECTRODE.**

Electrolytes.—Storage Batteries and Their Electrolytes. R. W. Vicarey. Abstract of a paper before the Faraday Soc. Gives a résumé of data and facts from actual practice, and much information of value. 8000 w. Elect'n, Lond—Sept. 29, 1905.

See also **Acids.**

Electrolytic Cell Related.—The Storage Battery as an Electrolytic Cell. C. J. Reed. A general review of the principles of electrolytic action and the relation between storage batteries and other electrolytic cells. 3500 w. Elec-Chem Ind—Dec., 1902.

Elieson.—See **Automobile.**

Energy.—Total and Free Energy of the Lead Accumulator. R. A. Lehfeldt. Read before the Faraday Soc. An analysis of the transformations of energy. 3000 w. Electro-Chem & Met—Sept., 1903.

Energy Losses.—The Losses of Energy in Accumulators. B. Hopkinson. A description of experiments made to ascertain definitely what the efficiency under different conditions might amount to. Serial. 1st part. 2500 w. Elect'n, Lond—Nov. 29, 1901.

Engineering.—Electric Storage Battery Engineering. J. Lester Woodbridge. Gives the points of difference between a dynamo and a storage battery, and discusses the character of the work the storage battery is best fitted to perform; also the characteristics of the storage battery and its auxiliary apparatus, its care, &c. 4500 w. Cassier's Mag—Nov., 1905.

Factory.—Storage Batteries in Mills and Factories. E. Vail Stebbins. Describes the construction of a battery and its action, and the extent to which storage batteries may be put in mills and factories to equalize the load. Ill. 4500 w. Jour Assn of Engng Soc's—July, 1902.

Faure.—Faure Type Accumulators. Abstract from a paper by M. Levazzari, read before the Second International Automobile Congress. Gives a résumé of storage battery conditions in France, limited to the light type of accumulators with pasted plates. 3500 w. Sci Am Sup—Nov. 14, 1903.

Fire and Police Telegraphs.—Storage Battery and Controlling Board. J. W. Ayden. Read at the Convention of the International Assn. of Munic. Elect'ns. On the advantages of storage batteries, especially discussing the lead battery as adapted to fire and police telegraph systems. 1800 w. Fire & Water—Nov. 23, 1901.

Fortification, U. S.—The Storage Battery in Its Relation to U. S. Fortifications. Lee Hagood. Facts about the storage battery, with special reference to its applications, and use in sea coast fortifications. Considers the technical features, care and management of these batteries. Serial. 1st part. 7000 w. Ill. Jour U. S. Art—July-Aug., 1903.

Heating Effect.—See **Temperature Effect.**

Heinz.—The Heinz Accumulator (Accumulateur Heinz). A. Bainville. Describing an improved form of Faure accumulator designed either for portable or for station service. 800 w. Electricien—Nov. 24, 1900.

High-Capacity.—Design for a High-Capacity Storage Battery. J. C. Brocksmith. Working drawings with descriptions of details. 3000 w. Am Elect'n—June, 1902.

High-Pressure.—High-Pressure Accumulators (Ueber Hochspannungs-Batterien). L. Schröder. Details of construction and operation of an accumulator charged at 3,000 volts; special reference is made to the insulation. Zeitschr f Elektrotechnik—Oct. 15, 1905.

History.—The Origin and Development of Storage Batteries. E. B. Walker. Read before the Can. Elec. Assn. Reviews the history and considers those batteries which show improvements, or departure from standard practice; also diseases of batteries, applications, &c. 5000 w. Can Engr—July, 1904.

The Historical Development of the Secondary Element (Die Geschichtliche Entwicklung der Sekundär-Elemente). Otto Hildebrand. A review of the various forms of electric storage devices, from the observations of Gautherot, in 1802, down to the present time. 2500 w. Elektrochem Zeitschr—August, 1904.

See also **ELECTRIC MACHINERY.**

Home-Made.—A Home-Made Storage Battery Cell. Walter G. Jones. Illustrates and describes a simple cell having a capacity of about 10 ampere-hours. 1500 w. Sci Am Sup—June 20, 1903.

Jungner.—The Jungner Nickel-Iron Accumulator and its Origin. M. V. Schoop. Translated from the "Centralblatt für Accumulatoren Technik und Verwandte Gebiete." An illustrated account of Jungner's work in this field. 3500 w. Sci Am Sup—Sept. 17, 1904.

The Jungner Alkaline Battery. Claims that this battery antedates the Edison battery in several important particulars. Compares the two types. 1800 w. Auto Jour—Feb. 6, 1904.

See also **Edison-Jungner.**

Lead Mine, St. Francois, Mo.—A Unique Storage-Battery Installation. Henry Flay. Illustrated description of a large auxiliary and regulating storage-battery and booster plant at the lead mines of the St. Louis Smelting & Refining Co., St. Francois, Mo. 1500 w. Elec Wld & Engr—Aug. 20, 1904.

Lee-Coll.—The Lee-Coll Accumulator. Illustrated detailed account of this new accumulator for use with automobiles. 1600 w. Auto Jour—Dec., 1900.

Leitner.—The Leitner Accumulators for Electromobile and Traction Work. Illustrated article giving information concerning storage batteries for automobile and traction use, for central station work, and for train and yacht lighting. 2000 w. Elec Times—Feb. 6, 1902.

Light.—Development of the Light Accumulator Since 1900. H. L. Joly. Illustrates and describes types appearing since the date named, discussing tests made. 3600 w. Electro-Chem & Met—Oct., 1903.

Limitations.—Limitations to the Use of Storage Batteries—An English Engineer's Views. H. M. Hobart, in "Technics." A discussion of the deterioration and cost of storage batteries, their efficiency, etc. 2400 w. Sci Am Sup—Dec. 24, 1904.

Locomotive.—See **ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY, ACCUMULATOR.**

Maintenance.—Storage Battery Maintenance. Thomas J. Fay. Gives tests for undesirable ingredients and explains their importance. 2800 w. Elec Wld & Engr—April 6, 1901.

The Maintenance of Central Station Batteries. A. J. Abraham. Gives instances of the abuse accumulators receive in most electricity works, and suggestions for keeping them in a healthy condition. 1300 w. Elec Rev, Lond—April 12, 1901.

The Battery. S. Lees. Concerning the care of accumulators. Ills. 1800 w. Elec Engr, Lond—Aug. 16, 1901.

The Principles and Care of Accumulators. Horace M. Wyatt. Considers the ways in which an accumulator may be damaged, and why they affect the plates. Ill. 2000 w. Autocar—June 20, 1903.

Care and Management of Storage Batteries. Edward Lyndon. Outlines the troubles to which batteries are subject and the methods of treating them, also indicates the more important records which should be taken. Serial. 1st part. 1800 w. Elec Rev, N Y—Jan. 23, 1904.

The Proper Care of Storage Batteries (Soins à Donner aux Batteries d'Accumulateurs). E. Dieudonné. A discussion of the influence which proper care has upon the life and performance of electric storage batteries. Serial. Part I. 2500 w. Revue Technique—July 25, 1904.

The Care of Storage Batteries. John Howatt. Gives suggestions for the proper care of a battery plant. 1400 w. Power—Nov., 1904.

Care and Preservation of the Lead Cell Exide Storage Battery. Excerpts from a recently issued pamphlet giving instructions for the proper care and preservation of this storage battery. Serial. 1st part. 2400 w. Automobile—April 8, 1905.

See also **Operation.**

Manufacture.—Recent Progress in Accumulator Manufacture. John H. West. Considers the defects and disadvantages from which these appliances suffer and ways of remedying them. Ill. Serial. 1st part. 2500 w. Elec Chem & Met—March, 1901.

Manufacturing Regulations.—Manufacture of Electrical Accumulators. A copy of the draft regulations which have been issued under the Factory and Workshop Act, 1901, in England. 1500 w. Elec Rev, Lond—June 26, 1903.

Max.—The Max Accumulator (Accumulateur Max). An illustrated description of this storage battery and the machinery for manufacturing the electrodes. The active material is in long thin cylinders, with a lead core and enclosed in woven material. 1000 w. Electricien—Dec. 21, 1901.

The Max Accumulator. From "La Locomotion." Illustrated detailed description of this new system. The electrodes have a cylindrical form. 1000 w. Sci Am Sup—April 19, 1902.

The Max Accumulator (Der Akkumulator Max). J. J. Heilmann. The active material is supported on wires of lead and antimony. 1500 w. Elektrochem Zeitschr—Nov., 1902.

Milking Cells.—A Method of Milking Faulty Cells. W. Dalton. Briefly describes method, giving diagram showing the connections. 500 w. Elec Engr, Lond—Oct. 23, 1903.

Mill.—See **Factory.**

Mining.—The Use of the Accumulator in Mining (Der Akkumulator im Bergbau). J. L. Huber. With illustrations of the extent to which the storage battery may be employed to equalize the load upon the generators in the supply of electrical energy for mining operations. 3000 w. Glückauf—Aug. 8, 1903.

Niblett.—See **Automobile.**

Nickel.—See **Edison; Jungner; Nickel Peroxide.**

Nickel-Iron.—See **Edison; Jungner.**

Nickel Peroxide.—Self-Forming Separator in a Nickel Peroxide Storage Cell. A. L. Marsh. Describes the construction of this cell, which is said to have considerable advantage over the dry cells in present use. 900 w. Elec Wld & Engr—Dec. 13, 1902.

See also **Edison; Jungner.**

Operation.—The Practical Storage Battery Operation. H. P. Liversidge. Suggestions helpful in securing successful operation, showing that intelligent care is all that is needed. 5000 w. Am Elect'n—Sept., 1903.

Operation of Storage Batteries and Boosters. W. T. Fernandez. Considers the daily operation of batteries, and cell switches and boosters. Diagrams. 2000 w. Am Elect'n—Jan., 1904.

See also **Maintenance.**

Pascal Marino.—The Pascal Marino Accumulator. W. Hibbert. Illustrated description of a lead accumulator employing phosphoric acid, with a statement of advantages claimed. 1100 w. Elec Rev, Lond—July 26, 1901.

Pastes.—Pastes for Accumulator Plates. Translation of article in the "Centralblatt für Accumulatoren und Elementenkunde," describing experiments made by Dr. Peters. 1500 w. Elect'n, Lond—Jan. 4, 1901.

Perret.—The Perret Light-Weight Storage Battery. Illustrates and describes the Perret cell, stating its desirable features. 1000 w. Sci Am Sup—May 31, 1902.

Planté.—Storage Battery Plate Construction. S. H. Rabenalt. Discussing the precautions to be observed to obtain the best results from batteries of the Planté type. 2500 w. Elec Wld & Engr—June 18, 1904.

Plate Construction.—Storage Battery Plate Construction with Special Reference to High Discharge Characteristics. W. W. Donaldson. Considers the construction of plates best adapted to high discharge work. 3000 w. Elec Wld & Engr—May 21, 1904.

Porosity.—Storage Battery Porosity. Thomas J. Fay. A discussion of vehicle batteries, giving a report of tests made and the advantages of batteries of the electric-chemical type. 1400 w. Elec Rev, N Y—May 18, 1901.

Portable.—See **Automobile; Edison; Edison-Jungner.**

Printing Press Operation.—The Storage Battery as a Factor in Speed Control. H. B. Coho. A description of the use of storage batteries in connection with the operation of printing presses and with the multiple voltage system. 800 w. Trans Am Inst of Elec Engrs—Dec., 1902.

See also **ELECTRIC DRIVING.**

Railway, Electric.—See Electric Railway; Traction.

Railway Power Station.—See Electric Power Station.

Railway Signal.—See RAILWAY SIGNAL—Storage Battery.

Recharging.—See Automobile Charging.

Regulator, Auxiliary Dynamo.—The Use of an Auxiliary Dynamo as a Battery Regulator (Verwendung von Zusatzmaschinen als Zellenschalter). B. Jacobi. Describing a convenient regulating system for a small electric station, using a storage battery. 2000 w. Elektrotech Zeitschr—March 9, 1905.

Resistance.—The Resistance of Lead Plate Accumulators (Ueber den Widerstand von Bleiakkumulatoren). F. Dolezalek and R. Gahl. With diagrams giving the results of numerous measurements, and showing the distribution of resistance between the two electrodes. Two articles. 3500 w. Zeitschr f Elektrochemie—Jan. 24, 31, 1901.

Reversible Booster.—See BOOSTER—Storage Battery.

Ricks.—Accumulator Cells with Carriers of Light Non-Conducting Materials. A description of a secondary cell, the invention of A. Ricks. 1400 w. Elect'n, Lond—Feb. 14, 1902.

Rotary Converter.—See ROTARY CONVERTER.

Rotary Converter in Parallel.—See ROTARY CONVERTER.

Rothmund.—A Novel Storage Battery. Dr. Alfred Gradenwitz. Describes a novel accumulator being brought out in Germany by O. van Rothmund in which the two electrodes are made of lead and zinc peroxide. 1200 w. Am Elect'n—Dec., 1905.

Shepherd.—The Construction of a Small Storage Cell. H. F. Shepherd. Sketches and description of a cell which has given excellent results. 800 w. Am Elect'n—Feb., 1902.

Sperry.—The Sperry Battery. Brief illustrated description of the battery used on the Waverley vehicles. 900 w. Horseless Age—May 29, 1901.

Sub-Station.—The Storage Battery in Sub-Stations. W. E. Goldsborough and P. E. Fansler. An account of tests made on a large interurban system to determine the storage battery equipment needed and showing the character of the demands which the battery has to meet. Ill. 7800 w. Trans Am Inst of Elec Engrs—July, 1903.

See also **Distributing Systems; ELECTRIC DISTRIBUTION; ELECTRIC SUB-STATION.**

Switch.—See ELECTRIC SWITCH—Storage Battery.

Telegraph.—See Fire and Police Telegraphs; TELEGRAPH—Storage Batteries.

Telegraph and Telephone.—See TELEGRAPH—Current Supply.

Telephone.—Care of Storage Batteries in Telephone Plants. S. P. Grace. Describes the batteries used, discussing their efficiency and maintenance. 3000 w. Telephony—June, 1902.

Storage Battery Records in Telephone Practice. Howard S. Knowlton. Gives an example of weekly battery record, showing its advantages. 1200 w. Elec Wld & Engr—July 23, 1904.

The Use of Accumulators to Supply Current for Microphones in Telephony (Akkumulatoren als Stromquelle für die Mikrophone der Fernsprechstellen). Ludwig Brückmann. Discussing the substitution of central-station storage batteries for local primary batteries for telephones. 3000 w. Elektrotech Zeitschr—Sept. 22, 1904.

The Power Plant of a Modern Telephone Exchange. A. Dallam O'Brien. Considers methods employed in charging the storage batteries and related matters. 3000 w. Am Elect'n—April, 1905.

Temperature Effect.—A Method for Increasing the Capacity of Accumulators (Ein Verfahren zur Steigerung der Kapacität der Akkumulatoren). C. Heim. An examination of the influence of the increase in temperature upon the capacity of accumulators. 5000 w. Elektrotech Zeitschr—Sept. 26, 1901.

A Process for Increasing the Capacity of Accumulators. C. Heim. Abstract of a paper read at Dresden meeting of the Verband Deutscher Electrotechniker. Discusses the influence of increase of temperature. 17,000 w. Electr'n, Lond—Nov. 1, 1901.

The Influence of Temperature on the Capacity of Lead Accumulators (Ueber den Einfluss der Temperatur auf die Kapacität der Bleiakkumulatoren). Ch. Liagre. From "L'Eclairage Electrique." A record of experiments with a d'Arsonval-Vaugeois cell, with positive and negative Planté plates, showing that the capacity increases with the temperature. Diagram. 600 w. Elektrotech Zeitschr—Jan. 16, 1902.

Influence of Temperature on the Capacity of Accumulators. W. Hibbert. Discusses figures obtained in extensive series of experiments confirming that a rise of temperature causes a marked increase in capacity. 1100 w. Elec Rev, Lond—May 30, 1902.

Terminology.—See ELECTRODE.

Testing Instruments.—Testing Instruments for Accumulators. H. M. Wyatt. Considers hydrometers and voltmeters and the proper way of using them. 2200 w. Auto-car—Dec. 17, 1904.

See also **ELECTRIC INSTRUMENT.**

Thallium.—The Thallium Storage Cell. A. L. Marsh. Describes this cell and compares it with the lead type, noting the points of difference. 2500 w. Elec-Chem Ind—Nov., 1902.

The Thallium Accumulator (Ueber den Thallium-Akkumulator). L. Jonas. Theoretical and experimental investigations. 3000 w. Zeitschr f Elektrochemie—June 25, 1903.

Theory.—Notes on the Theory of Accumulators (Beitrag zur Theorie des Akkumulators). Dr. E. Abel. An examination of the theory of the accumulator from a thermodynamic standpoint. 1500 w. Zeitschr f Elektrochemie—June 27, 1901.

A Contribution to the Theory of the Lead Accumulator (Ein Beitrag zur Theorie des Bleiakkumulators). M. U. Schoop. An illustrated description of a method of measuring the internal resistance of lead storage batteries, an account of experiments, and a discussion of the relation between the apparent and the real active surface, and other points, with diagrams. 3000 w. Elektrotech Zeitschr—March 19, 1903.

Storage Battery Principles. Herbert L. Towle. The present article deals with the chemistry of the cell. Serial. 1st part. 2000 w. Automobile—May 30, 1903.

See also **Edison; Electro-Chemistry.**

Three-Wire Distribution.—See ELECTRIC DISTRIBUTION—Three-Wire.

Tommasi.—A New Electric Accumulator. Dr. D. Tommasi. An illustrated description of a lead storage cell whose plates consist of a leaden frame containing a very large number of layers, and of an electrolyzer for the preparation of spongy lead. 600 w. Elec Rev, Lond—Jan. 2, 1903.

Traction.—The Use of Accumulators for Traction Purposes (Die Verwendung von Akkumulatoren zum Fahrbetrieb). W. v. Winkler. A general discussion of traction by means of storage batteries, of the batteries themselves, and of the conditions for success. Diagrams. Serial. 2 parts. 4500 w. Zeitschr f Elektrotechnik—May 31, June 7, 1903.

The Application of Accumulators in Transportation (Die Verwendung des Akkumulators in der Verkehrstechnik). Dr. Max Büttner. A paper before the Verein Deutscher Maschinen-Ingenieure, giving an illustrated account of the use of storage batteries in power stations, and on cars, locomotives, cranes, automobiles, etc. 10,000 w. Glasers Annalen—June 15, 1903.

See also **Automobile; Electric Power Station; Electric Railway; AUTOMOBILE, ELECTRIC; ELECTRIC RAILWAY; ACCUMULATOR.**

Tribelhorn.—The Tribelhorn Accumulator (Les Accumulateurs Tribelhorn). L. Brossement. An illustrated description of an accumulator in which the active material is placed on opposite sides of saucer-shaped elements, which are then piled on top of each other, and separated by glass balls, to form a battery. 600 w. Rev Technique—April 10, 1903.

United States.—Development of the Use of the Storage Battery in the United States. Charles Blizard. Historical outline. 1600 w. Elec Rev, N Y—Jan. 12, 1901.

Weight.—The Life and Weight of Accumulators (Zur Frage der Lebensdauer und des Gewichtes der Akkumulatoren). Dr. J. Rabinowicz. A discussion of the various materials available for accumulator construction with a view to reduction in weight. 1200 w. Elektrochemische Zeitschr—Aug., 1902.

Welsbach.—Welsbach's Carbon-Zinc-Cerium Salt Accumulator. Brief description. 1600 w. Horseless Age—Feb. 12, 1902.

Zinc-Lead.—Some Experiments with Zinc-Lead Accumulators (Einige Versuche mit Zink-Blei-Akkumulatoren). Oscar Gabran. An illustrated account of experiments with accumulators having lead positive plates in a case with amalgamated copper lining, which serves as the negative plate, and zinc-sulphate electrolyte. Tables and curves. 1200 w. Elektrotech Zeitschr—June 26, 1902.

Zinc Negatives.—Zinc Negatives for Electric Accumulators. Briefly reviews the difficulties met with in employing zinc negatives, and the absolute necessity for purity of all materials used in cells, etc. 1000 w. Auto Jour—Jan., 1901.

STORAGE BATTERY RAILWAY.

See **ELECTRIC RAILWAY, ACCUMULATOR.**

STORE.

See **MECHANICAL PLANT.**

STOVE.

See also **GAS STOVE; HEATING; HEATING AND VENTILATION.**

Electric.—See **ELECTRIC HEATING.**

Gas Escape.—The Escape of Gas from Stoves (Gasausströmungen aus Geheizten Oefen). H. Meidinger. An account of experiments with a model upon the conditions which cause the escape of deadly gases from warming stoves. 2500 w. Gesundheits-Ingenieur—Nov. 20, 1904.

Michigan Company.—Features of the Michigan Stove Company's Plant and Methods. Illustrated detailed description. 4000 w. Ir Trd Rev—March 3, 1904.

Manufacture.—Labor-Saving in Stove Manufacture. John Magee. From a paper read before the Nat. Assn. of Stove Mfrs. Briefly considers the labor-saving machinery and tools used, and the labor-saving shop methods. 2000 w. Ir Trd Rev—May 18, 1905.

STRAIGHTEDGE.

See also **SQUARE.**

Knife Edge.—How a Knife Edge Straightedge Was Made. F. N. Gardner. Describes some of the methods that led to success, and indicates "how not to do it." Ills. 2000 w. Mach, N Y—Nov., 1905.

STRAIT.

Surabaya, Java.—The Improvement of the Outlet of the Strait of Surabaya (Over den Toegang mit Zee naar Straat Soerabaja). J. W. Welcker. A discussion of the practicability of improving the channel from the strait of Madoera to the Java Sea, with a comparison with the mouth of the Rio Grande do Sul, and the Delta of the Nile. 3500 w. De Ingenieur—Dec. 20, 1902.

STRASBURG MUSIC HALL.

See **CONCRETE REINFORCED—Music Hall.**

STRATAMETER.

The Gothan "Stratameter" (Der Stratameter von Hermann Gothan in Gross-Lichterfelde). H. Thumann. Paper before the International Meeting of Boring Engineers at Karlsbad, in 1901, describing a compass needle apparatus for determining the dip and strike of strata encountered in bore holes, and the plumbness of the latter. 1600 w. Glückauf—Jan. 18, 1902.

STRAY CURRENTS.

See also **ELECTRIC DISTRIBUTION—Grounded Return; ELECTRIC RAILWAY—Return Current; ELECTRIC STATION—Lost Current; RAIL BOND; METAL CORROSION; STEEL CONSTRUCTION—Corrosion.**

Electrolysis. Albert B. Herrick. Gives the history of subterranean electrolysis, explaining the cause and effect, and means employed to reduce the trouble to a minimum. 2000 w. St Ry Rev—Jan. 15, 1901.

Electrolysis as Caused by the Railway Return Current. Albert B. Herrick. Reviews the fundamental laws governing electrolysis and the remedies that have been most successfully employed. Gives the outcome of investigations covering many of the largest cities in the United States. Ills. 7300 w. St Ry Jour—April 2, 1904.

Electrical Current. F. A. W. Davis. A statement of the destructive action upon gas and water pipes, with illustrations. Also report of decisions of the U. S. courts in regard to difficulties arising from this cause. 3000 w. Jour N E Waterworks Assn—March, 1901.

Cause and Effect of Electrolytic Action Upon Underground Piping Systems. A. A. Knudson. Considers the cause of deflection of currents from well-bonded tracks to water mains; acute points of deflection; effect of joint resistance on water mains; effect upon water mains in a positive district. Ill. and discussion. 11,200 w. Jour N E Waterworks Assn—March, 1901.

Corrosion of Metals by Electrolysis. A. A. Knudson. Read at New York meeting of the Am. Elec-Chem. Soc. Calls attention to instances of corrosive effects from unintentional electric currents and presents considerations for their avoidance. Ill. Serial. 1st part. 3200 w. Elec, N Y—April 22, 1903.

Some Recent Effects of Electrolytic Action Upon Underground Mains and Other Metals. A. A. Knudson. Read at a meeting of the Am. Waterworks Assn. Considers the law governing return currents of single trolley systems, the passing of current through underground mains, the direction of current, etc. Ill. 3000 w. Am Gas Lgt Jour—July 13, 1903.

The Electrolysis of Gas Mains. James Swinburne. Read before the Gas Inst. (England). An impartial discussion of the subject, explaining the meaning and causes of electrolysis. 9000 w. Gas Wld—June 14, 1902.

The Electrolysis of Gas Mains. James Swinburne. Lecture before the Incor. Gas Inst. Aims to give a broad discussion of the subject, furnishing general information. Serial. 1st part. 3000 w. Elect'n, Lond—Aug. 8, 1902.

The Question of Electrolysis. Abstract translation from the "Jour für Gasbeleuchtung." Continental, American and English experience, the remedy, etc. 3500 w. Gas Wld—March 30, 1901.

The Electrolysis of Gas and Water Pipes. M. Claude. Some new ideas as to the electrolytic mode of action of the return currents of transmission installations. Ill. Serial. 1st part. 4300 w. Engng—May 3, 1901.

The Path of the Return Currents in Electric Street Railways and their Electrolytic Action (Ueber den Verlauf der Rückströme von Strassenbahnen und über ihre Elektrolytischen Wirkungen). Illustrated abstract of a paper by M. G. Claude before the Paris Electrical Congress, giving the results of experiments, with recommendations. 2000 w. Elektrotech Zeitschr—Jan. 23, 1902.

A French Opinion of Electrolysis of Pipes. Review of a report claiming that electrolysis will not occur where the difference in potential between pipes and rails is less than 1 to 1 1-2 volts. 1600 w. Eng Rec—June 1, 1901.

Destruction of Gas Pipes by Means of Electricity. Dr. W. Leybold. Read before the Gas Section of the Glasgow Congress. An explanation of the action of the electric current, with description of the conditions found. General discussion. 6500 w. Jour Gas Lgt—Sept. 10, 1901.

Electrolysis of Underground Metallic Structures. L. C. Anderson. Explains the conditions accompanying gas or waterworks piping systems and the methods of construction and operation of single trolley electric railroads, showing the effect and discussing the remedy. 4600 w. Fire & Water—Dec. 21, 1901.

Protection of Water Pipe from Electrolysis. E. B. Ellicott. A statement of conditions existing in large cities where electric railways are operated, and the remedy, with general discussion of the subject. Ill. 7500 w. Jour W Soc of Engrs—Dec., 1901.

Earth Currents Derived from Distributing Systems. E. Basil Wedmore. Read before the Inst. of Elec. Engrs., England. A statement of some of the conclusions reached, with their application. Serial. 1st part. 3500 w. Elect'n, Lond—Jan. 24, 1902.

The Leakage of Current from Buried Bare Conductors. Reviews the paper by E. Basil Wedmore before the Inst. of Elect. Engrs. and its discussion. Ill. 1400 w. Elec Rev, Lond—Feb. 14, 1902.

The Injury of Metal Pipes by Electric Railways (Zur Frage der Gefährdung von Metalleitungen durch Elektrische Bahnen). R. Ulbricht. A mathematical discussion of the dangers of electrolysis of underground pipes by stray currents from electric railways. Diagrams. 3000 w. Elektrotechnisch Zeitschr—March 13, 1902.

Damaging Effects of Electrolysis on Pipe. Reports of its action at St. Paul, Minn., Dayton, Ohio, and Taunton, Mass., with illustrations. 5300 w. Fire & Water—April 19, 1902.

Electrolysis of Underground Metals. J. M. Humiston. Explains the action, cause and means of protection. Ill. 4000 w. Pro Age—June 16, 1902.

The Prevention of Electrolysis. William Brophy. Extract from a paper read before the International Assn. of Fire Engrs. Considers existing conditions as affecting water mains, giving suggestions for their improvement. 2400 w. Ins Engng—Oct., 1902.

Electrolysis and Its Ravages. William Brophy. From a paper read before the International Assn. of Fire Engrs. Advises the placing of insulators or circuit breakers in metal pipes to prevent any flow of current over them. 2400 w. Fire & Water—Dec. 13, 1902.

Unscientific Electric Engineering: Destruction of Underground Pipes, etc. H. W. Spang. Discusses the defects of the engineering branch of electrical science, the destruction caused, and the remedy. 2500 w. Am Gas Lgt Jour—Jan. 18, 1904.

Electrolytic Corrosion in Underground Pipes. Alec A. Beadle. An explanation of the change that takes place, and a suggestion for the prevention of corrosion. 1200 w. Elec Rev, N Y—Jan. 7, 1905.

The Electrolytic Corrosion of Underground Metallic Pipes (Corrosions Electrolytiques des Canalisations Métalliques Souterraines). M. Nourtier. A review of the conditions under which gas, water, and other pipes are attacked by stray currents from electric tramways. 2500 w. Rev Technique—Feb. 25, 1905.

Report on Electrolysis. E. F. Scattergood. Showing comparative effect of lead and cement joints in city water mains. 600 w. Sib Jour of Engng—March, 1905.

Guarding Against Electrolysis of Underground Pipes. Putnam A. Bates. Gives results of recent tests made in a large town near New York, to determine the condition with regard to the presence of leakage currents from the grounded circuit of the local traction company. 2000 w. Elec Rev, N Y—Nov. 11, 1905.

Battle Creek, Mich.—Electrolysis of Water and Gas Pipes. W. W. Brigden. Read before the Mich. Engng. Soc. Relates experience in Battle Creek, Mich., and in other places, and discusses the cure. The advantage of the double trolley is shown, and means of increasing the life of water and gas pipes discussed. 4200 w. Munic Engng—May, 1901.

Bayonne, N. J.—Electrolytic Corrosion of Water Pipes at Bayonne, N. J. Abstract of results of an investigation made by A. A. Knudson, which reveals serious conditions as to stray electric railway currents and electrolytic corrosion of underground metals. Ill. 3000 w. Engng News—Nov. 17, 1904.

Booster.—See BOOSTER—Negative.

Boston.—See Massachusetts Metropolitan.

British.—Electric Traction Troubles. Discusses the troubles arising from electrolysis since the introduction of electric traction in England. 1400 w. Nature—Nov. 22, 1900.

Electrolysis in Water Pipes. W. H. Humphreys. Read before the Brit. Assn. of W. Wks. Engrs. Presents facts relating to the injury of pipes from electrolytic action, giving extracts from the Board of Trade regulations. 6500 w. Elec Engr, Lond—Aug. 8, 1902.

The Prevention of Electrolysis of Gas and Water Pipes in Great Britain. A review of steps taken by the British Board of Trade, presented by W. H. Humphreys at the recent meeting of the Brit. Assn. of Waterworks Engrs. 1700 w. Eng News—Oct. 2, 1902.

British Parliament.—The Question of Electrolysis. The evidence and discussion before the Select Committee of the House of Commons. 6400 w. Gas Wld—June 29, 1901.

Brooklyn Gas Pipes.—The Effect of Stray Trolley Currents. H. E. McGowan. Gives results and conclusions from experience in connection with the Brooklyn Union Gas Co. Ill. 1700 w. Stevens Ind—April, 1901.

Cambridge, Mass.—Notes on the Electrolysis of Water Pipes. Illustrated description of damaged 48-inch pipes in Cambridge, Mass., with abstract of remarks made by A. A. Knudson before the N. E. W. W. Assn., on recent aspects of electrolysis. 1400 w. Eng Rec—April 6, 1901.

Columbus, O.—An Electrolysis Survey at Columbus, Ohio. Statement of investigations to determine the electric current carried by water-mains, and the suggestions of F. O. Caldwell for avoiding electrolysis of mains. 1800 w. Eng Rec—June 8, 1901.

Condenser Tubes.—See **CONDENSER—Corrosion; METAL CORROSION.**

Copenhagen.—Measurements of Stray Currents in Gas and Water Pipes (Messungen von Vagabundirenden Strömen in Gas und Wasserrohren). Absalon Larsen and S. A. Faber. An account of systematic investigations conducted in Copenhagen, with description of methods, and maps. diagrams and tables. 8500 w. Elektrotech Zeitschr—Dec. 19, 1901.

The Electrolytic Action of Currents upon Buried Pipes (Ueber den Elektrolytischen Angriff Elektrischer Ströme auf Eisenröhren in Erde). A. Larsen. A review of experiments made upon buried iron pipes at the Technical High School of Copenhagen. 1200 w. Elektrotech Zeitschr—Sept. 18, 1902.

Dayton, O.—Electrolysis of Water and Gas Pipes, Resulting from Electrical Currents Escaping from Street Railways. Edwin P. Mathews. Read at the Central States Waterworks Assn. Refers especially to conditions in Dayton, Ohio, but the remarks are of general application. 8400 w. Fire & Water—Oct. 12, 1901.

Electrolysis Decision in Dayton. Slightly abstracted report of the decision rendered by Judge O. B. Brown. 12,800 w. St Ry Jour—April 12, 1902.

Dresden and Leipsig.—Injury to Metal Pipes by Electric Railways (Gefährdung von Metallrohrleitungen durch Elektrische Bahnen). R. Ulbricht. Giving the results of measurements of electric leakage in Dresden and in Leipsig, and the corrosion of water pipes in both cities. 2000 w. Elektrotech Zeitschr—Aug. 14, 1902.

Erie, Pa.—Electrolysis Investigations at Erie, Pa. Illustrated description of some unusual results due to electricity leaving the street railway tracks. 1200 w. Eng Rec—March 8, 1902.

Geneva.—Investigations of Stray Currents in the Street Railways of Geneva (Untersuchungen über Vagabundierende Ströme auf den Strassenbahnen in Genf). L. Thormann. An examination of the electrolytic corrosion of buried pipes by the action of stray currents from the electric tramways. 2000 w. Schweizerische Bauzeitung—Nov. 28, 1903.

Measurements of Electric Currents on Gas and Water Pipes in Geneva, Switzerland. Gives results of a recent electrical survey. 1000 w. Eng News—Dec. 31, 1903.

Hamburg.—The Return Circuits of the Hamburg Electric Railways (Rückleitungsnetz der Elektrischen Strassenbahnen in Hamburg). S. Freiherr v. Gaisberg. A paper before the Verband Deutscher Elektrotechniker, giving an account of the measures adopted to prevent the electrolysis of pipes in Hamburg, Germany. Map and diagrams. 2000 w. Elektrotech Zeitschr—June 25, 1903.

History.—History of the Electrolysis Question. W. H. Humphreys. Extracts from a paper and discussion at the annual meeting of the British Assn. of Water-Works Engrs. Presents facts relating to the action on gas and water pipes. 7500 w. Jour Gas Lgt—Aug. 5, 1902.

Indianapolis Decision.—A Court Decision as to Responsibility for Damage by Electrolysis to Gas Mains. Gives a decision rendered at Indianapolis, Ind., that may prove of great importance. 1800 w. Eng News—Jan. 3, 1901.

Legal Aspects.—The Law Relating to the Escape of Electricity. W. Valentine Ball. Discusses briefly the principles that appear to have been adopted by the courts in both England and America. 4400 w. Elec Wld & Engr—Dec. 17, 1904.

See also **British Parliament; Indianapolis Decision; Peoria Litigation; Telegraph Interference.**

Leipzig.—See **Dresden.**

Massachusetts Metropolitan.—Electrolysis on the Metropolitan Water Works. Extracts from the report of F. P. Stearns for the last year, giving results of tests made and conditions found when the annual survey was made to determine the corrosion due to the electrolytic action of stray currents. 1600 w. Eng Rec—July 29, 1905.

Measurement.—The Measurement of Electric Currents in Underground Pipes (Ueber Messungen der Elektrischen Ströme in den Städtischen Rohrleitungen). Sigvald Krohn. An article giving the method and results of measurements of stray currents from electric tramways in gas and water pipes, with recommendations for the avoidance of this trouble. Diagrams. 2000 w. Elektrotech Zeitschr—March 28, 1901.

See also **Potential Curves; Surveys;** and under names of places.

Peoria Litigation.—Report of the Master in Chancery on the Peoria Electrolysis Litigation. Extracts from report filed with the U. S. Circuit Court at Chicago, stating that the pipes were being steadily injured by the return currents of the railways operated by the single trolley system. Also editorial on the effect of this report on electric railway investments. 5000 w. Eng Rec—June 15, 1901.

Peoria Standpipe.—See **STANDPIPE—Peoria Deterioration.**

Potential Curves.—Earth Potential Curves from Chicago, Toledo and Columbus. Interesting curves representing the contour lines of electric pressure in the earth under the influence of the electric railway system of current distribution. 600 w. Elec Wld & Engr—April 13, 1901.

See also **Measurement; Surveys.**

Reading, Pa.—Electrolysis in Reading, Pa. Illustrated extracts from a report by A. A. Knudson, on an electrical survey of the water mains in Reading, the interlacing of street tracks introducing some special features. Also editorial note on the danger of stalling cars at railroad crossings. 4500 w. Eng Rec—Nov. 10, 1900.

Regulations.—Regulations for the Protection of Metallic Pipes Against Stray Currents from Electric Railways (Leitsätze Betreffend den Schutz Metallischer Rohrleitungen Gegen Erdströme Elektrischer Bahnen). Regulations proposed by a Committee of the Verband Deutscher Elektrotechniker. 1500 w. Elektrotech Zeitschr—May 14, 1903.

Reversal of Current.—The Prevention of Electrolysis by Periodical Reversal of Current (Ueber Periodische Stromwendung als Mittel zur Verringerung Elektrolytischer Zerstörungen). A. Larsen. Data and results of experiments showing that electrolytic corrosion of buried pipes may be greatly diminished by daily or hourly reversal of the flow of current. 1500 w. Elektrotech Zeitschr—Sept. 25, 1902.

Richmond, Va.—Electrolysis Investigations at Richmond. Review of the Report of Dabney H. Maury made after an examination of 101 lines of pipe. 1600 w. Eng Rec—Nov. 7, 1903.

Rochester, N. Y.—Method of Making Electrical Survey of Rochester, N. Y. An account of a special survey and report made by Albert R. Herrick, describing methods. Ills. 3000 w. Munic Engng—June, 1904.

Surveys.—Surveys for Electrolysis and Their Results. D. H. Maury. Read before the Am. Water Wks. Assn. Also editorial. Practical suggestions for determining and mapping the conditions of stray current flow, for the purpose of studying the corrosion of underground metal structures by electrolytic action. 6000 w. Eng News—July 23, 1903.

Surveys for Electrolysis, and Their Results. D. H. Maury. Suggestions useful to superintendents of waterworks. 5700 w. Am Gas Lgt Jour—Nov. 23, 1903.

See also **Measurement; Potential Curves; Rochester, N. Y.**

Telegraph Interference.—Escaping Electricity and the Law. W. Valentine Ball. A review, from a British standpoint, of the legal aspects of the question of stray currents, and the liability for damages due to their electrolytic action and their interference with telegraph signals. 2500 w. Trac and Trans—Dec., 1902.

Telephone Cables.—Electrolysis of Telephone Cables. A. E. Dobbs. Discusses the trouble in connection with underground cables, and the methods of preventing. Ill. 2000 w. Am Tel Jour—Feb. 8, 1902.

Submarine-Telegraph Interference.—See **SUBMARINE TELEGRAPH—Electric Railway Action.**

Washington, D. C.—Electrolysis in the District of Columbia. Grahame H. Powell. Concerning the steps being taken to provide more stringent penalties for failure to furnish a proper metallic return for the powerful currents. Information from the report of the Commissioners of the District. 2000 w. Elec Wld & Engr—Feb. 16, 1901.

Worcester, Mass.—An Electrical Disturbance in the Gas Industry. D. D. Barnum. Read before the New England Assn. of Gas Engrs. An account of a leakage in a gas main, in Worcester, Mass., due to electrolysis. 1400 w. Am Gas Lgt Jour—March 23, 1903.

Zinc Treated Ties.—See **TIMBER PRESERVATION.**

STREAM DISCHARGE.

See **RIVER DISCHARGE; WATER FLOW.**

STREAM GAUGING.

See **RIVER DISCHARGE; WATER FLOW—Streams.**

STREET.

See also **MUNICIPAL ENGINEERING; MUNICIPAL IMPROVEMENT; PAVEMENT; ROAD; STREET IMPROVEMENT; TRACK—Street.**

Canandaigua.—See **BRICK PAVEMENT.**

Curb and Gutter.—See **CEMENT PAVEMENT.**

Curves.—See **ROAD.**

Engineering.—See **ROAD.**

Intersections.—Difficult Street Intersections. An account of the plans used in Duluth, Minn., on steep grades. 2000 w. Eng Rec—Oct. 24, 1903.

London.—The State of London Streets. Thomas Blashill. Read at meeting of the Sanitary Inst. Compares the streets of London with Continental cities and towns to their detriment, and discusses some details where improvements are needed. 2800 w. Builder—Feb. 23, 1901.

The State of London Streets. T. Blashill. Discusses the condition of the London streets, and the treatment of streets in Continental cities. General discussion follows. 11000 w. Jour San Inst—April, 1901.

See also **STREET IMPROVEMENT; TRANSPORTATION.**

Oiled.—See **ROAD.**

Opening.—Losses in Underground Municipal Structures. Prof. A. Prescott Folwell. Read before the Am. Soc. of Munic. Imp. Discusses the enormous loss and inconvenience caused by present methods of managing street surface and subsurface structures. Considers the sources of loss separately, and possible remedies. 2500 w. Eng Rec—Oct. 15, 1904.

See also **PIPE GALLERY; SUBWAY.**

Opening, Eng.—The Right to Break Up Streets. Discusses English law upon this subject. Serial. 1st part. 3600 w. Engr, Lond—July 22, 1904.

Opening, N. Y.—The Cost of Pavement Openings in New York City. Wisner Martin. Read before the Municipal Club of Brooklyn. Especially discusses the cost of making the openings and repairing, as an argument in favor of the construction of pipe galleries. 2200 w. Eng News—Feb. 23, 1905.

See also **SUBWAY—New York Pipe Galleries.**

Paris.—The Streets and Street Plan of Paris; A Lesson in Municipal Esthetics. Remarks on the beauty of Paris, comparing London, New York and Washington. 2000 w. Eng News—June 2, 1904.

Highways of France. William Ballantine. Reports an inspection of the boulevards and avenues of Paris and roads of the surrounding districts. Serial. 1st part. 3500 w. Munic Jour & Engr—July, 1905.

Pawtucket, R. I.—See **PAVEMENT.**

Pipe Gallery.—See Openings, N. Y.; **SUBWAY.**

Pipe Laying, English Law.—See Opening, Eng.

Public Utilities.—See **AUTOMOBILE; ROAD; STREET RAILWAY MANAGEMENT.**

Repairs, Brooklyn.—The Organisation and Conduct of the Brooklyn Bureau of Street Repairs. Edwin J. Fort. Read before the Am. Soc. of Munic. Imp. Explains the organization under which the work in Brooklyn has been successfully carried on. 4000 w. Eng News—Sept. 28, 1905.

Settlement.—See **LANDSLIDE—Hartford.**

Steel.—See **TRACKWAY.**

Subsidence, Chicago.—See **TUNNEL—Chicago.**

Sub-Surface Maps.—Municipal Sub-Surface Construction Maps. Herbert S. Wynkoop. A description of the Philadelphia plan of giving information to contractors which enables them to know the conditions below the surface, thus making possible the opening of streets for repairs and other work, and the quickest possible closing. Map. 1800 w. Eng Rec—April 1, 1905.

Sunlight.—See **BUILDING.**

STREET CAR.

See also **ELECTRIC CAR; ELECTRIC RAILWAY; STREET RAILWAY.**

Gasoline.—See **CAR, MOTOR-DRIVEN.**

Italy.—See **CAR.**

Old.—Method of Utilising Old Street Cars. Illustrated descriptions of old cars utilised as dwellings and an account of quite a settlement formed in this way at the seaside in California. 900 w. Sci Am—June 29, 1901.

STREET CAR HOUSE.

See **ELECTRIC CAR HOUSE.**

STREET CLEANING.

See also **DUST; REFUSE DISPOSAL; SNOW; STREET SPRINKLING.**

Asphalt.—Methods of Cleaning Pavements. H. C. Innes. Deals principally with the cleaning of asphalt pavements and the appliances used. 2000 w. Munic Engng—April, 1901.

Automobile.—Automobiles for City Street Cleaning Departments Are Desired. A discussion of the requirements of the work with the aim of securing a self-propelled vehicle that will give satisfactory results. Ill. 2000 w. Auto & Motor Rev—Nov. 15, 1902.

Auto Street Sweeper. Brief illustrated description of a machine on trial in Paris. 300 w. Automobile—Sept. 28, 1905.

See also **STREET SPRINKLING.**

Electric.—An Electric Street Sweeper. Waldon Fawcett. Illustrates and describes a novel sweeper used in Cleveland, O. 800 w. Munic Engng—Sept., 1901.

See also **STREET SPRINKLING.**

Electric Car.—Sprinklers and Sweepers for Electric Tramways (Arroseuses et Balayeuses Electriques). A short illustrated account of a sprinkling trolley car at Lyons and a track-sweeping car at Paris. 700 w. Revue Technique—Jan. 10, 1902.

See also **STREET SPRINKLING.**

Germany.—Street Cleaning in German Cities. Howard Woodhead. Describes the attention given to this branch, the enforced regulations for non-littering of streets, the removal of refuse, and the smooth pavements which make thorough cleaning possible. 2600 w. Munic Jour & Engr—Sept., 1904.

Machine.—New System of Street Cleaning. Illustrated description of a sanitary machine which sprinkles, sweeps and gathers, now in use in New York. 400 w. Sci Am—May 10, 1902.

A Street Sprinkling and Sweeping Machine (Balayeuse-Arroseuse Ramasseuse). An illustrated description of a machine for sprinkling, sweeping and collecting refuse at one continuous operation. 1200 w. Génie Civil—Dec. 6, 1902.

New York.—City Cleansing in New York. Charles A. Meade. Sketch of the work of the street-cleaning department for the past six or eight years. It not only sweeps the streets, but collects and disposes of all refuse. 7800 w. Munic Af—Dec., 1900.

See also **Machine; SNOW.**

St. Paul, Minn.—Street Cleaning in St. Paul. A description of the methods of cleaning different classes of pavement by machine and by hand. 1000 w. Eng Rec—April 13, 1901.

San Francisco.—Street Cleaning in San Francisco. L. M. King. Gives a résumé of the methods employed under the present system, with the results. 1200 w. Eng News—Aug. 20, 1903.

Snow.—See **SNOW.**

Statistics, U. S.—Street Cleaning Statistics for Cities Above 3,000 Population in the United States. A. Prescott Folwell. A summary from detailed reports in the Municipal Year Book, with explanatory notes. 1400 w. Eng News—Nov. 20, 1902.

STREET IMPROVEMENT.

See also **MUNICIPAL IMPROVEMENT; PAVEMENT; STREET.**

Basel, Switzerland.—The Improvement of the Freie Strasse in Basel, Switzerland (Die Umgestaltung der Freien Strasse in Basel). An account of the widening and straightening of an important city street, and the necessary changes in buildings. Serial. Part 1. 2000 w. Schweiz Bauzeitung—May 16, 1903.

Columbus, Ga.—Parking Wide City Streets. Robert L. Johnson. An account of work done in the city of Columbus, Georgia, for beautifying and improving the streets. Ill. 1200 w. Eng News—May 16, 1901.

Havana.—Street Improvements in Havana. Charles E. McDowell. Brief description of the conditions and the proposed remedies. 800 w. Eng Rec—April 25, 1903.

See also **PAVEMENT.**

London.—How to Brighten Street Frontages. Editorial on the London street improvements, criticising the editorial opinions expressed in the "Builder," and discussing some of the schemes. 1600 w. Jour Gas Lgt—Nov. 27, 1900.

See also **STREET.**

Vienna.—See **MUNICIPAL IMPROVEMENT.**

STREET LIGHTING.

See **ARC LIGHT; ELECTRIC LIGHTING; GAS LIGHTING; INCANDESCENT GAS LIGHTING; INCANDESCENT LAMP; LIGHTING; NERNST LAMP.**

STREET RAILWAY.

See also **CABLE RAILWAY; COMPRESSED-AIR RAILWAY; ELECTRIC RAILWAY; ELECTRIC RAILWAY, ACCUMULATOR; ELECTRIC RAILWAY, CONDUIT; ELECTRIC RAILWAY, CONTACT; LIGHT RAILWAY; STEAM TRAMWAY; TRACK—Street; TRANSPORTATION.**

Street Railways—A Review of the Past and a Forecast of the Future. Robert McCulloch. Read before the Am. St. Ry. Assn. 4700 w. St Ry Jour—Oct. 12, 1901.

Accounts.—See **STREET RAILWAY MANAGEMENT.**

Berlin. — See **ELECTRIC RAILWAY; STREET RAILWAY ACCIDENT; STREET RAILWAY MANAGEMENT; TRANSPORTATION.**

Brake.—See **BRAKE.**

Car House.—See **ELECTRIC CAR HOUSE.**

Compressed Air.—See **COMPRESSED-AIR LOCOMOTIVE; COMPRESSED-AIR RAILWAY.**

Concrete Roadbed.—See **TRACK—Street, Concrete.**

Congress.—The International Tramway Congress (Congrès International des Tramways). Charles Jean. An abstract of the questions and discussions at the congress held in connection with the Paris Exposition of 1900. 2500 w. Génie Civil—Nov. 17, 1900.

Consolidations.—See **STREET RAILWAY MANAGEMENT.**

Curves and Grades.—See **TRACTION—Street Railway Curves.**

Evolution.—Synopsis of Paper on the Evolution of the Street Railway. Richard McCulloch. Some interesting statements in regard to the progress and growth. 1300 w. Pro St Louis Ry Club—March 19, 1905.

France.—The Construction of Tramways in France. H. Conradi. A comparison between the different methods of traction based on the first cost, deducting from this what are the economical conditions under which one or other system is most suitable. 2700 w. Ry & Tram Wld—Dec. 6, 1900.

Germany.—See ELECTRIC RAILWAY; STREET RAILWAY MANAGEMENT.

Horse vs. Steam Car.—See AUTOMOBILE, STEAM—Clarkson.

Lisbon.—The Street Railway System of Lisbon. F. A. Wardlaw. An illustrated description of the street railways of this beautiful city of Portugal, the difficulties encountered, and novel features in construction and equipment introduced in changing to electricity. 5000 w. St Ry Jour—March 2, 1901.

Massachusetts.—See ELECTRIC RAILWAY.

New York.—See ELECTRIC RAILWAY, CONDUIT; STREET RAILWAY MANAGEMENT; TRANSPORTATION.

N. Y. Metropolitan.—The Metropolitan Street Railway System. Discusses the development of the company through consolidations, the history of cable conduit, some of the operating conditions, &c. Ill. 4000 w. St Ry Rev—Sept. 15, 1901.

A Three-Year Comparison of Cable, Electric and Horse Traction in New York City. Table showing in detail the earnings and operating expenses for the year ending June 30, 1901, of the Metropolitan St. Ry. Co. of New York, and comparing with the cable and horse traction formerly used. 1500 w. St Ry Jour—Oct. 5, 1901.

The Upbuilding of the Metropolitan Organization. H. H. Vreeland. Briefly reviews the history of the organization and its development, especially the human factor. 3000 w. St Ry Jour—Oct. 5, 1901.

New York State.—Street Railway Development in New York State. Map showing existing and projected roads, with comments on the growth and features of interest. 1800 w. St Ry Jour—June, 28, 1902.

Street Railway Situation in New York. G. Tracy Rogers. Presidential address at Caldwell meeting of the St. Ry. Assn. of the State of N. Y. 4000 w. St Ry Jour—Sept. 13, 1902.

Paris.—Mechanical Traction in Paris. This first article explains the difficulties and conditions existing and the new policy of the Municipal Council. Also the steps taken by the Compagnie Générale des Omnibus. Serial. 1st part. 3400 w. Engr, Lond—April 19, 1901.

The Tramways of the East and West Companies of Paris (Les Tramways de Penetration des Compagnies de l'Est et de l'Ouest Parisiens). H. Martin. An illustrated description of recent installations. The overhead trolley is used in the suburbs, and the Diatto contact system in Paris. 3000 w. 1 plate. Génie Civil—May 4, 1901.

The Tramways of Paris in 1900 (Les Tramways Parisiens en 1900). With tabulated data of the various lines showing the progress of electric traction, analysis of costs, etc. 3500 w. Génie Civil—Oct. 19, 1901.

Development of Street Railway Traffic in Paris. E. J. Lavalard. Reviews the history of the street transportation systems, including the omnibus as well as tramway lines. 1800 w. St Ry Jour—Jan. 4, 1902.

Rapid Transit in Paris. Daniel Bellet. Describes the legislation which rules in Paris under which passenger traffic is managed. First of two articles. Serial. 1st part. 7000 w. Trac & Trans—Aug., 1903.

Traction Systems of Paris. Paul Dubois. Brief, illustrated descriptions of some of the systems employed. The lines are controlled by many different companies, each using its own method. 3500 w. Elec Wld & Engr—Nov. 26, 1904.

See also ELECTRIC RAILWAY; ELECTRIC RAILWAY, ACCUMULATOR; TRANSPORTATION.

Paris Omnibus Co.—See AUTOMOBILE—Omnibus, Paris.

Permanent Way.—See TRACK—Street.

Providence, R. I.—See ELECTRIC RAILWAY.

San Francisco.—See ELECTRIC RAILWAY.

Sault Ste. Marie.—See ELECTRIC RAILWAY.

Snow, N. Y. City.—See SNOW.

Syracuse, N. Y.—See ELECTRIC RAILWAY.

Track and Paving.—See PAVEMENT; TRACK.

U. S. Census.—The Census Report on the Street Railway Industry. Reviews this report, giving details of interesting statistics. 1800 w. St Ry Jour—July 11, 1903.

Vienna.—See ELECTRIC RAILWAY; RAILWAY.

STREET RAILWAY ACCIDENT.

See also STREET RAILWAY LEGISLATION; STREET RAILWAY MANAGEMENT.

Accidents on Electric Railroads. C. R. Barnes. Read before the convention of the N. Y. State Ry. Assn. Discusses various classes of accidents and their causes, and matters of related interest. Serial. 1st part. 3200 w. St Ry Jour—Sept. 13, 1902.

Street Railway Accidents—Their Cause, Prevention and Adjustment. Henry W. Brooks, Jr. Discusses the subject in detail. 6500 w. St Ry Jour—May 14, 1904.

Berlin.—Accidents and Injuries in Street Railway Operation (Ueber Betriebsstörungen und Unfälle im Strassenbahnverkehr). F. W. Bork. A review of the operation of the street railway system of Berlin, discussing the wear and tear, and the losses and injuries by accidents; with discussion. 3500 w. Glasers Annalen—July 15, 1905.

Causes.—Why Accidents Happen. Dr. H. B. Rockwell. Discusses the main causes of accidents on electric railways. 3500 w. St Ry Jour—Aug., 1905.

Claim Department.—The Claim Department. D. W. Patterson. Read before the N. Y. State Ry. Assn. Discusses claims honest and dishonest, the precautions to be taken against accidents, and the need of intelligent employees. 4400 w. St Ry Jour—Sept. 28, 1901.

The Handling of Accident Claims. William A. Dibbs. Read before the N. Y. St. Ry. Convention. Describes methods of dealing with such claims. 2400 w. St Ry Jour—Sept. 13, 1902.

The Adjustment of Damage Claims. Mason B. Starring. Discusses some of the difficulties, offering suggestions concerning adjustment. 5400 w. St Ry Rev—Oct. 11, 1902.

I. The Machinery of the Claim Adjusting Department. T. E. Mitten. Describes in detail the method of reporting accidents and adjusting claims in vogue on the system of the International Ry. Co. of Buffalo. II. The Successful and the Unsuccessful Claim Agent. Dr. H. B. Rockwell. Analyzes the qualifications necessary. 4700 w. St Ry Rev—Aug. 20, 1903.

Claim Department Methods in Brooklyn. George R. Folds. Gives a description of the reports required and the methods in use, with comments on this important work. 2300 w. St Ry Jour—Oct. 3, 1903.

Glasgow.—The Accident on the Glasgow Tramways. Full report made to the Board of Trade by the inspector who inquired into the accident. 2000 w. Elect'n, Lond—Oct. 17, 1902.

Gloversville, N. Y.—Runaway Trolley Cars. Editorial discussion of the recent accident at Gloversville, N. Y., and the operation of electric roads in general. 3000 w. R R Gaz—Aug. 1, 1902.

Interurban.—Collisions on Interurban Roads. Considers the causes of the accidents, and means of signalling employed. 1700 w. St Ry Jour—Dec. 6, 1902.

Legal View.—Accidents to Tramway Passengers from Contributory Negligence. J. Neville Porter. Discusses the legal aspects of the question of compensation for personal injuries. Serial. 1st part. 2800 w. Tram & Ry Wld—Jan. 9, 1902.

Accidents on Street Railways from the Legal Point of View. Joseph F. Daly. Read at Caldwell meeting of the N. Y. State St. Ry. Assn. Discusses the immense number of cases to be dealt with by the courts, and the steps necessary for relief of the courts, so as not to unduly delay other cases. 3800 w. St Ry Jour—Sept. 20, 1902.

London.—The Hall Road Collision. A review of the report of Lieut.-Col. Druitt, who was appointed to conduct the inquiry into the cause of the collision which occurred on July 27, on the electric railway. 1700 w. Engr, Lond—Oct. 20, 1905.

Milwaukee.—The Accident Record and Resultant Disbursements of the Milwaukee Electric Railway and Light Company. Quotes decisions of the highest court of Wisconsin, gives tabulated classification of accidents by months, and the amounts paid in connection therewith, and other financial statistics. 2000 w. St Ry Jour—June 20, 1903.

Roosevelt.—President Roosevelt in a Trolley Accident. An illustrated article giving as accurate a statement of the facts as is now obtainable. 1200 w. St Ry Jour—Sept. 13, 1902.

STREET RAILWAY LEGISLATION.

See also **STREET RAILWAY ACCIDENT; STREET RAILWAY MANAGEMENT.**

Accidents.—See **STREET RAILWAY ACCIDENT—Legal View.**

Arbitration Cases.—Arbitration Cases Decided in the High and Appeal Courts of the United Kingdom in Relation to Tramways and Tramcars. J. Neville Porter. Reviews important decisions, stating briefly the facts and the judgments concerning them, and the more significant reasons upon which the decisions are based. 2500 w. Tram & Ry Wld—Sept. 12, 1901.

British.—A Session of Tramway Legislation. Herbert M. Adler. Discusses some of the more important schemes sanctioned by the British Parliment in 1892, and considers the measures passed in the last session of Parliament. Serial. 1st part. 2000 w. Engng—Aug. 22, 1902.

The Law of Master and Servant in Relation to Tramway Companies. J. Neville Porter. A report of several interesting decisions in the British courts. Serial. 1st part. 2500 w. Tram & Ry Wld—Sept. 11, 1902.

Procedure on Application for a Tramway Order. Outlines the procedure which must be observed by those who promote an electric tramway in England or Wales. Serial. 1st part. 1400 w. Elec Rev, Lond—Sept. 26, 1902.

Tramways and Compulsory Running Powers. Thomas Upton. Discusses the decision of the British Parliament to grant to a public company compulsory running powers over a portion of a certain municipal tramway. 3000 w. Elec Rev, Lond—July 29, 1904.

Electric Tramway Legislation in the Colonies and India. A short summary of the law as now enforced. 4600 w. Elec Rev, Lond—Dec. 30, 1904.

British, Speed.—The Speed of Tramcars. Reviews the laws which govern speed in England. 1200 w. Engr, Lond—Nov. 6, 1903.

Average Speed and Speed Allowances. A. R. Fearnley. Read before the Assn. of Tram. & Light Ry. Officials at Wakefield. Discusses the speeds allowed on British tramways, suggesting an increase. General discussion. 4300 w. Tram & Ry Wld—Dec. 8, 1904.

British Taxation.—Rating of Street Tramways. J. Neville Porter. Some cases of British law, and a discussion of the methods of valuation. 2300 w. Tram & Ry Wld—Aug. 8, 1901.

British Tramways Act.—The Economic Effect of the Tramways Act of 1870. E. F. Vesey Knox. Read before the British Assn. at Glasgow. Gives reasons why the writer believes it to have been the most disastrous legislative experiment attempted in England. 6500 w. Tram & Ry Wld—Oct. 17, 1901.

Chicago Franchises.—Street Railways of Chicago. The report of the Civic Federation Committees, including "Analysis of Financial Operations" by Milo Roy Maltbie, and the "Accountant's Report" by Edmund F. Bard. 64,000 w. Munic Af—June, 1901.

Chicago Committee on Local Transportation. A paper prepared by George C. Sikes containing suggested outlines of street railway franchise renewal ordinances for Chicago, with a description of some of the features of the case. 2300 w. St Ry Rev—Nov. 15, 1901.

STREET RAILWAY MANAGEMENT.

See also **ELECTRIC RAILWAY; ELECTRIC STATION MANAGEMENT; STREET RAILWAY; STREET RAILWAY LEGISLATION.**

Accounting.—The Routine of a Railway, Electric and Gas Lighting Company. C. O. Simpson. Read at Kansas City Convention. Points relating to office methods. 2500 w. St Ry Jour—Nov. 3, 1900.

Tramways: Their Working and Accounts. R. S. Tresilian. On the value of accounts and statistics, with suggestions as to the form to be used. 2500 w. Tram & Ry Wld—April 11, 1901.

Capital Accounts from the Viewpoint of Investors and the Public. Col. T. S. Williams. Read before the N. Y. State Ry. Assn. Briefly considers some recent street catastrophes in railroad finances due to improper swelling of capital accounts, with general discussion of the subject. 8400 w. St Ry Jour—Oct. 12, 1901.

The Accounting Department of Interurban Railways. W. B. Brockway. Discusses the many problems that arise in planning a system of accounting. 6800 w. St Ry Jour—Oct. 4, 1902.

Street Railway Accounting. J. F. Calderwood. A discussion by different authors, of "Distribution of the Discount Credit," "Standard Form of Report," "Advantages of the Car Hour," and "Computation of the Loss from Transfers." 3500 w. St Ry Jour—Jan. 3, 1903.

Comparative Statements. Henry W. Brooks, Jr. On the importance of intelligent accounting, and the value of comparative statements showing the results of any change in policy or methods. Refers chiefly to street railway work. 2500 w. St Ry Rev—March 20, 1903.

Census Statistics and the Standard form of Electric Railway Accounting. William M. Steuart. A discussion of the difficulties attending a uniform application of a system of accounts. 9000 w. St Ry Rev (Daily Ed)—Sept. 4, 1903.

The Province of the Street Railway Accountant. Henry W. Brooks, Jr. On the importance of the accountant's work, and some of the statistics needed by the general manager, with suggestions. 3500 w. St Ry Rev—Sept. 20, 1903.

Daily Reports, Store Room Accounting and Operating Records of the Camden & Suburban Railway. Gives interesting blanks used and explains the system. 3800 w. St Ry Jour—Dec. 19, 1903.

Accounting with Four Departments. H. M. Beardsley. Read before the St. Ry. Accountants' Assn. Describes the methods in use at Elmira, N. Y. 3000 w. St Ry Rev—Oct., 1905.

Accounting, Supplies.—The Store Room and Store Room Accounts. Benjamin W. Tingley. Discusses methods of keeping accounts in the store rooms of street railways. 2500 w. St Ry Jour—June 1, 1901.

Report of Committee on Standard Blanks and Accounting for Material and Supplies. F. E. Smith. Presented at convention of N. Y. State St. Ry. Assn. 4000 w. St Ry Jour—Oct. 12, 1901.

Purchasing and Store-Room Accounting on the Brooklyn Rapid Transit System. A review of the blanks and methods used for properly purchasing, checking, recording and distributing material and supplies. 2200 w. St Ry Rev—Oct. 15, 1901.

Stock Rooms and Stock Keeping of the Metropolitan Street Railway Company. New York City. An illustrated description of the store-rooms, and methods of purchasing and distributing. 2500 w. St Ry Jour—Jan. 4, 1902.

Purchasing and Accounting for Supplies on Electric Railway Systems. W. H. Staub. Explains the system used by the United Railways & Electric Co. of Baltimore, Md. 2800 w. St Ry Rev—Aug. 21, 1903.

See also **ELECTRIC RAILWAY SHOP—Accounting.**

Accounting, Tickets.—Interurban Ticket Accounting. J. H. Pardee. Read before the St. Ry. Accountants' Assn. Describes the system in use on the Rochester & Eastern Rapid Railway. 1000 w. St Ry Rev—Oct., 1905.

Benefit Associations.—Street Railway Mutual Benefit Associations. Oren Root, Jr. Read at the Detroit meeting of the St. Ry. Con. Gives details of the workings of the Metropolitan Street Railway Association of New York. 2700 w. St Ry Jour—Oct. 11, 1902.

The Brooklyn Rapid Transit Employees' Benefit Association. Some interesting features concerning its organization and methods of work. Ill. 2800 w. St Ry Jour—Dec. 13, 1902.

See also **Pensions.**

Berlin.—Alterations in the Train Service on the Berlin Metropolitan Electric Railway and Extension of the Line. Mr. Kemmann. Points out the alterations that have been made in the service of the main line and gives particulars regarding the extension towards the center of the city. Map. 4300 w. Bul International Ry Cong—July, 1903.

See also **ELECTRIC RAILWAY; STREET RAILWAY ACCIDENT.**

Camden & Suburban.—See **Employees.**

Car Mileage.—Car Mileage and How to Arrive at It Easily. J. M. Smith. Read before the N. Y. State Ry. Assn. Describes the forms bearing on this subject used by the Toronto Ry. Co. 1700 w. St Ry Jour—Oct. 12, 1901.

Claim Department.—See **STREET RAILWAY ACCIDENT.**

Commercial.—See **Manchester, Eng.**

Concord & Manchester.—Some Operating Data from the Concord & Manchester Branch of the Boston & Maine R. R., Concord, N. H. An illustrated series of articles, explaining methods of dispatching, collecting and registering fares, and the design and equipment of standard cars. 6000 w. St Ry Rev—April 20, 1901.

Conductor's Remittances.—The Advantages and Disadvantages of the "Bag System," as Compared with the "Receiver System" of Handling Conductor's Remittances. Frank R. Henry. Considers the comparative advantages and disadvantages of the two systems. 4400 w. St Ry (Daily Ed) —Sept. 4, 1903.

Consolidation.—Consolidation of Street Railways and its Effect Upon the Public. Daniel B. Holmes. Read at Kansas City Convention. Shows that such consolidation brings benefits to the public as well as to the companies. 2000 w. St Ry Jour—Nov. 3, 1900.

Consolidations of Street Railways. H. H. Vreeland. Discusses the benefits to the public and to employees, and gives interesting information. St Ry Rev—Jan. 15, 1901.

See also **STREET RAILWAY—N. Y. Metropolitan.**

Damage Claims.—See **STREET RAILWAY ACCIDENT—Claim Department.**

Delays.—New System of Checking Car Service for Delays—Brooklyn Rapid Transit Company. Explains an effective system of reporting car service, with special reference to the tracing of irregularities of headway. 2000 w. St Ry Jour—May 7, 1904.

Denver.—System of Reports of Denver City Tramway. Explains the extensive system in use, giving forms of blanks and general information. 3000 w. St Ry Jour—Sept. 26, 1903.

Despatching.—Interurban Car Despatching. Suggestions relating to a system for using the telephone, reviewing methods in present use. 2000 w. St Ry Jour—Aug. 2, 1902.

See also **RAILWAY OPERATION.**

Detroit.—The General Passenger Department of the Detroit United Railway System. Explains conditions and discusses the work of this department. 2000 w. St Ry Jour—Oct. 4, 1902.

Discipline.—See **Employees; RAILWAY EMPLOYEE.**

Earnings. — Street Railway Investments and Earnings. Alton D. Adams. Showing the effect of the change from horse to electric motive power, and the extensions of roads, upon returns on invested capital. 1200 w. St Ry Rev—July 20, 1902.

Economics.—The Economics of Electric Tramways in Britain. Robert H. Smith. Tabulated statistics and general information of a number of British lines. 3000 w. Engr, Lond—Nov. 11, 1904.

Employees.—The Raw Material for Electric Car Driving. F. T. Stewart. Remarks on the changed employment of men connected with tramways, by the change to electricity and some of the disadvantages of the service. 1800 w. Elec Engr, Lond—March 21, 1902.

Report of Committee on Standard Code of Rules for the Government of Conductors and Motormen. Submitted at the Caldwell meeting of the St. Ry. Assn. 4000 w. St Ry Jour—Sept. 27, 1902.

The Employing, Training and Disciplining of Car-Service Employees of the Boston Elevated Ry. William A. Bancroft. Describes the methods used in choosing, training and disciplining the motormen and conductors. Serial. 1st part. 4400 w. St Ry Rev—Nov. 20, 1902.

Discipline for Street Railway Employees. W. F. Harrington. Gives rules for the government of conductors and motormen on the Camden & Suburban railway, and the results of the "demotion" system, describing its essential features. 2200 w. St Ry Rev—Sept. 20, 1902.

The Methods of Handling the Men on the Camden & Suburban Railway. Gives in detail the methods followed and also the system of preparing time-tables, assigning runs, &c. Ill. 4000 w. St Ry Jour—Dec. 12, 1903.

See also **Benefit Associations; Instruction; Pensions; ELECTRIC CAR—Instruction.**

Employees, Physical Tests.—Uniform Standards of Examination of Railway Employees. Dr. F. H. Peck. Read before the St Ry Assn of the State of N. Y. Deals with the medical tests made of vision, hearing, physical, health, etc. 1600 w. St Ry Jour—July 1, 1905.

European Tariffs.—Tramway Tariffs on the Continent. Francis Reverdin. Reviews the subject as dealt with in Switzerland, Germany, Italy and Belgium at various places. 10,200 w. Trac & Trans—Sept., 1904.

Expenses, British.—Working Expenses of Electric and Cable Railways. Annual tables of the working expenses, receipts, etc., of the electric and cable railways of Great Britain, for which figures are available. 2800 w. Tram & Ry Wld—April 11, 1901.

Fare Collection.—Collection and Registration of Fares on City and Suburban Lines. William C. Sampson. Read at meeting of St. Ry. Accountants' Assn. Briefly describes the various systems tried by the Union Traction Co. of Indiana. 2700 w. St Ry Rev—Oct. 9, 1902.

Interurban Fare Collections. Irwin Fullerton. Read before the St. Ry. Acc. Assn. Describes the system in effect on the Detroit United Ry. system. 1500 w. St Ry Rev—Oct., 1905.

Fare Register.—Fares and Fare Protection. John F. Ohmer. Abstract of a paper read before the Penn. St. Ry. Asn. Reviews the conditions and describes the Ohmer register and system. 3000 w. St Ry Jour—Oct. 3, 1903.

A New Fare Register. Illustrates and describes a device invented by W. I. Ohmer, which contains many new ideas. 2200 w. St Ry Jour—Dec. 12, 1903.

Germany.—Financial Results of Electric Railway Operation in Germany. Gives particulars in regard to the profits made, cost of operating, fares charged, &c. The returns are less favorable than was anticipated. 2800 w. St Ry Jour—May 7, 1904.

The Operation of Street Railways in the Interests of the Residents (Rücksichtnahme bei Herstellung von Strassenbahnen auf die Interessen der Anlieger). W. Mende. An examination of the German law in connection with street railway operation. 4000 w. Zeitschr d Ver Deutscher Ing—June 11, 1904.

See also **ELECTRIC RAILWAY.**

Glasgow.—Electric Traction Finance. Editorial on the annual report of the working of the Glasgow tramways. 700 w. Engng—Aug. 8, 1902.

See also **ELECTRIC RAILWAY.**

Highway Conflicts.—Street Railway and Highway Conflicts. A review of an interesting paper by Bentley W. Warren, at a Boston meeting of the Good Roads Assn. 6000 w. St Ry Rev—Jan. 15, 1905.

See also **Public Relations.**

Holiday Traffic, Eng.—Holiday Traffic on Tramways. L. E. Harvey. Discussing the question of how far it pays to keep extra cars especially for holiday and week-end traffic in England. 1200 w. Elec Rev, Lond—July 10, 1903.

Instruction.—Lecture on Electric Car Driving. E. W. Elsley. A lecture to be given horsemen, enginemen and the novice on their first attendance for tuition in electric car driving. 1800 w. Elec Engr, Lond—Aug. 8, 1902.

A Motorman's School System in Brooklyn. An illustrated article explaining an interesting system for instructing new motormen for service on surface lines. 3500 w. St Ry Jour—June 17, 1905.

The Policy of More Liberal Instruction for Motormen. Edward Taylor. A discussion of the system of instruction which will best fit the motorman for his duties and responsibilities. 5500 w. St Ry Rev—Oct., 1905.

See also **Employees; ELECTRIC CAR.**

Load Diagrams.—Some Interesting Properties of Load Diagrams for Electric Railways (Ueber einige Interessante Eigenschaften des Belastungsdiagrammes Elektrischer Vollbahnen für Personenverkehr). Gustav W. Meyer. A discussion of passenger traffic and operation of electric railways, based on some load diagrams of the New York Elevated Railway. 3000 w. Zeitschr f Elektrotechnik—April 12, 1903.

See also **ELECTRIC STATION MANAGEMENT.**

Los Angeles, Calif.—See **ELECTRIC RAILWAY.**

Loops and Stub Tracks.—Traffic Problems Upon Loops and Stub Tracks. Howard S. Knowlton. Presents equations covering the general cases most commonly encountered. 2700 w. St Ry Rev—Nov. 15, 1905.

Manchester, Eng.—Some Notes on the Commercial Management of Electrical Tramways. T. W. Sheffield. A discussion of the advantages of electric traction, particularly in the Manchester district, the carriage of freight, interurban traffic, etc., with tabulated opinions of various British engineers. Serial. Part I. 2500 w. Feilden's Mag—Jan., 1903.

Monthly Reports.—The Street Railway Monthly Report. C. Nesbit Duffy. Suggestions from the writer's experience and practice as to the preparation, scope and arrangement of the monthly report. 3500 w. St Ry Jour—June 7, 1902.

Municipal Ownership.—Municipal Ownership and Operation of Street Railways. H. M. Sloan. From an article published in the "Calumet Record." Presents practical facts, and discusses methods of disposing of difficulties and securing compensation to the city. 4000 w. St Ry Rev—April 15, 1902.

City-Owned Street Cars. Walter C. Hamm. On the municipalization of the street car system of Hull, England. How it was accomplished, the mode of operation, and the success. 2200 w. Eng Rec—Aug. 6, 1904.

See also **Glasgow; MUNICIPAL OWNERSHIP.**

Ohio Central.—Ohio Central Traction System. An illustrated description of the construction and operation of the Mansfield, Crestline and Galion line, which is a part of this system. 2800 w. St Ry Jour—April 25, 1903.

Ohmer Fare Register.—See **Fare Register.**

Operating Costs.—Operating Costs and Guaranties of Electric Street Railways (Betriebskosten und Betriebskostengarantie bei Elektrischen Strassenbahnen). An analysis of costs so as to enable guaranties of operating costs to be made intelligently. 3000 w. Ill. Zeitschr f Klein u Strassenbahnen—Feb. 16, 1902.

Operating Expenses. J. B. Hamilton. Read before the Munic. Tram. Mgrs. Assn. Notes regarding practice on some American tramway systems. 2800 w. Tram & Ry Wld—Aug. 7, 1902.

The Operative Costs of Tramways and the Builder's Guarantees (Die Unterhaltungskosten bei Strassenbahnen und die Garantie der Baufirma). A. Hecker. A discussion of the elements of traffic, distance, frequency of trips, etc., upon which estimates of operating costs are based. 2500 w. Elektrotech Zeitschr—July 28, 1904.

Operating Practice.—Possibilities in the Direction of Improving Operating Practice. Remarks on benefits derived from inspection tours to other shops and from good railway literature. 3000 w. St Ry Jour—April 25, 1903.

See also under names of cities.

Overcrowding.—The Overcrowding of Street Cars. Dr. Louis Bell. Discusses some of the causes and what can be done to remedy them. 2000 w. Elec Rev, N Y—Feb. 14, 1903.

Pay Department.—Pay Department of the Metropolitan Company's Construction Department. Describes the method in use in paying laborers where a large number are foreigners unable to speak English. 1200 w. St Ry Jour—Nov. 29, 1902.

Pensions and Insurance.—Pension and Insurance System Adopted in Providence. Describes a scheme of the United Traction and Electric Co. of Providence, R. I., for providing employees with pensions, sick benefits, and insurance. 1500 w. St Ry Rev—Jan. 15, 1902.

See also **Benefit Associations.**

Philadelphia.—Operating Methods in Philadelphia. An account of the organization, personnel, employment department, way bills, crossings, etc. 4500 w. St Ry Jour—Sept. 23, 1905.

Physical Analysis.—The Physical Analysis of an Electric Railway Property. Albert B. Herrick. Discusses the character of a physical report, explaining some of the graphical methods used to represent the conditions. 3000 w. St Ry Jour—Sept. 23, 1905.

Publicity.—Publicity. J. Harvey White. Read before the St. Ry. Assn. of the State of N.Y. Discusses the attitude of the press toward public service corporation, and describes the work of the press agent of the Boston Elevated Company. 2300 w. St Ry Jour—July 1, 1905.

Public Relations.—The Public, the Operator, and the Company. C. S. Sergeant. Read before the American St. Ry. Assn. Considers some points in the relations of street railways to the public. 2800 w. St Ry Jour—Oct. 12, 1901.

See also **AUTOMOBILE; ROAD.**

Rapid Service.—The Encouragement of Urban Traffic. R. W. Western. Reaches the conclusion that it is wiser to study the passenger's time than his comfort, and considers the ways of securing rapid service. 2400 w. St Ry Jour—March 20, 1904.

Reading, Pa.—See **ELECTRIC RAILWAY—United Power & Transportation Co.**

Records.—See **Accounting; Monthly Reports.**

Reserve Fund.—The Utility of Reserve Accounts. A. O. Kittredge. On the wisdom of maintaining large emergency reserves in railroad business, explaining the reserve principle. 2100 w. St Ry Jour—Aug. 2, 1902.

Growing Necessity for Reserve Fund. A discussion of this subject in its bearing on electric railway business. 2000 w. St Ry Jour—Aug. 2, 1902.

Rules.—See **Employees.**

Running Powers.—Running Powers Over Tramways. Vincent R. Balfour-Browne. Discusses cases in England where running powers have been granted to one company to run over and use the stations of another company. 3000 w. Trac & Trans—Sept., 1903.

See also **STREET RAILWAY LEGISLATION—British.**

Schedules.—The Determination of Schedules by Speed Templates. Howard S. Knowlton. Shows how the speed template may be prepared and utilized in the solution of schedule problems upon electric railways. 2800 w. St Ry Rev—Oct. 20, 1904.

Seattle, Wash.—Operating Features of the Seattle Electric Company. Gives details of car operation and the handling of the trainmen. Ills. 5000 w. St Ry Jour—Dec. 17, 1904.

Securities.—Electric Railway Securities as Investments. From a paper by Albert L. Kramer, in "The Annals of the American Academy of Political and Social Science." Deals with companies in operation of city and interurban lines. 2400 w. R R Gaz—Vol. XXXVIII, No. 6.

Statistics.—A Graphical Representation of Street Railway Statistics. W. C. Gotshall. Gives diagram showing method of plotting street railway operating statistics, stating its advantages and applications. 2000 w. St Ry Jour—Nov. 1, 1902.

Stopping Effect.—The Cost of Stopping. R. W. Western. An examination of the expenses involved in the stoppage of tramcars. 2500 w. Tram & Ry Wld—Dec. 11, 1902.

The Effect of Frequent Stops in High-Speed Railroading. A. H. Armstrong. Showing that a stop in high-speed railroading is expensive and far-reaching in its results. 2000 w. St Ry Jour—Jan. 9, 1904.

Strike.—See **STRIKE—Chicago Street Railway; Providence Street Railway.**

Supplies.—See **Accounting, Supplies.**

Through Booking.—See **RAILWAY TRAFFIC.**

Through Traffic.—Through Traffic on Tramways for Passengers and Goods. J. E. Waller. Read before the Liverpool Chamber of Commerce. Also editorial. Advocating through traffic wherever possible and showing the advantages of a large system of tramways. Discusses methods and conditions. 5200 w. Elec Engr, Lond—July 25, 1902.

Ticket Accounting.—See **Accounting, Tickets.**

Traffic Curves.—Traffic Curves on the New Orleans and Carrollton R. R. A. H. Ford. Discusses how to prepare the traffic curve intelligently so as to show graphically the number of passengers carried throughout the car day, the number of cars provided to carry them, and the adequacy of the accommodation. 1500 w. St Ry Rev—Sept. 15, 1901.

Traffic Problems.—Some Traffic Problems. C. R. Bellamy. Read before the Assn. of Munic. Tram Mgrs. Discusses a few of the important problems in connection with the working of municipal tramways. 2200 w. Tram & Ry Wld—Aug. 7, 1902.

Traffic Stimulation.—Analysis of Traffic and Methods of Development. Henry W. Brooks, Jr. Suggestions as to methods of stimulating traffic. 4000 w. St Ry Jour—July 30, 1904.

Transfers.—Transfers and Transfer Problems with Special Relation to New York. Oren Root, Jr. The writer considers the extensive transfer system is an important factor in the increased dividend earning power of the road. Describes the conditions in New York and the methods adopted. 3800 w. St Ry Jour—Oct. 5, 1901.

Registration of Transfers. C. D. Meneely. Read at Detroit meeting of the St. Ry. Con. Outlines the arguments for and against the registration of transfers with a view to determining evidence from which to draw a conclusion. 1500 w. St Ry Jour—Oct. 11, 1902.

Some Disputed Points Concerning Transfers. Arthur Wentworth. A discussion of the views of C. D. Meneely as given in a recent paper. 2500 w. St Ry Jour—Dec. 6, 1902.

United Power & Transportation Co.—See **ELECTRIC RAILWAY.**

Vreeland Address.—President Vreeland's Address Before the American Street Railway Association. Remarks on the legal and social state of electric railroads, and the problems to be solved in connection. 3000 w. St Ry Rev—Oct. 9, 1902.

Electric Railway Operation in a Great City. H. H. Vreeland. Abstract of an address before the N. Y. Elec. Soc. Calls attention to points bearing on the electrical engineer in this branch of the industry. 4800 w. St Ry Jour—Feb. 25, 1905.

See also **Consolidation; STREET RAILWAY—N. Y. Metropolitan.**

Welfare Work.—See **Benefit Associations; Pensions; WORKS MANAGEMENT.**

STREET RAILWAY SHOP.

See **ELECTRIC RAILWAY SHOP.**

STREET RAILWAY SIGNAL.

See **RAILWAY SIGNAL.**

STREET RAILWAY STATION.

See also **ELECTRIC RAILWAY STATION; STREET RAILWAY TERMINAL.**

Basel, Switzerland.—Street Railway Stations in Basel (Strassenbahnhöfe in Basel). With views and plans of several of the attractive buildings at the stations and waiting places of the street and local railways. 1500 w. Schweizerische Bauzeitung—Aug. 17, 1901.

STREET RAILWAY TERMINAL.

See also **ELECTRIC RAILWAY TERMINAL.**

Design.—The Design of Street Railway Terminals. Describes and illustrates the terminals at the Pan-American exhibition at Buffalo, as well adapted for the rapid handling of crowds. 2100 w. Eng News—Oct. 30, 1902.

STREET SPRINKLING.

See also **DUST; ROAD—Oiled; STREET CLEANING.**

Automobile.—Automobile Street Sprinkler. Brief illustrated description of an automobile sprinkler, now in use in Paris. 800 w. Sci Am—July 30, 1904.

Automobile Steam Sprinkling Wagon (Tonneau d'Arrosage Automobile à Vapeur). E. Bret. Illustrating a large steam sprinkler used with salt water in the streets of Paris. 2000 w. Génie Civil—March 11, 1905.

Motor Sprinkler at Cologne. Illustrated description of a new type of motor sprinkling car in use in connection with the traction lines. 1200 w. Sci Am—Sept. 2, 1905.

Oil.—See **ROAD—Oiled.**

Paris.—The Sprinkling of Streets in Paris (L'Arrosement de la Voie Publique à Paris). E. Bret. A well illustrated account of street sprinkling and flushing, and the apparatus used. 4000 w. Génie Civil—Feb. 22, 1902.

See also **Automobile; STREET CLEANING.**

STREET SWEEPER.

See **STREET CLEANING.**

STREMMATOGRAPH.

See **RAIL—Stresses.**

STRENGTH OF MATERIALS.

See **MATERIALS' STRENGTH; TESTING;** and under specific materials.

STRESS.

See also **MATERIALS' STRENGTH; TESTING;** and under specific materials and structures.

Alternate Bending.—See **MATERIALS' STRENGTH.**

Bolt.—See **BOLT—Stress.**

Chain Links.—See **CHAIN—Stresses.**

Marine Engine.—See **MARINE ENGINE—Stresses.**

Steam Engine.—See **STEAM ENGINE — Frame Stresses.**

Steam Pipe.—See **STEAM PIPE—Stresses.**

Water Pipe.—See **WATER PIPE—Stresses.**

Wire Rope.—See **WIRE ROPE—Bending Stresses.**

STRIKE.

See also **LABOR; TRADE UNION; WAGES; WORKS MANAGEMENT.**

Anthracite.—Demands of Anthracite Coal Miners. Analysis of the causes leading to the present great strike in the Pennsylvania anthracite region. 2200 w. Eng & Min Jour—May 31, 1902.

The Anthracite Strike. R. W. Raymond. Statement of questions of permanent importance relating to this strike, some of which will be discussed in later articles. 1500 w. Eng & Min Jour—June 7, 1902.

Industrial History of the Anthracite Regions. R. W. Raymond. A brief review of the history of the last forty years, which furnishes the explanation to many things in present conditions. 1200 w. Eng & Min Jour—June 14, 1902.

The Resumption of Anthracite Mining. R. W. Raymond. A discussion of the difficulties to be met. A reply to opinions published in the N. Y. Evening "Post" and the N. Y. "Times." 2400 w. Eng & Min Jour—Aug. 9, 1902.

Anthracite Mining Conditions. Review of statement issued by John Mitchell, President of the United Mine Workers, showing that the case of the strikers has not been truthfully presented. 3300 w. Eng & Min Jour—June 28, 1902.

A General View of the Coal Strike. Talcott Williams. An explanation of conditions existing in the coal fields. 1700 w. Rev of Revs—July, 1902.

Is the Coal Strike a Conspiracy? Discussion of the anthracite coal strike, especially the attitude of the operators. 2000 w. Gunton's Mag—Sept., 1902.

The American Strike: Its Causes and Its Influences. Discusses the miner's wages in the United States, the quality of the coal, the influence on British prices, and the tariff. 3800 w. Ir & Coal Trds Rev—Oct. 10, 1902.

Settlement of the Anthracite Miners' Strike. Details of the settlement are given. 2000 w. Eng & Min Jour—Oct. 18, 1902.

Mistakes of the Anthracite Operators. Criticizes their failure to conciliate public opinion, and their lack of tact. 900 w. Eng & Min Jour—Oct. 25, 1902.

Report to the President on the Anthracite Coal Strike. Carroll D. Wright. Considers the origin, demands, claims and complaints, wages and cost of production, etc., with suggestions. 36,500 w. Bul Dept of Labor—Nov., 1902.

Principles Involved in the Settlement of the Coal Strike. Editorial discussing the right of fair wages and individual liberty. 1200 w. Eng News—Oct. 30, 1902.

The Settlement of the Coal Strike. Walter Wellman. A discussion of the lessons of the strike and the effect upon capital and labor. 3700 w. Rev of Revs—Nov., 1902.

The Labor Problem of the Anthracite Coal Mines. Editorial discussion of the demands made by the recently striking miners, especially the question of wages, outlining a method for improving the conditions. 2800 w. Eng News—Nov. 13, 1902.

The Reply of the Anthracite Mine Operators. Gives the reply to the demands of John Mitchell in behalf of the United Mine Workers of America, and discusses the same. [illegible]000 w. Eng News—Nov. 20, 1902.

Conditions of Labor and Life in Anthracite Coal Mining. Frederick L. Hoffman. Considers 1st, Wages, actual earnings and hours of labor. 2nd, Economic conditions, family expenditures, cost of living, savings, pauperisms, etc. 3rd, Health and mortality accident liability, and the waste of productive life and resulting social misery. Serial. 1st part. 2000 w. Eng & Min Jour—Nov. 22, 1902.

See also **COAL INDUSTRY—Retail.**

Anthracite Commission.—The Anthracite Coal Strike Commission. Report of proceedings giving abstracts of several of the statements presented by the companies. 2000 w. Eng & Min Jour—Nov. 22, 1902.

The Anthracite Commission. Extracts from the report on the awards of the Commission, with editorial. 6000 w. Ir Age—March 26, 1903.

The Award of the Anthracite Coal Strike Commission. Walter E. Weyl. A review of the work of the commission and matters related. 4500 w. Rev of Revs—April, 1903.

Report of the Coal Strike Commission. Reviews the work of the Anthracite Coal Strike Commission and its findings. 3500 w. Gunton's Mag—May, 1903.

Anthracite Conciliation Board.—A Great Experiment: The Anthracite Conciliation Board. The present article reviews the history of the appointment of this board by the Arbitration Commission, stating its duties. 1500 w. Eng & Min Jour—Dec. 24, 1903.

Arbitration.—See **Anthracite Commission; LABOR.**

Berlin.—Recent Strike and Lock-Out in Berlin. H. S. Meyer. A review of the causes of this strike and lock-out of about 40,000 workmen. 900 w. Elect'n, Lond—Oct. 20, 1905.

Chicago Street Railway.—Chicago Street Railway Strike. An account of the methods of obstructing tracks adopted by the union and its sympathisers, and of the troubles and attitude of those in authority. Ill. 1800 w. St Ry Jour—Nov. 21, 1903.

Coal Miner.—See **Anthracite; COAL MINE MANAGEMENT; COAL MINER.**

Cork, Gas.—History of the Cork Gas Strike. A summary of the official history prepared by the directors, giving a glimpse into the conditions under which the works were carried on. 2300 w. Gas Wld—Aug. 10, 1901.

Denaby Main Case.—See **TRADE UNION.**

History.—Strikes Ancient and Modern. Albert Strittmatter. Reviews early strikes in the United States, and gives table showing the increase. 1700 w. Am Mfr—June 6, 1901.

Illinois Coal Operators' Plan.—See **COAL MINE MANAGEMENT—Strikes.**

Italian Railway.—Obstructionism, or a New Form of Strike on the Italian Railways. Explains this form of strike, relating the causes that led to it, describing how it became developed, the results, and measures taken against it. 8500 w. Bul Int Ry Cong—Oct., 1905.

Machinists'.—The Machinists' Strike. Reports from all sections of the country concerning the strike for ten hours' pay in return for nine hours' work. 15,000 w. Ir Age—May 23, 1901.

The Machinists' Strike. Reports from all sections of the country. 10,500 w. Ir Age—May 30, 1901.

The Machinists' Strike. A statement of the changed conditions, with editorial. 12,600 w. Ir. Age—June 6, 1901.

The Machinists' Strike in the United States. An editorial commentary upon the situation based upon the opinions of a number of leading employers. 2000 w. Engineering Magazine—July, 1901.

National Cash Register Co.—The Dayton Strike. An account of the troubles at the works of the National Cash Register Company. 2300 w. Ir Age—May 30, 1901.

Providence Street Railway.—Providence and Pawtucket Railway Strike. An illustrated account of the trouble caused by the ten-hour law enacted by the last Legislature. 1700 w. St Ry Jour—June 21, 1902.

See also **LABOR.**

Steel.—A Candid View of the Steel Strike. George Gunton. The editor's opinions concerning this strike and his recommendation of a mutual union in which both capital and labor are equally represented, to determine all disputed questions. 3200 w. Gunton's Mag—Aug., 1901.

The Outcome of the Steel Strike. Gives the strikers' view of the causes of their failure, including President Shaffer's statement. 2500 w. Ir Trd Rev—Sept. 26, 1901.

The Lesson of the Steel Strike. A review of the strike, condemning the leader of the Amalgamated Ass., and commending the attitude of the managers of the U. S. Steel Corporation, and pointing the lessons it has taught. 2500 w. Gunton's Mag—Oct., 1901.

United States.—Strikes in the United States. Carroll D. Wright. Reviews the history of strikes, especially those of the last twenty years, no attempt having been made until 1880 to collect data relative to labor controversies. 4000 w. N Am Rev—June, 1902.

Waterbury Injunction.—The Waterbury Injunction. A discussion of the injunction issued by Judge Elmer against the strikers and their sympathizers in Waterbury, Conn. 2000 w. Gunton's Mag—April, 1903.

STROBOSCOPE.

See also **ONDOGRAPH; SPEED VARIATION.**

Slip Counter.—See **ELECTRIC INSTRUMENT.**

STRONTIUM.

Electric Furnace.—See **ELECTRO-METALLURGY—Calcium and Strontium.**

STRUCTURAL MATERIAL.

See **BUILDING MATERIAL; STEEL—Structural; STEEL CONSTRUCTION; STEEL SPECIFICATION.**

STRUCTURAL STEEL.

See **STEEL—Structural; STEEL CONSTRUCTION; STEEL SPECIFICATION.**

STRUCTURAL WORK.

See also **BRIDGE; BRIDGE CONSTRUCTION; BUILDING CONSTRUCTION; FERRIS WHEEL; FRAMEWORK; STEEL CONSTRUCTION; STEEL SPECIFICATIONS; VIADUCT.**

Pipe.—See **PIPE—Structural Work.**

Pneumatic Tools.—See **PNEUMATIC TOOL—Structural Work.**

STRUCTURE.

See also **BUILDING; ENGINEERING WORKS; FRAMEWORK; PUBLIC WORKS.**

Economy.—Comparative Economy of Structures. Gives problems shewing methods of determining the relative economy of different structures or machines for accomplishing the same ends. 2200 w. Technic—1902.

Railway.—See **RAILWAY STRUCTURE.**

STRUT.

See also **BRIDGE DESIGN; FRAMEWORK; MATERIALS' STRENGTH—Strut.**

STUFFING BOX.

See also **PACKING; STEAM ENGINE.**

A Double Stuffing Box (Doppellagerabdichtung). Hr. Toussaint. Illustrating a form of stuffing-box especially adapted for maintaining a tight joint about revolving shafts, as propeller shafts, or the spindles of steam turbines or centrifugal pumps. 1200 w. Zeitschr d Ver Deutscher Ing—Aug. 12, 1905.

Schwabe.—See **PACKING—Metallic.** „

SUBMARINE BOAT.

See also **TORPEDO BOAT.**

Submarine Navigation. W. P. Bradley. An account of the development of submarine navigation, giving illustrated descriptions of vessels of particular interest, and discussing their value in coast protection and in warfare. 5700 w. Pop Sci M—Dec., 1900.

Submarine Navigation (La Navigation Sous-Marine). H. Noalhat. A complete study of the action of the various forces upon a submerged boat. Serial. Part I. 3000 w. Revue Technique—Feb. 25, 1901.

Submarine Navigation (La Navigation Sous-Marine). H. Noalhat. A review of the problems which are involved in the attainment of successful submarine navigation. Serial. Part I. 3000 w. Revue Technique—Aug. 10, 1904.

The Submarine Boat; Its Promises and Performances. Admiral George W. Melville. Reviews the history of submarine boat construction and discusses the merits of such craft. 6000 w. N Am Rev—April, 1901.

Submarine Boats (Onderzeeche Booten). H. H. Versteegh. A general historical review, together with some account of recent submarines. Two articles. 5000 w. De Ingenieur—July 20, 27, 1901.

Submarine Torpedo Boats. G. W. Baird. Describes several designs and gives interesting information relating to them. 2500 w. Jour Am Soc of Nav Engrs—Aug., 1902.

Submarine Boats . Editorial review of opinions held as to the value of the submarine boat. 3700 w. Engng—Sept. 5, 1902.

Submarine Boats. Discusses the Holland, Lake, and Moriarty boats. 5000 w. Engng—Dec. 5, 1902.

The Success of the Submarine. Archibald S. Hurd. Discusses the British and French submarines, and their value as instruments of warfare. 4500 w. Nineteenth Cent—Nov., 1903.

Submarines. Sir William H. White. From the Engineering supplement of the London "Times." The present article reviews the history of the construction of these vessels in England and France. Serial. 1st part. 4000 w. Sci Am Sup—June 10, 1905.

Notes on Submarine Boats (Ueber Unterseeboote). C. Stainer. A general review of the development of submarine navigation, and a discussion of the present state of the art. 5000 w. Stahl u Eisen—Nov. 1, 1905.

Submarines. J. H. Tomb. A brief description of types, operations of, and accidents to submarines. 2200 w. Pro U S Naval Inst—Dec., 1905.

"Adder" and "Moccasin."—Official Trials of Our Submarine Boats. Brief account of the gratifying results obtained in the trials of the "Adder" and the "Moccasin," two of the six submarines being constructed for the U. S. Navy. Ill. 900 w. Sci Am—Nov. 29, 1902.

Submarine Boats in the United States. Remarks on the official returns of the Naval Board of Inspection in regard to the official trials of the "Adder" and "Moccasin." 2000 w. Engr, Lond—Dec. 19, 1902.

Official Trials of Submarine Boats "Adder" and "Moccasin." William Russell White." Brief description with detailed report of trials and general comments upon the behavior and possibilities of the boats. Ill. 5200 w. Jour Am Soc of Nav Engrs—Feb., 1903.

American.—The American Submarine Boats. Waldon Fawcett. Information concerning the boats now building and the trials to be made with them. Ill. 1500 w. Am Mfr—Feb. 14, 1901.

American Navy.—Construction and Tests of Submarine Torpedo Boats for the U. S. Navy. Plan showing the chief characteristics of the boats being constructed by the U. S. Navy, with extract from Admiral Hichborn's report, and description of the "Holland" are given in the present article. Serial. 1st part. 2500 w. Marine Engng—April, 1901.

British.—Submarine Boats for the British Navy. Sectional drawing of the improved Holland submarine boat, of which five are being built for the British Navy, with comment and description. 2500 w. Engng—March 29, 1901.

Submarines, "A" and "B" Class. Illustrates British submarines of these two classes, giving brief notes. 350 w. Engr, Lond—June 16, 1905.

British Admiralty.—The Admiralty and Submarine Boats. Edmund Robertson. On the attitude of the British Admiralty, and also comment on what has been done in France and the United States. 4400 w. Nineteenth Cent—Jan., 1901.

British Loss.—The Loss of Submarine A 8. Extracts from the "Western Morning News" in the account of the trial of the survivors of this submarine which sank suddenly near Plymouth Sound on June 8. Also editorial. 7200 w. Engr, Lond—June 23, 1905.

French.—Construction and Machinery of the French Submarine Boats (Bau und Mechanismus der Französischen Unterseeboote). B. Denninghoff. A general account of the various experimental boats since 1888, and reference to those to be laid down in 1901. 2000 w. Schiffbau—Nov. 8, 1900.

The French Submarine Boats. The latest information concerning these boats, with editorial discussion. 4000 w. Engr, Lond—Jan. 18, 1901.

The French Submarines. A critical editorial discussion of the types thus far tried and the French manoeuvres. 3700 w. Engng—Jan. 9, 1903.

See also **Nordenfeldt.**

"Fulton."—Launch of the Submarine Torpedo Boat "Fulton." Illustrates the launch of this boat which is to be used by the Holland Company as an experimental vessel. 500 w. Sci Am—June 22, 1901.

Gasoline Engine.—See **GASOLINE ENGINE—Submarine Boat.**

"Grampus" and Pike."—Official Trial of the Submarine Boats "Grampus" and "Pike." Leo Morgan. Brief illustrated description, with report of trials. 4500 w. Jour Am Soc of Nav Engrs—May, 1903.

Trials of the Submarine Boats Grampus and Pike. Illustrations with report of trial in San Francisco waters. 800 w. Marine Engng—July, 1903.

History.—Early Submarine Warfare. An account of early attempts at building submarine vessels for war purposes. 2000 w. Engr, Lond—Feb. 1, 1901.

Submarine Weapons in the Nineteenth Century (Le Armi Subaqnee nel Secolo XIX). Quintino Bonomo. A general review from the early experiments of Fulton, with especial reference to torpedoes. 10,000 w. 3 plates. Rivista Marittima—June, 1902.

Submarine Torpedo-Boats—Past, Present and Future. Lawrence Spear. Historical review, with remarks on the outlook for the future. 7 plates. 10,300 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 14—Nov., 1902.

Early Attempts at Submarine Navigation. Notes from a recent work by Alan H. Burgoyne, giving particulars of the work of early inventors in this field. 1800 w. Sci Am Sup—Jan. 9, 1904.

See also **"Nautilus."**

Holland.—The Submarine Boat and Its Future. John P. Holland. An account of what may be expected of submarine boats in warfare and in peace. 4300 w. N Am Rev—Dec., 1900.

The Development and Future Possibilities of the Submarine Boat. Editorial criticism of statements made by John P. Holland, the inventor of the Holland submarine boat. 2500 w. Eng News—Jan. 10, 1901.

The Holland Submarine Boat. Report prepared by Rear Admiral O'Neil on the submarine boat Holland, with editorial. 6000 w. Engr, Lond—March 1, 1901.

See also **American; American Navy; British; "Fulton;" Netherlands; GASOLINE ENGINE—Submarine Boat;** and other names of boats.

Holland Trial.—Holland's Speed Endurance Trial. A not very favorable report from Lieut. Com. John R. Edwards of the U. S. Navy. 3500 w. Marine Rev—March 7, 1901.

To Test Submarine Boats. Information concerning the extended trials the newly-constructed Holland craft is to undergo during the next two weeks. Ill. 1400 w. Naut Gaz—Nov. 13, 1902.

Lake Type.—Report of the Army Board as to the Usefulness of the Lake Type of Submarine Boat for Coast Defense. A summary of the military view of the usefulness of the submarine designed by Simon Lake. 2000 w. Sci Am—March 12, 1904.

The Evolution of the Submarine and How Far the Lake Type Solves the Problem. Robert G. Skerrett. Discusses types and methods of submergence, and reviews the development of the Lake type. Ills. 10,900 w. Jour U S Art—Sept., 1904.

See also "Protector."

"Moccasin."—See "**Adder.**"

"Nautilus."—The First Submarine Boat. From "La Nature." An illustrated account of the "Nautilus," devised by Fulton, and the experiments made with it one hundred years ago. 1400 w. Sci Am Sup—Oct. 12, 1901.

"Nautilus."—The First Submarine Boat. From "La the Netherlands. (De Eerste in Nederland Gebouwde Onderzeesche Torpedo-boote). Illustrated description of a boat built at the Government works on the Scheldt River from plans of the American Electric Boat Company. 3000 w. De Ingenieur—Sept. 16, 1905.

Nordenfeldt.—Submarine Boats. Discusses the attitude of the French Government to the subject of submarine navigation, and gives an illustrated description of the Nordenfeldt submarine boat for Turkey, built in 1887. Serial. 1st part. 3300 w. Engr, Lond—Jan. 25, 1901.

"Pike."—See "**Grampus.**"

Pino.—Submarine Work. Carlo Iberti. Concerning the inventions of Signor Pino, which it is claimed make possible the recovery of sunken ships or objects of any kind from practically any depth. Illustrated description of his working submarine boat. 2500 w. Contemporary Rev—Nov., 1902.

"Plunger," "Porpoise," "Shark."—Official Trials of the Submarine Boats "Plunger," "Porpoise" and "Shark." Daniel S. Mahoney. An account of the trials. 6500 w. Jour Am Soc of Nav Engrs—Aug., 1903.

Polar Exploration.—Submarine Boat for Polar Exploration. An account of a project to reach the pole in this way; the idea of Mr. Anschutz-Kaempfe. 900 w. Naut Gaz—May 23, 1901.

"Shark."—See "Plunger."

"Protector."—The Submarine Boat "Protector." Waldon Fawcett. Illustration with description of this submarine torpedo boat, recently launched. It is the invention of Mr. Simon Lake and is dissimilar to any other submarine boat. 1100 w. Sci Am—Nov. 22, 1902.

An Under-Water Automobile. Herbert C. Fyfe. An illustrated account of the new American submarine torpedo-boat "Protector," discussing its efficiency as compared with the Holland type. 3000 w. Page's Mag—April, 1903.

The Development of the Submarine in the Direction of Increased Scope. Lieut. John Halligan, Jr. A study of the Lake submarine torpedo boat "Protector," with illustrations. 10,500 w. Jour Am Soc of Nav Engrs—Nov., 1903.

The Submarine Boat "Protector." Illustrated description of this American vessel, and information respecting it. 2000 w. Engr, Lond—Nov. 20, 1903.

The Lake Submarine Torpedo Boat "Protector." An illustrated article outlining the main features of this boat. 2500 w. Sci Am—Dec. 26, 1903.

Salvage.—Submarine Boats and Their Salvage. Capt. R. H. Bacon. Read before the Inst. of Naval Archts. Discusses the causes of accidents to submarine boats, the means of preventing their occurrence, and the methods of raising such vessels. Also editorial. 8000 w. Engng—July 28, 1905.

"Shark."—See "Plunger."

Trials.—See under names of boats, makers and countries.

Vertical Motion.—The Motion of Submarine Boats in the Vertical Plane. William Horgaard. Read before the Brit. Inst. of Naval Archts. An examination of the qualities of stability of motion and manoeuvring power, and the manner in which they are affected by varying the rudders, the amount and distribution of buoyancy, shape of hull, etc. Serial. 1st part. 8500 w. Engng—April 5, 1901.

SUBMARINE CABLE.

See also **CABLE SHIP; ELECTRIC CABLE; SUBMARINE TELEGRAPH.**

Submarine Cables (Ueber Unterseekabel). Hermann Hildebrandt. A general review of the growth of the submarine cable service of various parts of the world. Serial. Part I. 2500 w. Schiffbau—Aug. 9, 1905.

Submarine Cables (Unterseekabel Hermann Hildebrandt. Historical, descriptive and statistical with illustrations and tables. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 26, 1905.

Alaska.—Cable Laying in Arctic Waters. George F. Porter. Illustrated account of the laying of the St. Michael-Cape Nome cable and the wreck of the cable ship. 1400 w. Elec Rev, N Y—Dec. 5, 1900.

Completion of the Alaskan Cable. Article reprinted from "Telegraph Age," giving an account of the laying of a cable from Skagway to Seattle, and telling of other telegraph and wireless projects in Alaska. 1500 w. Elec Rev, N Y—Aug. 13, 1904.

Aluminum Sheathed.—An Aluminum-Sheathed Cable. Charles Bright. A short description of a cable aiming to combine strength and lightness with freedom from corrosion. 500 w. Electro-Chem & Met—May, 1902.

American Manufacture.—Ocean Cables Should Be of American Make. J. W. Marsh. Discusses the subject of cables and their manufacture, urging the extension of the industry in the United States. 4500 w. Am Mfr—Jan. 10, 1901.

The Manufacture of Deep Sea Cables in America. Discusses points relating to the ability of the American manufacturer to make such cable, and the protection that should be afforded the industry. 2500 w. Elec Wld & Engr—Dec. 21, 1901.

Artificial.—On a Form of Artificial Submarine Cable. Augustus Trowbridge, in the "Physical Review." Describes a simple piece of apparatus designed to imitate the action of a submarine cable used in teaching physics. 1300 w. Elec, N Y—July 31, 1901.

Block Island.—Laying the New Block Island Cable. Illustrated description of the work of laying eleven miles of heavy cable connecting Block Island with the mainland of Rhode Island. 1200 w. Elec Rev, N Y—Sept. 26, 1903.

British.—Imperial Telegraphic Communication. Charles Bright. An address before the London Chamber of Commerce on the British Pacific cable in particular, and on the submarine cable system of the British Empire in general. Serial. Part I. 3500 w. Elec Rev, Lond—Dec. 12, 1902.

Capacity and Resistance.—The Ratio of Resistance to Capacity in Long Submarine Cables, and Some Related Quantities. J. Elton Young. The first part of an interesting paper on the core ratio of submarine cables, with editorial. Serial. 1st part. 4000 w. Elect'n, Lond—March 6, 1903.

Capacity Measurement.—Measurement of the Capacity of Long Submarine Cables (La Mesure de la Capacité des Longs Cables Sous-Marins). M. Devaux Charbonnel. The method consists in charging the cable in cascade with a condenser of known capacity; from which the capacity of the cable may be deduced. 1200 w. Comptes Rendus—June 13, 1905.

Current Analysis.—See **TELEGRAPH.**

Fault Localization.—The Localisation of Breaks in Submarine Cables. Remarks on reported tests of A. Davidson, concerning the importance of knowing the conditions under which the tests were made. 2500 w. Elec Rev, Lond—April 1, 1904. See also **ELECTRIC MEASUREMENT—Fault, Submarine.**

German-American.—The German-American Cable (Das Deutsch-Amerikanische Kabel). A description of the Emden-Fayal-New York cable, including the instruments and method of operation. 3000 w. Electrotech Zeitschr—Dec. 5, 1901.

The German-American Cable. From the "Elektrotechnische Zeitschrift." An interesting account of the new Emden-Fayal-New York cable which was laid over a year ago. 3500 w. Elect'n, Lond—Feb. 14, 1902.

Germany-North Sea Islands.—See **Telephone.**

Gutta Percha.—See **GUTTA PERCHA; INSULATION; SUBMARINE TELEGRAPH.**

Honolulu.—See **Pacific.**

Inductance.—See **Telephone; TELEPHONE CABLE.**

Insulation.—See also **GUTTA PERCHA; INSULATION; SUBMARINE TELEGRAPH.**

Insulation Resistance.—See **ELECTRIC MEASUREMENT—Fault, Submarine.**

Laying.—Submarine Cables (Les Cables Sous-marins). G. Couraud. Describing modern methods of cable laying, illustrating the practice of different countries. Serial. Part I. 3000 w. Revue Technique—Aug. 25, 1904.

See also **Manufacture; CABLE SHIP;** and under specific names of submarine cables.

Manufacture.—The Manufacture of Cables (Ueber Kabelfabrication). Gustav Bergholtz. A review of the development of the manufacture of submarine telegraph cables, with illustrations of modern machinery and methods. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 31, 1902.

Mexican.—The Vera Cruz-Frontera-Campeche Cable for the Mexican Government. Illustrates and describes the making and laying of this cable. 3000 w. Elec Rev, N Y—Dec. 13, 1902.

The Manufacture and Laying of a Submarine Cable. Dr. A. E. Kennelly. Abstract of a lecture delivered before Sibley College. The cable described was the one made for the Mexican Government, connecting the ports of Vera Cruz, Frontera, and Campeche on the Gulf of Mexico. Description, with illustrations. 2300 w. Sib Jour of Mech Engng—Jan., 1903.

Military.—See **Philippines; Testing; TELEGRAPH; TELEPHONE.**

Military and Naval Supremacy.—The Influence of Submarine Cables Upon Military and Naval Supremacy. George O. Squier. Showing the importance of submarine cables in national defence, and discussing the existing and proposed systems of the United States and Gt. Britain. 7500 w. Nat Geog Mag—Jan., 1901.

Pacific.—The Cables Across the Pacific. Thomas Commerford Martin. Remarks and information regarding the British and American Pacific cables. Maps. 1500 w. Rev of Revs—Feb., 1903.

See also **Military; Twentieth Century.**

Pacific, American.—Opening of the First Section of the Pacific Cable. An account of the opening of the section between San Francisco and Honolulu, with information concerning the depth, and other matters of interest. Ill. 900 w. Sci Am—Jan. 10, 1903.

The Laying of the American Trans-Pacific Cable. Alexander G. McAdie. An illustrated account of this important project, with chart of deep-sea soundings off the coasts of California and Mexico, and between California and the Hawaiian Islands. 2500 w. Jour of Elec—Jan., 1903.

The Landing of the Honolulu End of the Pacific Cable. A brief account of the work of laying the cable, and the extent of this great work with illustrations of the ceremonies celebrating the landing at Honolulu. 1100 w. Sci Am—Jan. 31, 1903.

The New Pacific Cable from San Francisco to Honolulu, Hawaii. William H. Crawford, Jr. Illustrated description of the cable-ship "Silvertown," and its equipment for laying the cable and of the getting of the line ashore at San Francisco, and at Honolulu. 1500 w. Marine Engng—Feb., 1903.

The Laying of the Commercial Pacific Cable. Frank P. Medina. Describes points of design and construction, laying and maintenance of submarine cables, with special reference to the Commercial Cable Company's cable between San Francisco and Manila. 3500 w. Jour Assn of Engng Socs—Sept., 1904.

Completion of the First American Pacific Cable. Map showing the route from San Francisco to Manila, with information of interest concerning this recently completed work. 1400 w. Elec Wld & Engr—July 11, 1903.

The Pacific Cable. Reviews the various attempts to give cable communication across the Pacific, and the final success, discussing the importance of the event. 2000 w. Gunton's Mag—Aug., 1903.

Pacific, British.—The Imperial Cable. An interesting account of the All-British cable now in course of construction, which will connect England with Canada, Fiji and other South Sea Islands, Australia and New Zealand. 4000 w. Engr, Lond—Feb. 21, 1902.

The Pacific Cable. Illustrates and describes some of the technical features of this recently completed cable. 800 w. Elect'n, Lond—Nov. 7, 1902.

The Completion of the Pacific Cable, and Its Lessons. Calls attention to lessons from the history of this undertaking, and the prospects of improved communication. 2400 w. Elec Rev, Lond—Nov. 7, 1902.

See also **British.**

Philippines.—The Philippine Cable and Attending Work. Illustrated description of the difficulties encountered in establishing telegraphic communication in these islands. 1600 w. Elec, N Y—Nov. 13, 1901.

Cable Laying in the Philippines. Frederick Moore. An illustrated account of the work and some of the difficulties. 900 w. Sci Am—Nov. 23, 1901.

The Military Cable System of the Philippines. Capt. Edgar Russel. Describes somewhat fully the laying of the cables to connect the various islands. Ill. 4000 w. Trans Am Inst of Elec Engrs—May 28, 1902.

The Military Cable System of the Philippines. Edgar Russel. Describes the conditions under which the work was carried out by the U. S. Signal Corps. Ill. 8800 w. Trans Am Inst of Elec Engrs—Oct., 1902.

See also **MILITARY ENGINEERING.**

Power Transmission.—Some Points Relating to Submarine Electric Power Cables. G. U. G. Holman. Refers to lessons taught by interruptions of service on the submarine power cable belonging to the Canadian Electric Light Co., which is laid on the bed of the St. Lawrence River. 1600 w. Can Engr—July, 1903.

See also **ELECTRIC CABLE.**

Quebec-Levis.—Submarine Cable Laying During a Canadian Winter. G. U. G. Holman. Illustrates and describes the laying of a cable between Quebec and Levis, Canada. 2200 w. Elec Wld & Engr—March 22, 1902.

Relay.—See **SUBMARINE TELEGRAPH.**

Ship.—See **CABLE SHIP.**

Siemens-Halske Works.—The Manufacture of Submarine Cables. The new cable-works of Siemens and Halske are illustrated and the process of manufacture is described. 1400 w. Sci Am—Feb. 8, 1902.

Space Telegraphy.—See **SPACE TELEGRAPHY—Cables Compared.**

Telephone.—Submarine Telephone Cable with Increased Self-Induction (Unterseeische Fernsprechkabel mit Erhöhter Selbstinduktion). C. E. Krarup. An account of measurements of experimental telephone cables having iron ribbon and iron wire wound about the copper conductor. 1800 w. Elektrotech Zeitschr—April 17, 1902.

The Anglo-Belgian Telephone Cable. Some particulars of the laying of this cable, the longest submarine telephone cable yet laid, as given by M. Leduc, in a recent paper. 800 w. Elect'n, Lond—June 12, 1903.

Recent Submarine Telephone Cables (Ueber Neuere Unterseeische Fernsprechkabel). F. Breisig. Illustrating and describing recent cables laid to connect the North Sea Islands with Germany. 5000 w. Elektrotech Zeitschr—March 17, 1904.

Some Recent Long-Distance Submarine Telephone Cables. F. Breisig. Abstract of a paper read before the Elektrotechnischer Verein of Berlin. An illustrated article describing the Fehmarn-Lolland, the Greetsiel-Borkum, and the Cuxhaven-Heligoland cables. 2000 w. Elect'n, Lond—Sept. 2, 1904.

See also **TELEPHONE CABLE.**

Testing.—Submarine Cable Testing in the Signal Corps, U. S. Army. Townsend Wolcott. An account of the tests made and method of conducting them. 4400 w. Trans Am Inst of Elec Engrs—Oct., 1902.

Plant for Testing Cables at High Pressures. Stuart A. Russell. A description of a plant installed by the India Rubber, Gutta Percha and Telegraph Works Co. of Silvertown, Eng., for testing submarine cable core at a pressure of 5000 volts. Diagrams. 1200 w. Engr, Lond (Elec Engng Sup)—Dec. 12, 1902.

Twentieth Century.—The Outlook for the Submarine Cable Industry in the Twentieth Century. Charles Bright. Considers the outlook better than for some years, and gives views in regard to the Pacific cable proposed. 1500 w. Elec Rev, Lond—Jan. 11, 1901.

U. S. Army Test.—See **Testing.**

SUBMARINE CABLE LAYING.

See **CABLE SHIP; SUBMARINE CABLE; SUBMARINE TELEGRAPH.**

SUBMARINE CABLE WORKS.

See **SUBMARINE CABLE.**

SUBMARINE MINE.

See also **COAST DEFENSE; TORPEDO.**

Submarine Mines. Illustrated description of this means of coast defense. 1300 w. Sci Am Sup—July 27, 1901.

The Submarine Mine. Describes the three different kinds of submarine mines, giving illustrations showing the principles upon which they are built and operated. 1500 w. Sci Am—April 23, 1904.

Electric.—Electricity in Its Application to Submarine Mines. Capt. John Stephen Sewell. Reviews the objects desirable to accomplish by such a plant, the electrical arrangements and apparatus, testing, etc. 2300 w. Trans Am Inst of Elec Engrs—Oct., 1902.

Electrically Operated Submarine Mines. Waldon Fawcett. Brief explanation of the operation of electrical mines, with remarks and illustrations. 1600 w. Elec Rev, N Y—June 11, 1904.

Protection.—See **TORPEDO.**

Removal.—The Discovery and Removal of Contact Mines (De la Recherche et du Dragage des Torpilles Vigilantes). M. Dibos. An account of modern floating contact mines used for harbor defence in time of war, and the methods of dragging for their removal. 3500 w. Mem Soc Ing Civ de France—Oct., 1904.

SUBMARINE MINING.

Coal, N. S. Wales.—See COAL MINING—Submarine, N. S. Wales.

SUBMARINE NAVIGATION.

See **SUBMARINE BOAT.**

SUBMARINE OIL WELL.

See **PETROLEUM WELL—Submarine.**

SUBMARINE SIGNAL.

See also **SOUNDING—Acoustic Method.**

Submarine Signaling. Arthur J. Mundy. An illustrated account of a device due to the writer and Prof. Elisha Gray, which sends a signal twelve miles. 1200 w. Sci Am—Feb. 2, 1901.

Submarine Signaling. A description of the system devised by Arthur J. Mundy and Prof. Elisha Gray, which has been recently tried in Boston harbor. 2000 w. Marine Rev—April 25, 1901.

Submarine Sound Telegraphy. Gives an illustrated description of perfected apparatus for the transmission and reception of bell sound vibrations through water from one vessel to another. 1100 w. Sci Am—Feb. 27, 1904.

Submarine Signaling by Means of Sound. J. B. Millet. Read before the Inst. of Naval Archts. A review of investigations in this field, and especially recent work and its great value, explaining the system. 4000 w. Engng—May 19, 1905.

J. B. Millet's Submarine Signaling System (J. B. Millet's Unterwasser. Signaleinrichtungen). Th. Karrass. Describing the successful application of the microphone to the reception of distant bell signals under water. 2000 w. Elektrotech Zeitschr—Sept. 21, 1905.

Submarine Signaling. Reviews what has been done in this field, and gives an illustrated description of the apparatus devised for this purpose by the Submarine Signal Co., of Boston. Gives details of trials and other information. 2800 w. Engr, Lond—Sept. 1, 1905.

Some Recent Developments in Submarine Signaling. Alfred Gradenwitz. Illustrates and describes the invention of Arthur J. Mundy for sending sound through the water, and some of its applications. 2000 w. Elec Rev, Lond—Sept. 29, 1905.

Cunard Line and Submarine Signaling. Brief illustrated description of the system devised by the Submarine Signal Co. of Boston, for signaling through the water, and lately tested on the Cunard steamer "Lucania." 600 w. Marine Rev—Oct. 5, 1905.

Submarine Signaling. Henry R. Gilson. Reviews the experimental investigations made during the last twenty years in this field, especially the success attained by American investigators, describing the present signaling system and explaining some of the uses to which it may be applied. Ills. 6500 w. Tech Qr—Dec., 1905.

SUBMARINE TELEGRAPH.

See also **CABLE SHIP; SUBMARINE CABLE; SYNCHRONOGRAPH.**

Alternating Currents.—The Application of Alternating Currents to Cable Telegraphy (Darf Man die Theorie Rein Sinusförmiger Wechselströme in Fragen der Kabeltelegraphie Anwenden?). Dr. F. Breisig. A comparison of the electrical transmission of power, with the possibility of telegraphing with similar currents. 4500 w. Elektrotech Zeitschr—May 16, 1901.

See also **Transmission Speed; SYNCHRONOGRAPH.**

Armstrong-Orling Recorder.—The Electro-Capillary Recorder for Cable Purposes. J. Tarbotton Armstrong and Axel Orling. Illustrated description of an instrument which the inventors claim will enable them to receive 400 to 500 letters per minute. 1100 w. Page's Mag—May, 1904.

The Orling-Armstrong Electro-Capillary Recorder. Illustrated detailed description of this apparatus and its operation. It is peculiarly adapted for cable work. 1700 w. Sci Am Sup—Jan. 21, 1905.

See also **SPACE TELEGRAPHY.**

Baudot Printing.—See **Printing; TELEGRAPH.**

Brown Relay.—See **Relay.**

Calculator Board.—Practical Examples with the Calculator Board. Edward Raymond-Barker. Notes for submarine cable staffs giving a series of practical examples worked out by use of the calculator board. Serial. 1st part. 1400 w. Elec Rev, Lond—Oct. 23, 1903.

Coherer.—See **SPACE TELEGRAPHY—Cables Compared.**

Commercial Co.—See **SUBMARINE CABLE—German-American; Pacific; TELEGRAPH—Postal.**

Duplex Balancing.—The Duplex Balancing of Telegraph Cables. W. Gaye. Notes arising out of a little study of the operational methods of Mr. Oliver Heaviside in connection with the balancing of cables for the purpose of duplex telegraphy. Serial. 1st part. 2500 w. Elect'n, Lond—Sept. 23, 1904.

Electric-Railway Action.—The Eastern and South African Telegraph Company, Limited, v. Cape Town Tramway Companies, Limited. Reviews the cause of this dispute over the interference of electric-railway currents with submarine telegraphy, and the first decision, discussing the appeal. 2300 w. Elec Rev, Lond—March 28, 1902.

Electro-Capillary Recorder.—See **Armstrong-Orling.**

Gutta Percha.—Some Light on the History of the Submarine Telegraph. Baker A. Jamison. An account of the discovery of the insulating properties of gutta percha, and of its successful application to the needs of submarine telegraphy, and the wrong done the discoverer. 2700 w. Sci Am Sup—Feb. 27, 1904.

See also **GUTTA PERCHA; INSULATION.**

History.—Submarine Telegraphy. J. Wright. Reviews the early history of cable lines, the difficulties met; their working, etc. Ill. 4800 w. Ind & East Engr—Aug., 1901.

Jubilee.—The Jubilee of Submarine Telegraphy. Reviews the first public employment of submarine telegraphy which took place fifty years ago—on November 13, 1851. 1500 w. Engr, Lond—Nov. 22, 1901.

Longitude Determination.—See **LONGITUDE—Honolulu.**

Muirhead.—Dr. Muirhead's New Mode of Transmission and Relay for Cables. John Munro. Begins a description of this invention, giving an account of the work in this field. Serial. 1st part. 2200 w. Elec Rev, Lond—Oct. 3, 1902.

Orling-Armstrong Recorder.—See **Armstrong-Orling.**

Printing.—The Baudot System for Submarine Cables (Baudotbetrieb in See-Kabelleitungen). Describing the application of the Bandot printing telegraph apparatus to the cable between Marseilles and Algiers. 3000 w. Elektrotech Zeitschr—June 30, 1904.

See also **TELEGRAPH.**

Relay.—Automatic Relay Translation for Long Submarine Cables. S. G. Brown. Read before the Inst. of Elec. Engrs. Illustrated description of a system in use on some of the lines of the largest cable companies. Serial. 1st part. Elect'n, Lond—May 16, 1902.

Automatic Relay Translation for Long Submarine Cables. S. G. Brown. Read before the Inst. of Elec. Engrs. Illustrates and describes a system in every day use on some of the lines of the largest cable companies. 4000 w. Sci Am Sup—Sept. 20, 1902.

Vibrating Cable Relay. K. Gulstad. On the working of the apparatus which has given favorable results with some of the cables of the Great Northern Telegraph Co. Ill. Serial. 1st part. 1800 w. Elek Rev, Lond—Aug. 22, 1902.

Relays for Submarine Cables (Les Relais pour les Cables Sous-Marins). Devaux-Charbonnel. A discussion of the limitations of submarine telegraphy, and the possibility of using relays. Three articles. 3000 w. Electricien—Jan. 24, 31, Feb. 7, 1903.

Sound Signal.—See **SUBMARINE SIGNAL.**

Speed-Rate Conversion.—Cable Speed-Rate Conversion Tables. E. Raymond-Barker. Presents a table of multipliers by which statements of telegraphic speeds, whether in siphon recorder or in Morse codes, may be reduced from one mode of expression to another with due regard always to the varying space factor. 1500 w. Elec Rev, Lond—Nov. 22, 1901.

Synchronograph.—See **SYNCHRONOGRAPH — Submarine.**

Transmission Speed.—The Alternating-Current Theory of Transmission-Speed over Submarine Telegraph Cables. Prof. A. E. Kennelly. Mathematical treatment, showing the importance of the receiving-end impedance. Also bibliography and appendix, with table of hyperbolic functions of semi-imaginary quantities. 9000 w. Int Elec Cong of St Louis—Sept., 1904.

SUB-PRESS.

See **PUNCHING; SHEET METAL.**

SUB-STATION.

See also **ELECTRIC SUB-STATION; ROTARY CONVERTER; STORAGE BATTERY.**

Chicago Elevated Ry.—See **STORAGE BATTERY.**

Telephone.—See **TELEPHONE; TELEPHONE EXCHANGE.**

SUBWAY.

See also **ELECTRIC CONDUIT; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; TUNNEL; UNDERGROUND RAILWAY.**

Subway Systems. R. M. Parkinson. Extracts from the first prize essay in the competition on this subject instituted by the Pavior's Company. Ill. 2600 w. Jour Gas Lgt—Dec. 1, 1903.

Aberdeen.—The Aberdeen Cable Subway and Outfall Sewer. G. R. G. Conway. An illustrated description of an electric cable subway which men can walk in, constructed on top of a large sewer. 3500 w. Feilden's Mag—Dec., 1902.

Baker, Milton, Boston.—See **DAM.**

Boston.—See **UNDERGROUND RAILWAY.**

Boston Pipe Gallery.—Pipe Tunnel at Dover St. Bridge, Boston. Frederic I. Winslow. Brief illustrated description of this work. 700 w. Eng News—July 13, 1905.

Chicago Freight and Telephone.—Telephone Tunnels and Street Railway Subways in Chicago. Information concerning the low-level telephone tunnels, and the schemes for underground railways. Ill. 1100 w. Eng News—July 17, 1902.

Scope, Extent and Construction of the Underground Conduits of the Illinois Telephone and Telegraph Co. in Chicago. George W. Jackson. An illustrated detailed description of the construction work in building conduits to accommodate 100,000 subscribers. Discussion follows. 4800 w. Jour W Soc of Engrs—Oct., 1902.

Underground Conduits in Chicago. George W. Jackson. An illustrated article showing the extent and describing the construction of the underground conduits of the Illinois Telephone and Telegraph Company. 2800 w. Page's Mag—April, 1903.

Methods of Work Adopted in Constructing the Chicago Telephone Tunnels. Gives illustrated general description of the work and methods of construction of conduits for placing telephone wires underground. 2000 w. Eng News—Feb. 19, 1903.

Electric Traction for Freight Transportation in the Chicago Telephone Tunnels. An illustrated article describing the utilization of these tunnels for the handling of mail, express, and freight. 900 w. Eng News—March 17, 1904.

Chicago's Underground Freight Railroad. Illustrated detailed description of this tunnel, with statement of its purpose, methods of construction, motive power, equipment, method of handling trains, etc. 5000 w. Ir Age—Aug. 4, 1904.

Chicago's Freight Subways. An illustrated account of these subways showing the great advantage of the system. 1500 w. Sci Am—March 11, 1905.

Chicago's Underground Freight Traffic. George E. Walsh. Compares conditions in New York and Chicago, and gives information in regard to the tunnels of the Illinois Tunnel Company. 1600 w. Sci Am Sup—April 1, 1905.

The Chicago Tunnels. Illustrates and describes the 30 miles of underground passages built for carrying telephone cables, and now to be operated for the carriage of mails, parcels and goods. Serial. 1st part. 1000 w. Engr, Lond—July 14, 1905.

Building the Chicago Subway. William Hard, in "Public Opinion." An account of the carrying out of this project; with a brief comparison with the methods of the New York subway. 3000 w. R R Gaz—Vol. XXXVIII., No. 22.

The Telephone Tunnels in Chicago. Information of interest taken from the report of the Commissioners appointed to study these tunnels, giving the history of the undertaking, and the effect on the streets and buildings. 2000 w. Eng Rec—Aug. 26, 1905.

Mail Handling Facilities of the Chicago Freight Tunnels. Illustrates and describes the arrangements made, especially the construction of a tunnel to run under the post-office where the mails may be loaded and unloaded. 1000 w. R R Gaz—Vol. XXXIX., No. 25.

An Electric Underground Freight Railroad System. Frank C. Perkins. Illlustrates and describes details of track and trolley construction in the Chicago subway. 2000 w. Mod Mach—Dec., 1905.

See also **TRANSPORTATION.**

Concrete.—Concrete Subways for Underground Pipes. Extracts from a paper by Arthur Taylor Allen read before the Society of Engineers. Illustrates and describes a suggested construction, with its lighting, ventilation, etc. 3200 w. Gas Wld—Aug. 10, 1901.

Hull.—A Short Account of the Construction of a Subway for a Gas Main Under Queen's Dock Basin, Hull, England. F. J. Bancroft. Read before the North of England Gas Mgrs. Assn. Ill. 1800 w. Jour Gas Lgt—April 29, 1902.

Iowa State College.—Tunnel Construction for Underground Steam Pipes. Describes a tunnel 460 ft. long, built at the Iowa State College to accommodate electric, gas, water, and steam pipes. 1000 w. Eng Rec—Feb. 8, 1902.

London.—The City of London Subways. Illustrated description of existing subways and manner of lighting. 900 w. Elect'n, Lond—Nov. 30, 1900. See also **UNDERGROUND RAILWAY.**

New York.—See also **UNDERGROUND RAILWAY.**

New York, Pipe Galleries.—The Elm Street Subways in New York. An account of the scheme to build galleries for pipes on each side of the rapid transit subway, and the cause of the work being discontinued. Ill. 1200 w. Eng Rec—Nov. 17, 1900.

Pipe Galleries for New York. James C. Bayles. Discusses the effect on pavements of the frequent excavations, and of gas leakage, and the lessons to be learned from the experience of foreign cities. 2500 w. Munic Jour & Engr—Aug., 1904.

See also **STREET—Openings, N. Y.**

Philadelphia.—The Pennsylvania Avenue Subway and Tunnel, Philadelphia, Pa. George S. Webster and

Samuel Tobias Wagner. An illustrated description of the depression of the Philadelphia and Reading R. R. tracks. 21,000 w. Pro Am Soc of Civ Engrs—March, 1902.

Pipe Gallery.—Pipe Gallery Experience. James C. Bayles. A summary of experience with pipe galleries in cities, showing their advantages. 3800 w. Dom Engng—Oct. 24, 1903.

See also **Boston; Concrete; New York; STREET—Openings, N. Y.**

SUDAN.

See also **RAILWAY.**

Exploration.—Exploration in the Sudan and Abyssinia. A. H. Ackermann. Illustrations, with description of the country, transport difficulties, climate, labor, etc. 1500 w. Eng & Min Jour—Sept. 8, 1904.

SUEZ CANAL.

See **CANAL—Suez.**

SUGAR.

See also **CENTRIFUGAL MACHINE; VACUUM PUMP.**

Bohemian Factory.—See **ELECTRIC DRIVING—Sugar Factory.**

Cambrai, France.—The New Plant of the Sugar Works at Cambrai France (Les Installations Nouvelles de la Sucrerie Centrale de Cambrai, à Escaudoeuvres). A well illustrated description of a beet-sugar refinery, equipped with modern machinery, including an electric plant. Serial. 2 parts. 1 plate. 5000 w. Génie Civil—April 18 and 25, 1903.

Egypt Plant.—A Sugar-Cane Triple-Crushing Plant. A. E. Jordan. Describes a sugar-cane crushing plant erected and in operation at Ballâna, Upper Egypt; the installation is guaranteed to crush 750 tons of cane per day of 22 hours. Ill. 1600 w. Engng—Nov. 8, 1901.

Evaporation.—The Evaporation of Juice. A. E. Jordan. On the importance of adopting a more economical apparatus for the evaporation of the water contained in juice. Gives illustrations and descriptions of the most modern evaporators, the present article presenting the Yaryan, and the Lillie types. Serial. 1st part. 3800 w. Engng—Jan. 3, 1902.

See also **VACUUM PUMP.**

Factory Construction.—See **BUILDING CONSTRUCTION.**

Fremont, O.—The Beet Sugar Plant at Fremont, O. Illustrated description of plant with new apparatus for rapid crystallisation of low products and new forms of centrifugals, with notes on a method of utilising the poor molasses now run to waste. 900 w. Eng Rec—April 13, 1901.

Hawaiian Factory.—See **BUILDING CONSTRUCTION—Factory, Hawaii.**

Indian Industry.—The Development of the Indian Sugar Industry. Discusses the reasons for lack of enterprise, considering the ignorance of the best methods, and the need of better machinery to be in part the cause. Serial. 1st part. 1000 w. Engr, Lond—Aug. 2, 1901.

Ketzin, Germany.—The Sugar Works of Ketzin, near Berlin (Sucrerie de Ketzin, près de Berlin). Illustrated description of large beet sugar plant. 1000 w. 1 plate. Génie Civil—Aug. 22, 1903.

Machinery Erection.—Notes on Erecting Sugar Machinery. From "Steam Engineering." Describes the methods employed in building the foundations and erecting the apparatus. Ill. 1700 w. Mach, N Y—Aug., 1901.

Utah Beet.—The Beet Sugar Industry in Utah. W. P. Hardesty. Illustrates and describes the method of making beet sugar at Lehi, Utah; the seventeen stages of the process are explained and the apparatus briefly described. 5200 w. Eng Rec—March 2, 1901.

SUGAR MACHINERY.

See **CENTRIFUGAL MACHINE; SUGAR; VACUUM PUMP.**

SULPHIDE ORES.

See **LEAD METALLURGY; METALLURGY; ORE DEPOSIT; ORE TREATMENT; SMELTING; SILVER; SILVER METALLURGY; TIN METALLURGY; ZINC METALLURGY.**

SULPHITE MILL.

See also **PAPER MILL.**

Power Plant.—See **POWER PLANT—Sulphite Mill.**

SULPHUR.

America.—Sulphur. Edward W. Parker. Extract from the annual report of the U. S. Geol. Survey. Information relating to the amount consumed in the United States, where it is produced, and the methods of reducing the ores. 3300 w. Mines & Min—Feb., 1901.

The Vesuvius of America. Day Allen Willey. An illustrated article describing the sulphur mining industry, and giving an interesting account of its history. 1200 w. Sci Am—April 22, 1905.

Analysis.—See **IRON ANALYSIS.**

Coke.—The Presence of Coke Sulphur in the Blast Furnace (Das Verhalten des Koksschwefels im Hochofen). Oscar Simmersbach. An examination of extent to which sulphur may be brought into the blast furnace with the fuel; with tabulated results of analyses. 2000 w. Glückauf—July 15, 1905.

Gas Manufacture.—See **GAS MANUFACTURE—Sulphur Utilisation.**

Italy.—See **MINING INDUSTRY.**

Japan.—See **MINING INDUSTRY.**

Louisiana.—The Sulphur Deposits of Calcadieu Parish. Frank M. Kerr. Concerning these deposits in Louisiana and their development, methods, and their results, etc. 2800 w. Jour Assn of Engng Socs—Feb., 1902.

Roasting.—See **ORE TREATMENT—Roasting, Sulphur.**

Sewer Pipe Joints.—See **SEWER—Joint, Sulphur.**

Sicily.—See **MINING INDUSTRY—Italy.**

Slag.—See **SLAG.**

SULPHUR DIOXIDE.

Binary-Vapor Engine.—See **BINARY ENGINE—Sulphur Dioxide.**

Pressure Temperature Curve.—The Pressure Temperature Curve of Sulphurous Anhydride. Edward F. Miller. Gives results of experimental determinations. 1000 w. Trans Am Soc of Mech Engrs. No. 010—Dec., 1903.

SULPHURETTED HYDROGEN.

See **GAS ANALYSIS; GAS PURIFICATION; HYDROGEN SULPHIDE; MINE GAS.**

SULPHURIC ACID.

Manufacture.—On the Manufacture of Sulphuric Acid at Sydney, C. B. Presented at meeting of the Canadian Min. Inst. Gives a sketch of the process, discussing details as carried out at the Dominion Iron & Steel Co.'s plant in Sydney, Nova Scotia. 4200 w. Can Min Rev—Jan. 31, 1904.

Sulphuric Acid Manufacture. F. Luety. Abstract translation of a paper in "Zeit. für angewandte Chemie." Reviews the principal modern improvements in the sulphuric-acid chamber process, and deals more in detail with a method due to H. H. Niedenfuehr. Ills. 2500 w. Eng & Min Jour—Oct. 7, 1905.

SULPHUROUS ANHYDRIDE.

See **SULPHUR DIOXIDE.**

SUN MOTOR.

See **SOLAR MOTOR.**

SUN SPOT.

See also **MAGNETISM—Terrestrial.**

Influences of the Sun Spots upon Electrical and Magnetic Forces of the Earth. William Finn. An account of investigations, and of theories. 2000 w. Sci Am Sup—Dec. 5, 1903.

SUPERHEATED STEAM.

See also **HEATING—Superheated Steam; LOCOMOTIVE—Superheater; STEAM ENGINE; STEAM ENGINE TEST; STEAM TURBINE.**

How High Shall Steam Be Superheated (Wie Hoch Soll Dampf Ueberhitzt Werden?). Josef Jedlicka. An exhaustive examination of the subject, to determine the most economical degree of superheating for given conditions. Three articles, 1 plate. 8000 w. Oesterr Zeitschrift f Berg u Hüttenwesen—Dec. 29, 1900.

Superheated Steam. Ernest H. Foster. Read before the junior meeting of the Am. Soc. of Mech. Engs. A statement of the advantages of superheating as a means of increasing the efficiency of steam plants, and a brief description of types of superheaters now in regular use. 4000 w. Eng Rec—April 6, 1901.

Superheated Steam. Ernest H. Foster. Briefly reviews the history of superheating, discusses the increased efficiency and methods. 3700 w. Trans Am Soc of Mech Engrs, No. 909—May, 1901.

Superheated Steam. O. Herre. Explains the manner of superheating and gives tabulated information showing the economy effected. 800 w. Power—Sept., 1901.

Some Experiences and Results Derived From the Use of Highly Superheated Steam in Engines. R. Lenke. 2300 w. Inst of Mech Engrs—Glasgow Congress, 1901.

Steam Superheaters (Les Surchauffeurs de Vapeur). Maurice Miet. A description of recent progress in superheater construction, with illustrations of various types. 3000 w. Génie Civil—Feb. 1, 1902.

The Use of Superheated Steam. W. H. Wakeman. Considers some points that are disadvantages in the use of superheated steam. 1500 w. Elec, N Y—May 21, 1902.

The Practical Economy of Using Superheated Steam. P. Nolet. Translated from the French. Discusses some of the essentials of successful application and gives reasons for the savings effected. 4000 w. Steam Engng—Aug. 10, 1902.

Superheated Steam. H. L. Koenig. Considers methods of superheating, its use, applications of the system, etc. 2900 w. Sib Jour of Engng—Oct., 1902.

Progress in the Use of Superheated Steam (Fortschritte in der Anwendung des Ueberhitzten Dampfes). A paper by Director Burkhardt before the "Eisenhütte Oberschlesien," giving a general account of the application of superheated steam for engines and of superheating systems. Serial. Part I. 5000 w. Stahl u Eisen—July 15, 1903.

A Contribution to the Study of Superheating (Contribution à l'Etude de la Surchauffe). A. Petot. A discussion of the formulas for superheated steam, showing the necessity for a more satisfactory determination of the specific heat at various temperatures. 1200 w. Comptes Rendus—July 20, 1903.

The Generation of Superheated Steam (Die Erzeugung des Ueberhitzten Wasserdampfes). Dr. Otto Berner. A discussion of the construction of superheaters, with tabulated data of results of experimental researches. Two articles. 10,000 w. Zeitschr d Ver Deutscher Ing—Oct. 24, 31, 1903.

The Generation of Superheated Steam. Otto Berner. From the German as published in "Zeitschrift des Vereines Deutscher Ingenieure." Facts deduced from experiments with superheated steam, considering the material required in the construction of steam superheaters, the transmission of heat, the velocity of steam through the pipes, and the work done by the boilers. 3500 w. Power—Aug., 1904.

The Principles and Practice of Superheating. W. H. Booth. General discussion of superheated steam and its use. 3000 w. Tram & Ry Wld—Aug. 11, 1904.

Superheated Steam. A. G. Gibson. Read before the Owens College Engng. Soc. Briefly reviews the history of superheating, and considers superheating as applied to steam engines or steam turbines. Serial. 1st part. 3700 w. Mech Engr—March 25, 1905.

Superheated Steam. J. L. Moore. Explains the aim in the use of superheated steam, gives results of tests, and conclusions. General discussion. 3500 w. Pro Engrs' Soc of W Penn—May, 1905.

Performance of a Superheater. A. Bement. Gives diagrams plotted from a large number of experiments, discussing the results shown. 700 w. Trans Am Soc of Mech Engrs, No. 076—June, 1905.

The Application of Superheated Steam to Piston Engines (Die Anwendung des Ueberhitzten Dampfes bei der Kolbenmaschine). Otto Berner. A study of various tests of engines using superheated steam, forming the introduction to a general investigation of the subject. Serial. Part I. 6000 w. Zeitschr d Ver Deutscher Ing—July 1, 1905.

The Use of Superheated Steam in Engines (Les Applications de la Vapeur Surchauffée aux Machines). Ch. Compère. Account of tests and description of apparatus. 3000 w. Mem Soc Ing Civils de France—Aug., 1905.

The Use of Superheated Steam in Engines (La Surchauffe Appliquée à la Machine à Vapeur d'Eau). François Sinigaglia. Paper before the Mechanical Congress at Liége, giving a general review of the subject, with illustrations and tables. Serial. Part I. 10,000 w. Rev de Mécanique—Aug. 31, 1905.

Advantages.—See Computation; Economy.

Alloy Strength.—See **ALLOY—Superheated Steam Effect.**

Alternator Tests.—Steam Alternator Working with Highly Superheated Steam. E. Kilburn Scott. A summary of results obtained by Prof. Ewing in tests upon a 300 I. H. P. single crank compound jet condensing engine. Ill. 1700 w. Tram & Ry Wld—Nov. 12, 1903.

Automobile.—See **AUTOMOBILE, STEAM—Superheated.**

Berlin Electric Station.—A Compound Superheater. R. Hildebrand. An account of the power plant of the tramway station, Luisenstrasse, Berlin, Germany, which has a maximum capacity of 12,000 H. P., using separately fired superheaters. Diagrams. 900 w. Power—March, 1905.

Bodman.—See **AUTOMOBILE, STEAM.**

Bull's Paper.—The Use of Superheated Steam. Prof. Storm Bull. Reviews the history of its use, and describes the arrangements of superheater, with respect to the boiler, the difficulties, with tests of engines under superheated steam, various types, &c. General discussion. 10,500 w. Jour W Soc of Engrs—Dec., 1903.

Cole.—See **LOCOMOTIVE—Superheater, Cole.**

Compound Engines.—The Use of Superheated Steam and of Re-heaters in Compound Engines of Large Size. Lionel S. Marks. Gives results of 28 tests on 9 separate engines to determine the performance under different loads both with and without jacketing and reheating. Ills. 7500 w. Trans Am Soc of Mech Engrs, No. 021—June, 1904.

See also Test.

Compound Locomotive.—See **LOCOMOTIVE—Superheater; LOCOMOTIVE TEST—Superheated Steam.**

Computation.—The Computation of the Advantages of Superheating (Calcul du Bénéfice de la Surchauffe). M. Delaporte. A study of the advantages of superheating considered in connection with the steam engine as an important machine. 5000 w. Revue de Mécanique—Nov. 30, 1903.

Method of Computing the Amount of Superheating of Steam in the Cylinder of a Superheated Steam Eugine. Prof. D. S. Jacobus. A detailed explanation of the method used by the writer. 700 w. Stevens Ind—July, 1905.

Conveying Losses.—The Conveying of Superheated Steam (Die Fortleitung des Ueberhitzten Wasserdampfes). Dr. Otto Berner. A discussion of the losses in carrying superheated steam through pipes. Serial. Part I. 4000 w. Zeitschr d Ver Deutscher Ing—April 2, 1904.

Cruse.—The Cruse Patent Controllable Superheater. Illustrated description of an improved form. 1300 w. Prac Engr—May 16, 1902.

Some Notes on the Construction and Operation of Flue-Fired Superheaters. H. Cruse. Considers the construction, materials and management of superheaters. 2400 w. Elec Times—Aug. 21, 1902.

The Cruse Controllable Superheater. Illustrates and describes a superheater which claims to have solved the difficulties found in other types. 2400 w. Engng—Aug. 14, 1903.

De Laval.—See **STEAM TURBINE.**

Disinfection.—Disinfection by Steam (Ueber Dampfdesinfektion). Drs. Kister and Weichardt. Advantages and disadvantages of superheated steam for disinfection and sterilization of clothing and other materials. Diagrams and tables. Serial. 2 parts. 2500 w. Gesundheits Ing—June 30 and July 10, 1903.

Economy.—Superheated Steam. G. D. Seaton. Abstract of a paper read before the Staffordshire Iron & Steel Inst. Facts from the writer's experience showing the saving in cost effected by using superheaters. 1200 w. Ir & Coal Trds Rev —Feb. 26, 1904.

The Thermal Effect and the Practical Utility of Superheated Steam. Robert H. Smith. Discusses this subject, concluding the whole merit and utility of using superheated steam in engines lies in that it prevents condensation, and keeps the cylinder and ports dry. 2000 w. Elec Rev, Lond—May 13, 1904.

The Superheating of Steam and Its Influence on Engine Economy. R. M. Neilson. The first of two articles; including a description of the various modes of giving additional heat to the steam with typical forms of superheater construction. 4000 w. Engineering Magazine—March, 1905.

The Superheating of Steam and its Influence on Engine Economy. R. M. Neilson. The second paper discusses the results secured by the use of superheated steam, with data and results of tests. 4000 w. Engineering Magazine—April, 1905.

Electric Generation.—The Assistance of Superheated Steam for Reducing the Cost of Electrical Energy. E. J. Fox. Remarks giving the writer's experience and showing the subject is deserving of the attention of those interested in the generation of electricity. 1500 w. Ir & Coal Trds Rev—Nov. 4, 1904.

Superheated Steam and the Construction of Superheaters as Used in Power Plants. Frans Koester. Illustrations of types of superheaters, with a discussion of the use of superheated steam. 3500 w. St Ry Rev—Dec. 15, 1905.

Engine Test.—See Test; **LOCOMOTIVE TEST; STEAM ENGINE TEST.**

European Practice.—European Practice in the Use of Superheated Steam. Frans Koester. Reviews the history of its use and describes examples of modern engine equipment. Serial. 1st part. 2200 w. Power—Sept., 1904.

Ewing's Engine.—The Use of Highly Superheated Steam. Prof. Ewing. A discussion of some points in regard to the advantages gained by superheating, referring to trials of an engine recently made by the writer. 2000 w. Engr, Lond —Feb. 20, 1903.

Heating Value.—The Heating Value of Superheated Steam (Zur Frage des Wärmewertes des Ueberhitzten Wasserdampfes). C. Bach. Derivation of formulas for the computation of the heating power of steam superheated to various temperatures. 1000 w. Zeitschr d Ver Deutscher Ing—May 17, 1902.

See also **Total Heat.**

Heizmann.—The Transfer of Heat in the Heizmann Superheater (Wärmedurchgangsversuche mit dem Dampfüberhitzer von Heizmann). Dr. Otto Berner. Data and results of experimental tests of the transfer of heat in superheaters, both in the smoke flue and when independently fired. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—March 25, April 8, 1905.

Herring.—See **Test, Mannheim.**

History.—Superheated Steam, from 1827 to the Present Day (La Vapeur Surchauffée, de 1827 à Nos Jours). G. Loffet. An illustrated general review of the subject, in theory and practice. Serial. 1st part. 2000 w. Rev Technique—Feb. 10, 1902.

A Century of Superheated Steam. E. P. Watson. Explains the term; discussing the difficulties encountered in its use, and its value. 2500 w. Ir Age—July 16, 1903.

Holland.—Engines for Use with Superheated Steam (Stoommachines met Hoog-Overhittenstoom). C. F. Stork. A review of the question of superheated steam, with data and results from a number of engines in use in the Netherlands. 3500 w. Ingenieur—Oct. 11, 1902.

Hunger Paper.—Boilers and Engines for Superheated Steam (Kessel und Dampfmaschinen für Ueberhitzten Dampf). Oscar Hunger. A discussion of the importance of using properly designed engines and boilers if the full benefits of superheating are to be obtained. 2500 w. Zeitschr d Ver Deutscher Ing—April 27, 1901.

New German Boilers and Engines for Superheated Steam. Abstract of a paper by Oscar Hunger, before the Soc. of German Engrs., describing the details of boilers and engines best adapted for superheated steam. 2700 w. Eng Rec—May 18, 1901.

"James C. Wallace."—See **MARINE ENGINE—Test.**

Large Units.—See **STEAM PLANT.**

Lentz Engine.—See **STEAM ENGINE.**

Locomotive.—See **LOCOMOTIVE—Superheater; LOCOMOTIVE TEST—Superheated Steam.**

Locomotive Test.—See **LOCOMOTIVE TEST—Superheated Steam.**

Maiche.—Steam Superheaters (Surchauffeurs de Vapeur). M. Loffet. With especial reference to the Maiche superheater, with data and results of tests. 2500 w. Revue Technique—Oct. 25, 1902.

Marine.—See **Watkinson; MARINE ENGINEERING.**

Mechanical Features.—Mechanical Features in the Use of Superheated Steam. Editorial pointing out some of the relations of superheated steam to mechanical details in stationary and locomotive engines and boilers. 2000 w. Ry Age—Aug. 14, 1903.

Pielock System. — See **LOCOMOTIVE — Superheater, Pielock.**

Potter Mesh Separator.—See **STEAM SEPARATOR.**

Practical Applications.—The Practical Application of Superheated Steam. George A. Hutchinson. Defines superheated vapor and applies the law to a concrete case, showing the advantage and the economy. Discusses the requirements of a superheater and gives illustrated descriptions of various designs. 7800 w. Trans Am Soc of Mech Engrs, No. 902—May, 1901.

Properties.—Properties of Superheated Steam. Prof. J. E. Denton. Reviews the results of investigations made by experimenters and the theories advanced and formulas deduced. 4000 w. Stevens Ind—Oct., 1905.

See also **Specific Heat; Total Heat.**

Pumping Engine.—See **PUMPING ENGINE—Superheated Steam.**

Richter's Experiments.—See **Test, Charlottenburg.**

Rowan's Paper.—Superheated Steam. F. J. Rowan. Read before the Inst. of Engrs. & Shipbuilders in Scotland. The present paper gives a historical review of investigators and their systems. Ill. Serial. 1st part. 2200 w. Mech Engr—Nov. 28, 1903.

Superheated Steam. F. J. Rowan. Discussion of this paper. Ill. 4700 w. Trans Inst of Engrs & Shipbuilders—Nov. 24, 1903.

Superheated Steam. Discussion of paper by F. J. Rowan. 5000 w. Ills. Trans Inst of Engrs & Shipbldrs in Scotland—Vol. 47, Part III.

Superheated Steam. F. J. Rowan. Continued discussion and correspondence in connection with this paper. 4500 w. Trans Inst of Engrs & Shipbuilders in Scotland—Feb. 23, 1904.

Superheated Steam. F. J. Rowan. Read before the Inst. of Engrs. and Shipbuilders. Reviews the history of the various investigations made in this field since 1736, describing designs of superheaters. 3500 w. Sci Am Sup—June 18, 1904.

Schmidt System.—The Schmidt System of Superheating Steam. Illustrates and describes the Schmidt patent "direct-fired" superheater, and the flue-fired superheater. Also the Schmidt single-acting tandem compound condensing engine. 2800 w. Ir & Coal Trds Rev—Aug. 30, 1901.

The Schmidt System of Superheating Steam. Illustrated description. 2200 w. Elec Engr, Lond—June 13, 1902.

The Schmidt System of Superheating Steam (Die Erzeugung und Anwendung von Hochüberhitztem Dampf nach dem System von Wilhelm Schmidt). A discussion of the economy of high superheating, as obtained in the Schmidt apparatus. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 8, 1902.

Superheated Steam. E. H. Foster. From a paper before the Engine Builders' Assn. Considers the advantages and disadvantages of superheating, describes the Schmidt system, the benefits of moderate superheating, and the use of superheated steam. 3000 w. Ir Age—Dec. 4, 1902.

Superheated Steam for Steam Engines. Bryan Donkin. An illustrated article considering a number of types of superheaters and giving facts in regard to the Schmidt system. 2400 w. Cassier's Mag—Jan., 1904.

The Schmidt Smoke-Tube Steam Superheater. Illustrates and describes a new form recently brought out. 1100 w. Engng—Dec. 23, 1904.

See also **LOCOMOTIVE—Superheater, Schmidt; STEAM ENGINE—Superheated Steam.**

Schwoerer.—Superheated Steam and the Schwoerer Superheater (La Vapeur Surchaffée et le Surchauffeur Schwoerer). Abstract of a paper by M. Nolet on superheated steam and the results obtained with the Schwoerer superheater. 8500 w. Revue Technique—Dec. 10, 1901.

Specific Heat.—The Specific Heat of Superheated Steam (Ueber die Spezifischen Wärmen des Ueberhitzten Wasserdampfes). Dr. Weyrauch. An exhaustive examination of the relation of the specific heat of steam to temperature and pressure, with formulas and tables for its determination. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 2, 9, 1904.

Experiments for Determining the Specific Heat of Superheated Steam. R. C. Carpenter. A report of experimental investigations and results. 2000 w. Sib Jour of Engng—May, 1904.

The Specific Heat of Superheated Steam (Die Spezifische Wärme des Ueberhitzten Wasserdampfes). H. Lorenz. Describing investigations made at the Institute of Technical Physics at Göttingen, showing the specific heat of superheated steam to be about 0.6. 2000 w. Zeitschr d Ver Deutscher Ing—May 14, 1904.

Recent Investigations upon the Specific Heat of Superheated Steam (Neure Versuche über die Spezifische Wärme des Ueberhitzten Wasserdampfes). H. Lorenz. A comparison of the results of Carpenter and Jones with those of the author. 1000 w. Zeitschr d Ver Deutscher Ing—Aug. 6, 1904.

The Specific Heat of Superheated Steam. Robert H. Smith. A discussion of the investigations made by Prof. H. Lorenz for making exact measurement of the specific heat, and of his results. A graphic interpretation of the results is given and explained. 2500 w. Engr, Lond—July 8, 1904.

The Specific Heat of Superheated Steam. Sidney A. Reeve. Reviews information from various investigators and calls attention to the unsatisfactory present state of knowledge on this subject, urging its reinvestigation. 4000 w. Jour Worcester Poly Inst—Nov., 1904.

The Specific Heat of Superheated Steam. The present article reviews the paper of Prof. Sidney A. Reeve, which was published in the Worcester Polytechnic Journal. Serial. 1st part. 2500 w. Engr, Lond—Feb. 8, 1905.

The Calorific Properties of the Vapor of Water at High Temperatures (Die Kalorischen Eigenschaften des Wassers und seines Dampfes bei Hohen Temperaturen). C. Dieterici. A discussion of the determination of the specific heat of water and of superheated steam. 3500 w. Zeitschr d Ver Deutscher Ing—March 4, 1905.

Specific Heat of Superheated Steam. R. C. H. Heck. Describes the first method used for the determination by measurement of total heat, and experimental work in this field. 2000 w. Power—May, 1905.

See also **Properties.**

Steam Turbine. — See **STEAM TURBINE — Superheated Steam.**

Test.—Superheated Steam Tests (Versuche mit Ueberhitztem Dampf). Otto Berner. Report to the Verein Deutscher Ingenieure on tests conducted at the steam experimental station of the Bavarian "Revisions Verein," in Munich. 7000 w. Zeitschr d Ver Deutscher Ing—Sept. 2, 1905.

See also **Alternator Tests; LOCOMOTIVE TEST; STEAM ENGINE TEST—Superheated Steam; Wolf; STEAM TURBINE—Superheated Steam.**

Test, Charlottenburg.—The Action of Superheated Steam in Reciprocating Engines (Das Verhalten Ueberhitzten Wasserdampfes in der Kolbenmaschine). Fritz Richter. Discussing tests on the experimental engine at Charlottenburg, including the calibration of instruments and graphical plotting of results. Three articles. 10,000 w. Zeitschr d Ver Deutscher Ing—April 30, May 7, 14, 1904.

The Action of Superheated Steam in Reciprocating Engines (Fonctionnement de la Vapeur Surchauffée dans les Machines à Pistons). F. Richter. A French translation by M. Lecuir, of Prof. Richter's important experimental researches at Charlottenburg. 10,000 w. Revue de Mécanique—Aug. 31, 1904.

Test, Enschede.—Results of Tests of Compound Engine Using Superheated Steam (Eenige Beschouwingen Over de Resultaten der Stoombeproeven met de Compound-Stoommachine, Werkende met Oververhitten Stoom). H. A. Ravenek. Data and results of tests of the engines of the Tubantia Spinning Mills at Enschede. 8000 w. De Ingenieur—Oct. 18, 1902.

Test, Ewing.—See **Ewing's Engine.**

Test, Mannheim.—Superheater Duties and Design. Frans Koester. A detailed account of a test made at the municipal plant in Mannheim, Germany, in which Herring superheaters were used. 1200 w. Power—March, 1905.

Test, Niechcice, Russia. — Test of a Superheated Steam Plant at Niechcice, Russia (Abnahmeversuche an einer Heissdampfanlage in Niechcice). M. Westphal. Data and results of test of a compound engine of 240 horse power, with steam superheated 350 degrees C. 2000 w. Zeitschr d Ver Deutscher Ing—Sept. 19, 1903.

Theory.—The Present State of the Theory of Superheated Steam (Etat Actuel de la Theorie de la Surchauffe de la Vapeur). H. Bernard. A review of the formulas of Witz, Poincaré and Rupprecht for computing the economy due to various degrees of superheating. 2000 w. Génie Civil—July 25, 1903.

Total Heat.—The Total Heat of Superheated Steam (Die Erzeugungswärme des Ueberhitzten Wasserdampfes). Dr. A. Griessmann. An experimental study of the properties of superheated steam, with especial reference to the specific heat at various temperatures. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—Dec. 19, 26, 1903.

Van den Kerchove.—See **STEAM-ENGINE TEST.**

Watkinson.—Some New Types of Superheaters. Prof. W. H. Watkinson. Read before the Inst. of Naval Archts. Illustrates and describes various superheaters designed by the author, which are giving exceedingly satisfactory results. Briefly explains the objects and advantages of superheating. 5000 w. Engng—July 10, 1903.

Superheaters. Benjamin Taylor. Illustrates and describes some new types invented by W. H. Watkinson, giving results of practical tests. 3500 w. Power—Aug., 1904.

Wire-Drawing.—Notes Relating to the De Laval Steam Turbine, the Wire-Drawing Calorimeter and the Superheating of Steam by Wire-Drawing. Prof. W. H. Watkinson. Read before the Inst. of Engrs. and Shipbuilders in Scotland. Discusses problems relating to the wire-drawing of steam. Serial. 1st part. Ill. 1200 w. Prac Engr—March 27, 1903.

Superheating by Wire-Drawing. Frank Foster. Shows a diagram of the wire-drawing calorimeter, explaining its principle and discussing its value; also considers another method of superheating steam by wire-drawing. 1200 w. Feilden's Mag—Sept., 1903.

Wolf Portable Engine.—See **STEAM ENGINE; STEAM ENGINE TEST.**

SUPERHEATER.

See **LOCOMOTIVE—Superheater; SUPERHEATED STEAM.**

SURFACE.

Polishing.—See **POLISHING.**

Testing.—See **TESTING—Optical Examination.**

SURFACE CONDENSER.

See **CONDENSER; COOLING TOWER.**

SURFACE-CONTACT RAILWAY.

See **ELECTRIC RAILWAY, CONTACT.**

SURFACING MACHINE.

The Surfacing Machine. Illustrated description of a new machine for facing tees, crosses and elbows. 900 w. Am Mach—April 24, 1902.

SURF BOAT.

See **LIFEBOAT.**

SURVEYING.

See also **PLUMB LINE; SURVEYING INSTRUMENT.**

Adjustment.—The Adjustment of a Transit Survey as Compared with That of a Compass Survey. Charles L. Crandall. Explains the method of adjustment of a compass survey and its improper application to transit surveying; gives a method in detail that can be used mechanically the same as the old compass survey method. 2200 w. Pro Am Soc of Civ Engs—Dec., 1900.

The Adjustment of a Transit Survey as Compared with That of a Compass Survey. George W. Tuttle. Discussion of the paper by Charles L. Crandall. 2000 w. Pro Am Soc of Civ Engs—Feb., 1901.

The Adjustment of a Transit Survey as Compared with That of a Compass Survey. Continued discussion of a paper by C. L. Crandall. 2400 w. Pro Am Soc of Civ Engrs—March, 1901.

Alaska Boundary.—The Alasko-Canadian Frontier. Thomas Willing Balch. A review of the entire negotiations relating to the purchase of Alaska with a view of determining the boundary. Maps. 8500 w. Jour Fr Inst—March, 1902.

Albula Railway.—See **RAILWAY.**

Balloon Path.—See **AERONAUTICS—Path of Balloon; Speed Determination.**

Base Line.—The Base Line Measurements for the 98th Meridian Triangulation. John F. Hayford. Gives the principal features of this work, calling attention to departures from past practice. Of value as a record of rapid and economical measurement of bases of a primary degree of accuracy. Ill. 5400 w. Eng News—Sept. 4, 1902.

Rapid Base Line Measurement for the Ninety-Eighth Meridian Triangulation. Illustrated description of methods followed by the U. S. Coast and Geodetic Survey in which steel tapes were employed in comparison with older methods. 4900 w. Eng Rec—Sept. 27, 1902.

Recent Rapid Base-Line Measurements, Precise Leveling, and Triangulation. A. L. Baldwin. An illustrated article giving an account of the work of the U. S. Coast and Geodetic Survey. Also discussion. 3700 w. Pro Engrs' Club of Phila—Oct., 1903.

Base-Line Measurements with Steel Tapes. Arthur D. Butterfield. Describes apparatus used, methods employed and results obtained by the writer. Ill. 3400 w. Jour Worcester Poly Inst—March, 1903.

Bicircular Quartics.—Two Problems in Field Engineering. Arnold Emch. Gives the solution of an application of the theory of bicircular quartics, and an application of projective geometry. 1000 w. Eng News—Dec. 31, 1903.

Bore Hole.—See **SURVEYING INSTRUMENT—Electric, Bore Holes.**

Boundary.—A brief discussion of the Law of Boundary Surveys. William E. Kern. 6000 w. Eng News—Aug. 28, 1902.

See also **Alaska Boundary; Massachusetts Boundary; Mexican Boundary.**

Bridge, Blackwell's Island.—Surveys for the Manhattan-Queens Bridge, New York. An account of the method in conducting the surveys, as described in the chief engineer's report. The bridge passes over Blackwell's Island. 1200 w. Eng Rec—Jan. 25, 1902.

The Triangulation for Bridge No. 4 Across the East River, New York City. Oscar Erlandsen. Describes the novel methods used in obtaining the distances across the channels in the Blackwell's Island Bridge. Also the apparatus and results. Ill. 1500 w. Eng News—Feb. 13, 1902.

See also **BRIDGE—Blackwell's Island.**

British.—The Practice of Our Profession and Suggested Reforms. A. G. Cross. Read before the Quantity Surveyors' Assn. The first part of the paper is a plea for a uniform system of measurement in England; the second part deals with reforms in the employment and payment of the quantity surveyor. 6500 w. Builder—April 22, 1905.

Canada.—Tide Levels and Datum Planes in Eastern Canada. W. Bell Dawson. Information gathered in connection with the tidal survey regarding tidal levels and facts of importance in harbor construction, etc. 15,500 w. Can Soc of Civ Engrs, Adv Proof—March, 1903.

Canal Construction.—The Solution of Certain Geodetic Problems in Connection with Canal Construction (Ueber Lösungen Geodätischer Aufgaben bei Verfassung der Detailprojecte von Wasserstrassen). J. Urbanski. An analysis of some of the surveying problems connected with the projects for the Danube-Moldau Canal. 2500 w. Zeitschr d Oester Ing u Arch Ver—Aug. 30, 1901.

See also **Isthmian Canal; CANAL; RIVER REGULATION.**

City Lots.—The Laying Out of City Lots Bounded by Curved and Straight Lines. Ernest McCullough. Gives an explanation of the practice followed by the writer, illustrating by plan. 1100 w. Eng News—May 11, 1905.

Cloud Distances.—Measuring Cloud Distances from a Railway Train. A brief description of a method involving sighting over marks on a window, and estimating distance run by train by counting telegraph poles. 1300 w. Eng News—March 27, 1902.

Curves.—Methods for Determining the Equations of Experimental Curves. A. S. Langsdorf. An examination of methods of analysis, illustrating by examples. 2200 w. Jour Assn of Engng Socs—June, 1904.

See also **CURVE; RAILWAY CURVE.**

Dresden Exhibition.—Surveying at the German Municipal Exhibition at Dresden (Das Vermessungswesen auf der I. Deutschen Stadtausstellung in Dresden). Dr. Hans Löschner. With numerous illustrations showing improvements in methods of surveying, levelling, etc., with especial reference to municipal work. Two articles. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—July 15, 22, 1904.

Electrolysis.—See **STRAY CURRENT—Surveys.**

Ferguson's System.—Ferguson's System of Surveying. John C. Ferguson. Describes and illustrates the use of Ferguson's surveying circle and percentage unit of angular measurement. 2800 w. Engng—July 25, 1902.

Field Work.—Engineering Field Work in the Colonies. W. G. Bligh. An illustrated article describing a type of angular instruments suited for rough work, and new types which will save time and labor. 3500 w. Public Works—Jan., 1905.

Geodesy.—Recent Contributions to Our Knowledge of the Earth's Shape and Size, by the United States Coast and Geodetic Survey. C. A. Schott. An account of the work, with chart and explanatory notes. 2200 w. Nat Geog Mag—Jan., 1901.

The Transcontinental Triangulation and the American Arc of the Parallel. John E. McGrath. On the importance of this work and the value of the report, with information relating to the work. 3500 w. Eng News—Jan. 3, 1901.

The Russo-Swedish Expedition for Measuring an Arc of the Meridian in Spitzbergen (Les Travaux de l'Expedition Russo-Suédoise pour la Mesure d'un Arc de Méridien au Spitzberg). A. Hansky. A fully illustrated account of the expedition. An arc of 4 degrees was measured up to 80 degrees north latitude. Two articles. 8000 w. Rev Gen des Sciences—Dec. 15, 30, 1902.

Report of the Commission for Geodetic Work at the Equator (Rapport Présenté au Nom de la Commission chargée du Contrôle Scientifique des Operations Géodésiques de l'Equateur). H. Poincaré. An account of progress made in measuring an arc of the meridian near Quito, Ecuador. 2800 w. Comptes Rendus—April 6, 1903.

Report of the Commission upon the Geodetic Operations at the Equator (Rapport Presente au Nom de la Commission Chargée du Controle Scientifique des Opérations Géodésiques de l'Equateur). Progress report of the Commission of the French Academy upon work done in Ecuador during 1903. 2500 w. Comptes Rendus—April 25, 1904.

The Present Status of Geodesy (L'Etat Actual de la Géodésie). R. Bourgeois. A review of the latest methods of accurate base and angle measurement, with especial reference to the work of the French equatorial expedition. 5000 w. Rev Gen des Sciences—April 30, 1904.

Report of the Equatorial Geodetic Commission (Rapport Présenté au Nom de la Commission Chargée du Controle Scientifique des Opérations Géodésiques de l'Equateur). Describing the work of the French expedition in Ecuador during 1904. 3500 w. Comptes Rendus—April 10, 1905.

The Complementary Geodetic Triangulation of the Higher French Alps (Sur les Triangulations Géodésiques Complémentaires des Hautes Régions des Alpes Françaises). P. Helbronner. With a list of stations and altitudes, and a brief review of the field work. 1800 w. Comptes Rendus—Nov. 13, 1905.

See also **Base Line; Canal Construction; Meridian; U. S. Coast and Geodetic; U. S. Geological; U. S. Government.**

Geological.—See **United States Geological; GEOLOGY; MINE MAP.**

Graphic Determination.—The Graphical Determination of Time Azimuth and Meridian (Ueber Graphische Bestimmung der Zeit, des Azimutes, und des Meridianes). E. Dolezal. Developing a graphical method of facilitating the computations, with diagrams for practical use. Serial. Part I. 1800 w. 2 plates. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 3, 1903.

Meridian Diagrams. Charles Arthur Albert Barnes. Describes certain practical methods which have proved satisfactory. 1700 w. (No. 3531). Inst of Civ Engrs.

See also **Slope Stakes.**

Gunnison River, Col.—Topographic Work in the Grand Canyon of the Gunnison. I. W. McConnell. An illustrated article giving facts brought out by surveys and explorations made to determine the possibility of diverting the water from the Gunnison River into the Uncompahgre Valley. 2500 w. Eng Rec—Oct. 3, 1903.

Hydrographic.—Recent Methods of Hydrographic Surveying. A. S. Cooper. Briefly describes recent important developments, discussing their accuracy and cost. 1200 w. Eng News—May 19, 1904.

Hydrographical Surveys, 1903. Reviews the chief points of interest in connection with the operations of the British surveying vessels. 2500 w. Engr, Lond—May 27, 1904.

See also **RIVER DISCHARGE; SOUNDING; WATER FLOW.**

Hydrographic and Forest.—Hydrographic and Forest Surveys of the United States. Herbert M. Wilson. Explains the work of this division of the U. S. Geological Survey. Map. 2200 w. Eng News—July 11, 1901.

Isthmian Canal.—Problems and Methods of the Isthmian Canal Surveys. Boyd Ehle. Gives outlines of the various routes, describing the survey work. Map. 4500 w. Trans Assn of Civ Engrs of Cornell Univ—1902.

Surveying in Central America. An account of the methods used in making surveys for the Isthmian Canal Commission. 2000 w. Eng Rec—July 19, 1902.

See also **CANAL.**

Leveling.—The Theory and Practice of Precise Spirit Leveling. Discussion of the paper by David A. Molitor. Ill. 26,000 w. Pro Am Soc of Civ Engs—Nov., 1900.

The Theory and Practice of Precise Spirit Leveling. David A. Molitor. Continued discussion of this paper. 9500 w. Pro Am Soc of Civ Engs—March, 1901.

Notes on Precision Leveling (Note sur un Niveau de Précision). MM. Böet and Huberti. Describing improvements made by the writers in the so-called "dumpy" level, and discussing methods of use. 2500 w. Rev Univ des Mines—Nov., 1900.

The Theory and Practice of Precise Spirit Leveling. W. S. Williams, J. A. Ockerson, and C. L. Crandall. Continued discussion of paper by David A. Molitor. 3500 w. Pro Am Soc of Civ Engs—Jan., 1901.

A Rapid Method of Leveling. E. Philip Gilman. Short description with sketches. 700 w. B. C. Min Rec—July, 1901.

See also **U. S. Government; SURVEYING INSTRUMENT.**

Map.—See **CITY PLAN; MAP; MINE MAP.**

Massachusetts Boundary Line.—Steel Tape Measurements on the Massachusetts Boundary Line, 1896 to 1898. N. Spofford. An illustrated article describing the work and showing the operation of the devices used. 2000 w. Eng Rec—July 16, 1904.

How the Massachusetts Northern Boundary Was Run Without Random Lines. N. Spofford. An account of the use of tall signal poles through land covered with a heavy growth of wood and timber. 2000 w. Eng Rec—Dec. 10, 1904.

Meridian.—The Location of a Meridian by Polar Elevation (Le Tracé d'une Méridienne par une Hauteur de la Polaire). M. Dehalu. Describing a method adapted for use with the surveyor's theodolite, and suitable for topographical surveying. 2000 w. Rev Univ des Mines—Dec., 1901.

Daylight Observations of Polaris to Establish a Meridian. W. O. Owens. Gives the writer's method of establishing his meridians in broad daylight. 2800 w. Eng & Min Jour—Jan. 10, 1903.

See also **Geodesy; Graphical Determination.**

Mexican Boundary.—The Arid District Between the Rio Grande and the Pacific, Traversed by the Engineers of the Mexican Boundary Commission in 1892-94. Prof. Oscar C. S. Carter. A review and discussion of the report of the Mexican Boundary Commission. 7500 w. Pro Engrs' Club of Phila—July, 1902.

Mine.—Method of Connecting Survey in a Shaft Mine with That of Property Lines and Topographical Features on the Surface. H. L. Auchmuty. Explanatory. 3300 w. Mines & Min—June, 1901.

Mine Surveying. Paper presented at meeting of the Assn. of Ontario Land Survs. by Messrs. De Morest and Silvester. Methods of obtaining accurate underground surveys and plans are considered. 2700 w. Can Engr—May, 1902.

Mine Surveying. Messrs. De Morest and Silvester. Read at meeting of the Assn. of Ontario Land Surveyors. An account of methods, and the benefit of mine plans. 3500 w. B C Min Rec—July, 1902.

Mine Surveying and Mapping. Charles E. Rowe. Describes a system which will be found useful in the surveying of flat or moderately pitched seams of coal, and parts of it may be applied to any underground surveying. Serial. 1st part. 3000 w. Min Rept—Sept. 29, 1904.

Mine Surveying. C. A. S. Andrews. Read at meeting of the Queensland Inst. of Surveyors. Detailed description of the method the writer has found to be best for an underground survey. Serial. 1st part. 2500 w. Queens Gov Min Jour—Sept. 15, 1905.

See also **MINE MAP; SURVEYING INSTRUMENT—Henderson's Traverser; Thornton's Mine Dial.**

Mine, Anthracite.—Anthracite Mine Surveying Practice. Brief account summarizing the methods of several companies. 1600 w. Eng & Min Jour—Feb. 11, 1904.

Mine, Austria.—The Survey of the Kaiser Franz Josef I. Tunnel at Breth-Raibl (Die Achsabstechung des Kaiser Franz Josef I. Hilfsstollens in Breth-Raibl). Alois Plasser. With plan of the triangulation system used in connection with the running of a tunnel of 4,800 metres long in the Raibl lead and zinc mines. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 7, 1905.

Mine, Center Star, B. C.—Mine Surveying as Carried on at Centre Star Mine, Rossland, B. C. L. Heber Cole. Describes the methods employed by the engineering staff of the War Eagle and Centre Star Mining Companies. Ills. 4000 w. Can Min Rev—July, 1905.

Mine, Coal.—Surveying and Mapping of Flat Coal Mines. Charles H. Thompson. General discussion and practical directions. 2800 w. Eng & Min Jour—Aug. 25, 1904.

Mine Errors.—Errors in Underground Surveying with the Fast Needle. Discusses how errors occur in the use of the vernier dial and how they may be avoided. 2400 w. Col Guard—March 27, 1903.

Mine, Missouri.—Mine Surveying Problems. W. E. Gordon. An account of methods used under peculiar conditions in the zinc-lead regions of Missouri. Ill. 900 w. Mines & Min—July, 1901.

Mine, New Almaden, Calif.—A Mining Survey. J. F. Wilkinson. Description of a survey made in June, 1890, for the San Francisco shaft of the New Almaden quicksilver mines, which required great accuracy. 1800 w. Trans Am Inst of Min Engs—Aug., 1890.

Mineral Land.—Mineral Land Surveying. James Underhill. Presents methods used at the present time for the survey of mineral lands in the western part of the United States. Serial. 1st part. 1700 w. Min Rept—Dec. 7, 1905.

Mine, Secondary Openings.—Surveying Secondary Mine Openings. Floyd L. Burr. Read before the L. Sup. Min. Inst. A brief description of a method used by the writer, and as accurate as is necessary for the work for which it is used. 1000 w. Eng & Min Jour—Nov. 11, 1905.

Mine Shaft.—Shaft Surveying. T. Lane Carter. Deals with the practice in the Johannesburg gold fields for surveying vertical shafts. 2000 w. Eng & Min Jour—Oct. 11, 1902.

See also **MINE SHAFT; PLUMB LINE; SHAFT SINKING.**

Mine, Volume.—A Method for Obtaining the Volume of Small Drifts and Working Places, Where It Is Impossible to Use a Transit. C. S. Herzig. States the conditions and describes method. 1200 w. Trans Am Inst of Min Engs—Aug., 1900.

A Method for Obtaining the Volume of Small Drifts and Working-Places, Where It Is Impossible to Use a Transit. Discussion of paper by C. S. Herzig. 600 w. Trans Am Inst of Min Engs—Aug., 1900.

Mississippi Headwaters.—See **RESERVOIR.**

Mountain.—Directions for Topographical Work in Mountains (Neue Anweisung für Vermessungen im Hochgebirge). Some Swiss regulations for trigonometrical and tachymetrical surveying. 1000 w. Schweiz Bauzeitung—Jan. 4, 1902.
See also **Geodesy.**

Municipal.—See **Dresden Exhibition.**

Oneida Lake.—Report on the Triangulation of Oneida Lake. Charles E. Curtis. A description of the work, the instruments used, the cost, etc. 2800 w. Trans Assn of Civ Engrs of Cornell Univ—1904.

Photographic.—Photography as Applied to Architectural Measurement and Surveying. J. Bridges Lee. Indicates the great possibilities of accurate photography and the lines along which the development should progress. Ill. 6000 w. Jour Soc of Arts—April 18, 1902.

Photographic Surveying. J. T. McIntyre. An illustrated discussion of this method of topographical surveying, and description of the instruments used. Serial. Part I. 5000 w. Feilden's Mag—Jan., 1903.

The Use of the Stereoscope in Topography and Astronomy (De l'Emploi du Stéréoscope en Topographie et en Astronomie). Col. Laussedat. A discussion of the use of stereoscopic photography in connection with surveying and astronomy with reference to recent topographic work in Austria. 2500 w. Comptes Rendus—Jan. 5, 1903.

The Use of Stereoscopic Images for the Construction of Topographic Plans (Sur l'Emploi d'Images Stéréoscopiques dans le Construction des Plans Topographiques). A. Laussedat. Describing a system of exaggerated stereoscopic photography for use in photographic surveying. 2000 w. Comptes Rendus—May 30, 1904.

Results Recently Obtained by Métrophotography (Sur Différents Résultats Récemment Obtenus par la Métrophotographie). A. Laussedat. Showing the excellent results in the study of topography by the aid of the Pulfrich stereo-comparator. 1000 w. Comptes Rendus—Aug. 8, 1904.

The Rapid Preparation of a Topographical Map by the Aid of Photography (Sur Une Carte Topographique d'une Assez Grande Etendue Levée en tres Peu de Temps à l'Aide de la Photographie). A. Laussedat. Describing important photo-surveying work about Mount Argaeus, in Asia Minor. 2000 w. Comptes Rendus—Feb. 13, 1905.

Stereoscopic Topography (Sur la Téléstéréoscopie). Paul Helbronner. An account of the application of stereoscopic photography with telephotographic lenses to views in the French Alps to aid in topographical work. 1500 w. Comptes Rendus—Dec. 5, 1904.

Photographic Methods on the Canadian Topographical Survey. Abstract of a paper by Arthur O. Wheeler, read before the Canadian Congress explaining a very interesting method of surveying 3000 w. Eng Rec—Feb. 18, 1905.

Photographic, Wave.—The Photographic Measurement of Ocean Waves (Photographische Messung der Meereswellen). W. Laas. A fully illustrated description of the application of methods of photographic surveying to the measurement of sea waves, during a voyage to and from South America. Three articles. 8000 w. 8 plates. Zeitschr d Ver Deutscher Ing—Nov. 25, Dec. 2, 9, 1905.

Planetable.—The Three-Point Problem in Plane-Table Surveying. Antonio Llano. Describes Bessel's method for the graphic solution of this problem in the field. 1500 w. Eng News—Dec. 29, 1904.

Planetable Stadia.—A Few Notes on the Use of the Planetable for Rapid Stadia Work. John W. Hays. Notes from experience, describing the use of this instrument and the methods. 2200 w. Eng News—March 13, 1902.

Race Track.—See **RACE TRACK.**

Railway Center Line.—Practice in Re-Establishing and Monumenting a Railway Center Line. Albert I. Frye. Explains a feature which has proved convenient and effective in adjusting the center lines of tangents. 600 w. Eng News—April 14, 1904.

Railway Curves.—See **RAILWAY CURVE—Surveying.**

Railway Location.—See **Stadia; RAILWAY LOCATION.**

Range Pole.—Range Pole Surveying. H. F. Wilson, Jr. Abstract of a paper read before the Engng. Assn. of the South. Describes a rapid method of approximate surveying for a railway in Alabama. 1400 w. Eng Rec—May 17, 1902.

Record Filing.—See **INDEX—Surveying Records.**

Rhaetikon Railway.—See **RAILWAY—Albula.**

River Profile.—River Profile Work of the United States Geological Survey, Kennebec River, Maine. Arthur D. Butterfield. Describes work carried out in Maine, and confined to the part of the Kennebec River extending from the top of the dam at Showhegan to the highway bridge at The Forks. Describes methods and work giving general results. 3500 w. Eng News—Aug. 31, 1905.

Road.—See also **ROAD.**

Road, Maryland.—Preliminary Road Surveys in Maryland. Describes the nature and cost of the work of the Maryland Geological Survey. 900 w. Eng Rec—April 12, 1902.

Road, New York.—Surveys for New York State Road Improvements. C. W. Trumbull. Read at Cornell Univ. An account of the methods of carrying out the necessary preliminary work for the extensive improvement of public highways now in progress. 5500 w. Eng Rec—Dec. 9, 1905.

Russo-Swedish Expedition.—See **Geodesy.**

Simplon Tunnel.—The Alignment of the Simplon Tunnel (Ueber die Absteckung des Simplon-Tunnels). Max Rosenmund. An illustrated account of the triangulation over the Simplon pass in connection with the alignment of the tunnel. Two articles. 2500 w. Schweizerische Bauzeitung—May 25, June 8, 1901.

The Triangulation and Construction Survey for the Simplon Tunnel. Horace Andrews. A summary of the work involved in the triangulation and the construction-surveys. 3000 w. Eng News—Dec. 21, 1905.

See also **SURVEYING INSTRUMENT — Theodolite; Universal; TUNNEL.**

Slope Stakes.—A Graphical Method of Setting Slope Stakes. J. M. Rudiger. Describes a simple and effective method, giving diagram. 700 w. Eng News—July 30, 1903.

Spitzbergen.—See **Geodesy.**

Stadia.—Stadia Surveys for Railway Location. H. P. Boardman. On the advantages of the stadia method as applied to railway location, and its economy. 2700 w. Eng News—Feb. 21, 1901.

A Practical Improvement in Tachymetry (Eine Praktische Neuerung beim Tachymetrieren). S. Wellisch. With especial reference to the reduction of vertical angles to a horizontal plane. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 27, 1901.

The Closing of a Polygonal Survey by the Use of Modern Stadia Instruments (Festlegung eines Polygonalen Zuges bei Verwendung Neuer Instrumenten für Optische Distanzmessung). E. Dolezal. A very full discussion and application of Prof. Schell's new tachymetric method. Serial. 3 parts. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 22, Dec. 6, 13, 1901.

Notes on Tacheometry: A Comparison of Systems. Arthur L. Bell. A comparison of the two main systems of staff holding—staff vertical, and staff at right angles to line of sight. Ills. 1500 w. Engng—Oct. 21, 1904.

Methods of Rod-Holding in Stadia Surveying and Description of a New Stadia Slide Rule. Arthur L. Bell. Describes the two methods of rod or staff holding now in use, and the circular slide rule for reducing stadia readings designed by the writer. Ills. 2500 w. Eng News—Nov. 9, 1905.

See also **SURVEYING INSTRUMENT.**

Stadia-Intersection.—The Stadia-Intersection Method for Topographical Surveys. Prof. L. E. Ashbaugh. Describes a method of intersections from stadia base lines which has proved efficient and rapid in securing desired results. General discussion. 5500 w. Jour W Soc of Engrs—April, 1905.

Stadia Lines.—Stadia Lines. H. Dennis Taylor. Describes the simple or direct method of applying stadia lines to instruments, and also the anallatic method. 1300 w. Engng—April 17, 1903.

Stereoscopic.—See **Photographic; SURVEYING INSTRUMENT.**

Stray Currents.—See **STRAY CURRENTS—Surveys.**

Tacheometry.—See **Stadia.**

Tachymetric.—See **Stadia; SOUNDING.**

Tide Levels.—See **Canada.**

Topographic.—Controlling a Topographical Survey. William C. Bunnel. A discussion of methods, describing in detail the method recommended and illustrating by an actual case. 3000 w. Eng News—Feb. 14, 1901.

Topographical Surveying. W. C. Bunnel, Jr. Notes showing what has been done, and the results obtained. Discussion. 5000 w. Jour W Soc of Engrs—Oct., 1903.

Outline of Work of the Topographic Branch of the United States Geological Survey, with details of secondary (Plane Table) Triangulation. Joseph A. Close. Ills. Explains methods used in making a surface map of the country. 12600 w. Sch of Mines Qr—July, 1905.

Corrections for Instrumental Errors in Topographical Surveying (Compensation des Erreurs Instrumentales dans les Opérations Topographiques). H. Naudin. A review of the various errors of theodolites, levels, and other geodetic instruments, with methods for calibration and correction. 5000 w. Revue Technique—Nov. 25, 1905.

Traverse Errors.—The Errors of Traverse Surveys. William D. Pence. Reviews briefly the limits of error recommended by various engineers and authors of standard text books, and presents a simple rational method of fixing the permissible errror of closure of a traverse survey under known conditions of field work. 3000 w. Pro of Purdue Soc of Civ Engng—1900-1901.

Triangulation.—The Accurate Measurement of Angles With the Engineer's Transit. F. D. Cunningham. Describes the methods used. 700 w. Eng News—May 30, 1901.

See also **Bridge; Geodesy; Oneida Lake; Simplon Tunnel; Topographic; Tunnel; U. S. Government.**

Tunnel.—The Accuracy of Surveying Measurements for Tunneling (Ueber den Genauigkeitsgrad der Messungen für Anlage und Bau von Tunneln). F. Haller. Discussing the method of determining the probable error in a system of triangulation. 2000 w. Schweizerische Bauzeitung—Nov. 7, 1903.

See also **Mine; Simplon Tunnel.**

Tunnel, Austria.—See **Mine, Austria.**

United States Coast and Geodetic.—The U. S. Coast and Geodetic Survey. O. H. Tittmann. Reviews the history of this undertaking, the organization, work, etc. 3800 w. Nat Geog Mag—Jan., 1903.

See also **Base Line.**

United States Early.—Origin of the United States Land Surveys. W. A. Truesdell. Information concerning the early public surveys of this country. 3500 w. Jour Assn of Engng Socs—April, 1904.

United States Geological.—The Topographic Mapping of the United States by the U. S. Geological Survey. H. M. Wilson. Gives the early history of the work, showing its utility, and describing methods and cost in present article. 2700 w. Eng News—Feb. 7, 1901.

Geological Survey Plan of Operations. Details of the arrangements made for the work of the U. S. Geol. Survey for the fiscal year 1901-1902. 3000 w. Min & Met—May 1, 1901.

The Geological Survey and the Western Miner. T. A. Rickard. On the value of the work of the survey to the miner, and the practical value of the work done, urging that it be made more timely. 1400 w. Eng & Min Jour—July 5, 1902.

See also **River Profile; Topographic.**

U. S. Government.—Primary Triangulation and Precise Levels of the United States Government Surveys. Herbert M. Wilson. An explanation of the work done by the government surveying organizations. 3000 w. Eng News—April 4, 1901.

SURVEYING INSTRUMENT.

See also **PLUMB LINE; SURVEYING.**

Adjustments.—The Adjustments of the Engineer's Transit and Level. Howard C. Ives. Describes the methods of adjustment. 4000 w. Jour Worcester Poly Inst—March, 1904.

Chains.—Standardization of Surveyor's Chains. Henry Louis. Abstract of a paper and discussion before the N. of Eng. Inst. of Min. & Mech. Engrs. Calls attention to the precautions that should be observed in setting out a standard length, and details those employed by the writer. 1800 w. Col Guard—Feb. 14, 1902.

Compass.—See **Mining Compass.**

Dresden Exhibition.—See **SURVEYING.**

Electric, Bore Holes.—Electrical Devices for Deep Borehole Surveying. Hugh F. Marriott. Read before the Inst. of Min. & Met. Describes in detail the construction of two sets of instruments for use in deep level borehole surveying, and gives results obtained. 5000 w. Eng News—July 27, 1905.

Note on a New Instrument for Surveying Deep Bore Holes. J. B. Porter. Briefly outlines the usual methods of surveying bore holes, and gives a description of an apparatus invented by Wm. Helme, of Johannesburg. 1500 w. Ills. Can Soc of Civ Engrs—Nov. 30, 1905.

Ferguson's Percentage.—See **Theodolite.**

Gradient-Telemeter.—See **Level.**

Grubb-Davis Mine Dial.—See **Thornton's Mine Dial.**

Hammer-Fennel.—See **Stadia.**

Hand.—New Types of Hand Surveying Instruments. Illustrates and describes interesting adaptations of the gun-sight to portable surveying instruments. 1400 w. Engng—July 11, 1902.

Henderson's Traverser.—Henderson's Rapid Traverser. Herbert Perkin. An illustrated description of the instrument and the method of using, discussing the conditions under which its use is of advantage. 1200 w. Mines & Min—June, 1903.

Level.—The Gradient-Telemeter Level and Its Advantages on Preliminary Work. R. W. MacIntyre. Illustration, with description of this instrument and the principle upon which it works. 1800 w. Can Soc of Civ Engrs, Adv Proof—March, 1903.

See also **Spirit Levels; NICKEL STEEL—Surveyor's Levels; SURVEYING.**

Level, Precise.—The New Coast and Geodetic Survey Precise Level: A Possible Successor of the Wye Level. John F. Hayford. An illustrated description of the instrument and its manipulation, with report of its use in actual service. 3500 w. Eng News—July 2, 1903.

See also **SURVEYING—Leveling; U. S. Government.**

Level Rod.—A New "Automatic" Level Rod. Illustrates and describes a recent patent in which the rod reading itself is the cut, fill or elevation. 1000 w. Eng News—March 12, 1903.

A Rod for Rapid and Accurate Leveling. Illustrates and describes the Heghmian level rod and slope tape. Cut, fill or elevations are read directly from the rod. 1800 w. Eng Rec—April 4, 1903.

Machine Shop.—The Use of a Surveying Instrument in Machine Shop Practice. Charles C. Tyler. Describes its use for laying out work where the dimensions are so great as to demand the use of portable machine tools secured to a large floor surface plate, the tools being moved rather than the parts which are being machined. Ill. 4600 w. Trans Am Soc of Mech Engrs, No. 0969—Dec., 1902.

Meridianoscope.—The Mining Meridianoscope (Le Méridianoscope Minier). Ch. Monkowski. Describing a form of solar compass adapted for geological surveying in localities in which the presence of iron ore deposits affect the magnetic needle. 1800 w. 1 plate. Rev Univ des Mines—Dec., 1901.

Mine.—The Evolution of Mine Surveying Instruments. Dunbar D. Scott. Continued discussion. Ill. 3800 w. Trans Am Inst of Min Engs—Dec., 1900.

The Evolution of Mine-Surveying Instruments. Dunbar D. Scott. Concluding discussion of paper on this subject. Ill. 3800 w. Trans Am Inst of Min Engrs—Oct., 1901.

Notes on Mine-Surveying Instruments, with Special Reference to Mr. Dunbar D. Scott's Paper on Their Evolution, and Its Discussion. Benjamin Smith Lyman. Ill. 17,400 w. Trans Am Inst of Min Engs—Aug., 1900.

Remarks on Mine-Surveying Instruments, with Special Reference to Mr. Dunbar D. Scott's Paper on Their Evolution, and Its Discussion. H. D. Hoskold. Ill. 7600 w. Trans Am Inst of Min Engs—Aug., 1900.

Remarks upon Surveying Instruments, with Special Reference to the Paper of Mr. Dunbar D. Scott on the Evolution of Mine-Engineering Instruments, and to its Discussions. H. D. Hoskold. Ill. 8400 w. Trans Am Inst of Min Engrs—Nov., 1901.

Notes on Tripod-Heads, with Reference to Mr. Dunbar D. Scott's Paper on the Evolution of Mine-Surveying Instruments. John H. Harden. Discusses the improved tripod-legs and the tripod-head. 1000 w. Trans Am Inst of Min Engs—April, 1901.

The Evolution of Mine-Surveying Instruments. Continued discussion of the paper of Dunbar D. Scott, read at the Buffalo meeting, Oct., 1898. 1000 w. Trans Am Inst of Min Engrs—Nov., 1902.

A Simple and Convenient Instrument for Mine Surveys. Frank Robbins. Read before the Canadian Min. Inst. Illustrated description. 2500 w. Can Min Rev—Feb. 28, 1901.

See also **Electric; Bore Holes; Meridianoscope; Solar; Thornton Mine Dial; SURVEYING.**

Mining Compass.—An Improved Mining Compass (Ein Neues Zulegzeug). O. Nowotny. Describing an improved instrument for running lines in mining work and especially adapted for convenient use underground. 1000 w. Oesterr Zeitschr f Berg u Huttenwesen—Sept. 19, 1903.

Nickel Steel. — See **NICKEL STEEL — Surveyor's Levels.**

Solar.—History of Solar Surveying Instruments. J. B. Davis. Prepared to supplement paper by Dunbar D. Scott, on "Evolution of Mine-Surveying Instruments." Remarks on land surveys in general, and detailed history of solar instruments. Ill. 6000 w. Trans Am Inst of Min Engs—Aug., 1900.

See also **Meridianoscope.**

Spirit Levels.—Spirit Levels on Engineer's Field Instruments. Harold Van Dusee. Discusses the reliability of the spirit levels attached to transits and levels. 4000 w. Eng News—Nov. 22, 1900.

See also **Level; Transit; Theodolite; LEVEL.**

Spring Balance.—The Corrections to be Applied to the Readings of a Spring-Balance When Used Horizontally or on a Slope. Alfred Ernest Young. Discusses the corrections needed. Formulae. 800 w. (No. 3532.) Inst of Civ Engrs.

Stadia.—The Hammer-Fennel Tachymeter-Theodolite (Der Hammer-Fennel'sche Tachymeter-Theodolit). J. Stambach. Description of an improved stadia theodolite for topographical surveying. 2000 w. Schweizerische Bauzeitung—March 29, 1902.

The Hammer-Fennel Tachymeter-Theodolite (Der Hammer-Fennel'sche Tachymeter-Theodolit). Edouard Dolezal. Describing an improved form of stadia apparatus, with examples showing its accuracy and convenience. 3000 w. Zeitschr Oesterr Ing u Arch Ver—Dec. 5, 1902.

The Richards Prismatic Stadia as a Range-Finder. E. K. Landis. Describes the use of this instrument as a range finder, giving results obtained. 1800 w. Pro Engrs' Club of Phila—July, 1903.

The Hammer-Fennel Instrument for Stadia Work. Horace Andrews. Illustrated description of the recent improvements in this instrument. 1400 w. Eng News—Aug. 13, 1903.

The Stereoscopic Measuring Apparatus (Das Stereoskopische Messverfahren). A. Freiherr v. Hübl. Describing the application of exaggerated stereoscopic effects to the measurement of distances, with especial reference to the apparatus of Dr. Pulfrich. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 25, 1904.

See also **Theodolite; SOUNDING — Tachymetric; SURVEYING.**

Standard.—The Standard and Its Use in Surveying. Edward Riordan. Illustrated description, with remarks on its various uses. 1200 w. Eng News—Aug. 27, 1903.

Standards of Measurement.—Variations and Uses of the Standards of Measurements Employed in Field Engineering. Benjamin Franklin. Discusses the differences in standard and the mechanical inaccuracies. 4800 w. Pro Engrs' Club of Phila—April, 1901.

Steel Tape.—See also **Spring Balance; Tape Apparatus; SURVEYING—Base Line; Massachusetts Boundary.**

Stereoscopic Measurer.—A Stereoscopic Instrument for Measuring Distances in Hydrographical Surveys (Ueber Stromsondierungen). Karl Grünhut. An illustrated description of a binocular instrument by which the distance to an object can be readily determined from a boat or any other place. 1500 w. Oesterr Wochenschr f d Oeffent Baudienst—July 4, 1903.

Stereoscopic Vision Applied to Surveying. E. F. Northrup. Brief description of the "Telemeter" and the "Stereocomparator," two instruments making use of the principle of stereoscopic vision. Discussion. 1800 w. Pro Engrs' Club of Phila—July, 1905.

See also **SURVEYING—Photographic.**

Tacheograph.—The Schroder Tacheograph. Illustrated description of an instrument shown at the Paris Exhibition. A combination of the plane table with the triangle of Praetorius. 3000 w. Engng—June 7, 1901.

Tachymeter.—See **Stadia; Theodolite; SOUNDING; SURVEYING—Stadia.**

Tape Apparatus Tests.—Tests of the Massachusetts Institute of Technology Tape Apparatus. Alfred E. Burton and John F. Hayford. Gives a brief history of the apparatus, with an account of the tests. 2500 w. Tech Quar—June, 1901.

Theodolite.—The Heyde Geared Theodolite (Heyde's Neuer Zahnkreis-Theodolit). W. Wojtan. The instrument is made with toothed limb, enabling very accurate and positive movements to be made; it is especially adapted for geodetic work. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—May 10, 1901.

Ferguson's "Percentage" Theodolite. Illustrates and describes a tacheometer theodolite in which is embodied a method of graduating the arcs. 800 w. Engng—Dec. 4, 1903.

A Special Theodolite for Tunnel Cross-Sections and General Tachymetry. Illustrated description of an instrument that has been used extensively in taking cross-sections of the Simplon tunnel. 1200 w. Eng News—March 2, 1905.

Some Surveying Instruments. An illustrated description of a special theodolite, made by Mr. Coradi, of Zürich, and a tacheometer, invented by Messrs. Mayer and Wiesmann, engineers on the Simplon Tunnel. 1700 w. Engr, Lond—Dec. 15, 1905.

See also Stadia; Transit—Theodolite; Universal.

Thornton's Mine Dial.—Additional Remarks on Surveying Instruments. H. D. Hoskold. Remarks on Thornton's improved miner's dial, the Grubb-Davis mine-surveying dial, and micrometer stadia-measurement. 1000 w. Trans Am Inst of Min Engrs—Feb., 1904.

Transit.—Some Hints on Specifications for an Engineer's Transit. Prof. L. S. Smith. An illustrated article discussing the deficiencies of this instrument and the proper remedies. 3700 w. Wis Engr—April, 1902.

Specifications for an Engineer's Transit and Level. L. S. Smith. A discussion of the best type of transit for topographic work, the changes needed, &c. Also engineer's leveling instruments. Ills. 4200 w. Ks Engr—Dec., 1905.

Desirable Features in a Transit for Topographical Surveys. George Jacob Davis, Jr. Reviews the requirements of a telemeter and of other improvements introduced, with the hope of aiding in the development of a standard form of stadia instrument. Ills. 1800 w. Eng News—March 31, 1904.

Transit Theodolite.—Note Concerning an Old Instrument for Finding Distances, Exhibiting the Oldest Known Form of the Transit-Theodolite Principle. H. D. Hoskold. Illustrations and information concerning early devices for the object under consideration. 4000 w. Trans Am Inst of Min Engrs—Oct., 1903.

Universal.—A Universal Angle-Measuring Instrument (Universal Winkelinstrument). A. Mayer and E. Wiesmann. Ilustrating an improved form of engineer's transit, adapted for tunneling and general railway work, and designed in connection with the work on the Simplon tunnel. 2000 w. Schweiz Bauzeitung—Oct. 15, 1904.

See also Theodolite.

Webb Devices.—Some Devices for Increasing the Accuracy or Rapidity of Surveying Operations. Walter Loring Webb. Illustrates and describes devices designed under the direction of the writer. All have been subjected to practical use. 2400 w. Pro Am Soc of Civ Engrs—Dec., 1901.

Some Devices for Increasing the Accuracy or Rapidity of Surveying Operations. Discussion of the paper by Walter Loring Webb. Ill. 13,600 w. Pro Am Soc of Civ Engrs—March, 1902.

SUSPENDED RAILWAY.

See also **CABLEWAY; ELECTRIC RAILWAY; SINGLE RAIL; TELPHERAGE.**

Barmen-Elberfeld.—The Barmen-Vohwinkel Suspended Railway. Illustrates and describes details of this railway as given in a series of articles in the "Centralblatt der Bauverwaltung. 1400 w. Elec Engr, Lond—Dec. 14, 1900.

The Barmen-Elberfeld-Vohwinkel Suspended Railway (Die Schwebebahn Barmen-Elberfeld-Vohwinkel). G. Lüdorf. A full description of the road with especial attention to the electrical details. 7000 w. Elektrotech Zeitschr—June 27, 1901.

The Barmen-Elberfeld-Vohwinkel Suspended Railway (Le Chemin de Fer Suspendu de Barmen-Elberfeld-Vohwinkel, Allemagne). Alfred Boudon. A well illustrated description of this interesting German elevated railway, designed by E. Langen. 1 plate. 3500 w. Génie Civil—Dec. 28, 1901.

The Langen Suspended Railway of Barmen-Vohwinkel-Elberfeld. Prof. Dolezalek. Illustrated description of the road, equipment and operation. 1000 w. Sci Am—Jan. 25, 1902.

The Barmen-Elberfeld-Vohwinkel Suspended Railway (Die Schwebebahn Barmen-Elberfeld-Vohwinkel). Hr. Petri. A paper before the Verein für Eisenbahnkunde giving an illustrated account of this railway, and of the advantages of suspended railways in general, with illustrations of one at Loschwitz near Dresden. 3000 w. Glasers Ann—Feb. 15, 1902.

The Langen High-Speed Railway (Note sur les Chemins de Fer à Trafic Rapide, Système Langen). Robert Zumach. An illustrated description of the suspended electric railway at Barmen-Elberfeld, Germany, and a project for a similar one between Brussels and Antwerp. 7500 w. Rev Universelle des Mines—May, 1902.

The Elberfeld Suspension Railway. Describes the newer constructive details, the line having been built slowly, and many improvements introduced in the latest work. Also general information relating to the working of the line and its location. Map. Serial. 1st part. 3000 w. Engr, Lond—Oct. 24, 1902.

New Bogies for the Elberfeld Suspension Railway. An illustrated explanation of an improvement made by introducing a new design of suspending bogie, and the objects fulfilled by the alteration. 1200 w. Engr, Lond—Jan. 13, 1905.

See also **ELECTRIC ENGINEERING—Europe.**

Berlin.—Design for a Suspension Railway in Berlin (Entwurf einer Elektrischen Schwebebahn für Berlin. Detailed account of a rapid transit system for Berlin similar to the Barmen-Elberfeld line. 5000 w. Elektrotech Zeitschr—Oct. 26, 1905.

Halford.—See **GRADIENT RAILWAY.**

Loschwitz, Saxony.—Suspension Railway at Loschwitz, Saxony. Brief account of a new mountain railway opened in May, with illustration. 450 w. U S Cons Repts, No. 1076—July 1, 1901.

The First Suspended Mountain Railway in the World (Die Erste Bergschwebebahn der Welt). E. A. Ziffer. A description of the suspended railway of the Langen type from Loschwitz to the heights of Loschwitz above Dresden. 2000 w. Mitt des Ver f die Ford d Local und Strassenbahnwesens—Nov., 1902.

Mine Haulage.—See **MINE HAULAGE—Single Rail.**

Wetterhorn, Switzerland.—The Wetterhorn Electric Aerial Mono-Rail. A form of mountain railway construction combining cableway and Langen suspended railway is illustrated and described. A stout wire cable forms the overhead mono-rail from which is suspended the runing gear of the car body. 1000 w. Engr, Lond—Nov. 10, 1905.

SUSPENSION BRIDGE.

See **BRIDGE.**

SWAGING MACHINE.

Swaging Machines and the Cold Swaging Process. Illustrates and describes several swaging machines and their work, and discusses uses made of this process. 2500 w. Mach, N Y—May, 1903.

SWING BRIDGE.

See **BRIDGE.**

SWITCH.

Electric.—See **ELECTRIC SWITCH; ELECTRIC SWITCHBOARD; TELEPHONE SWITCHBOARD.**

Railway. — See **INTERLOCKING; RAILWAY SWITCH.**

Telephone.—See **TELEPHONE EXCHANGE; TELEPHONE SWITCHBOARD.**

SWITCHBOARD.

See also **ELECTRIC SWITCHBOARD; TELEPHONE SWITCHBOARD.**

Dynamo Connections.—See **ELECTRIC GENERATOR—Switchboard Connections.**

SYNCHRONIZER.

See **ELECTRIC GENERATOR, ALTERNATING—Parallel; ELECTRIC INSTRUMENT.**

SYNCHRONOGRAPH.

See also **SUBMARINE TELEGRAPH—Alternating Currents.**

Sine-Wave Submarine Cable Telegraphy. A review of a recent paper by Albert C. Crehore and George O. Squier, read before the Am. Inst. of Elec. Engs. Ill. 4000 w. Engng—Jan. 4, 1901.

A Practical Transmitter Using the Sine Wave for Cable Telegraphy; and Measurements with Alternating Currents Upon an Atlantic Cable. Albert C. Crehore and George O. Squier. Discussion of the above paper. 6800 w. Trans Am Inst of Elec Engs—Feb., 1901.

SYPHON.

See **SIPHON.**

T

TABULATING MACHINE.

Hollerith.—See **CALCULATING MACHINE.**

TACHEOGRAPH.

See **SURVEYING; SURVEYING INSTRUMENT.**

TACHOGRAPH.

See **HOISTING — Diagrams; Safety Appliances; SPEED INDICATOR; SPEED RECORDER.**

TACHOMETER.

See **SPEED INDICATOR.**

TACHYMETER.

See **SURVEYING INSTRUMENT—Stadia; Theodolite.**

TACK.

See also **NAIL; WIRE MANUFACTURE.**

Atlas Works.—Plant of the Atlas Tack Company, Fairhaven, Mass. Illustrated detailed description of a carefully planned factory, equipped with automatic machinery, a modern power plant, and methods of power transmission. 2800 w. Eng Rec—Jan. 17, 1903.

Dies.—See **DIE—Tack.**

TAILINGS ELEVATOR.

See **ELEVATOR—Tailings.**

TAIL RACE.

See **HYDRO-ELECTRIC PLANT; WATER POWER.**

TAIL SHAFT.

See **SHAFT.**

TALC.

New York.—Talc in Northern New York. Robert B. Brinsmade. An illustrated description of the deposits of the Talcville region, discussing their origin, and the mining and milling practice. 3500 w. Eng & Min Jour—Dec. 23, 1905.

TALL BUILDING.

See **BUILDING; BUILDING CONSTRUCTION; CAISSON; FIREPROOF CONSTRUCTION; FOUNDATION; MECHANICAL PLANT; STEEL CONSTRUCTION; UNDERPINNING.**

TANK.

See also **COAL BIN; GAS HOLDER; GRAIN BIN; GRAIN ELEVATOR; RAILWAY WATER SERVICE; RESERVOIR; STANDPIPE; TRACK TANK; WATER TOWER; WATERWORKS.**

Aden, Arabia.—See **RESERVOIR.**

Cast-Iron.—Cast-Iron Tanks. W. J. Jones. A discussion of tank design and construction, with illustrations. 8000 w. Public Works—April, 1905.

Chicago.—See **Hemispherical Bottom.**

Concrete, Acid Liquors.—Concrete-Tanks for Acid Liquor Under Pressure. A. C. Arend. Drawings and explanation. 700 w. Eng News—April 21, 1904.

Concrete Reinforced.—Monier Concrete-Steel Storage Tanks for Portland Cement; Illinois Steel Co. Brief illustrated description of four bins or tanks constructed in South Chicago, Ill., having a total capacity of 25,000 bbls. 1000 w. Eng News—Dec. 11, 1902.

See also **COAL BIN; GRAIN BIN.**

Conical Bottomed.—Stresses in a Conical Bottomed Water Tank. Illustrated analysis of the stresses in a tank like that which collapsed in 1901 at Fairhaven, Mass. 700 w. Eng Rec—March 8, 1902.

Failure.—Failure of an Elevated Wooden Water Tank by Busting of Hoops from the Inside. Gives particulars of the failure of a tank belonging to the mills of the Bamford Bros. Silk Mfg. Co., of Paterson, N. J. Ill. 500 w. Eng News—Dec. 27, 1900.

Failure of a Cast-Iron Tank. P. Hutchison. Description of the tank, the failure and the cause. Ill. 600 w. Prac Engr—May 24, 1901.

Hemispherical Bottom.—Water Tank with Hemispherical Bottom at Washington Heights, Chicago. Brief illustrated description of a steel tank of interesting design having a capacity of 180,000 gallons. 900 w. Eng News—Dec. 25, 1902.

Insulation.—See **RAILWAY WATER SERVICE—Tank Insulation.**

Measurement.—The Content and Surface of Tanks (Inhalte und Oberflächen von Gefässen). M. Grellert. Discussing the method of computing tanks of various forms so that the surface may be a minimum and the content a maximum. 2500 w. Gesundheits-Ingenieur—Sept. 15, 1902.

Calculating Diagrams for Capacities of Tanks, Etc. E. C. de Wolfe. Gives diagram for estimating approximately the capacity of tanks, cisterns, or other vessels, or for finding the quantity of their contents when partially filled. 2700 w. Power—Dec., 1904.

Sedimentation.—See **WATERWORKS—Denver.**

Storage.—Storage Tanks. The first of two articles illustrating and describing the most approved practice to meet varying conditions. Serial. 2 parts. 2000 w. Met Work—Aug. 22, 29, 1903.

Stresses.—Improved Forms for Tanks (Neuere Formen für Flüssigkeitsbehälter). G. Barkhausen. With especial reference to various curved forms of bottoms for tanks, so arranged as to equilibrate opposing stresses. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—Nov. 24, Dec. 8, 1900.

A Derivation of Formulas for Stresses in the Curved Bottoms of Tanks. Arthur N. Talbot. Gives derivation of formulas for stresses in the cone, sphere and ellipsoid. 1200 w. Technograph, No. 16—1901-2.

See also **Conical Bottomed; Hemispherical Bottom.**

Track. — See **RAILWAY WATER SERVICE; WATER SCOOP.**

Wood Stave.—How to Set Up Wood Stave Tanks. R. Stuart Browne. An interesting description of methods of building and tearing down wood stave tanks, taken from advance sheets of a new catalogue of the Redwood Mfg. Co. 1300 w. Min & Sci Pr—April 22, 1905.

See also **WATER PIPE.**

TANK LOCOMOTIVE.

See **LOCOMOTIVE—Tank.**

TANK STEAMSHIP.

See **STEAMSHIP—Tank.**

TANNING.

See **LEATHER.**

TANTALUM.

See also **INCANDESCENT LAMP—Tantalum; METAL—Rare.**

The Preparation and Properties of Tantalum (Das Tantal, seine Darstellung und seine Eigenschaften). Dr. Werner von Bolton. Describing fully the electrolytic method of producing pure tantalum for use in the tantalum incandescent lamp. 3000 w. Zeitschr f Elektrochemie—Jan. 20, 1905.

Tantalum. Gives the physical constants of pure tantalum, discussing some of its properties and alloys. 1200 w. Engng—Sept. 1, 1905.

United States.—The Occurrence of Tantalum Minerals. David T. Day. On the places where tantalum ore is found in the United States, and on the composition of the ores. 1400 w. Elec-Chem & Met Ind—April, 1905.

TANTALUM LAMP.

See **INCANDESCENT LAMP—Tantalum.**

TAPE.

See **SURVEYING—Base Line; Massachusetts Boundary Line; SURVEYING INSTRUMENT.**

TAPER TUBE.

Fixture.—See **MACHINE TOOL—Taper-Tube Fixture.**

TAPPING TOOL.

See **TOOL.**

TAR.

See also **GAS MANUFACTURE; GAS, WATER; ROAD; PAVEMENT.**

The Present Condition of the Coal-Tar Industry. H. W. Jayne. Address at meeting of the Philadelphia Soc. of the Am. Chem. Soc. Reviews the growth of this industry and its present importance. 3000 w. Sci Am Sup—Jan. 5, 1901.

Automobile Fuel.—See **FUEL—Coal Tar.**

Coke Oven, Germany.—See **COKE OVEN—German Practice.**

Derivatives.—Derivatives of Coal Tar. Condensed from the "Revue Technique." An account of the distillation, refining and laboratory work. 5500 w. Pro Age—Aug. 15, 1901.

Distillation.—The Distillation of Coal Tar. Harold Smith. Read before the Manchester & Dist. Jr. Gas Assn. A description of the process involved in the extraction of the crude products, mentioning their principal uses. Discussion. 3600 w. Jour Gas Lgt—Sept. 29, 1903.

Fuel.—See **FUEL—Tar.**

Noxious Vapors.—Noxious Vapors from Tar Distillation. Extract from a report by John Craven and W. H. Coleman. Describes experimental work with the view of effecting more complete purification and doing away with inefficient methods. 2400 w. Gas Wld—April 20, 1901.

Pavement.—See **PAVEMENT—Tar.**

Road.—See **ROAD—Tar.**

Testing Still.—The Testing of Coal Tar and Oils and an Improved Testing Still. H. W. Jayne, in "Jour. Am. Chem. Soc." Describes this still and the methods used. 1200 w. Am Gas Lgt Jour—Sept. 7, 1903.

Water Determination.—Determination of Water in Tar. Herr Becker. Illustrates and describes an apparatus which gives an exact and rapid analysis. 800 w. Gas Wld—Nov. 22, 1902.

Water-Gas.—Water-Gas Tar for Boiler Heating. Illustrated description of the system as used by the Hodroleum Company. 1800 w. Jour Gas Lgt—Nov. 26, 1901.

See also **GAS, WATER.**

TARIFF.

See also **COMMERCE; INDUSTRY; SHIPPING.**

British Manufactures and the Policy of Unfettered Commerce. Edward Atkinson. An advocacy of free competition, in open markets, as against a war of tariffs. 5000 w. Engineering Magazine—April, 1901.

Free Trade and Protection (Freihandel und Schutzzoll). Karl Wittgenstein. An address giving a general discussion of the subject and the economic conditions of different countries. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—March 20, 1903.

British.—Imperial Policy and Free Trade. Three articles, by Sir Robert Giffen, Edward Dicey, and Benjamin Kidd, discussing this subject and Mr. Chamberlain's policy. 25900 w. Nineteenth Cent—July, 1903.

Imperial Trade and Tariffs. Benjamin Taylor. A discussion of Mr. Chamberlain's views on imperial reciprocity. 4400 w. Page's Mag—July, 1903.

Free Trade and Protection from the Workman's Point of View. M. Maltman Barrie. A discussion of the value of Mr. Chamberlain's proposals to the British workman. 7200 w. Nineteenth Cent—Aug., 1903.

British Iron and Steel and the Proposed Fiscal Tariff. States the arguments of those who believe that a preferential tariff is of first importance to the welfare of these industries. 2800 w. Ir Age—Aug. 20, 1903.

The Fiscal Problem. Sir Charles Malcolm Kennedy. Traces the adoption of the present fiscal policy and tariff of the United Kingdom, the principal European powers, and the United States; explaining the present commercial, industrial and economic position of these powers, and referring to details related. General discussion. 24,000 w. Jour Soc of Arts—Dec. 4, 1903.

Report of Mr. Chamberlain's Tariff Commission. A review of the first report of the Commission appointed to inquire into the probable effect of fiscal changes on the trade of the country. The present report deals with the heavy iron and steel trades. Also editorial. 7000 w. Ir & Coal Trds Rev—July 22, 1904.

Coal.—See **COAL INDUSTRY—Free Trade.**

German Iron Trade.—See **IRON INDUSTRY—German Tariff.**

Iron.—See **IRON INDUSTRY—German Tariff.**

Machine Tools.—Machine Tools and the Tariff. Fred A. Geier. Gives information concerning rates in the various countries, and discriminations in some countries against America. 1600 w. Ir Age—April 20, 1905.

United States vs. Russia.—American Tariff Measures Now Shutting the Open Door. W. L. Saunders. A discussion of the effect of the imposition of the countervailing duty on Russian beet sugar, upon the export of American machinery to Russia. 5000 w. Engineering Magazine—April, 1901.

TAR STILL.

See **TAR—Testing Still.**

TAXATION.

See **FRANCHISE; MUNICIPAL OWNERSHIP; RAILWAY TAXATION; STREET RAILWAY MANAGEMENT; TELEPHONE COMPANY—Michigan Taxation.**

TEAGLE.

See **ELEVATOR; HOISTING; LIFT.**

TEAK.

Siam.—Teak Industry of Siam. Information concerning the teak-lumber business, the most valuable lumber for shipbuilding. 2500 w. U S Cons Repts, No. 1041—May 20, 1901.

TECHNICAL DICTIONARY.

See **DICTIONARY—Technical; TERMINOLOGY.**

TECHNICAL INSTITUTE.

Entrance Requirements.—See **EDUCATION—College Entrance Requirements.**

TECHNICAL SCHOOL.

See **EDUCATION; LABORATORY.**

TECHNICAL SOCIETY.

See **ENGINEERING SOCIETY;** and under specific branches of engineering.

TELAUTOGRAPH.

See also **TELECTROSCOPE.**

Cerebotani.—The Cerebotani Autotelegraph. Illustrated description of this apparatus for the telegraphic transmission of writing and its operation. 1400 w. Sci Am Sup—Aug. 5, 1905.

Gray.—Telautograph. James Dixon. Reviews the development of electrical transmission of handwriting, and describes the telautograph and its recent improvements, operation, etc. 3500 w. Trans Am Inst of Elec Engrs—Oct., 1904.

The Telautograph. Illustrated description of the automatic reproducing telegraph constructed by the National Gray Telautograph Co., of New York, explaining its operation. 1000 w. Engng—Dec. 2, 1904.

The Telautograph. H. I. English. Brief account of the invention and development of the Gray telautograph, dealing especially with its present commercial form. 3400 w. Jour Fr Inst—Oct., 1905.

Gruhn.—The Gruhn Telautograph (Ueber einen Neuen Telautographen der Kopier-Telegraph-Gesellschaft m. b. H., Dresden). Hr. Gruhn. Paper before the Elektrotechnischer Verein giving an illustrated description of an apparatus for transmitting writing and sketches telegraphically. At the receiving station a mirror, controlled by the transmitter, throws a beam of light which photographs the record. 4000 w. Elektrotech Zeitschr—Feb. 6, 1902.

The Gruhn Telechirograph for Transmission of Handwriting. An illustrated description of the construction and operation of this instrument. 1800 w. Elec Wld & Engr—June 20, 1903.

The Improved Gruhn Telautograph. Dr. Alfred Gradenwitz. An illustrated description of great improvements in this apparatus. 900 w. Sci Am—July 8, 1905.

Ritchie.—Ritchie's Telautograph. An illustrated detailed account of a new writing telegraph and its capabilities. 1500 w. Elect'n, Lond—Nov. 16, 1900.

The Telautograph. Illustrative description of the Foster Ritchie writing telegraph, and its operation. 1400 w. Nature—May 30, 1901.

TELECHIROGRAPH.

See **TELAUTOGRAPH.**

TELECRYPTOGRAPH.

Malcotti.—See **TELEGRAPH—Simultaneous Telephony.**

Siemens & Halske.—See **TELEGRAPH—Printing.**

TELECTROSCOPE.

See also **TELAUTOGRAPH.**

An Electric Picture Telegraph. Describes an improved electrograph instrument, giving illustration and sample of work, and explaining its operation. 1300 w. Eng News—May 1, 1902.

Korn.—An Apparatus for Long-Distance Electric Photography (Ueber einen Apparat sur Herstellung von Elektrischen Fernphotographien). A. Korn. Giving the results of the experimental transmission of photographic images. 1800 w. Elektrotech Zeitschr—May 22, 1902.

The Transmission of Photographs by Telegraph (Sur la Transmission de Photographies à l'Aide d'un Fil Télégraphique). A. Korn. An illustrated description of a telephotographic apparatus, including a selenium resistance at the transmitter and a vacuum tube discharge, varied by the line current, at the receiver. 400 w. Comptes Rendus—May 18, 1903.

Long Distance Electric Photography (Elektrische Fernphotographie). Dr. Arthur Korn. A review of the methods which have been proposed for the transmission of portraits and autographs by electricity, with a special account of the recent successful operation between Munich and Nuremberg. 3500 w. Elektrotech Zeitschr—Dec. 14, 1905.

Nisco.—Tele-Electroscopy. From "L'Electra." An account of the investigations made recently by Adriano Nisco, of Naples. Ill. 1500 w. Aust Min Stand—Feb. 11, 1904.

Palmer-Mills.—The Electrograph—A New Facsimile Telegraph. Illustrates and describes an instrument on exhibition at the Pan-American, in the U. S. Patent Office exhibit, for transmitting pictures by synchronized telegraph apparatus. 1500 w. Sci Am—June 15, 1901.

The Improved Electrograph—A Fac-Simile Telegraph. An account of the improvements made in the machine invented by Herbert R. Palmer and Thomas Mills. Ill. 1800 w. Sci Am—Nov. 15, 1902.

TELEGRAPH.

See also **SUBMARINE TELEGRAPH; TELEGRAPHER; TELEGRAPH LINE; TELEPHONE.**

Telegraphy and Telephony (Telegraphie und Telephonie). Barth Edler v. Wehrenalp. An address, giving a general review of different systems of electric communication, with illustrations. The first part deals with telegraphy. Serial. Part I. 5000 w. Zeitschr d Oesterr Ing u Arch Vereines (Supplement)—June 5, 1903.

Present Conditions in Telegraphy. Francis W. Jones. Reviews the improvements to increase the efficiency, giving records of remarkable speeds, and noting proposed inventions. 1200 w. Elec Rev, N Y—Jan. 9, 1904.

Africa.—The Telegraph Lines of Africa (Die Telegraphenlinien in Afrika). Hans V. Hellrigl. A review of the existing lines and those under construction. 2000 w. Zeitschr f Elektrotechnik—Aug. 6, 1905.

Alaska.—Building the Alaskan Telegraph System. Capt. William Mitchell. A description of some of the difficulties met and conquered. 3300 w. Nat Geog Mag—Sept., 1904.

The Alaskan Telegraph. George O. Maynard. The history of the Alaskan telegraph from its inception in 1865 to its successful working in October, 1904. Ills. 4200 w. Elec Rev, N Y—Nov. 12, 1904.

See also SUBMARINE CABLE.

Alternating Current.—The Use and Advantages of the Alternating Current for Land Telegraphy. Edwin F. Northrup. Describes and discusses the fundamental electrical principles involved in applying the alternating current to transmitting telegraphic signals, and in maintaining synchronous motion over long telegraph lines. Serial. 1st part. 4000 w. Elec Wld & Engr—Nov. 8, 1902.

American.—See **United States.**

Australia.—The Telegraph and Telephone Services of Australia. Abstract of the report issued by the Committee of Electrical Experts, as given in the 'Melbourne Argus." 1600 w. Elec Rev, Lond—Oct. 25, 1901.

Australia, Long Distance.—Long-Distance Telegraphy in Australia. T. Howard. An account of a trial of long-distance working over the Australian telegraph lines. 1000 w. Elec Rev, N Y—Nov. 25, 1905.

Barclay.—Barclay's Printing Telegraph. Illustrated description of the apparatus invented by John C. Barclay, as embodied in the patent specification. 1800 w. Sci Am Sup—May 27, 1905.

Barclay's Printing Telegraph. Illustrated description of the machine, which gives great promise of being practical. 3000 w. R R Gaz—Vol. XXXVIII., No. 23.

Baudot Multiplex Printing.—The Baudot Multiplex Printing Telegraph (Der Mehrfach-Typendrucker von Baudot). Hr. Grallert. A paper before the German Elektrotechnischer Verein, giving a very complete, illustrated description of this system now in use between Berlin and Paris. 12,000 w. Elektrotech Zeitschr—March 28, 1901.

See also **Printing; Synchronous; SUBMARINE TELEGRAPH.**

Berlin Printing.—The Berlin Printing Telegraph Central Station. Dr. Alfred Gradenwitz. Illustrated detailed description. 1000 w. Sci Am—Dec. 26, 1903.

The Berlin Teletyping Central Station. Dr. Alfred Gradenwitz. Illustrates and describes a type-printing telegraph and its operation. 900 w. Elec Rev, N Y—April 9, 1904.

The Use of Printing Telegraphs in Berlin (Ueber den Ferndruckertrieb in Berlin). Adolf Franke. An extensively illustrated paper describing the workings of the Siemens & Halske system in Berlin. 4000 w. Elektrotech Zeitschr—March 24, 1904.

Brazil.—Telegraph System of Brazil. A report of the telegraph lines, rates, and matters of interest in regard to their operation. 1700 w. U S Cons Repts, No. 1239—Jan. 15, 1902.

Bréguet-Rodary.—See **Selective Calling.**

British.—Government Telegraphs and Telephones in Great Britain. Calls attention to interesting statistics appearing in the last report of the British Postmaster-General. Serial. 1st part. 1600 w. Elec Wld & Engr—Sept. 12, 1903.

Buckingham Printing.—The Buckingham Long-Distance Page-Printing Telegraph. William Maver, Jr. An illustrated description of a system operating at a high rate of speed on the longest circuits, in which the messages are received on the ordinary telegraph blank, or on large sheets if desired. 6000 w. Elec Wld & Engr—May 24, 1902.

Bull System.—See **SPACE TELEGRAPHY.**

Burry Printing.—The Burry Page-Printing Telegraph. Illustrated description of this very successful invention. A large number of the machines may be operated at the same time by a single sender at a central station. 2300 w. Sci Am—March 23, 1901.

The Burry Ticker and Page Printing Telegraph. Frank C. Perkins. Illustrated description. 1300 w. Elec, N Y—March 19, 1902.

Cape to Cairo.—The Cape to Cairo Telegraph. An illustrated article giving information in regard to the construction of the line. 1400 w. Sci Am—Nov. 30, 1901.

Cardwell.—Typo-Telegraph. Frederick J. Swift. Illustrated description of the system originated by Dr. George A. Cardwell. 2200 w. Elec Rev, N Y—June 24, 1905.

Cuba.—The New Cuban Telegraph Service. Charles Minor Blackford. Maps showing old and new lines, with explanatory notes. 700 w. Sci Am Sup—Aug. 22, 1903.

Current Analysis.—The Action of Telegraph Signals in Long Cables (Ueber die Darstellung des

Verlaufes Telegraphischer Zeichen in Langen Kabeln). Dr. F. Breisig. An analytical examination of the progress of electromotive force and current over the length of a cable, plotted graphically, taking into account the transmitting and receiving instruments. 5000 w. Elektrotech Zeitschr—Dec. 13, 1900.

See also **TELEPHONE LINE—Pupin.**

Current Supply. — Modern Methods of Generating Weak Electric Currents (Ueber Moderne Stromquellen für Schwachstrombetriebe). Emil Muller. Discusssing the ues of dynamos, storage batteries, etc., for the generation of weak currents for telegraphy and similar service. Two articles. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 18, 25, 1903.

Weak Current Plants Connected to Heavy-Current Systems (Ueber Schwachstrom-Lieferungsanlagen im Anschlusse an Starkstromnetze). Hans Carl Steidle. A discussion of the use of current from lighting and power systems, for telegraphy and telephony, particularly in connection with storage-batteries. Diagrams. 4000 w. Elektrotech Zeitschr—Aug. 24, 1905.

Delany.—Rapid Telegraphy. Patrick B. Delany. Discusses the causes of delays in sending messages by the Morse system, and maintains that future progress must be in high speed. 1200 w. Elec Wld & Engr—Aug. 24, 1901.

A New System of Rapid Telegraphy. Describes the system recently invented by Patrick B. Delany, designed to transmit and receive messages at the rate of 1000 words a minute over distances of 1,000 miles. 900 w. Sci Am—March 26, 1904.

See also **High-Speed.**

Delay and Output.—See TELEGRAPHER.

Developments.—Recent Developments in Electric Signalling. Reviews the progress made during the last few years in wireless telegraphy; also important improvements in wire-using devices, discussing the Pollak-Virag system, Dr. Pupin's system, and others. 4000 w. Nature—May 2, 1901.

Duplex.—See **Hughes Duplex; SUBMARINE TELEGRAPH.**

England-Teheran.—See **Indo-European.**

Facsimile. — See **TELAUTOGRAPH; TELECTROSCOPE.**

Field Lines.—See Military; MILITARY ENGINEERING.

Fire Alarm.—See **FIRE ALARM.**

Fire and Police.—See **FIRE ALARM; STORAGE BATTERY.**

Franchises.—See **FRANCHISE; TELEPHONE COMPANY.**

Gavey Address.—Presidential Address to the Institution of Electrical Engineers. John Gavey. Principally a discussion of telegraphy and telephony, and their problems. Serial. 2 parts. 12800 w. Elect'n, Lond—Nov. 10, 17, 1905.

Germany.—Telegraphy and Telephony in the German Empire (Telegraphen- und Fernsprechwesen im Deutschen Reichs-Postgebiet). Abstract of the official statistics for 1900. 1500 w. Elektrotech Zeitschr—Dec. 19, 1901.

See also **High Speed.**

Harmonic.—See Multiplex.

High-Speed.—High-Speed Telegraphy (Rundschau). An editorial discussion of the advantages of and need for high-speed telegraphy and automatic apparatus, particularly in Germany. 1200 w. Elektrotech Zeitschr—Dec. 19, 1901.

Rapid Telegraphy. George S. Macomber. An interesting account of the inventions for this purpose by Patrick B. Delany and of the multiplex telegraphic apparatus invented by Paul La Cour, of Copenhagen, Denmark. Ill. 2800 w. Sib Jour of Engng—May, 1902.

Rapid Telegraphy. Patrick B. Delany. Defines the term as designated by usage, and reviews the various systems, their limitations, and related matters. 5700 w. Int Elec Cong of St. Louis—Sept., 1904.

See also **Delany; Multiplex; Pollak-Virag; Printing; Rowland; Synchronous.**

History.—The Telegraph. Patrick B. Delany. Historical reviews. 3600 w. Elec Wld & Engr—Jan. 5, 1901.

The Evolution of Electrical Telegraphy. Perry F. Nursey. A brief article showing that the idea embodied in the telegraph was expressed in the writings of Galileo, Shakespeare and early writers, though not made practical until the last century. 1700 w. Elec Engr, Lond—Aug. 29, 1902.

The Telegraph in the Nineteenth Century. William Maver, Jr. An interesting review of the history and development, with portraits, of S. F. B. Morse and Cyrus W. Field. 4500 w. Elec Rev, N Y—Jan. 12, 1901.

The Progress of Telegraphy During the Past Thirty Years. William Maver, Jr. An interesting review of the progress during the past thirty years. 2200 w. Elec Wld & Engr—March 5, 1904.

Old-Time Telegraph History. A review of an interesting collection of original letters and documents relating to the early history of the telegraph, recently acquired by Cornell University. 4500 w. Elec Wld & Engr—Jan. 17, 1903.

See also **Printing; Stock Ticker; TELEPHONE.**

Hughes Duplex.—Improvements in Hughes Duplex Telegraphy (Verbesserungen in der Hughes Duplex-Telegraphie). J. Jokisch. An illustrated description of a refined differential duplex arrangement. 1500 w. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 15, 1902.

Hughes Keyboard.—The Keyboard of the Hughes Telegraph (Die Klaviatur des Hnghes-apparates). G. Conradt. Discussing the arrangements of the keyboard of the Hughes printing telegraph to give the best efficiency in different languages. 2000 w. Elektrotech Zeitschr—Aug. 25, 1904.

Indo-European.—Direct Wheatstone Working Between England and Teheran. T. W. Stratford-Andrews. Technical description, with notes, map and diagram of connections, at London station. 2800 w. Elect'n, Lond—Jan. 13, 1905.

Through Wheatstone Working Over a Line of 4,000 Miles. T. W. Stratford-Andrews. Concerning the Indo-European telegraph line from London to India and Persia, via Europe; some of the difficulties met with, method of working, etc. Map. 1600 w. Elec Rev, Lond—Jan. 20, 1905.

Japan.—Telegraphy and Telephony in Japan. Saitaro Oi. Reviews the development in Japan, and the present situation. Ills. 4800 w. Int Elec Cong of St. Louis—Sept., 1904.

Telegraph and Telephone Systems in Japan and Central Stations. From "L'Electrician." Brief account showing how rapidly the Japanese adopted and installed telegraph and telephone lines, and their facility in operating and constructing them. 1200 w. Sci Am Sup—Oct. 15, 1904.

Jones Phantoplex.—The Jones Phantoplex Telegraph System. Describes a system employing alternating currents of equal frequencies to be superimposed upon ordinary telegraph lines already operated by the present Morse systems, for increasing the facilities of the wires for the transmission of messages. Ills. 1000 w. Elec Wld & Engr—Dec. 30, 1905.

Kotyra Transmitter.—See Transmitter.

La Cour.—See **High-Speed.**

Legal Questions. — See **ELECTRIC LINE; FRANCHISE.**

London-Birmingham.—See ELECTRIC CABLE.

Machine.—The Slight Use of Automatic or Machine Telegraphy. Edward A. Calahan. Reviews the telegraphs of this class, discussing the systems, and reasons for their slow adoption, and the effect of the growing use of the telephone. 2000 w. Elec Wld & Engr—July 27, 1901.

See also **Manual vs. Automatic.**

Magini.—An Important Innnovation in Telegraphy. Editorial remarks on the recent invention of Signor Magini, and its importance in connection with telegraphy. Briefly describes this new system, which appears to employ high-frequency currents on an ordinary wire, the receiving apparatus containing a self-restoring coherer. 1000 w. Sci Am—Sept. 23, 1905.

Manual vs. Automatic.—The Telegraph of To-day. J. C. Barclay. A letter favoring manual rather than automatic telegraphy except for emergency service. 1000 w. Elec Wld & Engr—May 24, 1902.

Meray-Rozar.—See TYPE-SETTING MACHINE.

Mercadier.—See **Multiplex.**

Military.—Field Telegraph Lines. Lieut. Sabin Gibbs, Jr. Illustrates and describes systems of field connections, and reports concerning the working of such lines, and the transportation of materials. 3000 w. Elec Rev, N Y—Sept. 21, 1901.

Electricity in the Signal Corps. Lieut.-Col. Samuel Reber. An illustrated article reviewing the applications of the telephone, telegraph and cable in military service. 4400 w. Trans Am Inst of Elec Engrs—Oct., 1902.

See also **Philippines; MILITARY ENGINEERING; TELEPHONE.**

Multiplex.—An Improved Simple Method of Multiplex Telegraphy (Vorschlag zu Einer Neuen Einfachen Methode der Vielfach-telegraphie). J. W. Giltay. The system is based on the use of alternating currents of different periodicity. 2000 w. Elektrotech Zeitschr—Jan. 31, 1901.

The Mercadier Telegraph. Illustrated description of a multiplex system, based upon the use of rapid oscillatory currents. 1800 w. Engng—June 28, 1901.

Simultaneous Multiplex and Ordinary Telegraphy on the Same Circuit (Sur l'Emploi Simultané de la Telegraphie Multiplex et de la Telegraphie Ordinaire dans le Même Circuit). E. Mercadier. A discussion of the experiments of Callho between Paris and Bordeaux. 600 w. Comptes Rendus—Sept. 16, 1901.

Harmonic Telegraph. Prof. Ferdinando Lori. Brief explanation of a multiple transmission system based on this principle. 500 w. Int Elec Cong of St. Louis—Sept., 1904.

See also **Baudot; Rowland; SPACE TELEGRAPHY—Bull.**

Murray.—A New Page-Printing Telegraph. William B. Vansize. Reviews other work in this field, and gives illustrated detailed description of system invented by Donald Murray. 7000 w. Trans Am Inst of Elec Engs—Jan., 1901.

A New Page-Printing Telegraph. Discussion of paper by William B. Vansize. 8700 w. Trans Am Inst of Elec Engrs—May, 1901.

The Murray Page-Printing Telegraph. Illustrates and describes this ingenious invention, in which a perforated tape is run through a transmitter and the impulses at the receiving station operate a magnetic perforator. The receiving tape is run through a printer, whose operation is similar to the automatic piano. 1500 w. Sci Am—May 4, 1901.

The Donald Murray Rapid Telegraph (Ueber den Schnelltelegraphen von Donald Murray). A. Kraatz. With numerous illustrations of the perforator, transmitter and receiver, as used in the Royal telegraph offices. 6000 w. Elektrotech Zeitschr—April 28, 1904.

Setting Type by Telegraph. Donald Murray. Briefly considers the conditions to be fulfilled, and the work that has been done, especially describing the Murray automatic system. Ills. 13,500 w. Inst of Elec Engrs—Feb. 23, 1905.

Type-Printing Telegraphs. Donald Murray. Reviews the development and outlines the main difficulties that have beset the introduction of the system. Ills. 3200 w. Elec Mag—May 23, 1905.

Page Printing.—See **Buckingham; Burry; Murray; Printing.**

Paris Exposition.—Telegraphs and Telephones at the Paris Exhibition. J. Gavey. A brief review of the exhibits of this class which show novelty or illustrate the progress of the last decade. 5000 w. Elect'n, Lond—Nov. 23, 1900.

Philippines.—Telegraph Engineering in Moro Land. A short illustrated account, by a Signal Corps man, of the methods and working conditions under which military communication is maintained in field operations in the Philippines. 1400 w. Engineering Magazine—May, 1903.

See also **TELEGRAPHER.**

Pollak-Virag.—The Pollak-Virág Telegraph. Herr Pinter. Translation of a paper read before the Congress of Electricians at Paris. Brief illustrated description of the system, with account of recent trials and progress. 4000 w. Engng—Dec. 7, 1900.

The Pollak-Virag Rapid Telegraph. An illustrated explanation of the working of this system. 1200 w. Engr, Lond—Dec. 16, 1904.

Postal Commercial Co.—The Development of the Postal Telegraph-Cable Company. Charles P. Bruch. General account of the Postal Telegraph and Commercial Cable companies, with map. 2000 w. Elec Rev, N Y—Sept. 9, 1905.

See also **SUBMARINE CABLE—German-American; Pacific.**

Printing.—The Forerunner of the Telephone. Edward A. Calahan. Illustrated description of printing instruments and the system for a bank and private line used before the invention of the telephone by New York banks and the Clearing House. 1500 w. Elec Wld & Engr—Feb. 23, 1901.

The Applications and Requirements of a Printing Telegraph. Romyn Hitchcock. From the "Telegraph Age." Gives reasons why the printing telegraph operated from a keyboard can never compete with the Morse key for general service, and discusses the requirements and the subject in general. 2800 w. Elec, N Y—April 24, 1901.

Applications and Requirements of a Printing Telegraph. Romyn Hitchcock, in the "Telegraph Age." Presents reason why such an invention would never take the place of the Morse key in general telegraphic work, and discusses the lines where it would doubtless find use. 2000 w. Ry & Engng Rev—Jan. 11, 1902.

Printing Telegraphy. Dr. Louis M. Potts. Treats of the various essential principles involved in the system which have been shown to be of practical value. 4500 w. Int Elec Cong of St. Louis—Sept., 1904.

Modern High Speed Printing Telegraph Systems. J. C. Barclay. General discussion with brief descriptions of the Murray, Rowland and Buckingham systems. 3500 w. Int Elec Cong of St Louis—Sept., 1904.

See also **Barclay; Baudot; Berlin; Buckingham; Burry; Cardwell; Hughes; Murray; Rowland; Siemens & Halske; Steljes; Stock Ticker; SUBMARINE TELEGRAPH; TELEPHONE; TYPESETTING MACHINE.**

Protective Devices.—See **ELECTRIC PROTECTIVE APPARATUS**—Telephone; **LIGHTNING PROTECTION.**

Railway.—The Importance in Telegraphy of Apparently Little Things. Thomas D. Lockwood. Extracts from a paper read before the Ry. Tel. Supts.' Assn. Considers points relating to the conductor and instruments and also the batteries. 1800 w. Elec Rev, N Y—July 6, 1901.

The Importance in Telegraphy of Apparently Little Things. Thomas D. Lockwood. Full paper as read before the Assn. of Ry. Tel. Supts. at Buffalo, N. Y. Points in connection with lines, batteries and instruments are discussed. 8700 w. Pro. St. Louis Ry Club—July 12, 1901.

Efficiency of the Railway Telegraph Department. J. C. Browne. Discusses maintenance and operation, interruptions and their causes, and means of improving the service. General discussion. 5500 w. St. Louis Railway Club—Jan. 8, 1904.

Improvements in Telephony and Telegraphy for Railways (Neuerungen in Telephonie und Telegraphie für Eisenbahnen). Dr. Ebeling. Describing improved signal systems, rapid printing telegraphs, Pupin coils, etc., and their special application to railway service. 4500 w. Glasers Annalen—May 1, 1904.

The Evolution of the Telegraph in Railroad Work. Charles E. Yetman. Discusses especially the mechanism used in telegraph work and the conditions arising from its use as affecting the telegraph operator. Illustrates and describes the transmitting typewriter. Discussion. 18,500 w. Pro N Y R R Club—May 19, 1905.

See also **Selective Calling; Storage Batteries; RAIL BOND—St. Gothard Railway; RAILWAY OPERATION—Telephone vs. Telegraph; STORAGE BATTERY; TELEGRAPHER.**

Rapid.—See **High Speed.**

Recording.—Recording Telegraph for Amateurs. George M. Hopkins. An illustrated description. 1000 w. Sci Am—Feb. 21, 1903.

Relay.—An Improved Relay System for Continuous Currents, with Mechanical Locking Device (Ueber eine Neue Ruhestrom Translation mit Mechanischer Verriegelung der Relaishebel). J. Jokisch. Details of the relay system in operation on the

Austrian telegraph lines. 2000 w. Zeitschr f Elektrotechnik—May 21, 1905.

See also **ELECTRIC SWITCH—Time.**

Repeater.—A New Automatic Telegraph Repeater. Illustrates and describes an invention of Julio E. Cordovez for repeating telegraphic messages both with and without the use of sounders or other receivers at intermediate stations. 1000 w. Sci Am—Oct. 19, 1901.

Rodary.—See **Selective Calling.**

Rowland.—The Rowland Rapid Telegraph System. Begins an illustrated detailed description of this system and its operation. It is a multiplex system, having a capacity of four different signals each way on one wire in one-quarter second. Serial. 1st part. 3700 w. Elec Wld & Engr—Oct. 18, 1902.

The Rowland Multiplex System of Page Printing Telegraphy. Illustrated detailed description of the system invented by Prof. Henry A. Rowland. 3300 w. Sci Am—Oct. 25, 1902.

The Rowland Writing Telegraph. Day Allen Willey. An illustrated description of the apparatus and its operation, with editorial. 3300 w. Elec Rev, N Y—Nov. 15, 1902.

The Rowland Multiple Telegraph System (Ueber dem Rowlandschen Vielfach-telegraphen). H. Tuck. A fully illustrated account of the Rowland apparatus by which eight messages are sent simultaneously over a single wire. The system is in operation between Berlin and Hamburg. 10,000 w. Elektrotech Zeitschr—Sept. 17, 1903.

Selective Calling.—The Rodary Selective Signaling System on the Paris-Lyon-Mediterranean Railway (Applications du Rappel Bréguet-Rodary aux Communications Télégraphiques et Téléphoniques sur les Chemins de Fer de P. L. M.) M. Rodary. Illustrated description of a selective call applied to telegraph and telephone stations on a railway. 2000 w. Rev Gén Chemins de Fer—June, 1903.

A Selective Call for Morse Telegraph Systems (Der Wahlweise Anruf in Ruhestrom Morseleitungen). J. Baumann. Describing methods of using either continuous or alternating currents for calls over telegraph lines. 3500 w. Elektrotech Zeitschr—Jan. 26, 1905.

Shanghai-Woosung.—Disturbances on Underground Cables. W. Schönau. A brief, illustrated account of disturbances on cables connecting the submarine cables terminating at Woosung, China, with Shanghai, and the improvement effected by an "induction balance" consisting of a condenser and resistance inserted between the circuits. 400 w. Elect'n, Lond—Dec. 19, 1902.

Siberia.—The Telegraph System of Siberia. H. L. Geissel. Interesting information concerning the establishment of telegraphic communication across Siberia, showing the country quite advanced in this respect. 1800 w. Elec Wld & Engr—Nov. 17, 1900.

Telegraphy in Siberia. L. Lodian. An illustrated article describing the severe conditions which have to be met by the linemen, and the present heavy and responsible work of transmitting war news in cipher. 2000 w. Elec Rev, N Y—April 16, 1904.

Siemens & Halske.—The Siemens & Halske Rapid Printing Telegraph (Schnellwirkender Typendruck-Telegraph von Siemens & Halske A. G.). Wilhelm v. Siemens. A fully illustrated account of the improved apparatus capable of transmitting 2,000 characters per minute. 7500 w. Elektrotech Zeitschr—March 10, 1904.

Siemens & Halske Printing Telegraph or Telecryptograph. L. Ramakers. Illustrated detailed description of this automatic telegraphic system. 2500 w. Sci Am Sup—Nov. 19, 1904.

The Siemens & Halske Printing Telegraphic Apparatus. Emile Guarini. Illustrated description of the automatic printing telegraph system recently brought out by this firm. 1100 w. Elec Rev, Lond—Sept. 22, 1905.

See also **Berlin Printing.**

Simultaneous Telephony.—Telephony on Telegraph Circuits (Anschaltung von Fernprechsystemen an Morseleitungen). O. Cantor. A short description of an arrangement by which telephoning is carried on over Morse telegraph circuits. Diagrams. 400 w. Elektrotech Zeitschr—April 4, 1901.

Simultaneous Use of Telephone and Hughes System on Telephone Lines (Gleichzeitiger Fernsprech und Hughesbetrieb auf Fernsprech-Verbindungsanlagen). O. Jentsch. A description of the method used between Berlin-Vienna and other cities for the use of the Hughes telegraph system in connection with telephone lines. 1800 w. Elektrotech Zeitschr—April 18, 1901.

Light, Power, Phone and Telegraph on One Circuit. A brief description of the invention of Alexander McMartin Stark of a new system of distribution, claiming the advantages of economy and simplicity of construction and operation. 1200 w. Can Engr—June, 1903.

Simultaneous Telegraphy and Telephony. Charles C. Duvall. Describes a method, very simple to install, whereby a toll telephone line may be utilized for telegraphic service without interfering with telephonic communication. 400 w. Elec Wld & Engr—June 20, 1903.

Simultaneous Telegraphy on the Hughes System and Telephony (Doppelter Hughesbetrieb und Gleichzeitiges Fernsprechen in Doppelleitungen). H. Pfitzner. Illustrated description of a system, modified from that of Dejongh, used in the German Imperial telegraph office. 1000 w. Elektrotech Zeitschr—Dec. 17, 1903.

Simultaneous Telephone and Telegraph Equipment. Le Roy W. Stanton. An illustrated article showing the arrangement by the circuit, and the details of the system, and giving information concerning the amount of work already done in the application, and remarks on the effect to be anticipated. 4000 w. Elec Wld & Engr—April 2, 1904.

Simultaneous Telegraphy and Telephony. Joseph Hollos. Outlines the principles which were followed in the formation of the Hungarian system, which shows good results. 1500 w. Int Elec Cong of St. Louis—Sept., 1904.

The Malcotti Telecryptograph for Telegraphing upon Telephone Lines. Emile Guarini. Remarks on recent efforts to popularize the telegraph for private use, and to insure privacy on telephone lines, with illustration and information concerning the instrument which claims to have solved the problem. 1700 w. Sci Am—Sept. 17, 1904.

Combined Telephony and Telegraphy. Samuel G. McMeen. Presented at the convention of the Nat. Inter-State Telephone Assn. Explains the advantages of combined working, and the plans of arrangement for different classes of service. 2500 w. Elec Rev, N Y—July 8, 1905.

See also **TELEPHONE—Railway.**

Sounder.—The Morse Sounder. E. C. Barton. An examination of the proper method of proportioning the various parts of a telegraph circuit. Serial. 1st part. 2000 w. Aust Min Stand—July 18, 1901.

Space Telegraphy Compared.—See **SPACE TELEGRAPHY—Telegraph Compared.**

Speed and Economy.—Telegraph Systems, Operating Speeds and Economies. Romyn Hitchcock. Discusses the present condition of the telegraph, the reasons why the service is slow and costly, and the directions to look for improvements. 3000 w. Elec Wld & Engr—Nov. 16, 1901.

Steljes.—Steljes Type-Printing Telegraph. Brief description, with illustration. No batteries are required, and the message is printed automatically at both ends of the line. 800 w. Sci Am—Nov. 7, 1903.

The Steljes Printing Telegraph (Der Steljes Ferndrucker). H. Lindow. An improved form of printing telegraph using the alternating current. 3000 w. Elektrotech Zeitschr—Feb. 25, 1904.

Stock Ticker.—The Evolution of the Stock Ticker. Edward A. Calahan. An interesting account of the invention and development of this apparatus. 2800 w. Elec Wld & Engr—Feb. 9, 1901.

See also **Printing.**

Storage Batteries.—The Application of Storage Batteries to Railway Telegraph Service. W. E. Athearn. Extracts from a paper read before the Ry Tel Supts' Assn. Points drawing the economy of such installations and the care needed. 1200 w. Elec Rev, N Y—July 6, 1901.

See also **STORAGE BATTERY—Fire and Police Telegraphs.**

Submarine.—See **SUBMARINE TELEGRAPH.**

Synchronous.—Modern Synchronous Telegraph Systems (Moderne Telegraphen-Systeme mit Synchroner Bewegung). Karl v. Barth. An illustrated description of the Hughes, Baudot, Delany and other systems and apparatus. 1 plate. 5000 w. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 25, 1902.

See also **Delany; Hughes; Printing.**

Time Switch.—See **ELECTRIC SWITCH—Time.**

Transmitter.—The Kotyra Transmitter (Le Transmetteur Kotyra). R. Wittebolle. Describing an improved keyboard transmitter for the rapid sending of Morse characters over a telegraph wire. 2000 w. Revue Technique—Dec. 25, 1904.

Typesetting.—See **Murray; TYPESETTING MACHINE.**

United States.—Clark on the Conditions of American Telegraphy. Discusses the map, chart and evidence of Thomas F. Clark, vice-president of the Western Union Telegraph Co., presented before the U. S. Industrial Commission. 1200 w. Elec Wld & Engr—Aug. 24, 1901.

Statistics of the Telephone and Telegraph Industries. Information from a census bulletin on telephony and telegraphy for the year ending Dec. 31, 1902. Serial. 1st part. 2700 w. Elec Wld & Engr—Jan. 21, 1905.

U. S. Signal Corps.—See **Military.**

War.—See **Military; TELEPHONE—Military.**

Wheatstone.—See **Indo-European.**

White House.—See **TELEPHONE.**

TELEGRAPH CABLE.

See **ELECTRIC CABLE; SUBMARINE CABLE; TELEGRAPH LINE; TELEPHONE CABLE.**

TELEGRAPH ENGINEER.

See also **EDUCATION; ELECTRIC ENGINEERING—Light Current; TELEGRAPH.**

Malay Peninsula.—The Experiences of a Telegraph Engineer in Perak State, 1898-1901. D. P. Reid. An account of some of the troubles encountered in the Malay Peninsula. Serial. 1st part. 2500 w. Elec Rev, Lond—Oct. 3, 1902.

TELEGRAPHER.

See also **TELEGRAPH; TELEGRAPH ENGINEER.**

Delay and Output.—Delay and Output. C. H. Garland. From the "Telegraph Chronicle." Gives some interesting results from notes by Signor Ettore Rossi bearing upon the relation between the individual output of telegraphers and the delay in the transmission of messages, showing that overwork induces delay. 800 w. Elect'n, Lond—July 25, 1902.

Philippines.—Telegraph Operators in the Philippines. F. E. Grain. Information concerning the need of operators and the requirements. 2400 w. Elec Wld & Engr—Jan. 29, 1901.

See also **TELEGRAPH.**

Railroad.—The Telegraph Operator in the Railroad Service. John B. Taltevall. Read at meeting of Assn. of Ry. Tel. Supts. On instruction needed by operators to increase their efficiency. 1600 w. Ry Age—June 24, 1904.
See also **TELEGRAPH.**

TELEGRAPH LINE.

See also **ELECTRIC LINE; POLE; TELEGRAPH; TELEPHONE LINE; TIMBER PRESERVATION.**

Breaks.—Breaks in Overland Telegraphic Communication Due to Storms. William Maver, Jr. Discusses some proposed remedies. 3300 w. Cassier's Mag—Feb., 1905.

Poles.—See **POLE.**

Protective Devices.—See **ELECTRIC PROTECTIVE APPARATUS—Telephone; LIGHTNING PROTECTION.**

Railway Signals.—See **RAILWAY SIGNAL—Telegraph Lines.**

Storm Breaks.—See **Breaks.**

TELEGRAPHONE.

See also **ELECTRIC ENGINEERING—Europe; INSTRUMENT—Paris Exposition; TELEPHONE—Improvements.**

The Telegraphone: A Magnetic Speech-Recorder. Valdemar Poulsen. Illustrated description of the principles and arrangement of this invention for making a magnetic record of speech on a steel wire or disc by means of an electromagnet through which telephone currents are passing.

The Telephonograph (Der Telephonograph). Dr. Rellstab. An examination of the action of the Poulsen telephonograph, showing the condition under which the most accurate records of human speech may be expected. 3000 w. Elektrotech Zeitschr—Jan. 17, 1901.

The Poulsen Telephonograph (Ueber den Telephonographen von Poulsen). Jul. H. West. A paper read before the German Electrotechnical Society, illustrating and describing very fully the apparatus for making a magnetic record of speech on a steel wire or disc by means of an electromagnet through which telephone currents are passing. 4000 w. Elektrotech Zeitschr—Feb. 21, 1901.

The Telegraphone. An illustrated description of the remarkable recording telephone invented by Herr Poulsen. 1500 w. Nature—June 20, 1901.

The New Telegraphone. An illustrated description of recent improvements made in the Poulsen invention. 900 w. Sci Am—Oct. 3, 1903.

The Telegraphone. Dr. Z. B. Babbitt. An interesting description of this invention of Valdemar Poulsen, its workings and the uses to which it may be applied. 1600 w. Jour Fr Inst—Jan., 1905.

British Post Office.—The Telegraphone and the British Post Office. Herbert C. Fyfe. An illustrated description of this instrument that records and reproduces the message spoken into it. 1200 w. Sci Am—April 25, 1903.

TELEMETER.

See **SURVEYING—Photographic; Stadia; SURVEYING INSTRUMENT—Stadia.**

TELEPHONE.

See also **TELEGRAPH; TELEPHONE CABLE; TELEPHONE COMPANY; TELEPHONE EXCHANGE; TELEPHONE LINE; TELEPHONE PATENT; TELEPHONE SERVICE; TELEPHONE SWITCHBOARD.**

Features of Modern Telephone Work. Address of J. J. Carty to the N. Y. Elec. Soc. at the new Cortlandt St. Exchange of the N. Y. Telephone Co. 2800 w. Elec Wld & Engr—Feb. 22, 1902.

Telephony. W. H. Radcliffe. The first of a series of articles commencing with the fundamental principles and presenting in full the most advanced practice in construction, the exchange and its equipment, and recent important developments. Ill. Serial. 1st part. 1400 w. Elec, N Y—June 4, 1902.

Practical Telephony. This first of a series of articles explains some of the terms used. Serial. 1st part. 1500 w. Telephony—Oct., 1902.

Planning a Telephone System. Samuel G. McMeen. Read at the St. Louis convention of the Ind. Tel. Assn. of the U. S. A discussion of rules to be applied in planning a telephone system at minimum costs. 2500 w. Elec Rev, N Y—Sept. 3, 1904.

The Telephone System of To-day. C. J. H. Woodbury. Abstract of a paper before the Brooklyn Inst. of Arts & Sciences. An explanation of the latest type of the telephone system, discussing operation, rates, &c. 4500 w. Elec Rev, N Y—May 13, 1905.

Development and Future Tendencies of the Telephone Art. Edward E. Clement. Abstract of a paper prepared for the Nat. Interstate Tel. Assn. A review of past and present practices, and a brief discussion of improvements and changes to be expected. 2500 w. Elec Rev, N Y—Aug. 19, 1905.

Acoustic and Electric Constants.—The Acoustic and Electric Constants of the Telephone. Max Wien. Discusses whether in the telephone itself there are causes for the different transmission of different notes, thus affecting the distinctness of speech. 2500 w. Elect'n, Lond—May 10, 1901.

A. I. E. E., Discussion.—Discussion. A discussion of the papers by Thomas D. Lockwood and by William J. Hammer. 12,500 w. Trans Am Inst of Elect Engrs—Feb., 1903.

See also **Status Quo; TELEPHONE EXCHANGE Automatic; TELEPHONE SWITCHBOARD—Evolution.**

Arc.—See **ARC LIGHT—Singing; LIGHT TELEPHONY.**

Army and Navy.—See **Military.**

Australia.—Telephony in Australia. Interesting information from a government report, regarding the status of telephony and the proposals for the reconstruction and development of the systems of the commonwealth. 1800 w. Elec Wld & Engr—Aug. 2, 1902.

Automatic System.—See **A. I. E. E. Discussion; TELEPHONE EXCHANGE.**

Batteries.—See **ELECTRIC CELL—Telephony; STORAGE BATTERY; TELEGRAPH—Current Supply; TELEPHONE EXCHANGE—Common Battery.**

Bell.—Some Notes on Bell's Telephone. Fred Deland. Gives in detail the steps that led to the invention of Bell's telephone. 3700 w. Telephony—Oct., 1901.

The Evolution of the Telephone. W. H. Sharp. Reviews the history of telephone evolution, leading to A. G. Bell's telephone "improvements" in 1876. 5000 w. Sci Am Sup—July 15, 1905.

See also **History; Invention.**

Bréguet-Rodary.—See **TELEGRAPH—Selective Calling.**

British.—Telephony in Great Britain. Gives brief descriptions of the three competitive systems which have been put into operation, explaining the attitude of the government. Ill. 2800 w. Elec Rev, N Y—Feb. 15, 1902.

The Future of the Telephone in the United Kingdom. J. E. Kingsbury. Read at Belfast meeting of the British Assn. A review of the history of telephony in England, endeavoring to remove misunderstandings and considering the features upon which the service depends. 5500 w. Elec Engr, Lond—Sept. 19, 1902.

See also **TELEGRAPH; TELEPHONE WORKS.**

Construction.—Telephone Construction—City Work Plans. W. H. Johnson. This first article discusses present conditions, and the making of plans. Serial. 1st part. 2800 w. Telephony—Dec., 1901.

See also **TELEPHONE EXCHANGE; TELEPHONE LINE.**

Cross Talking.—See **TELEPHONE LINE—Transposition.**

Current Supply.—The Dynamo in Recent Telephone Practice. D. M. Bliss. An illustrated description of apparatus now considered standard for supplying exchange systems, the arrangement of circuits, etc. The dynamo is especially considered. 2500 w. Elec Wld & Engr—Feb. 23, 1901.

Efficiency of Telephone Generators. W. S. Henry. Gives a method of comparing the capacities of telephone generators. 1400 w. Am Elect'n—Sept., 1901.

See also **STORAGE BATTERY; TELEGRAPH; TELEPHONE EXCHANGE—Power Plants.**

Design.—The Designing of Telephone Apparatus. W. A. Taylor. Discussing points of importance representing the best practice. Serial. 1st part. 2600 w. Elec Rev, N Y—Sept. 13, 1902.

Duplex.—Combined Telephone Circuits (Les Circuits Téléphoniques Combinés). M. Devaux-Charbonnel. A description, with diagrams, of arrangements of telephone circuits for carrying on two conversations over one circuit at the same time, and particularly, of M. Cailho's arrangement, which has operated successfully between Paris and Rouen, 140 kilometers. 3000 w. Bull Soc Internat des Elect—May, 1903.

Education.—See **EDUCATION—Telephone Engineer.**

Engineering.—Telephone Engineering. Frans J. Dommerque. The first of a series of articles devoted to the discussion of the building and maintenance of telephone plants and the operation of exchanges. Serial. 1st part. 1400 w. Am Elect'n—Jan., 1902.

Practical Telephone Engineering. William W. Handy. A general description of problems in the design and construction of modern telephone plants in large cities, discussing the methods that will yield the best results. Serial. 1st part. 2500 w. Elec Rev, N Y—June 20, 1903.

See also **EDUCATION—Telephone Engineer; ELECTRICAL ENGINEERING—Light Current; TELEPHONE LINE.**

Europe.—An American Review of Telephony Abroad. A review by U. N. Bethell. An abstract of evidence given before the U. S. Ind. Com., containing much matter of interest. 3700 w. Elec Wld & Engr—Aug. 3, 1901.

Faller Automatic.—See **TELEPHONE EXCHANGE—Automatic.**

Farm Service.—See **TELEPHONE COMPANY—Colorado.**

Franchise.—See **FRANCHISE.**

Gavey Address.—See **TELEGRAPH.**

Generator Efficiency.—See **Current Supply.**

Germany.—See **TELEGRAPH.**

History.—Telephony. Kempster B. Miller. A review of progress and improvements, noting the present tendencies. 1700 w. Elec Wld & Engr—Jan. 5, 1901.

The Electrical Transmission of Intelligence. Kempster B. Miller. A review of progress made in the telegraph and the telephone. 1700 w. W Elect'n—Jan. 5, 1901.

The Technical Development of Telephony. Kempster B. Miller. A rapid review of the development. 3500 w. Telephony—April, 1902.

The History of the Invention and Development of the Speaking Telephone. George C. Maynard. Interesting historical account, with portaits. 5000 w. Elec Rev, N Y—Jan. 12, 1901.

Telephony Twenty Years Ago and To-day. Thomas D. Lockwood. A brief review of the general advancement made. 1600 w. Elec Rev, N Y—Feb. 15, 1902.

A Review of Twenty-five Years of Telephony. Arthur Vaughan Abbott. 2500 w. Elec Wld & Engr—March 5, 1904.

Telephony. Herbert Laws Webb. An illustrated review of the history and development of the telephone. Serial. 1st part. 7000 w. Jour Soc of Arts—Sept. 15, 1905.

See also **Bell; Invention; Transmitter; TELEPHONE PATENT.**

Humming.—Note on a Humming Telephone. F. Gill. A record of experiments showing the behavior of a telephone when placed near the diaphragm of a microphone. 2000 w. Elec Rev. Lond—May 31, 1901.

Improvements.—Improvements in Telephony (Neuerungen auf dem Bebiete der Telephonie). H. Zopke. With especial reference to improvements in switchboards; also containing an account of th Poulsen telephonograph. 3000 w. Zeitschr d Ver Deutscher Ing—April 20, 1901.

Invention.—The Invention of the Telephone. George S. Davis. Gives the claims of William A. Skenkle to the invention. Also editorial. Ill. 3800 w. Elec Wld & Engr—March 23, 1901.

See also **Bell; History; TELEPHONE PATENT.**

Japan.—See **TELEGRAPH.**

Japanese Army.—See **Military.**

Krejsa.—See **Printing; Transmitter, Krejsa.**

Light.—See **LIGHT TELEPHONY.**

Locomotive Cab.—See **RAILWAY SIGNAL.**

Long Distance.—Some Interesting Phases of Long-Distance Telephony. S. G. McMeen. An interesting discussion, touching upon simultaneous telephony and telegraphy, long-distance trunks, booster batteries, ticket-tube system, etc. General discussion. Diagrams. 9200 w. Jour W Soc of Engrs—Dec., 1904.

See also **TELEPHONE LINE.**

Mendel Railway, Tyrol.—See **RAILWAY SIGNAL.**

Microphone.—Improvements to Maintain a Uniform Action of the Microphone in Telephony (Neuerung zum Erreichen einer Dauernd Zuverlässigen Wirkungsweise des Mikrophons im Fernsprechbetrieb). H. Stosberg. Showing the proper proportioning of the resistances to insure permanency of action. 800 w. Elektrotech Zeitschr—Feb. 4, 1904.

See also **Time Signals; Transmitter; ELECTRIC CURRENT, ALTERNATING; TELEPHONE PATENT.**

Military.—The Telegraph, Telephone and Cable in War. Maj. Samuel Reber. A general description of the service and its value in modern warfare, with review of its early history. 4000 w. Int Elec Cong of St. Louis—Sept., 1904.

Signal Service in Modern Warfare. M. C. Sullivan. Describes methods used by the Japanese army in the war now in progress, especially the extensive use of the telephone. Ills. 1500 w. Sci Am—Sept. 10, 1904.

The Use of the Telephone by the Japanese Army at the Battle of Mukden. M. C. Sullivan. An account of the skilful use made of the telephone in handling the Japanese army. 1500 w. Elec Rev, N Y—July 1, 1905.

The Use of the Telephone in Army and Navy Manoeuvres. Col. B. K. Roberts. An account of the communications used during the recent Army and Navy exercises, to keep the officers informed as to the movements and approach of the Navy in its attack on the forts which defended the City of Washington. 1200 w. Elec Wld & Engr—Nov. 4, 1905.

See also **TELEGRAPH.**

Moldau-Elbe Canal.—Telephone Switch for the Moldau-Elbe Canal System (Telephon-Umschalter für die Fernsprechanlage der Moldau-Elbe-Canalisierung). Hans Mattausch. An illustrated description of the telephone system of the Moldau-Elbe canalisation works, particularly of a switching arrangement designed by the author. 1 plate. 4500 w. Oester Wochenschr f d Oeffent Baudienst—April 26, 1902.

Municipal.—See **MUNICIPAL OWNERSHIP; TELEPHONE COMPANY; TELEPHONE EXCHANGE.**

1903.—The Telephone in 1903. C. J. H. Woodbury. Reviews the improvements during the past year. 1500 w. Elec Rev, N Y—Jan. 9, 1904.

Nomenclature.—The Origin of Telephonic Nomenclature. Harry S. Coyle. An explanation of the sources from which the terms used are derived. 1800 w. Telephony—Jan., 1902.

Overtones.—See **Therrell System.**

Pacific Coast.—The Development of the Telephone on the Pacific Coast. Discusses the causes of the rapid development. Ill. 1700 w. Elec Wld & Engr—April 20, 1901.

The Engineering Side of Telephone Work on the Pacific Coast. An illustrated detailed description of the exchange equipments and operation. 2000 w. Elec Wld & Engr—April 27, 1901.

Pan-American Police.—See **Police.**

Paris Exposition.—See **TELEGRAPH.**

Party Lines.—See **TELEPHONE LINE.**

Pasquet Transmitter.—See **Transmitter.**

Police.—Police Department System Pan-American Exposition. Illustrated description of the interesting police system employed for official use by the police and guard departments, employing a telephone with a signalling apparatus. 1600 w. Telephony—Nov., 1901.

Potential Measurement.—See **ELECTRIC MEASUREMENT—Potential.**

Printing.—A Sketch for a Type-Printing Telephonograph (Skizze zu einem Typen-Druck-Telephonographen). W. Krejsa. A suggestion, with diagram, for a system using selective receiving telephones, each of which would respond to the sound corresponding to a letter and would operate a relay which would actuate the type-printing mechanism. 500 w. Zeitschr f Elektrotechnik—April 12, 1903.

Protective Apparatus.—See **ELECTRIC PROTECTIVE APPARATUS—Telephone; LIGHTNING PROTECTION.**

Railway.—Permanent Communication Between Moving Trains (Intercommunication Permanente des Trains en Marche). Emile Dieudonné. Description of a system invented by Senor Basanta, by which moving trains are connected telephonically with each other and with the nearest stations, and by which the different cars of a train are in telephonic communication. 2500 w. Rev Tech—March 25, 1903.

The Telephone and the Railway. Brief account of recent tests made on a number of American railways with telephone apparatus which can be connected to telegraph line wires and so establish communication between halted trains and stations. 1000 w. Sci Am—Oct. 24, 1903.

See also **RAILWAY OPERATION—Telephone; TELEGRAPH—Railway; Selective Calling; TELEPHONE LINE.**

Rates.—See **TELEPHONE SERVICE.**

Relay, Lyons.—A New Telephone Relay. Illustrates and describes a novel method of reinforcing telephone currents recently patented by Joseph Lyons. 1200 w. Sci Am Sup—Oct. 18, 1902.

Relays.—The Problem of the Telephone Relay. Dr. John Trowbridge. An account of an instrument produced by the writer, and the character of its working. 1000 w. Elec Rev, N Y—Sept. 10, 1904.

Repeating Coils.—Something About Repeating Coils. A. E. Dobbs. An illustrated article giving information concerning coils used on long telephone lines. 1600 w. Am Tel Jour—Jan. 11, 1902.

Safety Appliance.—See **ELECTRIC PROTECTIVE APPARATUS; LIGHTNING PROTECTION; SAFETY APPLIANCE.**

Science.—Telephony from a Scientific Standpoint. Harry S. Coyle. Some remarks on the ignorance concerning the essential principles of the science, and its progress as an art. 1800 w. Telephony—Sept., 1901.

Secrecy.—Connections for Maintaining Secrecy in Communication (Schaltung zur Sicherung des Gesprächsgeheimnisses). J. E. Salzer. Describing methods of preventing private telephone communications from being overheard by exchange operators or others. 2500 w. Elektrotech Zeitschr—Oct. 22, 1903.

Selective Alarm.—See **TELEPHONE LINE—Party.**

Selective Signaling.—Telephone Magnetoes for Delivering Pulsating Current for Selective Signaling. N. H. Holland. Describing an improved form of magnets for "individual call" telephone circuits. 1200 w. Elect Wld & Engr—Aug. 31, 1901.

See also **TELEGRAPH; TELEPHONE LINE.**

Series Grounded.—Telephone Engineering. J. C. Kelsey. The first of a series of articles reviewing those circuits that have played a prominent part in the development of the telephonic art, and have at one time been a standard form. The present article considers the series grounded system. Serial. 1st part. 2200 w. Elec Rev, N Y—April 9, 1904.

Shipboard.—See **Steamship "Minnesota;" ELECTRIC EQUIPMENT.**

Short Distance.—A Study of Short-Distance Telephony. Valentine Ryan. Considers the installations of short-distance telephones and their working. Serial. 1st part. Elec Engr, Lond—May 26, 1905.

Simultaneous Telegraphy.—See **TELEGRAPH.**

Status Quo.—The Telephonic Status Quo. Arthur Vaughan Abbott. A general discussion of the present telephone situation, briefly reviewing the history and considering the outlook. 4500 w. Trans Am Inst of Elec Engrs—April, 1902.

Steamship "Minnesota."—Telephones on Great Northern Steamship "Minnesota." A. F. Boardman. Illustrated detailed description of what is said to be the largest installation of a telephone system on shipboard. 1400 w. Marine Engng—March, 1905.

Stock Exchange.—See **ELECTRIC EQUIPMENT.**

Storage Battery.—See **STORAGE BATTERY.**

Sub-Station.—The Telephone Sub-Station. Arthur V. Abbott. The present article deals with induction coils and sub-station circuits. Diagrams. Serial. 1st part. 1500 w. Elec Wld & Engr—March 26, 1904.

See also **TELEPHONE EXCHANGE.**

Switch.—See **Moldau-Elbe Canal; TELEPHONE**

Terminology.—See **Nomenclature.**

Testing.—Electrical Testing for Telephonists. H. S. Webb. Describes apparatus necessary where much testing is to be done, in addition to the ordinary magneto set. The present article describes galvanometers and shunts. Serial. 1st part. 2500 w. Am Tel Jour—Jan. 25, 1902.

Therrell System.—Voice Overtones, or Harmonics, as Affecting Long-Distance Telephone Transmission. D. MacL. Therrell. Describes apparatus and experiments for improving articulation. 4500 w. Elec Wld & Engr—Nov. 11, 1905.

Time Signals.—The Precise Transmission of Time by Telephone (Transmission Précise de l'Heure par le Téléphone). E. Guyou. The oscillations of a standard pendulum are transmitted by sound, using a special microphone transmitter. 1000 w. Comptes Rendus—May 29, 1905.

Train Communication.—See **Railway.**

Transmitter.—The Pasquet Telephone Transmitter used in the French government lines. 1500 w. L'Electricien—Nov. 22, 1902.

The Telephone Transmitter: Its Early History, Its Present Status with Relation to the Berliner Patent—Past and Present. J. J. Nate. Abstract of paper before the Interstate Independent Telephone Association, giving a history of telephone invention. 1200 w. Elec Rev, N Y—Dec. 20, 1902.

Telephone Transmitters. Arthur V. Abbott. Explains the three principles upon one of which every transmitter operates, and discusses microphonic contact in the present article. Ill. Serial. 1st part. 2800 w. Elec Wld & Engr—Dec. 5, 1903.

See also History; Microphone; Time Signals; TELEPHONE PATENT.

Transmitter Cases.—See DIE—Telephone Parts.

Transmitter, Krejsa.—A New Loud Speaking Microtelephone (Un Nouveau Microtélephone Haut Parleur). From a paper by W. Krejsa before the Vienna Electro-Technical Society. An illustrated description of a transmitting apparatus in which the induction coil has an armature whose distance from the core varies with the current. 400 w. Electricien—Sept. 28, 1901.

Tuned Transmitter.—See ELECTRIC CURRENT, ALTERNATING—Microphone Transmitter.

United States.—See TELEGRAPH; TELEPHONE SERVICE.

War.—See Military.

White House.—The New Telephone and Telegraph Bureau at the White House. Waldon Fawcett. An illustrated article describing the fine equipment which is of such invaluable service to the President. 1200 w. Elec Rev, N Y—April 18, 1903.

TELEPHONE CABLE.

See also ELECTRIC CABLE; ELECTRIC CONDUIT; SUBMARINE CABLE; TELEPHONE LINE; WIRE—Telephone.

Telephone Cables—Their Construction and Maintenance. P. Kerr Higgins. An illustrated article stating the conditions as they exist at the present time. Serial. 1st part. 3000 w. Am Tel Jour—Feb. 1, 1902.

Underground Work for Telephone Exchanges. Arthur V. Abbott. The first of a series of articles dealing with the conductive system, describing the details of the plant, calculating cost, etc. Serial. 1st part. 1300 w. Elec Wld & Engr—Aug. 30, 1902.

Some Interesting Experiences Connected with the Manipulation and Installation of Cables. H. W. Fisher. Brief notes on telephone and electric light cables. 1000 w. Pro Engrs Soc of W Penn —Jan., 1903.

Air Insulation.—Air-Spaced Cables: Their Treatment and Use. G. E. Fletcher. Read before the Manchester Sec. of the Inst. of Elec. Engrs. Considers the conditions and precautions necessary for the production of air-spaced insulated cables and the question of protecting them from the destructive effect of lightning, recommending their use. 2000 w. Mech Engr—April 19, 1902.

Air-Spaced Cables: Their Treatment and Use. G. E. Fletcher. Read at Manchester meeting of the Inst. of Elec. Engrs. Gives the writer's experience in laying down and maintaining this form of insulated conductor for telegraphic and telephonic lines, which he regards with favor. Ill. 3000 w. Prac Engr—May 23, 1902.

The Manufacture of Multiple-Core Telephone Cables with Air Insulation (Die Fabrikation Mehradriger Telephonkabel mit Luftisolation). J. Schmidt. Describing methods of manufacture employed by several German firms. 2500 w. Zeitschr f Elektrotechnik—Jan. 17, 1904.

The Manufacture of Multiple Telephone Cables with Air Insulation (Die Fabrikation Mehradriger Telephonkabel mit Luftisolation). J. Schmidt. Giving sections of various makes of cables and details of their construction. 3500 w. Zeitschr f Elektrotechnik—April 10, 1904.

Multiple Telephone Cables with Air Insulation (Die Fabrikation Mehradriger Telephonkabel mit Luftisolation). J. Schmidt. Giving details of construction and methods of manufacture of several German makers. 3000 w. Zeitschr f Elektrotechnik—May 29, 1904.

The Manufacture of Air-Insulated Cables. Emile Guarini. Illustrates and describes the process at Messrs. Siemens & Halske's cable works, at Nonnendamm, where air is used as an insulating medium in connection with the manufacture of telephone cables. 1000 w. Elec Rev, N Y—Jan. 21, 1905.

Anglo-Belgian. — See SUBMARINE CABLE — Telephone.

Austin, Minn.—Economical Features of the Austin Telephone Company's All-Cable Plant, Austin, Minn. Illustrated description of an aerial telephone cable plant, and other features of the equipment of the Austin exchange. Also editorial. 1800 w. Elec Wld & Engr—Aug. 20, 1904.

Berlin.—Underground Conductors for the Municipal Telephone System of the German Post Office (Unterirdische Führung von Anschlussleitungen in Stadfernsprechnetzen der Deutschen Reischpost). H. Zappe. A fully illustrated description of the underground system recently installed in Berlin. 5000 w. Elektrotech Zeitschr—April 10, 1902.

Chaux-de-Fonds.—The Underground Telephone Network at Chaux-de-Fonds, Switzerland (Das Unterirdische Telephonnetz zu Chaux-de-Fonds). An illustrated description, abstracted from "Journal Telegraphique," of a telephone distribution system. 1000 w. Elektrotech Zeitschr—Jan. 9, 1902.

Construction.—Cable Construction for Telephone Lines. General specifications, with illustrations. 10,000 w. Elec Wld & Engr—Feb. 14, 1903.

Davenport, Iowa.—Placing Telephone Lines Underground. John S. Huntoon. Illustrates and describes the work as carried out at Davenport, Iowa. 1500 w. Technograph, No. 16—1901-2.

Design.—Telephone Cables. Arthur V. Abbott. This first article discusses the principles of circuit design. Ill. Serial. 1st part. 3700 w. Elec Wld & Engr—Dec. 6, 1902.

Destruction, Queensland.—A New Danger to Lead-Covered Aerial Cables. John Hesketh. Describes trouble caused by an insect in Queensland which attacks the telephone cables. Ills. 2500 w. Int Elec Cong of St. Louis—Sept., 1904.

Electrolysis.—See STRAY CURRENTS—Telephone Cables.

Fault Location.—Two Methods of Locating Faults in Telephone Cables. H. B. Stabler. Description with diagrams of methods used where paper insulation of lead-sheathed cables gets wet. 2000 w. Elec Wld & Engr—Aug. 27, 1904.

See also ELECTRIC MEASUREMENT.

Hultman.—A New Underground Cable System. Axel Hultman. Illustrated description of a method worked out by the writer. 1000 w. Elec Rev, Lond—April 14, 1903.

Inductance.—Measurements of Telephone Cables with Self-Induction (Messungen an einem Fernsprechkabel mit Selbstinduktion). Dr. F. Breisig. An account of experiments with telephone conductors wound with iron wire to increase their inductance. 3000 w. Elektrotech Zeitschr—Dec. 19, 1901.

Telephone Cables with Iron Wire Wrapping (Ueber Fernsprech Kabel mit Eisendrahtumwickelung). C. E. Walsöe. A discussion of the inductive effect of external iron wire wrapping upon telephone cables. 1800 w. Elektrotech Zeitschr —Sept. 10, 1903.

See also SUBMARINE CABLE—Telephone; TELEGRAPH—Current Analysis; TELEPHONE LINE.

Induction.—The Prevention of Induction in Telephone Cables (Ueber Induktionsstörung in Fernsprechkabeln mit Doppelpaarrig Verteilten Drähten). J. H. West. Showing how the conductors in telephone cables in which there are two pairs of wires may be so arranged as mutually to destroy induction effects. 1500 w. Elektrotech Zeitschr—Oct. 3, 1901.

Cross-Talk in Telephone Cables, with Wires Laid Up in Fours. Jul. H. West. From the "Electrotechnische Zeitschrift." Discusses the reason why cross-talk appears and some means of eliminating it. 1400 w. Elect'n, Lond—Oct. 11, 1901.

The Prevention of Induction in Cables for Weak Currents (Ueber die Vermeidung der Induktion bei Schwachstromkabeln). J. Schmidt. A description of the various methods of manufacturing and insulating cables, with especial reference to minimizing the effects of induction. 3500 w. Zeitschr f Elektrotechnik—Dec. 11, 1904.

The Reduction of Induction in Cables for Weak Currents (Ueber die Vermeidung der Induktion bei

Schwachstromkabeln). J. Schmidt. A discussion of the best arrangement of wires in telephone and telegraph cables to minimise induction effects. 3500 w. Zeitschr f Elektrotechnik—March 19, 1905.

See also **TELEPHONE LINE—Transposition.**

Interior.—Comparative Investigations of System Cables (Vergleichende Untersuchungen an Systemkabeln). Dr. W. Schuler. An examination of the special cables used in the interior of a telephone exchange, as distinguished from line cables. 7000 w. Elektrotech Zeitschr—May 4, 1905.

See also **ELECTRIC WIRING—Telephone; TELEPHONE EXCHANGE.**

Iron Wire Wrapping.—See **Inductance; SUBMARINE CABLE—Telephone.**

Maintenance.—Telephone Cables. Arthur V. Abbott, C. E. A discussion of the cost and maintenance of underground and aerial telephone cables, with diagrams. 1500 w. Elec Wld Engr—Jan. 3, 1903.

Multiple Conductor.—The Conditions Involved in Multiple Electric Conductors (Ueber die Definitionen der Elektrischen Eigenschaften von Mehrfach-Leitungssystemen). Dr. F. Breisig. A discussion of the conditions involved in using multiple conductor cables for telephone lines. 4500 w. Elektrotech Zeitschr—Dec. 25, 1902.

See also **Air Insulation; TELEPHONE LINE.**

Pupin.—See **TELEPHONE LINE.**

St. Gothard Tunnel.—The Placing of a New Telephone Cable in the St. Gothard Tunnel (Verlegung eines Neuen Kabels für den Oeffentlichen Fernsprechverkehr im Gothard-Tunnel). A. Baechtold. With section of the cable and a description of the method of placing. 18,000 w. Elektrotech Zeitschr—June 27, 1901.

Submarine.—See **Inductance; SUBMARINE CABLE—Telephone.**

Tests and Specifications.—Cable Tests and Specifications. H. J. Dommerque. Discusses the electrical requirements of a telephone cable when in service, indicating methods of testing and making up specifications. 3800 w. Am Elect'n—Oct., 1903.

Thawing.—See **THAWING.**

TELEPHONE COMPANY.

See also **TELEPHONE; TELEPHONE EXCHANGE; TELEPHONE SERVICE.**

Bell.—A European Study of American Telephone Statistics. G. De La Touanne. A discussion of the statistics of the American Bell Telephone Co. 1900 w. Elec Wld & Engr—June 8, 1901.

Bell vs. Independent.—A Comparison of the Bell and Independent Systems and Methods of Operation. R. Max Eaton. Discusses the methods of both companies and the telephone problem generally. 1700 w. Elec, N Y—June 19, 1901.

The Magnitude of Telephone Competition. Fred de Land. Gives statistics of the Bell Telephone showing what a powerful competitor the Independents have to meet. 2400 w. Elec Rev, N Y—June 21, 1902.

See also **TELEPHONE SERVICE.**

Brighton Municipal, Eng.—Brighton Municipal Telephones. Illustrating and describing the laying of the underground ducts and the construction and operation of the exchange; with details of the switchboards, and map of the area served. 3400 w. Elec Engr, Lond—March 4, 1904.

Colorado. — See **TELEPHONE SERVICE — Farming District.**

Cuyahoga.—See **TELEPHONE EXCHANGE—East Cleveland, O.**

Franchise.—See **FRANCHISE—Telephone and Telegraph.**

Glasgow, Scotland.—The Glasgow Municipal Telephone System. The first of a series of articles giving facts and figures on capital cost. Serial. 1st part. 2200 w. Elec Rev, Lond—Oct. 9, 1903.

The Cost of the Glasgow Corporation Telephone System. Analyzes the capital account under its natural divisions, extracting the average cost per unit of work, and determines the average capital cost per working line. 2500 w. Engng—Dec. 25, 1903.

Glasgow Municipal Telephone System: Estimates and Results Compared. Herbert Laws Webb. Showing that the original estimates of cost and size of plant have been greatly exceeded. Curves. 1600 w. Elec Rev, Lond—Aug. 5, 1904.

The Glasgow Municipal Telephones. A. R. Bennett. Illustrated description of the principal features of a system with over 8,000 working lines. 2500 w. Public Works—Aug. 15, 1904.

Guatemala.—The Telephone Company of Guatemala. Brief illustrated description of the system. 700 w. Elec Rev, N Y—Feb. 16, 1901.

Independent.—Independent Telephone Exchange Ownership as an Investment. Burt Hubbell. Discusses the points of importance, reaching a favorable conclusion. 1500 w. Elec Rev, N Y—Dec. 12, 1900.

The Rise, Growth and Present Extent of the Independent Telephone Movement. James M. Thomas. 2700 w. Elec Rev, N Y—Jan. 12, 1901.

Judge Thomas on Independent Telephony. His views on the growth and strength of the independent movement. 3500 w. Elec Wld & Engr—June 8, 1901.

Needed Improvements in Independent Telephony. L. W. Stanton. Read before the Ind. Tel. Assn. Discusses the problems of tariff, traffic and equipment in this field. 3500 w. Elec Rev, N Y—July 12, 1902.

Greater Permanent Progress of the Independent Telephone Industry. Fred De Land. Comments on cheap rates and the cost of maintenance. 2700 w. Elec Rev, N Y—Dec. 6, 1902.

The Telephone Situation of To-Day. A. E. Dobbs. Statistics showing the rapid growth of the independent telephone business, and the lessons learned. 2800 w. Elec Rev, N Y—Dec. 13, 1902.

See also **Bell vs. Independent; TELEPHONE EXCHANGE.**

Independent, British.—Independent Telephony in Great Britain. The first of a series of articles on the construction, capital cost and managements of exchanges in England. Serial. 1st part. 2000 w. Elec Engr, Lond—Oct. 2, 1903.

Independent, Buffalo.—Independent Telephony in Buffalo. James Malcolm. Illustrated description of the plant under construction and the system. 1500 w. Elec Wld & Engr—Dec. 13, 1902.

Independent vs. Bell.—See **Bell vs. Independent; TELEPHONE SERVICE.**

Michigan Taxation.—The Valuation and Taxation of Telephone Companies in Michigan. W. J. Rice. An explanation of the work of the Michigan Board of State Tax Commission; the results reached as a basis for the appraisal of telephone properties, and matters related. 3700 w. Elec Wld & Engr—Feb. 2, 1901.

Minneapolis-St. Paul.—Telephone Situation in the Twin Cities. Huntley L. Howard. An illustrated article giving the history of the telephone business in Minneapolis and St. Paul, describing the plant. 5800 w. Telephony—Dec., 1902.

Municipal Ownership.—Is State Ownership of Telephones Desirable? F. Dagger. Information regarding the results of government ownership in Austria, Belgium, France, Germany, Switzerland, and Luxemburg, showing the service generally unsatisfactory. 1600 w. Can Engr—Aug., 1903.

Municipal Telephones. J. F. Hemenway. Reports the successful operation in European and English cities at much lower rates than in America. 2800 w. Munic Jour & Engr—Nov., 1903.

See also **TELEPHONE EXCHANGE**; and under names of places.

Portsmouth, Eng.—Portsmouth Corporation Telephones. Explains the commercial policy of the undertaking and illustrates and describes the equipment. 2500 w. Elec Engr, Lond—Oct. 9, 1903.

St. Paul.—See **Minneapolis-St. Paul.**

Toledo, O.—The Toledo Home Telephone Company. A. E. Dobbs. Reviews the history of telephony in this city and gives an illustrated description of this new company's building and its equipment. 2700 w. Elec Rev, N Y—Oct. 18, 1902.

TELEPHONE ENGINEER.

See **EDUCATION — Telephone Engineer; ELECTRIC ENGINEERING—Light Current.**

TELEPHONE EXCHANGE.

See also **TELEPHONE; TELEPHONE COMPANY; TELEPHONE SWITCHBOARD.**

Modern Telephone Engineering. Kempster B. Miller. Read before the N. Y. Elec. Soc. A discussion of engineering problems arising in planning a telephone exchange and a description of methods and means employed in modern practice. Serial. 1st part. 2700 w. Elec Rev, N Y—May 4, 1901.

The Housing of a Telephone Plant. Herbert Laws Webb. An illustrated article tracing the evolution of the modern telephone exchange building. 4800 w. Elec Wld & Engr—Aug. 30, 1902.

Telephone Exchanges. Arthur V. Abbott. The present article deals with the sub-station and its apparatus. Ill. Serial. 1st part. 3000 w. Elec Wld & Engr—April 25, 1903.

Theory of Telephone Exchange Development. G. de la Touanne. A summary of the principal commercial questions met in starting a new telephone exchange. 4000 w. Int Elec Cong of St. Louis—Sept., 1904.

Alton, Ill. — An Independent Central Energy Exchange and Toll Line Office. An illustrated description of the exchange at Alton, Ill., which is a part of a scheme to give long-distance service to the cities of Missouri and Southern Illinois. 1400 w. Am Elect'n—April, 1902.

Ashtabula, Ohio.—The Exchange of the Ashtabula Telephone Company. Description and illustrations of the new exchange at Ashtabula, Ohio. 1200 w. Elec Rev, N Y—June 6, 1903.

Atlanta, Ga.—The Independent Telephone Exchange at Atlanta, Ga. E. E. Clement. Illustrated description of the main features of a large modern telephone exchange, in which the trunking principle has been successfully used throughout. 2100 w. Am Elect'n—Jan., 1901.

Automatic.—The Telephone Auto-Commutator. An illustrated explanation of the principle of a system recently installed in France for calling subscribers without the aid of the central office. 1100 w. Sci Am—Feb. 9, 1901.

Automatic Telephone System (Vollautomatisches Nebenstellensystem für Fernsprechanlagen). J. Baumann. A description of the improved equipment of the German Post Office telephone system. 5000 w. Elektrotech Zeitschr—Oct. 9, 1902.

The Automatic Telephone Exchange. Joseph B. Baker. Some facts relating to the service rendered and the advantages of this system. 1700 w. Elec Rev, N Y—Dec. 13, 1902.

An Automatic Telephone Operator. William J. Hammer. A description of an automatic telephone exchange operator, power driven, which performs the functions of switching, signaling, line-clearing, etc., of the human operator, and by exactly similar means. Also a comparison of the salient features of the manual and automatic systems. Ill. 7000 w. Trans Am Inst of Elec Engrs—Feb., 1903.

Some Latest Features of Automatic Telephony. Norman G. Meade. An explanation of the more important points of the automatic system, giving diagrams showing the various circuits and details. 2200 w. Elec Wld & Engr—Dec. 31, 1904.

See also **Mix & Genest; TELEPHONE; TELEPHONE SERVICE.**

Automatic, Chicago.—The Automatic Telephone and Switchboard. A. E. Kieth and J. F. Crook. Illustrated description of the apparatus with which the immense exchange of the Illinois Telephone and Telegraph Company is to be equipped, stating its advantages. 2700 w. Jour W Soc of Engrs—Oct., 1902.

An Automatic Telephone Exchange for Chicago. R. E. Sack. Illustrates and describes the interesting exchange of the Illinois Telephone & Telegraph Co. 3000 w. Elec Wld & Engr—July 4, 1903.

Automatic, Columbus.—New Automatic Telephone Exchange at Columbus, Ohio. Illustrated detailed description. 3500 w. Elec Rev, N Y—June 17, 1905.

Automatic, Dayton, O.—The Home Telephone Company, Dayton, Ohio. An illustrated description of a large automatic exchange recently inaugurated. 2500 w. Elec Rev, N Y—Oct. 24, 1903.

Automatic, Faller.—The Faller System of Automatic Telephony. Illustrated description. 1700 w. Elec Rev, N Y—March 22, 1902.

Faller Automatic Telephone Exchange. An illustrated description of this system. 2500 w. Sci Am—Oct. 11, 1902.

The Faller Mechanical Telephone Operator. Frank C. Perkins. An illustrated description of an interesting invention by Ernest A. Faller. 900 w. Elec, N Y—April 1, 1903.

The Faller Mechanical Telephone Operator. Frank C. Perkins. An illustrated description of the interesting invention of Ernest A. Faller, with its recent improvements, and data of interest. 2500 w. Elec Engr, Lond—June 19, 1903.

Automatic, Fall River.—The Automatic Telephone Exchange at Fall River, Mass. Illustrated detailed description of an exchange without a switchboard and without operators. 1800 w. Elec Rev, N Y—Nov. 16, 1901.

Automatic, Grand Rapids.—The New Automatic Telephone Exchange at Grand Rapids, Mich. Edward J. Hart. Illustrated description. 2500 w. Elec Wld & Engr—Jan., 1904.

Automatic, Los Angeles.—The Automatic Telephone System at Los Angeles, Cal. P. K. Higgins. Illustrated description of the new equipment of the Home Telephone and Telegraph Company. 3800 w. Elec Rev, N Y—Sept. 3, 1904.

Automatic, Ness.—Automatic Telephone Systems. A. Dallam O'Brien. The present article gives an illustrated description of the Ness interior system. 1600 w. Am Elect'n—May, 1903.

Automatic, New Bedford.—The Automatic Telephone Exchange at New Bedford, Mass. Alton D. Adams. Explains the general principles of the system, and gives an illustrated detailed description of the apparatus and station. 2500 w. Elec Wld & Engr—Feb. 9, 1901.

Automatic, Portland.—Automatic Telephone Exchange of the Northeastern Telephone Company at Portland, Me. Reviews the history of the company and gives an illustrated description of the new exchange. 1400 w. Am Elect'n—May, 1904.

Automatic, Prött.—The Prött Automatic Telephone System (Das Fernsprech-Nebenstellensystem von Prött). Dr. K. G. Frank. Describing a variety of automatic telephony in which groups of subscribers are connected with each other from the central station. 3000 w. Elektrotech Zeitschr—Sept. 17, 1903.

Automatic, Strowger.—The Strowger Automatic Telephone System (Das Selbstanschluss System für Fernsprechämter von Strowger). H. Feyerabend. A fully illustrated description of the American automatic telephone system of Strowger, now being introduced into the German Post Office. 7000 w. Elektrotech Zeitschr—Sept. 3, 1903.

The Strowger Automatic Telephone System (Het Automatisch Telephon-systeem van Strowger). N. Heinselmann. A fully illustrated description of the instruments and switchboard, and an account of the operation of the system in the United States. 6000 w. 1 plate. De Ingenieur—June 25, 1904.

Automatic vs. Manual.—Manual vs. Automatic Telephone Exchanges. Howard S. Knowlton. Discusses in detail the disadvantages of the automatic system and the reasons given in its favor. 2200 w. Am Elect'n—April, 1904.

The Automatic v. the Manual Telephone Exchange. Kempster B. Miller. An examination of some of the phases as they appear to the writer, with comments. 3700 w. Int Elec Cong of St. Louis—Sept., 1904.

Is the Automatic Telephone System Best for the Telephone Patron? P. Kerr Higgins. Read before the Engrs. & Archts. Assn., Los Angeles, Cal. Reviews briefly the features of both systems, and discusses the requirements of a successful automatic system. Serial. 1st part. 2000 w. Elec, N Y—Dec. 7, 1904.

Berlin.—The New Trunk Exchange No. 1, Berlin. An account of this recently installed exchange, described by Herr Lindow in the "Electrotechnische Zeitschrift," which is intended to deal with the whole trunk wire traffic of Berlin. 2200 w. Elec Rev, Lond—July 26, 1901.

Boulder, Col.—A Progressive Western Telephone Exchange. H. K. Sprague. An illustrated description of the new telephone exchange at Boulder, Colorado. 3800 w. Am Elect'n—Sept., 1904.

British.—The Equipment of a Modern Telephone Exchange. F. A. S. Wormull. Read before the Newcastle Sec. of the Inst. of Elec. Engrs. Illustrates and describes three systems as representative of the most recently built exchanges in England. 4500 w. Elec Engr, Lond—March 7, 1902.

See also **TELEPHONE; TELEPHONE COMPANY—Independent British.**

Brussels.—The New Telephone Station in Brussels (Die Neue Fernsprech-Vermittelungsanstalt in Brüssel). A description of the new central telephone station. The glow lamp signal is used, and the central battery system of the Western Electric Co. of America. 2500 w. Elektrotech Zeitschr—Sept. 12, 1901.

The New Brussels Telephone Exchange. An illustrated description of an exchange designed in accordance with the recommendations of a commission appointed to investigate modern systems. 1500 w. Elec Wld & Engr—May 2, 1903.

Buda-Pest.—New Telephone Exchange at Buda-Pest, Hungary. Joseph Hollos. An illustrated detailed description of the installation. 2200 w. Elec Wld & Engr—July 16, 1904.

The New Telephone Exchange at Budapest (Die Neue Telephoncentrale in Budapest). P. von Szalay. With views of the building, together with switchboard and connections made by the Western Electric Co. after a competition with Swedish, French, German and American firms. 2000 w. Elektrotech Zeitschr—Sept. 8, 1904.

Buffalo.—The Exchange of the Frontier Telephone Company, Buffalo, N. Y. Virgil Hayden. Illustrated description. 2400 w. Elec Rev, N Y—Dec. 26, 1903.

Cable.—See **TELEPHONE CABLE.**

Central Energy.—See **Common Battery.**

Chicago.—The New Douglas Exchange of the Chicago Telephone Company. Illustrated description 4500 w. Am Elect'n—Dec., 1903.

See also **Automatic, Chicago.**

Cincinnati.—The New Canal Telephone Exchange at Cincinnati, Ohio. J. E. Peavey. Illustrated description. 1300 w. Elec Rev, N Y—Feb. 4, 1905.

See **Automatic, Columbus.**

Common Battery.—Changing a Magneto Drop to a Central Battery System. Charles L. Goodrum. Illustrated description of the work. 700 w. Elec Wld & Engr—Oct. 5, 1901.

The Bell Company's Central Energy System. W. S. Henry. An explanation, with diagrams, of the principles of the Hayes common battery system. 2500 w. Am Elect'n—Jan., 1902,

The Kellogg Common-Battery Telephone System. W. S. Henry. Illustrated description of this system as installed in Philadelphia. 1000 w. Am Elect'n—Nov., 1905.

The Common-Battery System. J. J. Carty. An address before the New York Elec. Soc. Reviews the recent important advances made in telephony, and outlines the main features of the system named. 2400 w. Elec Rev, N Y—Feb. 22, 1902.

Common Battery for Small Exchanges. S. P. Grace. Gives calculations and experiments demonstrating the feasibility and economy of transmitting sufficient battery over the toll lines to small town exchanges, and still be able to talk over the toll lines at the same time. Ill. 4000 w. Telephony—Aug., 1902.

Common Battery Points. J. C. Kelsey. A discussion of some of the defects of common batteries for telephone systems and the means of remedying them 2700 w. Telephony—Sept., 1902.

A Central Energy Multiple Telephone System. E. T. Evans. Explains the operation of a system in use in an exchange having about 3000 subscribers. 2800 w. Am Elect'n—April, 1903.

Some Aids in the Maintenance of Common-Battery Central Offices. A. Dallam O'Brien. Considers various troubles that annoy and the methods of testing and correcting with promptness. 2000 w. Am Elect'n—April, 1904.

The Central Battery System in the Austrian Telephone Exchange (Das Zentral Batterie System in Oesterreichischen Telephon Zentralen). Emil Müller. A general description of the modern equipment of telephone exchanges in Austria. Three articles. 7500 w. Zeitschr f Elektrotechnik—July 9, 16, 23, 1905.

See also **Alton; Holborn; London; Mt. Vernon; New York; Testing Equipment.**

Common Battery, Dunbar.—Features of the Dunbar Two-Strand Common-Battery Systems. Prof. J. C. Kelsey. Briefly considers the features of the various commercial systems and the advance made by the Dunbar systems. Ills. 3000 w. Int Elec Cong of St. Louis—Sept., 1904.

Common Battery vs. Magneto.—The Relative Merits of Central Energy and Magneto Telephone Systems in Small Exchanges. W. A. Taylor. Read before the Wisconsin Ind. Telephone Assn. Calls attention to some of the advantages of each system. 1100 w. Elec Rev, N Y—Feb. 28, 1903.

See also **Magneto-Common Battery.**

Construction. — Exchange Construction. W. H. Crumb. Read before the Interstate Independent Tel. Assn. Considers points of importance in good construction. 2200 w. Telephony—April, 1902.

See alos **TELEPHONE.**

Denver.—The New Denver Telephone Exchange of the Colorado Telephone Company. C. W. Whitney. An illustrated detailed description of the building and its equipment. 4800 w. Elec Wld & Engr—Aug. 22, 1903.

Depreciation.—Depreciation of Lighting and Telephone Plants. Abstract of a paper by George Wilkinson touching many points of interest relating to the wear and tear upon plant, putting the depreciation at about 10 per cent. per annum. 1600 w. Elec Wld & Engr—July 27, 1901.

See also **DEPRECIATION.**

Design and Management.—The Economic Design and Management of Telephone Exchanges. Arthur V. Abbott. Notes from the experience of the writer concerning the economic design and management. The present article considers the factors in the problem of design. Serial. 1st part. 2300 w. Elec Wld & Engr—Dec. 7, 1901.

Distribution Boards.—See **Terminals; TELEPHONE SWITCHBOARD.**

Düsseldorf.—The New Telephone Central in Düsseldorf (Das Neue Fernsprechvermittelungsamt in Düsseldorf). H. Kehr. With illustrations of wiring, switchboard and general arrangement. 2500 w. Elektrotech Zeitschr—Jan. 8, 1903.

East Cleveland, O.—A Notable Independent Telephone Exchange. George L. Burlingame. Illustrated description of the lamp signal branch exchange at East Cleveland, Ohio, of the Cuyahoga Telephone Company. 1900 w. Am Elect'n—March, 1901.

Efficiency.—The Efficiency of Modern Telephone Equipment. M. A. Edson. Abstract of a paper read before the Chicago Elec. Assn. Discusses the present efficiency of the engineering elements which enter into the construction of a modern exchauge. 3000 w. Am Elect'n—Jan., 1904.

Electric Cell. — See **ELECTRIC CELL; STORAGE BATTERY; TELEPHONE—Current Supply.**

Electrolytic Rectifier.—See **ELECTRIC CURRENT RECTIFIER—Electrolytic.**

Evolution.—The Evolution of the Modern Telephone System. L. A. Lindsey. An explanation of the systems at present in use, favoring the common battery, lamp signal, multiple system for large systems. 1600 w. Elec Wld & Engr—Jan. 24, 1903.

Faller Automatic.—See **Automatic, Faller.**

Fall River.—See **Automatic, Fall River.**

Fire Protection.—Fire Protection in Telephone Exchanges. H. S. Knowlton. Mentions some practices that deserve criticism, and discusses the necessity for the proper maintenance of fire-protection apparatus. 1800 w. Am Elect'n—Oct., 1905.

See also **FIRE HAZARD.**

Fort William, Can.—See **Port Arthur.**

Glasgow.—Glasgow Corporation Telephone Exchange. Detailed illustrated description of a municipal telephone equipment. Serial. 1st part. 3800 w. Elect'n, Lond—Dec. 20, 1901.

Reconstruction of the National Telephone Co.'s Glasgow System. An illustrated description of the work. The method adopted is an adaptation of the "ringing through" principle to the central battery signalling system, used in connection with multiple switchboards fitted with branching jacks. 3200 w. Elect'n, Lond—April 17, 1903.

See also **TELEPHONE COMPANY.**

Grand Rapids.—See Automatic, Grand Rapids.

Holborn, Eng.—The New Holborn Telephone Exchange. Illustrated description of the special features of an installation of the central battery system. 3000 w. Elec Rev, Lond—July 1, 1904.

Janus.—The Janus Branch Exchange System for Business Telephony (Janusnebenstellen-System für Geschäftstelephonie). Hans Zopke. A well illustrated description of a switchboard system for changing connections from an interior network to the public lines and vice versa. 3000 w. Elektrotech Zeitschr—Feb. 20, 1902.

The Janus Telephone System. Dr. Alfred Gradenwitz. Illustrates and describes this system which enables each telephone of a private network to be used simultaneously with those belonging to the system of the telephone company. 600 w. Sci Am Sup—Aug. 27, 1904.

Kansas City.—The Plant of the Kansas City Home Telephone Company. Max Loewenthal. An illustrated description of the exchange and its equipment with an account of the formation of the company. 2500 w. Elec Wld & Engr—April 30, 1904.

Kellogg.—See Common Battery; London.

Kensington.—The National Telephone Co.'s New Telephone Exchange at Kensington. An illustrated detailed description of an exchange in England, typical of the latest practice. Serial. 1st part. 2000 w. Elect'n, Lond—Dec. 6, 1901.

Knoxville.—The People's Telephone and Telegraph Company's Exchange. Illustrated description of a model independent plant at Knoxville, Tenn. 2400 w. Elec Rev, N Y—June 21, 1902.

Large Cities.—The Telephone Problem in Large Cities. F. J. Dommerque. Considers the best service can be rendered in an exchange without trunking, and that the quality deteriorates with increasing percentage of trunking. 3000 w. Int Elec Cong of St. Louis—Sept., 1904.

Lausanne.—The New Telephone Exchange at Lausanne, Switzerland (La Nouvelle Station Téléphonique Centrale de Lausanne). L. Vanoni. Illustrated description of central station apparatus and lines. 5000 w. Bull Tech d l Suisse Romande—March 25, April 10, May 10, 1903.

London.—The Post Office Telephone Exchange for the City of London. Illustrated detailed description of the central exchange in Carter-lane. 4200 w. Elec Engr, Lond—Dec. 6, 1901.

The National Telephone Co.'s New Battersea Exchange. Illustrated description of an exchange with a lamp-signal switchboard, working on the Kellogg central battery system. Serial. 1st part. 2000 w. Elect'n, Lond—Feb. 7, 1902.

The City Exchange of the Post-Office Telephone Department. Illustrated technical description of the telephone system being erected in London, and of the equipment of the new city exchange. Serial. 1st part. 2500 w. Elect'n, Lond—March 7, 1902.

The New Small Branch Exchanges of the Post Office Telephone Service. An illustrated detailed description of one of the two completed exchanges, typical of the plan the Post Office proposes to follow in other small branch exchanges in the neighborhood of London. Serial. 1st part. 2500 w. Elect'n, Lond—July 25, 1902.

The New Telephone Exchanges of the Post Office. Illustrated description of two new exchanges of the London Post Office telephone service which have been opened recently on the common battery system. 1000 w. Elect'n, Lond—Nov. 21, 1902.

The New Trunk Exchange of the Post Office Telephone Service. Begins a detailed description of an exchange which provides telephonic communication between London and provincial and Continental towns. Serial. 1st part. 900 w. Elec Rev, Lond—Feb. 5, 1904.

See also Holborn; Kensington.

Magneto to Common Battery.—The Conversion of a Telephone Exchange from the Magneto to the Central Battery System. B. S. Cohen. Describes the methods adopted in carrying out the conversion, with as little inconvenience as possible to the telephone public. Serial. 1st part. 1500 w. Elec Rev, Lond—Feb. 17, 1905.

Maintenance.—The Practical Management, Maintenance and Operation of a Telephone Exchange. C. E. Stinson. Read before the Ohio Ind. Telephone Assn. Discusses details of importance in successfully conducting an exchange of 9,000 telephones. 2500 w. Elec Rev, N Y—April 29, 1905.

Manhattan Railway Co.—The Telephone Exchange of the Manhattan Railway Company. Brief illustrated description of a private exchange for intercommunication with its numerous stations, yards and terminals, having no outside connections. 1000 w. Elec Rev, N Y—June 27, 1903.

Mannheim, Germany.—The New Telephone Station in Mannheim (Das Neue Fernsprechamt in Mannheim). L. Dankwardt. A general description of one of the most recent telephone central stations in Germany, with details of the wiring and operation. 4500 w. Elektrotech Zeitschr—Sept. 10, 1903.

Maryland Company.—The Telephone Exchange Systems of the Maryland Telephone and Telegraph Company. Kempster B. Miller. An illustrated description of the system installed and the work that has been accomplished by this company. 2800 w. Elec Wld & Engr—Dec. 7, 1901.

Memphis.—Memphis Telephone Company's Exchange System. Illustrated description. 1500 w. Elec Rev, N Y—Dec. 6, 1902.

Mix and Genest.—The Multiple Telephone Exchange System of Mix and Genest, for Medium and Small Exchanges (Der Vielfachumschalterbetrieb bei Mitteleren und Kleineren Fernsprechämtern nach dem System Mix und Genest). Describing a simplified form of exchange for small telephone systems. 1800 w. Elektrotech Zeitschr—Dec. 20, 1900.

The Mix & Genest Automatic Telephone Private Exchange System (Neues Automatisches Fernsprechnebenstellensystem Mix & Genest, Berlin). Dr. L. Rellstab. A paper before the Elektrotechnischer Verein, giving an illustrated description of an automatic system for private branch telephone exchanges, with discussion. Serial. 2 parts. 3000 w. Elektrotech Zeitschr—July 2 and 9, 1903.

Mt. Vernon, N. Y.—A Modern Central Energy Bell Telephone Exchange. Illustrated description of the new common battery exchange at Mt. Vernon, N. Y. 1200 w. Am Elect'n—April, 1902.

Multiple Board.—See Transfer System; TELEPHONE SWITCHBOARD; and under names of places.

Municipal.—See TELEPHONE COMPANY; and under names of places.

Muskegon, Mich.—The Muskegon, Mich., Independent Telephone Exchange. Illustrated detailed description. 1200 w. Elec Wld & Engr—Nov. 3, 1900.

Ness.—See Automatic, Ness.

Neustadt, Germany.—Multiple Switchboard Exchange at Neustadt a. d. Haardt (Vielfach-Umschalteeinrichtung in Neustadt a. d. Haardt). J. Jacob. A very complete description of a modern exchange with lamp signals, central battery, etc. Two articles. 8000 w. Elektrotech Zeitschr—July 14, 21, 1904.

New Bedford.—See Automatic, New Bedford.

New York.—The Common-Battery Telephone System of the City of New York. Illustrates and describes an exchange equipped with the most perfect apparatus yet devised, and illustrative of the latest improvements. 1800 w. Sci Am—July 13, 1901.

A Typical New York Telephone Central Office. Illustrated description of the Eighteenth Street office; a model installation on the common battery system. 1800 w. Elec Rev, N Y—Aug. 24, 1901.

The New Bell Telephone Exchange, Cortlandt Street, New York City. An account of the change from the old to the new exchange, with an illustrated description of the new exchange which is operated on the common battery system. The method of operation is briefly explained. 1700 w. Elec Wld & Engr—Nov. 9, 1901.

Recent Common Battery Telephone Exchange Work in New York City. Herbert Laws Webb. An illustrated description of the recent conversion of the Cortlandt street district to common battery working. 4500 w. Elec Wld & Engr—Dec. 7, 1901.

The Latest Telephone Exchange on Manhattan

Island. Illustrated description of the "Morningside" exchange in upper New York. 700 w. Elec Wld & Engr—Dec. 6, 1902.

Paris.—See TELEPHONE SERVICE.

Pittsburg, Pa.—The Independent Telephone System at Pittsburg, Pa., of the Pittsburg and Allegheny Telephone Company. Kempster B. Miller. Illustrated description of the main exchange, and of the operation of the system adopted. 3500 w. Elec Wld & Engr—Nov. 3, 1900.

Port Arthur, Can.—Port Arthur and Fort William Independent Telephone Systems. Illustrated detailed description of the equipment of these exchanges recently established in Canada. 1800 w. Can Engr—Jan., 1903.

Portland.—See Automatic, Portland.

Portsmouth, Eng.—See TELEPHONE COMPANY.

Power Plants.—Power Plants for Relay Switchboards. A. A. Burch. Discusses the designing of a power plant for a relay system, the power supply, care required, etc. 7500 w. Telephony—Feb., 1902.

The Evolution of the Telephone Exchange Power Board. P. Kerr Higgins. An illustrated article calling attention to the changes during the last ten years, and giving suggestions for the care of the power plant. 2000 w. Elec, N Y—June 24, 1903.

Fundamental Principles of Power Equipment for Telephone Exchanges. B. D. Willis. Discusses in detail the fundamental parts of telephone power plants. 2200 w. Elec Wld & Engr—Dec. 17, 1904.

See also TELEPHONE—Current Supply.

Prött.—See Automatic, Prött.

Rochester, N. Y.—The Independent Telephone Exchange at Rochester, N. Y. Illustrated description of a modern equipped exchange. 1000 w. Elec Wld & Engr—Feb. 23, 1901.

The Rochester Telephone Company's Equipment. Illustrated description of a modern plant for a city of medium size. 1600 w. Elec Rev, N Y—Aug. 3, 1901.

St. Paul, Minn.—See HEATING AND VENTILATION—Telephone Exchange.

Sandusky, O.—The New Equipment of the Sandusky Telephone Company. A. E. Dobbs. History and illustrated description. 2200 w. Elec Rev, N Y—May 4, 1901.

Saratoga, N. Y.—The Plant of the Saratoga Telephone Company. Illustrates and describes a fine independent exchange. 1800 w. Elec Rev, N Y—July 5, 1902.

Scranton, Pa.—Scranton's New Independent Telephone Exchange. Kempster B. Miller. Illustrated description of the new independent telephone exchange. 3000 w. Elec Wld & Engr—June 8, 1901.

Service.—See TELEPHONE SERVICE.

Small.—The Construction of Small Telephone Exchanges. A. E. Dobbs. Gives a copy of a franchise considered fair for the average town, with comments. 2000 w. Elec Rev, N Y—Jan. 5, 1901.

The Construction of Small Telephone Exchanges. A. E. Dobbs. Discusses the advantages and disadvantages of party lines and gives suggestions for farmers' lines. 1800 w. Elec Rev, N Y—Jan. 4, 1902.

See also Village.

Storage Battery.—See STORAGE BATTERY—Telephone Plants.

Strowger.—See Automatic.

Swansea Municipal.—Swansea Municipal Telephones. Outlines the history of this undertaking, giving details of the work. Ill. 800 w. Elec Engr, Lond—Nov. 13, 1903.

Terminals.—Terminals and Distribution Boards in Telephone Exchanges. Arthur V. Abbott. An illustrated article discussing methods now considered the best practice. 3300 w. Elec Wld & Engr—July 22, 1905.

Testing Equipment.—The Testing Equipment of a Common Battery Central Office. A. Dallam O'Brien. Discusses the principal troubles that arise on sub-station lines, and the methods used by the wire chief to locate them and to arrange for their removal. Diagrams. 3200 w. Am Elect'n—Dec., 1904.

Toledo, O.—See TELEPHONE COMPANY.

Transfer System.—Transfer Systems and the Multiple Board in Telephone Exchanges. Arthur V. Abbott. This opening article explains these two systems. Serial. 1st part. 1800 w. Elec Wld & Engr—July 29, 1905.

Tunbridge Wells.—The Tunbridge Wells Telephone System. An illustrated account of the undertaking and the opening ceremony. 4500 w. Elec Engr, Lond—Aug. 2, 1901.

Tunbridge Wells Municipal Telephone Exchange. Brief description of a recently opened small system possessing features differing from usual practice. Ill. 1400 w. Elect'n, Lond—Sept. 13, 1901.

Underground Work.—See TELEPHONE CABLE.

Utica.—Utica Home Telephone Company's Exchange. F. L. Martin. An illustrated detailed description of construction work consisting of an office building, a complete underground system, cable and aerial system, including the installation of the central office and subscriber's sub-station equipment. 2800 w. Elec Wld & Engr—July 18, 1903.

Ventilation.—See VENTILATION—Telephone Exchange.

Village.—Village Exchanges and Farmers' Lines. S. P. Sheerin. Read at Buffalo meeting of Ind. Tel. Assn. Considers some points in connection with country lines. 3300 w. Elec, N Y—July 3, 1901.

Würzburg.—Multiple Switchboard System for the Telephone Exchange at Würzburg, Germany (Vielfach—Umschalteeinrichtung für die Fernsprechanlage zu Würzburg). J. Jacob. Illustrated description of a central-energy exchange and connections. 3500 w. Elektrotech Zeitschr—Aug. 31, 1905.

TELEPHONE LINE.

See also ELECTRIC CABLE; ELECTRIC LINE; POLE; TELEPHONE; TELEPHONE CABLE; TELEPHONE EXCHANGE; WIRE—Telephone.

Alternating Railway Disturbance.—A New Danger to Telephone Lines. J. C. Kelsey. Discusses troubles that may come with the use of the grounded alternating trolley system. 2500 w. Elec Rev, N Y—Dec. 17, 1904.

Arizona.—Telephone Engineering in "The Country God Forgot." George Bond Ellison. An amusing account of difficult work in Arizona. Ills. 3500 w. Jour of Elec—Nov., 1905.

Construction.—The Construction of Aerial Telephone Lines. Arthur V. Abbott, C. E. An illustrated discussion of pole lines for telephone circuits. Serial. Part I. 1200 w. Elec Wld & Engr—Jan. 17, 1903.

See also TELEPHONE.

Engineering.—Telephone Line Engineering. C. J. H. Woodbury. Explains methods of standard aerial and underground-line construction and methods of overcoming difficulties through mountains, over rivers, gorges and savannahs. 9500 w. Jour Fr Inst—March, 1905.

See also TELEPHONE.

Farm.—Rules and Specifications for the Construction of Telephone Toll Lines and Farmers' Circuits. W. H. Crumb. Ill. 5000 w. Telephony—Dec., 1901.

Farm Telephone Lines in Northern Ohio. A. E. Dobbs. Gives briefly the history of lines in Geauga County. Ill. 3500 w. Am Tel Jour—Feb. 15, 1902.

See TELEPHONE EXCHANGE—Village; TELEPHONE SERVICE.

Fault Location.—See ELECTRIC MEASUREMENT; TELEPHONE CABLE; TELEPHONE EXCHANGE—Testing Equipment.

Fritts.—Improvement in Electric Transmission by Wires. Charles T. Fritts. An illustrated account of a method of overcoming attenuation and distortion on telephone, telegraph and other lines and cables by dividing the line into sections connected by condensers or induction coils. 3000 w. Elec Wld & Engr—Aug. 2, 1902.

High-Frequency Tests.—High-Frequency Telephone Circuit Tests. Dr. A. E. Kennelly. Describes certain apparatus constructed for the purpose of measuring the alternating-current strength, at telephonic frequencies, received at the distant end of a telephone circuit, with a definite e. m. f. impressed on the sending end. Ills. 4500 w. Int Elec Cong of St. Louis—Sept., 1904.

Inductance.—Telephone Lines with High Inductance (Ueber Telephonleitungen Hoher Induktanz). Ludwig Kusminsky. Mathematical discussion. 1500 w. Oest Wochenschr f d Oeff Baudienst—Aug. 19, 1905.

See also Long Distance; Pupin; SUBMARINE CABLE—Telephone; TELEGRAPH—Current Analysis; TELEPHONE CABLE.

Induction. — See Transposition; TELEPHONE CABLE.

Interior. — See ELECTRIC WIRING — Telephone; TELEPHONE EXCHANGE.

Leakage.—The Influence of Leakage upon Telephone Lines on Pupin's System (Ueber den Einfluss der Ableitung auf Oberirdische Fernsprechleitungen nach Pupin's System). Dr. F. Breisig. A mathematical analysis, showing the effect of leakage, and its influence upon the amount of inductance to be added. 2000 w. Elektrotech Zeitschr—Dec. 12, 1901.

On Electric Conducting Lines of Uniform Conductor and Insulation Resistance, in the Steady State. A. E. Kennelly. A mathematical study of the effects of leakage and resistance on currents in telegraph, telephone and other long uniform conductors. 4500 w. Harvard Engng Jour—May, 1903.

See also ELECTRIC LINE.

Legal Questions.—See ELECTRIC LINE.

Lightning Arrester.—See ELECTRIC PROTECTIVE APPARATUS; LIGHTNING PROTECTION.

Long Distance.—Telephonic Transmission. A mathematical discussion of means for improving the transmission; considering Dr. Pupin's work and results obtained by other investigators. Serial. 1st part. 2000 w. Elec Rev, Lond—Jan. 4, 1901.

The Long-Distance Telegraph and Telephone Systems of Pupin, Thompson and Reed. E. F. Roeber. Considers these three methods, developing a mathematical theory of the Thompson system and the Reed system, following the analytical method used by Dr. Pupin. Serial. 1st part. 2700 w. Elec Wld & Engr—March 16, 1901.

See also Inductance; Pupin; TELEPHONE.

Long-Distance Analogies.—Attenuation and Distortion on Long Distance Telephone and Power Transmission Lines Regarded as Hydrodynamic Phenomena. Henry T. Eddy. Presents analogy between a hypothetical hydraulic system and actual electric transmission systems, extending it to the more complicated case of long-distance transmission by alternating currents. 2300 w. Elec Wld & Engr—July 26, 1902.

Norway.—A Few Notes on the Construction of Telephone Lines in Norway. Illustrated description of some peculiarities in construction, seen by the writer. 1800 w. Elec Rev, Lond—Feb. 8, 1901.

Party.—The Arrangement of Several Telephones Upon the Same Circuit (Montage de Plusieurs Postes Téléphoniques sur un Meme Circuit). Em. Piérard. A comparison of the arrangements in series and in parallel. 1200 w. Electricien—March 2, 1901.

Party Lines. Oscar M. Leich. Considers the difficulties encountered on party lines and describes the signaling systems used. 3000 w. Wis Engr—April, 1902.

Telephone Call Operating by Reversal of Current (Rappel Téléphonique par Inversion de Courant). L. Martin. Describing a system in which any one of three telephones on a circuit may call one of the others without affecting the third. 1200 w. Revue Technique—Nov. 25, 1902.

Selective Alarm Calls (Die Stufenwecker). J. Baumann. A description of an electric alarm call system for telephone lines by which any one subscriber on a party wire may be called without disturbing the others. 2500 w. Zeitschr f Electrotechnik—May 15, 1904.

See also TELEPHONE—Selective Signaling.

Poles.—See POLE.

Protection.—See ELECTRIC PROTECTIVE APPARATUS—Telephone.

Pupin.—An Important Telephone Invention Appreciated. Brief account of Dr. Pupin's patents relating to long-distance telephony, sold to the Bell Co. for a large sum. 1200 w. Elec Rev, N Y—Jan. 12, 1901.

Dr. Pupin's Improvements in Long-Distance Telephony. Herbert T. Wade. An explanation of Dr. Pupin's investigations and their great success and the application to long-distance telephony and to telegraphy. Ill. 2500 w. Sci Am Sup—Jan. 26, 1901.

Wave Transmission Over Non-Uniform Cables and Long-Distance Air Lines. M. I. Pupin. Discussion of the above named paper. 2700 w. Trans Am Inst of Elec Engs—Feb., 1901.

Transatlantic Communication by Means of the Telephone. M. I. Pupin. An exposition by Dr. Pupin, of the improvements made by him in long-distance telephone lines, by which transatlantic telephony may become practicable. 4000 w. Engineering Magazine—April, 1901.

Electrical Wave Transmission. An illustrated account of the researches of M. I. Pupin on the transmission of electric waves over long-distance air-lines and sub-marine cables. 2000 w. Engng—April 19, 1901.

A Note on Loaded Conductors. M. I. Pupin. Gives numerical and graphical illustrations relating to the system of the author for reducing the attenuation and distortion of telephonic currents in cables and long-land lines. 800 w. Elec Wld & Engr—Oct. 12, 1901.

The General Problem of Wave Propagation Over Non-Uniform Conductors. M. I. Pupin. Mathematical discussion of the line with resistance and capacity and with sources of inductance placed at intervals. 2400 w. Elec Wld & Engr—March 1, 1902.

The Success of Loaded Lines in Telephony. On the applications made of Dr. Pupin's invention, the difficulties met, and success attained. 1100 w. Elec Wld & Engr—March 5, 1904.

Loaded Telephone Lines in Practice. Dr. Hammond Vinton Hayes. A brief statement of the results obtained by the use of loading coils on many of the telephone circuits of the Bell companies. 3000 w. Int Elec Cong of St. Louis—Sept., 1904.

See also Inductance; Leakage; Long-Distance; ELECTRIC INVENTION; ELECTRO-PHYSICS Wave Transmission; TELEGRAPH—Developments.

Pupin, Austria.—The First Pupin Telephone Installation in Austria (Die Erste Pupin'sche Telephonleitung in Oesterreich). R. Nowotny. An account of the construction and operation of the line between Vienna and Innsbruck, using the Pupin inductance coils. 4000 w. Zeitschr f Elektrotechnik—March 26, 1905.

An Austrian Inductive Telephone Trunk Line. Abstract translation of an article by Herr R. Nowotny, describing a successful experiment made in Austria on the insertion of inductance coils in long telephone lines. Ills. 1700 w. Elect'n, Lond—Aug. 11, 1905.

Pupin, Germany.—Experiments upon the Pupin Long-Distance Telephone System (Untersuchungen über Telephonische Fernleitungen Pupinschen Systems). F. Dolezalek and A. Ebeling. A full account of the tests of the Pupin system made to determine its commercial value for the firm of Siemens & Halske. 5000 w. Elektrotech Zeitschr—Dec. 4, 1902.

Experiments on the Application of Pupin's System to Telephone Circuits. F. Dolezalek and A. Ebeling. An illustrated article translated from the "Elektrotechnische Zeitschrift," giving an account of experiments carried out by the Siemens & Halske Co. in Germany, on underground cables and overhead telephone lines with Pupin induction coils. Serial. Part I. 2000 w. Elec Rev, Lond—Dec. 12, 1902.

Experiments in Long-Distance Telephony on the Pupin System. F. Dolezalek and A. Ebeling. From the "Elektrotechnische Zeitschrift." Describes investigations made to ascertain to what extreme the improvement shown by theory in consequence of adding self-induction was actually attained in practice. Serial. 1st part. 2000 w. Elect'n, Lond—Feb. 20, 1903.

The Efficiency of Telephone Cables with Uniformly Divided Self-Induction (Ueber die Leistungsfähigkeit von Fernsprechkabeln mit Stetig Verteilter Selbstinduktion). F. Dolezalek & A. Ebeling. A theoretical and practical study of the action of the Pupin coils upon the performance of telephone lines. 5000 w. Elektrotech Zeitschr—

German Tests of the Pupin System of Long-Distance Telephony. An illustrated account of the experiments made by Siemens and Halske on the subterranean telephone cable, and on uncovered wires, giving in both cases very satisfactory results. 1300 w. Sci Am—June 27, 1903.

Experiments upon the Pupin System of Long-Distance Telephony (Untersuchungen über Telephonische Fernleitungen Pupinschen Systems). A review of the Siemens & Halske experiments upon the Pupin inductance coils in Germany. 2000 w. Glasers Annalen—Aug. 15, 1903.

Railway.—The Railway Telephone Service: Cost of Line Construction. Frank F. Fowle. A discussion of the cost of construction, maintenance and operation and matters relating to economy in the operation of railways. 5500 w. Tech Qr—June, 1905.

St. Gothard Tunnel.—See TELEPHONE CABLE.

Tension.—The Tension of Telephone Wires. Pierre Vandeuren. Calculations relating to steel lattice work poles, carrying large numbers of wires. 12,200 w. 1 table and figure. Bul International Ry Cong—April, 1903.

See also ELECTRIC LINE—Sag of Wires.

Thawing.—See THAWING.

Therrell System.—See TELEPHONE.

Toll.—See Farm.

Transatlantic.—See Pupin.

Transposition.—Transpositon of Telephone Lines: Cross-Talk and Induction. Reviews a paper by Frank F. Fowle, read at the New Orleans meeting of the Assn. of Ry. Tel. Supts. on line distubances arising from reactance and leakage. 2800 w. Elec Wld & Engr—Nov. 21, 1903.

The Transposition of Electrical Conductors. Frank F. Fowle. Mathematical and practical discussion of the transposition of telephone and of power circuits to avoid electric and magnetic disturbances. 3500 w. Trans Am Inst of Elec Engrs—Oct. 28, 1904.

The Transposition of Electrical Conductors. Frank F. Fowle. Mathematical and practical discussion of the transposition of telephone and of power circuits to prevent inductive interferences and cross-talk. 4400 w. Trans Am Inst of Elec Engrs—Nov., 1904.

Two-Wire Intercommunicating.—Two-Wire Intercommunicating Telephone Systems. H. S. Webb. The system employs two wires for each station, in addition to the two wires used in common by all the stations. Diagrams. 1800 w. Am Elect'n—Oct., 1903.

Vienna-Innsbruck.—See Pupin, Austria.

Wave Distortion.—See Fritts; Inductance; Leakage; Long Distance; Pupin; ELECTRIC CURRENT, ALTERNATING; TELEPHONE—Therrell.

TELEPHONE OPERATOR.

Training School.—The Training of Telephone Operators. An illustrated description of the operator's training school of the New York Telephone Co. 4200 w. Elec Wld & Engr—June 20, 1903.

TELEPHONE PATENT.

See also ELECTRIC INVENTION; INVENTION; PATENT; TELEPHONE.

Berliner.—Berliner Microphone Patent Declared Invalid. States the claims of the patent and the substance of the recent decision at Boston by Judge Brown who decides that Berliner was antedated by both Bell and Edison. 2500 w. Elec Wld & Engr—March 2, 1901.

Comment on the Berliner Patent Decision. A view of the telephone situation in the United States, giving interviews and opinions of prominent men, and the Berliner patent in full. Also editorial. 5500 w. Elec Rev, N Y—March 9, 1901.

The Berliner Telephone Patent Decision. The full text of Judge Brown's decision, with illustrations. 40,000 w. Elec Wld & Eng—June 29, 1901.

Berliner Decision. A summary of the opinion on the telephone transmitter case rendered at Boston recently, with editorial remarks. 3000 w. Elec Wld & Engr—Jan. 24, 1903.

TELEPHONE RATES.

See TELEPHONE—Status Quo; TELEPHONE COMPANY; TELEPHONE SERVICE.

TELEPHONE SERVICE.

See also TELEPHONE; TELEPHONE COMPANY; TELEPHONE EXCHANGE.

Telephone Exchange Service. L. W. Stanton. Read before the Ind. Telephone Con. Discusses the importance of good apparatus in securing reliability, promptness and good transmission. 2500 w. Elec Rev, N Y—July 6, 1901.

Telephone Service. S. J. Larned. A discussion of its value, and of the organization and methods of good service. 6000 w. Jour W Soc of Engrs—April, 1903.

Some Features of Telephone Traffic and Their Effect on Service. J. G. Wray. 2800 w. Trans Am Inst of Elec Engrs—June and July, 1903.

The Relation of Telephone Traffic to Efficient Service. Howard S. Knowlton. Discussion of details of telephone service, with traffic curves. 4000 w. Elec Wld & Engr—Aug. 13, 1904.

The Principles of Exchange Telephony. Herbert Laws Webb. A discussion of some of the details of telephone service and the principles of operation. Considers the proper unit of the local service to be the message, and discusses signaling, economy, rates, &c. 6500 w. Cassier's Mag—Dec., 1904.

Telephone Traffic. Herbert Laws Webb. Describes the improvements that have been made in the conduct of telephone traffic, and discusses the relation between traffic efficiency and engineering economy. 4800 w. Inst of Elec Engrs—May 11, 1905.

The Quality of Telephone Service. Samuel G. McMeen. Discusses the elements that contribute to making the service satisfactory. 2800 w. Elec Rev, N Y—Dec. 17, 1904.

Australia.—See TELEGRAPH; TELEPHONE.

Automatic.—Some Elements Inherent in Automatic Telephony Which Make It Popular. Joseph B. Baker. Discusses the character and advantage of the automatic service. 1700 w. Elec Rev, N Y—Dec. 12, 1903.

See also TELEPHONE EXCHANGE.

Belgium.—Telephones in Belgium. Describes the service, and notes the change from equal assessments to the message system. 1000 w. U S Cons Repts, No. 1240—Jan. 16, 1902.

Call Boxes, N. Y.—Telephone Service from Messenger Call-Boxes in New York City. Illustrated description of new telephone call-box, and an account of the way in which it will be installed. 800 w. Elec Rev, N Y—Nov. 7, 1900.

Emergencies.—How the Telephone Operator Assists the Electrician. Arthur B. Weeks. A description of the work of the telephone operator and electrician in emergencies. 1800 w. St. Ry Rev—Sept. 20, 1903.

Erie Long-Distance.—The Long-Distance Service of the Erie Telephone System. Arthur Stanley Riggs. Describes the growth of this service in the middle-western States. Ill. 3500 w. Elec Rev, N Y—Nov. 28, 1900.

Farming.—Some Telephone Problems in Farming Communities. Howard S. Knowlton. Considers some of the difficulties to be met in farming districts, giving the record of a Colorado Telephone Co. as an example. 3500 w. Elec Wld & Engr—June 11, 1904.

The Cost of Telephone Service in a Farming Community. H. Sprague. Gives figures drawn from American practice, in regard to the actual cost of operation. 2800 w. Elec Wld & Engr—Dec. 10, 1904.

See also TELEPHONE EXCHANGE—Village; TELEPHONE LINE.

Ideals.—Telephone Service Ideals. G. F. Jenks. Considers the ideal will only be reached when every business man has a telephone on his desk, and every house has a telephone in every room, and when all these telephones can readily communicate. 1300 w. Elec Wld & Engr—April 20, 1901.

Improvement.—Room for Improvement in Telephone Exchange Management. R. M. Lockwood. Discusses some of the customs that irritate customers, and urges that the good will of subscribers is of more importance than quickness of service. 2500 w. W Elect'n—April 6, 1901.

New York.—Telephone Service and Rates in New

York. Extracts from the report made by the Merchants' Association on this question. 6000 w. Elec Rev. N Y—Aug. 3, 1905.

See also Call Boxes.

Operator.—See TELEPHONE OPERATOR—Training School.

Paris.—The New Telephone System in Paris. J. Bertheonque. Abstract translation from the "Journal Télégraphique." Describes recent improvements made, eliminating the multiple jacks and making other changes that improve the service and lessen the expense. 2500 w. Elect'n, Lond—June 27, 1902.

Paris, 1900.—Telephony in Paris in the Exposition Year. An illustrated account of the service. 1500 w. Elec Wld & Engr—Nov. 3, 1900.

Pay Systems.—See Rates.

Power Transmission.—Telephone Service in Connection with Long-Distance Power Transmission. T. E. Tieterath. An illustrated article relating experiences encountered in this work. 1500 w. Jour of Elec—July, 1901.

Public Co-Operation.—Public Co-operation in Perfecting Telephone Service. Joseph B. Baker. Discusses the importance of educating the public in the use of the telephone, thus increasing its efficiency, and greatly lessening delays. 2500 w. Elec Wld & Engr—Sept. 7, 1901.

Rates.—Telephone Pay Systems; Fixed Rentals and Measured Service or Tolls. C. E. McClure. Reviews the mistakes made in the early systems and shows the need of a reliable recorder, in the first instance. Serial. 1st part. 2400 w. Elec Rev, N Y—Nov. 14, 1900.

The Evolution of the Message Rate Telephone Service. Herbert Laws Webb. Reviews the progress before and since the adoption of the message rates. 2200 w. Elec Wld & Engr—April 5, 1902.

Telephone Rates from an Engineer's Viewpoint. Franz J. Dommerque. Reviews the present method of charging for telephone service, outlining a scheme for charging, the kinds of rates, and the amount to be charged. 2800 w. Trans Am Inst of Elec Engrs—April, 1902.

The Sliding Scale of Rates for the Telephone Company. Henry S. Herr. A paper before the Interstate Independent Telephone Association, showing the necessity for increasing rates as the number of subscribers connected to an exchange increases. 1000 w. Elec Rev, N Y—Dec. 20, 1902.

Measured Service. George N. Bundy. Read before the Interstate Ind. Telephone Assn. Discussing methods of charging for telephone service, favoring the meter basis. 1100 w. Elec, N Y—Dec. 31, 1902.

Rates and Railroads.—Railroads and Telephone Rates. An editorial statement of the situation of the Bell Companies and the Independents and the competition that would probably result in case the latter united with the railroad interests. 2200 w. R R Gaz—May 24, 1901.

Rates, Independent vs. Bell.—Profitable Telephone Rates. Fred De Land. Discusses the charges of the "Independents" as compared with the experience of the Bell Company. Thinks the rates of the former too low to maintain a margin of profit as the business increases. 3800 w. Telephony—Nov., 1902.

Rates, Toll.—Toll Rates. H. H. Robinson. A paper before the Interstate Independent Telephone Association at Chicago, discussing interurban telephone rates and the method of fixing them. 1500 w. Elec Rev, N Y—Dec. 27, 1902.

River Plate.—The Telephone Service in the River Plate. Illustrates and describes recent developments in Buenos Ayres, and other important cities of the River Plate. 1400 w. Elect'n, Lond—June 27, 1902.

Signaling & Operating.—Methods of Signaling and Operating in Telephone Exchanges. Kempster B. Miller and Charles S. Winston. Explains some points in the standardized practice, and why they are regardless, as far as possible, of any circuit arrangement. Serial. 1st part. 2500 w. Elec Wld & Engr—Dec. 5, 1903.

Tone Test.—The Tone Test. A. Dallam O'Brien. Describes the principle and operation of the tone test as used in connection with calls completed over long-distance and toll lines. 2200 w. Am Elect'n—Feb., 1904.

United States.—The Telephone in the United States. Herbert Laws Webb. On the extensive development of the service, the methods, rates, with review of the progress. 6000 w. Cassier's Mag—July, 1904.

TELEPHONE SWITCHBOARD.

See also TELEPHONE; TELEPHONE EXCHANGE.

Automatic.—See TELEPHONE EXCHANGE.

Evolution.—The Evolution of the Telephone Switchboard. Thomas D. Lockwood. Historic account of the development of the telephone exchange and an analysis of the mechanical and electrical features of telephone switchboard apparatus from 1877 to 1902. Ill. 9000 w. Trans Am Inst of Elect Engrs—Feb., 1903.

See also TELEPHONE—A. I. E. E. Discussion.

Germany. Post Office.—The Switchboard of the German Post Office Telegraph of 50 Double Conductors (Der Klappenschrank für 50 Doppelleitungen M. 99 der Deutschen Reichs-Postverwaltung). Giving details of the standard board, plugs, and wiring. 1200 w. Elektrotech Zeitschr—May 2, 1901.

Mix and Genest.—See TELEPHONE EXCHANGE.

Multiple.—Multiple Switchboards. A. E. Dobbs. Describes only the drop or target type, and shows the advantage of multiple switchboard to operators of seven small exchanges. 1600 w. Am Tel Jour—Feb. 22, 1902.

See also TELEPHONE EXCHANGE.

Multiple, Divided.—Divided Multiple Switchboards: An Efficient Telephone System for the World's Capitals. W. Aitken. Abstract. Considers methods used, and the common battery system, and describes the system suggested. Serial. 1st part. 2500 w. Elec Rev, Lond—May 15, 1903.

Divided Multiple Switchboards. W. Aitken. Abstract of a paper read before the Inst. of Elec. Engrs., London. Considers briefly the methods already used, and explains the system, suggested by the writer to facilitate telephone service. Ill. Serial. 1st part. 2800 w. Elect'n, Lond—May 22, 1903.

Power Plant.—See TELEPHONE—Current Supply; TELEPHONE EXCHANGE—Power Plant.

TELEPHONE SYSTEM.

See ELECTRIC EQUIPMENT; TELEPHONE; TELEPHONE COMPANY; TELEPHONE EXCHANGE; TELEPHONE SERVICE.

TELEPHONE TUNNEL.

See also ELECTRIC CONDUIT; SUBWAY; TELEPHONE CABLE; TELEPHONE LINE.

Chicago.—See SUBWAY—Chicago Freight and Telephone.

TELEPHONE WIRING.

See ELECTRIC WIRING—Telephone; TELEPHONE CABLE; TELEPHONE LINE.

TELEPHONE WORKS.

Salford, Eng.—British-Made Telephones. An illustrated account of a visit to the General Electric Company's Salford works. 3000 w. Elec Engr, Lond—May 12, 1905.

TELEPHONOGRAPH.

See TELEGRAPHONE; TELEPHONE—Printing.

TELEPHOTOGRAPH.

See TELECTROSCOPE.

TELESCOPE.

See also FIELD GLASS; OBSERVATORY.

Large Astronomical Telescopes (Ueber Grosse Astronomische Fernrohre). Paul Hoppe. A historical review dealing with the mechanical side of the subject, and giving especial attention to the great telescope of the Treptow observatory. Two articles. 5000 w. 2 plates. Glaser's Annalen—Sept. 15, Oct. 1, 1901.

Construction.—The Construction of a Silvered Glass Telescope, Fifteen and a Half Inches in Aperture, and Its Use in Celestial Photography. Henry Draper. Historical sketch, with illustrations. Serial. 1st part. 6000 w. Sci Am Sup—July 29, 1905.

Paris Exposition.—See INSTRUMENT.

TELETYPING.

See TELEGRAPH—Berlin; Murray; Printing; TYPESETTING MACHINE—Meray-Rozar.

TELLURIDE.

See **GEOLOGY; GOLD.**

TELLURIUM.

See also **METAL—Rare.**

Alloys.—See **ALLOY — Antimony-Tellurium; Lead-Tellurium.**

Brass.—See **BRASS—Tellurium.**

Magnetic Effects.—The Thermo-magnetic and Galvano-magnetic Effects in Tellurium. Morton Githens Lloyd. Describes investigations giving qualitative results thus far obtained. 3000 w. Am Jour of Sci—July, 1901.

TELPHERAGE.

See also **CABLEWAY; CONVEYOR; MECHANICAL HANDLING.**

A Cableway Hoisting and Conveying Apparatus, with Traveling Electric Motor. Illustrated detailed description. 700 w. Eng News—Nov. 15, 1900.

The Telpherage System of Electric Traction. Illustrates and describes this system for the transportation of material, and its applications and merits. 1000 w. Sci Am Sup—May 17, 1902.

Telpherage. Charles M. Clark. An illustrated article giving the history, construction, method of operation, applications, etc. 3800 w. Jour Assn of Engng Soc's—June, 1902.

Telpherage.—C. J. Messer. An illustrated article on the value of electric propulsion applied to aerial transportation of materials, describing several interesting installations. 4500 w. Jour Fr Inst—Oct., 1904.

Electrically Driven Conveyors (Elektrisch Betriebene Schwebetransporte). G. Dieterich. Illustrating and describing a variety of telpherage systems in industrial establishments and on outside work. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—Nov. 12, 19, 1904.

Baker, Milton, Boston.—Transportation of Materials by Electricity. A. Frederick Collins. Illustrates and describes the equipment installed at the works of the Baker Chocolate Company, at Milton, near Boston, Mass., where overhanging electric telpher trains convey materials used. 1200 w. Sci Am—March 18, 1905.

Bleichert.—The Bleichert Electric Overhead Conveyor System (Das Bleichertsche Elektrohängebahn-System). G. Dieterich. Illustrating and describing a system with fixed supporting rail and independently driven motor carriers using overhead roller contact trolleys. 3000 w. Elektrotech Zeitschr—Nov. 10, 1904.

Factory.—Modern Factory Traction. Clarence J. Messer. On the advantages of a telpherage plant, with information of interest. Ill. 2500 w. Cassier's Mag—Dec., 1903.

Letters and Packages.—The Transmission of Messages by High-Speed Electric Carriers (Le Transport des Correspondances à Très Grande Vitesse par Chariots Electriques Automoleurs). A. Bidault des Chaumes. Describing a scheme for electric-telpherage, for carrying letters and packages. 1500 w. 1 plate. Génie Civil—Nov. 18, 1905.

Taeggi.—Piscicelli Taeggi's Electric Post. William P. Digby. Brief illustrated description of a system now under the consideration of an expert committee in Rome, Italy, for the transmission of letters, newspapers and parcels along an electric aerial railway at speeds as high as 400 kilometres per hour. 1800 w. Engng—Sept. 26, 1902.

TEMPERATURE.

See also **PYROMETRY; THERMOMETER.**

Absolute.—Concerning Absolute Temperature. Explains the term as used in the temperature scale of the perfect gas thermometer, showing the line of reasoning by which the existence of the absolute zero is established. 3500 w. Locomotive—April, 1901.

Castings.—See **CASTING—Temperature.**

Deep Mines.—See **Subterranean; MINING—Deep.**

Furnace.—See **COMBUSTION—Furnace Temperatures.**

Germany.—The Temperature of Germany in Its Relation to Artificial Heating (Die Temperaturverhältnisse Deutschlands, soweit sie für die Beheizung der Räume in Betracht Kommen). Hr. Marx. A paper before the Heating and Ventilating Engineers on the climate, and particularly the temperature of Germany, with tables and diagrams. 3000 w. Gesundheits Ing—Jan. 15, 1902.

High.—See **Measurement; Radiation Scale; PYROMETRY.**

Low.—See **LOW TEMPERATURE.**

Measurement.—The Measurement of Temperature. Robert S. Whipple. Gives a summary of the various means of measuring temperature in general use, and tests of their applications. Ills. 3000 w. Engng Times—March, 1904.

Thermometers and Pyrometers, with Some of Their Industrial Applications. Robert S. Whipple. Read before the Cleveland Inst. of Engrs. Gives a summary of the various means of measuring temperature in general use, and discusses details and applications. 5000 w. Engng—Feb. 17, 1905.

Thermometers and Pyrometers, with Some of Their Industrial Applications. Abstract of a lecture by Robert Whipple, delivered before the Cleveland Inst. of Engrs., England, describing these instruments and the uses to which they are applied. Ills. 4000 w. Sci Am Sup—July 22, 1905.

See also **SLIDE RULE — Temperature Calculations.**

Radiation Scale.—The Radiation Scale of Temperature and Its Realization up to 2,300 Degrees Absolute. O. Lummer and E. Pringsheim. From the "Berichte der Deutschen Physikalischen Gesellschaft." Explanation of a new method of measuring high temperatures, giving experimental investigations made. 3000 w. Elect'n, Lond—Aug. 7, 1903.

Slide-Rule Calculations.—See **SLIDE RULE—Temperature Calculations.**

Steel Transformation.—See **STEEL—Transformation Temperatures.**

Subterranean.—Temperature Measurements in Deep Borings (Temperaturmessungen in Tiefbohrlöchern). H. Thumann. An illustrated description of a thermometric apparatus for deep boreholes with an account of subterranean temperature measurements in a boring at Oldau, Germany. 1400 w. Glückauf—Dec. 21, 1901.

Underground Temperatures in Relation to Deep Mining. F. G. Meachem. Abstract of paper read before the S. Staffordshire & E. Worcestershire Inst. of Min. Engrs. A study of the earth's temperature and its variations. Also discussion. 3300 w. Col Guard—April 17, 1903.

Notes on Underground Temperature Observations. James Stirling. Gives the chief results of a series of observations made in some of the deep mines at Bendigo, to a depth of 3,250 ft. 1500 w. N Z Mines Rec—Dec. 16, 1904.

See also **HEAT — Earth's Interior; MINING — Deep.**

TEMPERING.

See also **HARDENING; IRON METALLURGY; STEEL METALLURGY.**

Oil.—See **FORGING.**

Punches.—See **PUNCHING—Hardening.**

Springs.—See **SPRING—Hardening and Tempering.**

Steel.—See **HARDENING; STEEL METALLURGY.**

Williams, Brooklyn.—See **HARDENING.**

TENDER.

See **LOCOMOTIVE TENDER.**

TENEMENT HOUSE.

See also **BUILDING CONSTRUCTION; WORKMEN'S DWELLING.**

Tenement Houses. Edward T. Potter. Answer to a circular letter of inquiry concerning the design and construction desirable. 7500 w. Am Archt—Nov. 24, 1900.

New York.—Light and Air in Tenement Houses. Describes the conditions in New York tenement houses under existing laws, and gives notes of the conditions in 1878, when the subject first received widespread attention. 3500 w. Eng Rec—June 15, 1901.

TERMINAL.

See **BRIDGE TERMINAL; ELECTRIC RAILWAY TERMINAL; RAILWAY TERMINAL; STREET RAILWAY TERMINAL; TUNNEL.**

York. Extracts from the report made by the Merchants' Association on this question. 6000 w. Elec Rev, N Y—Aug. 5, 1905.

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See also TELEPHONE; TELEPHONE EXCHANGE.

Automatic.—See TELEPHONE EXCHANGE.

Evolution.—The Evolution of the Telephone Switchboard. Thomas D. Lockwood. Historic account of the development of the telephone exchange and an analysis of the mechanical and electrical features of telephone switchboard apparatus from 1877 to date. Ill. 9000 w. Trans Am Inst of Elect Engrs—Feb., 1903.

See also TELEPHONE—A. I. E. E. Discussion.

Germany, Post Office.—The Switchboard of the German Post Office Telegraph of 50 Double Conductors (Der Klappenschrank für 50 Doppelleitungen M. 99 der Deutschen Reichs-Postverwaltung). Giving details of the standard board, plugs, and wiring. 1200 w. Elektrotech Zeitschr—May 2, 1901.

Mix and Genest.—See TELEPHONE EXCHANGE.

Multiple.—Multiple Switchboards. A. E. Dobbs. Describes only the drop or target type, and shows the advantage of multiple switchboard to operators of seven small exchanges. 1600 w. Am Tel Jour—Feb. 22, 1902.

See also TELEPHONE EXCHANGE.

Multiple, Divided.—Divided Multiple Switchboards: An Efficient Telephone System for the World's Capitals. W. Aitken. Abstract. Considers methods used, and the common battery system, and describes the system suggested. Serial. 1st part. 2500 w. Elec Rev, Lond—May 15, 1903.

Divided Multiple Switchboards. W. Aitken. Abstract of a paper read before the Inst. of Elec. Engrs., London. Considers briefly the methods already used, and explains the system, suggested by the writer to facilitate telephone service. Ill. Serial. 1st part. 2000 w. Elect'n, Lond—May 22, 1903.

Power Plant.—See TELEPHONE—Current Supply; TELEPHONE EXCHANGE—Power Plant.

TELEPHONE SYSTEM.

See ELECTRIC EQUIPMENT; TELEPHONE; TELEPHONE COMPANY; TELEPHONE EXCHANGE; TELEPHONE SERVICE.

TELEPHONE TUNNEL.

See also ELECTRIC CONDUIT; SUBWAY; TELEPHONE CABLE; TELEPHONE LINE.

Chicago.—See SUBWAY—Chicago Freight and Telephone.

TELEPHONE WIRING.

PHONE CABLE; TELEPHONE LINE.

See ELECTRIC WIRING—Telephone; TELE-

TELEPHONE WORKS.

Salford, Eng.—British-Made Telephones. An illustrated account of a visit to the General Electric Company's Salford works. 3000 w. Elec Engr, Lond—May 12, 1905.

TELEPHONOGRAPH.

See TELEGRAPHONE; TELEPHONE—Printing.

TELEPHOTOGRAPH.

See TELECTROSCOPE.

TELESCOPE.

See also FIELD GLASS; OBSERVATORY.

Large Astronomical Telescopes (Ueber Grosse Astronomische Fernrohre). Paul Hoppe. A historical review dealing with the mechanical side of the subject, and giving especial attention to the great telescope of the Treptow observatory. Two articles. 5000 w. 2 plates. Glaser's Annalen—Sept. 15, Oct. 1, 1901.

Construction.—The Construction of a Silvered Glass Telescope, Fifteen and a Half Inches in Aperture, and Its Use in Celestial Photography. Henry Draper. Historical sketch, with illustrations. Serial. 1st part. 6000 w. Sci Am Sup—July 29, 1905.

Paris Exposition.—See INSTRUMENT.

TELETYPING.

See TELEGRAPH—Berlin; Murray; Printing; TYPESETTING MACHINE—Meray-Rozar.

TELLURIDE.

See **GEOLOGY; GOLD.**

TELLURIUM.

See also **METAL—Rare.**

Alloys.—See **ALLOY — Antimony-Tellurium; Lead-Tellurium.**

Brass.—See **BRASS—Tellurium.**

Magnetic Effects.—The Thermo-magnetic and Galvano-magnetic Effects in Tellurium. Morton Githens Lloyd. Describes investigations giving qualitative results thus far obtained. 3000 w. Am Jour of Sci—July, 1901.

TELPHERAGE.

See also **CABLEWAY; CONVEYOR; MECHANICAL HANDLING.**

A Cableway Hoisting and Conveying Apparatus, with Traveling Electric Motor. Illustrated detailed description. 700 w. Eng News—Nov. 15, 1900.

The Telpherage System of Electric Traction. Illustrates and describes this system for the transportation of material, and its applications and merits. 1000 w. Sci Am Sup—May 17, 1902.

Telpherage. Charles M. Clark. An illustrated article giving the history, construction, method of operation, applications, etc. 3800 w. Jour Assn of Engng Soc's—June, 1902.

Telpherage.—C. J. Messer. An illustrated article on the value of electric propulsion applied to aerial transportation of materials, describing several interesting installations. 4500 w. Jour Fr Inst—Oct., 1904.

Electrically Driven Conveyors (Elektrisch Betriebene Schwebetransporte). G. Dieterich. Illustrating and describing a variety of telpherage systems in industrial establishments and on outside work. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—Nov. 12, 19, 1904.

Baker, Milton, Boston.—Transportation of Materials by Electricity. A. Frederick Collins. Illustrates and describes the equipment installed at the works of the Baker Chocolate Company, at Milton, near Boston, Mass., where overhanging electric telpher trains convey materials used. 1200 w. Sci Am—March 18, 1905.

Bleichert.—The Bleichert Electric Overhead Conveyor System (Das Bleichertsche Elektrohängebahn-System). G. Dieterich. Illustrating and describing a system with fixed suppporting rail and independently driven motor carriers using overhead roller contact trolleys. 3000 w. Elektrotech Zeitschr—Nov. 10, 1904.

Factory.—Modern Factory Traction. Clarence J. Messer. On the advantages of a telpherage plant, with information of interest. Ill. 2500 w. Cassier's Mag—Dec., 1903.

Letters and Packages.—The Transmission of Messages by High-Speed Electric Carriers (Le Transport des Correspondances à Très Grande Vitesse par Chariots Electriques Automoleurs). A. Bidault des Chaumes. Describing a scheme for electric-telpherage, for carrying letters and packages. 1500 w. 1 plate. Génie Civil—Nov. 18, 1905.

Taeggi.—Piscicelli Taeggi's Electric Post. William P. Digby. Brief illustrated description of a system now under the consideration of an expert committee in Rome, Italy, for the transmission of letters, newspapers and parcels along an electric aerial railway at speeds as high as 400 kilometres per hour. 1800 w. Engng—Sept. 26, 1902.

TEMPERATURE.

See also **PYROMETRY; THERMOMETER.**

Absolute.—Concerning Absolute Temperature. Explains the term as used in the temperature scale of the perfect gas thermometer, showing the line of reasoning by which the existence of the absolute zero is established. 3500 w. Locomotive—April, 1901.

Castings.—See **CASTING—Temperature.**

Deep Mines.—See **Subterranean; MINING—Deep.**

Furnace.—See **COMBUSTION—Furnace Temperatures.**

Germany.—The Temperature of Germany in Its Relation to Artificial Heating (Die Temperaturverhältnisse Deutschlands, soweit sie für die Beheizung der Räume in Betracht Kommen). Hr. Marx. A paper before the Heating and Ventilating Engineers on the climate, and particularly the temperature of Germany, with tables and diagrams. 3000 w. Gesundheits Ing—Jan. 15, 1902.

High.—See **Measurement; Radiation Scale; PYROMETRY.**

Low.—See **LOW TEMPERATURE.**

Measurement.—The Measurement of Temperature. Robert S. Whipple. Gives a summary of the various means of measuring temperature in general use, and tests of their applications. Ills. 3000 w. Engng Times—March, 1904.

Thermometers and Pyrometers, with Some of Their Industrial Applications. Robert S. Whipple. Read before the Cleveland Inst. of Engrs. Gives a summary of the various means of measuring temperature in general use, and discusses details and applications. 5000 w. Engng—Feb. 17, 1905.

Thermometers and Pyrometers, with Some of Their Industrial Applications. Abstract of a lecture by Robert Whipple, delivered before the Cleveland Inst. of Engrs., England, describing these instruments and the uses to which they are applied. Ills. 4000 w. Sci Am Sup—July 22, 1905.

See also **SLIDE RULE — Temperature Calculations.**

Radiation Scale.—The Radiation Scale of Temperature and Its Realisation up to 2,300 Degrees Absolute. O. Lummer and E. Pringsheim. From the "Berichte der Deutschen Physikalischen Gesellschaft." Explanation of a new method of measuring high temperatures, giving experimental investigations made. 3000 w. Elect'n, Lond—Aug. 7, 1903.

Slide-Rule Calculations.—See **SLIDE RULE—Temperature Calculations.**

Steel Transformation.—See **STEEL—Transformation Temperatures.**

Subterranean.—Temperature Measurements in Deep Borings (Temperaturmessungen in Tiefbohrlöchern). H. Thumann. An illustrated description of a thermometric apparatus for deep boreholes with an account of subterranean temperature measurements in a boring at Oldau, Germany. 1400 w. Glückauf—Dec. 21, 1901.

Underground Temperatures in Relation to Deep Mining. F. G. Meachem. Abstract of paper read before the S. Staffordshire & E. Worcestershire Inst. of Min. Engrs. A study of the earth's temperature and its variations. Also discussion. 3300 w. Col Guard—April 17, 1903.

Notes on Underground Temperature Observations. James Stirling. Gives the chief results of a series of observations made in some of the deep mines at Bendigo, to a depth of 3,250 ft. 1500 w. N Z Mines Rec—Dec. 16, 1904.

See also **HEAT — Earth's Interior; MINING — Deep.**

TEMPERING.

See also **HARDENING; IRON METALLURGY; STEEL METALLURGY.**

Oil.—See **FORGING.**

Punches.—See **PUNCHING—Hardening.**

Springs.—See **SPRING—Hardening and Tempering.**

Steel.—See **HARDENING; STEEL METALLURGY.**

Williams, Brooklyn.—See **HARDENING.**

TENDER.

See **LOCOMOTIVE TENDER.**

TENEMENT HOUSE.

See also **BUILDING CONSTRUCTION; WORKMEN'S DWELLING.**

Tenement Houses. Edward T. Potter. Answer to a circular letter of inquiry concerning the design and construction desirable. 7500 w. Am Archt—Nov. 24, 1900.

New York.—Light and Air in Tenement Houses. Describes the conditions in New York tenement houses under existing laws, and gives notes of the conditions in 1878, when the subject first received widespread attention. 3500 w. Eng Rec—June 15, 1901.

TERMINAL.

See **BRIDGE TERMINAL; ELECTRIC RAILWAY TERMINAL; RAILWAY TERMINAL; STREET RAILWAY TERMINAL; TUNNEL.**

TERMINOLOGY.

See also DICTIONARY—Technical; ELECTRIC TERMINOLOGY; ELECTRODE—Terminology.

Technical Terminology. Calls attention to some of the errors in terminology, and also to terms susceptible of improvement. 1500 w. Elec Rev, Lond—Feb. 14, 1902.

Rope.—See WIRE ROPE—Terminology.

Telephone.—See TELEPHONE—Nomenclature.

TERRA COTTA.

See also BUILDING MATERIAL; CERAMICS; CLAY; FIREPROOF CONSTRUCTION; TILE.

Reinforced.—The "New York" Reinforced Terra Cotta Arch. An illustrated account of an official test made of this new type of building construction. 4500 w. Ins Engng—Dec., 1903.

Reinforced, Hotel, Atlantic City.—See CONCRETE REINFORCED.

TESLA.

See ELECTRIC INVENTION; ELECTRIC MOTOR; SPACE TELEGRAPHY; SPACE TRANSMISSION.

TEST BAR.

See TESTING.

TESTING.

See also BEAM; COLUMN; LABORATORY; MATERIALS' STRENGTH; TESTING LABORATORY; TESTING MACHINE; and under specific materials and machines.

Testing of Iron and Steel. A. N. Kemp. Considers the usual methods of testing, describing two of the best known machines. Ills. 4000 w. Engng Times—Feb., 1904.

Alternating Stresses.—See Vibration; TESTING MACHINE.

American Society.—The American Society for Testing Materials. Paul Kreutzpointner. An address on the work, value, and national economic aims and importance of this society. 4500 w. Pro Engrs' Soc of W Penn—Oct., 1905.

Automobile Motors.—See AIR RESISTANCE—Renard Dynamometer; AUTOMOBILE—Testing; DYNAMOMETER—Renard.

Bars.—The False Witness of the Test Bar. Robert Buchanan. Emphasizing the importance of obtaining correctly representative bars for testing the strength of cast-iron, and showing the unsoundness of present accepted methods. 3000 w. Engineering Magazine—May, 1902.

Test Bars—Some Foundation for Comparisons. Asa W. Whitney. Remarks on certain relations to be considered as applying to various cast sections and test bars. 1500 w. Foundry—Sept., 1902.

The Influence of Form and Production upon the Resistance of Cast-Iron Test Bars (Einfluss der Form und Herstellungsweise von Gusseisernen Probestäben auf deren Festigkeit). P. Reusch. With numerous examples showing how the apparent resistance may vary according to the shape and manner of casting. 2500 w. Stahl u Eisen—Nov. 1, 1903.

The Resistance and Structure of Cast-Iron (Festigkeit und Struktur des Gusseisens). Oskar Leyde. Giving data and results of trials on test bars, showing the influence of dimensions on structure. 2500 w. 1 plate. Stahl u Eisen—Jan. 15, 1904.

Test Bars. B. J. Dunning. Gives the writer's experience in trying to determine what the test bar tells. 1400 w. Foundry—May, 1905.
See also Nicked Bars; FOUNDRY.

Beams.—Bending Tests of Rolled and Riveted Beams (Biegeversuche mit Gewalzten und mit Genieteten Trägern). F. Schüle. With illustrations of the Amsler-Laffon testing machine, and data and results of tests, with especial reference to the Grey beam. Two articles. 3500 w. Schweiz Bauzeitung—May 21, 28, 1904.

See also BEAM; CONCRETE REINFORCED.

Bending.—The Influence of Bending and Straightening Upon the Resistance of Low Steel (Einfluss des Biegens und Richtens auf die Festigkeitseigenschaften von Flusseisen). Prof. M. Rudeloff. Giving tabulated and plotted results of experiments at the Charlottenburg testing laboratory. 4000 w. Zeitschr d Ver Deutscher Ing—Jan. 12, 1901.

See also Brittleness; Impact; Nicked Bars; BEAM; CONCRETE REINFORCED.

Berlin Laboratory.—See LABORATORY; TESTING LABORATORY.

Boiler Material.—See BOILER PLATE.

Bridge Steel.—See STEEL; STEEL SPECIFICATIONS.

Brinell Method.—See Hardness.

Brittleness.—Experimental Studies of the Causes of Brittleness of Steel. Ch. Fremont. An illustrated description of experiments which show that both tension and compression tests are necessary and that flexure is a complete method of testing on condition that one gives to it the proper sensitiveness. 2800 w. R R Gas—March 13, 1903.

Testing Brittleness of Steel. E. G. Izod. Read before the British Assn. An illustrated description of a pendulum apparatus for testing steel as regards brittleness. 1500 w. Engng—Sept. 25, 1903.

The Brittleness of Certain Steels (Sur la Fragilité de Certains Aciers). MM. A. Perot & H. M. Levy. A note showing the influence of the speed of drop tests upon the indications as to brittleness. 700 w. Comptes Rendus—Dec. 26, 1904.

See also Impact; Nicked Bars; Vibrations.

Budapest Congress.—The Congress of the Association for Testing Materials at Budapest, September, 1901 (Le Congrès des Méthodes d'Essai Tenu à Budapest au Mois de Septembre, 1901). A. Pourcel. A general abstract of the proceedings of the section for testing metals. 2500 w. Génie Civil—Nov. 23, 1901.

The Third Congress of the International Association for the Testing of Materials (Der III. Congress des Internationalen Verbandes für die Materialprüfungen der Technik. K. Haberkalt and A. Stradal. A report of the meeting at Budapest and abstract of the proceedings. 9000 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 21, 1901.

The Budapest Meeting of the International Association for the Testing of Materials (Vom Internationalen Materialprüfungs Congress in Budapest). Prof. H. Wedding. A paper, with discussion, before the "Eisenhütte Oberschlesien," giving an account of the Budapest Congress, the proposed international laboratory at Zürich, etc. 2800 w. Stahl u Eisen—Jan. 1, 1902.

The Congress of the International Association for the Testing of Materials at Budapest in 1901 (Der Internationale Kongress für die Materialprüfungen der Technik zu Budapest, 1901). A general review of the congress and its proceedings. 2000 w. Schweiz Bauzeitung—Jan. 25, 1902.

New Researches in the Constitution of Materials (Ueber Neuere Arbeiten im Gebiete der Prüfung der Materialien der Technik). Prof. Fried. Kick. An illustrated review of some of the papers presented before the Budapest Congress of the International Association for the Testing of Materials, bearing particularly on solutions, metallography, etc. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—March 7, 1902.

Cannon Steel.—Official Testing of Steel for Cannon in France and in the United States (Essais Officiels de Réception des Aciers à Canon en France et aux Etats-Unis). M. S. Heryngfet. Description of methods of testing, with results of tests. Tables. 5000 w. Mem de l Soc d Ing Civils—February, 1901.

See also MATERIALS' STRENGTH—Gun Steel.

Castings.—Modes of Testing Castings. W. T. MacCall. Abstract of a paper read before the British Found. Assn. Describes briefly the various tests applied to cast-iron, and to some other metals. 2000 w. Ir & Coal Trds Rev—Dec. 9, 1904.

Modes of Testing Castings. W. T. MacCall. Abstract of a paper read before the British Found. Assn. Brief account of tests applied to castings of iron, steel, brass, gun metal, bronze, &c. 1800 w. Mech Engr—Jan. 7, 1905.

See also Bar; Cast-Iron; Steel Castings; CASTING.

Cast-Iron.—Report of the Committee on Standardizing the Testing of Cast-Iron. Ill. 3000 w. Jour Am Found Assn—June, 1901.

Standard Specifications for Testing Cast-Iron. Specifications adopted by the Am. Found. Assn., with recomendations of the committee relative to the molding of the test bars, etc. Ill. 2100 w. Jour Am Found Assn—June, 1901.

The Accuracy and Value of Testing Cast-Iron. Dr. Richard Moldenke. A discussion of American practice in testing, showing the aim to be the determination of the true value of the material apart from any particular casting. 2000 w. Engineering Magazine—August, 1902.

The Testing of Cast-Iron. Dr. R. Moldenke. Read before the New England Found. Assn. Gives proposed specifications upon which cast-iron may be bought and sold, discussing related matters. 8500 w. Ir Age—Feb. 18, 1904.

The Testing of Cast-Iron. Dr. Richard Moldenke. A summary of modern practice. Also discussion. 6200 w. Jour Fr Inst—June, 1905.

Methods for Testing Cast-Iron. Dr. Richard Moldenke. Read before the Atlantic City meeting of the Am. Soc. for Test. Materials. Reviews the American and English pig iron specifications, and the method by which the metal is judged. 2400 w. Ir Age—July 13, 1905.

Testing Cast-Iron. E. L. Rhead. The present article considers principally tests of the running power of the metal, and shrinkage. Serial. 1st part. 2500 w. Mech Engr—Sept. 9, 1905.

See also Bars; Nicked Bar; FOUNDRY; IRON; METALLOGRAPHY; PIG IRON.

Centrifugal Pumps.—See PUMP—Centrifugal Testing.

Commercial.—Commercial Tests of Materials. E. G. Izod. Read before the Engng. Soc., Univ. College, London. Considers tests to determine the quality of materials for commercial purposes. 2800 w. Engng—March 11, 1904.

Copper.—Breaking Tests with Long Continued Heating. The Behavior of Copper (Der Warmzerreissversuch von Langer Dauer. Das Verhalten von Knpfer). Prof. R. Stribeck. A well illustrated account of tension tests of copper bars subjected to high temperatures for long periods in an electric oven. 4000 w. Zeitschr d Ver Deutscher Ing—April 18, 1903.

See also COPPER—Hard Drawn; MATERIALS' STRENGTH—Copper Tests.

Crowds Weight.—See CROWDS—Weight.

Cylinders.—See CYLINDER.

Drills.—See DRILL—Testing.

Drop.—See Bars; Bending; Impact; Nicked Bars; DRAFT GEAR—Test; TESTING MACHINE—Impact.

Elastic Limit.—See Yield Point; MATERIALS' STRENGTH.

Elliptic Spring.—See SPRING—Elliptic.

Eye-Bars.—Comparisons of Full-Sized and Specimen Tests of Very Large Steel Eye-Bars. Gives a series of comparison tests made within the last few months, with remarks and conclusions. 800 w. Eng News—Feb. 2, 1905.
See also EYE-BAR.

Foundry Materials.—See Bars; FOUNDRY; IRON.

Fremont Method.—See Nicked Bars; Optical Examination.

Gas Engines.—See GAS ENGINE—Testing.

German Convention.—The Fifth Convention of the German Society for Testing Materials (Die Fünfte Hauptversammlung des Deutschen Verbandes für die Materialprüfungen der Technik). A general report of the proceedings of the meeting of Sept. 5, 1903, at Rübeland (Harz). 6000 w. Zeitschr d Ver Deutscher Ing—Jan. 30, 1904.

Glass Beams.—See MATERIALS' STRENGTH—Optical Examination.

Guillery.—A New Method of Testing Metals (Une Nouvelle Méthode d'Essais Mécaniques des Métaux). M. Guillery. The hardness is determined by Brinell's method, the elastic limit by the change in the appearance of a polished surface, and the brittleness by the fracture of a nicked bar in a special apparatus. 5000 w. Rev de Metallurgie. Bull Soc d'Encour—Aug., 1904.

Indentation Tests on Steel. Illustrates and describes M. Guillery's apparatus and the method of making the tests. 1600 w. Engr, Lond—Oct. 28, 1904.

Method of Making Tests on Metals. Dr. A. Gradenwitz. Illustrated description of apparatus, described by M. Guillery in a recent paper for carrying out mechanical tests on metals. 1400 w. Ir Trd Rev—April 6, 1905.

Gun Steel.—See Cannon Steel; MATERIALS' STRENGTH.

Hardness.—Hardness, or the Workability of Metals. W. J. Keep. Describes the machine constructed for testing, and gives examples of experimental work, with tabulated results. Ill. 3300 w. Trans Am Soc of Mech Engs, No. 879—Dec., 1900.

Brinell's Method for the Determination of Hardness (Brinell's Verfahren zur Härtebestimmung). A discussion of the method of determining the hardness of steel by the area of the depression produced by a hardened steel ball under pressure in the testing machine. Two articles. 3500 w. Stahl und Eisen—April 15, May 1, 1901.

Brinell's Method of Determining the Hardness and Other Properties of Iron and Steel. Axel Wahlberg. Abstract of a paper read before the Glasgow Congress. Considers the influence of chemical composition of freezing temperatures, of notches in the specimens, and of treatment. 3300 w. Ir & Coal Trds Rev—Sept. 6, 1901.

Brinell's Method of Determining Hardness (Méthode de M. Brinell pour la Détermination de la Durete des Corps). A discussion of the report of Axel Wahlberg upon Brinell's method of determining hardness by the penetration of a steel ball under pressure. 3000 w. Revue Technique—June 10, 1902.

The Steel Ball Test (Die Kugeldruck Prüfung). Albert Ohnstein. Describing an improved apparatus for applying the Huber modification of Brinell's test for hardness; using the depression made by a steel ball as a measure. 1000 w. Stahl u Eisen—April 1, 1904.

Researches on the Comparative Hardness of Acid and Basic Open-Hearth Steel at Various Temperatures, by Means of "Ball-Testing." J. A. Brinell. Brief report of tests, stating results. 600 w. Ir & Steel Mag—Jan., 1905.

See also Guillery.

Heating.—See Copper; Steel Castings.

Impact.—An Apparatus for Experiments in Impact. W. K. Hatt and W. P. Turner. Extracts from a paper before the Paris International Congress for the Unification of Tests of Materials. Illustrated description of impact testing machines and their use. 1700 w. R R Gaz—Nov. 23, 1900.

Tensile Impact Tests of Metals. W. Kendrick Hatt. Abstract of paper before the American Society for Testing Materials, with illustrations and tables, describing experiments made at Purdue University. 1400 w. R R Gaz—Vol. XXXVII, No. 11.

Tensile Impact Tests of Metals. W. Kendrick Hatt. Read before the Am. Soc. for Test. Mat. Illustrates and describes investigations made of the relative behavior of materials under impact and gradual loading and the results. 7000 w. Eng News—Sept. 8, 1904.

Tension Impact Tests of Rolled Steel. S. Bent Russell. Gives results of experiments made. Ill. 2000 w. Eng News—Jan. 3, 1901.

Irregularities in Fragility Tests (De la Discontinuité dans les Essais de Fragilité). H. Le Chatelier. An examination of a number of drop tests of various materials, showing the discontinuous nature of the results, and suggesting that this may be due to the methods of testing. 3000 w. Bull Soc d'Encour—July 31, 1902.

Impact Tests on the Wrought Steels of Commerce. A. E. Seaton and A. Jude. Aims to show some of the characteristics and peculiarities of wrought steel, to develop a more rational method of testing, and to point out peculiarites in the fracture of test specimens and actual pieces of machinery. 10 plates. 9300 w. Inst of Mech Engrs—Nov. 18, 1904.

Impact Tests in Detail. E. P. Buffet. Condensed translation of a paper by M. A. Pérot, describing an interesting investigation. Ills. 1000 w. Am Mach—Vol. 28, No. 8.

See also Brittleness; Nicked Bars.

International Association.—The International Association for Testing Materials. Their discussion of proposed specifications at the meeting held Oct. 25, 26 and 27. 6800 w. Ir Age—Nov. 1, 1900.
See also Budapest Congress.

Iron Plates.—See MATERIALS' STRENGTH.

Laboratory.—See LABORATORY; TESTING LABORATORY.

Lahmeyer Electric Works.—The Testing of Materials (Prüfung von Materialien). Dr. Paul Holitscher. An account of methods and results of testing all kinds of materials used at the electrical works of W. Lahmeyer & Co. Diagrams and tables. Serial. 2 parts. 8000 w. Elektrotech Zeitschr—Feb. 20, 27, 1902.

Locomotive Material.—See LOCOMOTIVE—Prussian Specifications.

Locomotive Parts.—Tests of Cast Steel Locomotive Parts on the Northern of France. M. du Bosquet. Translated from the "Revue Generale des Chemins de Fer. Gives report of tests and results. 700 w. R R Gaz—July 31, 1903.

Lubricants.—See LUBRICATION—Test.

Magnetic.—See MAGNETIC TESTING.

Mine, Silesia.—See LABORATORY.

Nicked Bars.—A New Method for Testing Materials (Nouvelle Méthode pour l'Essai des Materiaux). Ch. Frémont. A paper read before the International Congress for Testing Materials, describing the improvements of the author in the bending test. 7000 w. Revue de Mécanique—Oct. 31, 1900.

An Experimental Study of the Causes of the Fragility of Steel (Etude Experimentale des Causes de la Fragilité de l'Acier). Ch. Frémont. The method of M. Frémont of bending tests of small cross-ruled bars is employed to investigate the nature and deformation of brittle steels. 5000 w. Bull Soc d'Encour—Feb., 1901.

Experiments on Bending Notched Bars (Etude Expérimentale sur le Pliage des Barrettes Entaillées). MM. Frémont & Osmond. A review of tests made with scored bars according to the system of M. Frémont. 10,000 w. Bull Soc d'Encour—April, 1901.

The Testing of Metals by the Bending of Nicked Bars (Essai des Métaux par Pliage des Barrettes Entaillées). Ch. Frémont. A further discussion of the method of drop tests upon nicked bars, showing that reliable results may be obtained from small test bars. 7500 w. Bull Soc d'Encour—Sept. 30, 1901.

The Brittleness of Steel (Sur la Fragilité de l'Acier). A. Pourcel. A review of the experiments of Frémont on bending tests of small nicked bars. 3000 w. Génie Civil—Aug. 17, 1901.

Experiments in Flexure by Drop Tests (Quelques Expériences de Flexion par Choc). J. Barba. Data and results of the method of drop test upon nicked test bars; the experiments being conducted in the shops of the Eastern Railway of France. 8500 w. Mem Soc Ing Civ de France—April, 1901.

Tension Tests with Nicked Test Bars (Zugversuche Eingekerbten Probekörpern). A. Martens. Data and results of trials with the system of Prof. Barba, as applied at the Charlottenburg laboratory. 5000 w. Zeitschr d Ver Deutscher Ing—June 8, 1901.

The Drop Flexure Test for Metals (l'Essai des Metaux à la Flexion par Choc). M. G. Charpy. A discussion of experiments made upon nicked bars by use of a pendulum drop. The relation of such tests to other methods are discussed. 8000 w. 1 plate. Mem Soc Ing Civ de France—June, 1901.

The Testing of Metals by the Flexion of Notched Bars (Sur l'Essai des Métaux par Flexion de Barreaux Entaillés). G. Charpy. Describing the use of a special form of ballistic pendulum for producing impact tests upon small notched bars of metal. 5000 w. Mem Soc Ing Civ de France—Oct., 1904.

Impact Testing of Notched Bars. Illustrates and describes two recent types of machine invented by M. G. Charpy, which he considers will meet the requirements of all practical cases. 2000 w. Engr, Lond—March 10, 1905.

The Drop Test Upon Nicked Bars (Essai des Métaux par Choc sur Barreaux Entaillés). A. Dutreux. A review of the paper of Mr. Charpy before the "Société des Ingénieurs Civils de France;" followed by comments by M. A. Pourcel. 2500 w. Génie Civil—Sept. 28, 1901.

Impact Tests on Notched Steel Bars. Editorial on the plan advocated for the testing of notched bars, which are claimed to be extremely effective in showing brittleness or lack of homogeneity in structural steels. 1100 w. Engng—Feb. 7, 1902.

The Testing of Iron and Steel on Nicked Bars (Prüfung von Eisen und Stahl an Eingekerbten Stücken). M. Rudeloff. A discussion of the value of the drop test of nicked bars for the determination of the resistance of iron and steel. Two articles. 7000 w. Stahl u Eisen—April 1, 15, 1902.

Drop Tests of Nicked Bars (Les Essais au Choc sur Barreaux Entailles). M. Abraham. A discussion of the methods of Barba and Frémont for determining the strength of metals by the drop test upon small nicked bars. Serial. 1st part. 2500 w. Revue Technique—Jan. 10, 1903.

The Efforts Developed in Drop Testing Nicked Bars (Sur les Efforts Développés dans le Choc d'Eprovettes Entaillées). A. Pérot. Describing a device which draws automatic records of the forces exerted by a drop upon a test specimen. 800 w. Comptes Rendus—Dec. 14, 1903.

A Proposed Test for Detecting Brittleness in Structural Steel. J. P. Snow. Read before the Am Soc for Test. Materials. Proposes a nicked bending test on crop ends of plates and shapes as they are trimmed at the rolling-mill for shipment. 2500 w. Ir Age—June 23, 1904.

The Fremont Method of Determining the Fragility of Iron and Steel. Thorsten Y. Olsen. An explanation of the Fremont method and machine. Ill. 3800 w. Pro Engrs' Club of Phila—Jan., 1905.

Test for Fragility. Thorsten Y. Olsen. Abstract of a paper read before the Phila. Found. Assn. An illustrated article explaining the Frémont method of determining the fragility of iron and steel by means of notched bars. Also discussed. 4500 w. Foundry—May, 1905.

The Influence of the Form of Test Piece upon Tests for Brittleness (Influence des Variations de Forme de l'Entaille dans les Essais de Fragilité). F. Barbier. Discussing especially the effect of the shape of the notch upon drop tests on notched bars. 1200 w. Génie Civil—April 1, 1905.

Drop Tests on Nicked Bars (Schlagbiegeproben an Eingekerbten Stäben). C. J. Snyders & P. A. M. Hackstroh. A translation from "De Ingenieur" of drop testing work on nicked steel bars, conducted by the engineer staff of the Netherland army. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 22, 1905.

See also Bending; Brittleness; Guillery; Impact; Rail.

Optical Examination.—The Optical Examination of Metallic Surfaces (Examen Optique des Surfaces Métalliques). J. Vinsonneau. A discussion of the manner in which approaching rupture may be detected by a critical examination of surface changes in the parts of machines. 2000 w. Revue Technique—Sept. 25, 1901.

The Determination of the Elastic Limit of Metals (Mesure de la Limite Elastique des Métaux). Ch. Frémont. An examination of the irregularities in the determination of the elastic limit of metals under compression; showing how the limit may be seen in the changes on the surface of a polished test piece. 1000 w. Comptes Rendus—Aug. 4, 1902.

The Measurement of the Elastic Limit of Metals (Mesure de la Limite Elastique des Metaux). Ch. Frémont. Discussing the microscopic method of determining the true elastic limit at which the molecular structure of the material is changed under stress. 7000 w. Bull Soc d'Encour—Sept., 1903.

The Elastic Limit of Metals. Discusses the investigations of Ch. Frémont. Ills. 1700 w. Nature—Jan. 21, 1904.

See also Guillery; MATERIALS' STRENGTH.

Painting.—See PAINTING—Tests.

Paris Conservatoire.—See LABORATORY; TESTING LABORATORY; TESTING MACHINE.

Penetration.—The Resistance of Elastic and Non-Elastic Materials to Penetration (Résistance à la Penetration de Matiéres Elastiques ou Non). R. Simon. A report upon the Persos system of testing metallic and textile materials by penetration. 4000 w. Bull Soc d'Encour—March, 1902.

Pipe Covering.—See STEAM PIPE COVERING.

Pipe Joints.—See FLANGE—Test.

Plastic Limit.—See Yield Point; MATERIALS' STRENGTH.

Plates.—See PLATE.

Pneumatic Tools.—See PNEUMATIC TOOL—Testing Apparatus.

Progress.—New Viewpoints in the Testing of Materials (Ueber Einige Neuere Gesichtspunkte im Material prüfungswesen). B. Zschokke. An examination of the progress which has been made in the testing of materials, including improved drop tests, chemical examination, metallography, etc. Two articles. 2500 w. Schweiz Bauzeitung—Jan. 31, Feb. 7, 1903.

Pulleys. — See PULLEY; TESTING MACHINE — Belt and Pulley.

Pumps.—See PUMP—Tests; PUMPING ENGINE TEST.

Punching.—Punching Considered as a Method of Testing (Le Poinçonnage Envisagé comme Méthode d'Essai). L. Baclé. An examination of the use of measurements of the resistance to punching as an indication of the strength of the material. 3500 w. Bull Soc d'Encour—Nov. 30, 1904.

See also PUNCHING.

Rails.—A New Method of Testing Rails (Nouvelle Méthode d'Essai des Rails). Ch. Frémont. Describing the application of the nicked bar drop test to the investigation of steel rails. 1200 w. Comptes Rendus—Jan. 5, 1903.

See also RAIL—Stresses.

Rail Bonds.—See RAIL BONDS.

Railway Material.—See LABORATORY; RAILWAY MATERIAL—Testing.

Recorder.—See TESTING MACHINE.

Sheet Metal.—See MAGNETIC TESTING.

Sheet Steel.—See MAGNETIC TESTING.

Ship Details.—See SHIPBUILDING—Structural Details.

Solder.—See SOLDER—Brazing.

Spur Gears.—See GEAR—Spur.

Standardization.—Standardisation of Tests for Iron and Steel. W. H. Farnell. Read before the W. of Scotland Iron & Steel Inst. Discusses the present practice showing the necessity of standardisation, and considering the requirements and test limits. 4500 w. Ir & Coal Trds Rev—Dec. 20, 1901.

See also American Society; Budapest Congress; German Convention; International; STEEL SPECIFICATIONS.

Steam Engines.—See STEAM ENGINE TEST.

Steam Turbine.—See PUMP—Centrifugal Testing; STEAM TURBINE—Test.

Steel.—See Brittleness; Impact; Nicked Bars; MATERIALS' STRENGTH; STEEL; STEEL SPECIFICATIONS.

Steel Castings.—Experiments on the Resistance of Steel Castings (Versuche über die Festigkeitseigenschaften von Stahlguss). C. Bach. Data and results of an extensive and accurate series of tests of the strength of steel castings at ordinary and higher temperatures. Two articles. 10,000 w. 3 plates. Zeitschr d Ver Deutscher Ing—Dec. 5, 12, 1903.

The Resistance of Steel Castings at Ordinary and Higher Temperatures (Versuche über die Festigkeitseigenschaften von Stahlguss bei Gewöhnlicher und Höherer Temperatur). C. Bach. Data and results of tests, with diagrams showing the diminution of strength with increase in temperature. 1200 w. Zeitschr d Ver Deutscher-Ing —March 12, 1904.

See also STEEL CASTING.

Steel for Girders.—How Should Steel for Girders be Tested? Considers how the material should be tested to ascertain whether it is in accordance with the requirements of the specification. 2200 w. Engr, Lond—Jan. 10, 1902.

Structural Materials.—The Investigation of Structural Materials by the U. S. Geological Survey. Richard L. Humphrey. An account of the arrangements for the continuance of the valuable work carried on at the Louisiana Purchase Exposition, on a much more extensive scale. 2000 w. Eng Rec—Sept. 2, 1905.

See also BUILDING MATERIAL; STEEL CONSTRUCTION; STEEL SPECIFICATION.

Structural Steel.—See STEEL.

Tayler-White Process.—See TOOL STEEL—Testing.

Tension Failure.—Tension Failure Phenomena, Their Meaning and Cause. Rudolph Hartman. Considers phenomena noted in tension tests, giving a list of the men who developed the "Theory of Elasticity" and the dates of their work. 12,000 w. Wis Engr—June, 1903.

Thermo-Electric Measurement. — Thermo-Electric Measurement of Stress. C. A. P. Turner. A description of methods used, giving results obtained under somewhat unfavorable circumstances, with remarks regarding the errors, and the data that might be obtained by further investigations. 11,800 w. Pro Am Soc of Civ Engrs—Jan., 1902.

Timber.—See TIMBER.

Torsion.—See MATERIALS' STRENGTH.

Variable Section.—The Influence of Variations in the Section of Test Pieces upon the Results of Tensile Tests (Der Einfluss von Ungleichmässigkeiten im Querschnitte des Prismatischen Teiles eines Probestabes auf die Ergebnisse der Zugprüfung). Hr. Diegel. A discussion, with diagrams and tables, of the different results of different tests for elongation and tensile strength caused by turning down the central part of the test piece. 700 w. Zeitschr d Ver Deutscher Ing—March 21, 1903.

Vibration.—The Dangerous Crystallization of Mild Steel and Wrought Iron. J. O. Arnold. Illustrates a machine for testing vibratory brittleness and reviews various investigations in this field. 1000 w. Ir & Coal Trds Rev—June 26, 1903.

The Fracture of Structural Steel Under Alternating Stresses. Prof. J. O. Arnold. A British Association paper discussing the weakening effects of vibration upon tough steel and describing methods of tests. 1200 w. Engr, Lond—Sept. 2, 1904.

The Fracture of Structural Steel Under Alternating Stresses. Prof. John O. Arnold. Read before the British Assn. Gives facts learned by experimental investigations covering two years. Ills. 1300 w. Mech Engr—Sept. 24, 1904.

See also IRON—Wrought. Crystallization; MATERIALS' STRENGTH—Dynamics.

Yield Point.—The Behavior of Materials of Construction without Elastic Limits (Ueber das Verhalten von Konstruktionsmaterialien ohne Proportionsgrenze). Bernh. Kirsch. A review of the experiments of Bach and of Berner showing the nature of yielding beyond the elastic limit. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 16, 1904.

See also MATERIALS' STRENGTH—Dynamics.

TESTING ENGINEER.

See INSPECTION; LABORATORY; TESTING; TESTING LABORATORY.

The Testing Engineer. Presidential address by Dr. C. B. Dudley before the American Society for Testing Materials. Gives an analysis of the scope and field of the testing engineer, and remarks on the preparation needed. 4500 w. Eng Rec—July 8, 1905.

TESTING LABORATORY.

See also LABORATORY; MATERIALS' STRENGTH; TESTING; TESTING MACHINE.

Paris Conservatoire.—The Testing Laboratory of the Conservatoire des Arts et Métiers (Le Laboratoire d'Essais du Conservatoire des Arts et Métiers). A. Dumas. An illustrated description of the new French national testing and research laboratory, connected with the famous conservatory of arts and trades. 2800 w. Génie Civil —July 11, 1903.

See also LABORATORY.

Reichsanstalt, Germany.—The Work of the Reichsanstalt in 1903. Abstract of Director Kohlrausch's report on the testing and research work of the Physikalisch-Technische Reichsanstalt near Berlin. 4000 w. Engng—Aug. 5, 1904.

See also LABORATORY.

TESTING MACHINE.

See also LABORATORY; MATERIALS' STRENGTH; TESTING; TESTING LABORATORY.

Alternating Stress. — Alternating Stress Testing-Machine at the National Physical Laboratory. T. E. Stanton. An illustrated description of a machine recently fitted and erected in the workshop of the department. 4000 w. Engng—Feb. 17, 1905.

A New Testing-Machine for Reversals of Stress. J. H. Smith. Brief account, with illustrations, of a machine which is to form a part of the Mechanical Engineering Department of the Municipal Technical Inst. of Belfast. 1500 w. Engng —March 10, 1905.

See also **TESTING—Vibration.**

Anchors and Chains.—Testing Machine for Anchors and Chain Cables (Anker und Kettenprüfmaschine). Illustrating a 150-ton testing machine, designed to admit the anchors of ships, as well as heavy chain cables. 2000 w. Zeitschr d Ver Deutscher Ing—Dec. 23, 1905.

Automatic Drop Records.—See TESTING — Nicked Bars.

Babbitt.—Experience with a Simple Babbitt Testing Machine. E. S. Farwell. Read before the Am. Assn. for the Ad. of Science. Illustrates and describes the machine and the improvements made upon it. 1600 w. Am Mach—July 24, 1902.

Belt and Pulley.—A Belt and Pulley Testing Machine. C. M. Allen. Illustrated description of the apparatus used for making comparative pulley tests and belt tests. 1200 w. Jour Worcester Poly Inst—Nov., 1901.

A Belt and Pulley Testing Machine. C. M. Allen. Describes a machine used in the engineering laboratory of the Worcester Polytechnic Institute for making a series of comparative pulley tests. 1100 w. R R Gaz—June 6, 1902.

Brittleness. — See Alternating Stress; TESTING — Brittleness; Nicked Bars; Vibrations.

Buckton & Co., Leeds.—See Paris Conservatoire.

Emery.—The Emery Testing Apparatus at the Massachusetts Institute of Technology. Day Allen Willey. Illustrated description of experimental apparatus for testing material used in the construction of bridges, buildings, vessels, etc. 1400 w. Sci Am Sup—Jan. 30, 1904.

English.—Typical English Testing Machines. A. Francis. Illustrates types of commercial patterns, and describes methods, showing the advantage to engineers in determining the strength of materials. Serial. 1st part. 1500 w. Page's Mag —May, 1904.

Extensometer.—A Roller Extensometer. Gus C. Henning. Describes the new type of instrument and its working. Ill. 2200 w. Trans Am Soc of Mech Engrs, No. 0945—May, 1902.

Frémont.—See TESTING—Nicked Bars.

Glasgow University.—The 100-Ton Universal Testing Machine, with Variable Accumulator, at the James Watt Laboratories, Glasgow University. J. Hartley Wicksteed. Illustrated detailed description. 1900 w. Inst of Mech Engrs—Glasgow Congress, 1901.

Guillery.—See TESTING.

Hydraulic.—A Large Hydraulic Testing Machine for Uniform Loads. Robert A. Cummings. From a paper recently read before the Am. Soc. of Test. Materials. Illustrations with descriptions. 1100 w. Eng Rec—Aug. 12, 1905.

Impact.—See TESTING.

Mass. Inst. Tech.—See Emery.

Mohr and Federhaff.—Mohr and Federhaff Testing Machines (Machines à Essayer les Materiaux de Construction Mohr et Federhaff). An illustrated description of various types of machines for testing materials made by this German firm. 2000 w. Revue Technique—Jan. 25, 1902.

Nicked Bars.—See TESTING.

Paris Conservatoire.—A Large Testing Machine. An acccount of the recently completed machine for the testing laboratory of Paris, adapted for testing all kinds of substances. 1200 w. Engr, Lond—Jan. 29, 1904.

Testing Machine of 800 Tons Capacity (Machine Universelle d'Essais de 800 Tonnes). Pierre Breuil. An account of the large testing machine made by Buckton & Co., of Leeds, for the laboratory of the Conservatoire des Arts et Métiers. 2000 w. Génie Civil—July 2, 1904.

300-Ton Universal Testing Machine. Translation of article by M. Breuil in "Le Génie Civil," giving a well illustrated account of a large testing machine built by Messrs. Joshua Buckton & Co., for Conservatoire des Arts et Métiers, Paris. 2200 w. Engng—Aug. 12, 1904.

A Universal Testing Machine of 300 Tons for Full-Sized Structural Members. J. H. Wicksteed. Read before the British Assn. at Cambridge. Illustrates and describes the machine for the Paris Conservatoire des Arts et Métiers, tracing the development and reporting its working. 2800 w. Engng—Sept. 2, 1904.

A Universal 800-Ton Testing Machine. Illustrates and describes a machine in which the strength of full-sized members of structures may be tested. 1200 w. Sci Am Sup—Nov. 19, 1904.

See also **LABORATORY; TESTING LABORATORY.**

Pulley.—See Belt and Pulley; PULLEY.

Recorder.—Autographic Load-Strain Recorder for Test Specimens. Prof. Goodman. Illustrates and describes an apparatus entirely automatic in its action. 1500 w. Engng—Dec. 19, 1902.

Screw.—A 600,000-Pound Screw-Testing Machine. Illustrated detailed description of a fine machine recently completed for the University of Illinois. 1000 w. Am Mach—Vol. 28, No. 51.

Stress Reversal.—See Alternating Stress.

Universal.—See Paris Conservatoire.

TESTING TANK.

See **MODEL BASIN.**

TEXTILE FACTORY.

See also **SAFETY APPLIANCES; TEXTILE MACHINERY; WORKS; WORKS MANAGEMENT.**

Electric Driving.—See ELECTRIC DRIVING—Textile Mills; ELECTRIC PLANT—Cotton Mill.

Humidity.—See HUMIDITY—Textile.

Power Plant.—See ELECTRIC PLANT—Cotton Mill; POWER PLANT—Textile Mill.

Rope Driving.—See ROPE TRANSMISSION—Textile Plants.

Safety Appliances.—See SAFETY APPLIANCE.

TEXTILE MACHINERY.

See also **TEXTILE FACTORY.**

Düsseldorf Exposition.—Machinery for the Textile Industries (Die Arbeitsmaschinen für die Textilindustrie). G. Rohn. The first of a series of illustrated papers describing the textile machinery exhibited at Düsseldorf, 1902. Serial. Part I. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 30, 1902.

Hattersley Loom.—The New Automatic Hattersley Loom. Illustrates and describes a loom claiming to be perfectly automatic or self-feeding in regard to the weft yarn. Gives information concerning its operation. 1800 w. Sci Am Sup—Aug. 8, 1903.

Safety Appliances.—See SAFETY APPLIANCE—Textile Machinery.

Weaving.—Recent Inventions in Weaving Machinery. Prof. Roberts Beaumont. Discusses many recent improvements made in looms. Also discussion. 8000 w. Jour Soc of Arts—Feb. 28, 1902.

TEXTILE MILL.

See **TEXTILE FACTORY.**

THALLIUM CELL.

See **STORAGE BATTERY—Thallium.**

THAWING.

Telephone Laterals.—The Chicago Telephone Company's "Juice Wagon." An illustrated description of the method of thawing out frozen laterals connecting telephone lines and conduits. 2000 w. Elec Wld & Engr—Dec. 10, 1904.

Water Pipe.—Thawing Frozen Service Pipes by Electricity. An illustrated explanation of the use of electricity for this purpose. 2000 w. Met Work—March 12, 1904.

Experience in Thawing Water Pipes by Electricity. Reports from several places of success in using this method. 1200 w. Eng News—March 17, 1904.

Thawing Out Frozen Water Pipes Electrically. William Maver, Jr. Reviews plumbers' methods of thawing, and gives an illustrated description of the electrical method and related information of interest. 3000 w. Cassier's Mag—Nov., 1904.

Electrical Thawing of Water Pipes. From a report by George S. Haley for the Nat. Elec. Lgt. Assn. Describes the requisites and methods of procedure. 2800 w. Can Engr—March, 1905.

THEATRE.

See also **ELECTRIC EQUIPMENT; FIRE PROTECTION; FIREPROOF CONSTRUCTION; MECHANICAL PLANT; STEEL CONSTRUCTION.**

Buenos Aires.—The Rebuilding of a Theatre at Buenos Ayres (Reconstruction d'un Theatre à Buenos Ayres). An illustrated account of the manner in which a large theatre was wholly rebuilt without interrupting the daily performances. 1000 w. Génie Civil—May 13, 1905.

California University.—The Greek Amphitheatre at the University of California. C. W. Whitney. An illustrated description of the advantageous use of concrete for this work. 2800 w. Eng Rec—Dec. 31, 1904.

Electric Lighting.—See **ELECTRIC LIGHTING—Theatres.**

Fire, Chicago.—See **FIRE—Theatre.**

Fire Protection.—See **FIRE; FIRE PROTECTION.**

Fire Test, Vienna.—See **FIRE PROTECTION—Vienna Model Theatre.**

Hippodrome, N. Y.—The New York Hippodrome. Illustrated description of the largest building of its kind in the world, recently built in New York. Principally describes the mechanical features of the stage. The building seats 5,300. 1800 w. Sci Am—March 25, 1905.

See also **MECHANICAL PLANT; STEEL CONSTRUCTION.**

London Opera House.—Mechanical Engineering at the Royal Opera House, London. Illustrates and describes the stage mechanism and theatre engineering work. 2000 w. Mech Engr—June 7, 1902.

Majestic, Chicago.—See **FIREPROOF CONSTRUCTION—Majestic Building, Chicago.**

Majestic, N. Y.—See **BUILDING CONSTRUCTION—Pabst, N. Y.**

Mechanism.—See **Hippodrome; London Opera House; ELECTRIC EQUIPMENT; MECHANICAL PLANT.**

New Amsterdam, N. Y.—See **STEEL CONSTRUCTION.**

Safeguarding of Life.—See **FIRE PROTECTION—Theatre.**

Stage Mechanism.—See **Hippodrome; London Opera House.**

Vienna.—Modern Construction at the Court Theatre, Vienna. Edwin O. Sachs. Drawings and discussion of features of constructional iron-work. Serial. 1st part. 1700 w. Engng—Feb. 22, 1901.

THEODOLITE.

See **SURVEYING INSTRUMENT—Theodolite.**

THERMITE PROCESS.

See **ALUMINOTHERMY.**

THERMO-CHEMISTRY.

See **CHEMISTRY; ELECTRO-CHEMISTRY; PHYSICS; THERMO-ELECTRICITY.**

THERMODYNAMICS.

See also **ENTROPY; HEAT; MOTOR; STEAM; STEAM ENGINEERING.**

A New Theory of Heat Power Plants. Robert H. Smith. The first of a series of articles on the relation of heat to mechanics. Serial. 1st part. 3500 w. Engr, Lond—July 10, 1903.

Adiabatic.—Determination of Exponents of Adiabatics. Thomas M. Gardner. Showing that no simple relationship exists between the values of adiabatic exponents and specific, latent or total heats. 1100 w. Jour Fr Inst—March, 1905.

The Meaning of Adiabatic. Aims to show that three meanings are given to the word "adiabatic," and that this both confuses and misleads. 3000 w. Engr, Lond—Dec. 15, 1905.

Adiabatic Expansion.—Curves Representing Adiabatic Expansion of Steam. F. Foster. Uses the entropy diagram to determine the value for various initial conditions of pressure and dryness. 1200 w. Engr, Lond—April 10, 1903.

Diagram for Adiabatic Expansion of Steam. Sven S. Ekman. Describes a graphical method of calculating the velocity of steam, expanding adiabatically, etc. 2000 w. Power—Dec., 1903.

Conversion of Heat into Work by Adiabatic Expansion. A. M. Sevin. Gives table for finding the total energy obtained by expanding steam adiabatically, with explanation of its use. 2000 w. Power—Nov., 1905.

See also **STEAM.**

Alcohol Motor.—See **ALCOHOL MOTOR.**

Binary Vapor Engine.—See **BINARY ENGINE.**

Boiler.—The Work Done in a Boiler. Editorial discussing the boiler as an efficient converter of heat into work. 2400 w. Engr, Lond—May 24, 1901.

See also **BOILER; BOILER TEST.**

Combustion Chamber.—See **GAS ENGINE; GAS TURBINE.**

Electric Cells.—See **THERMO-ELECTRICITY—Constant Temperature.**

Entropy.—See **Rankine; ENTROPY.**

Explosion Pressures.—Investigations of the Pressures in Closed Vessels Due to the Explosion of Hydrogen and of Carbonic Oxide (Untersuchungen über die Drücke, welche bei Explosionen von Wasserstoff und Kohlenoxyd in Geschlossenen Gefässen Auftreten). Dr. Arnold Langen. An illustrated account of experiments on the thermodynamic phenomena with explosive mixtures of gases, such as are used in internal-combustion motors. Tables and diagrams. 4000 w. Zeitsch d Ver Deutscher Ing—May 2, 1903.

See also **Gaseous Mixtures; GAS; GAS ENGINE; GASOLINE.**

Fuel Utilization.—The Value of Combustibles for the Generation of Power (Die Auswertung der Brennstoffe als Energieträger). C. Linde. An important paper before the "Verein Deutscher Ingenieure" discussing the transformation of heat energy into mechanical work. 5000 w. Zeitschr d Ver Deutscher Ing—Oct. 17, 1903.

See also **CALORIFIC VALUE; FUEL; FUEL TEST.**

Gas Engine.—See **Explosion Pressures; Gaseous Mixtures; GAS ENGINE—Explosions.**

Gaseous Mixtures.—Heat Reactions of Gaseous Mixtures. Extracts from a paper by R. Forbes Carpenter and S. E. Linder, published in the "Journal of the Society of Chemical Industry." Deals with the heat reactions, theoretically considered, of different gaseous mixtures. 2800 w. Jour Gas Lgt—May 12, 1903.

See also **Explosion Pressures; GAS—Explosive Mixtures; GAS ENGINE—Explosions; GASOLINE—Explosive Mixtures.**

Graphics.—Elementary Graphics and Geometry of Thermodynamics. Robert H. Thurston. A graphical study of the principles of thermodynamics. Serial. 1st part. 4500 w. Jour Fr Inst—Jan., 1901.

Graphics of Thermodynamics: A Comparative Study. J. L. Bates and E. C. Welborn. The cycles of the Carnot, the Otto, the Brayton, the Ericsson and the Sterling have been computed, and under such assumptions that when plotted the resulting cycles would superimpose and give to the eye a suggestion of relative characteristics. 1200 w. Sib Jour of Engng—June, 1903.

See also **Heat Diagrams; GRAPHICS.**

Heat Diagrams.—New Diagrams for the Technical Applications of Heat (Neue Diagramme zur Technischen Wärmelehre). Dr. R. Mollier. Illustrating modifications of the temperature-entropy diagram, with practical applications. 2000 w. Zeitschr d Ver Deutscher Ing—Feb. 20, 1904.

Heat Economy.—See **STEAM ENGINE.**

Heat Engines.—See **MOTOR.**

Limitations.—See **PHYSICS—Biologists and Engineers.**

Rankine.—Rankine's Thermodynamic Function and Entropy. Quotes from Rankine's works concerning the thermodynamic function and its use, and sums the various views upon entropy. 1400 w. Engr, Lond—Feb. 27, 1903.

Refrigerating Machine.—See **REFRIGERATION—Thermodynamics.**

Reversibility.—See **ENTROPY—Swinburne.**

Second Law.—Second Law of Thermo-Dynamics. Jacob T. Wainwright. An attack upon the law. 2400 w. Ice & Refrig—Nov. 1, 1902.
See also Terrestrial Heat.

Steam.—See also STEAM; STEAM ENGINEERING.

Steam and Gas Flow.—See STEAM FLOW—Nozzle.

Steam Curves.—See Adiabatic Expansion; STEAM—Expansion.

Steam Energy.—See STEAM—Energy Conversion.

Steam-Engine Cycle.—Analysis of the Steam-Engine Cycle. R. H. Thurston. A study in thermodynamics. Discusses Rankine's formula. 1600 w. Sib Jour of Engng—April, 1902.

Steam Flow.—See STEAM FLOW.

Steam Pressures.—See STEAM—Regnault's Experiments.

Steam Turbine.—See STEAM TURBINE—Thermodynamics.

Steam Turbine Diagrams.—See STEAM TURBINE—Design.

Steam Velocity.—See Adiabatic Expansion; STEAM FLOW.

Sulphurous Anhydride.—See BINARY ENGINE—Sulphur Dioxide; SULPHUR DIOXIDE.

Superheated Steam.—See SUPERHEATED STEAM—Specific Heat; Total Heat.

Terrestrial Heat.—Energy from Terrestrial Heat. Jacob T. Wainwright. Discusses inaccuracies in "second law" of thermodynamics, and the means of converting heat of matter into available energy. 3300 w. Ice & Refrig—Oct., 1901.
See also HEAT—Earth's Interior; NATURE'S STORES; POWER—Natural Sources; TEMPERATURE—Subterranean.

Wet Steam.—See STEAM.

THERMO-ELECTRICITY.

See also ELECTRIC CELL; ELECTRICITY DIRECT; ELECTRO-CHEMISTRY; ELECTRO-PHYSICS; PYROMETRY.

Observations on Thermo-Electric Currents (Beobachtungen über Thermoelektrische Ströme). Albrecht Heil. An account of experiments with thermo-elements of various metals, with a discussion of possible improvements. 2500 w. Zeitschr f Elektrochemie—Jan. 29, 1903.

Thermo-Electric Researches (Ueber Thermoelektrische Versuche). Dr. C. Déguisne. A study of the production of electric currents in a single wire by a moving source of heat. 1200 w. Elektrotech Zeitschr—May 26, 1904.

Aluminum Alloys.—The Thermo-Electricity of Aluminum Alloys (Sur la Thermo-Electricité des Alliages d'Aluminium). Hector Pécheux. Data and results of tests upon alloys of aluminum with tin, lead, bismuth, magnesium, antimony and zinc. 700 w. Comptes Rendus—Dec. 26, 1904.

Battery.—A Novel Thermo-Electric Battery. Emile Guarini. Illustration, with brief description, of a battery called a "thermotor," made in Germany. 500 w. Sci Am Sup—May 6, 1905.

Constant Temperature.—Thermo-Electromotive Force Without Difference of Temperature. Abstract of a paper by Prof. Henry S. Carhart, read before the Am. Elec.-Chem. Soc. On the thermodynamical theory of galvanic cells. 2300 w. Elec Chem Ind—May, 1903.

Heat Equivalent.—The Mechanical Equivalent of Heat Measured by Electrical Means. Prof. Howard T. Barnes. Discusses the most probable value of the mechanical equivalent in terms of the generally accepted values of the electric unit. 4000 w. Int Elec Cong of St. Louis—Sept., 1904.

Nickel-Steel.—The Thermo-Electric Properties of Steel and Nickel-Steel (Sur la Thermo-Electricité des Aciers et des Ferro-Nickels). G. Belloc. A record of experiments with alloys with various percentages of nickel to determine the temperature of the neutral point and the electromotive force. 400 w. Comptes Rendus—Jan. 13, 1902.

See also NICKEL STEEL.

Oxide Formation.—Thermo-Electric Forces in a Heated Wire (Thermoelektrische Kräfte in einem Erwärmten Draht). F. Schneider. A review of the experiments of Egg-Sieberg, showing that the origin of the current in a heated wire is the formation of oxide. 1500 w. Elektrotech Zeitschr—March 24, 1904.

Pyrometer.—See PYROMETRY.

Stress Measurement.—See TESTING—Thermo-Electric Measurements.

Temperature-Voltage.—The Relation Between Temperature and Voltage in Thermo-Elements (Zusammenhang von Temperatur und Spannung bei Thermoelementen). Arthur Palme. Diagrams giving results of measurements upon couples of various materials. 1000 w. Zeitschr f Elektrotechnik—July 2, 1905.

Thermostat.—See ELECTRIC INSTRUMENT.

Tommasi.—See ELECTRICITY DIRECT.

THERMOMETER.

See also LOW TEMPERATURE; PYROMETRY; TEMPERATURE—Measurement.

Glass.—Thermometer Glass at Higher Temperatures. William McClellan. Describes the construction of thermometers where the boiling point of mercury is raised; and gives an account of the method of testing. 2800 w. Jour Fr Inst—July, 1901.

International Bureau, Paris.—See WEIGHTS AND MEASURES—Metric System.

formation of oxide. 1500 w. Elektrotech Zeit-

Vapor Pressure.—Thermometers, Pyrometers, and Thermo-Regulators Operated by the Pressure of Saturated Vapors. Illustrates and describes apparatus of various types for exact determination of temperature. 4000 w. Sci Am Sup—Dec. 16, 1905.

Whipple's Lecture.—See TEMPERATURE—Measurement.

THERMOSTAT.

See ELECTRIC INSTRUMENT—Thermostat; FIRE ALARM; FIRE PROTECTION.

THIRD RAIL.

See also ELECTRIC RAILWAY; ELEVATED RAILWAY; UNDERGROUND RAILWAY.

The Electric Third Rail. W. B. Potter. Illustrates and describes a third-rail protection which is simple and effective. It consists of a channel of iron or plank supported by brackets directly over and about 2 1-2 inches above the third rail. 1400 w. St Ry Jour—Aug. 2, 1902.

The Third-Rail System. L. E. Gould. Discusses details of the system. 3000 w. St Ry Rev—Aug. 20, 1903.

The Position and Protection of the Third Rail on Electric Railroads. William E. Langdan. Extracts from a paper read before the Engng. Con. of the Inst. of Civ. Engrs., London. Discusses the lack of uniformity in practice, and considers important points. 1500 w. R R Gaz—Aug. 21, 1903.

Collectors.—Collectors for Heavy Traction. George T. Hanchett. Calls attention to points in third rail and shoe construction, stating the requirements, and problems to be met. 3400 w. St Ry Jour—July 5, 1902.

Connections.—Third-Rail Connections. William A. Del Mar. Outlines a few general principles, the neglect of which has proved detrimental to several systems. 1200 w. Elec Wld & Engr—April 22, 1905.

See also RAIL BOND.

Contact.—Third-Rail Contact. George T. Hanchett. Discusses the troubles caused by sleet accumulations, and calls attention to some practical experiences which have reference to the commercial practicability of the third rail and contact shoe. Describes devices tried and offers suggestions. 200 w. Tram & Ry Wld—March 12, 1903.

Farnham Sectional.—A Protected Sectional Third-Rail System of Electric Traction. Illustrates and describes the Farnham system which not only protects the rail from contact, but distributes the current so that the section will be energised only while the car is passing. 2000 w. Eng News—March 31, 1904.

Inverted, Brooklyn Bridge.—Inverted Third-Rail Upon the Brooklyn Bridge. An illustrated description of an innovation in electric third-rail arrangement. 1300 w. St Ry Jour—July 30, 1904.

Laying Out.—Preliminary Work in Laying Out a Contact Rail System. William A. Del Mar. Deals with the practical problems with which a draughtsman has to contend when preparing to lay out a third-rail system on existing roads. 900 w. Am Elect'n—Feb., 1904.

Murray.—See **UNDERGROUND RAILWAY**—Baltimore.

N. Y. Central.—New York Central Under-Contact Third Rail. Brief illustrated description of the plan adopted, which has the rail protected by a sheathing which leaves only the under surface exposed. 700 w. Ry Age—Sept. 1, 1905.

New York Central Third Rail. Brief description with illustrations, of the under-contact type adopted. 700 w. Elec Wld & Engr—Sept. 2, 1905.

Under-Contact Third Rail for the New York Central. Illustrated description of current-carrying rail to be used in New York and vicinity. 600 w. St Ry Jour—Sept. 2, 1905.

Under-Running Third-Rail for the New York Central. Illustrated detailed description of the type of third-rail under trial with a view to using it in the zone around New York. 1800 w. R R Gaz—Vol. XXXIX., No. 9.

New York Elevated.—Contact Rails on Manhattan Elevated. Illustrated description of rails being installed in New York, in preparation for electrical operation. 800 w. St Ry Rev—Dec. 15, 1900.

Pick-Up Device.—Changes in the Baltimore and Ohio Locomotive Pick-Up Device. Illustrated description of an improved pick-up compressor installed on the cab. 1500 w. St Ry Jour—July 30, 1904.

Resistance.—See **ELECTRIC RESISTANCE**—Rails.

Sectional.—See Farnham; **ELECTRIC RAILWAY, CONTACT.**

Sleet Removal.—Removal of Sleet from a Third Rail. George T. Hanchett. Describes methods of dealing with this serious obstacle to traffic. 1200 w. St Ry Jour—Nov. 1, 1902.

The Sleet Break-Down of the Manhattan System. An article showing that the recent difficulties in running trains on the New York Elevated Ry. are not inherent in the third-rail system, and giving illustrations of pneumatic sleet cleaner and contact shoe and hanger. 800 w. Elec Wld & Engr—Dec. 20, 1902.

Melting Sleet on a Third Rail. W. A. Del Mar. Showing why a large amount of energy is required to heat the rail. 1200 w. Elec Wld & Engr—Nov. 21, 1903.

A Third-Rail Electric Heating System. William Greenow, Jr. Description of a method for keeping the third rail free from ice by heating it with an auxiliary electric wire placed under the rail head, but insulated from the rail. 1000 w. R R Gaz—Vol. XXXVII., No. 10.

Fighting Sleet on the Aurora, Elgin & Chicago Railway. An illustrated article explaining the method of using a solution of calcium chloride. 1100 w. St Ry Jour—Jan. 21, 1905.

See also **SNOW.**

Under Contact.—See Inverted; N. Y. Central.

THOMPSON.

Lewis Thompson and the Early Days of Gas Lighting. A review of the important work of this distinguished chemist. 5500 w. Jour Gas Lgt—Oct. 25, 1901.

THOMSON.

Elihu.—See **ELECTRIC INDUSTRY**—History.

Sir William.—See **KELVIN.**

THORIUM.

See also **INCANDESCENT GAS LIGHTING; METALS**—Rare; **MONAZITE; NERNST LAMP; RADIOACTIVITY.**

The Chemistry of Thorium. Summary of a paper by Dr. G. P. Drossbach, published in the "Zeitschrift für Angewandte Chemie." Methods of determining the value of the rare earths now so much used. 1200 w. Jour of Gas Lgt—April 1, 1902.

THREAD.

See also **PIPE THREAD; SCREW THREAD.**

Casting.—See **CASTING**—Threads.

Cutting.—See **MACHINE TOOL**—Thread Cutting; **SCREW CUTTING; SCREW MACHINE.**

Gauge.—See **GAUGE.**

THRUST BEARING.

Hydraulic.—See **DYNAMOMETER.**

THUNDERSTORM.

See **LIGHTNING.**

THURSTON.

Biographical Notice of Robert H. Thurston. William Kent. A memorial number devoted to the life and work of Dr. Thurston. Photograph. 25,000 w. Sib Jour of Engng—Nov., 1903.

TICKET MACHINE.

Automatic.—A Machine for Printing and Recording Tickets (Machine à Fabriquer et à Comptabiliser les Billets). MM. Leo & Dugit-Chesal. Illustrated account of an automatic railway ticket machine under trial by the Northern Railway of France. 7000 w. Rev Gen des Chem de Fer—June, 1904.

Street Railways.—See **STREET RAILWAY MANAGEMENT**—Fare Register.

TIDAL CORRECTIONS.

See **SHIP TRIALS**—Tidal Corrections.

TIDAL WAVE.

See **WAVE**—Tidal.

TIDE.

See also **HARBOR; OCEAN CURRENT; RIVER REGULATION; SHORE PROTECTION.**

St. John, N. B.—Large Ebb and Flow in Harbor. George H. Waring. An illustrated article explaining the advantage taken of the large ebb and flow of the tide in the harbor of St. John, N. B., Canada. 900 w. Marine Engng—Aug., 1903.

TIDE GATE.

See also **CANAL LOCK GATE.**

California.—Automatic Tide Gates for the Bolsa Chica Gun Club, California. Jas. D. Schuyler. Illustrates details of construction. 600 w. Eng News—Feb. 4, 1904.

TIDE GAUGE.

See **TIDE INDICATOR; WATER GAUGE.**

TIDE INDICATOR.

See also **WATER GAUGE.**

Electric.—An Electrical Tide Indicator. Grahame H. Powell. Illustrated description of a device for indicating tide levels in connection with artillery range finding. 600 w. Elec Wld & Engr—May 25, 1901.

Description of an Electrical Tide Indicator. L. Y. Schermerhorn. Illustrated description of an apparatus that has been in successful operation since Aug. 26, 1901. 1500 w. Pro Engrs' Club of Phila—Jan., 1902.

Pneumatic.—Tide Level Indicator with Pneumatic Transmission (Indicateurs de Hauteur d'Eau à Courant d'Air Continu). MM. Vidal & Kauffmann. The pencil of a recorder is moved by the varying degree of compression of air in a closed vessel according to the variations in head of water. 3000 w. Ann des Ponts et Chausséées—3 Trimestre, 1905.

U. S. Government.—Indicating and Recording the Tides. Day Allen Willey. Illustrates and describes the instruments used by the United States government for predicting, recording and indicating the fluctuations of the tide. 1700 w. Sci Am—April 12, 1902.

TIDE LEVELS.

Canada.—See **SURVEYING.**

TIDE POWER.

See also **WAVE MOTOR.**

Tide Mills. An account of some of these mills which successfully utilised the power of the tides, but have been superseded by later inventions or fallen into disuse. 1900 w. Engr, Lond—July 12, 1901.

Why Tidal Energy or the Force or Power of the Rising and Falling Tides Has Not Been, and Cannot Be, Economically Subservient to the Requirements of Man for Industrial Purposes. C. P. Baillairge. An examination of this subject, discussing the difficulties, and giving conclusions. 4500 w. Can Soc of Civ Engrs, Adv Proof—March, 1903.

Tidal Power Schemes. Gives a résumé of tidal schemes projected or actually carried into practice, with deductions. Serial. 1st part. 2000 w. Engr, Lond—Jan. 13, 1905.

Cephalonia "Sea Mills."—See **SEA MILL.**

TIDE PREDICTOR.

Lord Kelvin's Automatic Tide Predictor. An illustrated description of this machine which has recently come into the possession of the National Physical Laboratory of Great Britain. 3500 w. Sci Am Sup—Jan. 23, 1904.

TIE.

See CROSS TIE; RAILWAY PERMANENT WAY; TIMBER PRESERVATION; TRACK.

TILE.

See also BRICK; BUILDING MATERIAL; CERAMICS; FIREPROOF CONSTRUCTION; ROOF; TERRA COTTA.

Enameled.—The Architect's Use of Enameled Tiles. Halsey Ricardo. Considers their use on hygienic grounds, for saving or reflecting light, and for decoration. Also reviews the history of their use in early times, giving interesting information. Also discussion. 9000 w. Jour Soc of Arts—Jan. 24, 1902.

Mine Building.—See **MINE BUILDING—Tile vs. Brick.**

TILE WORKS.

Schernbeck, Germany.—See BRICK WORKS.

TIMBER.

See also BUILDING MATERIAL; FORESTRY; TIMBER PRESERVATION; WOOD; and under different kinds of wood.

Australia.—The Timber Resources of the Australian Commonwealth. Edward T. Scammell. Showing the claims of Australian timber to the favorable consideration of municipal, railway and marine engineers, architects, builders and cabinet and art-workers. Also discussion. 14,000 w. Jour Soc of Arts—May 2, 1902.

Australian Hardwood.—Australian Hardwoods (Ueber Australische Harthölzer). C. Froitzheim. Describing Karri and Jarrah, two varieties of Eucalyptus used for piles, cross ties, wood pavements, etc. 5000 w. Glaser's Annalen—Jan. 1, 1905.

Blue Gum, Tasmanian.—The Tasmanian Blue Gum—An Ideal Timber for Harbor Building. Harold J. Shepstone. It is one of the strongest, most durable and denses timbers in the world, and is immune from attacks of the sea-worm. 2800 w. Ills. Sci Am—Jan. 21, 1905.

Combustibility.—Combustibility of Timbers. G. Rodney Cherry. Describes tests made and gives valuable data and tables of comparison. 1500 w. Ins Engng—April, 1904.

See also FIREPROOF CONSTRUCTION; FIREPROOFING.

Concrete Adhesion.—See **PILE—Timber Concrete.**

Decay.—See TIMBER PRESERVATION.

Defects.—Some Common Defects in Timber and Their Causes. Harold Busbridge, in "Technics." The present article deals exclusively with those essential parts of a tree which are generally looked upon as blemishes by those who use the timber for structural purposes. Ills. 2800 w. Sci Am Sup—March 25, 1905.

See also Test.

Diseases.—See Fungi; TIMBER PRESERVATION.

Fungi.—Fungi, Merulius Lacrymans, and other Growths Injurious to Timber (Ueber Hausschwamm Merulius Lacrymans und andere Holzzerstörende Pilze). Dr. H. Zikes. A study of the diseases of timber as affecting its use for structural purposes, discussing various preservatives. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—March 6, 1903.

Fungous Diseases of Forest Trees. Herman von Schrenk. An explanation of how trees are infected, the rate of decay, treatment, remedies, etc. Ill. 6000 w. Bul Internat Ry Cong—Oct., 1903.

See also Protection.

Fungi, Mining.—Fungi in Mining Timber. Jules Elsner. An illustrated article, showing the growths that attack timber and discussing means of overcoming the trouble. 900 w. Ir & Coal Trds Rev—March 4, 1904.

Inferior.—The Use of Inferior Timbers for Structural Purposes. From a paper read before the Nat. Lumber Mfrs. Assn., at St. Louis, by Hermann von Schrenk. Concerning the strength and lasting powers of inferior timbers, and information related. 1200 w. Eng News—July 28, 1904.

Mines.—See Fungi, Mining; FORESTRY—English Black Country; TIMBERING.

Preservation.—See TIMBER PRESERVATION.

Protection.—Protecting Timber from Natural Enemies. George Ethelbert Walsh. On the destruction caused by insects and timber-destroying fungi. 2200 w. Archts & Builds Mag—Jan., 1902.

Railway Use.—I. The Use of Timber by Railroads and Its Relation to Forestry. Dr. Hermann von Schrenk. II. Railroad Interests in Forest Supplies. Prof. B. E. Fernow. Two papers on timber supply and preservation; followed by general discussion. Ill. 18,000 w. N Y R R Club—April 17, 1903.

See also CROSS TIE; TIMBER PRESERVATION.

Redwood, Cal.—The California Redwood in Modern Engineering. H. A. Crafts. An account of some of the uses to which the redwood is put in California. Ills. 1000 w. Sci Am—Dec. 3, 1904.

Roof.—See **ROOF—Timber, Long Span.**

Specifications.—A Criticism of Some Timber Specifications. Gives quotations from current specifications, with criticisms, and also quotations from rules of a lumber association, with remarks. 5000 w. Eng News—Feb. 23, 1905.

Strength.—The Strength of Timber. Discusses tests made and quotes from records of investigations by the U. S. A. Dept. of Agriculture. 2700 w. Builder—March 2, 1901.

Timber: Its Strength, and How to Test It. Prof. T. Hudson Beare. Abstract of a lecture delivered before the Dundee Inst. of Engrs. Gives tabulated report of tests made, with remarks on previous investigations, and the value of tests. 1000 w. Engng—Dec. 9, 1904.

The Strength of Structural Timber. A summary of the investigations being made by the U. S. Dept. of Agriculture, under the direction of W. K. Hatt, with editorial comment. 2800 w. Eng Rec—Dec. 24, 1904.

See also Tests; TIMBER PRESERVATION.

Teak.—See TEAK.

Temporary Structures.—See BUILDING CONSTRUCTION.

Tests.—Tests of the Relation Between Cross Bending and Direct Compressive Strength in Timber. Clarence A. Martin. An account of tests made at Cornell University, with tabulated results. 1500 w. R R Gaz—March 13, 1903.

Timber Tests. An informal discussion. 18,500 w. Pro Am Soc of Civ Engrs—Aug., 1903.

Tests of Structural Timber (Essais des Bois de Construction). J. Malette. A discussion of the common defects in timber, and the best methods of testing according to the conditions of usage. 3000 w. Revue Technique—April 25, 1905.

See also Strength.

U. S. Southern.—Southern Timber Resources. B. E. Fernow. Information concerning the supplies and suggestions for their managemnt. 2800 w. Mfrs Rec—Feb. 20, 1902.

TIMBERING.

See also COAL MINE; COAL MINING; MINE; MINE SHAFT; MINING; TUNNEL.

Some Defects in Timbering Underground. An illustrated article dealing with errors in propping. 1800 w. Ir & Coal Trds Rev—May 24, 1901.

Ore Delivery from Stopes. E. L. Lefevre. Considers the meritorious systems of timbering and mill hole construction in general use. 2500 w. Min & Sci Pr—April 23, 1904.

Anthracite.—Anthracite Timbering. Abstract of an article by a practical timberman of twenty-five years' experience. Ills. 2700 w. Mines & Min —April, 1905.

Austria.—See Saxony.

Bingham, Utah.—See Square Set; SILVER.

Bohemia.—Wooden Structures in Colliery Workings. A. Hübner, in "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Illustrates and describes those successfully employed in the fiery pits of Northern Bohemia. 1000 w. Col Guard—March 15, 1901.

Bohemia Railway Tunnels.—See VIADUCT—Bohemia.

British Columbia.—Methods of Mining and Timbering in Large Ore Bodies in British Columbia and Michigan. Norman W. Parlee. Describes and discusses methods and their modifications as carried out in mines where the writer has worked. Ills. 7500 w. Can Soc of Civ Engrs, Adv Proof—Feb. 25, 1904.

See also Phoenix; Square Set; GOLD MINE.

Coal Mines.—See also Anthracite; Europe; French; German; Saxony; COAL-MINING MACHINERY; COAL MINE; COAL MINING.

Colorado.—Methods of Renewing Old Timbering at the Dives-Pellican Mine, Silver Plume, Colorado. James F. McClelland. Illustrates and describes details of dangerous work, stating the conditions. 2800 w. Sch of Mines Qr—Nov., 1904.

Deep Mines.—Earth Pressures in Deep Mines. Considers that it is probable that at great depths pressures will be encountered that the timbering necessary to resist them will become an item of great expense. 2200 w. Col Guard—Jan. 2, 1903.

See also MINING.

Drift Mining.—Drift Timbering. W. H. Storms. Sketches illustrating some of the principles of drift timbering under the conditions usually encountered. Serial. 1st part. 1500 w. Min & Sci Pr—Oct. 10, 1903.

Europe.—Systematic Timbering in Continental Mines. The present article illustrates and describes methods used in the north of France and Belgium. Serial. 1st part. 2000 w. Col Guard—April 24, 1903.

French Coal Mines.—Methods of Preventing Falls of Roof Adopted at the Courrières Collieries. Report of a committee sent to investigate the special methods adopted in these French collieries which have resulted there in a remarkable diminution of the number of accidents. Ill. 9000 w. Col Guard—March 22, 1901.

Systematic Timbering in French Mines. Particulars from a report issued by a sub-committee of the Prussian Commission on the Falls of Rock and Coal in Mines, concerning the methods of working and timbering employed in French collieries. Ill. Serial. 1st part. 900 w. Col Guard—Nov. 28, 1902.

German Coal Mines.—Timbering in German Collieries. From the report of the Prussian Committee on Falls of Roof and Coal in Mines. Illustrates the manner of timbering, discussing the causes of falls, methods of working, etc. Serial. 1st part. 1700 w. Col Guard—October 24, 1902.

The Working of Seams and Faults in Coal Measures (Studien über das Auftreten von Schnitten und Schlechten in der Kohle). H. Fleck. A description of the methods of timbering employed in the Shamrock mine at Wanne in the Ruhr district. 2000 w. 4 plates. Glückauf—Jan. 3, 1903.

Systematic Timbering: Report of the Prussian Commission on Falls of Roof and Coal. Abstract from this report, dealing with general observations on timbering in the different countries visited. Ill. 2800 w. Col Guard—Aug. 28, 1903.

Idaho.—Timber and Timbering. J. H. Batcheller. Describes the methods in use at the Bunker Hill and Sullivan mines, in the Coeur d'Alene district, of Idaho. Serial. 1st part. Ills. 1700 w. Eng & Min Jour—Sept. 15, 1904.

Incline Workings.—The Most Rational Method of Timbering Inclined Workings (Welche Abbaumethode ist für Steile Gänge die Rationellste). Franz Mládek. A comparison between the advantages of vertical posts and inclined struts in timbering sloping mine workings. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 9, 1904.

Iron.—See also Steel.

Iron Bars.—The Employment of Iron Bars at the No. 6 Pit, Lens Colliery, France. E. Reumaux. Illustrates and describes the form of bars and method of using them to support the roof while working. 1000 w. Mines & Min—Nov., 1901.

Iron Pipe.—The Use of Iron Supports for Underground Workings (Ausbau von Abbaubetrieben mit Eisernen Stempeln). H. Middendorf. An examination of the use of iron pipe for supporting mine workings in place of the usual timbering. 2000 w. Glückauf—March 26, 1904.

Iron Rings.—Lining Galleries Exposed to Heavy Rock Pressure. Bergassessor Jacob, in "Glückauf." Illustrates and describes the method adopted in the Neumehl pit. The galleries were lined with closed U-iron rings. 600 w. Col Guard—Dec. 12, 1902.

Iron, Shaft.—Iron Shaft Fittings with Single Guides (Eiserner Schachtausbau mit Einseitiger Korbführung). F. Schulte. Showing an arrangement of structural iron work to replace the ordinary timbering used in mine shafts. 1800 w. Glückauf—Dec. 12, 1903.

See also MINE SHAFT.

Kennedy Mine, Cal.—Shaft Timbering at the Kennedy Mine. F. J. Girard. Illustrates and describes methods used in the deepest mine in California. 900 w. Min & Sci Pr—May 27, 1905.

Lake Superior Co.—Mine Timbering in Section 16 of the Lake Superior Mining Company, Michigan. C. G. Campbell. Describes the location of the mine, the method of mining the ore, the management, &c., outlining the conditions, and describing the applications of different methods. Ills. 3500 w. Can Soc of Civ Engrs, Adv Proof—Feb. 25, 1904.

Michigan.—See British Columbia; Lake Superior.

New South Wales.—See MINING—Wide Lodes.

Pacific Coast.—The Strength and Life of Mine Timbers. W. H. Storms. Abstract from Trans. Cal. Min. Assn. Notes applying to the Pacific Coast, where only Pacific Coast timbers are used, concerning the timbers best suited to meet the requirements. Serial. 1st part. 1800 w. Min & Sci Pr—April 15, 1905.

Phoenix, B. C.—Mine Timbering in the Old Ironsides and Knob Hill Mines. H. P. De Pencier. An illustrated description of extensive timbering at Phoenix, B. C., made necessary by the immense size of the ore bodies. 3500 w. Can Min Rev—July 31, 1902.

Mine Timbering in the Old Ironsides and Knob Hill Mines. H. P. De Pencier. Briefly describes these mines in British Columbia, which require an extensive system of timbering. Serial. 2 parts. 3700 w. Min & Sci Pr—Dec. 20 & 27, 1902.

Queensland.—Timbering at the Chillagoe Mines. T. J. Greenway. Illustrates and describes a method adopted in Queensland which permitted the use of local timber without the aid of a saw-mill. 500 w. Eng & Min Jour—March 16, 1905.

Rossland, B. C.—See Square Set.

Saxony and Austria.—Timbering in the Collieries of Saxony and Austria. Illustrates and describes methods as reported by the Prussian Commission on "Falls of Roofs in Mines." 1500 w. Ir & Coal Trds Rev—May 1, 1903.

Shaft.—See also Iron, Shaft; MINE SHAFT.

Shaft Sets.—The Framing of Rectangular Shaft Sets. Wilbur E. Sanders. Illustrates and describes the methods of framing almost universally accepted as affording the greatest possible strength. 2000 w. Eng & Min Jour—March 10, 1904.

Square Set.—Square Set Timbering. T. C. Renowden. Describes the timbering of the Ophir mine, U. S. A., and at Broken Hill, N. S. W. 1500 w. Aust Min Stand—June 19, 1902.

Mine Timbering by the Square Set System at Rossland, B. C. Bernard MacDonald. Describes the vein characteristics at Rossland, and the methods of construction used. Ill. 5400 w. Can Min Rev—Sept. 30, 1902.

Mine Timbering by the Square Set System at Rossland, B. C. A discussion of a previous article by Bernard MacDonald, by Ernest Woakes, at a meeting of the Canadian Mining Institute, and Mr. MacDonald's rejoinder. The conditions in a gold mine in Darien, Colombia, are described. 1800 w. Min & Sci Pr—Dec. 13, 1902.

Square-Set Practice at Bingham, Utah. Louis S. Cates. Illustrated description of timbering methods in copper mines with large bodies of low-grade ore. 2200 w. Eng & Min Jour—Aug. 25, 1904.

Steel.—Steel to Replace Timbering. R. V. Norris. Describes types of steel supports in use in the anthracite region, giving table of comparison with the strength of timber, of value in proportioning such supports. Ills. 900 w. Eng & Min Jour—July 14, 1904.

See also **Iron.**

Tapered Props and Bars.—Tapered Pit Props and Bars. W. Hutton Hepplewhite. Read at Derby meeting of the Inst. of Min. Engs. Illustrated description of patent tapered pit props and bars, with a statement of the advantages claimed for them. 700 w. Col Guard—Nov. 16, 1900.

Transvaal.—The Support of Excavations in the Witwatersrand Mines. T. Lane Carter. An account of the conditions of these mines, the prevailing practice, and cost of timbering. Ills. 1200 w. Eng & Min Jour—May 5, 1904.

See also **GOLD MINING.**

Ventilation.—Mine Timbering (Holzmauerungen in der Grube). A. Hübner. Discussing especially the construction of partitions for the control of ventilation and the isolation of gaseous workings. 1800 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—March 2, 1901.

See also **MINE VENTILATION.**

Wales.—Timbering and Arching in Mines. Idris Thomas. Read before the South Wales Inst. of Engrs. An illustrated description of the methods adopted in every-day labor in South Wales coal mines, where some of the finest examples of timbering may be found. 5500 w. Ir & Coal Trds Rev—July 21, 1905.

Wide Lodes.—See **MINING.**

Wilczek, Austria.—See **COAL MINING.**

TIMBER PRESERVATION.

See also **CROSS TIE; FIREPROOFING; TIMBER.**

Decay of Ties and Bridge Timber. Hermann von Schrenk. Presented at the Am. Ry. Engng. & Main. of Way Assn. Gives results of recent work, the methods hitherto adopted to prevent such decay, with recommendations as to what ought to be done in the future. 2500 w. Ry Age (Spec. No.)—March 15, 1901.

Factors Which Cause the Decay of Wood. Hermann von Schrenk. The subject is discussed under the heads of structure, chemical nature, decay, fungi, preventive measures. Ill. 5600 w. Jour Soc of Engrs—April, 1901.

Timber Preservation. Hermann von Schrenk. An informal general discussion mostly confined to the preservation of railway ties, the processes used and results, the kinds of wood, their decay and treatment. General discussion follows. Ill. 14,800 w. Pro W Ry Club—Dec. 16, 1902.

The Seasoning of Tie Timber. Hermann von Schrenk. From the Bureau of Forestry Bulletin, No. 41. On the treatment and processes of preservation, etc. 2800 w. R R Gaz—July 3, 1903.

Methods of Injecting Timber (Du Controle de l'Injection et de la Reception des Bois Injectés). M. Vinsonneau. An examination of the various antiseptic solutions and methods used for the preservation of timber. 2000 w. Revue Technique—Oct. 10, 1901.

Preservative Processes for Woodwork. H. C. Standage. Gives various processes covering almost every case of wood requiring preservatives from exceptional decaying influences. 4200 w. Builder —April 12, 1902.

Notes on the Treatment of Timber. S. W. Labrot. A brief review of the various methods, and the cost. 1500 w. Ry & Engng Rev—April 18, 1903.

Apparatus for and Methods of Treating Wood, to Protect It from Fire and Preserve It from Decay. Joseph L. Ferrell. Reviews the processes used for the protection from the attacks of flame and fungus. General discussion. 10,500 w. Pro Engrs Club of Phila—April, 1903.

The Preservation of Wood from Fire and Decay. Joseph L. Ferrell. Explains a method of impregnating and enameling wood, claiming very satisfactory results. General discussion. 2500 w. Jour W Soc of Engrs—Feb., 1904.

Preservation of Wood. Translated from "La Chronique Industrielle." Briefly describes a number of methods in use. 2700 w. Sci Am Sup—Aug. 8, 1903.

Timber Treatment and Timber Treating Plants. Walter W. Curtis. Reviews the history of timber preservation, the methods, with statement of comparative costs, and other information. General discussion follows. 10,700 w. Pro N Y R R Club—April 15, 1904.

The Preservative Treatment of Wood. Samuel P. Sadtler. Remarks on the structure and chemical composition of wood, with discussion of the methods of treatment to prevent decay, and the results. Ills. 5500 w. Tech Qr—June, 1904.

Alamogordo Lumber Co.—See **Wellhouse.**

Austrian Telegraph Poles.—The Behavior of Impregnated Wooden Poles of the Austrian Government Telegraph Department (Ueber das Verhalten Imprägnierter Holzsäulen im Gebiete der Staats-Telegraphen-Verwaltung). Robert Nowotny. An account of experience with telegraph and telephone poles treated with various preservatives. 2500 w. Oesterr Wochenschr f d Oeffent Baudienst —Nov. 30, 1901.

Ayer & Lord.—The Ayer & Lord Tie Co.'s Carbondale Preserving Plant. An illustrated detailed description of this Illinois plant, remarkable for its size, structures and arrangements for all the successful processes of preserving timber. 1600 w. R R Gaz—Sept. 11, 1903.

Chanute Paper.—The Preservation of Railway Ties in Europe. Discussion of paper by Octave Chanute. 6200 w. Pro Am Soc of Civ Engrs—Dec., 1900.

Chic., Burlington & Quincy R. R.—See **Sheridan.**

Creosoting.—The Inspection of Treatment for the Protection of Timber by the Injection of Creosote Oil. H. R. Stanford. Treats only of the quantity of oil which is injected, and is based on tests and observations made upon yellow pine treated for use in engineering structures in Pensacola Bay. 2500 w. Pro Am Soc of Civ Engrs—Nov., 1905.

Methods and Cost of Creosoting Timber. Oswald T. Dunn. Condensed from an article in "The Polytechnic." Describes methods in use. 1400 w. Eng News—April 27, 1905.

The Preservation of Timber with Antiseptics. E. H. Bowser. An explanation of the methods in use, especially the present method of creosoting as applied in the United States. 5000 w. Jour Assn of Engng Soc's—April, 1905.

See also **Cross Tie; French Western Ry.; West Pascagoula.**

Cross Tie.—Study of the Life of Cross-Ties. P. H. Dudley. Illustrated notes dealing principally with the record of 12 years' service of untreated yellow pine cross ties under the traffic of the New York Central & Hudson River Railroad. 5000 w. R R Gaz—Sept. 6, 1901.

The Life of Treated Ties. Samuel M. Rowe. Abstract from a pamphlet on "The Value of Treatment of Timber." 900 w. R R Gaz—Aug. 21, 1903.

Timber Treating Plants. W. W. Curtis. Refers to the methods of treatment now in use, especially for railroad ties, and their cost, giving illustrated description of plants. General discussion. 7500 w. Jour W Soc of Engrs—Oct., 1903.

Recent Investigations with Treated Ties. An article by Dr. Hermann von Schrenck, appended to the report of the Committee on Ties of the Am. Ry. Engng. & Main. of Way Assn. 1100 w. Eng Rec—March 26, 1904.

Report on the Question of Wooden Sleepers or Crossties (Subject I. B. for Discussion at the Seventh Session of the Railway Congress). F. J. E. Spring. A study of the causes of deterioration of wooden sleepers in tropical climates and of the method of preventing it. 23,800 w. Bul Int Ry Cong—Aug., 1904.

See also **Ayer & Lord; Europe; Great Northern; Sheridan, Wyo.; Southern Pacific; Texas; Zinc Treated Ties; CROSS TIE; TIMBER.**

Electric Line Poles.—Does It Pay To Creosote Wooden Poles for Electric Line Work? W. E. Moore. Read before the Nat. Elec. Lgt. Assn. Describes the treatment given the poles, giving the approximate cost, and the result. 1600 w. Elec Rev, N Y—May 31, 1902.

Europe.—Preservation of Sleepers in England and Continental Countries. P. H. Dudley. A brief account of handling and treating sleepers by the London & North Western at Willesdon Junction, near London; and the treatment on the Belgian railroads, with illustrations of woods after years of service. 3500 w. R R Gaz—March 8, 1901.

French Western Ry.—Creosoting Works of the Western Railway of France. Extracts from an article by J. M. Merklen, in "Revue Generale des Chemins de Fer," giving particulars of the plant at Surdon, France. 1200 w. Eng News—July 27, 1905.

Giussani Process.—See St. Louis Exposition.

Great Northern R. R.—The Timber Preserving Plant of the Great Northern. Illustrations and information concerning one of the largest preserving plants in the country, having a capacity of 4,000 ties a day. Located on Flat Head Lake, Montana. 1600 w. R R Gaz—May 30, 1902.

Hasselmann.—The Hasselmann Process for Timber Preservation (Die Timber Preservation des Imprägnierverfahrens Hasselmann auf Schwellen und Nutsholz). From "Tiefbau." A description of a process in which the preserving substances, generally metallic salts, are chemically united with the wood, which is also rendered fireproof. 1500 w. Glückauf—Feb. 1, 1902.

Mining.—See TIMBER—Fungi.

Pile.—Wood Preserving. James McKeon. Describes the destruction of piles by marine insects, and considers briefly some of the methods of preservation tried, especially the creosoting process. 2500 w. Pro Pacific C Ry Club—Dec., 1904.

See also PILE.

Rueping Process.—See St. Louis Exposition.

Rutgers.—The Preservation of Wood (Conservation des Bois). M. H. Besson. A review of the various processes which have been used for the preservation of timber from decay, with especial reference to the Rutgers process. 7500 w. Mem Soc Ing Civils de France—May, 1901.

St. Louis Exhibition.—Two New Timber Preservation Processes at the St. Louis Exhibition. Describes the Rueping process, and Giussani process. 1800 w. Eng News—Nov. 17, 1904.

Sheridan, Wyo.—The Operation of the Burlington Tie Treating Plant. F. J. Angier. Illustrated detailed description of the plant at Sheridan, Wyo. 2500 w. Ry Age—Sept. 4, 1903.

Shrinkage.—The Shrinkage and Warping of Timber. Harold Busbridge, in "Technics." Illustrates and describes the behavior of wood treated in different ways. 1000 w. Sci Am Sup—Oct. 1, 1904.

Southern Pacific Ry.—The Preservation of Ties on the Southern Pacific Ry. Particulars as to the preservative treatment and the renewals of treated ties. 2500 w. Eng News—Oct. 25, 1900.

Strength.—The Strength of Timber Treated with Preservatives. From Bul. U. S. Bureau of Forestry. Effect of steaming and different preservative chemicals and processes upon both green and seasoned lumber. 1400 w. St Ry Rev—April 15, 1905.

The Strength of Timber Treated with Preservatives. A statement of the results of tests carried out at the St. Louis Exposition by the Bureau of Forestry, U. S. Department of Agriculture. 1200 w. Eng News—Jan. 12, 1905.

Texas.—Timber Preservation Experiments in Texas. Abstract of a report on the condition of treated timbers laid in Texas, February, 1902. By Hermann von Schrenck. Published by the Bureau of Forestry. 4500 w. R R Gaz—Vol. XXXVIII, No. 7.

Experiments with Treated Cross-Ties in Texas. Notes from a report by Hermann von Schrenk, of the results of extensive tests made on railroad ties. 4500 w. Eng Rec—April 15, 1905.

United States.—The Present Condition of Timber Preserving in the United States. Reviews the art, giving a list of the plants now running, their situation and capacity and the processes used. 1800 w. R R Gaz—Aug. 8, 1902.

Wellhouse.—Timber Preserving Plant of the Alamogordo Lumber Co. Illustrated description of a plant intended particularly for treating ties and bridge timbers by the Wellhouse (zinc-tannin) process. 2500 w. Eng News—Oct. 30, 1902.

West Pascagoula.—The West Pascagoula Creosoting Works. Illustrated description of this important plant in Mississippi, for treating piles, wharf timbers, bridge timbers, cross ties, cutout and foundation timbers of all sizes, ship timbers, etc. 1800 w. Ry & Engng Rev—March 14, 1903.

Zinc-Treated Ties.—Rail Circuits and Zinc-Treated Ties. Extract from report of V. I. Smart, giving details of an interesting phenomenon caused by treating ties with zinc-chloride preservative. 600 w. R R Gaz—Vol. XXXVIII. No. 12.

TIME.

See CHRONOGRAPH; CHRONOMETER; CLOCK; LONGITUDE; NAVIGATION; TIME SERVICE; TIME SIGNAL.

TIME SERVICE.

U. S. Naval Observatory.—The Naval Observatory's New Year's Greeting to the World. George C. Maynard. An account of the great telegraphic achievement by which the ending of the year 1903 in Washington was signaled around the world. 1400 w. Elec Rev, N Y—Jan. 9, 1904.

TIME SIGNAL.

Simple Time Signal Apparatus. S. M. Kintner. Illustrated description of a simple design, installed at low cost to signal the beginning and end of lecture hours at the Western University of Pennsylvania. 1100 w. Am Elect'n—Aug., 1901.

Telephone.—See TELEPHONE—Time Signals.

TIMING APPARATUS.

See CHRONOGRAPH.

TIN.

See also LEAD; MINERAL REGION; MINING INDUSTRY; TIN METALLURGY; TIN PLATE; ZINC.

Sources of Tin Supply. Discusses the position of tin in the market, and the need of readjusting the balance. Reviews the principal supplies and conditions affecting the output. 1700 w. Engr, Lond—Jan. 4, 1901.

Some Notes Concerning Tin. John W. Gray. Concerning the location of tin deposits, methods of extraction, the distribution and production of the metal. 2000 w. Min & Sci Pr—March. 19, 1904.

Alaska.—An Occurence of Stream Tin in the York Region, Alaska. Alfred H. Brooks. From Mineral Resources of the U. S. Geol. Survey. A description of the deposit, which is of scientific rather than commercial interest. 1700 w. Min Rept—Feb. 13, 1902.

Tin Deposits of the York Region, Alaska. Edgar Rickard. Discusses the geology and economic conditions. 1000 w. Eng & Min Jour—Jan. 3, 1903.

Tin in the York Region, Alaska. Arthur J. Collier. Gives results of a trip made to investigate the resources of this region. One tin ledge was found and other minerals of value. Ill. 1500 w. Eng & Min Jour—Dec. 31, 1903.

Tin Deposits of the York Region, Alaska. A. J. Collier. Abstract from Bulletin 229, U. S. Geol. Survey, describing the tin district on the Seward Peninsula. Serial. Part I. 1000 w. Min & Sci Pro—Aug. 13, 1904.

Tin Deposits in Alaska. Advance abstract of the geological survey report, prepared by Arthur J. Collier, on developments in 1904. 2000 w. Ir Age—April 6, 1905.

Tin in Alaska. R. L. Beals. Describes the locality where the known deposits are found. Ills. 1100 w. Min & Sci Pr—Dec. 10, 1904.

See also America.

America.—Tin and Its Occurrence—Mineralogy and Metallurgy. Dr. J. Ohly. Describes the characteristics of this metal and its occurrence in the United States and Alaska in the present article. Serial. 1st part. 1200 w. Min Rept—Nov. 19, 1903.

Tin in the United States. F. Lynwood Garrison. Briefly reviews the localities where tin has been found and exploited, commenting on the recent discovery of tin in Alaska. 3000 w. Eng & Min Jour—Nov. 24, 1904.

Development of American Tin Deposits. Review of the industry by the United States Geological Survey. 1800 w. Ir Age—Dec. 8, 1904.

The Search for Tin. Gives a summary of places in the United States where tin ore is known to have been found, with a brief description of the mode of occcurrence and means for determining the mineral. 1500 w. Min Rept—June 22, 1905.

Assay.—See **ASSAYING—Tin.**

Australia.—Australian Tin and Tin Mining. John Plummer. Information concerning the location of these deposits, and the extent to which they have been worked. 900 w. Ir Age—Feb. 6, 1902.

See also **New South Wales; Queensland; Western Australia.**

Bolivia.—Notes on Tin Mining in Bolivia. J. B. Minchin. Information concerning the deposits and their mining, concentration, etc. 1400 w. Eng & Min Jour—Jan. 3, 1903.

California.—Tin in California. H. E. West. A brief description of the work at the San Jacinto tin mines in Southern California. 2000 w. Eng & Min Jour—May 4, 1905.

Carolina.—Tin Ore in North Carolina. Description, with illustrations and map of tin mines in North and South Carolina. 1000 w. Mining Wld—Aug. 20, 1904.

The Carolina Tin Belt. Information concerning the development and economic importance of the deposits. 1200 w. Ir Age—May 11, 1905.

Cornwall.—Red River Tin Stream, Cornwall. Edward Skewes. An illustrated article discussing the mode of operation of the these English tin mines, the loss of tin, etc. 2900 w. Eng & Min —Aug. 9, 1902.

See also **ORE TREATMENT—Tin-Wolfram-Copper; TIN METALLURGY.**

Electrolysis.—See **ELECTRO-CHEMISTRY — Tin; TIN METALLURGY.**

Greenbushes.—See **Western Australia.**

History.—Tin—History and Production. Charles Stevens. Reviews the history of this mineral, giving the sources of supply, the formation of the lodes, etc. Serial. 1st part. 2700 w. Aust Min Stand—Oct. 16, 1902.

Magnetic Separation.—See **MAGNETIC SEPARATION—Tin.**

Malaya.—Tin Supplies. Editorial on the supply in the Malay States, based on information given in the last annual report and claiming that there is no cause for anxiety concerning the future supply. 1300 w. Engng—Nov. 15, 1901.

The Mining in Malaya. Discusses the tin deposits in the Malay Peninsula, and the future outlook as a tin-producing region. Serial. 1st part. 1400 w. Serial. 1st part. Aust Min Stand—Dec. 26, 1901.

The Malay Tin Deposits. R. A. F. Penrose, Jr. Abstract of an article in the "Journal of Geology." Considers the geographical position and general geology of the tin regions, the location of the Kinta district, mode of occurrences, origin, and commercial features. Ill. 3000 w. Eng & Min Jour—June 20, 1903.

Alluvial and Lode Tin in Malaya. J. B. Scrivener. From the annual report of the Federated Malay States. Describes three mines of detrital tin associated with limestone, gives information of tin lodes, and briefly discusses the origin of the deposits. 2400 w. Min Jour—Sept. 9, 1905.

Mexico.—The Sain Alto Tin Deposits. J. Nelson Nevius. Information of the tin deposits in Mexico, with statistics of the Sain Alto bills of sale for the last three years. 700 w. Eng & Min Jour—June 30, 1903.

Tin Mining and Smelting at Santa Barbara, Guanajuato, Mexico. A. H. Bromly. Describes the unusual character of these deposits, the workings, etc., giving results. Ills. 2200 w. Am Inst of Min Engrs—July, 1905.

New South Wales.—Tin Mining in New South Wales. P. J. Thibault. A summary review covering the period from 1900 to 1904 inclusive. Serial. 1st part. 2000 w. Aust Min Stand—April 12, 1905.

1903.—Tin in 1903. Mainly a review of the New York and London markets. 2500 w. Eng & Min Jour—Jan. 7, 1904.

Plate Manufacture.—See **TIN PLATE.**

Queensland.—Crow's Nest Tin Deposits. Lionel C. Ball. Report on the geology and workings of deposits in Queensland. 3000 w. Queens Gov Min Jour—Oct. 15, 1903.

Notes on Tin, Copper and Silver Mining in the Stanthorpe District. Lionel C. Ball. An illustrated article, the present number deals with methods of tin mining. Serial. 1st part. 8800 w. Queens Gov Min Jour—July 15, 1904.

The Herberton Tin Field. Walter E. Cameron. Location and geology of the deposits, character of the mining, &c. Map. Serial. 1st part. 6500 w. Queens Gov Min Jour—May 14, 1904.

Queensland Tin Supply. Information concerning the output, which shows a marked increase. 1200 w. Aust Min Stand—June 2, 1904.

Queensland Beach Sands.—See **MINERAL REGION.**

South Dakota.—See **GOLD.**

Stream.—Hints to Aid the Identification of Stream Tin. Charles H. Walker. Suggestions aiding in recognizing cassiterite, the mineral from which metallic tin is principally produced. 1200 w. Min & Sci Pr—March 25, 1905.

See also **Alaska.**

Tasmania.—Mining in Eastern Tasmania. H. Grant. An account of the tin mining, the deposits and their development. 3500 w. Aust Min Stand—May 9, 1901.

Tin Mining in Tasmania. Describes the alluvial deposits at Mount Bischoff. 1800 w. Aust Min Stand—Aug. 15, 1901.

Notes on the Mount Bischoff Tin Mine, Tasmania. Sydney Fawns. Information concerning the location, geological features, deposits, method of mining, &c. 3000 w. Min Jour—Jan. 21, 1905.

The Mount Bischoff Tin Mine. Sydney Fawns. An account of this mine in Tasmania, 3500 ft. above sea level, the method of mining etc. 1400 w. Eng & Min Jour—March 9, 1905.

Tin Mining at St. Helens (T.). George A. Waller. Describes the deposits and the various workings. Serial. 3 parts. 4000 w. Aust Min Stand —Oct. 17, 24, 31, 1901.

The Briseis Tin Lead at Derby, Tasmania. Edgar Rickard. Describes this district, the deposits, the difficulties met in the recovery of the tin, methods adopted, etc. Map. 1800 w. Eng & Min Jour—Jan. 17, 1903.

The Pioneer Tin Mine (T.). Illustration, with description of the deposits of north-east Tasmania. Serial. 1st part. 3000 w. Aust Min Stand—Jan. 1, 1903.

Method of Removing Overburden at the New Brothers Home No. 1 Tin Mine, Tasmania. James B. Lewis. Illustrated description of these deposits and the method of removing the overburden and the stripping of the drift. 2500 w. Eng & Min Jour—May 30, 1903.

North-East Dundas (T.) Tin. Describes the deposits of this district and the work done in developing. 1300 w. Aust Min Stand—June 2, 1904.

Tin Mining in Tasmania. Hartwell Conder. Reviews briefly the past history, and describes present conditions. 1800 w. Min Jour—Sept. 30, 1905.

Transvaal.—Tin Discoveries in the Bushveld. Account, taken from the "African Review," of discoveries of rich veins of tin ore near Pretoria, Transvaal. 1000 w. Jour Soc of Arts—Aug. 5, 1904.

United States.—See **Alaska; America;** and **under names of States.**

Western Australia.—The Greenbushes Tinfields (W. A.) Describes a deposit in southwest Australia, and also the smelting works. 2000 w. Aust Min Stand—Dec. 20, 1900.

The Greenbushes Tinfield, W. A. C. A. Mulholland. Begins a description of an interesting field from a scientific point of view, from the variety of the deposits and the metallurgical problems to be solved. Serial. 1st part. 1200 w. Aust Min Stand—Jan. 29, 1903.

TIN ALLOY.

See **ALLOY; BRONZE.**

TINNING.

See **GALVANIZING.**

TIN METALLURGY.

See also **LEAD METALLURGY; METALLURGY; ORE TREATMENT; SMELTING; TIN; ZINC METALLURGY.**

Clippings.—See **Electric; Scrap.**

Cornwall.—Tin Concentration in Cornwall. C. M. Myrick. Illustrations, with outline of concentrating process used for the tin ores until a few years ago, when the more progressive mines introduced machinery. 1800 w. Min & Sci Pr—March 14, 1903.

See also ORE TREATMENT; TIN.

De-Tinning.—See ELECTRO-METALLURGY.

Electric.—The Recovery of Pure Tin from Waste Tin Cuttings by Electricity. F. Gelstharp. Describes a new process for the economical recovery by electricity. Ill. 2000 w. Elec Chem & Met—Dec., 1901.

The Electrical Recovery of Tin from Tin-Plate Wastes (Die Elektrochemische Entzinnung der Weisblechabfälle). Dr. H. Mennicke. Discussing the practicability of recovering the tin from tin-plate wastes by use of a solution of caustic soda and an electric current. Serial. Part 1. 2500 w. Zeitschr f Elektrochemie—May 22, 1902.

The Electric Separation and Refining of Tin by Means of Fluoric and Fluosilicic Acids (Elektrische Zinngewinnung und Zinnraffination mit Fluss und Kieselflusssäure). Hans Mennicke. Discussion of the Betts and other processes. Serial. Part I. 1500 w. Elektrochem Zeitschr—Sept., 1905.

Electrolytic Methods of Treating Tin Scrap. Gives details of all the processes which have attained industrial trial, with remarks upon costs. 3000 w. Engr, Lond—July 1, 1904.

See also Scrap; ELECTRO-CHEMISTRY; ELECTRO-METALLURGY.

Scrap.—Recovery of Tin From Tin-Plate Clippings. Jas. W. Worsey. Describes the process used by the writer, and the results. 1100 w. Min & Sci Pr—Sept. 21, 1901.

Tin Scrap Recovery Processes. John B. C. Kershaw. Gives details of all the processes which have attained industrial trial, with remarks upon operating cost and upon the future of the industry. Ills. 3000 w. Elec Rev, N Y—June 18, 1904.

See also Electric.

Sulphides.—Complex Tin Sulphides. An explanation of methods for their successful metallurgical treatment. 2600 w. Aust Min Stand—Aug. 29, 1901.

See also ORE TREATMENT.

Vanning.—Losses in Vanning Tin Ores. Richard Pearce. Describes experiments made with a view to determining approximately the accuracy of the ordinary process of vanning. 900 w. Eng & Min Jour—Jan. 21, 1904.

Western Australia.—See TIN.

TIN PLATE.

See also TIN.

An Interesting Year in Tin Plates and Sheets. B. E. V. Luty. A review of the past year, the technical progress, advances, relations with labor, &c. 5000 w. Ir Age—Jan. 7, 1904.

The Sheet and Tin Plate Industries. B. E. V. Luty. Discusses the demand and supply, the price movement, wage matters, &c. 4000 w. Ir Age—Jan. 5, 1905.

Donner.—See Monessen.

Laughlin Works.—The Manufacture of Tin Plate. An illustrated description of this industry as carried on at the Laughlin Works of the American Tin Plate Co., at Martin's Ferry, Ohio. Serial. 1st part. 1600 w. Sci Am—Oct. 4, 1902.

Manufacture.—The Manufacture of Tin-Plate. W. H. Tregoning. A review of this industry and the uses made of the tin plate, the raw materials, the manufacture, etc. 4000 w. Ir & Coal Trds Rev—June 20, 1902.

The Manufacture of Tin Plate. B. E. V. Luty. Read before Calvary Church Brotherhood, Pittsburg. A review of the processes used in this industry, describing the manufacture. 3600 w. Met Work—Feb. 14, 1903.

The Making of Tin Plate. Illustrates and describes the modern process of manufacture. 2500 w. Met Work—July 29, 1905.

Monessen System.—The Monessen System. From an article in "Tin and Terne," describing the Donner process of rolling black plate. 2500 w. Ir Age—Oct. 10, 1901.

1900.—Review of the Tin-Plate Industry in 1900. Charles Lancaster. An interesting review of the present position of the trade, and the effect of American competition on British trade, giving detailed information of cost, production, etc. 4000 w. Ir & Coal Trds Rev—Jan. 11, 1901.

Wales.—The Welsh Tin-Plate in 1900. Review of the year. 1900 w. Col Guard—Jan. 11, 1901.

TIRE.

See also AUTOMOBILE; CAR WHEEL; WHEEL.

All-Flanged Engine.—The Relation of All-Flanged Engine Tires to Track. H. Wilson. Considers the principles involved in the effects of all-flanged tires upon track, giving illustrations. 3200 w. Ry & Engng Rev—Nov. 2, 1901.

Automobile.—Automobile Tires. Frederick W. Barker. Abstract from a lecture delivered at the Automobile Club of America. A discussion of the qualities they should possess, the kinds best suited to heavy vehicles, etc. Serial. 1st part. 900 w. Horseless Age—May 1, 1901.

Automobile Tires. Pardon W. Tillinghast. Discusses the fabric of the tire and means for securing on the wheel. 1200 w. Horseless Age—June 26, 1901.

Tires. Charles E. Duryea. An account of tests to determine what tire rides easiest, propels easiest and is most durable. 1500 w. Horseless Age—June 26, 1901.

The Tire Question in Light and Heavy Vehicles. Albert L. Clough. Discusses the severe conditions imposed upon tires of heavy vehicles as compared with the light vehicle, and the need of a reliable, durable and moderately expensive tire. 800 w. Horseless Age—June 26, 1901.

Side Stresses and Braking Efforts on Tires. Albert L. Clough. An examination of stresses which might occur in the use of motor vehicles. 1000 w. Horseless Age—July 31, 1901.

Hints on the Use and Care of Tires. H. Wilton Bartlett. Discusses tire diameters, wheel sizes, oil, nipping patches, etc. 2500 w. Autocar—Jan. 18, 1902.

Tires for Heavy Vehicles. Arthur L. Stevens. Discusses the subject of a practical tire, presenting results of actual experience. 3000 w. Horseless Age—Feb. 5, 1902.

Tires and Automobile Design. F. A. Oatman. States the principal reasons for the unsatisfactory results obtained from tires, and expresses belief in the future of the solid rubber tire. 1900 w. Horseless Age—April 2, 1902.

Motor Car Tires. Discusses practical points in the manufacture of rubber tires and their repairs. 2400 w. Engr, Lond—July 25, 1902.

A Study of the Failure of Automobile Tires (Etude du Dérapage des Automobiles). J. Résal. An examination of the forces acting upon an automobile, with especial reference to the stresses tending to strip the pneumatic tires from the wheels. Two articles. 4000 w. Génie Civil—Oct. 17, 24, 1903..

Motor Car Tires and Springs. J. S. V. Bickford. Discusses the weaknesses of these parts, favoring solid tires, and double elliptical springs, suitably proportioned to the load. Ill. 2500 w. Engr, Lond—Feb. 26, 1904.

Tires and Springs. J. S. V. Bickford. Illustrated discussion of tires and springs for automobiles. 1400 w. Autocar—Aug. 13, 1904.

American Pneumatic Automobile Tires. Illustrates and describes types of tires in use, and the arrangements made to meet the severe conditions; the materials and methods of manufacture are also considered. 3000 w. Automobile—April 15, 1905.

See also Bands; Elastic; Manipulation; Michelin; Palmer; AUTOMOBILE—Wheels and Tires; WHEEL.

Automobile Trial.—Tires in the 1,000 Miles Trials. Gives details of their behavior, as furnished by the competitors. Ill. 1800 w. Autocar—Oct. 17, 1903.

See also AUTOMOBILE COMPETITION; AUTOMOBILE RACE.

Bands.—Non-Skidding Tires and Protective Bands for Use on the Wheels of Automobiles. Illustrates and describes types tried in the tests in France, giving points determined by the tests. 800 w. Sci Am—June 25, 1904.

Bands and Envelopes.—Anti-Skid and Puncture-Proof Bands and Envelopes for Pneumatic Tires. Illustrates and briefly describes some of the devices tested recently in France. 900 w. Sci Am Sup—April 2, 1904.

Bursting.—Remarkable Tire-Bursting Demonstration. An account of an interesting demonstration given by S. E. Edge at the Crystal Palace to show that bursting tires are not as disastrous as claimed. Ills. 700 w. Autocar—July 16, 1904.

Car Wheel.—See also **CAR WHEEL.**

Elastic.—Elastic Tires for Wheels (Bandages Elastiques pour Roues). Leo Dex. A general discussion of pneumatic and cushion tires, with reference to an improved form of cellular tire. 2000 w. Revue Technique—Dec. 25, 1900.

Report on Elastic Tires. M. Michelin. Presented at the International Automobile Congress. Reviews the history of tires, properties of elastic tires, experiments made, etc. 4800 w. Horseless Age—Jan. 2, 1901.

Fastening.—Methods of Fastening Tires to Car Wheels (Zur Radreifenbefestigung). Alois Schaffer. A study of the various methods of keying and securing tires to the wheels of railway vehicles, including the use of impact tools for upsetting the edge of the tire into the wheel rim. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—Sept. 13, 1902.

Helena Outfit.—The Helena Tire Outfit. Illustrates and describes a tire detaching and attaching outfit. 1000 w. Autocar—July 22, 1905.

Locomotive Wear.—Flat Spots that Develop in Driving Wheel Tires. I. F. Wallace. Reviews the history of driving wheel tires claiming that it is speed and counter balance combined that cause the trouble. 1500 w. Ry Mas Mech—Jan., 1902.

On the Wear of Tires of Locomotive Driving Wheels and on the Creeping of the Left Hand Rail of Tracks. O. Busse. An account of investigations made on the Danish State Railways. Diagrams. 3800 w. Bul Int Ry Cong—March, 1904.

See All-Flanged Engine; Steel, Germany.

Manipulation.—Tire Manipulation. Illustrated instructions referring to tires having thickened edges. 1700 w. Autocar—Sept. 20, 1902.

Tire Manipulation Illustrated. A series of illustrations showing the most approved methods of detaching and replacing a pneumatic tire. 500 w. Autocar—March 19, 1904.

Manufacture.—The Manufacture of Railway Tires and Axles (Die Fabrikation der Eisenbahnradreifen und Achsen). E. H. Steck. A detailed description of the methods of forging and rolling weldless tires and forging car axles, with especial reference to British practice. 4500 w. Stahl u Eisen—April 15, 1905.

Michelin Pneumatic.—The Michelin Pneumatic. Abstracts from articles by M. Michelin, published in the "Auto-Vélo," on the manufacture and care of pneumatic tires. Ill. 1200 w. Horseless Age—June 26, 1901.

Multiple.—Multiple Tires: A Query. Albert L. Clough. Describes a model of a "new and improved" wheel shown the writer, and discusses its possible advantages and disadvantages. 1000 w. Horseless Age—Dec. 11, 1901.

Palmer.—A New Motor Tire. An illustrated description of the new Palmer tire. 2000 w. Autocar—Nov. 14, 1903.

Pneumatic.—See **Automobile; Bursting; Elastic; Manipulation; Michelin; Puncture.**

Pump.—The Automatic Tire Pump—the "Pompeesi." Illustrated description of the apparatus and its operation. 800 w. Auto Journ—April 30, 1904.

Puncture Repairing.—Repairing a Puncture—A Modern Method. Illustrates and describes details in the process of effecting a vulcanized repair to an inner tube. Serial. 1st part. 1100 w. Auto Jour—Sept. 23, 1905.

Rubber.—See **Automobile; RUBBER.**

Steel, Germany.—Wear of Steel Tires in Germany. Reviews a recent summary of the report on the wear of steel tires on German railroads. 4400 w. R R Gaz—Sept. 12, 1902.

Valves.—See **TOOL—Tire Valves.**

Wear.—See **Locomotive Wear; Steel, Germany; CAR WHEEL.**

Wear and Turning.—Tire Wear and Tire Turning. F. W. Williams. Illustrates and describes styles of radius calipers for determining which tire has worn the shortest measurements from the center of the axle. Discussion. 3000 w. Pro Cent Ry Club—March 10, 1905.

Wide.—See **TRACTOGRAPH.**

TITANIUM.

See also **ELECTRO-METALLURGY—Iron and Steel; IRON ALLOY; METAL—Rare; STEEL ALLOY.**

Production of Titanium Ores. W. O. Snelling. Information concerning the deposits, their uses, methods of preparing titanium alloys, etc. 2800 w. Am Mfr—July 24, 1902.

Influence of Titanium on Pig Iron and Steel. P. Delville. Read before the Min. & Met. Cong. at Liége. Gives information concerning the smelting of titaniferous ores, and the little known of the effect of titanium on iron and steel. 1200 w. Mech Engr—Aug. 5, 1905.

Cast-Iron.—See **IRON ALLOY—Titanium.**

Electro-Metallurgy.—See **ELECTRO-METALLURGY—Iron and Steel.**

Iron.—See **IRON ALLOY—Titanium.**

Metallurgy.—The Metallurgy of Titanium. Auguste J. Rossi. A discussion of this class of iron ores, the objections against them, the experimental researches made, their value under proper treatment, results obtained, tests, etc. 7000 w. Jour Fr Inst—Oct., 1902.

The Metallurgy of Titanium. Auguste J. Rossi. On methods of treatment of these ores and the alloys formed with them. 7200 w. Trans Am Inst of Min Engrs—Feb. & May, 1902.

Steel.—See **STEEL ALLOY—Titanium.**

Styria.—The Titaniferous Charcoal Iron of Turrach in Upper Styria (Ueber Titanhaltiges Holzkohlen-Roheisen von Turrach in Obersteiermark). J. Hörhager. Giving analyses of the irons showing their availability for the production of ferro-titanium. 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 22, 1904.

TOGGLE JOINT.

Spring.—See **SPRING—Toggle Joint.**

TOOL.

See also **GAUGE; JIG; MACHINE SHOP; MACHINE TOOL; TOOL BOX; TOOL ROOM**; and under specific kinds of tools.

A Discussion of Various Boring, Reaming and Facing Tools. James Vose. Illustrates and describes tools and methods. 1200 w. Am Mach—April 4, 1901.

Various Tools and Fixtures. A. H. Cleaves. Brief illustrated descriptions of a jack block, adjustable gage, clamp parts, squaring block, rod-drilling jig, square for planer, &c., &c. 1600 w. Am Mach—Nov. 7, 1901.

Shop Tools and Rigs. James A. Murphy. Calls attention to the economy of having properly equipped shops, well designed tools, etc., giving illustrated description of useful tools. 1500 w. Jour Am Found Assn—June, 1902.

Tools and Gauges in the Modern Shop. H. F. L. Orcutt. Abstract of a paper read before the Inst. of Engrs. and Shipbuilders in Scotland. Considers important items to the successful introduction of improved equipment in shops. 5000 w. Mech Engr—April 25, 1903.

Shop Tools and Devices. F. J. Le Card. Illustrated sketches of tools and appliances useful for purposes stated. Serial. 1st part. 700 w. Am Mach—Vol. 28, No. 15.

Shop Tools and Devices. F. J. Le Card. Brief illustrated descriptions of devices for holding steady rest work on the live center, and other useful attachments. 1500 w. Am Mach—Vol. 28, No. 18.

Box.—Three Box Tools and Some Other Fixtures. A. H. Cleaves. Illustrated description of special box tools for turret lathe work, tools for countersinking rivets, a die holder and a graduating tool. 900 w. Am Mach—June 13, 1901.

See also **TOOL BOX.**

Cam Machining.—A Set of Tools for Machining a Cam. Joseph V. Woodworth. Illustrates and describes a set of tools for machining a repetition casting of unusual shape, which was used as a cam on an automatic machine for making fruit baskets. 700 w. Am Mach—March 20, 1902.

See also **CAM; MILLING MACHINE.**

Chest.—See **TOOL BOX.**

Chucking Fixture.—A Chucking Fixture. Charles R. Richardson. Illustrated description of a device found very useful. 1000 w. Am Mach—Vol 28, No. 20.

Cutting.—The Action of Cutting Tools. William Taylor. From a paper read before the British Assn. Defines true cutting action and the action of shearing and of abrasives. 1000 w. Am Mach—Nov. 27, 1902.

Cutting Tools for Planer and Lathe. W. J. Kaup. Abstract of a lecture delivered at Pratt Institute, Brooklyn. A discussion of important points in the use of these tools. Ill. 2500 w. Mach, N Y—Aug., 1903.

Cutting Angles.—See TOOL STEEL.

Dalton Combination.—A Useful Combination Tool for Motorists. Illustrates and describes the Dalton combination tool, showing the detachable parts separately and in different useful forms. 2000 w. Auto Jour—Aug. 8, 1903.

Diamond.—See Precious Stones; DIAMOND TOOL.

Dies.—See Taps and Dies; DIE.

Drill.—See DRILL—Manufacture; Portable.

Drives.—Comments on Drives for High-Speed Cutting Tools. C. E. Coolidge. Remarks on modern tools, giving calculation of cutting force on tool and speed of belt. 1700 w. Mach, N Y—June, 1904.

See also ELECTRIC DRIVING; MACHINE TOOL.

Forming.—Straight and Circular Forming Tools. Joseph M. Stabel. Illustrated description of the straight and circular forming tools used on screw machines. 2200 w. Mach, N Y—June, 1904.

See also DIE.

Grinding.—See GRINDING.

Hardening.—See HARDENING—Special Tools; Tools.

Interchangeable Manufacturing.—See GAUGE; INTERCHANGEABILITY—Tools.

Jig.—See JIG.

Keys.—See Milling Keys; KEYSEATING.

Manufacture.—Some Points of Experience in Making Twist Drills, Taps and Dies. Wolfra M. Fox. Illustrates and describes methods used by the author. 1500 w. Am Mach—July 4, 1901.

Tool Making. E. R. Markham. Considers the education of modern successful toolmakers, and discusses cutting speeds, reamers, etc., in the present number. Ill. Serial. 1st part. 4500 w. Mach, N Y—Dec., 1903.

See also Precious Stones.

Milling Keys.—Milling Keys. Illustrates and describes special tools constructed in such a way that by making a few changes the tool will answer for several sizes. 1400 w. Am Mach—May 7, 1903.

One-Handed.—See MACHINE TOOL—Fixture.

Piston Making.—See PISTON—Gas Engine.

Planer.—See PLANER—Special Tools.

Precious Stones.—Diamond Dust for Laps and Sapphires for Cutting Tools. Joseph M. Stabel. Information, with illustrations, of the use of those precious stones in the making of small tools of precision. 1500 w. Am Mach—May 26, 1904.

See also DIAMOND TOOL.

Pulleys.—Tools for Machining Pulleys. Joseph Vincent Woodworth. Detail sketches of tools and fixtures for use in the turret lathe. Ill. 1200 w. Mach, N Y—Nov., 1901.

See also PULLEY.

Punching.—See Sub-Die; PUNCHING.

Screw Cutting.—See Forming; SCREW CUTTING; SCREW MACHINE.

Square.—See SQUARE.

Standard.—Standard Taps, Reamers and Counterbores. Jos. M. Stabel. Gives tables for fluting taps, fluted reamers, counterbores with inserted pilots, with charts and explanatory notes. 600 w. Am Mach—March 3, 1904.

See also GAUGE; INTERCHANGEABILITY; STANDARDIZATION.

Steel.—See STEEL METALLURGY—Hardening; TOOL STEEL.

Straightedge.—See STRAIGHTEDGE.

Sub-Die.—The Making of a Sub-Die and Punch. F. B. Burnham. Describes a method which the writer has proved successful. 1200 w. Ir Trd Rev—Feb. 4, 1904.

See also DIE; PUNCHING.

Taps and Dies.—The Action of Taper Taps—Relieving Taps and Dies with Acid. Wolfra M. Fox. Suggestions from the experience of the writer. 1500 w. Am Mach—Aug. 6, 1903.

Tempering.—See STEEL METALLURGY.

Tire Valves.—Tools for Automobile Tire Valves. Joseph V. Woodworth. An illustrated description of the punches, dies and tools used in making the valves for pneumatic tires. 800 w. Am Mach—Oct. 10, 1901.

Track.—See TRACK—Tools.

Tube Manufacture.—See TUBE MANUFACTURE—Tools.

Turning.—See DRILL; LATHE.

Turret.—Turret Tools. Illustrated description of tools used for machinery gear blanks in the turret lathe. 1100 w. Mach, N Y—Jan., 1902.

See also Box; Pulleys; LATHE; MACHINE TOOL.

Wood.—See WOOD—Tool.

TOOL BOX.

See also MACHINE SHOP; TOOL ROOM.

The Tool Chest. A series of descriptive articles presenting the most approved modern hand tools and devices used by mechanics for purposes of drawing, measurement, adjustment, and getting accurate work. Ill. 900 w. Mod Mach—Jan., 1902.

Wall.—Wall Tool-Boxes. John Randol. An illustrated description of the Cowles' tool-box, showing its convenience. 2200 w. Am Mach—Aug. 6, 1903.

TOOL CAR.

See also ELECTRIC CAR—Line.

Brooklyn Elevated.—New Wrecking Tool Cars for Elevated Railway Service. Illustrated description of two new wrecking tool cars for the Brooklyn Rapid Transit. 2800 w. St Ry Jour—May 13, 1905.

TOOL ROOM.

See also MACHINE SHOP; RAILWAY SHOP; WORKS MANAGEMENT.

A Tool Room System. Describes a system in operation in one of the large works in the United States. 1800 w. Am Mach—Oct. 15, 1903.

The Modern Tool Room. Fred H. Hols, Jr. Read before the Cincinnati Metal Trds. Assn. Suggestions for facilitating work in this department. 1700 w. Ir Trd Rev—Dec. 17, 1903.

The Tool Room and Its Functions in Cost Reduction. John Ashford. An exhaustive study of the equipment and functions of the modern tool room of the well-arranged machine shop, with numerous illustrations of rooms and tools. Serial. Part I. 4500 w. Engineering Magazine—July, 1904.

The Tool Room and its Functions in Cost Reduction. John Ashford. Mr. Ashford's second paper treats of the standardising of small tools and the study of operations in which they are used. 4500 w. Engineering Magazine—August, 1904.

Systematisation and Tool-Room Practice in a Railway Repair Shop. R. Emerson. The first paper discusses the extent to which standardisation may be advantageously carried in a repair shop; together with the general organization of a tool management system. 3000 w. Engineering Magazine—Dec., 1904.

Care and Control of the Small-Tool Equipment in the Shop. R. Emerson. Discussing systems for the inspection, repair, and maintenance of small-tool kits, with forms from practical service for maintaining control of such supplies issued to workmen. 3500 w. Engineering Magazine—Feb., 1905.

The Tool Room and Stock Room. Oscar E. Perrigo. Describes and illustrates the complete arrangements from the time stock is wanted until it is accounted for; the design, arrangement, and accounting systems. 5000 w. Ir Trd Rev—July 6, 1905.

TOOL STEEL.

See also MACHINE TOOL—High Speed; SAW; STEEL METALLURGY; WORKS MANAGEMENT.

Tool Steel (Rundschau). A review of the Taylor-White tool steel, made at Bethlehem, Pa., and explanation of the way the cutting tool retains its sharpness, and a table comparing the operation of tools made of this steel with those of other steels. 1800 w. Zeitschr d Ver Deutscher Ing—March 30, 1901.

High-Speed Tool Steel (Schnelldrehstahl). A report of the Berlin section of the Verein Deutscher Ingenieure, upon the capabilities of special German steels for lathe tools; with numerous diagrams. 4000 w. Zeitschr d Ver Deutscher Ing—Sept. 28, 1901.

Comparative Use of American and English Tool Steels in the Machine Shops of the United States. A symposium of opinions of a number of firms called out by a statement made concerning the use of English steel in American shops. 5500 w. Ir Trd Rev—March 6, 1902.

New Tool Steels and Their Advantages. A review of special steels now made, with report of tests showing character, and information concerning their use. 6800 w. Ir & Coal Trds Rev—June 20, 1902.

The Recent Development of Tool Steel. Edmund L. French. Extract from a paper read before the Am. Assn. for the Adv. of Science. Discusses the advancement made in the production of "special steels." 1400 w. Eng News—Sept. 25, 1902.

High-Speed Tool Steels. William Lodge. Read at recent meeting of Cincinnati Machine Tool Mfrs. Gives suggestions for the use of high-speed steels on cast iron, and the general operation of these tools. 1400 w. Ir Trd Rev—May 21, 1903.

The Capabilities of High-Speed Steel. William Lodge. Read before the Cincinnati Metal Trds. Assn. Gives table showing results in actual practice, with remarks on use of this steel. 1800 w. Am Mach—June 11, 1903.

High-Speed Steels. William Lodge. Prepared for the convention of the Nat. Metal Trds. Assn. Deals with the methods and materials necessary to produce desired results. 2800 w. Ir Age—April 7, 1904.

The Use of High-Speed Steels. E. R. Markham. Suggestions in regard to the use of this material. 1500 w. Am Mach—April 7, 1904.

The New Tool Steel and Its Effect on Machine Shop Methods. Prof. C. I. King. Traces the development of tool steels, and the recent discovery which greatly increased the efficiency of the product, and results. 2500 w. Wis Engr—June, 1903.

Notes on High-Speed Tool Steels. Henry H. Suplee. Notes representing officially verified data of daily work. Ill. 1000 w. Inst Mech Engrs—July, 1903.

Rapid Tool Steels. Editorial on the recent improvements in tool steels, the tests made and what they show. 2700 w. Engng—Aug. 21, 1903.

High-Speed Tool Steels. Walter Brown. Practical suggestions for their treatment. 1500 w. Mach, N Y—June, 1904.

High-Speed Tool Steels. Walter Brown. Gives interesting experiences that were successful. 1500 w. Am Mach—June 2, 1904.

Profit in the Use of High-Speed Steel Tools. A discussion of this subject, illustrating by a typical example. 2000 w. Ir Age—Dec. 1, 1904.

The Use of High-Speed Steel. Remarks on methods of using, treating and grinding high-speed steel. 2000 w. Mach, N Y—April 1, 1905.

High-Speed Tool Steels (Les Aciers à Outils à Coupe Rapide). J. Garnier. A description of the shop methods of preparing and using high-speed steels, with some data as to results. 2500 w. Génie Civil—June 17, 1905.

High-Speed Tool Steels (Aciers Outils à Coupe Rapide). L. Guillet. A review of the development of high-speed steels, with chemical analyses, micro-photographs, and tables of results of tests. 5000 w. 1 plate. Mem Soc Ing Civ de France—June, 1905.

High-Speed Steel in the Factory. O. M. Becker and Walter Brown. The first of a series dealing with the problems included in the introduction of rapid-cutting steels, the whole forming a complete review of the subject. 8000 w. Engineering Magazine—Sept., 1905.

High-Speed Steel in the Factory. O. M. Becker and Walter Brown. The second article of this series discusses the controlling principles in introducing the new steel tools into the factory. 4000 w. Engineering Magazine—Oct., 1905.

High-Speed Steel in the Factory. O. M. Becker and Walter Brown. The third article gives working directions for making the tools, including hardening and tempering furnaces and details of manipulation. 8500 w. Engineering Magazine—Nov., 1905.

High-Speed Steel in the Factory. O. M. Becker. The fourth article deals with the design and operation of tools and machines for use with high-speed steel. 6000 w. Engineering Magazine—Dec., 1905.

Alloyed.—Alloyed Tool Steel. H. W. Rushmer. Read at meeting of the Railroad Master Blacksmiths' Assn. Discusses the properties of alloy tool steel, and the principles of working this material. 2300 w. Min Rept—Jan. 2, 1902.

Analysis.—See **STEEL ANALYSIS—Tool Steel.**

Bischoff.—See **Tests.**

Chips.—Is the Constitution of Chips from High-Speed Steel the Same as from the Older Cutting Tools? (Sind die Schnelldrehspäne ebenso Aufgebaut wie die mit den Alten Messern Genommenen?) Max Kurrein. With microphotographs and results of tests, showing the nature of the cuttings to be the same in both cases. 3500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Sept. 16, 1905.

Crucible Cast.—Treatment of Crucible Cast Tool Steel, with Chemical Composition of High-Speed Steel. Richard H. Probert. Read before the Ohio Soc. of Mech., Elec. & Steam Engrs. Serial. 1st part. 8200 w. Engr, U S A—June 15, 1904.

Cutting Angles.—Cutting Angles of Tools for Metal-Work as Affecting Speed and Feed. H. F. Donaldson. An account of experimental study to determine the best cutting angles for rapid cutting tool-steels. The experiments covered 14 different qualities of material. Ill. 4800 w. Inst of Mech Engrs—Jan. 16, 1903.

Efficiency.—High-Speed Tool Steel. An account of tests made to ascertain the increased efficiency obtained by the use of high-speed tool steel, and also the extra power required to drive the machines at the increased speed. 1500 w. Engng—Jan. 16, 1903.

Gledhill Paper.—High-Speed Tool Steel.—Its Manufacture and Use. J. M. Gledhill. Condensed paper, read before the Coventry Engng. Soc. Describes the method of manufacturing modern crucible steel, and considers the recent rapid progress and development of high-speed steel. 6600 w. Engr, Lond—March 11, 1904.

Manufacture and Use of High-Speed Tool Steel. J. M. Gledhill. Read before the Coventry Engng. Soc. Briefly notes the other systems of making steel, especially crucible steel, to make the recent results with high-speed tool steel better understood. Serial. 1st part. 3500 w. Mech Engr—March 19, 1904.

High Speed Tool Steel, Its Manufacture and Uses. J. M. Gledhill. Abstract of paper read before the Coventry Engng. Soc. Illustrates and describes the process of crucible cast steel, defining some of the substances used in its manufacture, and giving particulars of some of the alloys; also considers high-speed steel and its development. 5500 w. Ir & Coal Trds Rev—April 22, 1904.

The Development and Use of High-Speed Tool Steel. J. M. Gledhill. On the development and thermal treatment of high-speed steel, referring to its practical use and some of the most recent work done with it. Ills. 12,000 w. Iron & Steel Inst—Oct., 1904.

The Development and Use of High-Speed Tool Steel. A discussion of J. M. Gledhill's paper. 5500 w. Am Inst of Min Engrs—May, 1905.

The Practical Use and Economy of High-Speed Steel. J. M. Gledhill. Abstract of a paper read before the Glasgow & W. of Scotland Foremen Engrs. & Ironworkers Assn. Gives some comparative experiments with a view to ascertaining the saving in power absorbed with high-speed cutting. Illustrates some machines, and work accomplished. 2700 w. Ir & Coal Trds Rev—Nov. 17, 1905.

Heat Treatment.—Points of Heat Treatment of Tool Steel. C. P. Crowe in the "American Blacksmith." Gives suggestions and tables to serve as guides in hardening and tempering. 2000 w. Ir Trd Rev—May 8, 1902.

See also **Manufacture; STEEL; STEEL METALLURGY.**

Introduction.—The Introduction of High-Speed Steels in Engineering Work-Shops. Frank Fielden. Some suggestions for the success of these improved tools. 2500 w. Engng—March 4, 1904.

The Introduction of High-Speed Steel into a Factory. A. D. Wilt, Jr. Practical notes upon the difficulties encountered in the use of the new steels; including character of tools, methods of using, instruction of workmen, etc. 3000 w. Engineering Magazine—September, 1904.

The Introduction of High-Speed Steel Into a Factory. A. D. Wilt, Jr. Methods of determining the proper times, piece rates and costs due to the change from the old to the new tools. 2500 w. Engineering Magazine—Oct., 1904.

Machine Tools.—Metal Cutting with the New Tool Steels. Oberlin Smith. Discussing the influence of the introduction of high-speed tool steels upon machine tool design, involving the necessity of heavier construction and higher powering. 3000 w. Engineering Magazine—April, 1903.

Cutting Speeds and Feeds with the New Tool Steels. Oberlin Smith. A summary of practical experience with high-speed steels in the workshop showing their great advantages. 2500 w. Engineering Magazine—Jan., 1903.

Advanced Practice in Economical Metal Cutting. Charles Day. A discussion of the relation of the high-speed steels to the machine tools in which they are used, showing the necessity for a consideration of all the details of the subject. 5000 w. Engineering Magazine—July, 1904.

See also **MACHINE TOOL—High Speed.**

Manchester Experiments.—See **Tests.**

Manipulating.—The Practical Handling of High-Speed Steel. Gives general principles applicable to most of the rapid cutting steels. 1500 w. Ir Age—Oct. 6, 1904.

Manipulating Tool Steel, Including the High-Speed Varieties. R. A. Mould. Read before the International Master Blacksmiths' Assn. Deals with the quality, treatment, etc. 2000 w. Ry Mas Mech—Sept., 1905.

Manufacture.—The Taylor-White Process of Treating Tool Steel, and Its Influence on the Mechanic Arts. Charles Day. Briefly describes the process and gives an account of the work in the shops of the Link-Belt Engng. Co., Philadelphia. 5200 w. Jour Fr Inst—Sept., 1901.

The Taylor-White Process of Treating Tool-Steel. Report of the Committee on Science and the Arts on the invention of Maunsel White and Fred W. Taylor. 2500 w. Jour Fr Inst—Feb., 1903.

See also **Heat Treatment.**

Metallography.—See **Structure; METALLOGRAPHY—Tool Steel.**

Milling Cutters.—High-Speed Steel for Milling Cutters. Gives in detail results obtained with milling cutters of high-speed steel, with half-tone illustrations. 1200 w. Am Mach—Vol. 27, No. 35.

Nicolson Paper.—Rapid-Cutting Tool Steels. Dr. J. T. Nicolson. Report on experiments with rapid-cutting tool steels, made under the auspices of a Joint Committee. Ill. Serial. 1st part. 8000 w. Engng—Oct. 30, 1903.

High-Speed Tool Steels. Review of Dr. Nicolson's report of tests made on lathe tools. 3500 w. Engr, Lond—Oct. 30, 1903.

Rapid-Cutting Tool Steels. Report of the discussion on the paper read by Dr. J. T. Nicolson. 6500 w. Engng—Nov. 13, 1903.

Power.—See **Efficiency.**

Projectile Manufacture.—See **SHELL—Manufacture.**

Punching Holes.—See **PUNCHING—Tool Steel.**

Railway Shops.—High-Speed Steel in Railroad Shops. Henry W. Jacobs. Discusses the main points to be considered in the introduction of the new alloy steel tools if beneficial results are expected. Ills. 2000 w. Am Engr & R R Jour—Sept., 1904.

See also **RAILWAY SHOP.**

Saw.—See **SAW—Taylor-Newbold.**

Structure.—The Structure of High-Speed Steels. B. L. Rhead. Suggests a possible explanation of the behavior of rapid cutting steels. 800 w. Engr, Lond—April 3, 1903.

See also **IRON; METALLOGRAPHY; STEEL.**

Tests.—Notes on High Speed Steel (Einige Betrachtungen über Schnelldrehstahle). Giving tabulated results of tests of the Bischoff steel, at cutting speeds of 16 to 64 metres per minute. 1500 w. Ill. Zeitschr f Klein u Strassenbahnwesen—Dec. 16, 1902.

Comparative Trials of High Speed Steels. Gompei Kuwadi. Describes trials and gives results. 1200 w. Am Mach—Sept. 3, 1903.

Experiments with High-Speed Tool Steels. Report on experiments with rapid-cutting steel tools made at the Manchester (Eng.) Municipal School of Technology, under the auspices of a joint committee, to test the capabilities. Also editorial. Serial. 1st part. 6000 w. Mech Engr—Oct. 31, 1903.

American Tests of Rapid Cutting Tool Steels. A report of tests made by the Lodge & Shipley Machine Tool Co. of Cincinanti, O. 2400 w. Ir Age—Dec. 31, 1903.

Experiments with Rapid Cutting Steel Tools. Charles Day. Abstract report of a series of tests carried out in Manchester, Eng., giving results and calling attention to important points. Plate. 3000 w. Trans Inst of Engrs & Shipbuilders of Scotland—Feb. 23, 1904.

Notes on Tests of Rapid-Cutting Steel Tools. C. Pendlebury. On the tests made by a joint committee consisting of members of the sub-committee of the Manchester School of Technology. The trials were confined to lathe tools. 5000 w. Engr, Lond—April 1, 1904.

See also **Nicolson Paper.**

TOOL WORKS.

See **MACHINE TOOL WORKS.**

TOPOGRAPHY.

See **SURVEYING.**

TOPOPHONE.

See **FOG SIGNAL—Topophone.**

TORNADO.

See also **WIND PRESSURE.**

The Tornado of August 20, 1904, at St. Paul, Minn. C. A. P. Turner. Illustrates and describes the effect on buildings and bridges. 1800 w. Eng News—Sept. 1, 1904.

TORPEDO.

See also **COAST DEFENSE; NAVY; SUBMARINE MINE; TORPEDO BOAT; TORPEDO-BOAT DESTROYER; TORPEDO TUBE; TORPEDO WORKS.**

Attack and Defense of Coasts by Means of Torpedoes (Attaque et Défense des Côtes au Moyen des Torpilles). H. Noalhat. The first installment of a serial dealing with design and construction of automobile torpedoes. Serial. Part I. 3500 w. Revue Technique—Jan. 10, 1904.

The Torpedo in Warfare. Herbert C. Fyfe. An illustrated article giving the history of the "Whitehead" torpedo. 2200 w. Engng Times—March, 1904.

Torpedoes and Torpedo Warfare. Hudson Maxim. An account of the present state of the torpedo art, showing the advantage of greatly increasing the speed and range of the Whitehead torpedo. Ills. 4000 w. Rev of Revs—May, 1904.

Bliss-Leavitt.—The New Bliss-Leavitt Torpedo. S. D. V. Burr. Brief descriptions of the Howell torpedo, and the Russian torpedo, with illustrated detailed description of the Bliss-Leavitt torpedo. 2200 w. Ir Age—Dec. 14, 1905.

Discharging.—Discharging Torpedoes by Electricity. Describes the process of launching a torpedo, with diagrams. 1500 w. Elec Rev, Lond—Aug. 30, 1901.

Explosions.—The Effect of Torpedo Explosions. Interesting illustrations of a Japanese vessel torpedoed and left to sink, but finally saved, with brief notes. 400 w. Engng—Oct. 7, 1904.

Howell.—See **Bliss-Leavitt.**

Power Consumption.—Power Consumed in Propelling the Whitehead Torpedo at Various Speeds. Frank M. Leavitt. An account of tests made to ascertain the efficiency of the motive power, and the amount of power required to drive the torpedo at various speeds up to thirty-three knots per hour. Ill. 4400 w. Soc Nav Archts & Marine Engrs, No. 4—Nov., 1901.

Protection.—The Protection of Vessels against Torpedoes and Mines (Schutz der Schiffe gegen Torpedoes und Minen). Messrs. R. Blochmann and G. Neudeck. A study of torpedo warfare, and the improvements in modern warship construction designed to resist their attack. Three articles. 5000 w. Schiffbau—April 12, 26, May 10, 1905.

Russian.—See Bliss-Leavitt.

Space Telegraphy.—Steering Torpedoes by Wireless Telegraphy. An illustrated account of the work of an English electrician, Cecil Varicas, and successful experiments in steering submarine torpedoes. 1600 w. Sci Am—Feb. 16, 1901.

Whitehead.—The Modern Torpedo. Gustave Hubert. An illustrated detailed description of the Whitehead torpedo, with remarks on its value in warfare. 2700 w. Page's Mag—March, 1903.

See also **TORPEDO WORKS.**

TORPEDO BOAT.

See also **NAVY; STEAM TURBINE; STEAM YACHT; SUBMARINE BOAT; TORPEDO-BOAT DESTROYER; TORPEDO TUBE.**

I. The Holland Submarine Torpedo Boat Class. II. Torpedo Boats and Destroyers. Illustrated discussions with descriptions. 1700 w. Sci Am—Dec. 14, 1901.

American. — See **Performance at Sea**; and under names of torpedo boats.

"Bagley" and "Barney."—The Standardization and Contract Trials of the U. S. Torpedo Boats Bagley and Barney. Brief description with data of trials. 900 w. Marine Engng—Aug., 1901.

"Bagley," "Barney" and "Biddle."—U. S. Torpedo Boats, "Bagley," "Barney," and "Biddle." Charles P. Wetherbee. Illustrated detailed descriptions of these vessels, with report of trials. 2800 w. Jour Am Soc of Nav Engrs—Aug., 1901.

"Blakely."—Contract Trial of Torpedo Boat No. 27, the "Blakely." Description of vessel and its equipment, with report of trial. 4800 w. Jour Am Soc of Nav Engrs—Nov., 1904.

Care.—Care of Torpedo Boats in Reserve. G. C. Davison. Showing that attention and operation are essential for efficient maintenance. 6500 w. Jour Am Soc of Nav Engrs—Aug., 1903.

Construction.—Construction of Torpedo Boats and Destroyers. George Herbert Wilson. The first of a series of about twenty-five articles, containing subjects of interest to naval architects, shipbuilders, etc., and will apply to yachts and like craft as well as to the subject given. Ill. Serial. 1st part. 3000 w. Marine Rev—Feb. 14, 1901.

Some Points of Interest in Torpedo-Boat Construction. Harold E. Yarrow. Read before the Junior Inst. of Engrs., London. Briefly discusses the hull, riveting, vibration, lubrication, steam pipes, &c. 2500 w. Naut Gaz—Jan. 12, 1905.

"De Long."—Contract Trial of Torpedo Boat No. 28, the De Long. Lieut. Gustav Kaemmerling. Describes the vessel and its equipment and reports trials. 5000 w. Jour Am Soc of Nav Engrs—Aug., 1902.

Electric Plant.—See **ELECTRIC EQUIPMENT—Navy.**

French.—Torpedo Boat "No. 293" for the French Navy. Illustrated description of boat fitted with Parsons steam turbines. 1000 w. Engng—Aug. 5, 1904.

Gasoline.—See **Thornycroft.**

"Goldsborough."—Some Experiences with the U. S. Torpedo Boat "Goldsborough." H. G. Leopold. Gives an account of the conditions which caused shipbuilders a loss of over $2,000,000, and the failure of three firms, with facts and information of the trials made to secure the maximum speed guaranteed by the contractors. The causes of the failure of the machinery, with illustrations. 8400 w. Jour Am Soc of Nav Engrs—Aug., 1903.

Torpedo Boat No. 20, Goldsborough. G. H. Thayer. Detailed description, with report of official trial performance. 5000 w. Am Soc of Nav Engrs—Nov., 1905.

Launching.—See **LAUNCHING—Side.**

Nineteenth Century.—See **SUBMARINE BOAT—History.**

"Pangrang."—Oil Burning Torpedo-Boat. Illustrated description of the "Pangrang," one of three vessels recently built for the Dutch Government, the notable feature is that the boilers are fitted with a supplementary oil-burning apparatus. 1000 w. Engng—June 21, 1901.

Performance at Sea.—Some Notes on the Performance of the Torpedo Vessels of the United States Navy at Sea. Lieut. L. H. Chandler. Tables of information with explanatory notes. 2000 w. Trans Am Soc Nav Archts & Marine Engrs, No. 13—Nov., 1903.

Some Further Notes on the Performance of the Torpedo Vessels of the United States Navy at Sea. Lieut. L. H. Chandler. Tabulated information, illustrations and remarks of interest. 6000 w. Soc Nav Archts & Marine Engrs, No. 4—Nov., 1904.

Safety.—The Safety of Torpedo Boats at Sea and in Action Under Various Conditions. Lloyd Bankson. Describes briefly what may be expected to occur when these vessels are seriously injured or in danger in bad weather, and what chances they may have of keeping afloat. 8 plates. 1000 w. Trans Am Soc of Nav Archts & Marine Engs—Nov., 1900.

"Shubrick" and "Thornton."—Contract Trials of the Torpedo Boats "Shubrick" and "Thornton." H. Webster. Illustrated detailed descriptions of the boats and their equipments, with account of trials. 5000 w. Jour Am Soc of Nav Engrs—Aug., 1901.

Speed Trials.—See **SHIP RESISTANCE—Depth of Water**; and under names of torpedo boats.

Steam Turbine.—See **French; Yarrow; STEAM TURBINE; TORPEDO BOAT DESTROYER.**

Thornycroft. — Thornycroft 120-Horse-Power Gasoline-Propelled Torpedo Launch. Brief illustrated description. 600 w. Sci Am—Dec. 30, 1905.

"Tingey."—U. S. T. B. "Tingey." Rear-Admiral John D. Ford. General description with report of contract trial. 4500 w. Jour Am Soc of Nav Engrs—Feb., 1904.

Trials.—See **Performance at Sea; SHIP RESISTANCE—Depth of Water; TORPEDO-BOAT DESTROYER**; and under names of torpedo boats.

United States.—See **Performance at Sea**; and under names of torpedo boats.

"Wilkes."—The Contract-Speed Trial of the U. S. Torpedo Boat Wilkes. Lieut. Albert Moritz. Describes the boat and its equipment and reports the trial. 8000 w. Jour Am Soc of Nav Engrs—Aug., 1902.

Yarrow.—A Turbine-Driven Torpedo-Boat. Reports an unofficial trial of a boat built by Messrs. Yarrow & Co., describing the vessel and its equipment. 700 w. Engng—July 15, 1904.

TORPEDO-BOAT DESTROYER.

See also **NAVY; STEAM TURBINE; STEAM YACHT; TORPEDO BOAT; TORPEDO TUBE.**

The Development of the Torpedo-Boat Destroyer. W. J. Harding. Abstract of a paper read before the Inst. of Marine Engrs. An interesting review, with illustrations. 6900 w. Naut Gas—May 25, 1905.

American.—See under names of torpedo-boat destroyers.

"Bainbridge."—U. S. Torpedo-Boat Destroyers "Bainbridge," "Barry," and "Chauncey." Jas. Nelson Alexander. An illustrated detailed description of these vessels and their equipment, with report of trials. 8300 w. Jour Am Soc of Nav Engrs—Nov., 1902.

Trials of the United States Torpedo-Boat Destroyers "Bainbridge," "Barry" and "Chauncey." Tabulated results and conditions of the trials which were successfully passed, with illustrations and remarks. 1000 w. Marine Engng—Nov., 1902.

"Barry."—See **"Bainbridge."**

British.—Torpedo-Boat Destroyers. Editorial review of a recently issued Parliamentary paper giving information of the various torpedo-boat destroyers which have been built for the British Admiralty. 1600 w. Engng—Nov. 29, 1901.

Torpedo-Boat Destroyers. S. W. Barnaby. Read before the Inst. of Naval Archts. A discussion of this type of vessel as used in the British Navy, as to seaworthiness, strength, &c. 8400 w. Engng—March 21, 1902.

Destroyers. Editorial discussion of the new torpedo-boat destroyers for the British government. 4000 w. Engng—July 8, 1904.

"Bullfinch" Accident. — The "Bullfinch" Disaster. Some interesting information as to the cause of the accident which occurred on the torpedo-destroyer "Bullfinch," brought out in a recent court decision. 3800 w. Engr, Lond—Nov. 7, 1902.

The Accident on H. M. S. "Bullfinch." Summary of evidence given at the inquiry into the breakdown of machinery on the "Bullfinch" taken from the judgment of Mr. Justice Kennedy. 6000 w. Engng—Nov. 21, 1902.

The Accident on H. M. S. "Bullfinch." Gives the evidence relating to the dimensions of the jaw of the connecting-rod which fractured and caused the disaster, and the magnitude of the forces producing the stress under which the fracture took place. Ills. 2500 w. Engng—Feb. 5, 1904.

"Chauncey."—See "Bainbridge."

"Cobra" Disaster.—The "Cobra" Disaster. Discusses this disaster which occurred on Sept. 17, and caused loss of life, and also discusses the construction of this class of vessels and their requirements. 1800 w. Prac Engr—Oct. 11, 1901.

The "Cobra" Disaster. Editorial discussion of the verdict of the court-martial, and of this class of vessels. 3700 w. Engng—Oct. 18, 1901.

The "Cobra" Disaster. Reviews the circumstances of the disaster and the judgment of the court-martial. 3500 w. Engr, Lond—Oct. 25, 1901.

The Loss of the British Torpedo Boat Destroyer "Cobra" (La Perte du Contre-Torpilleur Anglais "Cobra"). S. Gradier. A description of this steam-turbine vessel and her loss with a review of the court of inquiry proceedings. 2000 w. Génie Civil—Dec. 28, 1901.

Construction.—See TORPEDO BOAT.

"Decatur."—Contract Trial of the Torpedo-Boat Destroyer "Decatur." H. Webster. Illustrated detailed description of the vessel and its equipment, with report of trial. 2000 w. Jour Am Soc of Naval Engrs—Feb., 1902.

"Hopkins" and "Hull."—Description and Trials of the U. S. Torpedo-Boat Destroyers "Hopkins" and "Hull." Illustration, description and account of trials. 15,600 w. Jour Am Soc of Nav Engrs—Aug., 1903.

"Hussar."—The Destroyer "Hussar." Description of this destroyer built for the Austro-Hungarian Government, with comparison with destroyers built for the Japanese Government. Ills. 1100 w. Engng—June 23, 1905.

"Lawrence" and "MacDonough."—United States Torpedo Boat Destroyers "Lawrence" and "MacDonough." Plans and description of these boats now under construction. 1600 w. Marine Engng—May, 1901.

Contract Trial of the United States Torpedo-Boat Destroyers "Lawrence" and "MacDonough." Walter Ball. Illustration and description of the vessels, with report of trial. 4800 w. Jour Am Soc of Nav Engrs—Aug., 1903.

Machinery.—The Propelling Machinery of a Torpedo-Boat Destroyer. William David Seton Brown. Read at a meeting of the Newcastle Assn. of Students of the Inst. of Civ. Engs. Discusses the machinery of this class of vessels and the improvements needed. Serial. 1st part. 2500 w. Prac Engr—Dec. 28, 1900.

"Magne."—The Swedish Torpedo-Boat Destroyer "Magne." Illustration, with brief notes comparing with an earlier vessel for the Swedish government. 350 w. Engng—Sept. 29, 1905.

"Mode."—The Swedish Torpedo Boat Destroyer "Mode." Illustrated description of a fine boat, recently completed, with report of the official trial. 800 w. Engng—Sept. 19, 1902.

"Paul Jones."—A Destroyer in Service. Lieut. G. C. Davison. A report of service data for the "Paul Jones." 1800 w. Jour Am Soc of Nav Engrs—May, 1905.

"Paul Jones," "Perry" and "Preble."—Contract Trials of Torpedo Boat Destroyers "Paul Jones," "Perry" and "Preble." Leo Morgan. Illustrations, with description of the boats and their equipment, and report of trials. 8000 w. Jour Am Soc of Nav Engrs—Aug., 1902.

Performance at Sea.—See TORPEDO BOAT.

"Salmon."—The Repair of the Torpedo-Boat Destroyer "Salmon." Illustrated description of interesting reconstruction of a vessel almost cut in two transversely by a collision. 2500 w. Engng—March 21, 1902.

Speed.—See SHIP RESISTANCE—Depth of Water.

"Stewart."—The Contract Speed Trial of U. S. Torpedo Boat Destroyer "Stewart." Albert Moritz. Illustration, description, and report of trial. 3500 w. Jour Am Soc of Nav Engrs—Feb., 1903.

Trials.—Some Notes and Recollections of Destroyer Trials. Illustrates a number of these vessels, and gives an account of the preparation for the trials, the work of the men during the trial, &c. 2800 w. Marine Rev—May 11, 1905.

See also SHIP RESISTANCE—Depth of Water; TORPEDO BOAT; and under names of torpedo-boat destroyers.

"Truxtun," "Whipple" and "Worden."—Largest Torpedo Boats of Any Navy. Brief illustrated description of the torpedo boat destroyers "Truxtun," "Whipple," and "Worden" of the U. S. government. 600 w. Marine Rev—Sept. 26, 1901.

U. S. Torpedo-Boat Destroyers "Truxtun," "Whipple" and "Worden." An illustrated description of one of these three identical boats, the armament, and report of trials. 1400 w. Marine Engng—Oct., 1902.

Description and Trials of the U. S. Destroyers "Truxtun," "Whipple" and "Worden." John D. Ford. Illustrates the engine and gives detailed description and report of trials. 5600 w. Jour Am Soc of Nav Engrs—Nov., 1902.

U. S. Torpedo Boat Destroyers "Truxtun," "Whipple" and "Worden." H. A. Magoun. A short description of certain features of these vessels which have successfully completed their final acceptance trials, with illustrations and general plans. Plates. 2000 w. Jour Am Soc of Nav Engrs—May, 1903.

"Viper."—See STEAM TURBINE.

"Welland."—H. M. Torpedo-Boat Destroyer "Welland." Illustration, with brief description and report of official trials. 900 w. Engng—July 8, 1904.

"Whipple."—See "Truxtun."

"Worden."—See "Truxtun."

TORPEDO TUBE.

See also TORPEDO; TORPEDO BOAT; TORPEDO-BOAT DESTROYER.

"Maine" Type.—The Submarine Torpedo Tube. Illustrates and describes a torpedo-tube of the type used on the battleship "Maine," the room below the protective deck, and the operation of firing. 1200 w. Sci Am—July 9, 1904.

TORPEDO WORKS.

Whitehead, Fiume.—The Whitehead Torpedo Works at Fiume. Gives the history of the evolution of the Whitehead torpedo, with illustrated description of the propelling mechanism and other essentials, and of the works. 3500 w. Engng—Sept. 20, 1901.

TORSION.

See DYNAMOMETER; MATERIALS' STRENGTH; SHAFT; TESTING; TORSION METER.

TORSION METER.

See also DYNAMOMETER—Torsion Meter.

Denny and Johnson's Torsion Meter. Illustrated detailed description of instruments by use of which the torsion of revolving shafts may be ascertained, enabling the H. P. transmitted to be accurately calculated. 2500 w. Engng—April 7, 1905.

An English Torsion Meter. O. Smith. Illustrates and describes an instrument for finding the torsion of revolving shafts, and thus ascertaining the horsepower developed. 1400 w. Engr, U S A—Nov. 1, 1905.

TOWBOAT.

See also STEAMBOAT.

Towing and Towboats. Theodore Lucas. Illustrated description of modern towboats and arrangements for towing transportation. 1800 w. Naut Gaz—April 4, 1901.

American.—Tugboats and Towing in the United States. Illustrates types of boats used on harbors, lakes and rivers, and reviews the history of this industry. 1800 w. Naut Gaz—Oct. 6, 1904.

Modern American Tugboats. Illustrates and describes three fine steel tugboats recently built at Staten Island, N. Y. 1000 w. Naut Gaz—April, 20, 1905.

Barge.—Evolution of the Tow Barge. John R. Spears. Reviews the history of the use of the tug and the tow barge, and the future outlook for such transportation. 2000 w. Sci Am—Oct. 14, 1905.

Canal Haulage.—See CANAL HAULAGE.

Coal.—See River Fleet; "Vesta;" COAL TRANSPORTATION.

"Conestoga."—Ocean-Going Steam Tug "Conestoga." Illustrated description of a new tug for the Philadelphia and Reading Railroad Company. 400 w. Marine Engng—Aug., 1904.

"Cornell."—New Steel Tug "Cornell." Description and illustration of a Hudson River towing steamer built by the Townsend-Downey Shipbuilding Co. 700 w. Naut Gaz—Aug. 18, 1904.

"Cuba."—Ocean Tugboat. Description of the "Cuba," now under construction at the shipyard of the Bath Iron Works. 1200 w. Naut Gaz—Feb. 7, 1901.

"Dauntless."—See LIQUID FUEL—Tug "Dauntless."

Isle of Wight.—Twin-Screw Tug for the Isle of Wight Steam-Packet Company. Illustrated description of a tug which can also be used for salvage purposes and for extinguishing fires. 800 w. Engng—Jan. 1, 1904.

"John G. Chandler."—New Boston Tugboat. Illustrates and describes the "John G. Chandler," fitted with machinery of the most modern design and construction. 500 w. Marine Engng—Aug., 1902.

Kings Lynn.—See STEAMBOAT.

Liquid Fuel.—See "Sea Rover;" LIQUID FUEL—Tug "Dauntless."

Ocean Going.—Economic and Earning Possibilities of the Ocean-Going Tugboat. Discusses briefly the development and improvements in towboats, and the probability of their being used more extensively for coast service. 1800 w. Naut Gaz—Oct. 6, 1904.

See also "Conestoga;" "Cuba;" Isle of Wight; "Sea Rover;" BARGE.

Oil Burning.—See "Sea Rover;" LIQUID FUEL—Tug "Dauntless."

River Fleet.—Towboats on Western Rivers. Illustrates and describes the towboats used on the Ohio and Mississippi rivers to transport coal. 900 w. Marine Engng—Aug., 1903.

See also "Sprague;" "Vesta;" COAL TRANSPORTATION.

"Sars."—See SALVAGE—"Sars."

Saskatchewan River.—Shallow-Draft, Twin-Screw Tugboat for the Northwest. Illustrated description of a boat intended for use in towing logs on the Saskatchewan River. 400 w. Marine Engng—June, 1904.

"Sea Rover."—Fuel-Oil Tugboat "Sea Rover." Illustrated description of this ocean-going steel tug, which was originally planned as a coal burner, but altered for using fuel oil. 1500 w. Marine Engng—Jan., 1903.

"Sprague."—Steel Towboat "Sprague." Illustration with description of the largest towboat ever built for the Mississippi river. To be used in taking the immense fleets of coal barges down the river. 3800 w. Marine Engng—Sept., 1903.

Twin Screw.—Design for Twin-Screw Towboats. Drawings and description of a light-draught steel towboat for use on western rivers. 1000 w. Marine Rev—March 10, 1904.

See also Saskatchewan River.

"Vesta."—Steel Towboat "Vesta" for the Monongahela River. Illustrated description of a boat to be used mainly in towing coal from the mines to the mills and furnaces. 3000 w. Marine Engng—Sept., 1902.

TOWER.

See ARCHITECTURE; BUILDING CONSTRUCTION; CATHEDRAL; CHURCH; DOME; WATER TOWER.

TOWING.

See also TOWBOAT.

Detroit River.—Old-Time Towing on the Detroit River. George Lansing. An illustrated article giving a review of past conditions on the St. Clair and Detroit Rivers. 2400 w. Naut Gaz—Aug. 28, 1902.

TRACK.

See also CROSS TIE; ELECTRIC RAILWAY; RAIL; RAIL JOINT; RAILWAY; RAILWAY CONSTRUCTION; RAILWAY PERMANENT WAY.

Track. Report of Com. of Am. Ry. Engng. & Main. of Way Assn. Individual expressions of the members of the committee, with discussion. 22,800 w. Ry Age (Spe. No.)—March 15, 1901.

Track. Report of the American Railway Engineering and Maintenance of Way Association, with discussion at the Chicago convention. 16,400 w. Ry Age, Special No.—March 21, 1902.

The Construction of Perfect Track. Two short papers by J. C. Brackenridge and R. Trimble with general discussion. 11,000 w. N Y R R Club—Sept. 18, 1902.

Progress in Track Construction During the Past Quarter of a Century. Considers the subject in detail. 2400 w. Ry Mas Mech—Feb., 1903.

General Track Work. From a paper by A. Morrison, read before the Roadmasters' and Maintenance of Way Assn. The importance of good drainage, good material, and various other points are considered. 1800 w. Ry & Engng Rev—Oct. 17, 1903.

B. & O. R. R.—Track Improvements on the Baltimore & Ohio. Maps and illustrated description of points where the most important betterments are being made. 1000 w. Ry Age—May 9, 1902.

Blocking.—Should Frogs and Switches Be Blocked? G. E. McCaughan. Also, J. H. Maher. Two papers considering the question of blocking. 6500 w. Pro Iowa Ry Club—June 16, 1903.

I. Should Frogs and Guard Rails Be Blocked? J. Harrington. II. Blocked Frogs and Guard Rails. J. L. Dawson. Two short papers discussing this subject. 2000 w. Pro Iowa Ry Club—Oct. 20, 1903.

Bonding.—See RAIL BOND.

Bridge Floor.—See BRIDGE FLOOR—Rail Bearers.

Broad Gauge.—See BRUNEL.

Creeping.—See RAIL; TIRE—Locomotive Wear.

Crossings.—Some Modern Appliances Connected with Railway Crossings and Points. O. R. Williams. Read before the Inst. of Engrs. & Shipbuilders in Scotland. Considers these appliances, stating the reasons why they are wanted, the qualities they ought to possess, &c. Serial. 1st part. 2500 w. Prac Engr—June 10, 1904.

Some Modern Appliances Connected with Railway Crossings and Points. Owen R. Williams. Describes and considers some appliances in regard to railway points and crossings, stating the reasons why they are needed, the qualities they should possess, etc. 3000 w. 3 plates. Trans Inst of Engrs. & Shipbldrs in Scotland—April 26, 1904.

On the Question of Improved Rail Crossings. C. W. Buchholz. Report on subject III. for discussion at the seventh session of the Railway Congress. Plates I. to XII. 6300 w. Bul Int Ry Cong—March, 1905.

A Graphical Method of Determining the Relative Positions of Points and Crossings. Charles John Albrecht. Brief description of method. 600 w. (No. 3489). Inst of Civ Engrs.

See also GRADE CROSSING.

Cross Tie.—See CROSS TIE.

Double.—Some Practical Points in the Double Tracking of Railways. Gives the opinions of the Pennsylvania, Union Pacific and Baltimore & Ohio railways on the conditions which determine the capacity of single-track lines, with discussion of the work, and opinions of other railways on various phases. Also editorial on this subject. 6600 w. Eng News—Sept. 14, 1905.

Electric Railway.—Construction Work on the Aurora, Elgin & Chicago Railway. An illustrated account of probably the best example of heavy high-speed electric railway work now to be found. 1400 w. St Ry Jour—Feb., 1902.

The Track Construction of Suburban and Interurban Electric Railways. S. S. Hoff. Read at meeting of the Penn. St. Ry. Assn. Discusses principally points relating to the construction through private property. 2700 w. St Ry Jour—Sept. 20, 1902.

The Track Construction of Surburban and Interurban Electric Railways. S. S. Hoff. Read before the Penn. St. Ry. Assn. Considers especially the construction through private property, discussing details. 2500 w. Elec Rev, N Y—Sept. 27, 1902.

Track Department of the Detroit United Railway. Illustrates and describes the interesting features of the work done by this department of a road now operating about 390 miles of track. Also describes the distribution system and overhead construction. 4000 w. St Ry Rev—Sept. 20, 1902.

Track Construction and Maintenance on the Detroit United Railway. Illustrated article describing methods and machines used in constructing and maintaining about 188 miles of city track and 192 miles of interurban track. 9000 w. St Ry Jour—Oct. 4, 1902.

See also **Street**; ELECTRIC RAILWAY.

Europe.—See **Improvements Needed**; RAIL—**Fast Train.**

Facing-Point.—High-Speed Facing-Points. An illustrated description of a new form of facing-point, called the St. George-Moore high-speed facing point, with explanation of the principle and the objects aimed to accomplish. 1400 w. Engng—Jan. 27, 1905.

Fastenings.—See RAIL FASTENING.

Fast Train.—See RAIL.

Frog.—See **Blocking**; **Crossing**; **Facing Point.**

Gauge.—The Choice of Gauge on Secondary Railways (Die Wahl der Spurweite bei Lokalbahnen). E. A. Ziffer. An address containing a general discussion of the best gauge for tracks under various circumstances. 4500 w. Mitt d Ver f d Förderung d Lokal u Strassenbahnwesens—June, 1903.

See also LIGHT RAILWAY; RAILWAY—**Narrow Gauge.**

German.—See RAILWAY SIGNAL—**St. Louis Exposition.**

Guard Rails.—See **Blocking.**

Hadfield's, London.—Hadfield's Special Steel Track-Work. Illustrated description of street railway track work on the conduit system recently laid in South London. Also editorial. 2000 w. Engng—Sept. 23, 1904.

Heavy Service.—What Will Be the Future Railway Track for Heavy Traffic? Editorial discussion of this subject, quoting from an editorial in the "R. R. Gazette." 2800 w. Eng News—June 8, 1905.

Improvements Needed.—The Necessity for Track Improvement. Max Barschall. Discusses things affecting the strength and endurance of tracks, and the great need of improvements due to increased loads and speeds. 1000 w. R R Gaz—Jan. 1, 1904.

Needed Improvements in Railway Track and Maintenance of Way. Editorial comparing briefly European and American railways to the disadvantage of the latter in the matter of tracks, with remarks on the exhibits at St. Louis. 1800 w. Eng News—Sept. 8, 1904.

Joint.—See RAIL JOINT.

Life.—See **Wear**; CAR WHEEL—**Life**; RAIL—**Wear.**

Oil Sprinkling.—See RAILWAY PERMANENT WAY; ROAD.

Pot Sleeper.—See CROSS TIE—**Cast-Iron.**

Premium Inspection.—See RAILWAY PERMANENT WAY.

Repair Plant.—See ELECTRIC CAR—**Line**; ELECTRIC PLANT—**Portable**; TOOL CAR.

St. Louis Exposition.—See **Improvements Needed.**

St. Louis Station.—Rearrangement of Tracks and Station Facilities at the Union Station, St. Louis, Mo. An illustrated description of the arrangements made for handling the great increase in traffic during the World's Fair. 5200 w. Eng News—Sept. 29, 1904.

Sleeper.—See CROSS TIE.

Steel Longitudinals.—Track Construction with Steel Longitudinals on the Pennsylvania R. R. Gives illustrations showing a construction that is to be tried which is a remarkable departure from the systems in use. It is the invention of Gustav Lindenthal. Also editorial. 1600 w. Eng News—Nov. 30, 1905.

Steel Substructure.—Steel Railroad Substructure. A system of supporting railroad rails on a continuous line of inverted trough-shaped girders, invented by Samuel E. Duff, is illustrated and described. 1200 w. R R Gaz—March 11, 1904.

See also CROSS TIE.

Street.—Permanent Way for Electric Tramways. W. Howard-Smith. Read at Leicester meeting of the Incor. Assn. of Munic. & Co. Engrs. Discusses the details of a well-designed track. Ill. Serial. 1st part. 4500 w. Elec Engr, Lond—July 19, 1901.

Permanent Way for Electric Tramways. W. Howard Smith. Extracts from a paper read before the Incorporated Assn. of Munic. & Co. Engrs. (England). Considers rails, foundations, paving, &c. 5000 w. St Ry Rev—Oct. 15, 1901.

Progress in Street Railway Track Construction. Charles S. Butts. Reviews the methods of track construction in early days of street railroading, and describes the most approved modern practice. 2500 w. St Ry Jour—Feb. 1, 1902.

How to Lay Interurban Track in Cities. Extracts from a letter presenting the points of difficulty to be overcome, and giving an invitation for discussion of the various subjects. 2200 w. Munic Engng—March, 1903.

Permanent Way Construction and Maintenance. Charles A. King. A summary of replies received to some seventy questions on track construction sent to different roads by the managers of the Glasgow tramways. 5000 w. St Ry Jour—Aug. 1, 1903.

Report on Mr. Young's Return Relating to Permanent Way Construction and Maintenance. Charles A. King. Read at Glasgow conference of the Municipal Tramways Assn. A summary of a report by John Young, containing a great variety of information gathered from a large number of towns. 11,000 w. Tram & Ry Wld—Aug. 6, 1903.

Standard Practice in City Track Construction. An illustrated article outlining the standard practice of the largest cities in the United States. 7200 w. St Ry Jour—Aug. 29, 1903.

Track Construction and Maintenance. Thomas W. Wilson. Read at Syracuse meeting of the N. Y. State St. Ry. Assn. Discusses rails, joints, roadbed and paving, &c. 2200 w. St Ry Jour—Oct. 17, 1903.

Notes on Permanent Way for Tramways. A. N. Connett. An analysis of proportionate costs, with discussion of construction details. 5000 w. Elec't'n, Lond—Nov. 4, 1904.

Permanent Way for Tramways. Charles T. Taylor. Read before the Rugby Engng Soc. Discusses rails, special work, foundation, paving, etc. Ills. 5000 w. Mech Engr—Nov. 19, 1904.

Permanent Way for Tramways. Charles T. Taylor. Abstract of a paper read before the Rugby Engng Soc. A discussion of details of track, rail bed or foundation, paving, etc. Ills. 4400 w. Elect'n, Lond—Nov. 18, 1904.

New Track Systems for City Streets. Gives views recently expressed by street railway officers, with illustrations of various types of construction. 1700 w. Eng Rec—Feb. 25, 1905.

Tramways Permanent-Way Construction and Maintenance. James Lord. Abstract of a paper read before the Leeds Loc. Sec. of the Inst. of Elec. Engrs. Describes methods used by the writer, illustrating apparatus. 2400 w. Elect'n, Lond—March 10, 1905.

Tramways Permanent-Way Construction and Maintenance. James Lord. Read before the Leeds Loc. Sec. of the Inst. of Elec. Engrs. Results of the author's experience of 21 years in the repairing and construction of municipal tramways. 3000 w. Elec Engr, Lond—March 24, 1905.

The Development of Special Track Work on Street Railways. Victor Angerer. From a paper read before the Conn. Soc. of Civ. Engrs. & Surv. Considers some of the problems of street railways and the modern methods for special track work, comprising curves, switches, frogs, etc. 5800 w. Eng News—Aug. 3, 1905.

See also Electric Railway; **CROSS TIE; ELECTRIC RAILWAY—Construction and Operation; PAVEMENT—Railway; RAIL JOINT—Pavement; ROAD—Electric Railway; TRACKWAY.**

Street, Boston.—Street Railway Track Construction in City Streets. Arthur L. Plimpton. Mainly an illustrated description of the track construction of the Boston Elevated Railway Company's system. Also discussion. 4800 w. Jour Assn of Engng Socs—Aug., 1902.

Recent Methods of Construction and Pavement of Tracks in Boston. Arthur L. Plimpton. Illustrated detailed description. 700 w. St Ry Jour——Feb. 4, 1905.

See also **PAVEMENT—Boston.**

Street, Brooklyn.—Track Construction on the Brooklyn Rapid Transit System. R. L. Russell. Describes the traffic conditions and the construction. 3400 w. St Ry Rev—Sept. 15, 1901.

Track Construction in Brooklyn. E. H. Packe. Illustrated description of the rail section designed by J. C. Brackenridge. 1400 w. St Ry Rev—Sept. 15, 1901.

Street, Buffalo.—Track Construction of the International Railway Co. in Buffalo, N. Y. T. W. Wilson. Begins an illustrated detailed description of fine construction laid on concrete with electrically welded rails. Serial. 1st part. 1800 w. St Ry Rev—March 20, 1903.

Street, Cincinnati.—Laying Street Railway Tracks in Cincinnati: Specifications for Bitulithic Pavement. J. M. Harper. Abstract of a paper read before the Ohio Eng'ng Soc. Gives a brief description of the concrete construction of a double-track railway on one of the principal crosstown lines. 2500 w. Eng News—March 2, 1905.

Street, Concrete.—Concrete Roadbed Construction for Street Railways. Discusses the best practice for city streets, and gives the details of roadbed construction for street railways in a number of large cities where concrete is used to a greater or less extent. Ill. 3500 w. Eng News—March 6, 1902.

Street, Detroit.—See **Electric Railway.**

Street, England.—English Street Railway Construction. Joseph Owen. Abstract of a paper read before the Incor. Assn. of Munic. and County Engrs, describing the rails and fish-plates, joints, and special work, tie-bars, bonds, etc. 3200 w. Eng News—Sept. 7, 1905.

Street, Manchester.—Special Track Work for Manchester Corporation Tramways. An illustrated description of special work where the tracks were manufactured complete, including all curved and connecting rails, without cutting or bonding rails in the street. 1000 w. Tram & Ry Wld—June 12, 1902.

Street, New York.—Rails and Track Construction on the Island of Manhattan. W. Boardman Reed. Reviews the various rails used, their advantages and disadvantages, describing the construction, giving cost in New York, &c. Ill. 3800 w. St Ry Rev—Sept. 15, 1901.

Street Paving.—The Relation of Street Railway Tracks to the Paving of City Streets. Henry Manley. Considers points in which the tracks affect the maintenance of the street surface. 1200 w. Jour Assn of Engng Socs—Aug., 1902.

See also **PAVEMENT—Railway.**

Street, Philadelphia.—The Track Construction Department of the Union Traction Company, Philadelphia. Illustrated description of track apparatus and tools used by this company. 2500 w. St Ry Jour—Dec. 7, 1901.

Some Improvements in Track Construction in Philadelphia. C. B. Voynow. An address before the Phila. branch of the Am. Inst. of Elec. Engrs. An illustrated description of the joints at present used, explaining their advantages, and of the improved methods of holding the rails to line and gage. 3500 w. St Ry Jour—April 2, 1904.

The Pennsylvania Railroad's Track Construction for City Streets. Illustrated description of track construction in Philadelphia, with girder rails weighing 141 lbs. per yard. 800 w. Eng Rec—Aug. 20, 1904.

Street, Rochester, N. Y.—Steel Tie, Concrete Construction. Le Grand Brown. Read before the N. Y. State Ry. Assn. Describes the method adopted in the city of Rochester, N. Y., and gives the cost. Ill. 900 w. St Ry Jour Sept. 21, 1901.

Street, St. Louis.—Reconstruction of Olive Street Tracks in St. Louis. An illustrated account of the reconstruction of an old cable track to an electric track without interfering with the traffic. 700 w. St Ry Jour—Dec. 5, 1903.

Changing the Gauge of Tracks in East St. Louis. W. A. Bennett. Methods employed in changing electric street railway tracks from broad to standard gauge, with detailed cost of work. 1800 w. St Ry Jour—Sept. 9, 1905.

Street, Scranton.—Street Railway Track Construction at Scranton, Pa. Illustrated description of a substantial system comprising a concrete base. T-rails, steel ties and reinforced joints, with brick and asphalt paving. 2000 w. Eng News—Dec. 26, 1901.

Subway, N. Y.—Tracks in Tunnels. George Hebard Paine. Considers track construction with a view to determining the best for the traffic in the New York subways. Ill. 900 w. R R Gaz—Sept. 12, 1902.

Tools.—Track Tools—Their Use and Abuse. From a paper by J. C. Rockhold, read before the Roadmasters' and Maintenance of Way Assn. The need of instructing men in regard to the proper use and care of tools, citing cases of bad practice. 2000 w. Ry & Engng Rev—Oct. 17, 1903.

Train Resistance.—See **TRAIN RESISTANCE—Track.**

Turnout Location.—A Problem in Locating Turnouts. C. M. Kurtz. Illustrated description of practical method for laying out railroad tracks, having regard to the angle of the frog at the turnout. 600 w. Eng News—Aug. 25, 1904.

A Problem in Locating Turnouts. C. M. Kurtz. States the problem and gives ready and accurate methods of obtaining solutions. 800 w. Eng News—Sept. 8, 1904.

Uniform Structure.—Uniform Track Structure. M. W. Thomson. Reviews the changes made necessary by changed conditions, and the experience with angle bars on the Pennsylvania tracks. 2200 w. R R Gaz—March 8, 1901.

Union Pacific R. R.—Some Advice on Track Work. Extracts from an address by W. L. Park to the roadmasters and section foremen on a division of the Union Pacific R. R. 1700 w. Ry & Engng Rev—Sept. 6, 1902.

See also **RAILWAY CONSTRUCTION.**

Washington Station.—Track Plans for the Washington Union Station. Gives track plans which differ radically from the accepted standards for terminal station arrangement. 1600 w. R R Gaz—Jan. 15, 1904.

See also **RAILWAY STATION.**

Wear.—The Effect on Track of Modern Equipment and High Speed. P. H. Dudley. A discussion of the distribution of loads, and of stresses, and of various things bearing on the wearing of tracks. Considers the statements of Mr. Hugh Wilson. 2800 w. Ry Age—March 20, 1903.

The Evolution of Railway Track (L'Evolution des Voies de Chemins de Fer). M. Mesnager. An examination of the deformation of rails and joints under the action of high-speed trains. 1800 w. Génie Civil—Dec. 9, 1905.

Effect of Rolling Stock on Track. Hugh Steele. Read before the New England R. R. Club. Discusses damage done by worn wheels, trailing obstructions from trains, water, etc., especially in large yards and terminals. 1800 w. Ry & Engng Rev—Dec. 16, 1905.

See also **RAIL; TIRE.**

TRACK BOND.

See **RAIL BOND.**

TRACK DEFORMATION.

See **RAIL—Stresses.**

TRACK DEPRESSION.

See also **GRADE CROSSING; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; SUBWAY.**

Milwaukee.—Track Depression of the Chicago & Northwestern Railway at Milwaukee. An illustrated description of work presenting features of great interest, the object being the separation of the traffic of the railway from the city streets. 2000 w. Ry Age—Oct. 14, 1904.

Track Elevation and Depression at Milwaukee. Brief illustrated account of work completed and projected. 1200 w. Eng News—March 9, 1905.

Philadelphia.—See SUBWAY.

Port Morris, N. Y. Central.—See RAILWAY PERMANENT WAY—N. Y. Central.

TRACK ELEVATION.

See also GRADE CROSSING; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; VIADUCT.

Allegheny.—See Pittsburg.

Boston.—Track Elevation on the New York, New Haven & Hartford R. R. at Boston, Mass. Illustrations, plans and description of work to eliminate a number of grade highway crossings where condensed traffic had to be protected. 7700 w. Ry & Engng Rev—Feb. 1, 1902.

See also RAILWAY TERMINAL.

Bridgeport, Conn.—See RAILWAY CONSTRUCTION.

Brooklyn.—See RAILWAY CONSTRUCTION; VIADUCT.

Chicago.—Track Elevation in Chicago. An account of work completed and in progress of raising 745 miles, at a cost of over $38,000,000. 1200 w. Ry Age—April 26, 1901.

Track Elevation in Chicago. An illustrated description of the work at the Eighteenth street section of the Chicago & Alton, Santa Fe and Illinois Central lines. 1700 w. Ry Age—May 10, 1901.

Track Elevation of the Chicago & Western Indiana Through the City of Chicago. An illustrated article describing the equipment, method of operation, materials, &c. 2800 w. Ry Age—March 24, 1905.

Track Elevation on the Chicago & Northwestern Ry., Chicago. Illustrated description of important and difficult work under trying conditions. Retaining walls, overhead and subway bridges, street improvements, track elevation, signal plants, etc., are embraced in the work. 4800 w. Eng News—Sept. 7, 1905.

Kinzie Street Track Elevation of the Chicago & North-Western, Chicago. An illustrated description of an interesting piece of work with difficult features. 2000 w. R R Gaz—Vol. XXXIX., No. 19.

Milwaukee.—See TRACK DEPRESSION.

Newark, N. J.—Track Elevation in Newark, N. J. Clarence H. Baily. A report of the work of changing and elevating the tracks through the city, being done by the Lackawanna, the Pennsylvania and the Central of New Jersey roads. 2000 w. R R Gaz—April 25, 1902.

Delaware, Lackawanna & Western Track Elevation in Newark and Harrison, N. J. Illustrated description of important improvements. 1200 w. R R Gaz—Nov. 27, 1903.

Delaware, Lackawanna & Western Railroad Improvements at Newark and Harrison, N. J. Illustrated detailed description of extensive work of eliminating grade crossings and reducing grades, costing approximately $3,500,000. 2500 w. Ry Age—Dec. 4, 1903.

The Newark Improvements of the Lackawanna Railroad. An illustrated account of work for eliminating grade crossings and improving alignment and grades. Serial. 1st part. 2500 w. Eng Rec—Dec. 26, 1903.

Track Elevation of the Pennsylvania in Newark, N. J. An illustrated detailed description of the work of elevating about three miles of track without interrupting the heavy traffic. 2800 w. R R Gaz—May 6, 1904.

See also BRIDGE ERECTION; BRIDGE MOVING; RAILWAY CONSTRUCTION — Lackawanna; VIADUCT.

Pittsburg.—Allegheny River Bridge Track Elevation at Pittsburg. An illustrated description of a new bridge made necessary by elevating the tracks of the Pennsylvania System. It is of the double-deck, lattice girder type. The work of removing the old bridge is described. 1500 w. R R Gaz—May 23, 1902.

Allegheny Track Elevation. H. S. Wilgus. A descriptive account of the work, method of construction, cost, materials, etc. 2700 w. Pro Engrs Soc of W Penn—Oct., 1902.

Rochester, N. Y.—See BRIDGE—N. Y. Central R. R.

Wilmington, Del.—See RAILWAY CONSTRUCTION.

TRACK LAYING.

See also RAIL; RAILWAY CONSTRUCTION; RAILWAY PERMANENT WAY; TRACK.

Methods of Laying Track (Pose de la Voie). H. Seymat. A comparison of the various methods of constructing the permanent way of railways at present in use. 5000 w. Soc Ing Civ de France—Dec., 1900.

Re-Laying of Rails (Schienen-Neulage). Frans Baumgartner. A practical detailed description of the relaying of railway track. 6000 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 7, 1901.

Machine.—The Improved Harris Track-Laying Machine. Illustrated description of the machine and its operation. 3300 w. Ry & Engng Rev—Oct. 10, 1903.

Williamsburg Bridge, N. Y.—Track Laying on the Williamsburg Bridge. Illustrated description of methods used in laying tracks for two lines of elevated railroad, and two lines of electric street cars, aggregating about five miles in length. 2400 w. Eng Rec—March 4, 1905.

See also ELECTRIC RAILWAY.

TRACKLESS TROLLEY.

See AUTOMOBILE TROLLEY; TROLLEY AUTOMOBILE.

TRACK TANK.

See RAILWAY WATER SERVICE; WATER SCOOP.

TRACKWAY.

Trackways for Streets (Strassengleise). A. H. Weicht. Illustrated descriptions of flat steel trackways, of various sections, for street traffic. 4000 w. Zeitschr d Mitteleuropäischen Motorwagen-Ver—No. 12, 1903.

American Steel Roads. George E. Walsh. On the advantages, construction, cost, &c., of steel roads for city and country, and for automobile use. 2000 w. Gunton's Mag—July, 1904.

Automobile.—See TRANSPORTATION.

Germany.—Rail Tracks for Highway Traffic. Abstract of a paper by Herr A. Nessenius, translated from the "Organ für die Fortschritte des Eisenbahnwesens." A study of the efforts and experiences of German engineers in the construction of an economical and serviceable iron track for highway purposes. 3000 w. Eng Rec—Dec. 13, 1902.

New York.—An Experimental Steel Trackway in New York City. Describes a steel trackway being laid in Murray St., New York city, which is expected to furnish valuable and interesting information regarding steel trackways in city streets. 800 w. Eng News—Dec. 4, 1902.

Progress of Steel Roads. Gen. Roy Stone. Reports concerning the steel road laid in Murray st., New York, and suggests the construction of automobile roads, and country highways, discussing the advantages of steel. 1800 w. Eng Rec—April 25, 1903.

Stock Yards, Chicago.—Steel Trackway. R. H. Gage. Describes a trackway recently completed near the Union Stock Yards, Chicago, stating the objections shown by experience. Ill. 1200 w. Technograph, No. 16—1901-2.

TRACTION.

See also CAR—Dynamometer; DYNAMOMETER; TRAIN RESISTANCE.

Acceleration.—See ACCELEROMETER; AUTOMOBILE; AUTOMOBILE, ELECTRIC—Speed Time Curves; ELECTRIC RAILWAY—Speed Time Curves.

Automobile.—Resistance of Obstacles. Ernest J. Loring. Diagrams intended to explain the relation existing between the weight carried by a wheel, and the power required to force it over an obstacle. 600 w. Horseless Age—Nov. 21, 1900.

Road Traction. H. S. Hele-Shaw. On past investigations of traction resistance, and the needed study of the causes of resistance for self-controlled vehicles, with suggestions. Also general discussion. Ill. 6000 w. Jour Soc of Arts—Dec. 7, 1900.

Automobiles and Their Relations to Roads. A paper explaining the investigations now in progress to determine the tractive effort necessary to drive self-propelling vehicles over different classes of roads. 2700 w. Eng Rec—May 11, 1901.

Heavy Motor Traction. Editorial discussion of the progress made, the power required, the wear on roads, etc. 1500 w. Engr, Lond—May 17, 1901.

Mechanical Road Traction. A. E. A. Edwards. Abstract of a paper read before the Birmingham Assn. of Mech. Engrs. Briefly reviews the history and considers present problems under heads of (1) Resistances to motion; (2) motive power; (3) cost of running; (4) future developments. 3700 w. Mech Engr—May 3, 1902.

Traction, Grade and Air Resistance. Reynold Janney. Explains method of calculation, giving chart. 1200 w. Horseless Age—Sept. 17, 1902.

The Tractive Power of Automobiles (Automobilisme: L'Effort de Traction dans les Voitures Automobiles). A discussion of the tractive power and resistance of automobiles on various pavements, with diagrams and tables. 2500 w. Rev Technique—March 25, 1903.

See also Road Vehicles; **AUTOMOBILE; AUTOMOBILE COMPETITION; TRANSPORTATION.**

Cable.—See **CABLE RAILWAY.**

Locomotive. — See **LOCOMOTIVE PERFORMANCE; TRAIN RESISTANCE.**

Renard Train.—See **AUTOMOBILE.**

Road.—See Automobile; Wagon; **DYNAMOMETER**—Hele-Shaw; **TRACTOGRAPH.**

Road Vehicles.—Traction of Road Vehicles. Information from a committee report presented at the Belfast meeting of the Brit. Assn. on the resistance of road vehicles to traction. Illustrates the apparatus by which investigations were carried on. 3500 w. Engng—Oct. 3, 1902.

The Resistance of Road Vehicles to Traction. Report of a committee submitted to the British Assn. Gives results of trials, suggestions, abstracts of papers, &c. 5800 w. Engng—Sept. 25, 1903.

The Resistance of Road Vehicles to Traction. Abstract of a report of a committee of the British Assn. 3000 w. Elect'n, Lond—Oct. 23, 1903.

See also Automobile; Wagon.

Speed-Time Curves.—See **AUTOMOBILE, ELECTRIC; ELECTRIC RAILWAY.**

Storage Battery.—See **ELECTRIC RAILWAY, ACCUMULATOR; STORAGE BATTERY** — Electric Railway; Traction.

Street Railway Curves.—Tractive Force and Grade Reduction in Street Curves (Zugkraft und Neigungsreduktion in Strassenkurven). K. Nussbaumer. A mathematical investigation of the relations between curve and grade resistances on street railways. 2000 w. Schweizerische Bauseitung—Nov. 5, 1904.

Wagons.—Traction on Wagon Roads. Ira O. Baker. An account of experiments on the tractive power required to draw wagons on different roads and pavements, with general discussion of the subject. Ill. 2500 w. Eng News—March 8, 1902.
See also Road Vehicles.

Wide Tires.—See **TRACTOGRAPH.**

TRACTION ENGINE.

See also **AGRICULTURAL MACHINERY; AUTOMOBILE; AUTOMOBILE, STEAM; ROAD ROLLER.**

Accidents.—Accidents with Traction Engines. William Fletcher. Describes some of the roads these engines have to traverse, and relates accidents that have taken place. Ills. 1400 w. Prac Engr—May 19, 1905.

Agriculture.—See **AGRICULTURAL MACHINERY.**

Compound.—Compound Road Locomotive. Illustrates and describes a machine shown at the Royal Agricultural Society's exhibition. 800 w. Engr, Lond—Aug. 7, 1903.

Historical.—See **AUTOMOBILE, STEAM.**

Hornsby.—See Military.

Lumbering.—The Tractor in Lumbering Operations. An illustrated description of a freighting engine in use in California, and the results accomplished. 900 w. Sci Am—June 28, 1902.
See also Snow.

Military.—The Use of Traction Engines and Armored Trains in the Field. (Emploie des Locomotives Routiéres et des Trains Blindés en Campagne). G. Espitallier. A discussion of traction engines hauling armored trains across country, with special reference to the experiences of the British army in South Africa. Illustrated. 3000 w. Génie Civil—April 13, 1901.

Military Tractor. An illustrated description of the traction engine designed by Richard Hornsby & Son, Limited, which secured the prise of £1,000 offered by the War Office of England. 2000 w. Engr, Lond—Dec. 18, 1903.

A Triumph for Heavy Oil. Illustrates and describes the Hornsby heavy oil military tractor, giving facts in regard to its operation, and the conditions it was required to meet. 2000 w. Auto Jour—Jan. 9, 1904.

See also **AUTOMOBILE.**

Ore Transportation.—Traction Engines for Transportation of Ores. G. P. Grimsley. Illustrated description of engines in use in California. 700 w. Eng & Min Jour—May 25, 1901.

"Pedrail."—The "Pedrail" Traction Engine. An illustrated description of an engine invented by B. J. Diplock, fitted with feet around the wheels, the frame being supported by a short rail which runs on small wheels attached to the feet. 1300 w. Transport—Nov. 28, 1902.

Recent Developments of the Pedrail. Illustrated description of a traction engine fitted with feet around the wheels. The frame is supported by a short rail which runs on small wheels attached to the feet. Ill. Serial. 1st part. 3000 w. Auto Jour—Jan. 23, 1904.

A Walking Locomotive. Illustrations of the Pedrail, with description as given by Prof. Hele-Shaw, and remarks. 1800 w. U S Cons Repts—March, 1904.

See also **TRANSPORTATION**—Road.

Port Huron, Mich.—See **ENGINE WORKS.**

Radial Valve Gears.—See **VALVE GEAR**—Woolf Reversing Motion.

Ring Rail.—A Remarkable Motor Wagon. Illustrated description of a novel wagon, invented in Germany, and tested severely with successful results. It is an attempt to secure ease of running whatever the nature of the road-surface by carrying rail rings, on which the wheels run. 1800 w. Engr, Lond—May 31, 1901.

Road Train.—See **AUTOMOBILE**—Renard Train.

Scott.—See **AGRICULTURAL MACHINERY.**

Snow.—A Great Traction Motor. Brief illustrated description of a steam traction locomotive on runners used in Michigan for hauling logs over the snow. 1000 w. Rev of Revs—Sept., 1903.

Turbo-Electric Wagon.—See **AUTOMOBILE.**

Woolf.—See **STEAM ENGINE; VALVE GEAR.**

TRACTION INCREASER.

See also **LOCOMOTIVE**—Freight; Prairie.

Prairie Type Passenger Locomotive with Traction Increaser—Atchison, Topeka & Santa Fe. Drawings and description, showing two ways of applying the increasers. Compressed air from the air-brake system is used to operate them. 900 w. R R Gaz—Jan. 17, 1902.

Prairie Type Freight Locomotives with Traction Increasers—Atchison, Topeka & Santa Fe. Illustrated description showing some slight differences between this type as designed for freight and the passenger locomotives previously described. 450 w. R R Gaz—May 16, 1902.

Locomotive Traction Increasers. Edward Grafstrom. Discussion of the types recently put into service on the Atchison, Topeka & Santa Fe. 1000 w. Am Engr & R R Jour—June, 1902.

Arrangements for Temporarily Increasing the Adhesion of the Driving Wheel of Locomotives (Vorrichtungen sur Zeitweiligen Erhöhung des Triebraddruckes bei Lokomotiven). Prof. K. Keller. Illustrated descriptions of various methods of increasing the portion of the weight of locomotives resting on the drivers at starting. 5000 w. Zeitschr d Ver Deutscher Ing—June 20, 1903.

N. Y. C.—The N. Y. C. Traction Increaser. Illustrated description of the mechanism as given by George S. Hodgins. 2000 w. Loc Engng—June, 1902.

TRACTOGRAPH.

Wide Tire Tests. Lawson M. Fuller. Report of a Board of Officers of the Ordnance Department of the United States army, describing the tractograph used and results obtained. 2000 w. Munic Jour & Engr—May, 1904.

TRADE SCHOOL.

See **EDUCATION—Trade School; TRADE UNION—Trade Schools.**

TRADE UNION.

See also **LABOR; STRIKE; WAGES; WORKS MANAGEMENT.**

Consolidated Labor. Carroll D. Wright. An analysis of the attitude of the public and of law toward labor unions, and the attitude of labor unions toward industrial society. 6400 w. N Am Rev—Jan., 1902.

The Possibilities of a New Trade Unionism. Percy Longmuir. Discussing modern industrial conditions in connection with labor relations, showing that interested co-operation is the true motive for association. 3000 w. Engineering Magazine—April, 1902.

Essentials of Labor Union Success. On the responsibility of the unions, and the need of wise leadership and economic education. 1000 w. Gunton's Mag—Dec., 1902.

The Position of Organised Labor. Samuel Gompers. The second of a series of articles by representatives of both sides of the controversy between labor and capital. 7800 w. Banker's Mag, N Y—Dec., 1903.

How Should Organised Labor be Dealt With? J. Kirby, Jr. Address before the Philadelphia convention of the Nat. Met. Trds. Assn. Discusses the conditions in various places, and how best to meet them. 3200 w. Ir Age—March 24, 1904.

America.—Labor Organizations in the United States. Carroll D. Wright. Reviews the development of trade-unionism in the United States, and its present standing. 4200 w. Contemporary Rev—Oct., 1902.

The Present Status of the American Labor Movement. John R. Commons. Discusses the question of organized labor and the recent disputes, and the future outlook. 3800 w. Rev of Revs—Aug., 1903.

Anthracite Conciliation Board.—See **STRIKE.**

Atchison Railway.—Union Rules Submitted to the Atchison. Extracts from a proposed set of rules, with comments by J. W. Kendrick. 1700 w. R R Gaz—May 13, 1904.

Birmingham, Eng.—An Unique Trade Union. A résumé of the plan of organisation instituted by E. J. Smith, and in operation in Birmingham, England. 2500 w. Am Mach—Vol. 28, No. 44.

Boycott.—See **LABOR; STRIKE.**

British.—The Old Trades Unionism vs. Wisely Organised Labor. George N. Barnes. A review of the relations of employers and employees in Great Britain, by the Secretary of the Amalgamated Society of Engineers. 3500 w. Engineering Magazine—Jan., 1901.

A Workingman's View of Trade-Unions. James G. Hutchinson. Discusses these associations in England, and suggests improvements in trade-union tactics. 4000 w. Nineteenth Cent—Feb., 1903.

See also Conspiracy; Taff Vale Case.

British History.—Lessons from the Experience of British Organized Labor. F. Brocklehurst. A review of the labor situation in England for the past fifty years, showing the futility of resisting improved machinery and methods. 2500 w. Engineering Magazine—June, 1901.

British Industries.—How Trade Unionism Affects British Industries. Benjamin Taylor. Showing the social and industrial harm due to trade unions; how they restrict output and enhance the cost of production. 7000 w. N Am Rev—Aug., 1901.

Building Trades.—The Building Trades Employers and the Unions. William English Walling. An explanation of the situation in New York City, comparing it with the Chicago lockout of 1900. 2000 w. World's Work—Aug., 1903.

An Opportunity for the Building Trade Unions. Editorial discussion of existing conditions in the building trade with suggestions for a remedy. 1800 w. Ir Age—Nov. 26, 1903.

Coal Mining.—Trade Unionism in Coal-Mining. The first of a series of articles discussing the recent growth of the system in Great Britain. Serial. 1st part. 2000 w. Ir & Coal Trds Rev—Nov. 22, 1901.

The Union Movement Among Coal-Mine Workers. Frank Julian Warne. A study of the trade union movement among the coal mine workers, pointing out the causes of the successes and failures marking its growth. 16800 w. Bul Bureau of Labor—March, 1904.

See also **COAL MINER; LABOR; STRIKE.**

Conspiracy.—Trade Unions and the Law of Conspiracy. A discussion of the proposed bill to be brought before the British parliament. 1400 w. Engng—Feb. 6, 1903.

Contracts.—Labor Unions and Labor Contracts. D. L. Cease. Discusses the benefits expected from the labor contracts, and the improved attitude of workmen. 1700 w. Gunton's Mag—Jan., 1902.

Damage Responsibility.—See Denaby Main Case.

Denaby Main Case.—The Denaby Main Case. Summary of facts and decision, with editorial, in this case where employers have successfully held the Union responsible for damages during an illegal strike. 5000 w. Engr, Lond—Feb. 12, 1904.

Employers' Association.—See **LABOR.**

Employers' Relations.—Employers and Labor Unions. Abstract of an address by Mr. George Gunton before the Manufacturers' Club of Cincinnati. Discusses the relations of the employer and employed, and suggests means of adjusting difficulties. 4200 w. Gunton's Mag—Dec., 1901.

England.—See British.

Gas Industry.—The Labor Problem. F. J. Symmes. Read before the Pacific Coast Gas Assn. A discussion of the labor unions and their attitude and what has been accomplished in overcoming difficulties. General discussion. 6000 w. Pro Age—Sept. 15, 1904.

Incorporation.—The Incorporation of Labor Unions. Howard R. Bayne. Discusses the incorporation and does not consider that it should be made compulsory. 1500 w. R R Gaz—Vol. XXXIX., No. 20.

Law.—The Courts on Organised Labor. James A. Miller. Reprint from Volume II., No. 1, "Bulletin Corporations Auxiliary Company," Cleveland, O. The article aims to encourage resort to the courts in labor troubles. Discusses the "right to parade," "picketing," the sympathetic strike, and injunctions. 6000 w. Ir Age—March 5, 1903.

See also Conspiracy; Contract; Denaby Main Case; Taff Vale Case.

Mellen Address.—The Evil and the Good of Labor Unions. Address of Charles S. Mellen. (Abstract). A notable address to a gathering of the employees of the New York, New Haven & Hartford Railroad. 2000 w. Ry Age—May 6, 1904.

Misconceptions.—The Rights and Methods of Labor Organizations. Albert S. Bolles. Discusses misconceptions that are somewhat general, explaining the attitude of many labor organizations, and the spirit of ill-will of employees toward employers, giving conclusions. 4500 w. N Am Rev—March, 1903.

Molders.—See **MOLDING—Limitation of Output.**

New Alignment.—A New Alignment of Industrial Forces. J. B. Johnson. Discusses the changed attitude of union leaders and trade unionism in general. 2100 w. Am Mfr—Dec. 19, 1901.

Organization.—See British; **WORKS MANAGEMENT.**

Responsibility.—See Taff Vale Case.

Smith.—See Birmingham.

Taff Vale Case.—The Responsibility of Trade Unions Under the Law. Remarks on the judgment of the House of Lords in the case of the Taff Vale Co. against the Amalgamated Soc. of Ry. Servants et al., adopting the principle that trade unions can be sued and held responsible for the acts of their officers. 2000 w. Jour Gas Lgt—July 30, 1901.

Labor Unions and the Law. A. Maurice Low. Discussing the recent Taff Vale decision in England, making unions liable for damages. 1600 w. Rev of Revs—Feb., 1903.

Trade Schools.—The Attitude of Trades Unions Toward Trade Schools. William H. Sayward. Why they do not look with favor on these schools, with a consideration of trade school conditions in various countries. 4000 w. Am Gas Lgt Jour—Oct. 12, 1908.

Trust.—Labor-Trusts the Worst. Robert S. Minot, in the Boston "Transcript." A presentation of the rights and principles involved in labor disturbances. 1000 w. Am Arch—Nov. 1, 1902.

TRADE WASTE.

See **BY-PRODUCT; FACTORY WASTE; RIVER POLLUTION; WASTE UTILIZATION.**

TRAIN.

See also **CAR; LOCOMOTIVE; RAILWAY; TRAIN, FAST; TRAIN RESISTANCE; TRAIN SERVICE.**

All-Stations Express.—See **RAILWAY OPERATION—Moving Train Boarding.**

De Luxe.—See India; Prince Henry's; **CAR.**

Fast.—See **TRAIN, FAST.**

India.—A New Indian Train de Luxe. Illustrated description of a special limited express between Bombay and Poona. 1000 w. Loc Engng—Nov., 1904.

Maximum.—Maximum Trains: Their Relation to Track, Motive Power and Traffic. E. E. R. Tratman. Discussing the question of maximum train and car loading, more particularly from the maintenance-of-way point of view, considering also the maintenance of equipment. General discussion follows. 29000 w. N Y R R Club—April 17, 1902.

See also **RAILWAY OPERATION; RAILWAY TRANSPORTATION.**

Narrow Gauge Stability.—Stability of Trains on a Track of 0.60 Metre Gauge (La Stabilité des Trains; La Voie 0.60 m.). Col. Péchot. Discussing especially the availability of track of about 24 inch gauge for military purposes, including details of construction and operation. 25000 w. 1 plate. Ann des Ponts et Chaussées—3 Trimestre, 1905.

Parting.—Control of Trains Parted Between Air-Brake Cars. E. W. Pratt. Believes all cars should be equipped with automatic brakes and enginemen carefully instructed in handling long trains. 1800 w. R R Gaz—March 21, 1902.

Trains Parting. Report of a committee appointed by the Car Foremen's Association of Scranton, Pa. Considers causes and remedies. 2500 w. Ry & Engng Rev—Jan. 3, 1903.

The Cause and Remedy for Freight Trains Breaking in Two. Two short papers by M. V. Quinn and C. P. Cass, discussing this subject. 4400 w. St. Louis Ry Club—May 14, 1904.

Breaking in Two of Long Trains, Passenger and Freight, at Slow Speeds, When Releasing Brakes, and Methods of Prevention. Read before the Traveling Engrs.' Assn. Considers the forces which the draw bars and couplers have to withstand and some of the causes of break-in-twos. 3000 w. Ry & Engng Rev—Sept. 23, 1905.

Prince Henry's.—Train for H. R. H. Prince Henry of Prussia. Illustrated description of the train used during the short tour through the United States. 900 w. Loc Engng—April, 1902.

Royal Canadian.—See **CAR.**

Standard.—Standard Trains. Discusses the increased weight of locomotives and rolling stock, and of axle loads, the composition of trains, etc. 2500 w. Engr, Lond—Nov. 22, 1901.

Unloading Moving Trains.—See **RAILWAY OPERATION—Moving Train Boarding.**

TRAIN ACCELERATION.

See **ACCELEROMETER; ELECTRIC RAILWAY—Speed Time Curves; TRAIN RESISTANCE.**

TRAIN DESPATCHING.

See **RAILWAY OPERATION—Despatching.**

TRAIN, FAST.

See also **ELECTRIC LOCOMOTIVE—Zossen; ELECTRIC RAILWAY—Zossen; LOCOMOTIVE—High-Speed; LOCOMOTIVE PERFORMANCE; RAILWAY OPERATION; TRAIN; TRAIN SERVICE.**

Modern Fast Trains (Moderne Schnellzüge). A short review of high-speed train records and of electric high-speed projects. 1200 w. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 11, 1902.

Discussion on Speed of Passenger Trains. B. A. Worthington. A communication giving interesting ideas and information on this subject. Discusses the approximate difference in the cost of pulling a 7-car passenger train 100 miles on a 3-hour schedule, and the same train on a 3-hour and 20-min. schedule, particularly as to cost of fuel. 2400 w. Ry & Engng Rev—May 10, 1902.

"Alton Limited."—The New "Alton Limited." Illustrated description of fine passenger equipment for this train. 1000 w. R R Gaz—Vol. XXXIX., No. 9.

America.—The Fastest Trains in the United States. W. A. Schulze, in "Zeitung des Vereins." Three short articles on the speed of American trains, giving tables. 3800 w. Bul Int Ry Cong—Sept., 1903.

America and Europe.—The Speed of Express Trains in Europe and the United States (Vitesse de Marche des Trains Express en Europe et aux Etats-Unis). A large table, taken from "Archiv für Eisenbahnwesen," giving comprehensive statistics of fast trains in Europe and America. 1200 w. Revue Technique—Dec. 10, 1901.

Train Speeds in Germany and America. Extracts from article by George C. Tunell, in the June number of the "Journal of Political Economy." Discusses statements made in paper by W. Schulze, and the comparisons made. 2700 w. Ry Age—July 18, 1902.

The Swiftest Trains in Europe and America (Die Schnellsten Züge in Europa und Amerika). Arnold Kramer. A tabulated comparison of standard trains on the principal railways of England, France, and the United States. 2000 w. Glasers Annalen—April 1, 1905.

The Fastest Trains in Europe and America. Arnold Kramer, in "Annalen für Gewerbe und Bauwesen." Information concerning the fastest trains at the present time. 900 w. Bul Int Ry Cong—Dec., 1905.

See also British and American.

Atlantic City-Philadelphia.—The Fast Camden-Atlantic City Trains. Facts and particulars concerning trains run by the Pennsylvania R. R. and the Philadelphia & Reading R. R. 3000 w. R R Gaz—Nov. 2, 1900.

See also **LOCOMOTIVE—"Atlantic."**

Braking.—See **AIR BRAKE—High-Speed.**

British.—The Alleged "Railway Race." Charles Rous-Marten. On misconceptions appearing in the British daily papers and how they have arisen, with a statement of facts. 2800 w. Engr, Lond—July 5, 1901.

British and American.—British and American Expresses. Aiming to prove Britain well in advance of America as regards the volume and average speed of her express traffic. 1400 w. Transport—Jan. 10, 1902.

C., B. & Q. Ry.—The Burlington Fast Mail. An account of the performance of these trains between Chicago and the Missouri River during the last two years, with comment. 900 w. Ry Age—May 16, 1902.

Cost.—The Question of the Cost of High-Speed Trains. C. Rous-Marten. Showing that the advantages of high-speed cause it to be a profitable practice; rapid transportation being the counterpart to intensified production. 4500 w. Engineering Magazine—Feb., 1901.

Cost of Running Trains at High Speed. Considers the cost of running trains at high speed as affected by mechanical considerations. 4800 w. Am Ry Mas Mech' Assn—Saratoga meeting, 1901.

The Cost of Running Trains at High Speed. John G. Crawford. A study of the results of tests made on the Chicago, Burlington & Quincy R. R. during July, 1900. 1200 w. Eng News—Sept. 12, 1901.

Concerning the Cost of Train Speed. Editorial discussion of the importance of the speed of freight trains, and the chance for economy. 1400 w. R R Gaz—June 13, 1902.

See also **LOCOMOTIVE OPERATION; MECHANICAL ENGINEERING—Topical Discussion.**

1897-1900.—Fast Runs. Tabulated statement of fast and unusual runs made during 1897-1900. 500 w. R R Gaz—Jan. 11, 1901.

Europe.—The Speed of Express Trains in Europe.

Editorial on an article in the "Archiv für Eisenbahnwesen," by W. Schulse, making a study of this subject. 1100 w. R R Gaz—Feb. 8, 1901.

See also America and Europe; British; French Northern.

French.—See British.

French Northern.—Fast Running on the Northern France. Report of a run from Arras to Paris. 450 w. R R Gaz—Nov. 16, 1900.

The Fastest Timed Railway Run in Europe. Charles Rous-Marten. Reports a new departure on the Northern Railway of France which gives it the fastest-timed railway run ever yet seen in European time-tables, including the British Isles. 700 w. Engr, Lond—April 18, 1902.

German and American.—See America and Europe.

Great Western, Eng.—See London-Plymouth; LOCOMOTIVE PERFORMANCE.

Great Western Royal.—A Royal Train "Record." Brief account of a run made by the Royal train on the Great Western Railway, from London to Cornwall. 600 w. Engr, Lond—July 17, 1903.

The Great Western's Royal "Record" Run. Charles Rous-Marten. Gives details of what is claimed as the most remarkable run on record. 2700 w. Engr, Lond—Aug. 14, 1903.

Lake Shore R. R.—A Twentieth Century Run. An account of a run of 133.9 miles at 69.8 miles per hour of the Twentieth Century Limited on the Lake Shore R. R. to make up time lost by the tracks being blocked by a wreck near Brocton, N. Y. 800 w. Am Engr & R R Jour—Aug., 1902.

See also New York-Chicago.

London-Birmingham.—Birmingham to London in One Hour, Fifty-five Minutes. Describes the successful run of a new train on the London and North Western. 800 w. Engr, Lond—Aug. 8, 1902.

London-Brighton.—Record Runs Between London and Brighton. Charles Rous-Marten. A report of test runs made to show that the trips could be made in 50 minutes, the time being really less than that. 1800 w. Engr, Lond—July 31, 1903.

London-Edinburgh.—Notes From Scotland. Alexander F. Sinclair. Discusses the increase of speed in London to Edinburgh trains, and the Knottingley locomotive boiler explosion. 1100 w. Loc Engng—Sept., 1901.

London-Leeds.—Great Northern Records Between London and Leeds. Charles Rous-Marten. A report of two record trips on this British railway. 2000 w. Engr, Lond—July 17, 1903.

London-Plymouth.—The Longest Non-Stopping Railway in the World. Charles Rous-Marten. An interesting account of two regular daily runs on the Great Western railway of 345 1-2 miles without halt—from Paddington to Plymouth and return. 2200 w. Engr, Lond—July 8, 1904.

London to Plymouth Without a Stop. A. G. Robins. Notes on the train service of the Great Western Railway, with reference also to other lines and to the progress recently made. 2500 w. Engng—July 15, 1904.

A Long Run Without a Stop. H. A. B. Campbell. Gives running time of the trains between London and Plymouth, with remarks on the service. The distance is 246 miles and the grades severe. 1800 w. R R Gaz—Vol. XXXVII., No. 14.

See also Great Western Royal; LOCOMOTIVE PERFORMANCE—Great Western, Eng.

London-South Western.—A "Record" Run on the London and South-Western. Charles Rous-Marten. An interesting account of the inaugural trip of fast service on the road named. 3300 w. Engr, Lond—July 10, 1903.

N. Y. & New Haven.—The New Haven's Merchants' Limited Train. Illustrates and describes two complete new Pullman trains placed recently on 5-hour service between New York and Boston. 800 w. Ry Age—Nov. 25, 1904.

N. Y. Central.—See New York-Chicago.

New York-Chicago.—New York to Chicago in Twenty Hours. Information concerning runs made by the new twenty-hour trains between New York and Chicago. Ill. 700 w. Ry Age—July 25, 1902.

Shortening Time Across the Continent. Henry Herbert McClure. Discussing the improved railway service in the United States, especially the twenty-hour train established between New York and Chicago. 1800 w. Nat Geog Mag—Aug., 1902.

A Ride to Chicago and Back on the Locomotive of the Twentieth Century Limited. An interesting account of the trip, with illustrations. 2500 w. Sci Am—Dec. 13, 1902.

Fastest Trains in the World. Angus Sinclair. Remarks on the 18-hour trains between New York and Chicago, run by the New York Central and the Pennsylvania lines, with illustrations of engines and cars. 1000 w. Ry & Loc Engng—July, 1905.

The New York-Chicago Fast Trains. A record of the speed of the special trains run over the road in June, with remarks. 1800 w. R R Gaz—Vol. XXXVIII., No. 26.

South Eastern & Chatham.—South-Eastern & Chatham Express Train. Engraving and description of a fine British express train. 900 w. Loc Engng—Nov., 1905.

Zossen, Germany.—High-Speed Railway Trains in Germany (Essais de Trains à Marche Rapide en Allemagne). Describing trials of steam locomotives on the Marienfelde-Zossen military railway, showing that speeds of 120 kilometres per hour were readily attained. 1800 w. Génie Civil—June 3, 1905.

See also AIR RESISTANCE; ELECTRIC RAILWAY.

TRAIN HEATING.

See CAR HEATING.

TRAIN INDICATOR.

See also STATION INDICATOR.

Electric.—An Electric Train Indicator. E. C. Parham. Describes a device whereby passengers at stations may tell the destination of any approaching train. 1200 w. Am Elect'n—March, 1903.

TRAINING SHIP.

See also NAVY; SCHOOL SHIP.

British Navy.—The Training of Engine-Room Artificers for the Royal Navy. Illustrated description of the training ship Bellerophon to be used in fitting mechanics for the Royal Navy. 2500 w. Engr, Lond—April 22, 1904.

The Training of Engine-Room Artificers. Describes a new departure for fitting engine-room artificers for the Royal Navy. An extensive floating department strictly under naval discipline. Ill. 2400 w. Engng—April 22, 1904.

"Okean."—See SCHOOL SHIP.

TRAIN INTERCOMMUNICATION.

See TELEPHONE—Railway.

TRAIN LIGHTING.

See CAR LIGHTING.

TRAIN OPERATION.

See also RAILWAY OPERATION; TRAIN; TRAIN SERVICE.

Automatic Control.—See RAILWAY SIGNAL—Locomotive Cab.

TRAIN PARTING.

See TRAIN—Parting.

TRAIN RESISTANCE.

See also ACCELEROMETER; AIR RESISTANCE; CAR BEARINGS; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE RATING; TRACTION; TRAIN.

Train Resistance. A. H. Armstrong. Considers the question of train friction, comparing the data from different tests. 2500 w. St Ry Jour—July 5, 1902.

Frictional Resistances on Railways (Der Reibungs-Widerstand bei Schienenbahnen). A discussion of the various resistances met with by trains moving on rails, with formulas and diagrams. Serial. 2 parts. 9000 w. Ill Zeitschr f Klein u Strassenbahnen—June 1 and 16, 1903.

Train Resistance. C. O. Mailloux. Summarizes the important fundamental laws and discusses their application to train propulsion. Serial. 1st part. 4500 w. Harvard Engng Jour—Nov., 1903.

Resistance to Locomotive Traction at High Speeds. Discusses the methods of finding the resistance to the motion of a train in the experimental investigations made. 2000 w. Engng—July 8, 1904.

Train Resistance. Chester A. Crandall. Gives first a comparison of the calculated with the actual train resistance; second, an analysis of the several factors which influence train resistance; third, a comparison of the best-known formulae. 1200 w. R R Gaz—Vol. XXXVII, No. 21.

Air.—Frictional Effect of Railway Trains Upon the Air. Francis E. Nipper. Reports a series of experiments bearing on this subject. Ill. 2800 w. Ry & Engng Rev—Jan. 26, 1901.

See also **AIR RESISTANCE; DYNAMOMETER—Renard; ELECTRIC CAR—Dynamometer.**

Aspinall.—Train Resistance. J. A. F. Aspinall. Abstract of a paper read before the Inst. of Civ. Engrs. dealing with results of experiments carried out with a dynamometer car on the Lancashire and Yorkshire Railway, in an endeavor to arrive at the tractive effort required to haul modern railway carriages. Also editorial. 2000 w. Engr, Lond—Nov. 29, 1901.

Train-Resistance. J. A. F. Aspinall. Extracts from a paper presented before the (British) Inst. of Civ. Engrs., setting forth details and results of some very elaborate experiments to ascertain the resistance of trains. Plate. 5000 w. R R Gaz—June 20, 1902.

Tractive Resistance of Loaded Railway-Wagons. J. A. F. Aspinall. Paper presented Inst. of Civ. Engrs. (England). An account of experiments made to determine the resistances of 10-ton, 20-ton and 30-ton railway wagons, loaded to their full capacity. Ills. 1100 w. R R Gaz—Vol. XXXVIII, No. 1.

Some Notes on Train Resistance. C. F. Dendy Marshall. Investigates details given by C. J. Bowen Cooke, of experiments carried out with the dynamometer van on the North-Western Railway, and the figures given by J. A. F. Aspinall in a paper read before the Inst. of Civ. Engrs. 2800 w. Engr, Lond—Oct. 2, 1903.

Blood.—A Rational Train Resistance Formula. John Balch Blood. A brief history of train resistance formulae and their devlopment, with discussion of each. 3000 w. Trans Am Soc of Mech Engrs—June, 1903.

See also **Davis.**

Center-Plate Friction.—Center Plate Friction and Its Effect on Wheel Flange Resistance. Willis C. Squire. A discussion of experimental investigations and their results. Also tables and general discussion. 7800 w. W. Ry Club—May, 1901.

See also **CAR BEARING.**

Computer.—Daly's Train-Resistance Computer. Illustrated detailed description of a "tonnage indicator," or mechanical arrangement for quickly computing the resistance of a train of cars. 1600 w. R R Gaz—April 25, 1902.

Curves.—Curve Resistance Tests at West Alton, Mo. Max H. Wickhorst. Describes tests made with dynamometer car on 7½ degree curve to determine the relative resistance of a train on straight track and curves at this point. 1200 w. Am Engr & R R Jour—April, 1902.

See also **TRACTION—Street Railway Curves.**

Davis.—Train Resistance. W. J. Davis, Jr. Discusses train resistance as affected by the interurban service of electric railways. Also comments on this paper, by engineers who have given special attention to the subject. 7500 w. St Ry Jour—May 3, 1902.

Train Resistance Formulae. John Balch Blood. A discussion of the formulae deduced by Mr. Davis, based on a series of tests on the Buffalo & Lockport Ry. 2000 w. St Ry Jour—July 5, 1902.

Train Resistance. W. J. Davis, Jr. Gives information of value based on tests made from time to time with electric cars operated under a wide range of conditions, and the resistances obtained by ammeter and voltmeter readings. 2500 w. St Ry Jour—Dec. 3, 1904.

Electric Railway.—See **Davis; AIR RESISTANCE—Zossen Railway; ELECTRIC RAILWAY—Speed-Time Curves.**

Europe.—Experiments upon Train Resistance (Versuche über den Widerstand von Eisenbahnzügen). Rolf Sanzin. A comparison of the results of French, German and Austrian experiments, giving curves representing the mean results. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 4, 1901.

Formulae.—Train Resistance Formulas. John G. Crawford. A discussion of the subject with special reference to the resistance of the portion of the train behind the tender. 1800 w. Eng News—Oct. 31, 1901.

New Formulae for Train Resistance (Nouvelles Formules de la Résistance des Trains). A comparison of various train resistance formulae, with diagram. 1000 w. Génie Civil—Jan. 11, 1902.

See also **Aspinall; Blood; Computer; Davis.**

Hanover Experiments.—New Determinations of the Resistance of Locomotives and Trains at High Speeds (Neuere Ermittlungen über die Widerstände der Lokomotiven und Bahnzüge mit Besonderer Berücksichtigung Grosser Fahrgeschwindigkeiten). Prof. Albert Frank. Discussions of experiments made on railways in Hanover to determine frictional, air and other resistances of locomotives and trains at speeds up to 100 kilometers an hour. Diagram. 4000 w. Zeitschr Ver Deutscher Ing—March 28, 1903.

German Tests of Railway Train Resistance. Prof. Albert Frank, in the "Zeitschrift des Vereines Deutscher Ingenieure." A report of a series of tests at different speeds carried out on the state railways of Hanover, Germany. 1000 w. Eng News—June 25, 1903.

Lancashire-Yorkshire Tests.—See **Aspinall.**

Locomotive Efficiency.—Train Resistances and Locomotive Efficiencies (Die Bewegungswiderstände der Eisenbahnfahrzeuge und die Leistungsfähigkeit der Lokomotiven). H. von Borries. A discussion of the performance of steam locomotives in the light of the high-speed electric trials. 2500 w. Zeitschr d ver Deutscher Ing—May 28, 1904.

See also **LOCOMOTIVE PERFORMANCE.**

Rotating Parts.—A Consideration of the Inertia of the Rotating Parts of a Train. Norman Wilson Storer. An investigation of this feature which has been almost neglected. 1500 w. Trans Am Inst of Elec Engrs—Feb., 1902.

Tonnage Indicator.—See **Computer.**

Track.—Train Resistance in Relation to the Track. P. H. Dudley. Reviews the reduction in train resistance and the factors that have most contributed to improvement, studying the effect of the distribution of loads, and the condition of tracks. 4500 w. Harvard Engng Jour—June, 1905.

See also **RAIL; TRACK.**

Underground Railway.—See **UNDERGROUND RAILWAY—Tubular.**

Zossen.—See **AIR RESISTANCE; ELECTRIC RAILWAY.**

TRAIN RULES.

See **RAILWAY OPERATION.**

TRAIN SERVICE.

See also **CAR; LOCOMOTIVE PERFORMANCE; RAILWAY OPERATION; TRAIN; TRAIN, FAST.**

Branch Lines.—On the Question of the Organisation of a Cheap Service on a Main Railway's Branch Lines Which Carry Little Traffic and on Light Railways (Subject XIX for Discussion at the Seventh Session of the Railway Congress). J. Rocca. Report No. 1, for all countries, except America, Austria-Hungary, Germany and Holland. 10,000 w. 3 tables and fig. Bul Int Ry Cong—Dec., 1904.

On the Question of the Organisation of a Cheap Service on a Main Railway's Branch Lines which Carry Little Traffic and on Light Railways. Cornel de Tolnay. Subject XIV for discussion at the seventh session of the railway congress. For Austria-Hungary, Germany and Holland. 5700 w. Ills. Bul Int Ry Cong (2d part)—Feb., 1905.

British.—European Railway Jottings. Charles Rous-Marten. Notes on British train service during the last year of the century. 1600 w. Loc Engng —Feb., 1901.

The London and Northwestern Company's Accelerated Train Services. Information concerning improved service between London, Manchester and Liverpool, and between Wolverhampton, Birmingham and London. 2500 w. Transport—May 30, 1902.

The Origin of British Express Trains. W. B. Paley. A brief review of this feature of British railroading. 1500 w. R R Gaz—Jan. 8, 1904.

British Autumn Train Services. Charles Rous Marten. A review of the general scheme of train services for the autumn on the railways of Britain. 2000 w. Engr, Lond—Oct. 14, 1904.

Summer Train Services in 1905—British and French. Charles Rous-Marten. A review of the improvement in fast service and a comparison to England's disadvantage. 3000 w. Engr, Lond—Oct. 6, 1905.

See also **TRAIN, FAST.**

British and French.—British and French Train Services in 1900. Charles Rous-Marten. Reviews the last year, the long runs, fast runs and general service in both countries. 4800 w. Engr, Lond—Jan. 11, 1901.

British and French Train Services in 1901. Charles Rous-Marten. A review of the principal train services of Great Britain and France as scheduled in the official time-books during the first year of the twentieth century. Serial. 1st part. 2700 w. Engr, Lond—Feb. 14, 1902.

Railway Accelerations—English and French. Charles Rous-Marten. Gives details of improved service on both English and French lines. 2500 w. Engr, Lond—June 6, 1902.

British and French Summer Train Services in 1902. Charles Rous-Marten. Reviewing what has been done during the current season in the way of improvements. 2000 w. Engr, Lond—Aug. 22, 1902.

British and French Train Services in 1903. Charles Rous-Marten. A review of the general character and tendency of the principal train services of Great Britain and France. 4000 w. Engr, Lond—Jan. 8, 1904.

British and French Summer Train Services in 1904. Charles Rous-Marten. The present article is a review of the service on British railways, calling attention to the progress made and novelties introduced. Serial. 1st part. 2500 w. Engr, Lond—July 15, 1904.

Between London and Paris. A comparison of routes, services, gradients, speed, etc., of the English and French lines. Ill. 2100 w. Transport—June 6, 1902.

British Coronation.—Express Trains at Four-Minute Intervals on an English Railway. Extract from an English paper concerning the arrangements for the extra traffic at the celebration over the coronation of the King. 900 w. Eng News—June 12, 1902.

Chicago.—Railways and Train Service in Chicago. Tabulated statement of the average number of trains arriving and departing every 24 hours at the present time, with explanatory remarks. 1800 w. Ry Age—Jan. 2, 1903.

Chicago & Northwestern.—A Typical Suburban Service. An account of the service rendered by the Chicago & Northwestern R. R., in carrying rural residents to and from Chicago. Map and illustrations. 5200 w. Ry Age—Feb. 15, 1901.

Fast.—See **TRAIN, FAST.**

French and British.—See **British and French.**

Graphic Record.—See **RAILWAY OPERATION.**

Great Western.—See **LOCOMOTIVE PERFORMANCE; TRAIN, FAST—London—Plymouth.**

Suburban.—See **Chicago & Northwestern.**

Workmen's.—Workmen's Trains in England. Facts and general information concerning the development of this service, the frequency of trains, number of passengers, rates, &c. 3700 w. Ry Age—May 20, 1904.

See also **Branch Lines.**

TRAIN SHED.

See also **RAILWAY STATION; RAILWAY TERMINAL.**

Hoboken, Lackawanna.—See **RAILWAY STATION.**

Skylights.—See **RAILWAY STATION—Skylights.**

TRAIN STAFF.

See **RAILWAY OPERATION—Train Staff.**

TRAMWAY.

See also **ELECTRIC RAILWAY; LIGHT RAILWAY; STREET RAILWAY.**

Aerial.—See **CABLEWAY.**

Cable.—See **CABLE RAILWAY.**

Compressed Air.—See **COMPRESSED-AIR RAILWAY.**

Congress.—See **STREET RAILWAY.**

Electric.—See **ELECTRIC RAILWAY; ELECTRIC RAILWAY, ACCUMULATOR; ELECTRIC RAILWAY CONDUIT; ELECTRIC RAILWAY, CONTACT.**

Kenton and Coxlodge.—See **WAGONWAY.**

Steam.—See **STEAM TRAMWAY.**

Stone.—Stone Tramways. Describes a system of stone tramways development, known as the Heytor tramway, in Devonshire, Eng., opened Sept. 16, 1820, and others of similar construction. 1900 w. Engr, Lond—April 19, 1901.

Stratford-Moreton, Eng.—See **RAILWAY.**

Wire Rope.—See **CABLEWAY.**

TRANSFER BRIDGE.

See also **FERRY BRIDGE.**

New Orleans.—A Movable Railway Incline Bridge at New Orleans. Illustrates and describes a tilting landing stage for the transfer of trains from Mississippi boats to the tracks of the Texas & Pacific Ry. It is a trussed bridge, fixed at the shore end, but capable of a wide range of adjustment at the river end. 2700 w. Eng Rec—Oct. 24, 1903.

N. Y. Central.—Standard Transfer Bridge for Car Floats—New York Central & Hudson River Railroad. Illustrated detailed description of the method of transferring cars from the float to the shore, including the construction of the bridge, apron and operating machinery. 1700 w. R R Gaz—May 31, 1901.

Standard Car-Transfer Bridge; N. Y. Central & Hudson River R. R. Illustrated description. 900 w. Eng News—Dec. 19, 1901.

TRANSFERRING MACHINE.

See **NAVAL ARCHITECTURE—Transferring Machine.**

TRANSFER TABLE.

See also **TURNTABLE.**

Electric.—Electric Transfer Table (Chariot Electrique à Niveau). M. Sabouret. A description of the transfer table used in the new station of the Orleans railway at Paris for handling the electric locomotives. The construction avoids the use of a depressed track. 2000 w. 1 plate. Rev Gen des Chem de Fer—May, 1901.

Transfer Table Without Pit (Chariot Roulant Sans Fosse). M. Cartault. A description of the electric transfer table used by the Paris, Lyons, Mediterranean Railway; constructed without requiring a pit or depression for the tracks for the table. 2000 w. 1 plate. Rev Gen des Chem de Fer—June, 1901.

Electric Transfer Table (Chariot Transbordeur Electrique). M. Pouchucq. Illustrated description of transfer tables of the Western Railway of France, arranged to travel upon curves and upon straight tracks. 2500 w. Rev Gen des Chem de Fer—Aug., 1904.

Traverser for the Western Railway of France. Illustrates and describes a new type, designed by M. Dubois, which is light and strong, easy of operation and designed to transfer rolling-stock from one curved track to another. 1000 w. Engng—July 28, 1905.

TRANSFORMER.

See also **ELECTRIC CURRENT; ELECTRIC CURRENT CONVERTER; ELECTRIC DISTRIBUTION; ELECTRIC STATION; ELECTRIC SUBSTATION; ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT; INDUCTION COIL;**

MOTOR GENERATOR; ROTARY CONVERTER.

Transformers. A. S. M'Allister. Concerning the behavior of the transformer built according to modern practice. 3500 w. Am Elect'n—Oct., 1901.

Some Up-to-Date Transformers. W. B. Warrilow. Illustrates and describes recent designs showing the advances made. Serial. 1st part. 3000 w. Elec Engr, Lond—Oct. 25, 1901.

Types of Transformers. John H. Ryan, Jr. An illustrated article explaining the systems of transmission of high-voltage currents and the transformers in use. 3500 w. Engr, U S A—March 15, 1902.

Transformers in Transmission Systems. Alton D. Adams. Gives examples showing the practice and discusses details. Serial. Two parts. 3000 w. Elec Rev, N Y—April 11 and 18, 1903.

Some Notes on the Theory and Working of Transformers. W. Rogers. Considers the fundamental principles of the alternate-current transformer, and important phenomena met with in the working. Serial. 1st part. 2400 w. Elec Engr, Lond—Dec. 18, 1903.

Transformers for Long-Distance Transmission. J. S. Peck. An illustrated description of the modern transformer. 4000 w. Cassier's Mag—June, 1904.

Transformers. R. T. MacKeen. Read before the Can. Elec. Assn. A general discussion upon the characteristics of lighting and power transformers as used for pole suspension in sizes limited to 50 K. W. and less. 5000 w. Can Elec News—Aug., 1905.

Aging.—See AGING.

Air Blast vs. Oil.—The Relative Fire-Risk of Oil and Air-Blast Transformers. E. W. Rice, Jr. A short paper to introduce a discussion of this subject. 900 w. Trans Am Inst of Elec Engrs—Jan., 1904.

Discussion on "The Relative Fire-Risk of Oil and Air-Blast Transformers. 28,500 w. Trans Am Inst of Elec Engrs—March 25, 1904.

Oil-Insulated Versus Air-Blast Transformers. M. A. Sammett. Gives practical results aiming to show the superiority of the oil-insulated type. 2500 w. Elec Rev, N Y—March 18, 1905.

Andrews Discriminating.—Some Experiments at the Hastings Electricity Works. An illustrated account of short-circuiting experiments showing the action of the Andrews "discriminating" transformer and choking coil, and of other experiments showing various apparatus and arrangements at Hastings, England. 3200 w. Elect'n, Lond—Dec. 26, 1902.

See also ELECTRIC STATION—Hastings, Eng.

Auto-Transformer.—The Theory of the Auto-Transformer (Die Theorie des Autotransformators). Dr. Ed. Slovsa. A discussion of the action of transformers in which the change of pressure is effected by the use of a single bobbin system. Serial. Part I. 2500 w. Zeitschr f Elektrotechnik—Sept. 18, 1904.

Auvert-Ferrand.—Single-Phase Electric Traction (La Traction Electrique par Courant Alternatif Simple). Describing the Auvert-Ferrand transformer for use directly upon the car. 1500 w. Génie Civil—Nov. 11, 1905.

Bay Counties Power Co.—See ELECTRIC GENERATOR.

Berthier Actino-Electric.—See ELECTRICITY DIRECT.

Care.—Care and Operation of Transformers. M. A. Sammett. Suggestions for the care and operation of both service and station transformers. 2500 w. Can Elec News—April, 1905.

Compound.—See ELECTRIC GENERATOR, ALTERNATING.

Compressed Air Insulation.—See ELECTRIC TRANSMISSION—Atmospheric Losses.

Connections.—Ordinary Transformer Connections. William H. Kritzer. Explanations with diagrams. 700 w. Min & Sci Pr—Feb. 6, 1904.

Y or Delta Connection of Transformers. F. O. Blackwell. Also discussion by J. S. Peck. A general statement of the advantages and disadvantages of both connections, as they appear to the writer. Mr. Peck discusses the question of grounding or not grounding the neutral and the best method of connecting transformers. 4800 w. Trans Am Inst of Elec Engrs—July, 1903.

See also Terminals and Bushings.

Constant Potential.—Single-Phase Constant Potential Transformers. George T. Hanchett. An explanation of the law of turns and voltages, considering a concrete case. 2500 w. Cent Sta—Nov., 1902.

Continuous-Current.—See DYNAMOTOR.

Core Aging.—See AGING—Transformer Core.

Core Plates.—The Best Thickness for Transformer Core Plates for Minimising Iron Losses (Die Hinsichtlich der Eisenverluste Günstige Stärke von Transformatorbleche). Hans Kamps. An investigation of the thickness of sheet iron plates for transformer cores to secure a minimum loss from hysteresis and eddy currents. 1800 w. Elektrotech Zeitschr—Feb. 5, 1903.

See also Sheet Steel.

Design.—The Design of Transformers. W. B. Woodhouse. Explains the method of design, the two types of modern transformers, and the advantages of each, etc. Serial. 1st part. 1700 w. Elect'n, Lond—Feb. 15, 1901.

The Design of Alternating Current Transformers. Harold B. Smith. Information and data to serve as a guide to those not entirely familiar with recent practice in transformer designs. Serial. 1st part. 3700 w. Jour Worcester Poly Inst—Nov., 1902.

Graphical Examination of Current and Pressure in Transformers (Graphische Methode zur Ermittelung der Strom- und Spannungswerte von Ungleichmassig belasteten Drehstromtransformatoren). Aug. König. An application of the graphical method of Blanc, using the vector analysis. 6000 w. Elektrotech Zeitschr—Jan. 8, 1903.

Predetermination of Transformer Regulation. Emerson G. Reed. Gives an empirical formula by which the inductance of the equivalent choking coil can be computed for a transformer of a particular type; also tabulated data on a line of commercial core-type transformers. 500 w. Elec Wld & Engr—March 12, 1904.

The Elementary Principles of Transformer Design. Prof. Thomas Gray. Outlines a method of treatment which may be followed with advantage in making an original design. Deals mainly with the problem of maximum efficiency. Serial. 1st part. 1800 w. Elec Wld & Engr—April 23, 1904.

Notes on Transformer Design (Ueber den Entwurf von Transformatoren). Arthur Miller. Deriving formulas for the most efficient proportion of iron cores and coils. 2000 w. Zeitschr f Elektrotechnik—July 17, 1904.

The Computation of Transformers (Zur Berechnung von Transformatoren). Dr. Richard Hiecke. Deducing formulas and tables for the most efficient proportions of transformers, with practical applications. 3000 w. Zeitschr f Elektrotechnik—Nov. 18, 1904.

The Design of Transformers. Gives an output formula representing a rule covering various designs from 5 kw. to 1,000 kw. as a basis for calculations. 700 w. Elec Rev, Lond—June 16, 1905.

The Proportions of Transformers Involving a Minimum Cost for Materials (Berechnung von Transformatoren auf den Mindestbetrag an Kosten des Wirksamen Materials). Dr. R. Pohl and Hermann Bohle. Deriving formulas and graphical diagrams for simplifying the practical calculations required for construction. 4000 w. Elektrotech Zeitschr—Sept. 28, 1905.

Calculation of Alternate-Current Transformers for Minimum Cost. Dr. R. Pohl and H. Bohle. Discusses the constructing of a transformer at a minimum cost for a given efficiency. Describes method entirely devoid of mathematical difficulties. Serial. 1st part. 1500 w. Elec Engr, Lond—Sept. 29, 1905.

See also Reactance; Voltage Drop.

Design, Flux Distribution.—Flux Distribution in Design. A. Press. Gives two cases, showing the effect of the lack of uniformity of distribution of magnetic flux in transformers. Also editorial. 1700 w. Elec Wld & Engr—April 8, 1905.

Diagram.—Circular Diagram for Special Cases of Transformers (Kreisdiagramme für Specielle Fälle des Allgemeinen Transformators). K. Kuhlmann. An examination of the Ossanna diagram, with applications to practical examples showing the agreement of results with those obtained by computation. 4000 w. Elektrotech Zeitschr—April 18, 1901.

See also **ELECTRIC MOTOR—Induction-Transformer.**

Efficiency Curve.—The Efficiency Curves of Constant Potential Transformers. A. E. Kennelly. A treatment of this subject stating the assumption made and concluding the efficiency curve is an acute hyperbola, having for one of its asymptotes a straight line representing only the copper loss. 1200 w. Elec Wld & Engr—April 16, 1904.

Electrostatic.—On an Attempt to Construct an Electrostatic Transformer. James Edmund Ives. Describes some experiments with a ballistic galvanometer, and others with the alternating-current. 800 w. Elec Wld & Engr—Oct. 10, 1903.

Fire Hazard.—The Station Transformer Hazard. George P. Low. Abstract of a paper read before the Fire Underwriters' Assn. of the Pacific. Considers the practice of immersing the transformer in oil and the dangers arising, suggesting their elimination by the confinement of the transformers in separate fireproof buildings. 1600 w. Jour of Elec—Aug., 1902.

See also **Air Blast vs. Oil.**

Ground Shield.—The Use of Ground Shields in Transformers. J. S. Peck. Considers the grounding of the low-pressure winding at the neutral point is a safer, more practical and cheaper method of protection. 600 w. Trans Am Inst of Elec Engrs—June 21, 1904.

See also **ELECTRIC DISTRIBUTION.**

High Voltage.—High-Tension Transformers. J. W. Farley. Describes the transformers of the Shawinigan Water & Power Co. as typical of the latest and best engineering practice in the design of high tension apparatus. Serial. 1st part. 2600 w. Can Engr—July, 1903.

High Tension Transformers. J. W. Farley. Describes the transformers as typical of the latest and best engineering practice in the design of high tension apparatus. 3700 w. Cent Sta—Aug., 1903.

See also **Smith; ELECTRIC TRANSMISSION.**

Incidents.—Transformer Incidents. Thomas W. Varley. Gives some interesting incidents in the use of transformers, explaining the causes. 800 w. Elec Wld & Engr—Feb. 23, 1901.

Induction Regulator.—See **INDUCTION REGULATOR.**

Insulation.—Transformer Insulation. O. B. Moore. Discusses the relation of ohmic resistance and dielectric strength. 2000 w. Elec Jour—June, 1905.

See also **INSULATION.**

Iron Losses.—Iron Losses in Loaded Transformers. Dr. E. S. Johonnott. Offers an explanation of the apparent diminution in the iron losses with increased load in the secondary. Also determines the magnitude of the exciting current and its phase with reference to the induction. Diagrams. 3500 w. Elec Wld & Engr—July 2, 1904.

See also **Core Plates; Testing; ELECTRIC GENERATOR; MAGNETIC TESTING.**

Iron Testing.—See **Testing; MAGNETIC TESTING.**

Leblanc Rectifying.—Leblanc Rectifying Transformer. Explains the fundamental principle of this invention. 2000 w. Elec Wld & Engr—Aug. 22, 1903.

See also **ELECTRIC CURRENT CONVERTER.**

Losses.—See **Iron Losses; Testing; ELECTRIC STATION MANAGEMENT; MAGNETIC TESTING.**

Magnetic Link.—See **ELECTRIC MEASUREMENT.**

Magnetization Curve.—See **OSCILLOGRAPH—Transformer Curves.**

Measuring Instruments.—Measuring Instrument Transformers. F. Punga. Explains the use of transformers in connection with measuring instruments to measure currents, showing the influence of various factors on the ratio of primary to secondary currents. Ill. 2500 w. Elect'n, Lond—Oct. 9, 1903.

Oil.—See **OIL.**

Oil Insulated vs. Air Blast.—See **Air Blast vs. Oil.**

Operation.—See **Core; Parallel.**

Parallel.—Paralleling of Alternate-Current Transformers. Arnold G. Hansard. The object of the paper is to explain the principles in a simple way for those who do not care to study the subject mathematically. 1300 w. Elec Times—Jan. 16, 1902.

On the Parallel Working of Delta- and Star-Connected Three-Phase Transformers. A. E. Kennelly and S. E. Whiting. Shows that it is not possible to parallel the secondaries of three-phase transformers when the transformation is delta-to-star or star-to-delta in one set, and delta-to-delta or star-to-star in the other. A study of phase transformation. 1200 w. Elec Wld & Engr—July 9, 1904.

The Multiple Operation of Transformers. R. T. MacKeen. Discusses the principles involved in the multiple operation of transformers, thus showing how to accomplish the best results. 2000 w. Can Elec News—Nov., 1905.

See also **ELECTRIC GENERATOR, ALTERNATING.**

Polyphase.—The Action of Unloaded Transformers for Polyphase Currents (Ueber den Leerlauf von Drehstrom Transformatoren). R. Goldschmidt. An examination of the distribution in non-symmetrical transformers. 1500 w. Elektrotech Zeitschr—Nov. 29, 1900.

Polyphase Ratio.—Ratio of Transformation in Three-Phase Circuits. William A. DelMar. Calls attention to the changes in ratio of transformation that can attend the various methods of connecting sectional transformers with three-phase circuits. Mathematical. 600 w. Elec Wld & Engr—April 19, 1902.

Reactance.—The Reactance Drop and Reactance Factor of Transformers. A. E. Kennelly. Develops formula and gives table prepared from it, with explanation. 1400 w. Elec Wld & Engr—July 20, 1901.

A Practical Method of Calculating Transformer Reactance. Presents a simple method of arriving at a basis from which the short circuit reactance of transformers of ordinary commercial design may be accurately predicted. 1000 w. Elec Rev, Lond—Sept. 5, 1902.

Resonance.—A Note on Transformers (Sur les Transformateurs). E. Brylinski. A mathematical discussion of the phenomena of resonance as exhibited in the operation of transformers. 3500 w. Bull Soc Int d Electriciens—Jan., 1905.

See also **Static Disturbance; ELECTRIC TRANSMISSION.**

Schwartzkopff.—A New Type of Transformer (Eine Neue Transformatorentype). E. Ziehl. Illustrated description of the Schwartzkopff trasformer in which the core is arranged in a series of rectangles. 1200 w. Elektrotech Zeitschr—Sept. 10, 1903.

Series.—Operation of the Series Transformer. Edward L. Wilder, in the "Electric Club Journal." An explanation of the operation, and the difference between the series and the shunt. 1000 w. Elec Rev, N Y—Oct. 1, 1904.

Series Resistance.—Effect of Series Resistance in the Primary Circuit of a Transformer. H. A. Pikler. Shows that by sending a sine wave exciting current through the transformer we get the e. m. f. wave distorted. 1200 w. Elec Wld & Engr—Aug. 8, 1903.

Sheet Steel.—Sheet Steel for Static Transformers. Walter S. Moody. Briefly reviews the development that has resulted in great improvement in the efficiency, safety and life of transformers, and considers the improved structure of the steel used to be the principal reason for the progress made. 1500 w. Elec Wld & Engr—April 11, 1903.

See also **Core Plates; MAGNETIC TESTING.**

Smith.—Notes on Experiments with Transformers with Very High Potentials. Prof. Harold B. Smith. Description, with illustrations, of a transformer made under the writer's direction, with a statement of the experience with it for the past six years. 2000 w. Int Elec Cong of St. Louis—Sept., 1904.

Standardization.—See **ELECTRIC APPARATUS.**

Standards, Düsseldorf.—See **ELECTRIC APPARATUS—Standardization.**

Standard Voltage.—Standard Transformer Voltages. J. S. Peck. Read before the Nat. Elec. Lgt. Assn. Outlines the standard arrangements and the requirements they are designed to meet. 1800 w. Elec Rev, N Y—June 13, 1903.

Static Disturbances.—Static Disturbances in Transformers. S. M. Kintner. An explanation of the way in which static disturbances are induced. 1000 w. Elec Jour—June, 1905.

See also **Resonance; ELECTRIC TRANSMISSION.**

Terminals & Bushings.—Terminals and Bushings for High-Pressure Transformers. Walter S. Moody. Considers the location and insulation of terminals in coils. Introductory to a discussion. 2000 w. Trans Am Inst of Elec Engrs—Jan., 1904.

See also **Connections.**

Testing.—Transformer Testing by Central Station Companies. R. F. Schuchardt. Practical information of testing methods which are rapid and sufficiently accurate. Gives a table of average results from transformers. Ill. 2300 w. Elec Wld & Engr—May 17, 1902.

Testing the Efficiency of Transformers. Fred W. Ballard. Gives directions for testing for core losses, copper losses, etc. Ill. 1800 w. Engr, U S A—Sept. 15, 1902.

Transformer Testing for Central Stations. S. E. Johanneson. Read before the Ohio Elec. Lgt. Assn. Describes the methods of making the various tests which may be applied to transformers. Serial. 1st part. 4700 w. Elec Rev, N Y—Sept. 17, 1904.

Transformer Testing for Central Stations. S. E. Johanneson. Gives the various tests which may be applied to transformers. Diagrams. Serial. 1st part. 2300 w. Engr, U S A—Oct. 1, 1904.

Experiments with a Transformer of High Capacity (Versuche mit einem Transformator Hoher Eigenkapacität). Leo Lichtenstein. Data and results of test with a special transformer of high electrostatic capacity in the secondary. 2500 w. Elektrotech Zeitschr—Oct. 6, 1904.

Transformer Practice. C. W. Humphrey. Describes some of the tests necessary to judge of the values of transformers, explaining the methods used and the reasons for them. 2500 w. Elec Wld & Engr—April 8, 1905.

Central Station Transformer Testing. William Nesbit. Gives directions for making the copper loss test, regulation test, ratio test, and insulation test. 2200 w. Elec Jour—Aug., 1905.

See also **ELECTRIC TESTING.**

Testing, Buffalo.—Testing Large Transformers. John S. Peck. Describes the transformers recently installed by the Cataract Power and Conduit Co., of Buffalo, N. Y., and the methods of testing them. Ill. 2500 w. Elec Wld & Engr—June 22, 1901.

Thomson.—General Electric Company's Constant Current Transformer for Alternating Series Arc Lighting. Report on the invention of Prof. Elihu Thomson. Ill. 1700 w. Jour Fr Inst—Nov., 1901.

Variable Frequency.—Operation of Transformers at Varying Frequencies and Voltages. M. A. Sammett. Read before the Can. Elec. Assn. Considers characteristics expressing the effect of varying frequency and variable voltage on transformer operation. 5000 w. Elec Rev, N Y—July 8, 1905.

Variable Voltage.—Construction of a Small Variable Voltage Transformer. W. B. Roberts. Illustrates a design having a maximum capacity of about 80 watts and capable of furnishing a secondary pressure from zero to about 5 volts. 2000 w. Am Elect'n—Nov. 5, 1903.

See also **Variable Frequency.**

Voltage Drop.—Graphical and Experimental Determination of the Drop of Pressure in Transformers (Graphische und Experimentelle Bestimmung des Spannungsabfalles in Transformatoren). O. S. Bragstad. A comparison of the graphical method with direct experimental measurements, showing the practical accuracy of the former. 3000 w. Elektrotech Zeitschr—Oct. 3, 1901.

A Simple Graphical Method of Determining the Pressure Drop in Transformers (Ueber eine Einfache Graphische Ermittelung des Spannungsabfalles bei Transformatoren). Walter Hahnemann. Showing the application of the circular diagram of Kapp, giving results within 10 per cent. 1500 w. Elektrotech Zeitschr—July 27, 1905.

See also **Design; Reactance.**

Water Cooled.—Experience on the Road. G. B. Rosenblatt. An account of an interesting incident with water-cooled transformers, explaining the cause of the trouble. 1200 w. Elec Jour—Oct., 1905.

Wave Distortion.—See **Series Resistance; ELECTRIC CURRENT, ALTERNATING; ELECTRIC WAVE —Three-Phase Transformer.**

TRANSFORMER STATION.

See also **ELECTRIC DISTRIBUTION; ELECTRIC STATION; ELECTRIC SUB-STATION; ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT.**

Buffalo, N. Y.—See **ELECTRIC STATION; TRANSFORMER—Testing, Buffalo.**

TRANSIT.

See **SURVEYING INSTRUMENT.**

TRANSPORT.

"Dufferin."—The Indian Troopship "Dufferin." Gives information of the progress made in this class of vessels, describing the "Dufferin," recently launched. 1500 w. Engng—Sept. 16, 1904.

Trials of the Troopship "Dufferin." Gives a report of the steam trials, and describes some of the special fittings. 1000 w. Engng—Dec. 30, 1904.

The Troopship "Dufferin." Illustrated detailed description of the largest and most powerfully armed troopship yet built. 2000 w. Engr, Lond—May 26, 1905.

Philippine Service.—Transport Service to the Philippines. An account of the work of the Quartermaster's Department, especially the transportation of troops and supplies to the Philippines. Ill. Serial. 1st part. 2000 w. Sci Am—March 23, 1901.

Road.—See **TRANSPORTATION.**

"Sumner."—The United States Transport "Sumner." An illustrated description of the work of conversion, and the completed ship. 2500 w. Engng—Aug. 16, 1901.

TRANSPORTATION.

See also **AUTOMOBILE; CANAL; ELECTRIC RAILWAY; MECHANICAL HANDLING; NAVIGATION; RAILWAY; RAILWAY STATION—Canal Exchange; RAILWAY TRANSPORTATION; RIVER; ROAD; SHIPPING; STEAMSHIP; STREET RAILWAY; TRANSPORT; WATERWAY.**

Presidential Address to the Mechanical Science Section of the British Association at the Glasgow Meeting. R. E. Crompton. Considers recent developments in means of locomotion on land, especially the congested street traffic in cities and towns, and means of rapid transit. 6000 w. Engng—Sept. 20, 1901.

Alaska.—See **ALASKA; RAILWAY.**

America.—See **United States.**

Automobiles.—Report on the Question of Traffic Conveyed by Automobiles (Subject XX for Discussion at the Seventh Session of the Railway Congress). Messrs. Keromnes, Léchelle, and E. Sartiaux. 11,200 w. Ills. 1 table. Bul Int Ry Cong (2d part)—Feb., 1905.

See also **AUTOMOBILE; CAR, MOTOR-DRIVEN; TRACTION.**

Automobile vs. Railway.—The Automobile and the Railway as Transport Agents. Sylvester Stewart. Shows that the steel rail is even a more important factor than the locomotive in increasing the speed and safety of transit, and argues that the automobile on common roads can never be a serious rival of the railway locomotive. It is an auxiliary for specialized service, but wherever possible will be run on plateways. 3000 w. The Engineering Magazine—July, 1903.

Automobile vs. Railway Transportation. Paul Synnestoedt. Comparison between conditions to be met in railroad service and those which must be considered in automobile transportation. Ills. 6000 w. Pro of Ry Club of Pittsburg—Nov., 1904. See also **AUTOMOBILE—Railway Compared.**

Berlin.—Local Passenger Traffic in Berlin (Der Berliner Lokalverkehr). A general discussion of the local transportation problem in Berlin, and of existing and projected means of travel. 2500 w. Ill. Zeitschr f Klein u Strassenbahnen—July 1, 1903.

See also **ELECTRIC RAILWAY; ELEVATED RAILWAY; STREET RAILWAY MANAGEMENT.**

Boston.—The Rapid Transit Situation in Boston. Louis Bell. Critical comments on the present situation and the outlook for future improvements. 2400 w. Elec Rev, N Y—Sept. 28, 1901.

See also **ELEVATED RAILWAY; UNDERGROUND RAILWAY.**

Brooklyn.—Traffic Conditions on the Brooklyn Rapid Transit System. C. R. Barnes. Abstract of report of the electrical expert of the Railroad Commissioners of the State of New York. 3000 w. St Ry Jour—Feb. 20, 1904.

See also **ELECTRIC RAILWAY; ELEVATED RAILWAY.**

Brooklyn Bridge.—See **BRIDGE TERMINAL.**

Canal.—See **CANAL; WATERWAY.**

Charleston Exposition.—Handling Traffic at the Inter-State and West Indian Exposition, Charleston, S. C., Jan. 1 to May 31, 1902. Describes the arrangement made to accommodate the public and meet the conditions, and gives a comparative statement of earnings and expenses. Ill. 3500 w. St Ry Rev—June 20, 1902.

Chicago Freight.—Chicago Freight Transfers and Deliveries. A discussion of the subject as it appears in Chicago, explaining the plan suggested by Frederic A. Delano, describing present arrangements, the Illinois Tunnel Co.'s conduits, &c. Ill. 4800 w. Ry Age—Feb. 3, 1905.

See also **RAILWAY TERMINAL; RAILWAY YARD; SUBWAY.**

China.—Transportation in China (Verkehrswege Chinas). Dr. Franz Ritter v. Le Monnier. A paper giving a comprehensive review of the navigable rivers, canals, and railways, both existing and projected in China. Serial. 3 parts. 1300 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 7, 21 and 28, 1902.

See also **RAILWAY.**

Costs.—Present Day Costs of Transportation by Rail and by Water. K. W. Blackwell. Presidential address before the Canadian Soc of Civ Engrs. 2000 w. Eng News—Feb. 11, 1904.

England.—See **RAILWAY; TRAIN SERVICE; WORKMEN'S DWELLINGS.**

Factory.—See **MECHANICAL HANDLING; TELPHERAGE.**

France.—Connections between Railway and Waterway Systems (Le Raccordement du Réseau Ferré et du Réseau Navigable). Paul Léon. A discussion of transport problems in France showing the advantages of harmonious action between the railways and the canal systems. 2500 w. Génie Civil—Dec. 6, 1902.

See also **CANAL; RAILWAY; WATERWAY.**

German vs. British.—See **WATERWAY.**

Germany.—Transportation Problems and Progress in Germany. Reports a constant improvement, considering the development of the Berlin electric railways, the State railways and electric traction on canals. 2000 w. U S Cons Repts, No. 1618—April, 1903.

See also **U. S. vs. Germany.**

Great Lakes-Ocean.—See **STEAMSHIP; STEEL INDUSTRY.**

Great Lakes, U. S.—The Development of Transportation on the Great Lakes. Waldon Fawcett. A review of changes in size and character of vessels, growth in passenger travel, and other interesting statistics. 1400 w. Sci Am—Dec. 13, 1902.

See also **IRON ORE TRANSPORTATION; SHIPPING; STEAMSHIP.**

Harbor Lighterage.—Harbor Lighterage and Transportation. H. L. Joyce. A study of the system in New York Harbor, its growth, difference in style of craft from time to time, and the many changes in methods and in class of traffic. Also discussion. 10,500 w. N Y R R Club—Dec. 19, 1901.

Lighterage: Its Advantages and Disadvantages to the Port of New York. A. J. Grymes. An interesting illustrated description of the service, with lengthy discussion. 17,600 w. N Y R R Club—Feb. 19, 1904.

See also **STEAM LIGHTER.**

India.—See **CABLEWAY; RAILWAY.**

Iron Ore.—See **IRON ORE TRANSPORTATION.**

Japan.—Japan and Its Transportation Facilities. Willard C. Tyler. An interesting address giving an account of the country, the older forms of transportation, the railroads and the steamship lines; with addresses also from Col. Joseph U. Crawford and Mr. S. Uchida, the consular representative. 14,000 w. N Y R R Club—Feb. 21, 1901.

Lake.—See **Great Lakes; NAVIGATION.**

Lake Superior.—See **Great Lakes; CANAL—Sault Ste. Marie; IRON ORE TRANSPORTATION; SHIPPING.**

Loading Machinery.—See **COAL HANDLING; CONVEYOR; IRON-ORE HANDLING; MECHANICAL HANDLING.**

London.—The Movement of London. T. C. Elder. A statement of conditions in London, and the traffic problems. A discussion of the work to be undertaken by the Royal Commission. 3600 w. Trac & Trans—April, 1903.

Locomotion and Transport in London. Edward Davy Pain. An account of the task awaiting the Royal Commission which was appointed to investigate and report concerning means of locomotion and transport. 3000 w. R R Gaz—April 24, 1903.

Railway Economics. Hon. Robert P. Porter. A review of the Royal Commission, appointed for the purpose of inquiring into the problems of London locomotion. Serial. 1st part. 8200 w. Trac & Trans—Jan., 1904.

London Traffic—An Unsolved Problem. J. Swinburne. Discusses the conditions in London, suggesting means of improving them. 4000 w. Cassier's Mag—March, 1904.

The London Traffic Problem. Brief review of changes in modes of conveyance, outlining an ideal system, and describing existing conditions and facilities, discussing possible solutions. Ills. 6200 w. Tram & Ry Wld—March 10, 1904.

Report of the Royal Commission on London Traffic. Extracts from the report of commissioners appointed to inquire into the means of locomotion and transport in London. Also editorial. 15,200 w. Elect'n, Lond—July 21, 1905.

The Traffic of London. George S. C. Swinton. Reviews the report of the Royal Commission, appointed to inquire into the means of locomotion and transport in London. 7500 w. Nineteenth Cent—Sept., 1905.

The Extension of Traffic Facilities in London. Describes the situation, and discusses possible improvements; also considers the electrification of the underground roads, and the new lines in process of construction. 4800 w. Bul Int Ry Cong—Vol. XIX. No. 6.

The Engineering of London Traffic. Editorial review of a recent report of the Royal Commission on London traffic by the advisory board of engineers. 8200 w. Engng—Oct. 13, 1905.

See also **ELECTRIC RAILWAY; UNDERGROUND RAILWAY.**

Lumber.—The Transportation of Lumber. Waldon Fawcett. Illustrates and describes some of the improved methods in use. 1800 w. Sci Am—Oct. 17, 1903.

See also **RAILWAY TRANSPORTATION; TRACTION ENGINE.**

Madagascar.—Transportation in Madagascar (Voies de Communication et Moyens de Transport à Madagascar). F. C. Taupiat de Saint Simeux. A review of the present state and the future of the ways of communication and means of transport on the island of Madagascar. Map. 11,000 w. Mem d l Soc d Ing Civils de France—May, 1902.

Roads and Transport Systems in Madagascar. A sketch of the railway in progress of construction, and explanation of the nature of work. Also account of the macadamized road, and discussion of the system of vehicular traffic to be used on it. 1500 w. U S Cons Repts, No. 1276—Feb. 27, 1902.

See also **WATERWAY.**

Maritime Channels.—Transport Across Maritime Channels. G. Leinekugel le Cocq. An illustrated review of the main ways of establishing communication between opposite shores of maritime waterways in such a manner as not to interfere with the passage of vessels having lofty masts. 5000 w. Public Works—Oct. 15, 1904.

See also **BRIDGE; FERRY; FERRY BRIDGE.**

Motor Cycle.—See **MOTOR CYCLE.**

New York.—Traffic and Traffic Conditions on Manhattan Island. Historical review of the street railways in New York city, the increase in traffic and growth of the transportation systems from the time of the first stage line. Ill. 4000 w. St Ry Rev—Sept. 15, 1901.

Traffic Conditions of New York City. Frank R. Ford. A review of the urban transportation problem, explaining the important characteristics and features of special interest, giving tables and diagrams comprising data of the system. Ill. 10,700 w. St Ry Jour—Oct. 5, 1901.

The Passenger Traffic Problems of Greater New York. W. W. Wheatly. Discusses existing conditions, the transportation problem, facilities under construction, the additional facilities as outlined, with suggestions for improvement. Ill. Serial. 1st part. 5000 w. St Ry Jour—Jan. 10, 1903.

The Transportation Problem of Greater New York. W. W. Wheatley. A review of the present conditions, an outline of the transportation problem, with a sketch of the plans already formed for its solution, indicating the effect upon the metropolitan population. General discussion. 17,000 w. N Y R R Club—May 15, 1903.

Rapid Transit in New York. Hon. Robert P. Porter. An outline of the schemes under way and prospected in New York, with comments. 2500 w. Engng—April 10, 1903.

The Transportation Problem in New York City. Charles Prelini. Considers the difficulties arising from the peculiar configuration of Manhattan Island; the defective plan originally outlined for the city; the great masses that have to be simultaneously handled during the rush hours; and the extraordinary increase in the population. 2800 w. Trac & Trans—July, 1903.

New York and Its Urban Traffic. From "Zeitung des Vereins." An interesting review of the means of transport, with map and explanation of conditions. 5000 w. Bul Int Ry Cong—Feb., 1904.

See also **ELECTRIC RAILWAY; ELEVATED RAILWAY; UNDERGROUND RAILWAY.**

New York-Brooklyn.—See **BRIDGE—Brooklyn; Manhattan; Williamsburg; BRIDGE TERMINAL.**

New York, Early.—Early Transportation in New York. Henry E. Armstrong. An interesting review. 1500 w. R R Gaz—Vol. XXXVII., No. 14.

Nicaragua-United States. See **SHIPPING—Nicaragua Contract.**

Nile.—See **BOAT; NAVIGATION; WATERWAY.**

Ocean Cargoes.—Importance of Economizing Tonnage Facilities by Compact Stowage of Cargoes. Henry P. Jones. A discussion of matters relating to ocean transportation, especially the export of cotton. 2000 w. Eng News—Feb. 28, 1901.

See also **SHIPPING; STEAMSHIP.**

Paris.—The Improvement in Local Transport in Paris (Amélioration des Transports en Commun à Paris). Marcel Delmas. A discussion of the present inadequate methods, with suggestions for improvement. 10,000 w. Soc Ing Civ de France—Dec., 1900.

See also **ELECTRIC RAILWAY; STREET RAILWAY; UNDERGROUND RAILWAY.**

Paris Exposition.—See **MACHINERY.**

Persia.—See **COMMERCE.**

Peru.—See **PERU.**

Philadelphia.—Analysis of Transportation Conditions in Philadelphia. Discusses the traffic districts, conditions which affect transportation, the congestion problem, trends of travel, etc., giving many illustrations. 3500 w. St Ry Jour—Sept. 23, 1905.

See also **ELECTRIC RAILWAY; UNDERGROUND RAILWAY.**

Pittsburg.—Pittsburg—Her Waterways and Her Railways. Antes Snyder. Historical review of the development of this city, discussing transportation problems. 17,500 w. Pro Engrs Soc of W Penn—Feb., 1903.

Road.—Transport on Roads. Discusses road locomotion, and devices for minimising shocks, especially the spring wheel, and the ped-rail engine. Ill. 1800 w. Builder—Dec. 13, 1902.

See also **ROAD; TRACTION.**

Road Material.—See **ELECTRIC RAILWAY.**

St. Louis Exposition.—Electric Transportation Within the World's Fair Grounds. Cloyd Marshall. Information concerning the intramural electric railway, electric automobiles, launches, &c. 1500 w. Elec Wld & Engr—June 4, 1904.

See also **RAILWAY TERMINAL; RAILWAY TRANSPORTATION.**

Sault Ste. Marie.—See **CANAL; SAULT STE. MARIE.**

United States.—Traffic on Improved Waterways and Railroads in the United States. Edward P. North. Extracts from a paper read before the Int. Engng. Cong. Gives much information of the development of transportation facilities in the United States, and the causes that have made possible the low rates as compared with other countries. 4000 w. R R Gaz—Vol. XXXVII., No. 18.

See also **Water; RAILWAY TRANSPORTATION.**

U. S. vs. Germany.—Raw Materials and Their Transportation in the United States (Rohmaterialien und Frachtenverhältnisse in den Vereinigten Staaten). Hr. Macco. Paper before the Verein Deutscher Eisenhüttenleute, giving statistics of coal, coke, iron ore and pig iron production, cost, transportation charges, etc., in the United States, and comparison with Germany. Maps. 2 plates. 7000 w. Serial. 2 parts. Zeitschr d Ver Deutscher Ing—May 16 and 23, 1903.

Raw Materials and Transportation Costs in the United States (Rohrmaterialien und Frachtenverhältnisse in den Vereinigten Staaten). Hr. Macco. A paper before the Verein Deutscher Eisenhüttenleute, giving extensive statistics of the production and transportation costs of coal, coke, iron ore and pig-iron in the United States, and comparison with Germany. Maps. 2 plates. 8000 w. Stahl u Eisen—May 15, 1903.

Water, U. S.—Water Transportation; Its Economic Importance. Frank Haigh Dixon. Discusses the economic importance of water transportation in the United States at the present time, under the heads of ocean, lake, river, and canal transportation. 10,500 w. St Louis Ry Club—Nov. 10, 1905.

See also **United States.**

Waterway vs. Railway.—See **Cost; France; WATERWAY—Railway Transportation.**

Yangtse River.—See **RIVER.**

TRANSPORTER.

See **CABLEWAY; COALING AT SEA; CONVEYOR; MECHANICAL HANDLING; TELPHERAGE.**

TRANSPORTER BRIDGE.

See **FERRY BRIDGE.**

TRANSPORTER CAR.

See **CAR TRANSPORTER.**

TRANSPORTING MACHINERY.

See **CABLEWAY; COAL HANDLING; CONVEYOR; MECHANICAL HANDLING.**

TRANSPORT SERVICE.

See **TRANSPORT.**

TRAVELING TROLLEY.

See also **MECHANICAL HANDLING—Overhead Tramrail**

Electric.—See **HOISTING—Electric Traveling; TELPHERAGE.**

TRAVERSER.

See **TRANSFER TABLE.**

TREE.

See **FORESTRY; LANDSCAPE ARCHITECTURE; PARK; TIMBER; WOOD.**

TRENCH.

See **EXCAVATION; STEAM SHOVEL.**

TRESTLE.

See also **BRIDGE; RAILWAY CONSTRUCTION; VIADUCT.**

Alabama.—High Timber Trestles on the North Alabama Railroad. Illustrates and describes important trestle work from 60 to 80 feet high from foundation to rail. One is 116 feet in maximum height and is 684 feet long. 500 w. Eng Rec—July 23, 1904.

Am. Main. Way Assn. Report.—See **Timber Specification.**

California, S. P. Ry.—The Reconstruction of a Timber Trestle. B. B. Boyd. Illustrated description of this work as carried out on the Southern Pacific Railroad in California. 800 w. Cal Jour of Tech—April, 1904.

Filling.—The Care of Railroad Trestles While Being Filled. From a report presented at the convention of the Assn. of Ry. Supts. of Bridges and Buildings on the best methods of caring for trestles while being filled. 2400 w. Eng Rec—Oct. 22, 1904.

See also **RAILWAY CONSTRUCTION—Trestle Filling.**

Paoli.—The Paoli Trestle on the Monon. A. E. Kemmer. Illustrates and describes a new steel trestle on the C. I. & L. Railroad, 870 ft. long and 87 ft. high. Includes about 4,300 cu. yds. of masonry. 500 w. R R Gaz—July 15, 1904.

Perth Amboy, N. J.—A Railway Trestle with Bents of Reinforced Concrete. William A. Allen. Brief illustrated description of work at Perth Amboy, N. J. 800 w. Eng News—March 12, 1903.

Railway Ass'n Report.—See **Timber Specification; BRIDGE.**

Santa Fe Ry.—Pile and Timber Trestle Bridges on the Santa Fé. Extracts and illustrations from paper by A. F. Robinson in Bulletin No. 53 of the American Railway Engineering and Maintenance of Way Association. 2200 w. R R Gaz—Vol. XXXVII, No. 9.

See also **Timber Specifications.**

Steel.—See **VIADUCT—Illinois.**

Timber Specification.—Wooden Bridges and Trestles. Abstract of report presented at meeting of the Am. Main. of Way Assn. Gives specifications compiled for bridge timber, and for trestles; also paper by A. F. Robinson on "Standard Plans for Pile and Timber Trestle Bridges, Santa Fé Railway System," with discussion. Ills. 17,000 w. Ry Age—March 24, 1905.

TREVITHICK.

Locomotive.—See **LOCOMOTIVE—Trevithick.**

TRIBUTING.

See **WAGES—Tributing.**

TROLLEY.

See also **ELECTRIC RAILWAY; TROLLEY STANDARD; TROLLEY WIRE.**

Bow.—A Plea for the Bow Trolley. E. Kilburn Scott. Considers the advantages and disadvantages of collecting current by means of a bow contact and by means of a wheel. 800 w. Elec Engr, Lond—Nov. 22, 1901.

See also **TROLLEY WIRE—Hour Glass Section.**

Overhead Tramrail.—See **MECHANICAL HANDLING.**

Pantagraph.—Design of a Pantagraph Trolley. C. P. Nachod. Illustrates and describes the design and gives an investigation of the mechanism. 800 w. Elec Wld & Engr—June 10, 1905.

Roller.—A Trolley for Heavy Multiple Unit Electric Trains. Herbert L. Bennett. An illustrated description of the roller trolley used on the San Francisco, Oakland and San José Railway. 600 w. Sci Am—Sept. 17, 1904.

Sliding Contact.—A New Form of Trolley for Electric Railways (Ueber eine Neue Stromzuführungsanlage für Elektrische Bahnen). E. Thomann. Illustrating and describing an improved form of sliding contact trolley, enabling current to be taken from overhead wires by the side of a main-line railway track. 2500 w. Schweiz Bauzeitung—Feb. 13, 1904.

See also **ELECTRIC LOCOMOTIVE—Oerlikon; ELECTRIC RAILWAY—Huber Current Collector.**

Trackless.—See **AUTOMOBILE, TROLLEY; TROLLEY AUTOMOBILE.**

TROLLEY AUTOMOBILE.

See also **AUTOMOBILE, TROLLEY.**

Siemens & Halske.—Railless Electric Trolley System. Enrico Bignami. Illustrated description of system used by Siemens & Halske, of Berlin. 1000 w. Elec Rev, N Y—Jan. 31, 1903.

TROLLEY STANDARD.

Dangers.—Trolley Standards: Their Liability to Become Dangerous to the Public, and Some Devices for Rendering Them Safe. P. J. Pringle. Refers especially to dangers on double-deck cars, giving an illustrated description of a device for promoting safety. 2200 w. Elec Engr, Lond—July 14, 1905.

TROLLEY TRIP.

New York-Boston.—See **ELECTRIC RAILWAY.**

Port Huron to Atlantic.—See **ELECTRIC RAILWAY.**

TROLLEY WIRE.

See also **ELECTRIC LINE; ELECTRIC RAILWAY—Overhead Construction.**

Curves.—Trolley Wire Curves for Electric Tramways (Die Kurvenabspannung des Fahrdrahtes bei Elektrischen Strassenbahnen mit Rollenkontakt). R. Wahle. An exhaustive discussion of the arrangement of overhead trolley wires on curves to permit satisfactory action of the contact roller. 7500 w. Elektrotech Zeitschr—Sept. 1, 1904.

Hour Glass Section.—Trolley Wires of Special Section (Der Profil Draht). Max Schiemann. A discussion of the so-called "hour-glass" section and other special shapes for trolley wires, with regard to the methods of supporting, joining, and protecting them. 1500 w. Elektrotech Zeitschr—Sept. 18, 1902.

The Overhead Conductor of the Hagen Tramways (Die Profildraht Oberleitungsanlage der Hagener Strassenbahn). H. Welter. Describing the use of trolley wire of the hour glass section, including the method of supporting and operating with the bow trolley. 1800 w. Elektrotech Zeitschr—Aug. 13, 1903.

Insulation.—See **INSULATION—Trolley Wire.**

TROOPSHIP.

See **TRANSPORT.**

TROOSTITE.

See **STEEL—Troostite.**

TRUCK.

Automobile.—See **AUTOMOBILE—Industrial; AUTOMOBILE COMPETITION; AUTOMOBILE, STEAM; TRACTION ENGINE.**

Car.—See **CAR TRUCK; ELECTRIC CAR; RAILWAY ACCIDENT—Derailment; STREET CAR.**

Locomotive.—See **LOCOMOTIVE TRUCK.**

Side Bearing.—See **CAR BEARING; CAR WHEEL—Flange Wear.**

TRUSS.

See also **BRIDGE; BRIDGE DESIGN; BUILDING CONSTRUCTION; FRAMEWORK; GIRDER; ROOF; STEEL CONSTRUCTION.**

Aerial Circus Platform.—Arch Trusses for Aerial Circus Platform. Gives plans and details of arch trusses for aerial circus at Luna Park, Coney Island, New York. 1100 w. Eng Rec—June 18, 1904.

Bridge.—See **BRIDGE DESIGN.**

Flange Stresses.—See **GIRDER.**

Joints.—The Strength of End Joints in Wooden Trusses. F. E. Kidder. An analysis of the tests on truss joints made in the engineering laboratories of the Mass. Inst. of Tech. in 1897. Ill. 2200 w. Eng Rec—Nov. 17, 1900.

Joints in Wooden Trusses. Letters from H. S. Jacoby and F. E. Kidder on the working stresses to be adopted in designing such trusses. 1300 w. Eng Rec—Dec. 29, 1900.

Lattice.—An Exhibit of Some Curious Lattice Trusses. George N. Linday. Gives illustrated study of miniature trusses made to determine their behavior when loaded. General discussion. 4500 w. Jour W Soc of Engrs—June, 1903.

Roof Design.—The Numerical Determination of the Maximum Stresses in a Roof Truss (Zeichnerische Bestimmung der Grössten Strebenkräfte eines Fachwerkbalkenträgers). Paul Neumann. An application of the graphical analysis, showing the practical details of computation. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—June 24, 1905.

See also **ROOF.**

TRUST.

See also **COAL INDUSTRY; COMMERCE; STEEL INDUSTRY.**

The Strength and Weakness of the Combination or Trust Idea. A symposium of the opinions of Messrs. John D. Rockefeller, Andrew Carnegie, J. B. Dill, and the late Lord Russell; with editorial comments. 4500 w. Engineering Magazine—Jan., 1901.

Industrial and Railroad Consolidations. A Symposium. 1. A Great Danger to the Community. Russell Sage. 2. Their Advantage to the Public. James J. Hill. 3. Their Effects on the Steel and Iron Industry. C. M. Schwab. 4. What They Have Accomplished for Capital and Labor. Charles R. Flint. 5. Influence of the "Trusts" on Prices. F. B. Thurber. 6. The Outcome of Unintelligent Competition. James Logan. 21,600 w. N Am Rev—May, 1901.

The Trusts and Their Effect on the Business World. Charles Kirchhoff. Read before the Philadelphia Foundrymen's Assn. Considers the effect of consolidation upon the manufacturing industries; how they are to deal with the growing competition, etc. 3500 w. Ir Age—April 17, 1902.

Industrial Trusts. Prof. W. Smart. Discusses the economy and monopoly of trusts as the good and bad features, showing their tendency to eliminate all unnecessary expenses in the production and distribution of goods, and also their power over price, improvements, and labor. General discussion. 9500 w. Jour Soc of Arts—Jan. 10, 1903.

The Future of the Trusts. Editorial on the recent changes in the administration of the great industries of the country, reviewing the development of American railways as a close parallel. 1700 w. R R Gaz—Dec. 25, 1903.

Trade Selling Combinations (Les Comptoirs de Vente en Commun). A comparative study of the trade combinations known as Trusts in America, Cartells in Germany, and Comptoirs in France. 2000 w. Génie Civil—June 17, 1905.

American.—The Growth of Trust Companies. Charles A. Conant. Discusses the striking growth shown in the United States, their management, privileges, etc. 5000 w. Rev of Revs—Nov., 1902.

European.—European Trusts. Reviews the report compiled by J. W. Jenks, the United States Industrial Commission's trust expert, concerning investigations extending over two years and embracing visits to the leading European industrial centers. 2000 w. Col Guard—Sept. 13, 1901.

Rings, Combinations and Trusts (Ringe, Kartelle und Trusts). Georg Gothein. An examination of industrial combinations from the Continental viewpoint. 6000 w. Zeitschr d Ver Deutscher Ing—May 28, 1904.

Everett-Moore Syndicate.—The Winding Up of the Everett-Moore Syndicate. An outline of this syndicate, which gained control of the most remarkable groups of electric railway properties and independent telephone system, and of its downfall. 4500 w. St Ry Jour—May 2, 1903.

German.—The German Coal and Iron "Rings." Editorial discussion of effect of these "syndicates" on trade. 1800 w. Engng—July 19, 1901.

German Syndicates and Their Influence. A report on German trade in 1902 by Mr. Oppenheimer, Consul for Frankfort-on-Main. 4000 w. Ir & Coal Trds Rev—Aug. 14, 1903.

See also **European; COAL INDUSTRY; IRON INDUSTRY.**

German Steel.—The German Steel Trust (Der Deutsche Stahlwerksverband). An editorial note giving the list of firms forming the combination of steel makers in Germany, with an abstract of the articles of their agreement. 1500 w. Stahl u Eisen—March 15, 1904.

See also **IRON INDUSTRY; STEEL INDUSTRY.**

Grosscup Address.—The Great Consolidations Called "Trusts." Peter S. Grosscup. A valuable address delivered before the students of the University of Nebraska, at Lincoln. 5500 w. R R Gaz—Dec. 19, 1902.

See also **RAILWAY RATES—Regulation.**

Hill Address.—See **Railways; RAILWAY ECONOMICS.**

Labor.—See **LABOR; TRADE UNION.**

Legislation Against.—See **Railways.**

Prices.—How Trusts Affect Prices. Jeremiah W. Jenks. A study of the results of combination on the distribution of wealth; the savings effected, and who receives the benefit. 4800 w. N Am Rev—June, 1901.

See also **INDUSTRIAL ENGINEERING.**

Publicity.—What Is Publicity? Henry C. Adams. Discusses its general, particular, and administrative significance in relation to the solution of the trust problem. 4000 w. N Am Rev—Dec., 1902.

Railways.—How to Curb the Trusts. Henry Michelson. Explains the existing state of affairs in the United States and considers the nationalization of the railways, the remedy. 2800 w. N Am Rev—June, 1902.

Mr. Hill on the Railways and the Trusts. Extracts from an address before the Illinois Manufacturers' Assn., Chicago, by Mr. J. J. Hill, president of the Great Northern Ry. Thinks there is safety rather than danger in the combination of railways. 2500 w. Ry & Engng Rev—June 7, 1902.

Anti-Trust Bills in Senate and House. Reviews bills so far as they relate to railways. 3400 w. Ry Age—Jan. 30, 1903.

See also **RAILWAY ECONOMICS—Hill Address.**

Roosevelt Address.—President Roosevelt and the Trusts." Joseph S. Auerbach. Considers the views of Mr. Roosevelt as expressed in his addresses, and gives a suggestion. 7300 w. N Am Rev—Dec., 1902.

Steel.—See **German Steel; STEEL INDUSTRY—Trust.**

TUBE.

See also **PIPE; TUBE MANUFACTURE.**

Boiler.—See **BOILER TUBE.**

Cleaners.—See **BOILER CLEANING.**

Upsetting.—See **HYDRAULIC MACHINERY—Tube Upsetting.**

Vacuum.—See **RADIOGRAPHY; VACUUM TUBE.**

TUBE EXPANDER.

Plastic Pressure.—The Plastic Pressure Tube Expander. Illustrated description of a new device manufactured in England, and its operation. 1000 w. Am Mach—Feb. 27, 1902.

TUBE MANUFACTURE.

See also **PIPE MANUFACTURE; TUBE WORKS.**

Charcoal Iron.—The Manufacture of Charcoal Iron Railway Boiler Tubes. George G. Crawford. An illustrated description of the various processes from the charcoal pig iron to the finished tube. Discussion. 2500 w. Pro W Ry Club—Jan. 19, 1904.

Diescher.—Diescher Billet Piercing Process. Illustrated description of a new method for piercing billets to be used in the manufacture of seamless tubing. Gives illustrations showing the important steps in the art since its introduction by M. Mannesmann in Germany. 1800 w. Ir Trd Rev—Feb. 28, 1901.

Hydraulic Press.—See **HYDRAULIC PRESS—Tube Upsetting.**

Inventions.—Some Recent Inventions Relating to the Manufacture of Iron and Steel Tubes. Edward C. R. Marks. The present article considers billet-piercing processes. Ill. Serial. 1st part. 1700 w. Prac Engr—Dec. 26, 1902.

Mannesmann.—Notes on the Manufacture of Weldless Steel Tubes by the Mannesmann Process. J. H. H. Barrée. Read before the South Wales Inst. of Engrs. An illustrated article fully describing the process. 3000 w. Ir & Coal Trds Rev—Aug. 22, 1902.

Seamless Steel.—Description of the Manufacture of Seamless Steel Boiler Tubes. C. A. M'Allister. Brief description, with requirements for all seamless cold drawn steam tubes furnished to the U. S. government. 3000 w. Marine Engng—May, 1901.

Manufacture of Seamless Cold-Drawn Steel Boiler Tubes. G. M. Kohler. Description of the process. Ill. 1700 w. Marine Engng—Jan., 1904.

See also **Weldless.**

Shop Appliances.—See **Tools; IRON WORKS; TUBE EXPANDER; TUBE WORKS.**

Tools.—Tube-Forming Tools. B. J. Dougherty. Illustrates and describes a set of tools for forming taper tubes from tin or other light gage metals. 1500 w. Am Mach—July 4, 1901.

Weldless.—The Manufacture of Weldless Steel Pipes and Shells. Heinrich Ehrhardt. Read before the Iron & Steel Inst. An illustrated description of the process. 900 w. Ir Age—Sept. 17, 1903.

Weldless Tubing (Tubes sans Soudure). L. Joubert. A discussion of the methods of making seamless tubing of iron or steel, including the practice in France, England, Sweden and Germany. 7500 w. 1 plate. Mem Soc Ing Civ de France—July, 1904.

The Manufacture of Weldless Steel Tubes. John David Morgan. Describes the methods of manufacture as conducted at the present time. 5500 w. (Students' Paper No. 515.) Ills. Inst of Civ Engrs.

See also **Mannesmann; Seamless; PIPE MANUFACTURE.**

TUBE MILL.

Gold.—See **GOLD MILLING—Tube.**

TUBE WORKS.

See also **PIPE MANUFACTURE; TUBE MANUFACTURE.**

Chesterfield, Eng.—Universal Tube Works. Illustrates and describes these works situated at Chesterfield, Eng. 1200 w. Engng—Oct. 9, 1903.

National.—Manufacture of Steel Pipe. An article illustrating and describing the plant and methods of the National Tube Works. 2000 w. Sci Am—Dec. 12, 1903.

TUGBOAT.

See **TOWBOAT.**

TUNGSTEN.

See also **IRON ALLOY; METAL—Rare; MINERAL REGION; STEEL ALLOY.**

Tungsten: Its Use and Value. States the chief sources, with some of its uses, and present value. 900 w. Eng & Min Jour—Nov. 10, 1904.

Arizona.—Notes on Tungsten Deposits in Arizona. Forbes Rickard. Description, with illustrations, of veins and placers containing tungsten, in the Little Dragoon Mountains, and methods of working them. 3400 w. Eng & Min Jour—Aug. 18, 1904.

Black Hills.—Some Recently Exploited Deposits of Wolframite in the Black Hills of South Dakota. J. D. Irving. A study of the geology, occurrence and character of the ore, with report of analysis made. 4000 w. Trans Am Inst of Min Engrs—Feb., 1901.

Tungsten Ores in the Black Hills. Jesse Simmons. Information concerning these deposits and their mode of formation. 1300 w. Min Rept—Sept. 1, 1904.

Colorado.—The Boulder County, Colorado, Tungsten Deposits. Kirby Thomas. Remarks on the demand for tungsten due to its use as an alloy for high-grade steels, and an account of these deposits. Map. 1400 w. Min Wld—July 8, 1905.

Determination.—Some Methods of Tungsten Determinations. George M. Parker. Abstract of a graduation thesis at the Univ. of Arizona. An explanation of methods, and results. 1500 w. Min & Met—Sept. 1, 1901.

Tungsten. G. M. Parker. A description of methods of tungsten determination, as given in a recent graduation thesis. 1600 w. Aust Min Stand—Jan. 2, 1902.

Wolfram: How to Know It. B. Dunstan. Notes describing the physical characteristics, properties and other information useful to the prospector. 1500 w. N Z Mines Rec—Nov. 16, 1904.

Magnetic Separation.—See **MAGNETIC SEPARATION—Tin.**

New South Wales.—The Wolfram Deposits of New England, New South Wales. Hartwell Conder. Briefly describes this district and the deposits of wolfram, and the occcurence of other valuable minerals. Editorial. Ills. 3000 w. Min Jour—Aug. 12, 1905.

Queensland.—Wolfram, Molybdenite, and Bismuth Mining, at Wolfram Camp, Hodgkinson Goldfield. Walter E. Cameron. Deals with the geology, working, etc. 3500 w. Queens Gov Min Jour—July 15, 1903.

Wolfram and Molybdenite Mining. From the report of Walter E. Cameron. Gives history, statistics, geology and report of demands for those minerals, describing the Lappa Lappa lodes and the Tinaroo lodes. 4000 w. Queens Gov Min Jour—Feb. 15, 1904.

Wolfram in Queensland. B. Dunstan. From the Annual Progress Report, Geological Survey of Queensland, for 1904. Information concerning the localities, deposits, developments, etc. 2300 w. Queens Gov Min Jour—July 15, 1905.

Tasmania.—Wolfram Near Pieman Heads (T.). George A. Waller. Describes the deposits and discusses their origin. Serial. 1st part. 1500 w. Aust Min Stand—Nov. 14, 1901.

See also **MINERAL REGION.**

TUNNEL.

See also **INTAKE; MINE; MINING; RAILWAY; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; SEWER; SUBWAY; TUNNEL VENTILATION; UNDERGROUND RAILWAY.**

The Construction of Railroad Tunnels. J. V. Davies. Reviews the various methods of underground construction of tunnels and subways. Illustrations and general discussion. 12,000 w. N Y R R Club—Dec. 20, 1900.

Air Lock.—See **AIR LOCK—Harlem River Tunnel.**

Air Testing.—See **TUNNEL VENTILATION.**

Albula, Switzerland.—The Highest Tunnel in Europe. Brief illustrated description of the Albula tunnel in Switzerland. 600 w. Sci Am Sup—Dec. 26, 1903.

See also **RAILWAY; RAILWAY CONSTRUCTION.**

Alfreton, Eng.—I. Alfreton Second Tunnel. Ernest Frederick Crosbie Trench. (No. 3380.) II. The Reconstruction of Monchelffe Tunnel. Dugald McLellan. (No. 3498.) With an abstract of the discussion on the two papers. Illustrated descriptions of the construction work. 22,500 w. Inst of Civ Engrs.

Alpine.—See **Albula; Cornallas; Europe; Italo-Swiss; Rigoroso; Simplon; TUNNEL VENTILATION.**

Alpine and European Railways.—British Trade and the Central European Railways. A study of the influence of the various railway tunnels in Europe upon commerce. Map. 5700 w. Trac & Trans—July, 1903.

Arion.—See **Winston.**

Aspen, Wyo.—The Construction of the Aspen, Wyoming, Tunnel on the Union Pacific Railroad. W. P. Hardesty. An explanation of recent improvements on this road for shortening the line and improving the grade, with illustrated description of the interesting features in connection with the tunnel named. 3700 w. Eng News—March 6, 1902.

The Aspen Tunnel. A. W. Clapp. Interesting features in the construction work of this tunnel of the Union Pacific R. R. in Wyoming are described and illustrated. 1400 w. Eng & Min Jour—April 12, 1902.

Austria.—See **Bohemia; RAILWAY.**

Baltimore Collapse.—The Collapse of the Pennsylvania Railroad tunnel in Baltimore. Kenneth Allen. An account of the accident with discussion of the cause, and description of the work of restoration. 1300 w. Eng News—July 25, 1901.

Barrientos, Mexico.—The Barrientos Tunnel, Mexico. C. Gordon Paterson. Brief illustrated description of this tunnel and the methods of construction. 900 w. Eng News—Aug. 10, 1905.

Berlin.—See **Spree River.**

Bernese Alps.—See **RAILWAY—Switzerland.**

Big Bend.—The Big Bend Tunnel for Power Development. Franklin Riffle. Gives the history of this tunnel which was a disastrous mining failure, and an account of its recent utilisation for power development, in which it promises great commercial success. 1200 w. Sci Am—Oct. 11, 1902.

Bohemia.—Tunnel Construction on the North Bohemian Transverse Railway (Die Tunnelbauten der Nordböhmischen Transversal bahn). K. Imhof. Details of the excavating, timbering, and construction work on five short tunnels offering constructive difficulties. Three articles. 4000 w. Schweizerische Bauzeitung—June 15, 22, 29, 1901.

See also **VIADUCT.**

Boston Harbor.—The East Boston Tunnel Shield. Illustrated description of a roof shield for a tunnel under Boston harbor, noteworthy for the provision made for bulk-heading its front, when necessary. 900 w. Eng Rec—Dec. 29, 1900.

Concrete Work on the East Boston Tunnel. An abridgment of parts of the report of Howard A. Carson. Describes the method of constructing a subaqueous tunnel of 23 ft. clear diameter with concrete walls. 2100 w. Eng Rec—Feb. 2, 1901.

Construction of the East Boston Subway and Tunnel. An illustrated description of an extension now being constructed to the underground system of rapid transit. 2000 w. Ry & Engng Rev—Feb. 16, 1901.

Tunneling with a Roof Shield at East Boston. Illustrated description of the method of driving a double-track tunnel by means of advance headings on each side for the walls, with a roof shield run forward afterward on top of these walls. 900 w. Eng Rec—March 23, 1901.

The New Street Railway Tunnel Under Boston Harbor. J. A. Stewart. Illustrated description of interesting engineering work costing about $2,700,000. 1200 w. Sci Am—March 23, 1901.

The East Boston Tunnel Extension of the Boston Subway. Illustrates and describes the essential features of the work of constructing a tunnel under the harbor. Also editorial. 4600 w. Eng News—April 4, 1901.

Progress on the East Boston Subway and Tunnel. Illustrated description of the construction work on the branch extension of the Boston subway into East Boston. 2500 w. Ry & Engng Rev—Jan. 11, 1902.

Work on the East Boston Tunnel. From the official progress report of Mr. Howard A. Carson. 2300 w. Eng Rec—Jan. 11, 1902.

Methods of Work on the East Boston Tunnel Extension of the Boston Subway. Account of the work extracted from the report of Chief Engineer Howard A. Carson. Ill. 4300 w. Eng News—Jan. 23, 1902.

The Progress on the East Boston Tunnel. Describes the method of driving a tunnel by means of two advance drifts for the side walls and a roof shield for the arch. 1300 w. Eng Rec—April 19, 1902.

Tunnel Construction Under Water. Howard A. Carson. Abstract of informal remarks before the Boston Soc. of Civ. Engrs., with illustrations, describing the construction of the East Boston tunnel. Discussion. 6300 w. Jour Assn of Engng Socs—Dec., 1902.

The East Boston Tunnel. Reviews the scheme for rapid transit in Boston, and gives an illustrated description of this work of shield tunneling, now in progress. 3500 w. R R Gaz—April 10, 1903.

The Construction of the East Boston Tunnel of the Boston Subway System. Robert H. Farwell. Interesting information in regard to the material encountered, construction work, etc. Ill. Serial. 1st part. 3700 w. Eng Rec—Nov. 7, 1903.

See also **UNDERGROUND RAILWAY.**

Brooklyn Sewer.—See **SEWER—Brooklyn.**

Cascade, Washington.—The Cascade Tunnel, Great Northern Ry. John F. Stevens. The crossing of the summit of the Cascades has been effected by means of a switchback. A long tunnel has now been completed which will do away with this switchback. The methods of construction are illustrated and described. 3800 w. Eng News—Jan. 10, 1901.

Chicago.—Tunnel and Crib Construction in Chicago. Paul G. Brown. An illustrated review of the construction work, giving information concerning cost, methods, improvements, etc., in both lake and land tunnels. 7200 w. Jour W Soc of Engs—Feb., 1901.

Tunnel Construction in Chicago. George W. Jackson. Illustrates and describes the method of driving and constructing adopted so as not to disturb the surface. 3600 w. Mines & Min—Jan., 1903.

Tunnel Construction and the Subsidence of Streets in Chicago. Gives particulars from the report of a commission of engineers appointed to investigate the matter, showing the construction work and the relation to street settlements, attributing the trouble to excavation without the use of air pressure. 3500 w. Eng News—Aug. 24, 1905.

Settlement of Chicago Buildings Due to Tunneling. From the supplement to the report of the commission giving a detailed statement of places where the settlement of streets and buildings can be attributed to this work. 1800 w. Eng Rec—Sept. 23, 1905.

See also **Shield, Hastings, Chicago; SEWER; WATERWORKS.**

Chicago Freight.—See **SUBWAY.**

Cincinnati Waterworks.—See **WATERWORKS.**

Cleveland Sewer.—See **SEWER.**

Cleveland Waterworks.—See **INTAKE.**

Concrete Reinforced.—Scheme for a Tunnel in Reinforced Concrete (Projet de Tunnel Tubulaire en Béton Armé). Ch. Dantin. Describing a system for tube-tunneling lining of light structural skeleton imbedded in concrete. 2000 w. Génie Civil—Jan. 28, 1905.

New Design for Armored Concrete Tunnels. Illustrates and describes a design in which there is no protective lining, and thin steel plates and channels are adopted to afford a built-up ring. 1400 w. Engr, Lond—Sept. 15, 1905.

See also **Netherwood, N. J.; South Knoxville, Tenn.; Wasserburg, Bavaria; CONCRETE REINFORCED.**

Condensing Water.—An Unusual Method of Constructing Condensing Water Tunnels. Illustrates and describes the tunnels of the power stations of the Manhattan Railway and of the New York Edison Co., consisting of concrete-lined tubes built on launching ways, like boats, floated to the station and then sunk into their position. 1700 w. Eng Rec—Feb. 8, 1902.

Cornallaz.—Difficult Work in Repairing a Swiss Railway Tunnel. Illustrates and describes methods of repairing a rock fall in the Cornallaz Tunnel, between Lausanne and Bern, which was so serious that traffic was interrupted for 53 days. 900 w. Eng News—Sept. 25, 1902.

Costs.—The Cost of Concrete Tunnel Lining and of Tunnel Excavation. George W. Lee. An illustrated article describing methods of construction and giving figures showing the cost of this kind of work. 1800 w. Eng News—Dec. 17, 1903.

Coudray, France.—The Re-Lining of the Coudray Tunnel. Illustrated description from "Centralblatt der Bauverwaltung," of a traveling steel center permitting the passage of trains and enabling workmen to tear out and rebuild a tunnel arch. 700 w. Eng Rec—April 20, 1901.

East River.—Test Borings in the Bed of the East River, New York. An account of the subaqueous boring between Manhattan and Brooklyn on the line of the proposed Rapid Transit tunnel. 1000 w. Eng Rec—Jan. 18, 1902.

The East River Division of the Pennsylvania R. R. Tunnel at New York City. Illustrates and describes the construction under the East River to Long Island. 1500 w. Eng News—Oct. 29, 1903.

The Brooklyn Tunnel of the New York Rapid Transit Railroad. Illustrated description of details and progress of the work on the tunnel from the Battery, New York, to Brooklyn. 1800 w. Eng Rec—Oct. 31, 1903.

The East River Tunnel. Interesting illustration with description of construction work on this tunnel which is to connect Brooklyn and Manhattan. 1800 w. Compressed Air—Dec., 1903.

The Pennsylvania Tunnel at New York City. Gives a diagram showing the location of these tunnels under the Hudson and East Rivers, with an outline of the work. 1600 w. Ills. Sci Am—Jan. 16, 1904.

The New York and Brooklyn Tunnel for the Rapid Transit Railroad. An illustrated detailed description of the tunnel being constructed to connect the Broadway extension of the New York Rapid Transit Railroad with the Brooklyn Subway, passing under the East River. Serial. 1st part. 2500 w. Eng Rec—March 5, 1904.

The New York Subway Under the East River. An illustrated description of this part of the work, the methods of construction, and general information of interest. 700 w. Ir Age—Nov. 10, 1904.

Progress on the Battery Tunnel, New York. An illustrated report of the progress made and methods adopted in the construction of this interesting work. 1200 w. Eng Rec—Sept. 9, 1905.

See also **Hudson River**; **UNDERGROUND RAILWAY—New York-Brooklyn.**

East River Borings.—East River Borings for Brooklyn Extension of the New York Rapid Transit. J. C. Meem. A record of the principal events in conection with the East River borings for the Brooklyn extension of the Rapid Transit system of New York. 5400 w. Harvard Engng Jour—May, 1903.

Electric Equipment.—The Applications of Electricity in Tunneling (Elektrotechnische Aufgaben im Tunnelbau). Arthur Hruschka. A discussion of the increasing applications of electric power for ventilators, rock drills, traction, and other departments of tunnel construction work. Three articles. 6000 w. Zeitschr f Elektrotechnik—May 21, 28. June 4, 1905.

See also **ELECTRIC EQUIPMENT—Karawanken Tunnel.**

English Channel.—A Channel Railway. Henry Haguet. Discusses the prospect of a tunnel railway connecting France and England. 2300 w. Transport—July 8, 1904.

The Crossing of the English Channel. F. Arnodin. An explanation of the reasons why the author hesitates to recommend the construction of a tunnel beneath the English channel. 5400 w. Public Works—Jan., 1905.

Europe.—A Brief Account of Recent Large Tunnel Works. Editorial on the extent of this work in Continental Europe. 1800 w. Eng News—Aug. 13, 1903.

Freezing Process.—The Depth of Freezing and the Loss of Cold by Conduction in the Freezing Process of Tunneling. Information given by Mr. Charles Sooysmith, based on records made at a mining shaft sunk at Iron Mt., Mich. 1000 w. Eng News—April 9, 1903.

See also **Hudson River**; **EXCAVATION**; **SHAFT SINKING.**

Gardanne, Marseilles.—Lining the Mine Gallery at Gardanne. G. Leugny, in "La Revue Technique." Illustrates and describes the work, materials used, etc. 700 w. Col Guard—Nov. 2, 1900.

Gas Conduits.—See **Subaqueous.**

Genoa.—A New Tunnel at Genoa. An illustrated article describing interesting details of working adopted by reason of the difficult conditions under which the operations had to be carried out. 2400 w. Engr, Lond—Aug. 28, 1903.

Glacier.—See **GLACIER—Protection Work.**

Gravehals, Norway.—The Gravehals Tunnel, Norway. Illustrated description of the construction of a tunnel 5,300 metres long, which ranks as the seventh or eighth of the large tunnels of the world. 3300 w. Public Works—Oct. 15, 1904.

Gravel, Loose.—See **Michel Creek Loop.**

Hand Driving.—Driving Tunnels by Hand. J. H. Shockley. Some points of value from an experience of over twenty years throughout North America. 1000 w. Min & Sci Pr—Feb. 1, 1902.

Harlem River.—Harlem River Tunnel of the Rapid Transit Subway. Illustration and description of a difficult piece of engineering work carried out on a new system through difficult material. 1200 w. Sci Am—Oct. 31, 1903.

An Improved Method of Subaqueous Construction at the Harlem River Crossing of the New York Rapid Transit Railroad. Illustrates and describes the method used near 145th street. 1300 w. Eng Rec—Dec. 26, 1903.

The Harlem River Tunnel of the New York Rapid Transit Railroad. The conditions and very shallow depth made the construction difficult, and the methods employed are illustrated and described. The present article describes the work on the second half of the tunnel. 2800 w. Eng Rec—May 14, 1904.

Progress on the Harlem River Tunnel of the New York Rapid Transit Railroad. Illustrated account of work on this double-track tunnel, 1,500 ft. long, part being a twin-tube cast-iron shell enclosed in concrete. 4000 w. Eng Rec—Aug. 20, 1904.

The Harlem River Tunnel Section of the New York Rapid Transit Railway. Illustrated description of the method of building the eastern half of the tunnel, radical changes having been made with the approval of the Chief Engineer. 2500 w. Eng News—Oct. 13,. 1904.

See also **UNDERGROUND RAILWAY—New York.**

Harlem River, Drainage.—Drainage of the Interborough Subway Under the Harlem River. Brief illustrated description of the drainage and pumping system adopted, and the precautions taken to meet possible conditions. 700 w. Ir Trd Rev—June 22, 1905.

Drainage of the Interborough Rapid Transit Railroad Under the Harlem River. An illustrated article explaining the drainage and pumping system adopted, and the precautions taken to meet possible conditions in the two tubes under the Harlem River. 1000 w. Stevens Ind—Oct., 1905.

Hook Mountain.—Hook Mountain Tunnel. Wager Fisher. Illustrates and describes the difficulties overcome and the method of prosecuting the work in constructing this tunnel, which forms a part of the Jersey City Water Supply Co.'s pipe line. 3300 w. Trans Assn of Civ Engrs of Cornell Univ—1902.

Hudson River.—The Pennsylvania Railroad Tunnel Bridge. Longitudinal view and cross section of proposed construction with notes. 600 w. Sci Am—Feb. 1, 1902.

The North River Tunnels by the Sooysmith Freezing Process. An illustrated outline description of the method proposed. 2800 w. R R Gaz—Nov. 21, 1902.

The Hudson River Tunnel. Reviews the history of this undertaking from its commencement in 1874, and gives an illustrated account of the preparations to complete the work. The tunnel will cross from the foot of 15th st., Jersey City, to the foot of Morton St., New York. 3800 w. Eng Rec—July 25, 1903.

The Hudson River Tunnel. An interesting illustrated article giving history and description of work of construction of the tunnel which is to give communication between the trolley systems of New York and Jersey City. 1700 w. Sci Am—Aug. 22, 1903.

The Pennsylvania Railroad Tunnel Under the North River, at New York City. An illustrated article describing the portion of the line in the North River division. 8000 w. Eng News—Oct. 15, 1903.

Manhattan and Weehawken Shafts of the Pennsylvania Railroad Tunnels under the North River. Illustrations wth brief account of the work. 1200 w. Eng Rec—Nov. 14, 1903.

Hudson River Tunnel of the New York & New Jersey Railroad. Outlines the past history of this work and an account of the resumed work, giving drawings. 1800 w. R R Gaz—Nov. 27, 1903.

The Present Status of the Hudson River Tunnel. Reviews the history of the construction work of the tunnel begun 30 years ago. 1200 w. Ir Age—Dec. 17, 1903.

The Hudson River Tunnel. Gives a résumé of the principal events in the history of the enterprise now approaching completion. The junction between the New Jersey and New York sections was made March 11, 1904. Ills. 1500 w. Sci Am. March 26, 1904.

The Hudson River Tunnel. An illustrated article, giving briefly the history of this work, begun thirty years ago and now approaching completion. 1800 w. Sci Am Sup—April 2, 1904.

The Originator of the Hudson River Tunnel. Brief review of the early history of this work, calling attention to names deserving record in connection with the undertaking. 1000 w. Eng News—April 7, 1904.

Pennsylvania R. R. Tunnel under North River. An illustrated account of an exhibit at the World's Fair of a full-sized section, showing the construction, concrete lining, screw pile and bridge system, &c., with information concerning this great work. 1700 w. Ry & Engng Rev—May 21, 1904.

The Hudson River Tunnel. S. D. V. Burr. An illustrated article comparing the original methods with those now employed. Serial. 1st part. 3000 w. Ir Age—June 2, 1904.

Notes on the Early History of the Hudson River Tunnel. S. D. V. Burr. An account of early work on this tunnel, describing also some of the peculiar physical characteristics of the silt composing the bed of the river. 1800 w. R R Gaz—June 3, 1904.

Some Notes on the Early History of the Hudson River Tunnel. S. D. V. Burr. Describes features of this work which have passed out of use, and are of historical value. Ills. 2500 w. R R Gaz—Vol. XXXVII., No. 18.

The Remarkable Progress of the Hudson River Tunnel for the New York and New Jersey R. R. Co. A brief illustrated account of the methods of construction and the progress of the work. 1000 w. Eng News—Nov. 10, 1904.

The New Jersey Tunnels and Subways. Map, with explanations and description, showing the connections of Manhattan Island and the mainland by tunnels, including also the East River tunnels. 1600 w. Sci Am—Aug. 12, 1905.

Completion of Twin Tunnels Under the Hudson River. Illustrations and account of the completion of these tunnels connecting Jersey City with New York. 1100 w. Sci Am Sup—Oct. 14, 1905.

The Hudson River Tunnels. Brief accounts of three pairs of tunnels being extended under the Hudson River between New York and Jersey City. 1700 w. Ir Age—Dec. 7, 1905.

Progress in the New Jersey Tunnels and Subways. Information concerning the tunnels connecting Jersey City and New York. Ills. 1500 w. Sci Am—Dec. 9, 1905.

See also **East River; New York; BRIDGE; RAILWAY TERMINAL—New York Pennsylvania; VIADUCT—Subaqueous.**

Intake.—See **Chicago; INTAKE; WATERWORKS.**

Intake, Cleveland Waterworks.—See **INTAKE.**

Iowa State College.—See **SUBWAY.**

Irish Channel.—The Proposed Irish Channel Tunnel. An account of a project to connect England and Ireland by tunnel under the Irish Channel. 3300 w. Eng News—May 23, 1901.

The Proposed Tunnel Between Scotland and Ireland. James Barton. Abstract of a paper read before the Glasgow Congress. Discusses briefly the selection of a site, the line, the water question, ventilation and cost. 1300 w. Engng—Sept. 6, 1901.

Italo-Swiss.—Italo-Swiss Alpine Tunnels. Outlines the various schemes proposed and under construction for connecting Italy and Switzerland, and tunneling the Alps and Apennines. 1800 w. Engr, Lond—June 10, 1904.

See also **Simplon.**

Japan.—Notes on Tunnel Work, Japanese Government Railways. Information taken from the annual report of the Imperial Government Railways on difficulties encountered in tunnel work. 1000 w. Ry & Engng Rev—April 13, 1901.

Karawanken, Austria-Hungary.—See **ELECTRIC EQUIPMENT—Karawanken Tunnel.**

Kellogg, Idaho.—The Kellogg Tunnel, Bunker Hill and Sullivan Mines, Idaho. Ulysses B. Hough. An illustrated account of the tunnel constructed for the purpose of developing mines, the aim from the outset being to make the greatest possible progress. 1200 w. Eng News—April 25, 1901.

Kelly, Col.—See **Newhouse and Kelly.**

Lining.—An Improved Method of Constructing Tunnel Linings (Die Richtige Tunnel-Kernbau-Methode). Michael v. Könyves-Toth. Describing an improved method of constructing a continuous concrete lining during the boring of a tunnel. 2000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Dec. 30, 1904.

See also **Boston Harbor; Coudray; Gardanne, Marseilles; Los Angeles; Musconetcong; Winston.**

London.—Improvements in Tunnel-Boring Practice in London for Deep-Level Railroads. Brief description of methods employed in tunneling beneath the River Thames. 1800 w. Sci Am—Nov. 21, 1903.

See also **Shield; UNDERGROUND RAILWAY.**

Los Angeles, Calif.—The Third Street Concrete and Brick-Lined Tunnel, Los Angeles, Cal. J. H. Quinton. An account of the difficulties met and the methods used in constructing this tunnel. Ill. 5700 w. Eng News—July 18, 1901.

Maintenance, Great Britain.—Maintenance of Railway Tunnels in Great Britain. Arthur Watson. Slightly condensed from a paper published by the Inst. of Civ. Engrs. 3900 w. Eng Rec—Nov. 23, 1901.

Melbourne, Aust.—Hydraulic Shield Tunneling on the Melbourne and Metropolitan Sewerage System. A paper by George Henry Dunlop, read before the Victorian Inst. of Engrs. Illustrates and describes work notably on account of the number of sewers of small diameter built in this way, the novel methods adopted for lining, and the variety and extent of the soft ground passed through. 3000 w. Eng News—Feb. 7, 1901.

See also **SEWERAGE.**

Meudon.—Difficult Work on the Meudon Tunnel on the New Railway from Paris to Versailles. Translated from "Le Génie Civil." An illustrated description of interesting work because of the difficulties encountered. 1800 w. Eng News—Sept. 11, 1902.

See also **ELECTRIC RAILWAY—Paris-Versailles.**

Michel Creek Loop.—Tunnel at Michel Creek Loop, Crow's Nest Pass Line, Canadian Pacific Ry. C. R. Coutlee. An illustrated account of the construction of a tunnel through loose gravel, describing the methods and plant. 3300 w. Eng News—April 2, 1903.

Mine.—The Opening of Mines by Tunnels. D. W. Brunton. An illustrated description of methods of timbering, operating, etc. 1600 w. Eng & Min Jour—Feb. 2, 1901.

Tunnels and Tunnel Schemes. Arthur Lakes. The advantages and disadvantages of the adit and the cross-cut; circumstances where the driving of each is advisable. Ill. 3600 w. Mines & Min—May, 1901.

Tunnel Schemes. Arthur Lakes. Compares the Standard, or Cripple Creek, with the Rothschönberger Stollen tunnel, of Freiburg, Germany. 2200 w. Mines & Min—Nov., 1901.

See also **Kellogg; Newhouse; Newhouse and Kelly; MINE; MINING.**

Moncreiffe, Scotland.—See **Alfreton, Eng.**

Mountain Pressure.—Tunnel Boring and Mountain Pressures (Tunnelbau und Gebirgsdruck). C. J. Wagner. An examination of the influence of rock pressures in mountains upon the difficulty of tunneling. Serial. Part I. 2000 w. Schweiz Bauzeitung—July 1, 1905.

Musconetcong, N. J.—Tunnel Lining Without Traffic Interruption. Willard Beahan. An illustrated account of work on the Musconetcong tunnel on the Lehigh Valley R. R. in the State of New Jersey. 3700 w. Trans Assn of Civ Engrs of Cornell Univ—1901.

Netherwood, N. J.—Reinforced Concrete Passenger Tunnel—C. R. R. of N. J. Illustrations showing the plans of a subway which this railroad is now building under its main line at Netherwood, N. J. Description. 600 w. R R Gaz—Vol. XXXIX. No. 6.

Newhouse.—Driving the Newhouse Tunnel. H. Foster Bain. An illustrated description of one of the most interesting mining tunnels in existence, now being driven at Idaho Springs, Colorado. 2200 w. Eng & Min Jour—April 19, 1902.

The Newhouse Tunnel. A. W. Warwick. An illustrated account of one of the greatest tunnel schemes ever undertaken, now being carried out at Idaho Springs, Colorado. 2800 w. Min Rept—April 24, 1902.

Newhouse and Kelly, Colo.—Kelly and Newhouse Tunnels. Arthur Lakes. Discusses the sources from which such tunnels derive revenue; how they are planned and the methods used in driving them. Ill. 2100 w. Mines & Min—June, 1901.

Newton Highlands.—See **SEWER.**

New York.—The New York Terminal of the Pennsylvania Railroad. The first of three articles giving an illustrated description of this great undertaking. 2300 w. R R Gaz—Oct. 9, 1903.

The New York Terminal of the Pennsylvania Railroad. The present article illustrates and describes the tunnels to be constructed from the middle of the North River under Manhattan and the East River to Long Island City. 2000 w. R R Gaz—Oct. 16, 1903.

Tunnels for the New York City Terminus of the Pennsylvania and Long Island Railroads. An illustrated article describing the plans for this extensive undertaking. The tunnels under the North and East rivers, and the great terminal station forming the most costly and stupendous engineering work for passenger traffic in the history of railroading. 3800 w. Eng Rec—Oct. 10, 1903.

Tunnels for the New York City Terminus of the Pennsylvania and Long Island Railroads. An illustrated description of the East River division of this system, with general matter and illustrations. Also editorial on the specifications. 4000 w. Eng Rec—Oct. 17, 1903.

The Pennsylvania Railroad Tunnel Under New York City. General plan of this great undertaking, with four insets. 2500 w. Ry Age—Oct. 30, 1903.

See also **East River; Harlem River; Hudson River; RAILWAY TERMINAL; UNDERGROUND RAILWAY.**

New York, Broadway.—A New Method of Tunneling Under Broadway, New York. Illustrated description of the system adopted which will cause but little interruption of traffic and present no serious obstacles in the street. 1400 w. Eng Rec—Oct. 24, 1903.

New York-Jersey City.—See **Hudson River.**

New York, Park Ave.—Proposed Alterations in the Park Ave. Tunnel, New York City. An outline of the proposed changes, with a cross-section of the proposed construction. 700 w. Eng News—Oct. 17, 1901.

See also **RAILWAY ACCIDENT; TUNNEL VENTILATION; UNDERGROUND RAILWAY.**

Palestine.—Tunnel Boring in Ancient Palestine. Brief account of tunnels built 2,500 years ago by means of which water was brought to ancient cities. 600 w. Sci Am—Nov. 4, 1905.

Paris.—See **Seine; Shield; RAILWAY TERMINAL; UNDERGROUND RAILWAY.**

Pennsylvania, N. Y.—See also **East River; Hudson River; New York; RAILWAY TERMINAL.**

Pipes.—See **SUBWAY.**

Pittsburg, Carnegie & West.—Some Tunnel Work on the Pittsburg, Carnegie & Western R. R. An illustrated account of tunnels now under construction on the Wabash R. R. extension, having features of unusual engineering interest. 3000 w. Ry & Eng Rev—Dec. 5, 1900.

See also **RAILWAY CONSTRUCTION.**

Pocahontas, N. Y.—Construction of the Pocahontas Tunnel, New York Central R. R. Illustrates and describes improvements on the Harlem Division of this road, near New York City, giving details of construction work. 1700 w. Eng Rec—Aug. 26, 1905.

Prelini.—Tunnelling. Review of a practical treatise by Charles Prelini, with additions by Charles S. Hill, placing on record the distinguishing characteristics of tunneling methods practised in the present day. 5600 w. Builder—Nov. 9, 1901.

Price Machine.—Tunneling Machine; Great Northern, Piccadilly and Brompton Railway. Brief illustrated description of the invention of Mr. Price. 500 w. Engng—Feb. 5, 1904.

Propeller Shaft.—See **SHAFT—Tunnel; PROPELLER—Tunnel.**

Pryor Gap, Mont.—The Pryor Gap Tunnel; Burlington & Missouri River R. R. F. T. Darrow. Illustrated description of the construction of this tunnel in Montana, of interest because of the simple means used in its excavation. 1300 w. Eng News—July 3, 1902.

Re-Lining.—See **Coudray, France; Winston.**

Rigoroso.—Some Proposed Alpine Tunnels. Information, with map, concerning a new railway line from Genoa to Paris, and the tunnels that would have to be bored. Also a route from Genoa to Tartona, with the Rigoroso tunnel. 1600 w. Engr, Lond—March 17, 1905.

River.—See **Boston Harbor; East River; Harlem River; Hudson River; Seine; Shield; Spree; Subaqueous; Tubular.**

Rogers Paper.—The Location and Construction of Railway Tunnels. Extracts from a paper by Mr. Arthur E. Rogers, published by the Inst. of Civ. Engrs. Discusses the materials to be tunneled, estimating, &c., giving examples of several tunnels where unusual conditions were met, and methods used. 4000 w. Eng Rec—Jan. 18, 1902.

Salt River Reclamation, Arizona.—Tunnel Construction on Salt River Reclamation Project, Arizona. Beverly R. Harrison. Briefly describes some difficult tunnel work. Ills. 1200 w. Eng Rec—Dec. 16, 1905.

See also **DAM; IRRIGATION.**

Sand.—Tunneling Through Fine Sand. Illustrated description of a method of driving a heading for a 6 1-2 ft. sewer by canvas backing for the lagging and cantilever supports for the top poling boards. 1200 w. Eng Rec—Jan. 26, 1901.

Santa Barbara.—The Proposed Tunnel for Water Development for Santa Barbara, Cal. A statement of the conditions at this place, and the means proposed for assuring an adequate water supply. 800 w. Eng News—Feb. 18, 1904.

Seattle, Wash.—Great Northern Tunnel at Seattle. Illustrated detailed description of the tunnel, nearly a mile long, being driven under the business section of the city. 1300 w. R R. Gaz—Vol XXXVII, No. 22.

Seine, Paris.—Tubular Tunnels in Water Bearing Soil (Les Tunnels Tubulaires en Terrains Aquiféres). C. Birault. An account of the tunnels under the Seine for the new lines of the Paris Metropolitain. 15,000 w. 2 plates. Mem. Soc. Ing. Civ. de France—June, 1905.

Sewer.—See **Chicago; Cleveland Sewer; Shield, Hastings; SEWER.**

Shield.—The Use of the Shield in the Construction of Tunnels (L'Emploi du Couchier à la Construction des Tunnels). An exhanstive critical study of tunneling by means of the shield, with accounts of numerous applications. Serial. Part I. 2500 w. Revue Technique—May 10, 1901.

Tunneling with a Shield in London Clay. H. A. Bartlett. Extract from a paper presented to the Inst. of Civ. Engrs., London. Illustrates and describes the work done by the shield and methods employed. 1500 w. R R Gaz—Vol. XXXVII. No. 14.

The New Roof Shield for the Metropolitan Railway Tunnel of Paris. R. Bonnin. Explains the lack of success of the half section shield, which was to have been used for this work, and illustrates and describes the new type and its operation. 4800 w. Eng News—Sept. 28, 1905.

See also **Boston Harbor; Chicago; Cleveland Sewer; East River; Hudson River; London; Melbourne; New York;** and under other names of places.

Shield, Hastings, Chicago.—The Hastings Tunnel Shield, Chicago. Intercepting Sewers. A description, by the City Engineering Department of Chicago, of two shields, 25 ft. in diameter, used in clay. 1400 w. Eng Rec—Jan. 19, 1901.

An Improved Tunneling Shield. Describes a type of shield designed by Cornelius G. Hastings, for application to tunnels of a considerable range of sizes through various classes of material, seeking to overcome the difficulties encountered in submarine and some land tunneling. Ill. 1500 w. Eng Rec—Jan. 2, 1904.

Signaling.—See **RAILWAY SIGNAL—St. Louis Tunnel.**

Simplon.—The Simplon Tunnel (Le Tunnel de Simplon). A. Dumas. A very full and illustrated account of the work on the Simplon tunnel as conducted up to date, with maps, profile and numerous views. 3500 w. Génie Civil—Oct. 27, 1900.

The Simplon Tunnel. Reviews the progress that has been made, and considers the prospect of a completion within the time limit. 1600 w. Nature—July 4, 1901.

The Construction of the Simplon Tunnel (Der Bau des Simplon-Tunnels). C. J. Wagner. An analysis and discussion of the work upon the Simplon tunnel from January 1, 1900, to January 1, 1901. Two articles. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 23, 30, 1901.

The Construction of the Simplon Tunnel (Der Bau des Simplontunnels). C. J. Wagner. A general review of the progress of work on this great tunnel through the Alps, from Jan. 1, 1901, to Jan. 1, 1903, with illustrations and tables. Serial. 2 parts. 1 plate. 9000 w. Oesterr Wochenschr f d Oeffent Baudienst—June 13 and 20, 1903.

The Construction of the Simplon Tunnel (Der Bau des Simplon-Tunnels). C. J. Wagner. A detailed review of the work for the year from January 1, 1902, to January 1, 1904. 10,000 w. 2 plates. Oesterr Wochenschr f d Oeff Baudienst—July 30, 1904.

The Work on the Simplon Tunnel (Simplon Tunnel). Report, showing the progress of the work during the quarter ending June 30, 1901. 1200 w. Schweizerische Bauzeitung—Aug. 24, 1901.

The Simplon Tunnel. Illustrates and describes the works in progress on the northern or Swiss side of the mountains. 2400 w. Engr, Lond—Sept. 27, 1901.

The Construction Works of the Simplon Tunnel (Die Bauarbeiten am Simplontunnel). S. Pestalozzi. Describing especially the auxiliary works in connection with the tunnel, including the water-power plants, etc. Serial. Part I. 2000 w. Schweizerische Bauzeitung—Nov. 2, 1901.

The History of the Simplon Undertaking (Zur Geschichte des Simplon-Unternehmen). S. Pestalozzi. A general history of the various projects which resulted in the boring of the Simplon tunnel. Serial. Part I. 1800 w. Schweiz Bauzeitung—March 4, 1905.

Work on the Simplon Tunnel. Comments on the engineering work and the advantages of this route through the Simplon Pass over the Mt. Cenis and St. Gothard. Ill. 2000 w. Sci Am—Nov. 16, 1901.

Simplon Tunnel (Simplon Tunnel). An abstract of the progress upon the Simplon tunnel works for the July-September quarter, 1901. 1800 w. Schweizerische Bauzeitung—Nov. 16, 1901.

The Simplon Tunnel (Traforo del Sempione). A. Ferrucci. A discussion of the progress up to the close of 1901, and an account of the irruption of water on the Italian side. 1000 w. Gior d Lav Pubb e delle Str Ferr—Jan. 15, 1902.

Progress of the Simplon Tunnel (I Lavori del Traforo del Sempione). A. Ferrucci. An analysis of the work done at the various headings during the last quarter of 1901. 2000 w. Gior d Lav Pub e d Str Ferr—Feb. 26, 1902.

The Construction of the Simplon Tunnel (Der Bau des Simplon-Tunnels). Hr. Moisen. A paper before the Hamburg branch of the Verein deutscher Ingenieure, giving a general account of this great Swiss-Italian tunnel and its construction. 3000 w. Zeitschr d Ver Deutscher Ing—May 3, 1902.

Simplon Tunnel (Simplon Tunnel). An abstract of the fourteenth quarterly report, showing the progress of the work on the Simplon tunnel up to the end of March, 1902. Nearly 58 per cent. of the boring has been accomplished. 1800 w. Schweizerische Bauzeitung—May 17, 1902.

The Simplon Tunnel and Its Construction. A description of this tunnel and the methods of working, correcting some of the errors which have appeared concerning this work. Serial. 1st part. 1000 w. Engr, Lond—July 4, 1902.

The Work on the Simplon Tunnel (Die Bauarbeiten am Simplon Tunnel). H. Pflug. A general account of the work on the Simplon tunnel with a comparison with the previous tunnels through the Alps. 5000 w. Glasers Annalen—July 15, 1902.

Observations on the Alignment of the Simplon Tunnel (Ueber einige Wahrnehmungen bei den Richtungskontrollen am Simplontunnel). M. Rosenmund. A discussion of the operative difficulties encountered in the establishment of the line of the Simplon tunnel. 3000 w. Schweizerische Bauzeitung—Aug. 2, 1902.

The Final Results of the Measurements of the Simplon Tunnel (Die Schlussergebnisse der Absteckung des Simplontunnels). Prof. M. Rosenmund. Discussion of the small errors in direction and level found after the tunnel had been finished. 2400 w. Schweiz Bauzeitung—Sept. 9, 1905.

The Simplon Tunnel (Simplon Tunnel). An abstract of the quarterly report of progress on the Simplon tunnel, showing the work and operative conditions from March to June, 1902. 2000 w. Schweiz Bauzeitung—Aug. 30, 1902.

The Simplon Tunnel. Illustrations and interesting information concerning this great engineering work. 2200 w. Transport—Sept. 26, 1902.

The Simplon Tunnel (Simplon Tunnel). Abstract of the quarterly report showing the progress of the work between June and September, 1902. 1800 w. Schweiz Bauzeitung—Nov. 15, 1902.

The Construction of the Simplon Tunnel (Der Bau des Simplon-Tunnels). Paul Möller. A very complete description of the project, its execution down to the present time, and the methods employed in boring and conveying material; with many illustrations. 7500 w. Zeitschr d Ver Deutscher Ing—Nov. 15, 1902.

The Simplon Tunnel and Its Consequences. Discusses the effect the opening of this line will have on the industrial progress of Italy; considers other engineering works planned, and the increase in traffic probable. 3000 w. Engr, Lond—March 27, 1903.

The Simplon Tunnel (Der Simplondurchstich). H. Baum. A general description of the work with numerous illustrations showing the methods and progress down to the close of 1902. 7000 w. 2 plates. Glückauf—July 18, 1903.

The Construction of the Simplon Tunnel. The present article gives the history of the project, explaining the relation of the tunnel to existing routes, and describing engineering features of connecting lines. Ill. Serial. 1st part. 3500 w. Eng News—Aug. 13, 1903.

The Simplon Tunnel (Simplon-Tunnel). The Nineteenth quarterly report, showing the progress made from April 1 to June 30, 1903. There is now about 77 per cent. of the total length completed. 2000 w. Schweizerische Bauzeitung—Aug. 15, 1903.

The Simplon Tunnel. Reviews the history of this great undertaking, commencing a detailed description of the construction. Ill. Serial. 1st part. 5400 w. Trac & Trans—Jan., 1904.

The Simplon Tunnel (Simplon Tunnel). The twenty-first quarterly report of the progress of the work, showing the tunnel to be about 91 per cent. of the distance through the mountain. 1500 w. Schweiz Bauzeitung—Feb. 13, 1904.

The Simplon Tunnel (Le Tunnel du Simplon). Pierre de Blonay. A detailed account of the work from July 1, 1903, to June 30, 1904, with tables and diagrams of excavation, temperature, ventilation, drainage, etc. 4000 w. Bull Tech de la Suisse Rom—Sept. 10, 1904.

The Simplon Tunnel. Francis Fox. A brief illustrated account of this work, the difficulties encountered, and conquered, the present condition, and the probable junction of the headings. 1500 w. Nature—Oct. 27, 1904.

The Construction of the Simplon Tunnel (Der Bau des Simplon Tunnels). Paul Möller. A description of the methods of working, drainage, ventilation, and timbering of the later portions of the tunnel. 4500 w. Zeitschr d Ver Deutscher Ing—Oct. 29, 1904.

The Geological Predictions for the Simplon Tunnel (Ueber die Geologische Voraussicht beim Simplon Tunnel). A comparison of the indications given by the geological commission, with those actually revealed by the boring. 3000 w. Schweiz Bauzeitung—Jan. 28, 1905.

The Simplon Tunnel. Editorial review of this great engineering work, its difficulties and interesting features. 3500 w. Engng—Feb. 24, 1905.

The Piercing of the Simplon (Il Traforo del Sempione). N. Sacerdoti. A review of the undertaking in view of the completion of the perforation, with comments on the salient features of the work. 1800 w. Il Monitore Tecnico—Feb. 28, 1905.

The Perforation of the Simplon (Il Traforo del Sempione). A comprehensive review of the Simplon tunnel works, in connection with the announcement of the meeting of the headings. 3000 w. L'Industria—March 12, 1905.

The Completion of the Simplon Tunnel. Charles R. King. The first of a series of extensively illustrated articles. The present number deals principally with the difficulties due to encountering hot springs. Serial. 1st part. 2500 w. Sci Am Sup—March 25, 1905.

The Construction of the Simplon Tunnel. Leon Monete. A very fully illustrated account of the work, including the project, the mechanical equipment, and the manner in which the numerous difficult engineering problems were solved. 3500 w. Engineering Magazine—May, 1905.

The Simplon Tunnel. Lewis A. Parsons. Brief review of the work. 2000 w. Yale Sci M—June, 1905.

The Scientific Results of the Piercing of the Simplon Tunnel (Les Resultats Scientifiques du Percement du Tunnel du Simplon). H. Schardt. A complete study of the geological and physical information gained in the course of the boring of the tunnel, from a scientific viewpoint. Serial. Part I. 3000 w. Bull Tech de la Suisse Romande—May 25, 1905.

Simplon Tunnel (Simplon-Tunnel). Abstract of report on the progress of work to the end of June, 1905. Tables. 1000 w. Schweiz Bauzeitung—Aug. 25, 1905.

The Construction of the Simplon Tunnel (Les Travaux du Tunnel du Simplon). M. Jaquier. A general description of the undertaking and its difficulties; reviewing the engineering peculiarities of the work, with statistics of the execution. 20,000 w. 1 plate. Ann des Ponts et Chaussées—4 Trimestre, 1905.

The Crowning Work of the Simplon Tunnel. Drawings and engravings showing the means employed for the very difficult operation of constructing the passage through 40 m. of saturated decomposed clay slate. 1600 w. Engr, Lond—Dec. 8, 1905.

See also Alpine; RAILWAY; RAILWAY TRAFFIC; SURVEYING; TUNNEL VENTILATION.

Simplon Water Irruption.—The Flow of Water in the Simplon Tunnel (Irruption de'Eau dans le Tunnel du Simplon). An account of the sudden heavy discharge of water into the works of the Simplon tunnel in September, 1901. 800 w. Revue Technique—Nov. 10, 1901.

The Flow of Water in the South Heading of the Simplon Tunnel (Wasserandrang auf der Südseite des Simplon-Tunnels). A detailed report of the sudden irruption of water into the Italian side of the Simplon tunnel works in September, 1901. 1000 w. Schweizerische Bauzeitung—Dec. 7, 1901.

Hot Springs and the Simplon Tunnel. An explanation of the conditions which have caused the interruption of this work at the Swiss side. Serial. 1st part. 1800 w. Engr, Lond—Aug. 19, 1904.

The Simplon Tunnel. The first of a series of articles describing the difficulties encountered and overcome, especially those due to the influx of large quantities of hot water. Serial. 1st part. 2800 w. Engr, Lond—March 3, 1905.

Sooysmith Process.—See Hudson River.

South Knoxville, Tenn.—Reinforced Concrete Tunnel on the Southern. Illustrated detailed description of the construction of a tunnel at South Knoxville, Tenn. 450 w. R R Gaz—Vol. XXXVIII., No. 11.

Spree River.—The Stralau-Treptow Tunnel Under the River Spree. Brief illustrated account of the first submarine tunnel ever constructed in Germany. 700 w. Sci Am—June 22, 1901.

Subaqueous.—Subaqueous Tunnels for Gas Conduits. W. W. Cummings, with discussion. Illustrated description of methods of construction used in three river crossings recently carried out by the Massachusetts Pipe Line Gas Co. 8 plates. 7500 w. Jour Assn Engng Socs—June, 1901.

Improved Methods for Difficult Subaqueous Tunneling. Brief illustrated descriptions of some of the methods that have been proposed for the construction of important tunnels in connection with the transportation systems of New York. Also editorial. Ill. Serial. 1st part. 4800 w. Eng Rec—March 14, 1903.

The General Problem of Tunneling under Rivers. Editorial on methods of construction, requirements, etc. 1200 w. Eng Rec—Oct. 31, 1903.

Subaqueous Tunneling. Sir Alexander Binnie. Considers, exclusively, those tunnels which have had to be constructed in water-bearing strata in close proximity to the channel bed. Ills. 9500 w. Public Works—Oct. 15, 1904.

See also Boston Harbor; Chicago; East River; Harlem River; Hudson River; Seine; Shield; Spree River; Tubular; INTAKE; VIADUCT.

Surveying.—See SURVEYING—Tunnel.

Switzerland.—See Albula; Cornallaz; Italo-Swiss; Simplon; MOUNTAIN RAILWAY; RAILWAY; RAILWAY CONSTRUCTION.

Telephone, Chicago.—See SUBWAY—Chicago Freight and Telephone.

Timber Quicksand.—See SEWER—Newton, Mass.

Tubular.—Tubular Tunnels in Wet Ground (Les Tunnels Tubulaires en Terrains Aquifères). C. Brault. A mathematical investigation of the stresses in submerged metallic-tube tunnels. 2000 w. Génie Civil—Dec. 24, 1904.

See also East River; Harlem River; Hudson River; London; Seine.

Ventilation.—See TUNNEL VENTILATION.

Washington, D. C.—The Virginia Avenue Tunnel, Washington. Illustrated description of the construction. 2400 w. Eng Rec—Aug. 27, 1904.

The First Street Tunnel at Washington. Begins an illustrated description of the construction work of the tunnels for the passenger trains of the Pennsylvania R. R. by which they will reach the new Union Terminal Station. Serial. 1st part. 1600 w. Eng Rec—Sept. 3, 1904.

The First Street Tunnel, Washington, D. C. Illustrated description of construction work on the double-track tunnel being built to connect the passenger tracks of the Pennsylvania R. R. with the new union terminal station. Serial. 1st part. 2000 w. Eng Rec—May 20, 1905.

The Pennsylvania R. R. Tunnel Under Capitol Hill, Washington, D. C. An illustrated article giving details of the methods of excavation and the machinery employed in this example of soft ground tunneling. 2800 w. Eng News—Sept. 14, 1905.

See also RAILWAY TERMINAL.

Wasserburg, Bavaria.—A Reinforced Concrete Tunnel (Tunnel in Eisenbetonkonstruktion). L. Zöllner. Illustrating a tunnel lining on the Wayss system near Wasserburg, Bavaria. 1000 w. Beton u Eisen—No. V. 1903.

Wayss System.—See Wasserburg.

West Virginia.—Tunnels on the West Virginia Short Line Railroad. J. V. Davies. Describes this line through a very mountainous region, and illustrates and describes the extensive tunnel construction. 2800 w. R R Gaz—March 8, 1901.

Winston.—Relining Winston Tunnel on the Chicago Great Western. An illustrated description of the work of relining with brick and concrete and building retaining walls in the cut. 1000 w. R R Gaz—July 22, 1904.

Some Recent Works of Railway Tunnel Improvement. Describes the relining and change of grade in the Winston tunnel, and the opening up of the Arlon tunnel. Ills. 1500 w. Eng News—Aug. 4, 1904.

TUNNELING.

See TUNNEL.

TUNNEL VENTILATION.

See also MINE VENTILATION; SEWER VENTILATION; TUNNEL; UNDERGROUND RAILWAY; VENTILATION.

Ventilation of Subways and Tunnels. Editorial on the need of studying this subject, referring to recent articles bearing upon it, and reporting the conditions of the air. 1800 w. Eng Rec—March 7, 1903.

Air Testing.—Air-Testing in Tunnel Construction. Joseph W. Ellms. Reports concerning the use of the Shaw gas-tester, at Cincinnati. 2500 w. Eng Rec—March 7, 1903.

Albespeyre.—The Farcot Ventilator (Ventilateurs Farcot). Ed. Sauvage. Data and results of test of a large Farcot fan used for ventilating the Albespeyre tunnel in the south of France. Details of the machinery are given. 7500 w. Bull Soc d'Encour—Jan., 1904.

The Ventilation of the Albespeyre Tunnel (Aération du Tunnel de l'Albespeyre, Lozère). Illustrating an installation of the Saccardo system, with Farcot fan on the line of the Paris, Lyons, Mediterranean railway between Langogne and Alais, in southern France. 1200 w. Génie Civil—March 12, 1904.

The Ventilation of the Albespeyre Tunnel, France. Dr. Alfred Gradenwitz. An account of the large size machinery required and the difficulties met with. Ills. 1400 w. Eng Rec—June 4, 1904.

Alpine, Plants.—Ventilating Plants for the Construction of Large Alpine Tunnels (Die Lüftungsanlagen beim Baue der Grossen Alpen-tunnels). Karl Brabbée. A review of experience in the ventilation of tunnels during construction; with special reference to the Bosruck, Tauern, Karawanka, and Wochein tunnels. Serial. Part I. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 11, 1905.

East Mahanoy, Pa.—Ventilation of the East Mahanoy Tunnel—Philadelphia & Reading. Theodore Voorhees. Illustrated description of a fan installation where advantage was taken of part of the working of the Buck Mountain coal vein, which is cut by the tunnel. 1100 w. R R Gaz—March 8, 1901.

Elkhorn, W. Va.—The Ventilation of Elkhorn Tunnel—Norfolk & Western Railway. Charles S. Churchill. An illustrated description of the tunnel, with details of the method employed which consists of an injector and machinery for forcing the air in at one end of the tunnel. 2700 w. R R Gaz—May 10, 1901.

Europe.—The Ventilation of Some Continental Tunnels. Begins an account of notable installations, showing what has been done on the Continent. Serial. 1st part. 3000 w. Engr, Lond—Jan. 15, 1904.

See also **Alpine.**

Farcot Fan.—See **Albespeyre.**

Lubricating Oil.—See **LUBRICATION—Compressed Air Apparatus.**

New York.—The Ventilation of Railway Tunnels Under City Streets. Editorial discussion of the complaints in regard to the tunnels leading to New York. 2300 w. Eng News—July 11, 1901.

A Proposed Ventilating System for the Park Ave. Tunnel, New York City. Albert A. Cary. Illustrated description of the system proposed by the writer in his testimony before the Grand Jury while investigating this problem. Also editorial. 2300 w. Eng News—Aug. 8, 1901.

Saccardo System.—See **Albespeyre.**

Simplon.—The Ventilation of the Simplon Tunnel (Die Ventilationsanlagen am Simplon-tunnel). C. J. Wagner. An illustrated account of the ventilating plant and method of ventilation. 2 plates. 2500 w. Oesterr Wochenschr f d Oeffent Baudienst—Feb. 15, 1902.

The Ventilation of the Simplon Tunnel. Illustrated description of the ventilating plant employed in tunneling about 12-14 miles under mountains so high that the natural rock temperature is over 100 degrees F. for half the distance. Gives the temperature and humidity readings in different parts of the tunnel. 2600 w. Eng Rec—March 8, 1902.

See also **TUNNEL.**

TURBIDITY.

See **WATER—Turbidity.**

TURBINE.

See also **HYDRO-ELECTRIC PLANT; MOTOR; PUMP; STEAM TURBINE; WATER POWER; WATER MOTOR; WATER WHEEL.**

Turbines. Arthur Henry Tyack. Read before the Inst. of Civ. Engs., Manchester, Eng. Part first gives description of various types. Serial. 1st part. 1800 w. Elec, Lond—Nov. 2, 1900.

Modern Hydraulic Turbines (Sulle Turbine Idrauliche Moderne). W. Zuppinger. An exhaustive discussion of the modern theory of turbine construction, with descriptions of various types and comparisons of their performances. Serial. Part 1. 1500 w. L'Industria—Jan. 19, 1902.

Turbines and the Effective Utilisation of Water-Power. Alex. Rea. Abstract of a paper read before the Salford Science Students' Assn. Illustrated descriptions of various types of turbines, discussing their construction. Serial. 1st part. 2200 w. Mech Engr—March 22, 1902.

Modern Turbine Practice and the Development of Water Power. John Wolf Thurso. Reviews the development of the turbine in Europe and America, present American turbine practice, types for low and high heads, general construction, etc. Ill. 10,000 w. Eng News—Dec. 4, 1902.

Hydraulic Turbines (Turbines Hydrauliques). M. Abraham. A general examination of the various types of turbine water wheels, with a mathematical discussion of the mechanical principles involved in turbine design. Serial. Part I. 3000 w. Revue Technique—Oct. 25, 1905.

Foreign and American Hydraulic and Turbine Plants. Frank C. Perkins. Gives illustrations and brief descriptions of plants showing the arrangement of horizontal shaft turbines, and vertical shaft turbines, and the types of governors employed. 1700 w. Engr, U S A—Dec. 1, 1905.

Buckets.—See **Francis Buckets.**

Bouvier Governor.—The Bouvier Governor for Water Turbines. Dr. Alfred Gradenwitz. Illustrated description of an apparatus in which any disturbance occurring in the resisting work is corrected by a corresponding displacement of the gate mechanism. 1400 w. Mach, N Y—June, 1905.

Classification.—The Classification of Turbines (Klassifikation von Turbinen). N. Baashuus. Deriving characteristic curves from which the turbine best adapted to the conditions of fall, speed, etc., may be determined. 1800 w. Zeitschr d Ver Deutscher Ing—Jan. 21. 1905.

Design.—See **WATER FLOW—Turbines and Pumps.**

Escher, Wyss & Co.—Recent Turbine Installations (Neuere Turbinenanlagen). Giving descriptions of recent installations by Escher, Wyss & Co., at Schaffhausen, Chèvres, Lyons, Niagara, and Kubel. Serial. 2 parts. 4000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Aug. 24, 31, 1901.

Great Modern Turbine Installations (Grosse Moderne Turbinenanlagen). L. Zodel. With especial reference to the work of Escher, Wyss & Co., including the plant of the Canadian Niagara Falls Power Company. Serial. Part I. 3000 w. Schweiz Bauzeitung—Jan. 2, 1904.

See also **Niagara; Switzerland.**

Flow Recorder.—See **WATER FLOW—Turbines and Pumps.**

Francis.—Progress in Turbine Construction (Fortschritte im Turbinenbau). C. Schmitthenner. A paper giving review of recent progress in turbines and their regulating apparatus, and a particular discussion of Francis turbines, with illustrations and diagrams. Serial. 2 parts. 5000 w. Zeitschr d Ver Deutscher Ing—June 13 and 20, 1903.

The Theory and Computations for Turbines and Centrifugal Pumps (Theorie und Berechnung der Vollturbinen und Kreiselpumpen). H. Lorenz. A mathematical discussion of the curves of turbines of the Francis type, deriving formulas also applicable to centrifugal pumps. 4000 w. Zeitschr d Ver Deutscher Ing—Oct. 14, 1905.

The Distribution of Pressure in the Francis Turbine, and the Pressure on the Step (Die Druckverhältnisse in der Francis Turbine und der Druck auf den Spurzapfen). Karl Kobes. A mathematical investigation of the action of the water-pressure in turbines of the Francis type, with especial reference to the load on the spindle step. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 8, 1905.

See also **High-Pressure.**

Francis Buckets.—The Construction of the Buckets of Radial Turbines (Zur Konstruktion der Laufräder Radialturbinen). N. Baashuus. A graphical method of laying out the curves of the buckets of wheels of the Francis type. 2000 w. Zeitschr d Ver Deutscher Ing—Nov. 9, 1901.

Bucket Forms for the Francis Turbine (Die Schaufelung der Francis-Turbine). R. Escher. A mathematical study of the proportions and curvatures to be given to the buckets of the Francis type of hydraulic turbine. Two articles. 3000 w. Schweiz Bauzeitung—Jan. 17, 24, 1903.

Francis vs. Jonval.—A Comparison Between Axial Turbines and the Modern Radial Turbines (Vergleich zwischen Achsial Turbinen und den Neueren Radialturbinen). Prof. Pfarr. A discussion of the advantages of the Francis type of turbine over the older Jonval design, showing the reasons for the higher efficiency of the former.

3000 w. Zeitschr d Ver Deutscher Ing—Sept. 26, 1903.

Girard.—See **Switzerland.**

Governing.—Hydraulic Regulator for Turbines (Hydraulic-Tachymètre pour Régulateur de Turbines Hydrauliques). L. Ribourt. A description of the writer's turbine governor, acting by variations in the pressure of a stream of water. 1200 w. Comptes Rendus—Feb. 23, 1903.

The Regulation of Hydraulic Turbines (La Régulation des Turbines Hydrauliques). L. Ribourt. An examination of the action of various turbine governors, comparing the centrifugal type with the hydraulic cataract form. 6000 w. 3 plates. Mem Soc Ing Civ de France—July, 1904.

The Speed Regulation of Turbines (Die Geschwindigkeitsregulierung der Turbinen). A. Budau. A review of the improvements which have been made during the past thirty years, with especial reference to Continental practice. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 17, 1905.

See also **Bouvier; Paris Exposition; WATER WHEEL.**

Hemmer Inward-Flow.—See **Inward-Flow.**

High-Pressure.—High-Pressure Water Wheels, with Particular Reference to the Girard and Francis Turbines. E. G. De Wald. Paper before the Pacific Coast Electric Transmission Assocs., giving a description of these turbines, with illustrations and diagrams. 2000 w. Jour of Elec—Aug., 1904.

See also **WATER WHEEL.**

History.—Notes on the History of Turbine Development in America. A. C. Rice. An interesting review of water-wheel development, especially of the turbine design. 3300 w. Eng News—Sept. 18, 1902.

The Development of the Turbine (Die Entwickelung der Turbine). Prof. R. Escher. A historical sketch of turbines and their regulating apparatus. Serial. 2 parts. 6000 w. Schweiz Bauzeitung—Dec. 21, 28, 1901.

Impulse.—See **WATER WHEEL.**

Impulse vs. Reaction.—Impulse and Reaction Turbines. An illustrated article explaining the distinction between the impulse and reaction turbine. 1200 w. Mech, N Y—March, 1905.

Water Turbines. The present number gives a study of tangential flow. Serial. 1st part. 450 w. Prac Engr—March 3, 1905.

Installation.—Preliminary Plans for Turbine Plants (Erster Entwurf von Turbinenanlagen). N. Baashuus. Discussing the simple calculation required to determine the general questions involved in the planning of a hydraulic turbine installation. 4000 w. Elektrotech Zeitschr—Oct. 18, 1905.

Inward-Flow.—Inward-Flow Turbines. Illustrated description of these turbines which, when tested, reached 85 1-2 per cent. total efficiency. Also report of tests. 2400 w. Engr, Lond—Aug. 16, 1901.

Italian.—See **Niagara; Terni.**

Jolly-McCormick.—The Jolly-McCormick Turbines at the "Soo." An illustrated description of these turbines with an outline of the history of this type. 1600 w. Ir Age—Nov. 20, 1902.

The Turbine Equipment of the "Soo." Brief illustrated description of this important development of water power. 700 w. Min Rept—Nov. 27, 1902.

See also **HYDRO-ELECTRIC PLANT—Sault Ste. Marie.**

Kykkelsrud.—See **HYDRO-ELECTRIC PLANT.**

Leaf Arrester.—See **LEAF ARRESTER; SCREEN.**

Low Pressure.—Comparative Experiments with Low-Pressure Reaction Turbines (Vergleichende Untersuchungen an Reaktions-Niederdruckturbinen). Dr. Franz Prasil. A very complete account of experiments made at the Zurich Polytechnic upon turbines of the Francis type. Serial. Part I. 1800 w. Schweiz Bauzeitung—Feb. 18, 1905.

Millinocket, Me.—Rodney Hunt Turbine Plant at the Great Northern Paper Company's Mill. Illustrated description of this hydraulic plant at Millinocket, Maine, which is the largest of its kind in the world. 1500 w. Sci Am—April 13, 1901.

See also **PAPER MILL.**

Niagara.—The 3000 Horse Power Turbines at Niagara (Die 3000-Pferdigen Turbinen am Niagara). R. Thomann. A detailed description of two horizontal Francis turbines built by Riva, Monneret & Co., of Milan, Italy, for the Hamilton Electric Light and Contract Power Co., of Canada. 1800 w. Zeitschr d Ver Deutscher Ing—Aug. 3, 1901.

Italian Turbines for a Niagara Water-Power Plant. Illustrates and describes the turbines supplying power to the plant of the Hamilton Electric Light & Cataract Power Co. 900 w. Eng News—Nov. 14, 1901.

The New Turbines for the Niagara Falls Power Company. Illustrated description with a statement of the conditions to be met. 700 w. Eng Rec—Nov. 23, 1901.

The 5500 Horse Power Turbines of the Niagara Falls Power Co. and their Hydraulic Governors (Die 5500 P. S. Turbinen der Niagara Falls Power Cie. und deren Hydraulische Regulatoren). A well illustrated description of this machinery, built by Escher, Wyss & Co., of Zurich, for the 1900 extension of the power plant above the Falls. 1800 w. Schweiz Bauzeitung—Feb. 15, 1902.

See also **Escher, Wyss & Co.; HYDRO-ELECTRIC PLANT.**

Niagara German.—German Turbines at Niagara (Deutsche Turbinen am Niagara). Albert Ungerer. With illustrations and descriptions of the Francis type of turbines built by Voith, of Heidenheim, Würtemberg, for the Hamilton and the Ontario Power Companies at Niagara Falls. 2500 w. Zeitschr d Ver Deutscher Ing—Dec. 16, 1905.

Paris Exposition.—Special Report Upon Turbines and Their Regulators at the Paris Exposition of 1900 (Specialbericht über die Turbinen und deren Regulatoren auf der Weltausstellung in Paris, 1900). Prof. F. Prasil. Giving details of various wheels and their governors, especial attention being devoted to the latter. Serial. Part I. 1500 w. Schweizerische Bauzeitung—Feb. 9, 1901.

Hydraulic Turbines at the Exposition of 1900 (Les Turbines Hydrauliques à l'Exposition de 1900). G. Lavergné. A general review of the wheels exhibited at Paris, with especial reference to regulating devices. Two articles. 3500 w. April 20, 27, 1901.

Pipe Pressure.—See **WATER PIPE—Pressure Variations.**

Pumping Plants.—See **PUMPING STATION—Turbine.**

Pumps.—The Reversibility of Hydraulic Turbines (Sur la Réversibilité des Turbo-Machines Hydrauliques). Platon Yankowsky. A study of turbine water-wheels and centrifugal pumps showing the manner in which they are related to each other. 12000 w. Revue de Mécanique—May 31, 1904.

See also **PUMP—Centrifugal; Turbine.**

Reaction.—See **Impulse vs. Reaction; Low Pressure.**

Regulation.—See **Governing; Paris Exposition; WATER WHEEL—Governing.**

Rhine-Marne Canal.—See **PUMPING STATION.**

Ribourt Governor.—See **Governing.**

Risdon.—See **HYDRO-ELECTRIC PLANT—Colgate, Cal.**

Rodney Hunt.—See **Millinocket.**

St. Anthony Falls.—Testing the Capacity of Turbines. Edward P. Burch. Résumé of a test recently made for the St. Anthony Falls Water Power Co., of Minneapolis. 1600 w. Elec Wld & Engr—Dec. 22, 1900.

Sault Ste. Marie.—See **Jolly-McCormick; HYDRO-ELECTRIC PLANT.**

Shawinigan.—The Largest Water Turbine in Existence. Illustrates the large turbine at Shawinigan Falls, near Montreal, giving brief description. 800 w. Sci Am—Jan. 7, 1905.

See also **HYDRO-ELECTRIC PLANT.**

Steam.—See **STEAM TURBINE.**

Switzerland.—Turbine Building and Turbo-Electric Stations in Switzerland. Prof. F. Präsil. A résumé of progress, with particular attention to the installations built since 1888 and the facilities of the largest makers at the present time, and discussion of some of the more important hydro-electric stations. Ill. Serial. Part I. 8200 w. Engineering Magazine—May, 1901.

Turbine Building and Turbo-Electric Stations in Switzerland. Prof. F. Prasil. The second section of Prof. Prasil's review deals mainly with the great hydro-electric plants at Chèvres and at Rheinfelden. 3500 w. Engineering Magazine—June, 1901.

Swiss Turbines of the Girard & Pelton Types. Frank C. Perkins. Illustrates and describes various types of water wheels used in hydro-electric plants in Europe. 700 w. Min Rept—July 2, 1903.

See also **Escher, Wyss & Co.; History; HYDRO-ELECTRIC PLANT.**

Terni, Italy.—Turbines of the Italian Calcium Carbide Company, at Terni (Turbines de la Société Italienne de Carbure de Calcium, à Terni). J. Michaud. Illustrated description of the hydraulic part of this hydro-electric plant on a branch of the Tiber. 2500 w. Bull Tech d l Suisse Romande—April 10, 1903.

Tests.—Brake Tests on a New American Turbine (Bremsversuche an einer New American Turbine). A comparative test by Professor Pfarr of Darmstadt, with data of trials made in the flume at Holyoke, Mass. 3000 w. Zeitschr d Ver Deutscher Ing—June 7, 1902.

A Prony Brake Test of a Horizontal Turbine for the Bates Mfg. Co., Lewiston, Me. William O. Webber. An illustrated account of tests made to determine if a pair of horizontal turbine waterwheels fulfilled a guaranteed performance of 688 brake horse-power at 223 revolutions per minute and 27 ft. of head. 800 w. Eng News—April 30, 1903.

Brake Tests of a Radial Turbine (Bremsversuche an einer Radialturbine, Gebaut von der Maschinenfabrik Briegleb, Hansen & Co., in Gotha). Prof. Pfarr. An illustrated account of a test of a German turbine and comparison with test of a "New American" turbine of the same size and using about the same volume of water. Diagrams and tables. 700 w. Zeitschr d Ver Deutscher Ing—May 2, 1903.

See also **St. Anthony Falls.**

Theory.—See **Francis; WATER FLOW—Turbines and Pumps.**

Voith.—See **Niagara German.**

Water Meter.—See **WATER FLOW—Turbines and Pumps.**

TURBINE WORKS.

Hartlepool.—See **STEAM TURBINE WORKS.**

Morris.—See **MACHINE WORKS—Port Richmond.**

Port Richmond, Pa.—See **MACHINE WORKS.**

TURBO-GENERATOR.

See also **GENERATING SET; STEAM TURBINE.**

Commutator Sparking.—See **COMMUTATION—Sparking.**

TURNING.

See also **BORING MILL; LATHE; MACHINE TOOL.**

Capitaine's Machine.—See **CRANK PIN—Turning Machine.**

TURNING MILL.

See **BORING MILL.**

TURNTABLE.

See also **RAILWAY TERMINAL; RAILWAY YARD; ROUNDHOUSE; TRANSFER TABLE.**

Cast-Iron.—An All Cast-Iron Turn-Table. James C. Bennett. An illustrated description of a turntable for industrial tracks, designed to increase the efficiency and lessen cost. 900 w. Eng & Min Jour—Feb. 4, 1904.

Compressed Air.—Pneumatic Turntable. Illustrates and describes a high-speed compressed air turntable recently installed at Trenton, N. J. 600 w. R R Gaz—April 17, 1903.

Electric.—An Electrically Operated Turntable (Ueber einen Neuen Elektrischen Antrieb von Drehscheiben). E. Block. An illustrated description of a Westinghouse electric motor which runs on the circular track under the table and pulls the latter around. 1200 w. Glasers Annalen—May 1, 1902.

Electrically Operated Turntables. Extract from a committee report to the Assn. of Ry. Supts. of Bridges and Bldgs. Ill. 2500 w. Am Engr & R R Jour—Nov., 1902.

New Electric Turntable in Germany. Illustrations showing an electric turntable of interest, with brief notes. 200 w. U S Cons Repts, No. 1706—July 25, 1903.

Gasoline Engine.—Turntable Operation with Gasoline Engine. Illustrated description of an installation for the N. Y. C. & H. R. R. R. in New York City. 400 w. Ry & Engng Rev—March 16, 1901.

Inclined Railway.—See **Mine Haulage.**

Mine Haulage.—Adjustable Turntable for Haulage Inclines. From "Glückauf." Drawings and description of an arrangement introduced to overcome the difficulties attending the switching of tubs in and out of haulage inclines. 7000 w. Col Guard—Aug. 30, 1901.

Improved Turntable for Inclined Planes (Verstellbare Drehscheibe für Geneigte Bahnen). A description of the "Best" turntable for transferring cars from inclined to horizontal tracks. 1800 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 19, 1901.

Adjustable Turntable for Haulage Inclines. From "Glückauf." Brief illustrated description of an apparatus designed to overcome the difficulties attending the switching of tubs in and out of haulage inclines. 800 w. Quarry—Nov. 1, 1901.

Turntable for Inclined Railway (Schwenkbühne für Geneigte Bahnen). H. Best. Illustrating a form of tilting turntable to enable cars to be transferred from an inclined track to a horizontal one at right angles. 2000 w. Glückauf—March 18, 1905.

Operating Methods.—Best Method of Operating Turn-Tables by Power. Report of committee to the Assn. of Ry. Supts. of Bridges and Bldgs. Gives tabulated information of turn-tables operated by electricity, gasoline engines and steam, advising electricity where available. 1800 w. Ry & Engng Rev—Oct. 26, 1901.

St. Louis Exposition.—A Turntable of New Design. Illustrated description of an exhibit at the St. Louis World's Fair, of a design embodying several new features. 700 w. Ry & Engng Rev—May 21, 1904.

See also **LOCOMOTIVE EXHIBITION—St. Louis "Big Four."**

TURQUOISE.

See also **PRECIOUS STONE.**

Arizona.—See **New Mexico.**

New Mexico.—The Turquoise Mines of the Cerrillos Mountains in New Mexico. Arthur Lakes. Describes these mines which are said to be the largest producers in the world. 1400 w. Mines — Min—April, 1901.

Turquoise Mining in Arizona and New Mexico. An illustrated article describing the deposits, the formation in which turquoise is found, methods of mining, etc. 1800 w. Min & Sci Pr—Aug. 23, 1902.

The Burro Mountain Turquoise District. George D. Reid. An account of this district in New Mexico, the mines, quality of stones, value, etc. 1500 w. Eng & Min Jour—May 23, 1903.

TURRET.

See also **ARMORED CRUISER; ARMOR PLATE; BATTLESHIP; MONITOR; NAVY.**

Battleship.—Shipbuilder Cramp's Views on Battleship Turrets. Letters to the chief constructor of the United States Navy. 4400 w. Naut Gaz—Sept. 26, 1901.

See also **BATTLESHIP.**

Superposed.—See **BATTLESHIP—American; "Georgia;" CRUISER—Swedish.**

TURRET LATHE.

See **LATHE—Turret; MACHINE TOOL; SCREW MACHINE; TOOL.**

TURRET MACHINE.

See **LATHE; MACHINE TOOL; SLOTTING MACHINE.**

TUYERE.

See **BLAST FURNACE; FOUNDRY.**

TWISTING.

See DIE; **METAL WORKING**; **PUNCHING**; **SHEET METAL.**

TYPE-CASTING MACHINE.

See **TYPE-SETTING MACHINE.**

TYPE-FOUNDING.

Early Methods of Type-Founding. A brief history of the evolution of the type-mould as brought out by the researches of J. Eliot Hodgkin. Ills. 4600 w. Engng—Oct. 14, 1904.

TYPE FOUNDRY.

Electric Equipment.—See **ELECTRIC EQUIPMENT—Type Foundry.**

TYPE-SETTING MACHINE.

Church.—The Inventions of Dr. William Church—The First Patented Type-Casting and Composing Machine. Illustrates and describes a machine patented in 1822. 2300 w. Sci Am—Feb. 14, 1903.

Dow.—A New Type-Setting Machine. Illustrated description of a system invented by Alexander Dow. 1000 w. Sci Am—July 20, 1901.

Meray-Rozar.—The Meray-Rozar Electrotypographic Machine. An illustrated description of this composing machine and its operation. 1000 w. Sci Am Sup—Aug. 30, 1901.

The Electric Typograph (L'Electro-Typograhe). A. Levessari. A description of the Meray-Rozar apparatus by means of which a composing machine may be operated electrically at a distance. 6000 w. Mem Soc Ing Civ de France—Aug., 1902.

Monotype.—See **Symboling Parts**; **CAM.**

Paige.—The Paige Typesetting Machine. Illustrated description of a most complicated piece of mechanism which sets, justifies and distributes foundry types with speed and precision. Also editorial. 3200 w. Sci Am—March 9, 1901.

Pulsometer.—Type-Composing and Distributing Machines. Illustrates and describes the Pulsometer Company's type-composing and justifying machine and a type-distributing machine. 2200 w. Engr, Lond—April 29, 1904.

Stringer.—The Stringer Type Composing and Casting Machine. Illustrated description of an ingenious machine for composing and casting type. 2500 w. Engr, Lond—June 16, 1905.

Symboling Parts.—A Symboling System for Machine Parts. W. Bancroft. Explains a method devised by the Monotype Company to designate the parts of its type-casting and composing machine. This machine contains 2,028 parts. 2500 w. Am Mach—Vol. 28, No. 42.

Telegraph. — See **Meray-Rozar**; **TELEGRAPH—Printing.**

TYPEWRITER.

Electric.—An Electric Typewriter. B. C. Washington, Jr. Illustrated description of an application of electricty to the operating of a typewriter, with explanation of the operation. 1100 w. Elec Wld & Engr—May 11, 1901.

Kamm.—See **SPACE TELEGRAPHY—Kamm Typewriter.**

TYPEWRITER WORKS.

Remington.—See **WORKS MANAGEMENT—Typewriter Factory.**

Smith Premier.—Works of the Smith Premier Typewriter Company, Syracuse, N. Y. Illustrated description of a new plant which is an example of modern practice in factory construction and equipment. Serial. 1st part. 2800 w. Eng Rec—March 5, 1904.

TYPHOID FEVER.

See **SEWAGE DISPOSAL — Oyster** Pollution; **WATER POLLUTION**; **WATER SUPPLY.**

TYRE.

See **TIRE.**

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UNDERGROUND RAILWAY.

See also **ELECTRIC RAILWAY**; **ELEVATED RAILWAY**; **RAILWAY CONSTRUCTION**; **RAILWAY SIGNAL**; **RAILWAY TERMINAL**; **SUBWAY**; **THIRD RAIL**; **TUNNEL**; **TUNNEL VENTILATION.**

Accident, N. Y.—Another Accident in the New York Subway. An illustrated account of the accident near 168th street on March 29, with editorial. 2000 w. R R Gaz—Vol. XXXVIII., No. 14.

See also New York Rock Slide; **EXPLOSION—N. Y. Subway.**

Baltimore.—Murphy Third Rail in the Baltimore Belt Line Tunnel. States the situation of the tunnel and the arrangement for hauling traffic through it, and gives an illustrated description of the new system installed. 1500 w. Ry & Engng Rev—Feb. 2, 1901.

Third Rail in the Baltimore Belt Line Tunnel. An illustrated description of the sectional and third-rail installations with which this line has been recently equipped. 1400 w. Sci Am—March 16, 1901.

Berlin.—Proposed Subway in Berlin (Entwurf von Unterpflasterbahnen in Berlin). Plans for shallow subways in the central portion of the city, with map. 2500 w. Elektrotech Zeitschr—Oct. 26, 1905.

See also **ELEVATED RAILWAY.**

Boston.—An Interesting Example of Wide Arch Soft Ground Tunneling. An illustrated account of interesting work in building the Atlantic avenue station of the Boston subway extension to East Boston, Mass. 3500 w. Eng News—June 4, 1903.

Progress on the East Boston Subway. Describes interesting construction work on this tunnel, which passes under Boston Harbor and under the streets of the city. Ills. 4000 w. Ry & Engng Rev—March 12, 1904.

The Boston Transit Problem. Illustrated detailed description of the construction of the subway and elevated railway, with explanation of the way it meets the needs of transportation of the city. 2800 w. Ry Age—March 18, 1904.

The Equipment of the East Boston Tunnel. Considers features of interest in the roadbed, track, lighting, power supply, and ventilation systems, outlining the main physical characteristics of the tunnel. 3500 w. St Ry Jour—Jan. 28, 1905.

See also **ELECTRIC RAILWAY**; **ELEVATED RAILWAY**; **TUNNEL.**

Boston Franchise.—Boston's New Subway. Willard Winslow. A review of the franchise questions, quoting at length from the Governor's reasons for vetoing the bill. 1800 w. Munic Af—June, 1901.

British Law.—Law of Deep Tunnel Railways. Discusses complaints made by occupiers of houses along the route, and the attitude of English law. 2400 w. Engng—Jan. 4, 1901.

Tube Railways and the Law of Compensation. W. Valentine Ball. A discussion of British law as affecting these railways in the county of London. 4000 w. Trac & Trans—May, 1903.

Shallow Tunnel Railways and the Law. W. Valentine Ball. Discusses some of the legal difficulties that promoters of shallow tunnel railways in England would encounter. 2000 w. Trac & Trans—June, 1903.

See also London Bill.

Brooklyn, N. Y.—Rapid Transit Subway Construction on Fulton St., Brooklyn. An account of the change in plans to a four-track structure, with illustrated description of construction work. Serial. 1st part. 2300 w. Eng Rec—Dec. 23, 1905.

See also New York; **TUNNEL.**

Buenos Aires.—Proposed Underground Electric Railways for Buenos Aires. L. D. Tandy. An illustrated description of this beautiful South American city, with an account of the tramway situation, and the possibilities of the proposed underground railway. 4200 w. Tram & Ry Wld—June 13, 1901.

Chicago.—Proposed Inner Circle System for Chicago. Illustrated description of a plan by A. S. Robinson, which consist of one inner circle or loop subway, upon which cars will move only in one direction, acting as a transfer and stopping at all stations. 1200 w. St Ry Jour—July 11, 1903.

Proposed Passenger Railway Subways for Chicago, Illinois. An illustrated account of proposed subways and estimate of cost. 1800 w. Eng News—Dec. 22, 1904.

See also **SUBWAY.**

Chicago Freight.—See **SUBWAY.**

Concrete.—See **CONCRETE—Subway.**

Concrete Reinforced. — See **CONCRETE REINFORCED—Subway.**

Danger.—Tube Railways. Editorial called out by the recent accident in the Liverpool elevated railway, discussing the dangers of tube railways, and their construction. 1500 w. Engr, Lond—Jan. 10, 1902.

See also **ELECTRIC RAILWAY.**

Deep-Tunnel.—Deep-Tunnel Railways. Editorial review of the report of the joint committee appointed to consider the London underground railway question. 3200 w. Engng—Oct. 25, 1901.

See also **British Law; London; Tubular; VENTILATION.**

Elevated and Surface Compared.—See **ELEVATED RAILWAY—Subway and Surface Compared.**

Explosion, N. Y.—See **EXPLOSION—N. Y. Subway.**

Grades.—See **Tubular.**

Great Northern and City.—See **London, Great Northern.**

London.—Underground Railway Construction in London. W. H. Booth. Describes the natural conditions existing, the construction, etc., criticising the methods of working, lack of proper ventilation, and faults of management. 1700 w. St Ry Jour—Feb. 2, 1901.

Inner Circle London Underground Railway. Gives the principal points in a scheme for the electrical equipment of this road which is now operated by steam. 1000 w. Elec Wld & Engr—Feb. 2, 1901.

The Electrical Equipment of the District and Metropolitan Railways. Charles T. Yerkes. Letter to the London "Times" explaining the position of the company represented by the writer. 1500 w. Elect'n, Lond—Aug. 2, 1901.

Underground Railways in London. Report from the Joint Select Committee of the House of Lords and House of Commons, recently issued. 3000 w. Archt, Lond—Aug. 2, 1901.

The Rapid Transit Problem in London. Frank J. Sprague. Outlines a scheme for operating the roads electrically under a single complete plan, the abolishment of classes, establishment of one regular rate of fare, etc. Ill. 4000 w. Engineering Magazine—Oct., 1901.

Mr. Yerkes on the London Situation. A letter to the London "Times." Relates to the electrification of the Metropolitan Dist. Ry. 1500 w. St Ry Rev—Sept. 15, 1901.

The Electrification of the Metropolitan Railways. An editorial statement of the situation and discussion of the Ganz system. 3300 w. Engng—Oct. 11, 1901.

The Electrification of the Metropolitan and Metropolitan District Railways. A report of the discussion at meeting held to decide what system of electric traction shall be employed. 3500 w. Engng—Nov. 1, 1901.

The Electrification of the London Underground Railway (Die Elektrisirung der Londoner Untergrundbahn). An editorial discussing the relative merits of the continuous and polyphase systems of electric traction for the London Underground Railway. 2500 w. Elektrotech Zeitschr—Nov. 28, 1901.

Electric Railway Communication Within the Metropolis. Editorial discussion of the schemes and the modifications introduced. 3000 w. Engng—Nov. 29, 1901.

New Underground Electric Railroads for London. Discusses proposed plans for relieving the congested traffic of the streets. 1700 w. Sci Am—Nov. 30, 1901.

The Transformation of the Underground Railway. A retrospective view of the situation which led to the attitude taken by the Board of Trade is commenced. Serial. 1st part. 1400 w. Elec Rev, Lond—Jan. 3, 1902.

Electric Underground Railways in London. A descriptive summary of the scope of the new lines, with list dealt with in the Parliamentary Session of 1902. Map and report of the Committee proceedings. 4700 w. Elect'n, Lond—June 6, 1902.

Deep-Tunnel Railways. Editorial discussing these London railways, especially the schemes associated with the name of Mr. Yerkes. 3000 w. Engng—Nov. 28, 1902.

The Tangle of London Locomotion. Sidney Low. A discussion of the transit problem in London, the tube, or deep-level railways; the high-level, or sub-surface tunnels, etc.; the points the Special Commission should consider. 8500 w. Nineteenth Cent—Dec., 1902.

Underground Electric Tube Railways in London. A. Webster. Some gossip concerning old and new schemes, with sketch maps. 2400 w. Elec Rev, N Y—Dec. 20, 1902.

The Electrification of the Underground. Wilfred Yorke. An illustrated description of the section from North Ealing to South Harrow. 2000 w. Elec Rev, Lond—June 5, 1903.

London's "Tubes"—The Novel Method of Their Construction. Describes the novel features of the four tubes in process of construction. Ill. 2200 w. Sci Am Sup—Aug. 22, 1903.

The Electrification of the Metropolitan Railway. The first of a series of illustrated articles showing the progress that has been made in the electrical equipment of this road. Serial. 1st part. 2000 w. Engr, Lond—Feb. 12, 1904.

The London Underground Railways. Map, with description of improvements being made to facilitate transit of passengers. 2800 w. Ry Age—Oct. 21, 1904.

Underground Railways of London. Map and notes from the "Statist," giving an idea of the extent of the transformation work in progress in changing the lines to electric power. 1700 w. Eng Rec—Dec. 31, 1904.

Metropolitan District Railway Electrification. An illustrated comprehensive account of the electrical equipment of this underground road and of the great power-station at Chelsea. 34000 w. Tram & Ry Wld—Feb. 9, 1905.

The Electrification of the London Underground Electric Railways Company's System. S. B. Fortenbaugh. A full illustrated detailed description of this very interesting installation. 13500 w. St Ry Jour—March 4, 1905.

The Electrification of the London Underground Railway (Die Einführung des Elektrischen Betriebes bei den Vereinigten Londoner Stadtbahnen). K. Meyer. A general description of the conversion work, with details of the substations, cars and roadbed. 3000 w. Zeitschr d Ver Deutscher Ing—Oct. 7, 1905.

See also **British Law; Deep Tunnel; Shallow; Subways; Tubular; Vibration; CATHEDRAL—St. Paul's Undermining; ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY—Ganz System; TRANSPORTATION; TUNNEL.**

London, Baker St.—See **London, Waterloo.**

London, Bill, 1903.—London Underground Railways. A review of the London electric railway bills which will come before Parliament in 1903, with map. 1200 w. Elect'n, Lond—Dec. 12, 1902.

London, Central.—The Central London Railway. An illustrated account of this underground railway and its equipment. 7400 w. Tram & Ry Wld—Nov. 8, 1900.

The Central London Underground Electric Railway (Die Central London Untergrundbahn mit Elektrischen Betriebe). E. A. Ziffer. A well illustrated paper, giving a comprehensive account of this railway and its operation. 5000 w. Mitt d Ver f d Förderung d Local u Strassenbahnwesens—Jan., 1902.

The Central London Railway. H. F. Parshall, E. Parry, and W. Casson. An account of various tests made during the first three years' working. Illustrates and describes the equipment and the operation. An underground system worked on the continuous current principle with third rail. Serial. 1st part. 7000 w. Trac & Trans—Aug., 1903.

The Central London Railway. H. F. Parshall, E. Parry, and W. Casson. The present article gives an illustrated detailed description of the later type of motor cars which are now in service. Serial. 1st part. 1700 w. Trac & Trans —Sept., 1903.

London, Great Northern.—The Great Northern and City Railway. Illustrated description of this underground road, the tunnel and the special shield designed for the work, and its method of operation. Ill. 5400 w. St Ry Jour—March 1, 1902.

The Great Northern & City Railway. Illustrated detailed description of a London underground electric railway nearing completion, and its construction. 4500 w. Tram & Ry Wld —July 10, 1902.

London's New Tube Railroad. C. H. Grinling. Information concerning the Great Northern & City Railway, recently completed. Ill. 1400 w. R R Gas—Jan. 29, 1904.

The Great Northern and City Railway. An illustrated description of London's latest "tube," with facts concerning it. 3500 w. St Ry Jour —March 5, 1904.

The Great Northern and City Railway. H. O. Fyfe. A description of the line and power plant of the most recent tube railway of London. 3000 w. Engineering Magazine—June, 1904.

London, Islington.—See **London, South.**

London, South.—The Islington Extension of the City and South London Railway. A description of this recently opened section, and its equipment. Ill. 1700 w. Transport—Nov. 22, 1901.

The City and South London Railway. An interesting illustrated account of the development and improvement of this pioneer electric railway in England, its equipment, operation, etc. 6600 w. Tram & Ry Wld—Dec. 12, 1901.

London, Ventilation.—See **VENTILATION—Underground Railway.**

London, Waterloo.—The Underground Electric Railways of London. Gives the main points in the prospectus of the Baker Street & Waterloo Railway Co. and a general view of what is being done in the way of underground electric railways. Map. 3000 w. Ry & Tram Wld—Dec. 6, 1900.

The Waterloo and City Railway—Working Results. Herbert Jones. Abstract of a paper read before the Tram. & Lgt. Rys. Assn. Briefly describes the construction and equipment of the line, its operation, and reports 24-hour tests being made. Serial. 1st part. 2800 w. Elect'n, Lond—Feb. 24, 1905.

Waterloo and City Railway. Herbert Jones. Read before the Tram. & Lgt. Rys. Assn., London. A brief description of the plant and its equipment and the working results. 4500 w. Tram & Ry Wld—March 9, 1905.

Baker Street and Waterloo Railway. Illustrated detailed description of the construction and equipment of this London tube line. 3000 w. Tram & Ry Wld—June 8, 1905.

London, Whitechapel.—The Whitechapel and Bow Railway. Illustrated description of the last of the London "undergrounds," and an account of the opening ceremonies. 4000 w. Transport June 6, 1902.

The Whitechapel and Bow Railway. Illustrated description of a road representing modern British practice in the construction of a first-class double main line in cut and cover and in tunnel, or a shallow-tunnel subway. Serial. 1st part. 1800 w. Engng—May 1, 1903.

Mail Handling.—See **SUBWAY—Chicago Freight and Telephone.**

Metropolitan Cities.—Rapid Transit Subways in Metropolitan Cities. Illustrated account of the subways of London, Paris, Budapest, Glasgow and Boston. 5000 w. Munic Affairs—Sept., 1900.

London Electric Railways. Robert P. Porter. Reviews electrical street railway work in London, New York, Paris, Chicago, Berlin, and Boston, especially the underground railways, with conclusions and general discussion. 20000 w. Jour Soc of Arts—Jan. 27, 1905.

Rapid Transit in Great Cities. William Barclay Parsons. From an address delivered at Purdue University. An interesting article dealing with underground railways, their engineering and legal aspects, and various phases of the problem. 6000 w. R R Gas—Vol. XXXIX., No. 3.

See also under names of cities.

New York.—Progress of Work on the Rapid Transit Tunnel, New York. Views, showing the plant and method of construction, with explanatory notes. 1500 w. Sci Am—Nov. 24, 1900.

Section Third of the New York Rapid Transit Subway. Illustrated description of a four-track subway in an important New York street, built by the cut and cover method, without disturbing four street railway tracks. 2500 w. Eng Rec—Jan. 12, 1901.

Sections 6 A and 6 B, New York Rapid Transit Railway. Illustrated description of the method of trenching in a crowdded street without materially interfering with street railway traffic or wagons. 1800 w. Eng Rec—March 30, 1901.

Sections 11, 13 and 14, New York Rapid Transit Railway. Illustrated description of method of constructing double-track concrete subway, partly in open cut and partly in rock tunnel. 1600 w. Eng Rec—April 13, 1901.

Some Features of the New York Rapid Transit Tunnel. Illustrates the conditions at 34th St., which give eight tracks at three different levels, and calls attention to progress and interesting features. 1900 w. Sci Am—May 25, 1901.

Section Four of the New York Rapid Transit Railway. Illustrates and describes the methods of work in rock tunnel. 3500 w. Eng Rec—June 29, 1901.

New York's Subway Policy. William J. Gaynor. A statement of the way the great subway system in New York is being constructed, and a comparison with the scheme proposed for Boston. 2300 w. Munic Af—June, 1901.

The New York Rapid Transit Subway. Illustrated description of details of tunnels and methods of construction of the underground railway now being built. 1700 w. Elec Rev, N Y—Sept. 21, 1901.

The Rapid Transit Tunnel and Railway. A brief illustrated review of the work actually accomplished and a description of the tunnel so far as the plans have been perfected. 3000 w. St Ry Rev—Sept. 15, 1901.

The New Subway in New York City. Charles Prelini. Reviews the various proposals for rapid transit, and begins an illustrated detailed description of the work now in progress. Serial. 1st part. 3200 w. Engng—Oct. 4, 1901.

The Subway of New York. Charles Prelini. Comments on the plan presented by William Barclay Parsons, and of other improvements in transportation facilities. 2000 w. Engng—March 27, 1903.

The New York Rapid Transit Subway. Briefly reviews the steps leading to the work now under construction, and gives an illustrated account of the undertaking. 4200 w. St Ry Jour—Oct. 5, 1901.

Progress of Construction of the Rapid Transit Tunnel. An outline of the satisfactory progress made on the New York tunnel, with map and editorial. 3000 w. Sci Am—Nov. 2, 1901.

Some Methods of Construction of the Rapid Transit Subway. Views taken at various points, illustrating methods and showing progress, with description. 1300 w. Sci Am—Nov. 9, 1901.

The New York Rapid Transit Railway. This first article of a series reviews the early history of rapid transit enterprises in New York City. 5000 w. Eng News—Jan. 30, 1902.

Mining Methods in the New York Subway. D. H. Newland. An illustrated article giving an account of the methods of construction, the materials, mechanical devices, etc., used. 3500 w. Eng & Min Jour—Feb. 1, 1902.

I. The New York Rapid Transit Commission's Plan for a System of Interborough Rapid Transit. II. The Proposition to Abandon the Construction of the Third East River Bridge at New York. Gives in the first article a communication recently presented at a meeting of the Commission, discussing it in the editorial in the II. article, in connection with the subject of abandoning the Third East River Bridge. 3500 w. Eng News—May 22, 1902.

Interborough Rapid Transit in New York City. Editorial discussion of questions in relation to a complete interborough system of underground passenger railways, and the powers of the Rapid Transit Commission. 2000 w. Eng News—June 5, 1902.

The Second Division of the New York Rapid Transit Railroad. Illustrated description of the construction of nearly 4 miles of road by trenching, with particular attention to methods of keeping records of the progress of work, moving water pipes and sewers, supporting elevated railway structures over the trench, and underpinning street railway tracks. Serial. 1st part. 4400 w. Eng Rec—July 19, 1902.

The Rapid Transit Subway, New York. An illustrated article showing the method of carrying the electric tracks, with plan showing the progress of the entire work, and remarks on the engineering difficulties, due to the conditions. 2100 w. Sci Am—Sept. 27, 1902.

The Proposed Extensions of the New York Rapid Transit Railway System. Extracts from the report of Mr. William Barclay Parsons, explaining the work and giving reasons for the suggested improvements. 1200 w. Eng News—Feb. 26, 1903.

A Complete Rapid Transit System for New York. Extracts from the report of William Barclay Parsons for the boroughs of Manhattan and the Bronx, with brief comments. Map. 1000 w. Ry Age—Feb. 27, 1903.

Section 4, New York Rapid Transit R. R. An illustrated description of the work from 34th to 41st st. It has two separate double-track, concrete-lined, rock tunnels, driven below the existing double-track street car tunnel. Serial. 1st part. 2200 w. Eng Rec—June 6, 1903.

Section Nine of Division Three of the New York Rapid Transit Railroad. Illustrated detailed description of open trench construction is given in the present article. Serial. 1st part. 3500 w. Eng Rec—Aug. 22, 1903.

Section Seven, Division Three, of the New York Rapid Transit Railroad. An illustrated description of the work on this section almost wholly in tunnel excavation through micacous rock, and having difficulties due to the irregularity of the ground and obstructions at various points. 4200 w. Eng Rec—Sept. 19, 1901.

The New York Rapid Transit Railway. Sydney W. Ashe. An interesting illustrated description of the route and construction of the New York Rapid Transit railway. 5000 w. W Elect'n—Jan. 2, 1904.

New York Rapid Transit. F. O. Dufour. Reviews the attempts made to secure rapid transit for New York, describing the construction of the underground railway and giving its history. Ill. 4200 w. Wis Engr—Feb., 1904.

Section Five A, Second Division, New York Rapid Transit Railroad. Illustrated description of a section passing from 41st street and Park Avenue to 47th Street and Broadway, and containing many difficult problems. 2000 w. Eng Rec—March 5, 1904.

The New York Rapid-Transit Subway. H. C. Fyfe. A fully illustrated description of the subway just completed in New York City, describing the location, construction and details of operation. 5000 w. Engineering Magazine—September, 1904.

The Rapid Transit Subway in New York City. An illustrated article reviewing this recently completed work and describing the general conditions. 3800 w. Elec Rev, N Y—Sept. 10, 1904.

The Completion of the New York Subway. A brief review of this important engineering work with illustrations. 2000 w. Sci Am—Sept. 10, 1904.

The New York Subway. M. G. Cunniff. An illustrated description and review of the construction of this twenty-one-mile tunnel, built in about four years through a maze of pipes and sewers, under rivers, etc. 5000 w. Wld's Work—Oct., 1904.

History and Physical Aspects of the New York Subway. Illlustrated description; also short articles on the traffic features, signaling and power equipment. 4500 w. R R Gaz—Vol. XXXVII., No. 14.

Passenger Stations and Engineering Details of the New York Subway System. An illustrated detailed description of many interesting features. 5000 w. St Ry Jour—Oct. 1, 1904.

Underground Rapid Transit in New York City. Begins a detailed description of this great engineering work. The present number outlines the routes, and begins an illustrated description of the power plant, and its equipment. Serial. 1st part. 8000 w. Elec Wld & Engr—Oct. 8, 1904.

New York's Great Underground Railway. An illustrated article giving the history of the undertaking, the route, construction, stations, lighting, rolling stock, signaling, etc. 11,400 w. Tram & Ry Wld—Nov. 10, 1904.

Rapid Transit Railroad Construction at Battery Park, New York. An illustrated detailed description of the reinforced concrete subway at the lower end of Manhattan. 4000 w. Eng Rec—Dec. 24, 1904.

The New York Subway (Le Métropolitain "Subway" de New York). Ch. Dantin. A well illustrated account of the underground railway in New York City. Two articles. 6000 w. 2 plates. Génie Civil—Dec. 24, 31, 1904.

The Extension of the New York Rapid Transit Lines. Map, with account of plans outlined in a recent report by William Barclay Parsons for additional lines in Manhattan, Brooklyn, and the Bronx. 2500 w. Eng Rec—Jan. 7, 1905.

New York Subway. Roger A. Selby. An illustrated article describing this great engineering work, and briefly reviewing its history. 3000 w. Yale Sci Mm—Jan., 1905.

The New York Subway (Die New Yorker Untergrundbahn). Frans Köster. A fully illustrated account of the subway, power house and rolling stock of the New York Rapid Transit Company. Serial. Part I. 3000 w. 1 plate. Zeitschr d Ver Deutscher Ing—March 4, 1905.

The Construction of Section I, New York Rapid Transit R. R. Illustrates and describes the construction of the section between Chambers and Ann streets, including the City Hall loop and station, and the Brooklyn Bridge station, New York. 2000 w. Eng Rec—March 11, 1905.

The New York Rapid Transit Railway. The present article explains the conditions on Manhattan Island and begins an illustrated detailed description of the construction of the rapid transit subway. Serial. 1st part. 2000 w. Engr. Lond—Oct. 13, 1905.

See also **Accident; Brooklyn; Metropolitan; ELECTRIC STATION—New York Interborough; ELEVATED RAILWAY—N. Y. Interborough; RETAINING WALL—Moving; TRACK—Subway; TRANSPORTATION; TUNNEL — East River; Harlem River; VENTILATION.**

New York-Brooklyn.—New York and Brooklyn Rapid Transit Subway. An illustrated article giving an idea of the location of the subway at the Battery and under the East River, and describing some of its features. This section is now under construction. 1400 w. Sci Am—Dec. 20, 1902.

The Manhattan-Brooklyn Branch of the Rapid Transit Subway. Drawings showing interesting details of construction, with descriptive notes. 1200 w. Sci Am Sup—Dec. 20, 1902.

See also **TUNNEL—East River.**

New York, Reno.—The Double Deck Subway System. Illustrates and describes a subway designed some years ago by J. W. Reno, for conditions under Broadway, New York, with discussion of its advantages. 1200 w. Sci Am—April 8, 1905.

New York Report.—New York Rapid Transit Railroad. Editorial review of the report of the Board of Rapid Transit Railroad Commissioners. 1800 w. Eng Rec—Nov. 29, 1902.

Report of the New York Rapid Transit Commissioners. An illustrated review of the second report of the Board, for the year ending Dec. 31, 1902. 4000 w. R R Gaz—Sept. 4, 1903.

New York Rock Slide.—A Rock Slide on the New York Rapid Transit Railway. Describes the recent accident in constructing a tunnel 60 ft. below the surface which resulted in the collapse of several house fronts. 1500 w. Eng Rec—March 29, 1902.

Cave-In at the Park Avenue Rapid Transit Tunnel. Brief illustrated account of the accident which wrecked valuable property between 37th and 38th streets on Park avenue, New York City. 700 w. Sci Am—March 29, 1902.

The Park Avenue Tunnel Cave-In. Illustrated description of the cause of the accident and the method decided upon to repair the trouble. 1100 w. Sci Am—April 5, 1902.

New York, Sanitation.—The Sanitary Condition of print of the preliminary report of Dr. George A. the New York Rapid Transit Subway. Gives a re- Soper, with editorial comment. 2800 w. Eng News—Nov. 9, 1905.

New York Sewers.—See **SEWER—New York Underground Ry.**

North Ealing-South Harrow.—See **London.**

Paris.—The Metropolitan Underground Railway of Paris, France. An illustrated description of the contemplated system and of the work already done, prepared from a paper by Raymond Godfernaux, in the "Revue Generale des Chemins de Fer." 700 w. Eng News—Dec. 6, 1900.

The Metropolitan Railway of Paris (Le Metropolitain de Paris). A. Dumas. A fully illustrated account of the portion of the line already constructed, and of the power house, and a description of the experience in its operation. Two articles. 12,000 w. 2 plates. Génie Civil—March 2, 9, 1901.

The Paris Metropolitan Railway (Le Métropolitain de Paris). A. Dumas. A review of the experience with the section now in operation and a description of the portions projected and under construction. The new carriages are shown. 2000 w. Génie Civil—July 20, 1901.

The Construction of the North Circular Section of the Paris Metropolitan Railway (Le Metropolitain de Paris. Construction de la Circulaire Nord). A. Dumas. A well illustrated description of the construction of this underground and elevated section of the line, principally of the elevated structure. 1 plate. 5000 w. Génie Civil—March 28, 1903.

The Construction of the South Circular Section of the Paris Metropolitan Railway (Le Metropolitain de Paris. Construction de la Circulaire Sud. Viaduc sur la Seine à Passy). A. Dumas. A well illustrated description of the construction of this section of the line, including the viaduct over the Seine, at Passy. 2 plates. 4500 w. Génie Civil—April 4, 1903.

The Courcelles-Ménilmontant Section of the Paris Metropolitan Railway (Le Métropolitain de Paris. Ligne du Boulevard de Courcelles à Ménilmontant). A. Dumas. A well illustrated description of this underground section of the line, through the heart of the city. 1 plate. 5000 w. Génie Civil—April 11, 1903.

The Crossing of the Seine by the Metropolitan Railway (Traversée de la Seine par la Ligne Métropolitaine). A. Dumas. Describing the construction of the tunnel under the Seine for the North and South transversal of the Paris Metropolitan railway. 3000 w. 1 plate. Génie Civil—Dec. 2, 1905.

Shallow Tunnels for Railways. The important part of the report of Lieut. Col. A. H. Yorke on the Chemin de Fer Metropolitain de Paris. 3800 w. Arch't, Lond—April 11, 1902.

Metropolitan Railway of Paris. Abstract of the report of Lieut-Col. Yorke, giving interesting facts and brief discussion of the applicability of the shallow tunnel system to London. 3500 w. Tram & Ry Wld—April 17, 1902.

The Paris Metropolitan Railway. C. H. Wordingham. Reviews the report of Lieut. Col. H. A. Yorke concerning this railway, summarising the salient features of the construction and operation and commenting on points of interest. 2000 w. Elec Rev, Lond—April 25, 1902.

Construction of the Metropolitan Railway, Paris. Illustrated description of tunneling operations with and without shields, sometimes along the route of large sewers. 3400 w. Eng Rec—May 24, 1902.

Reconstruction of the Underground Foundations for the Paris Metropolitan Railway. From "La Nature." Describes the preparation of the subsoil in certain regions that the city line is to traverse, in which extend vast quarries, now abandoned. Ill. 1000 w. Sci Am Sup—July 12, 1902.

Recent Improvements on the Metropolitan Railway of Paris. Describes and illustrates the two-motor car train system recently installed on this underground electric road. 1400 w. St Ry Jour—Sept. 6, 1902.

The North Circular Section of the Paris Metropolitan Railway (Le Chemin de Fer Metropolitain de Paris, Ligne Circulaire, Nord par les Boulevards Exterieurs). Raymond Godfernoux. A well illustrated description of the section of the Metropolitan electric railway of Paris, which follows the line of the northern exterior boulevards, partly in viaduct, but principally underground. 8 plates. 6500 w. Rev Gén des Chemins de Fer—April, 1903.

The Paris Metropolitan Electric Railway. Daniel Bellet. An illustrated detailed description of the construction work, the difficulties met, etc., with report of the success of the portion of the road in operation. 5600 w. Trac & Trans—July, 1903.

The Paris Metropolitan Railway. A summary of the work, with a description of the principal features of the viaduct is given in the present article. Ill. Serial. 1st part. 3500 w. Engr, Lond—July 10, 1903.

A General Study of the Metropolitan Railway of Paris (Etude Générale sur le Chemin de Fer Métropolitain de Paris). E. de Loyselles and L. Perreau. A long historical and descriptive review. Serial. Part I. 1000 w. Rev Technique—May 25, 1903.

Details of Construction of the Paris Underground Railway Beneath the Place de l'Opera. Brief illustrated description. 1000 w. Sci Am Sup—Aug. 22, 1903.

The Metropolitan Underground Railway of Paris. Illustrates and describes the construction of the North Circle. 3000 w. Eng News—Sept. 3, 1903.

The Paris Metropolitan Railway (Die Pariser Stadtbahn). Ludwig Troske. A general account of the Paris underground railway, with maps and profile. Serial. Part I. 4000 w. 1 plate. Zeitsch d Ver Deutscher Ing—Nov. 7, 1903.

The Metropolitan Railway of Paris. Paul Letheule. A fully illustrated account of the building, equipment, and operation of the underground electric railway of Paris. 3000 w. Engineering Magazine—Dec., 1903.

Underground Electric Railway Work in Paris, Francis Paul. An illustrated detailed description of new construction on the Paris Metropolitan. 2500 w. Am Elect'n—Dec., 1904.

Recent Developments on the Paris-Metropolitan Railway System. An illustrated account of the opening of a new section, and giving information in regard to the entire system. 2000 w. St Ry Jour—Dec. 31, 1904.

Paris Metropolitan Railway Co. M. Vingoe. Illustrated description of line No. 3, extending from Courcelles to Père Lachaise, five miles, recently opened. 2000 w. St Ry Rev—Feb., 1905.

The Paris Metropolitan Railway. An illustrated description of the construction of the Passy bridge and viaduct. 2000 w. Engr, Lond—March 10, 1905.

The Construction Works of the Paris Metropolitan (Travaux de Construction des Differentes Lignes du Metropolitain de Paris). Georges Lesourd. A very full account of the recent extensions of the Paris underground railway, bringing the record down to January, 1905. 20,000 w. Mem Soc Ing Civ de France—March, 1905.

See also **TUNNEL—Shield.**

Philadelphia.—Subway Structures of the Philadelphia Rapid Transit Company. Illustrated detailed description of the proposed construction of a concrete steel subway. 2500 w. Eng Rec—April 18, 1903.

The Philadelphia Rapid Transit Railway. An illustrated description, with map, of a partly underground and partly elevated structure in progress in this city, which will eventually prove one of the great urban rapid transit railways of the world. 5000 w. Eng News—Dec. 29, 1904.

The Subway of the Philadelphia Rapid Transit Co. Illustrated detailed description. 4500 w. Eng Rec—Feb. 25, 1905.

Philadelphia's Rapid Transit Railroad. Outlines the general scheme for real rapid transit, and begins an illustrated detailed description of the Market Street subway, now under construction. Serial. 1st part. 1800 w. R R Gas—Vol. XXXIX., No. 7.

The Philadelphia Subway and Elevated Railroad. Illustrated description of the new Market street trunk line of the Rapid Transit Co., the engineering features of the subway and elevated divisions, and the new bridge over the Schuylkill River. 6800 w. St Ry Rev—Sept. 15, 1905.

The Subway and Elevated Lines in Philadelphia. Describes the general conditions of the West Market street subway, the ventilation, Schuylkill River bridge, elevated structure, shops, etc. Illus. 5300 w. St Ry Jour—Sept. 23, 1905.

The New Philadelphia Subway. J. A. Stewart. An illustrated outline of the subway scheme, with the general plan of construction. 1800 w. Sci Am—Dec. 23, 1905.

The Opening of the Philadelphia Subway. An illustrated account of the opening of the first section of this subway, describing the construction. 1800 w. St Ry Jour—Dec. 23, 1905.

The Lighting System and Overhead Construction of the Philadelphia Subway. An illustrated article giving particulars of this work. 800 w. St Ry Jour—Dec. 30, 1905.

Reno.—See **New York, Reno.**

Rock Slide.—See **New York Rock Slide.**

Salt Mines.—See **MINE HAULAGE—Electric, Stassfurt.**

Shallow.—Shallow Underground Tramways. C. H. Wordingham. Reviews the report of Messrs. Baker and Rider, presented to the London County Council. 2600 w. Elec Rev, Lond—Dec. 13, 1901.

See also **London; New York; Paris; RAILWAY LEGISLATION.**

Tubular.—Tubular Railways. Editorial discussion of the advantages of these railways in metropolitan districts. 2200 w. Engr, Lond—May 17, 1901.

Underground Tube Railways. P. V. McMahon. Read before the International Tramways Congress. Compares the tube railway and the shallow tunnel tramway, discusses the general conditions, giving a brief description of the existing tubes in London and a few results of their working. 3600 w. Tram & Ry Wld—Aug. 7, 1902.

See also **British Law; Danger; London; Vibration; VENTILATION.**

Ventilation.—See **TUNNEL VENTILATION; VENTILATION.**

Vibration.—Vibration on the Central London Railway. Extracts from the report of the committee appointed to investigate complaints of vibration in buildings adjacent to the Central London Railway. 2000 w. R R Gaz—Feb. 28, 1902.

Vibrations Caused by Underground Railway Trains. Summary of a report on the serious vibrations in buildings along the Central London Railway. 2300 w. Eng Rec—March 8, 1902.

Tube Railways and Vibration. A discussion of investigations made in London. 2800 w. Engr, Lond—March 14, 1902.

Vibration on Railways. Editorial review of Mr. Mallock's report on the complaints against the Central London Railway. 2500 w. Engng—April 11, 1902.

See also **CATHEDRAL—St. Paul's Undermining.**

Vienna.—See **ELECTRIC RAILWAY; RAILWAY.**

Yerkes, London.—See **London.**

UNDERGROUND WATER.

See **GROUND WATER; WATER SUPPLY; WELL.**

UNDERPINNING.

See also **BUILDING CONSTRUCTION; BUILDING MOVING; FOUNDATION.**

Lifting and Underpinning a Nine-Story Wall. Describes the method of raising a 9-story wall of an office building nearly two inches and underpinning it without injury to the masonry or disturbance to the alignment of the elevators and other machinery. 1200 w. Eng Rec—April 19, 1902.

Complicated Underpinning. Illustrated description of methods of supporting high walls where the working space was unusually restricted. 2000 w. Eng Rec—Sept. 27, 1902.

Difficult Supports for Underpinning. Brief description, with illustrations, of difficult underpinning made necessary by quicksand, when adjacent foundations were excavated. 1200 w. Eng Rec—May 2, 1903.

Brick Wall.—Supporting a Brick Wall From One Side Only. Illustrated description of the manner of underpinning a Boston building by raking struts, suspender rods and cantilever beams, so that the interior of the building was not affected. 900 w. Eng Rec—June 1, 1901.

Cantilever.—Underpinning a High Wall with Steel Cantilever Girders. Illustrates and describes method used at Paterson, N. J., to make safe a mill injured by the severe floods of 1903. 1500 w. Eng Rec—July 16, 1904.

Cantilever and Needle Beams.—Direct and Indirect Supports for Underpinning a High Wall. Brief illustrated description of method used at 56 Cedar street, New York, for underpinning a heavy wall and piers with needle beams and cantilevers. 1200 w. Eng Rec—March 21, 1903.

Columbus Monument, N. Y.—Underpinning the Columbus Monument, New York. Illustrates and describes the method of supporting a 75-ft. monument, weighing 724 tons, which is partly on the right of way of the New York Rapid Transit Railway. 1000 w. Eng Rec—July 27, 1901.

Corner Column.—Underpinning a Corner Column on a Slender Pier. Brief illustrated description of work of special difficulty executed in New York. 600 w. Eng Rec—Jan. 9, 1904.

Decker Building, N. Y.—Underpinning the Decker Building, New York. Illustrates and describes the method used in carrying long sections of wall, 185 ft. high and weighing 12,000 tons, by means of unusually heavy beams and shores. 2500 w. Eng Rec—May 10, 1902.

Underpinning a Tall and Narrow Brick Building. Illustrated description of the method of underpinning a 6x12 ft. extension of the Decker Building, a brick building 175 ft. high, having a heavy chimney in one corner. 1700 w. Eng Rec—July 5, 1902.

Galatz Reservoir.—Note on the Underpinning of the Piers in the Reservoirs of the Galatz Waterworks, Roumania. William Morris Langford. Illustrates and describes the manner of supporting the piers and their loads during repairs. 5000 w. Inst of Civ Engrs (No. 3551).

Heavy Wall.—Transferring a 2,000-Ton Wall to Columns and Girders. Illustrated description of a method of underpinning used for a heavy wall. 1200 w. Eng Rec—Nov. 4, 1905.

Jacking Down.—Jacking Down Open Cribs for Underpinning. Describes interesting construction work carried out in New York while erecting a steel-cage office building at the corner of Fulton and William streets. 1400 w. Eng Rec—Jan. 30, 1904.

Masonry Structures.—Underpinning High Masonry Structures. Illustrated description of the method of raising a large stone court-house at Springfield, Ill., and of strengthening the foundations of an 80-ft. brick chimney of the Soldiers' Home, Quincy, Ill. 1100 w. Eng Rec—Feb. 2, 1901.

Office Building, N. Y.—A Protracted Job of Underpinning. Illustrated description of very difficult work at Exchange Place, New York, where the soil is very fine and the building of a steel-cage structure endangered old buildings. 3500 w. Eng Rec—Nov. 1, 1902.

Underpinning an Old Office Building on Broadway, New York. Diagram and description of counter-weighted cantilever needle beams and girders for underpinning, and methods used. 1000 w. Eng Rec—Dec. 5, 1903.

Paris.—See **RAILWAY CONSTRUCTION.**

Philae Temples.—See **FOUNDATION.**

Residence, N. Y.—Concealed Underpinning for a New York Residence. Describes the damage to a building on the corner of 38th st. and Park ave., New York, caused by the construction of the tunnel for the Rapid Transit Ry., and the method of underpinning devised to support the building until the new foundations are built. Ills. 900 w. Eng Rec—Nov. 26, 1904.

Steel Building.—Underpinning an Unfinished Steel-Cage Building. Illustrated description of an interesting piece of engineering work. An unfinished building thrown out of plumb by adjacent excavations, is restored to a safe condition and foundations built. 1000 w. Eng Rec—Jan. 25, 1902.

Times Building, N. Y.—Underpinning and Protecting the Foundations of the Times Building, New York. Illustrates and describes methods of underpinning the building at the corner of Spruce St. and Park Row, made necessary in constructing the City

Hall loop of the Rapid Transit Subway. 1200 w. Eng Rec—May 27, 1905.

Tribune Building, N. Y.—Underpinning a 70 ft. Wall Without Temporary Supports. Brief description of methods used in building the addition to the Tribune Building, New York City. Ills. 1500 w. Eng Rec—July 22, 1905.

UNION.

See also **FLANGE; PIPE JOINT; TRADE UNION.**

Gas Meter.—See **GAS METER—Union Standardization.**

UNIT.

See **ELECTRIC UNIT; MAGNETIC UNIT; WEIGHTS AND MEASURES.**

UNIT COSTS.

See **COST-KEEPING—Contract Work; Unit Costs.**

UNITED STATES.

See also under specific main headings.

Some Great Things Which Make Our Country Great. John Birkinbine. Reviews the resources of the country, the industries, engineering works and wealth, in a general way. 2400 w. Pro Engrs Club of Phila—April, 1902.

UNIVERSITY.

See **EDUCATION; LABORATORY.**

URALITE.

Uralite. A material that is claimed to be made of mineral substances only; to be fire-proof and practically water-proof; to be a non-conductor of heat, cold and electricity, not affected by hot or cold water, by atmospheric influences, nor such gases as will destroy galvanised iron, is described, and some of its uses given. 2300 w. Engr, Lond—Aug. 15, 1902.

Uralite. Editorial on this material and the fire-proof tests carried out by the British Fire Prevention Committee. Describes the manufacture of the material. 2800 w. Engng—Aug. 15, 1902.

Uralite: New Fireproof Material. A description of this material, its various advantages and uses. 2000 w. U S Cons Repts, No. 1463—Oct. 7, 1902.

The Manufacture of the New Fireproof Material Uralite. Illustrates and describes this new material which originated in Russia and takes its name from the Ural Mts., giving the process of manufacture, the notable features, tests, etc. 2000 w. Sci Am—Oct. 4, 1902.

URANIUM.

See also **CARNOTITE; METAL—Rare; RADIO-ACTIVITY.**

Uranium. Describes this metal and some of its oxides which have been found useful. 1700 w. Aust Min Stand—Aug. 27, 1903.

The Preparation of Radium, Vanadium and Uranium Compounds from Carnotite and Pitchblende. J. Ohly. Explains methods and observations made, giving conclusions. 2000 w. Min Rept—May 12, 1904.

Pitchblende and Carnotite. Dr. J. Ohly. Information concerning the concentrates produced by these radioactive minerals, and the methods of treatment. 900 w. Min Rept—June 29, 1905.

Analysis.—The Analysis of Uranium and Vanadium Ores. Oliver P. Fritchie. Directions for the determination. 800 w. Eng & Min Jour—Nov. 10, 1900.

V

VACUUM.

See also **CONDENSER.**

Measurement.—The Measurement of Vacuum. C. Turnbull. Read before the Newcastle Loc. Soc. of the Inst. of Elec. Engrs. Remarks on the methods and the importance of vacuum measurements. 700 w. Engr, Lond—April 21, 1905.

VACUUM PUMP.

See also **AIR PUMP; SUGAR.**

A Study of Vacuum Pumps (Etude sur Pompe Sèche). E. Portemont. A discussion of the air pumps used in drying beet roots in sugar refineries, with suggestions for improved valve and valve gear, with diagrams. 2500 w. Revue Technique—April 10, 1902.

VACUUM TUBE.

See also **ELECTRIC DISCHARGE; ELECTRO-PHYSICS; OSCILLOGRAPH; RADIOACTIVITY; RADIOGRAPHY.**

Braun.—The Braun Tube in the Study of Alternating Currents. Describes the Braun tube, explaining its use for this purpose, referring to experiments carried out by Prof. A. Petrovski. Ills. 2000 w. Elec Wld & Engr—April 30, 1904.

Some Applications of the Braun Cathode-Ray Tube. M. Mansergh Varley and W. H. F. Murdoch. Illustrates and describes a few interesting experiments with the tube. 1300 w. Elect'n, Lond—June 16, 1905.

Cathode Surface.—See **Current Distribution.**

Crookes.—Observations on Crookes Tubes. H. Westbury. Read at New York City, before the Roentgen Soc. of the U. S. 2200 w. W Elect'n—Jan. 5, 1901.

See also RADIOGRAPHY.

Current Distribution.—Distribution of Current at the Surface of Cathodes in Vacuum Tubes. A. Wehnelt. Translated from "Ann. der Physik." Considers the distribution of current in cathodes not completely covered with glow light, at the surface of completely covered plane cathodes, and the influence of the material and the surface condition upon the distribution between two parallel cathodes. Ill. 4500 w. Elect'n, Lond—March 14, 1902.

Distribution of Current at the Surface of Cathodes in Vacuum Tubes. A. Wehnelt. An account of investigations, with illustrations, translated from "Ann. der Physik." 4800 w. Sci Am Sup—Nov. 8, 1902.

Geissler.—Geissler Tube and Condenser Effects. Alfred. G.; Dell. Gives causes of the effects observed by the writer in experimental work. 1000 w. Elec Wld & Engr—Aug. 23, 1902.

Gundelach-Dessauer.—The Gundelach-Dessauer Röntgen Tubes (Die Gundelach-Dessauer's Röntgenröhre). Ludwig Henne. Describing an improved form of vacuum tube in which a regulating device is introduced. 1500 w. Elektrotech Zeitschr—July 31, 1902.

Luminescence.—The Luminescence of a Rarified Gas Around Metallic Wires (Luminescence d'un Gaz Raréfié autour des Fils Metalliques). J. Borgman. A study of the luminous effects produced when a wire connected to one pole of an induction coil passes through a rarefied gas. 1200 w. Comptes Rendus—Dec. 24, 1900.

Spectra.—See **ELECTRIC DISCHARGE.**

VACUUM TUBE LIGHTING.

See also **MERCURY VAPOR LAMP.**

Moore.—The Moore Electric Light. Illustrated description of the latest improved forms of the Moore vacuum light, with details from recent patents. 2500 w. Elec Wld & Engr—June 28, 1902.

VALUATION.

See also **MINE VALUATION; RAILWAY VALUATION; WORKS MANAGEMENT.**

The Determination of Physical Values. Clinton S. Burns. Presents a method for the determination of valuations which it is believed is founded upon correct economics. 2500 w. Eng Rec—Sept. 16, 1905.

Mines.—See **MINE VALUATION.**

Plants for Public Services.—The Appraisal of Plants for Public Services. Nicholas S. Hill, Jr. A review of the principles on which a property is valued when purchased by private parties or by municipalities. 4000 w. Eng Rec—June 8, 1901.

Railway.—See **RAILWAY TAXATION; RAILWAY VALUATION.**

Water Power.—See **WATER POWER—Valuation.**

Waterworks.—See **WATERWORKS — Mobile; WATERWORKS LAW; WATERWORKS MANAGEMENT.**

VALVE.

See also LOCOMOTIVE VALVE; SAFETY VALVE; STEAM ENGINE; STEAM ENGINEERING; VALVE GEAR; VALVE SETTING.

Air Brake.—See AIR BRAKE—Valve.

Air Compressor.—See Long Stroke; AIR COMPRESSOR—Valves.

Anderson.—Automatic Exhaust Relief Valve. Illustrates and describes the Anderson valve, which is claimed to have overcome all the difficulties met with in valves for maintaining a predetermined back pressure on steam engines. 1000 w. Engr, Lond—Oct. 20, 1905.

See also STEAM ENGINE—Back Pressure.

Balancing.—Balancing a Valve and Diaphragm. Jas. Clark. Gives the author's solution of the problem of finding the outside diameter of a diaphragm to balance a valve of 1 1-4 inches diameter of seat, both connected to the same stem, which was ½ inch diameter. 500 w. Am Mach—Vol. 27, No. 43.

Various Applications of Balanced Cylindrical Slide Valves (Verschiedene Verwendungen des Entlasteten Rohrschieberventiles). F. Strnad. With illustrations of a variety of steam valves using tubular piston devices to relieve the steam pressure. 8000 w. Zeitschr d Ver Deutscher Ing—Nov. 4, 1905.

See also LOCOMOTIVE; LOCOMOTIVE, COMPOUND; MARINE ENGINE; VALVE GEAR.

Blast Furnace.—See Gate; BLAST FURNACE—Gas Valves.

Blowing Engine.—See BLOWING ENGINE.

Boilers.—See also SAFETY VALVE.

Brocq.—See STEAM—Priming.

Chart.—See Slide.

Compound Locomotive.—See LOCOMOTIVE COMPOUND; LOCOMOTIVE VALVE.

Compressor.—See Long Stroke; AIR COMPRESSOR—Valve.

Corliss.—See BORING MACHINE—Valve Seats; MARINE ENGINE; STEAM ENGINE; VALVE GEAR.

Cylindrical Locomotive.—See LOCOMOTIVE VALVE.

Design.—See VALVE SETTING—Reed's Lecture.

Diaphragm.—See Balancing.

Dreyer, Rosenkranz & Droop.—See INDICATOR.

Drop.—The Design of Drop Valves. Concerning the angle of seat employed, with calculations for the correct radii and angles. Ills. 1100 w. Engr, Lond—Jan. 6, 1905.

The Drop Valve and Its Gear. An illustrated discussion of the design of drop valve gears, describing some early designs, and the changes. Serial. 1st part. 2200 w. Engr, Lond—May 26, 1905.

See also STEAM ENGINE.

Emergency.—Emergency Valves. W. H. Wakeman. Illustrated descriptions of emergency valves for use with high pressure steam, explaining their applications. Serial. 1st part. 1000 w. Elec, N Y—Aug. 2, 1905.

See also Oil Well Emergency.

Explosions.—Causes of Explosions of Cast-Iron Steam Valves (Causes d'Explosion des Valves en Fonte). S. Perissé. Discussing the importance of providing by-pass communication to avoid water-hammer shocks and consequent ruptures. 2000 w. Génie Civil—Feb. 6, 1904.

See also BOILER EXPLOSION; STEAM PIPE EXPLOSION.

Foster, Gas.—Water Controlled Foster Reversing Valve. Illustrated description of a new style of gas valve for regenerating furnaces. 1600 w. Ir Age—Dec. 18, 1902.

Four-Way.—Stratton's Four-Way Hydraulic Valve. Illustrates and describes an ingenious device. 1200 w. Engng—Oct. 9, 1903.

Gas Compressors.—See AIR COMPRESSOR.—Valve; COMPRESSOR.

Gas Engine.—Valves and Valve Mechanism of Internal Combustion Engines. R. E. Phillips. Excerpt of a paper read before the Auto. Club. Remarks confined to the valves and valve mechanisms used in the Otto four-cycle type. Ills. 3700 w. Prac Engr—April 15, 1904.

See also GAS ENGINE—Valves.

Gasoline Engine.—See GASOLINE ENGINE—Valves.

Gate.—An 8-inch Hydraulic Gate Valve on a Detroit Water Main Supplying River Rouge, Mich. George H. Fenkell. Illustrated description of an automatic hydraulic gate which has been in operation since 1900. 600 w. Eng News—April 17, 1902.

A Large Gate Valve of New Type for Low Pressures. John J. Smith. Illustrates and describes valves designed for blast-furnace work. 1500 w. Am Mach—Vol. 28, No. 34.

Gauge.—See GAUGE—Valve.

Globe.—The Globe Valve—Its Origin and Development. J. O'Meara. An illustrated account of the origin and development of this steam valve. 1000 w. Heat & Vent Mag—Nov., 1905.

See also MACHINE TOOL.

Globe Injector.—Globe Valve for Injector Throttle. William Newton. Ilustrated description, with suggestions for constructing. 600 w. Am Mfr—May 2, 1901.

Gutermuth.—The Gutermuth Patent Valve. Illustrated description of a simple and novel valve for pumps, compressors, blowing engines, &c. 1200 w. Ir Age—July 6, 1905.

Hoerbiger.—See AIR COMPRESSOR.

Hydraulic.—See Four-Way; Gate; Long Stroke; Pulley Press; Pump; HYDRAULIC ENGINE; HYDRAULIC MACHINERY; PUMP.

Kennedy Blowing Engine.—See BLOWING ENGINE—Kennedy Valves.

Leakage.—See STEAM JACKET—Inst. of Mech. Engrs.

Locomotive.—See Testing; LOCOMOTIVE VALVE.

Long-Stroke.—Long-Stroke Pump Valves (Vollhubige Pumpenventile). F. Strnad. Illustrating improved forms of balanced, cushioned ring-valves, especially adapted for gas and vacuum pumps and for air compressors. 5000 w. Glückauf—April 22, 1905.

Long-Stroke Valves for Compressors (Vollhubventile für Kompressoren). Ferd. Strnad. Describing an improved form of cushioned valve for high speed air compressors. 2500 w. Zeitschr d Ver Deutscher Ing—April 29, 1905.

Manufacture. — See BORING MACHINE — Valve Seats; MACHINE TOOL—Globe Valve Manufacture; VALVE WORKS.

Oblique Flow.—See Wear.

Oil Well Emergency.—A New Emergency Straightway Gate Valve. A. F. Lucas. Illustrated description of a valve used in closing an oil well near Beaumont, Texas. 600 w. Eng & Min Jour—Sept. 21, 1901.

Otto Gas Engine.—See Gas Engine.

Phoenix.—The Phoenix Steam-Pressure Regulating and Automatic Cut-Off Valves. Descriptive account with illustrations. 1200 w. Engng—April 25, 1902.

Piston.—Piston, Corliss and Double-Beat Valves. Translation of a lecture by M. Vanderstegen, delivered at Ghent. States why the Corliss and double-beat valves have been abandoned in favor of piston valves. 2800 w. Engr, Lond—Dec. 6, 1901.

Piston, Corliss and Double-Beat Valves. A comparison with discussion of the merits of these types, and illustrated description of the Van den Kerchove gear. 900 w. Am Elect'n—April, 1902.

A Style of Valve Difficult to Set. H. H. Kelley. Concerning the piston valve used for high pressures, giving illustrations of various types, and suggestions for their adjustment. 2000 w. Engr, U S A—June 16, 1902.

Some Notes on Piston Valves. F. A. Haughton. Calls attention to peculiarities inherent in certain types. Diagrams and indicator cards with general discussion. 4200 w. Pro Richmond Ry Club—Sept. 11, 1902.

See also Balanced; LOCOMOTIVE VALVE; STEAM ENGINE; VALVE SETTING.

Poppet.—See also STEAM ENGINE; VALVE GEAR.

Poppet Pressure Drop.—The Pressure Drop Through Poppet Valves. Charles Edward Lucke. A report of tests made with air to determine the relation between pressure drop through a poppet valve of a gas engine and the condition of flow, form of opening, &c., that give rise to the pressure drop observed. Ills. 2800 w. Trans Am Soc of Mech Engrs, No. 084—Dec., 1905.

Pressure Drop.—See Poppet; Pressure Drop.

Pressure Reducing.—See Reducing; SAFETY VALVE.

Pressure Retaining.—See AIR BRAKE—Valve.

Pulley Press.—Pulley Press Valve. Francis H. Stillman. Illustrates and describes a large press operating valve, believed to be one of the most elaborate ever used to operate the motions of a single hydraulic press. 1000 w. Trans Am Soc of Mech Engrs, No. 894—May, 1901.

Pump.—Tests of the Relative Efficiency of Mechanically Operated and Automatic Spring Valves for Pumps (Versuche zur Ermittlung der Bewegungen und Widerstandsunterschiede Grosser Gesteuerter und Selbstthätiger Federbelasteter Pumpen—Ringventile). Rud. Schröder. An exhaustive series of tests, showing the advantages of mechanically-operated pump valves, of the Riedler type, with illustrations and many diagrams. 5 plates. 5000 w. Zeitschr d Ver Deutscher Ing—May 10, 1902.

The Action of Spring-Loaded Pump-Valves (Die Wirkungsweise Federbelasteter Pumpenventile und ihre Berechnung). H. Berg. An exhaustive mathematical study of the reaction of pump valves, including the results of investigation with the indicator. Three articles. 12,000 w. Zeitschr d Ver Deutscher Ing—July 23, 30, Aug. 6, 1904.

The Action of Pump Valves (Fonctionnement des Soupapes de Pompes). M. Lecuir. A translation of the paper of Berg upon experiments on spring-loaded pump valves. Serial. Part I. 7000 w. Revue de Mécanique—Nov. 30, 1904.

Free Moving Pump Valves (Ueber Freigehende Pumpenventile). L. Klein. Data and results of experimental investigations into the relation of lift to discharge in the case of pump valves free from any mechanical control. 1800 w. Zeitschr d Ver Deutscher Ing—March 25, 1905.

See also Long Stroke; PUMP.

Reducing.—A Large Differential Action Reducing Valve. Illustrates a reducing valve of unusual size which has found a wide variety of applications. 1400 w. Am Mach—Aug. 14, 1902.

Valves for Reducing Steam Pressures (Das Dampfdruckminderungsventil). Siegfried Mertens. A discussion of means for perfecting steam pressure reduction valves and calculating their performance. 2500 w. Gesundheits-Ingenieur—May 10, 1903.

Reducing Valves. R. T. Strohm. Gives illustrated description of the construction and operation of three different types of reducing valves. 1800 w. Am Elect'n—Jan., 1904.

See also Royle's.

Reed Lecture.—See VALVE SETTING.

Regenerative Furnace.—New Valves for Regenerative Furnaces. Illustrates and describes the Czekalla system, and the Naegel system, both of which close the valves at one end of the furnace before those at the other end are opened. 1800 w. Ir Age—July 23, 1903.

Reversing Valves for Renegerative Furnaces. A. D. Williams, Jr. Shows the losses due to a poor valve, and comments on some good valves. 2000 w. Ir Age—April 7, 1904.

See also Foster, Gas; FURNACE.

Regulating.—Note on Some Experiments with a New Form of Pressure Regulator. William Kendrick Hatt. Illustrates and describes apparatus for pipe lines, and records experiments made at Purdue Univ. 1200 w. Jour Fr Inst—Aug., 1902.

An Automatic Regulating Valve for Reservoirs or Stand-Pipes Supplied from a Higher Elevation. J. W. Ledoux. Illustrated description of a device that has been tested and works with certainty. 900 w. Eng News—March 9, 1905.

Regulating Valve. J. W. Ledoux. An illustrated description of an apparatus for regulating the flow of water with gravity supplies. Discussion. 1700 w. Pro Engrs' Club of Philadelphia—April, 1905.

Reservoir.—See Regulating.

Replacing.—See VALVE SETTING.

Reversing.—See Foster, Gas; Regenerative Furnace.

Rocking.—Modern Practice in Rocking Valves and Valve Gears. H. F. Schmidt. Considers some of the different types of valves and valve gears employed in modern steam engine practice, with reasons for the modifications of the original Corliss type. Ill. 6500 w. Am Elect'n—June, 1902.

Rotary.—See GAS ENGINE—Rotary Valve.

Royle's.—Royle's Reducing Valve. Illustrated description of a novel design of combined reducing valve and safety valve. 700 w. Mech Engr—Feb. 28, 1903.

Safety.—See Royle's; SAFETY VALVE.

Seat Boring.—See BORING MACHINE—Valve Seats.

Self-Closing.—See ENGINE STOP; SAFETY VALVE—Steam Pipe Cut-Off.

Slide.—A New High Pressure Balanced Slide Valve. Illustrates and describes a valve designed to work easily under pressures as great as 250 lbs. 1000 w. Am Engr & R R Jour—April, 1902.

Low Pressure Slide Valve with Triple Openings for Admission and Exhaust (Niederdruckschieber mit Dreifacher Eröffnung für Einlass und Auslass und mit Ueberströmung). M. Hochwald. The valve is a combination of the Penn double-ported valve and the Allen valve with auxiliary passage, giving quick and large opening with small travel. 1200 w. Zeitschr d Ver Deutscher Ing—Aug. 12, 1905.

Slide, Calculating Charts.—The Application of Calculating Charts to Slide-Valve Design. William J. Goudie. Gives calculating charts designed by the author, explaining their use. 4500 w. Trans Inst of Engrs & Shipbuilders in Scotland—Dec. 19, 1905.

Slide vs. Piston.—Slide Valve versus Piston Valve. L. S. Allen. Read before the Traveling Engrs' Assn. A statement of the merits of the piston valve and its advantages over the slide valve. 3500 w. Ry & Engng Rev—Sept. 16, 1905.

See also VALVE SETTING—Replacing..

Slip.—The Slip of Discharge Valves. C. H. Benjamin. A report of experiments made to determine the effect of variations in the lift and stiffness of the spring on the discharge through the valves of a feed pump. 700 w. Engr, U S A—Nov. 15, 1905.

Stand Pipe.—See Regulating.

Steam Pipe Cut-Off.—See SAFETY VALVE.

Stop.—See ENGINE STOP; SAFETY VALVE.

Stratton.—See Four-Way.

Strnad.—See Long Stroke.

Suspended.—See BLOWING ENGINE—Suspended Valves.

Suyden's.—Suyden's Combined Stop and Isolating Valve. Illustrates and describes a valve which closes automatically in both directions in case of accident. 1200 w. Engng—Jan. 1, 1904.

Testing.—To Test for Blows in Valves, Cylinder Packing, Separate Exhaust Valve and Intercepting Valve. S. H. Draper. Suggestions for testing with discussion of causes of some engine troubles. 1500 w. Loc Engng—Aug., 1904.

See also LOCOMOTIVE TEST—Leaks.

Throttle.—Throttle Valves for Steam Engines. W. H. Wakeman. Showing the advantages and disadvantages of some familiar types. Ill. 900 w. Engr, U S A—Aug. 1, 1901.

See also LOCOMOTIVE VALVE.

Tire.—See TOOL—Tire Valves.

Van den Kerchove.—See Piston; STEAM ENGINE.

Wear.—Valves (Ventile). H. Raschen. A discussion of the unequal wear upon lift and check valves, due to the oblique flow of the fluid, with suggestions to obviate this action. 2000 w. Zeitschr d Ver Deutscher Ing—June 24, 1905.

VALVE GEAR.

See also LINK MOTION; LOCOMOTIVE VALVE GEAR; STEAM ENGINE; STEAM ENGINEERING; VALVE; VALVE SETTING.

Improved Valve Gears for Steam Engines (Neuere Steuerungen für Dampfmaschinen). H. Dubbel. Illustrating recent automatic valve gears for Corliss and poppet-valve engines. 1200 w. Zeitschr d Ver Deutscher Ing—Nov. 30, 1901.

Air Compressor.—See AIR COMPRESSOR — Valve Gear; Valve Motion.

Analysis.—Valve Gears. C. C. Major. Discusses the relation between piston and valve position and crank and eccentric angles. Ill. 1500 w. Am Elect'n—March, 1904.

Valves and Valve Gears. Robert Gibson Griswold. An illustrated analysis of the various gears, with a careful study of the simple "D" slide valve and its effect upon the steam distribution and formation of the diagram. Serial. 1st part. 2800 w. Power—Sept., 1904.

See also **Fourier's Analysis; Harmonic Analysis.**

Armstrong.—A New Valve Gear Embodying a Novel Mechanical Movement. Illustrates and describes an interesting valve gear recently designed by E. J. Armstrong, of the Ball Engine Co., Erie, Pa. 1400 w. Mach, N Y—Nov., 1905.

Balancing.—The Balancing of Valve Gears. A discussion of the force due to friction, the force due to gravity and the force due to inertia, advancing a method by which the crank shaft and valve gear bearings may be relieved of the inertia force in conjunction with the gravity effect. 8 plates. 5500 w. Trans Am Soc of Nav Archts of Marine Engrs, No. 16—Nov., 1902.

See also **LOCOMOTIVE; LOCOMOTIVE, COMPOUND; MARINE ENGINE; VALVE.**

Beam Engine.—Beam Engine Valve Gears. Theodore Lucas. Calls attention to the remarkable accuracy and perfection of the steam distribution of the American beam engine, by a form of valve gear remarkably free from possibilities of derangement. Ill. 2200 w. Marine Engng—June, 1902.

Buckeye.—Valve Gear of the Buckeye Engine. Illustrated detailed description. 1800 w. Power—March, 1903.

Cam Operation.—The Operation of Valve Gears by Cams (Die Bewegungsverhältnisse von Steuergetrieben mit Unrunden Scheiben). W. Hartmann. A study of the kinematics of cam movements with especial reference to their applications in operating the valves of steam and gas engines. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—Sept. 30, Oct. 7, 1905.

Central Valve.—See **STEAM ENGINE.**

Clearance Reducing.—Clearance Reducing Valve Mechanism and Cylinder. Reviews the work in this field by J. B. Alfree and Ira O. Hubbell, giving illustrated description of their system. 2200 w. Ry Mas Mech—Sept., 1904.

Cockerill.—The Cockerill Variable Cut-Off Gear for Gas Engines. Illustrated detailed description. 1200 w. Ir Age—April 24, 1902.

See also **GAS ENGINE.**

Connecting-Rod Angularity.—Valve Gears. C. C. Major. Discusses the effect of connecting-rod angularity. 1000 w. Am Elect'n—Feb., 1904.

Corliss.—Caring for Corliss Valve Gears. W. H. Wakeman. Suggestions and discussion of some of the features. 1200 w. Engr, U S A—Oct. 1, 1901.

The Corliss Valve Gear. J. Begtrup. Illustrated descriptions of the Corliss valves discussing their limitations, dimensions, etc. 3200 w. Am Mach—Jan. 23, 1902.

Layout of Corliss Valve Gears. Sanford A. Moss. Gives a method for laying out a Corliss or other similar valve gear, using as a starting point the desired percentages of compression and release. Ill. Serial. 1st part. 5800 w. Am Mach—April 9, 1903.

Adjustment of Corliss Valve Gears. Ralph D. Van Valkenburgh. An illustrated article considering the essential conditions for valve gears and how to set them for best performance. Serial. 1st part. 3000 w. Ice & Refrig—Oct., 1904.

A New Corliss Valve Gear. F. Hardie Jeannin. Illustrates and describes a valve gear which relates to the class of steam engines using rotary exhaust valves, and rotary induction valves tripped by a suitable device and closed by means of a dashpot. 1500 w. Engr, U S A—July 1, 1905.

See also **Diagram; Trip; STEAM ENGINE.**

Correction.—Correcting a Faulty Valve Gear. H. A. Davis. Describes method and shows results. 800 w. Engr, U S A—Nov. 1, 1905.

Cut-Off.—Double Slide Valve Gears for Steam Engines (Doppelschiebersteuerungen für Dampfmaschinen). B. Stein. A discussion of various forms of cut-off gear operating by one valve sliding on or in another, with especial reference to the piston-valve engine of Haniel & Lueg. 2500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Jan. 3, 1903.

Diagram.—Graphical Chart for the Solution of Valve-Gear Problems. W. F. Durand. Describes a form of diagram or graphical representation of the relations involved, which, once drawn, shall contain the solution of all possible problems within the usual working range. 2500 w. Jour Am Soc of Nav Engrs—Nov., 1902.

Simple Slide Valves and Link Motions. J. Dowling. A solution of the various problems by graphical methods. Ill. Serial. 1st part. 2000 w. Prac Engr—Oct. 26, 1900.

See also **Meyer; INDICATOR DIAGRAM.**

Diagram, Corliss.—Laying Out a Valve Gear Diagram for a Corliss Valve Air Compressor. A. L. Goddard. Considers the laying out of a diagram for a two-stage Corliss valve compressor to compress 4,000 cu. ft. net of free air from an atmosphere of 14 1-2 pounds to 100 pounds gauge at a piston speed of 60 feet per minute. Ill. Serial. 1st part. 3000 w. Wis Engr—Jan., 1901.

Diagram, Sweet.—See **Meyer.**

Diagram, Zeuner.—Some Special Problems in Valve-Gear Design by the Zeuner Diagram. Walter C. Kretz. Gives a mathematical demonstration of the problem—"Given the crank angle at cut-off, the lead, and the maximum port-opening, to find the minimum travel to suit these conditions." Also demonstrates other propositions required in the proof. 7800 w. Sch of Mines Qr—July, 1902.

Double Slide.—See **Cut-Off; Eccentrics.**

Drop.—See **VALVE.**

Duplex.—Duplex Valve Gear, London and North-Western Railway. Illustrated description, with diagrams, of Whale's valve gear. 500 w. Engr, Lond—Jan. 8, 1904.

Eccentrics.—The Selection of Eccentrics for Double Valve Gears (Die Wahl der Exzenter bei Doppelschiebersteuerungen). W. Pickersgill. With valve diagrams showing the influence of variations in eccentricity upon valve action in slide-valve engines. 2000 w. Zeitschr d Ver Deutscher Ing—July 8, 1905.

Electromagnetic.—See **Naylor.**

Elsner.—The Elsner Valve Gear (Die Elsner-Ventilsteuerung). Georg W. Koehler. An illustrated description of a valve gear for steam engines, in which the amount of steam admitted is automatically regulated, illustrations of engines, and valve diagrams and their discussion. Serial. Part I. 1000 w. Glasers Annalen—March 15, 1903.

Fourier's Analysis.—Fourier's Analysis Applied to the Plain Slide Valve Gear. W. F. Durand. A discussion of the application of this method to the motion of the plain slide valve gear, with special reference to its comparison by the same form of expansion. 1800 w. Sib Jour of Engng—June, 1905.

Frikart.—See **STEAM ENGINE—Piston Valves.**

Gas Engine.—Gas Engine. Valve Gears. Charles Hurst. The discussion is confined to the mushroom type of valve, considering the sizes of the valves and area of passages, position, governing, etc. Ill. 4000 w. Feilden's Mag—March, 1903.

See also **Cockerill; GAS ENGINE.**

Gölsdorf.—See **LOCOMOTIVE, COMPOUND; LOCOMOTIVE VALVE GEAR—Compound.**

Graphical Solution.—See **Diagram.**

Harmonic Analysis.—The Harmonic Analysis of Valve Motions. Silvanus P. Thompson. An explanation of a very simple method. 800 w. Engng—July 14, 1905.

Henschel.—See **LOCOMOTIVE—Tank, Henschel; LOCOMOTIVE VALVE GEAR—Compound.**

Hoisting Engine.—Positive and Releasing Valve Gears for Hoisting Engines (Freifall oder Zwangschleiss bei Fördermaschinen-Ventilsteuerungen?) A. Ehrlich. A comparison between the reliability of trip valve gears and positively actuated valves. 1200 w. Glückauf—Sept. 27, 1902.

See also **HOISTING ENGINE.**

Hydraulic Elevators.—Valve Gear for High Pressure Hydraulic Elevators. William Baxter, Jr. States where the high-pressure system is advantageous and gives an illustrated description of the general arrangement of the valves for the Otis high-pressure system. 1500 w. Am Mach—June 6, 1901.

See also **ELEVATOR.**

Inertia Stresses.—The Inertia of a Slide Valve. J. E. Cooper. Deals with the stresses caused by the reciprocating motion, and considers the best means of providing for them. 1500 w. Prac Engr—Aug. 23, 1901.

Locomotive.—See **Duplex**; **LOCOMOTIVE VALVE GEAR.**

Marshall.—Marshall's Valve Gear. Illustrated detailed description of a successful valve gear, the invention of James T. Marshall. 2000 w. Engr, Lond—Nov. 3, 1905.

Meyer.—The Application of Sweet's Diagram to the Meyer Valve. J. Begtrup. Explains the fundamental principles of cut-off valves, the Meyer cut-off diagram, and its limitations. 1600 w. Am Mach—Nov. 8, 1900.

Mill Engines.—The Valve Gears of Modern Mill Engines. Charles Hurst. An illustrated description of recent types. 3300 w. Feilden's Mag—Oct., 1903.

Model.—See **LINK MOTION—Bench.**

Musgrave.—Musgrave's Valve Gear for Steam Engines. Illustrates and describes an improved construction and arrangement for steam engines of the type in which the distribution is effected by four separate balanced piston valves, two for admission and two for exhaust. 900 w. Mech Engr —Nov. 25, 1905.

Naylor.—A New Valve Gear for Gas, Steam and Air Engines. Ernest W. Naylor. An illustrated description of a system of puppet valves, opened by the pull of electro-magnets and closed by springs, stating the advantages. 1400 w. Trans Am Soc of Mech Engrs, No. 920—Dec., 1901.

Poppet.—Recent Valve Gear Devices (Sur Quelques Dispositions Récentes de Distribution par Soupapes). M. Svilokossitch. Illustrating and describing recent poppet valve gears for steam engines. Serial. Part I. 2000 w. Revue Technique—Jan. 25, 1903.

See also **STEAM ENGINE; VALVE.**

Porter-Allen.—Valve Gear of the Porter-Allen Engine. Illustrated description. The special feature is the use of a link, actuated by a single eccentric and driving independently the steam and exhaust valves. 2300 w. Power—May, 1903.

Riedler.—See **AIR COMPRESSOR; PUMP.**

Riekie.—Improvements in Valve Gears. John Riekie. Discussion of this paper. 2700 w. Trans Inst of Engrs and Shipbuilders—Nov. 24, 1903.

See also **LOCOMOTIVE, CO[illegible]ND.**

Rock Drill.—See **ROCK DRILL—Valve Gear.**

Rocking.—See **VALVE.**

Rottmann.—See **ROLLING-MILL ENGINE.**

Slide.—The "Missing Quantity" in Double Slide-Valve Gears (Das Fehlerglied bei Doppelschiebersteuerungen). H. Gauhe. An examination of the error in valve motion due to the angularity of the connecting rod. 1000 w. Zeitschr d Ver Deutscher Inf—Dec. 5, 1903.

See also **VALVE.**

Steam Actuated.—Steam Actuated Valve Gear. W. H. Collier. Illustrated description of a 14x30 engine running 100 revolutions per minute, developing from 80 to 120 H. P., with a statement of the advantages claimed. 1800 w. Trans Am Soc of Mech Engrs, No. 061—June, 1905.

Stephenson.—The Theory of the Stephenson Link Valve Motion. William N. Barnard. Develops a simple method of analyzing the Stephenson Link Mechanism, which is based largely on that given in Bilgram's Valve Gears. 2400 w. Sib Jour of Engng—Dec., 1903.

See also **LOCOMOTIVE VALVE GEAR—Walschaerts vs. Stephenson.**

Trip.—Speed of Engines Fitted with Trip Valve Gear. Abstract of the individual replies to inquiries as to the speeds used by a number of engine builders for Corliss engines fitted with trip or releasing valve gear. 2500 w. Engr, Lond—Aug. 29, 1902.

Van den Kerchove.—See **VALVE—Piston; STEAM ENGINE.**

Walschaerts.—See **LOCOMOTIVE VALVE GEAR.**

Walschaerts vs. Stephenson.—See **LOCOMOTIVE VALVE GEAR.**

Whale's.—See **Duplex.**

Woolf Reversing Motion.—The Woolf Reversing Motion. Frederick H. Stacey. An illustrated article explaining the functions and laws on which the working of a radial valve gear for traction engines depends. 1400 w. Power—Nov., 1903.

See also **STEAM ENGINE.**

Zeuner Diagram.—See **Diagram, Zeuner; GASOLINE ENGINE—Diagram.**

VALVE SETTING.

See also **LOCOMOTIVE VALVE GEAR; VALVE GEAR.**

Setting Inside Admission Piston Valves. Ira A. Moore. Gives directions. Ills. 1600 w. Loc Engng—March, 1904.

Setting Direct and Indirect Link Motion. H. H. Kelley. An illustrated article giving directions for setting both the direct and indirect link gears. 2300 w. Engr, U S A—June 15, 1905.

Brown Engine.—Setting the Valves of the Brown Engine. Illustrated directions. 2000 w. Power—April, 1904.

Corliss.—See **VALVE GEAR.**

McIntosh & Seymour Engine.—Setting the Valves of the McIntosh & Seymour Engine. Illustrated detailed description. 1800 w. Power—Jan., 1903.

Reed Lecture.—Method of Laying Out and Adjusting Valves by Means of Valve Diagrams. Report of a lecture by Prof. C. A. Reed on the setting and design of engine valves. 2500 w. Engr, U S A—Nov. 15, 1902.

Replacing.—Replacing a Slide Valve with a Piston Valve. J. P. Badenhausen. Describes the method of making the change, and explains why it was undertaken. Ill. 1100 w. Marine Engng—July 1903.

VALVE WORKS.

Hopkinson's.—Hopkinson's Valve Works at Huddersfield. Illustrated detailed description of these new works, which embrace the most commendable practice, and also their equipment. 4000 w. Engng—Sept. 8, 1905.

VANADIUM.

See also **CARNOTITE; METAL—Rare; STEEL ALLOY; URANIUM.**

Vanadium. Describes this rare metal, giving much information concerning it. 1800 w. Aust Min Stand—Aug. 20, 1903.

The Applications of Vanadium in Metallurgy (Le Vanadium en Métallurgie). S. Marsollan. A study of the influence of vanadium upon iron and steel, showing the increase produced in resistance. Two articles. 4000 w. Revue Technique—Sept. 25, Oct. 10, 1903.

Extraction of Vanadium from Natural Vanadate of Lead (Extraction du Vanadium du Vanadate de Plomb Naturel). H. Herrenschmidt. Describing the treatment used for the vanadate of lead from the Santa Marta mines, Spain, and the subsequent production of ferro-vanadium. 800 w. Comptes Rendus—Oct. 24, 1904.

Vanadium and Vanadium Steel. Gives a résumé of the methods by which this metal has been extracted from its ores, and discusses the properties of the vanadium steels. 2500 w. Engr, Lond—June 9, 1905.

VANNER.

See **ORE TREATMENT.**

VAPOR LAMP.

See **MERCURY VAPOR LAMP.**

VARIABLE SPEED.

See also **AUTOMOBILE GEAR; BICYCLE; GEAR; MACHINE TOOL; PULLEY—Cone; SPEED VARIATION.**

A Study of Variable Speed Gear (Etude sur les Changements de Vitesse). H. Noalhat. A general discussion of the problem, with details of a solution by the use of speed cones and planetary gears. Two articles. 6000 w. Revue Technique —April 10, 25, 1901.

Variable Speed Transmitters. Illustrates and describes three new devices, the Shattuck, the Heymann and the Dieterich, for the positive transmission of variable speed. 2800 w. Mach, N Y —Sept., 1901.

Mechanical Speed Changing Devices. Driving Machine Tools from Constant Speed Motors. H.

M. Palmer, G. E. Flanagan and others. A discussion of these subjects. 4200 w. Pro Engrs' Soc of W Penn—May, 1902.

Variable Speed Mechanisms. The present article considers their development and general principles. Ills. Serial. 1st part. 2200 w. Mach, N Y—May, 1905.

Automobile.—See **Simplex; AUTOMOBILE GEAR.**

Automobile Truck.—Motor Driven Truck Having Novel Variable Speed Mechanism. Diagram and description of the construction of the variable-speed gear of a machine exhibited in the late automobile show, in New York. 1200 w. Mach, N Y—March, 1903.

Cone Pulley Transformer.—A New Variable Speed Mechanism. Walter Ferris. Illustrates and describes a recently invented device called a cone pulley transformer manufactured by the Moore & White Co. 900 w. Am Mach—July 3, 1902.

Delagneaux.—The Delagneaux Extensible Pulley (La Poulie Extensible du M. Delagneaux). An illustrated description of a pulley whose diameter can be varied on the principle of the "Nuremberg shears" and so vary the speed transmitted. 600 w. Bull Soc d'Encouragement—June, 1902.

De Leeuw.—Something New in Speed Changing Devices. A. L. de Leeuw. An illustrated description of the device and its operation. 2300 w. Am Mach—Vol. 27, No. 36.

De Montais.—The de Montais Speed-Changing Device. Half-tone and line engravings, with description of a device adapted particularly to automobile purposes, consisting of two pulleys whose diameter can be varied. 700 w. Am Mach—Sept. 26, 1901.

A New Variable Speed Transmission. From "La Nature." Illustrates and describes a device invented by Roger de Montais. 1500 w. Sci Am—April 19, 1902.

Dieterich.—A New Speed-Changing Gear. Illustrated description, with explanation of the principles upon which it works. 1300 w. Eng News—Nov. 15, 1900.

The Dieterich Speed-Varying Device. Illustrated description of the Dieterich gear, and some of its applications. 1800 w. Am Mach—Nov. 22, 1900.

Dumaresq.—See **Simplex Automobile.**

Electric vs. Mechanical.—Electrical and Mechanical Methods of Variable Speed Control. William Cooper. Abstract of paper read at Chicago meeting of the Nat. Elec. Lgt. Assn. Explains the various methods and devices used. 5600 w. Ir Trd Rev—Sept. 10, 1903.

Electro-Mechanical.—An Improved Electro-Mechanical Variable-Speed Gear (Nouveaux Dispositifs Electromécaniques d'Embrayage et de Changement de Vitesse Progressifs). Paul Gasnier. A combination of an epicyclic gear train, a motor and a dynamo, the latter in connection with a rheostat, regulating the driving reaction. 1500 w. Comptes Rendus—Dec. 28, 1903.

Friction.—See **AUTOMOBILE GEAR.**

Gasnier.—Gasnier's New Electro-Mechanical Coupling and Speed-Varying Device. E. P. Buffet. Illustrates and describes an electro-mechanical method of transmission devised by Paul Gasnier. 1200 w. Am Mach—July 14, 1904.

Hall Hydraulic.—The "Hall" Hydraulic Variable Speed-Gear. Illustrated description of a form of gear in which a hydraulic system, using oil as the fluid medium, is employed. Serial. 1st part. 3300 w. Auto Jour—June 25, 1904.

Julien.—Improved Speed-Change Gear for Motor Boats (Nouveau Changement de Marche Progressif pour Canots à Petrole). A description of the Julien gear for enabling a gradual change of speed for the propeller of a motor boat driven by a gasoline motor. 1800 w. Revue Technique—Dec. 25, 1904.

Lathe.—Automatic Lathe Speed Changing. Howard A. Coombs. Illustrates and describes various arrangements of speed-changing devices, with remarks on their use. 1600 w. Am Mach—Oct. 15, 1903.

Lodge and Shipley.—Improved Variable Speed Countershaft. Illustrated description of the improved device made by the Lodge and Shipley Machine Co. of Cincinnati, Ohio. 1400 w. Am Mach—Aug. 21, 1902.

Newman.—The Newman-Gradually-Variable Speed Gear. Illustrated description of a change-speed gear which gives any speed from zero up to a certain limit. Serial. 1st part. 1400 w. Auto Jour—Sept. 12, 1903.

Two New Power Transmission Devices. Brief illustrated descriptions of Pope's spring sprocket, and the Newman variable-speed gear. 1500 w. Eng News—June 8, 1905.

Planer.—See **PLANER—Variable Speed.**

Simplex Automobile.—The Simplex Gradual Variable-Speed Gear. Illustrated description of the mechanism invented by W. N. Dumaresq. 2500 w. Auto Jour—March 7, 1903.

Swedish Atlas.—See **MACHINE TOOL.**

VARNISH.

See also **METAL PROTECTION; PAINT.**

Composition and Classification.—See **PAINT.**

Insulation.—See **INSULATION—Varnish.**

Technology.—See **PAINT.**

VAULT.

See also **BUILDING CONSTRUCTION.**

Müller-Breslau.—The Determination of the Line of Thrust of Barrel Vaults by the Law of Least Work (Bestimmung der Stützlinie von Tonnengewölben auf Grundlage des Satzes von der Kleinsten Formänderungsarbeit). J. V. Gerstenbrandt. An exhaustive analytical and graphical analysis according to the method of Müller-Breslau. 5000 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—Nov. 8, 1902.

Sidewalk, Misuse.—The Misuse of Public Sidewalk Areas and Vaults. Reginald Pelham Bolton. Discusses some of the encroachments on the public property under sidewalks, and upon them. 1200 w. Eng Rec—April 18, 1903.

VAULT-LIGHT SLAB.

Test.—Test of a Vault-Light Slab. Illustrated report of a test to destruction of a concrete-steel slab fitted with lenses for use over sidewalk vaults. 900 w. Eng Rec—Sept. 7, 1901.

VECTOR.

See **ELECTRIC CURRENT, ALTERNATING—Vector; MATHEMATICS.**

VEHICLE.

See also **AUTOMOBILE; CAR; CAR, MOTOR-DRIVEN.**

Sail Propelled.—See **SAIL VEHICLE.**

Traction.—See **TRACTION.**

Vibration Recorder.—Apparatus for Studying the Secondary Movements of Vehicles (Méthode pour l'Etude Experimentale des Mouvements Secondaires sur les Véhicules en Marche). M. Sabouret. A combination of pneumatic diaphragm devices for recording the oscillations and other secondary motions of railway and road vehicles. 1200 w. Comptes Rendus—Feb. 29, 1904.

See also **CAR.**

VEIN.

See also **GEOLOGY; GOLD GEOLOGY; MINING LAW; ORE DEPOSIT; SILVER.**

Identity and Continuity.—See **MINING LAW—Veins.**

VELOCITY DIAGRAM.

See **KINEMATICS.**

VENTILATING COWL.

Explanation of a Simple Method of Laying Out Ship Ventilating Cowls. George C. Stanley. Presents a group of six cowls and a simple method of determining their outlines. 1000 w. Marine Engng—June, 1901.

VENTILATION.

See also **BUILDING CONSTRUCTION—Sanitary; CAR VENTILATION; FAN; HEATING AND VENTILATION; MECHANICAL PLANT; MINE VENTILATION; SEWER VENTILATION; TUNNEL VENTILATION.**

Ventilation. A. C. Hardy. On the importance of fresh air for the health of mankind, the support of combustion, etc., and the systems of ventilation in use. 4500 w. Dom Engng—July 15, 1901.

Mechanical Ventilation. W. Yates. Read at meeting of the Brit. Inst. of Heat. & Ven. Engrs. Discusses the subject of vacuum or ventilation by extraction, and plenum, or ventilation by blowing in. Ill. 4200 w. Met Work—Feb. 22, 1902.

The Ventilating of Domestic Dwellings. E. W. Mayner. Read at London meeting of the Inst. of Heat. & Ven. Engrs. How to obtain the best results. Discussion follows. 4500 w. Plumb & Dec—June 2, 1902.

The Ventilation of Domestic Dwellings. E. W. Mayner. Read before the British Inst. of Heat. & Ven. Engrs. Discusses points of importance in securing good ventilation. 3000 w. Dom Engng —Aug. 25, 1902.

Distribution of Air. Alton D. Adams. The present article is introductory, showing the great importance of proper ventilation, and causes of vitiation. Serial. 1st part. 2000 w. Archts & Builders Mag—Dec., 1903.

Air and the Ventilation of Dwellings (Ueber Luft und Lüftung der Wohnung und Verwandte Fragen). Th. Oehmcke. A general discussion of the effect of impure air upon health and of the best methods of ventilation and the removal of dust. 8000 w. Gesundheits-Ingenieur—May 10, 1904.

Ventilation. W. Henman. Read before the Archts. Assn., England. Paper and discussion on modern practice in ventilating buildings. 11600 w. Builder—Nov. 19, 1904.

The Science of Ventilation. J. D. Sutcliffe. Read before the Inst. of Heat. & Ven. Engrs., England. A comparison of the advantages and limits of natural and mechanical systems. Ills. 7500 w. Plumb & Dec—Feb. 1, 1905.

Air Purification.—Air Purification in the Ventilating Plant of the City Hall, St. Louis. Concerning ing the operation of a water-spray filter for purifying the dirt-laden air. 1600 w. Eng Rec—Feb. 18, 1905.

Baldwin Engine House.—Ventilation of Baldwin Locomotive Works Engine House. Illustrated description of the system of carrying away the smoke and gases from locomotives. 500 w. Ry Age—March 25, 1904.

Car.—Car Ventilation. Edward Taylor. Gives information gained while testing an important city electric railway system, describing methods and giving other related information. 3500 w. St Ry Jour—April 15, 1905.

See also **CAR HEATING; CAR VENTILATION.**

Centrifugal.—See **FAN; PUMP.**

Cold Stores.—Ventilation of Cold Stores. Considers the factors that determine the need of systematic ventilation, the objections urged and methods used. Ill. 3500 w. Ice & Refrig—Nov. 1, 1902.

See also **REFRIGERATION.**

Color Works.—The Ventilation System in the Royal Uranium Color Works at St. Joachimsthal (Die Ventilationsanlage in der K. K. Uranfarbenfabrik zu St. Joachimsthal). F. Janda. Describing an arrangement of exhaust pipes and hoods over the tanks containing the alkaline solutions. 1800 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 4, 1905.

Factories.—The Ventilation of Factories. Abstract of the "First Report of the Departmental Committee Appointed to Inquire Into the Ventilation of Factories and Workshops," with editorial comment. 3000 w. Engr, Lond—Jan. 9, 1903.

The Humidification and Ventilation of Factories (L'Humidification et la Ventilation des Ateliers). Paul Razons. Describing various devices for supplying textile factories with air containing a predetermined amount of moisture. Two articles. 3000 w. Génie Civil—April 16, 23, 1904.

The Ventilation of Factories and Workshops. F. S. Lister. Discusses methods by which effective ventilation is secured, especially the "Exhaust" system, and the "Plenum" system, favoring the latter. 3000 w. Builder—March 18, 1905.

See also **Machine Shop; WORKS MANAGEMENT—Hygiene.**

Fans.—See **Law Courts; FAN.**

Farcot.—See **TUNNEL VENTILATION—Albespeyre.**

Hospitals.—Hospitals and Contagious Diseases and Their Ventilation. Thomas Barwick. Read before the Am. Soc. of Heat. & Ven. Engrs. Describes the best design for such buildings and the details of a ventilating system. 1800 w. Met Work—Jan. 25, 1902.

See also **HEATING AND VENTILATION.**

Hotel Astor, New York.—The Ventilation of the Hotel Astor, New York. Description, with drawings, of an extensive equipment of fans and blowers for circulating air through the building. 3000 w. Eng Rec—Oct. 8, 1904.

Hygrometer.—See **HYGROMETER.**

Law Courts, London.—Improvements in the Ventilation of the Law Courts. An outline of the improvements made including the adoption of the Davidson "Sirocco" fans. 1500 w. Engr, Lond—April 12, 1901.

Machine Shop.—The Ventilation of Workshops. Reviews the first report of the Commissioners inquiring into the ventilation of factories and workshops. Deals only with general ventilation. 2200 w. Iron & Coal Trds Rev—Nov. 7, 1902.

See also **HEATING AND VENTILATION; WORKS MANAGEMENT—Hygiene.**

Mechanical.—The Mechanical Transport of Air. W. B. Snow. A fully illustrated account of the manner in which the fundamental problems of ventilation and draft have been solved, with descriptions of fans and blowers. 3000 w. Engineering Magazine—Jan., 1905.

Natural.—Natural Ventilation (Ueber Natürliche Lüftung). W. Mehl. An examination of the manner in which air becomes fouled, and of the best method of inducing currents to provide for the necessary change by natural means. Two articles. 1 plate. 7500 w. Gesundheits Ingenieur —Dec. 15, 31, 1900.

New York Subway.—See **Underground Railway.**

Plenum System.—Notes on the Plenum System of Ventilation. W. Henman. Introducing a discussion before the Royal Institute of British Architects. 4600 w. Archt, Lond—June 10, 1904.

Notes on the Plenum System of Ventilation. William Henman. Also discussion. Showing that this system can be beneficially employed in certain buildings. 16000 w. Jour Roy Inst of Brit Archts—June 11, 1904.

Plenum Ventilation Systems (Ueberdruck-Lüftungsanlagen). Richard Hofmann. A brief discussion of the superior economy of the plenum method of ventilating buildings over an exhaust system. 2000 w. Gesundheits-Ingenieur—Nov. 30, 1904.

See also **HEATING AND VENTILATION.**

Pratt Institute, Brooklyn.—Ventilation in the Pratt Institute High School, Brooklyn, N. Y. Illustrates and describes the installation of improved facilities in an existing building without the necessity of much reconstruction. 1500 w. Eng Rec—Nov. 22, 1902.

Railway Tunnel.—See **TUNNEL VENTILATION.**

Respiration Calorimeter.—See **CALORIMETRY—Respiration.**

Roundhouse.—See also **CAR VENTILATION; ROUNDHOUSE.**

St. Louis City Hall.—See **Air Purification.**

School.—Ventilation: Success and Failure of Methods at Present in Use. Christopher Childs. Discusses chiefly the various methods for the ventilation of schools. Also general discussion. 15800 w. Jour San Inst—April, 1901.

See also **HEATING AND VENTILATION.**

Sewer Gas.—See **SEWER GAS; SEWER VENTILATION.**

Ship.—Some Experiments with Ventilating Fans. D. W. Taylor. An account of experiments made for supplying fresh air to vessels, to determine the fan that will supply the required quantity of air with the least expenditure of power. 4500 w. Eng News—Nov. 3, 1904.

See also **Warship; HEATING AND VENTILATION; VENTILATING COWL.**

Sirocco.—See **MINE VENTILATION.**

Subway.—See **UNDERGROUND RAILWAY.**

Telephone Exchange.—Ventilation of a Telephone Exchange. Illustrated description of an interesting example of ventilating where the avoidance of drafts was difficult. 1400 w. Eng Rec—Jan. 11, 1902.

Tunnel.—See **TUNNEL VENTILATION.**

Underground Railway.—The Ventilation of Deep-Level Underground Railways. A suggestion. B. Pontifex. Describes a scheme for automatically removing the foul air by suction pipes. 500 w. Elec Engr, Lond—Oct. 9, 1903.

The Cause of High Temperatures in the New York Subway. Editorial discussion of the amount of heat developed. 1500 w. Eng News—June 15, 1905.

New York Subway Ventilation. Konrad Meier. A discussion of the present condition, showing that the exchange of air is too slow, and the ventilation inadequate. 2000 w. Eng Rec—June 17, 1905.

The Problem of Ventilating the New York Subway and Similar Tunnels. Editorial discussion of the heat losses by conduction through the walls of the subway, and remarks on ventilation. 2500 w. Eng News—June 22, 1905.

The Ventilation of the Baker-Street and Waterloo Railway. G. Rosenbusch. Outlines the construction and mode of operation of these tube railways, and illustrates and describes the means adopted to improve the ventilation. 2500 w. Engng—Dec. 22, 1905.

Warship.—The Ventilation of War Ships (Die Lüftung der Schiffsräume bei Kriegsschiffen). Otto Kratschmer. A discussion of the arrangement of ventilating pipes in connection with the maintenance of watertight compartments. 1200 w. Zeitschr d Ver Deutscher Ing—Nov. 22, 1902.

Experiments with Ventilating Fans and Pipes. D. W. Taylor. Describes experiments undertaken to determine the capacities and efficiencies of fans used for ventilation on U. S. naval vessels, and to obtain information for the design of systems of ventilation piping. 40 plates. (No. 2.) 11,000 w. Soc of Nav Archts & Marine Engrs—Nov. 10, 1905.

See also **Ship; HEATING AND VENTILATION.**

Workshop.—See **Factories; Machine Shop.**

VERNIER.

See also **GAUGE; INSTRUMENT; SURVEYING INSTRUMENT.**

Reading.—The Reading of Verniers. An explanatory article. Ill. 1300 w. Am Mach—April 3, 1902.

VESSEL.

See **BOAT; NAVY; SAILING VESSEL; SCHOONER; SHIP; SHIPPING; STEAMBOAT; STEAMSHIP; STEAM YACHT; YACHT;** and the various types of warships.

VESTIBULE TRAIN.

See **CAR; TRAIN.**

VIADUCT.

See also **BRIDGE; ELEVATED RAILWAY; GIRDER; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; TRACK ELEVATION; TRESTLE.**

Africa, East.—See **Uganda.**

Avignon, France.—The Avignon Viaduct. Daniel Bellet. Illustrated detailed description of a viaduct connecting two stations on the Paris-Lyons-Mediterranean Railway, at Avignon. 1000 w. Trac & Trans—Aug., 1904.

See also **BRIDGE ERECTION.**

Avon River.—See **Caledonian Railway.**

Basel.—The Widening of the Birsig Viaduct at Basel (Die Verbreiterung des Birsigviaduktes in Basel). The roadway is increased in width from 7.5 metres to 16 metres by the addition of auxiliary arches and flooring on each side. 1800 w. Schweiz Bauzeitung—April 23, 1904.

Becks Run, Pa.—See **BRIDGE ERECTION.**

Bellevue, Pa.—The Erection of the Bellevue Viaduct. Illustrated description of a viaduct, near Pittsburg, which will carry a double-track electric railway, highway traffic, and six sidewalks. 1000 w. Eng Rec—Aug. 26, 1905.

Bohemia.—Viaduct and Tunnel Construction on the North Bohemian Railway (Die Viaduct und Tunnelbauten der Nordböhmischen Transversalbahn). H. Rosche. With details of the construction of large masonry viaducts and of the timbering of tunnels. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—March 1, 1901.

Boone, Ia.—Double-Track Railway Viaduct Over the Des Moines River. Illustrated description of a viaduct nearing completion, near Boone, Iowa, remarkable for the combination of height, length and weight. 600 w. Sci Am—June 1, 1901.

Des Moines River Viaduct: Chicago & Northwestern Ry. Illustration of this large railway viaduct, with details of the construction and erection taken from a paper by W. C. Armstrong, in the "Iowa Engineer." 2000 w. Eng News—June 27, 1901.

The Chicago & Northwestern Viaduct at Boone, Ia. Illustrated description of this viaduct, which is said to be the largest double-tracked structure of its kind in the world. 1700 w. Ry Age—July 5, 1901.

The Boone Viaduct. Illustrated description of the structural details of a double-track bridge 2,685 ft. long and 185 ft. in maximum height. 2500 w. Eng Rec—July 13, 1901.

Boone Cut-Off and Des Moines River Viaduct; Chicago & Northwestern Ry. Illustrates and describes details of this structure on the new short line. 1800 w. Eng News—Aug. 22, 1901.

The Boone Viaduct. Illustrates and describes some of the details of the steel work and its erection. 1500 w. Eng Rec—Aug. 24, 1901.

The Des Moines Steel Viaduct. An illustrated description of an important structure on what is known as the Boone cut-off. 2000 w. Engr, Lond—Oct. 24, 1902.

Boston, Summer St.—The Summer Street Bridge, Boston. Illustrated description of a 4-span highway viaduct 100 ft. wide having heavy Pratt trusses and three steel piers of unusual construction. All special details are illustrated. 1500 w. Eng Rec—Dec. 21, 1901.

Summer Street Viaduct, South Boston. Herman K. Higgins. A statement of the complicated conditions to be met with; an illustrated description of the structure and its construction. 3800 w. Jour Assn of Engng Soc's—Dec., 1901.

Brooklyn, N. Y.—Erection of the Atlantic Avenue Improvement Viaduct, Brooklyn. An illustrated article describing the erection of about 13,600 ft. of steel viaduct to carry the Long Island R. R. 2700 w. Eng Rec—Sept. 5, 1903.

See also **RAILWAY CONSTRUCTION.**

Brugg, Switzerland.—See **BRIDGE.**

Cala Mines, Spain.—See **PIER—Guadalquivir.**

Caledonian Railway.—Caledonian Railway New Viaducts and Extensions. Illustrates and describes engineering features of interest, especially the erection of two viaducts over the River Avon, one of which is 175 feet above the bed of the river. 2800 w. Engr, Lond—June 9, 1905.

Cannington, Eng.—The Concrete Railway Viaduct at Cannington. Gives data, concerning a viaduct built wholly of concrete, taken from a paper presented to the Inst. of Civ. Engrs. by Arthur Wood-Hill and Edward D. Pain. Ils. 2700 w. Eng Rec—Oct. 21, 1905.

On the Construction of a Concrete Railway Viaduct. Arthur Wood-Hill, and Edward Davy Pain. An illustrated detailed account of the construction of a concrete viaduct of 10 elliptical arches, the total length being 600 ft. Ils. Discussion, and correspondence. 23,000 w. (No. 3502.) Inst of Civ Engrs.

Chicago.—The Southwestern Ave. Boulevard Nine-Track Viaduct in Chicago. Illustrated description of an unusually wide viaduct made necessary by track elevation improvements. 2000 w. Eng Rec—April 29, 1905.

See also **TRACK ELEVATION.**

Cleveland, O.—The Cuyahoga Valley Viaduct. G. H. Tinker. Illustrates and describes the design of the new structure at Cleveland, O., stating some of the problems in the erection. 1300 w. R R Gaz—Vol. XXXVIII. No. 15.

Coatesville, Pa.—The Coatesville Viaduct of the Pennsylvania Railroad. An illustrated description of a four-track stone arch bridge now under construction. 800 w. Ry Age—Nov. 27, 1903.

Concrete.—See **Cannington, Eng.; Riverside, Cal.**

Concrete Reinforced.—See Herkimer; BRIDGE; CONCRETE REINFORCED; PIER.

Cuyahoga Valley, O.—See Cleveland.

Des Moines River.—See Boone, Iowa; Fort Dodge, Iowa.

Eggenburg.—The Eggenburg Viaduct on the Vienna-Eger Railway (Der Eggenburger Viadukt im Zuge des Zweiten Gleises der Eisenbahnlinie Wien-Eger). Karl Stöckl. Illustrations and details of continuous girder viaduct constructed for the second track of the Vienna-Eger railway; with data and results of tests. 5000 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—April 9, 1904.

Ehegaon, India.—See BRIDGE—India.

Eighteen-Mile Creek.—The Eighteen Mile Creek Viaduct. Illustrated description of the method of replacing a double-track viaduct with a new structure at the same grade on the same piers, without interrupting traffic. Used by the N. Y., Chicago & St. Louis Ry. and the Western N. Y. & Pa. Ry. 2300 w. Eng Rec—Sept. 20, 1902.

Fades, France.—The Viaduct of Fades. Emile Guarini. Illustrates and describes some interesting features of a great viaduct, having a length of 1,446 ft. being constructed in the south of France. It is remarkable not only for its dimensions, but for the original arrangements. 1800 w. Sci Am Sup—March 4, 1905.

The Fades Viaduct Over the Sioule River near Vauriat, France. Illustrated description of a continuous structure, a three-span girder of deck type, having two multiple-web trusses. The center is 435 ft. above the bed of the river, and masonry piers are used instead of steel towers. 1800 w. Eng News—June 8, 1905.

The Fades Viaduct. E. Ommelange. Illustrated detailed description of this viaduct under construction in France, which will be the highest railroad bridge in the world. 1000 w. R R Gaz—Vol. XXXIX., No. 21.

Failure.—See Minneapolis; BRIDGE ACCIDENT.

Fort Dodge, Iowa.—The Chicago Great Western and the Fort Dodge Bridge. An illustrated description of a viaduct having a total length of 2,582 ft., with many features of interest. 4000 w. Ry Age—March 20, 1903.

The Des Moines River Viaduct of the Mason City & Fort Dodge R. R., at Fort Dodge, Iowa. H. C. Keith. A paper before the Iowa Engng. Soc. Describes the construction of a viaduct 2,582 ft. in length, consisting of 38-ft. towers, with 75-ft. suspended spans, and four truss spans of 220 ft. each. Ill. 2700 w. Eng News—April 9, 1903.

The Des Moines River Viaduct of the Chicago Great Western Railway. The present number gives an illustrated description of the substructure, towers and truss spans. Serial. 1st part. 2400 w. Eng Rec—Jan. 30, 1904.

French Railway.—See Fades; Mussy; Viaur; CONCRETE REINFORCED—Viaducts, France.

Gokteik, Burma.—The Gokteik Viaduct, Burma. Illustrated description of a steel viaduct 2,260 ft. long and 320 ft. in maximum height, built by the Pennsylvania Steel Co. The general features of the structure and its erection are explained. Serial. 1st part. 2300 w. Eng Rec—Jan. 12, 1901.

The Gokteik Viaduct; Burma Railways, Ltd., Burma. Brief illustrated description of one of the most notable bridge structures erected by American bridge builders in foreign countries. It is 2260 ft. long and 320 ft. high, and required 4,852 tons of steel work for its construction. 1200 w. Eng News—Feb. 28, 1901.

The Erection of the Gokteik Bridge. Day Allen Willey. Illustrated description of this structure in Burma, Asia, which is notable for its height, length and the remarkably short time in which it was built. 1200 w. Sci Am—Aug. 17, 1901.

The Gokteik Bridge. J. C. Turk, in the "World's Work." Extracts of interest from an article by the engineer in charge of the work of erection of the Gokteik Viaduct, Burma. Ill. 2500 w. R R Gaz—Sept. 6, 1901.

The Gokteik Viaduct (Der Gokteik-Viadukt in Indien). Hr. Frahm. An illustrated account of this great steel railway viaduct in Burma, built by the Pennsylvania Steel Co. 2200 w. Stahl u Eisen—May 1, 1903.

Grasshopper Creek, Ill.—The Grasshopper Creek Viaduct. Illustrated description of a viaduct 650 ft. long, with a maximum height of 88 ft. above the tops of the masonry pedestals of the tower posts. 1000 w. Eng Rec—Nov. 24, 1900.

Herkimer, N. Y.—The Concrete Bridge at Herkimer, N. Y., Over West Canada Creek, Now Being Constructed by the Utica & Mohawk Valley Railway Co. F. C. Phillips. Illustrated description of a viaduct for an electric railway, consisting of 10 reinforced concrete arches and 4 steel spans, 1212 feet long in all. 3500 w. St Ry Rev—Dec. 20, 1902.

The Herkimer Viaduct for the Utica and Mohawk Valley Railway. Wilbur J. Watson. An illustrated description of this structure and its construction. 3000 w. Eng Rec—Feb. 27, 1904.

Horse Run.—See Ludlow, Ky.

Illinois.—Bridges on the Eastern Illinois and St. Louis. General plan and description of the 550-ft. double track steel trestle over the Middle Fork of the Big Vermillion River and Illinois Central R. R. 400 w. R R Gaz—June 12, 1903.

Jackson, Minn.—Viaduct at Jackson, Minn., C. M. & St. P. Ry. Illustrations and brief description of a steel trestle bridge with plate-girder deck spans, carrying a single track. 500 w. Ry & Engng Rev—March 2, 1901.

Kentucky River.—See BRIDGE ERECTION.

Kinzua, Pa.—The Kinzua Viaduct. Illustrated detailed description of the reconstruction of a heavy steel viaduct on the Bradford Div. of the Erie R. R. 3200 w. R R Gaz—Nov. 30, 1900.

The New Kinzua Viaduct. Illustrated description of the general features, details of construction, and methods of erection of a heavy steel viaduct 2,053 ft. long and 301 ft. in maximum height. 3000 w. Eng Rec—Dec. 1, 1900.

The New Kinzua Viaduct. An editorial discussion of the difference in design between the old and new structures. 1000 w. Eng Rec—Dec. 22, 1900.

The Kinzua Viaduct of the Erie Railroad Company. C. R. Grimm. An illustrated detailed description of this reconstructed viaduct, with reasons for the design chosen, and information of interest. 3000 w. Pro Am Soc of Civ Engs—Nov., 1900.

The Kinzua Viaduct of the Erie Railroad Company. George S. Morison, R. S. Buck and L. S. Moisseiff. Discussion of paper by C. R. Grimm. 5500 w. Pro Am Soc of Civ Engs—Jan., 1901.

The Kinzua Viaduct of the Erie Railroad Company. Continued discussion of paper by C. R. Grimm. 6500 w. Pro Am Soc of Civ Engs—Feb., 1901.

The Kinzua Viaduct of the Erie Railroad Company. Continued discussion of paper by C. R. Grimm. 4400 w. Pro Am Soc of Civ Engrs—May, 1901.

The New Kinzua Viaduct (Die Neue Kinzua Brücke). F. Müller von der Werra. A description of the new Kinzua viaduct, being mainly a discussion of the paper of the engineer, Mr. C. R. Grimm, in the Trans. Am. Soc. C. E. 3500 w. Zeitschr d Ver Deutscher Ing—May 24, 1902.

The New Kinzua Viaduct (Der Neue Kinzua-Viaduct in Nordamerika). Hr. Frahm. A well illustrated description of the new viaduct, with a short history of the old one. 3500 w. Stahl u Eisen—Jan. 1, 1902.

Laibach, Austria.—See BRIDGE.

Ludlow, Ky.—Reconstruction of the Horse Run Viaduct: Cincinnati Southern Railway. Illustrated description of the rebuilding, without interrupting traffic, of this bridge at Ludlow, Ky. 2000 w. Eng News—June 8, 1905.

Luxemburg.—See BRIDGE.

Manhattan Valley.—See New York.

Minneapolis, Minn.—Failure of a Steel Viaduct at Minneapolis, Minn. A description of the conditions which existed and the cause of the failure. 450 w. Eng News—June 25, 1903.

Monticello, Ill.—See CONCRETE REINFORCED—Wabash Ry.

Mussy, France.—The Mussy Viaduct (Le Viaduc de Mussy). M. Pouthier. A fully illustrated account of this fine masonry railway viaduct in the valley of the Loire, France. 10,000 w. 3 plates. Ann des Ponts et Chaussées—1 Trimestre, 1901.

Newark, N. J.—The Newark Viaducts of the Lackawanna Railroad. Illustrated detailed description of work made necessary in the elimination of grade crossings of the D. L. & W. R. R. 1800 w. Eng Rec—July 22, 1905.

See also **TRACK ELEVATION.**

New York.—The Manhattan Valley Viaduct of the New York Rapid Transit Railroad. Illustrated detailed description of a viaduct 2174 feet in total length, which reaches from 125th street to 133d street and carries three lines of track. 2500 w. Eng Rec—March 28, 1903.

Erecting the Manhattan Valley Viaduct. Brief illustrated account of methods adopted to avoid interrupting traffic in a very busy thoroughfare. 700 w. Ir Age—July 30, 1903.

Erection of Manhattan Valley Viaduct. An illustrated account of the erection of a three-track plate girder structure, 2,174 feet long, with a maximum height of about 54 ft., for the N. Y. Rapid Transit R. R. 1700 w. Eng Rec—Aug. 8, 1903.

Viaduct Erection on Section 10, New York Rapid Transit Railroad. Illustrates and describes some special features that have developed in the work, showing some traveler details. 2000 w. Eng Rec—Oct. 8, 1904.

See also **ELEVATED RAILWAY.**

New York Riverside.—Riverside Viaduct. John W. Ripley. Illustrated detailed description of this fine viaduct in New York. 2600 w. Trans Assn of Civ Engrs of Cornell Univ—1901.

The New Riverside Viaduct, New York. Brief illustrated description of the fine viaduct connecting Riverside Drive with the northerly end of Manhattan Island. 800 w. Sci Am—Aug. 3, 1901.

The Riverside Drive Viaduct Over Ninety-sixth Street, New York. Illustrated description of a short skew cantilever highway bridge. 2700 w. Eng Rec—April 12, 1902.

A Boulevard Supported on Cantilevers. Brief illustrated description of a cantilever platform to be erected to carry Riverside Drive over the railroad tracks in New York City. 800 w. Eng Rec—Jan. 28, 1905.

Paderno, Italy.—The Paderno Viaduct, Italy. An illustrated detailed description of one of the most harmoniously-proportioned of iron bridges in Italy, and of its construction. Serial. 1st part. 2000 w. Engr, Lond—April 17, 1903.

Paris.—See **BRIDGE.**

Philadelphia.—See **BRIDGE.**

Planen, Saxony.—See **BRIDGE.**

Portage, Erie R. R.—The New Spans of the Portage Viaduct, Erie R. R. An illustrated description of the third bridge bearing this name, giving details of reconstruction. 2000 w. Eng Rec—Feb. 4, 1905.

The Reconstruction of the Portage Viaduct. Illustrated explanation of the method of reconstruction without interrupting traffic. 2200 w. Eng Rec—March 4, 1905.

Richmond, Ind.—See **BRIDGE ERECTION.**

Richmond, Va.—The Chesapeake & Ohio Railroad Bridge at Richmond, Va. Illustrated description of double-track plate-girder viaduct 12,810 ft. long and a truss bridge 4,000 ft. long. The unusual method of erection by means of a steel cantilever traveler with an overhang of 142 ft. is fully explained. 3000 w. Eng Rec—March 29, 1902.

The Erection of the James River Viaduct, Richmond, Va. Illustrated description of the design and construction. 1200 w. Eng Rec—Aug. 5, 1905.

See also **RAILWAY TERMINAL.**

Riverside, Cal.—The Santa Ana Concrete Arch Viaduct. Illustrates and describes a viaduct 984 ft. in length, in California. 600 w. Ry & Engng Rev—Oct. 10, 1903.

The Concrete Viaduct Near Riverside, Cal.; San Pedro, Los Angeles & Salt Lake R. R. A. O. Ostrom. Illustrated description of the arched viaduct crossing the Santa Ana River. 1000 w. Eng News—Oct. 22, 1903.

Concrete Viaduct at Riverside, California. H. Hangood. An illustrated detailed description of an important structure over the Santa Ana River. It has a total length of 984 feet, and an average height of 55 feet. 3500 w. Eng Rec—Sept. 9, 1905.

Santa Ana, Cal.—See **Riverside.**

Subaqueous.—A New Subaqueous Viaduct. Fred W. Lepper. Illustrates and describes the engineering features of a proposed submarine viaduct. 1700 w. Eng News—March 28, 1901.

See also **TUNNEL.**

Summer St.—See **Boston.**

Uganda.—Erection of the Uganda Railway Viaducts. Describes the erection of the superstructure of these viaducts in British East Africa by an overhead steel tower traveler with two 70-ft. booms which overhung the completed structure far enough to assemble a tower and two spans in advance. 1200 w. Eng Rec—Aug. 2, 1902.

Building American Bridges in Mid-Africa. A. B. Lueder. Gives the experience of an engineer in constructing twenty-seven viaducts in the jungles. Ill. 5500 w. World's Work—July, 1903.

Experience in the Erection of American Viaducts on the Uganda Railway. A. B. Lueder. The writer was in charge of the work of erection, and gives an interesting report of his experiences. 3700 w. Eng News—April 14, 1904.

Notes on a Foreign Contract. A. B. Lueder. Concerning the contract for twenty-seven viaducts in British East Africa on the Uganda Railway, awarded to the American Bridge Co., of New York. Ills. 3300 w. Trans Assn of Civ Engrs of Cornell Univ—1904.

The American Invasion of Uganda. Joseph M. Rogers. An illustrated account of the twenty-seven American bridges, built on the Uganda Ry. and interesting features of the construction work. Also gives brief review of conditions in this section of Africa, and historical events of interest. 3200 w. Rev of Revs—July, 1903.

American Bridge Building in Equatorial Africa. An illustrated detailed description of the construction of the bridges on the Uganda Railway, in Central Africa. Serial. 1st part. 3300 w. Eng Rec—Sept. 3, 1904.

See also **RAILWAY.**

Viaur.—The Construction of the Viaur Viaduct (Notes sur la Construction du Viaduc der Viaur). M. Théry. A long article giving the calculations for this great steel arch in southern France, descriptions of which by the same author have already been indexed. Tables. Diagrams. 1 plate. 18,000 w. Ann d Ponts et Chaussées. 3 Trimestre, 1901.

The Viaur Viaduct (Le Viaduct Métallique du Viaur). E. Godfernaux. An illustrated description of the steel railway viaduct over the Viaur Valley near Rodez in the south of France. The clear opening of the cantilevers is 220 metres. 6000 w. 2 plates. Rev Gen des Chem de Fer—Jan., 1903.

Viaduct over the Viaur. Illustrates and describes a remarkable structure which carries the railway from Carmaux to Rodez, in the south of France. It is a system of balanced arches on a scale of great magnitude. Describes methods of erection, materials, etc. 1200 w. Engr, Lond—Feb. 27, 1903.

The Viaur Viaduct on the Line from Carmaux to Rodez. An illustrated description of this great steel railway viaduct in the southern part of France, which includes an arch with a span of 220 metres. 3200 w. Bull International Ry Cong—April, 1903.

The Viaur Viaduct (Le Viaduc du Viaur sur la Ligne de Carmaux à Rodez). Henry Martin. A very well illustrated description of this great steel railway viaduct in the southern part of France, which includes an arch with a span of 220 meters. 2 parts. 2 plates. 7000 w. Génie Civil—May 2 and 9, 1903.

The Viaur Railway Bridge. J. Walter Pearse. Gives the history of the bridge, the general conditions, and an illustrated description of the structure and its erection. 6300 w. Feilden's Mag—Sept., 1903.

The Viaur Viaduct on the Railway Line from Carmaux to Rodez, France. M. René Bonnin. Illustrated detailed description of the work, with discussion of the principles and advantages of the design. 8500 w. Eng News—Sept. 10, 1903.

The Viaur Viaduct. Daniel Bellet. Illustrated detailed description of this viaduct in the south of France. It has a total length of 1,509 feet; the central arch a span of 721 feet 9 inches; the rails are at height of 377 feet above the river. 4000 w. Trac & Trans—June, 1904.

Viaur Tests.—Results of the Tests of the Viaur Viaduct (Résultats des Epreuves du Viaduct du Viaur). Describing the manner in which the viaduct was loaded with locomotives and cars. The deflections were much less than had been computed. 1800 w. Rev Gen des Chem de Fer—Feb., 1903.

Washington, D. C.—See **BRIDGE.**

VIAGRAPH.

Road Testing.—See **ROAD—Test, Viagraph.**

VIBRATION.

See also **ELECTRO-PHYSICS; MARINE ENGINE; PHYSICS; SHAFT.**

Car.—See **CAR—Vibration; VEHICLE—Vibration.**

Helical Springs.—See **SPRING—Helical.**

Locomotive.—See **LOCOMOTIVE—Balancing; Counterbalanced; LOCOMOTIVE COMPOUND—Balanced.**

Marine Engines.—See **MARINE ENGINE—Balancing.**

Sabouret Pneumatic Apparatus.—See **CAR—Vibration; VEHICLE—Vibration.**

Steam Engine.—See **MARINE ENGINE—Balancing; STEAM ENGINE—Balancing; VALVE GEAR—Inertia Stresses.**

VICTORIA FALLS.

See also **BRIDGE—Zambesi; ELECTRIC TRANSMISSION—Victoria Falls; RAILWAY—Cape to Cairo.**

The Physical History of the Victoria Falls. Abstract of a paper by A. J. C. Molyneaux in the "Geographical Journal." Claims the combination of cañon, gorge, chasm, and falls is due to erosion, and the constant reducing action of the Zambesi River. Ills. 900 w. Nature—April 27, 1905.

VISCOSITY.

See **LUBRICATION.**

VOLCANO.

See also **EARTHQUAKE; GEOLOGY.**

Bomb-Throwing, Idaho.—The Bomb-Throwing Volcanoes of Idaho. Arthur Lakes. Description of this interesting phenomena, with illustrations. 800 w. Min Rept.—July 7, 1904.

Colorado.—Volcanoes. Prof. Arthur Lakes. An illustrated article considering the manner of their eruption, their effect upon the deposition of minerals, and their relation to the mining fields in Colorado. 3000 w. Mines & Min—July, 1902.

Mud.—Mud Volcanoes. Prof. Arthur Lakes. On present-day illustrations of mud flows and formations resembling some older ones in which mineral deposits have been found. Ill. 1000 w. Mines & Min—Aug., 1903.

See also **PETROLEUM—Java.**

VOLTAIC CELL.

See **ELECTRIC CELL; ELECTRO-CHEMISTRY.**

VOLTAMETER.

See **ELECTRIC INSTRUMENT—Voltameter.**

VOLTMETER.

See **ELECTRIC INSTRUMENT; ELECTRIC METER.**

VORTEX MOTION.

See **WHIRLPOOL.**

VOTING MACHINE.

Bardwell.—The Bardwell Votometer. A. Francis Bardwell and James Hamilton. Explains the Australian and votometer systems of voting, and gives an illustrated description of the machine. 6000 w. Trans Am Soc of Mech Engrs, No. 901—May, 1901.

Electric.—Voting by Electricity. Describes a device it is proposed to place in the House of Representatives at Washington, enabling Representatives to vote and have their votes recorded and counted and displayed by electricity. 800 w. Elec Wld & Engr—March 23, 1901.

W

WAGES.

See also **COAL MINER; LABOR; MINER; STRIKE; TRADE UNION; WORKS MANAGEMENT.**

A Rational Basis for Wages. Harrington Emerson. An interesting contribution to the labor problem, and the relations of the employer and employee, with especial reference to the development of the interested co-operation of the latter. 4800 w. Trans Am Soc of Mech Engrs, No. 022—June, 1904.

Payment of Labor. John Magee. A brief survey of the methods used, classifying them in nine groups and considering each. 2700 w. Am Found Assn—June, 1904.

A Review of the Wage Problem. C. H. Benjamin. Outlines briefly the various systems that have been tried, discussing their merits. 5000 w. Cassier's Mag—July, 1904.

American.—Capital and Labor in America (Kapital und Arbeit in Amerika). M. A. Nüscheler. Discussing especially methods of determining wages, including day work, piece work, and the premium and contract systems. 3000 w. Glasers Annalen—Jan. 1, 1905.

Anthracite Mines.—See **STRIKE.**

Assessment.—See **Coal Miner's Assessment.**

Bonus.—A Bonus System of Rewarding Labor. H. L. Gantt. Describes a system of wages used in the machine shop of the Bethlehem Steel Co., in which a bonus is given when a job is completed within a certain time that has been fixed after careful experiment. 6000 w. Trans Am Soc of Mech Engrs, No. 924—Dec., 1901.

The Bonus System of Rewarding Labor. H. L. Gantt. Explains the work of Mr. Fred W. Taylor, as this system was an outgrowth from his investigations, showing the advantages and the working of the system. 2000 w. Rev of Revs—Sept., 1902.

Exact Time Study as the Basis of Pay for Work Done. H. L. Gantt. Read at the Philadelphia meeting of the Nat. Metal Trades Assn. A discussion of the difficulties in satisfactorily adjusting the price of labor, and the effect on the output of plants. 2800 w. Ir Trd Rev—March 31, 1904.

Equitable Labor Compensation and Maximum Output. H. L. Gantt. Describes the principles on which the bonus system is founded, and the way in which it is carried out. 8500 w. Cassier's Mag—April, 1904.

Application of Scientific Methods to the Labor Problem. H. L. Gantt. Read before the Int. Cong. of Arts and Sciences at St. Louis. Reviews briefly the development of the manufacturing industries, and suggestions for a scientific study of the proper amount of work to be required in a day, and the compensation. 2300 w. Am Mach—Oct. 20, 1904.

The Compensation of Labor. H. L. Gantt. A discussion of piece work, premium and bonus systems, showing that all wage systems are simply expedients to make employer and employee see the facts in the same light. 2800 w. Engineering Magazine—March, 1905.

See also **WORKS MANAGEMENT—Gantt.**

Bonus and Premium.—A Combined Bonus and Premium System. Hugo Diemer. Describing the practical introduction of the system in a stronghold of trades unionism. 3000 w. Engineering Magazine—August, 1905.

British.—The Inefficiency of the Wages System. Discusses the inefficiency of the wages system in England and the possibility of improving or superseding it. 2800 w. Jour Gas Lgt—May 27, 1902.

Wages and Hours of Labor in 1901. Review of the last annual report of the Labor Department of the Board of Trade in England. 2500 w. Engng—Sept. 5, 1902.

Coal, Germany.—Wages in the German Coal Industry. A statement of the present condition of the industry, the reductions made in wages, and the question of Polish labor. 1700 w. Col Guard—Sept. 13, 1901.

Coal Miner's Assessment.—The Assessment of a Miner's Wages. Discusses the provision in the Coal Mines Regulation Act of England. 2400 w. Engng—March 18, 1904.

Coal Mining.—See also COAL INDUSTRY—British; COAL MINER; STRIKE—Anthracite.

Contract System.—See MINE MANAGEMENT.

Discomfort vs. Skill.—Discomfort vs. Skill as a Wage Basis. Thomas D. West. An argument against the position that a chief consideration in fixing wages should be the prosecution of the work under comfortable conditions. 2000 w. Ir Trd Rev—Sept. 8, 1904.

Eight-Hour Day.—See LABOR.

England.—See British.

Fair.—What Shall Fix Fair Wages? Editorial discussion of what is a fair wage, with the problems connected, with reference to strikes and the demands at issue. 2000 w. Eng News—Aug. 1, 1901.

Foundry.—The Economic Status of Wages. Edward Howell Putnam. A discussion of this subject, especially as applied to foundry work. 5400 w. Jour Am Found Assn—June, 1901.

Fund Theory.—See Theory.

Gantt System.—See Bonus; WORKS MANAGEMENT.

Gas Works.—See Profit-Sharing.

Halsey System.—See Premium.

Hess Paper.—Wage-Paying Methods from the Viewpoint of the Workman. Henry Hess. A graphical comparison of piece-work, bonus, and premium systems. 3500 w. Engineering Magazine—April, 1904.

Wage Paying Methods from the Viewpoint of the Employer. Henry Hess. Mr. Hess's second paper examines the wage problem from the employer's side of the question, illustrating the results of various plans by the graphical method. 3000 w. Engineering Magazine—May, 1904.

Wage-Paying Methods from the Viewpoint of Invested Capital. Henry Hess. Mr. Hess's concluding paper gives a graphic study of the effects of various methods upon the funds used and the dividends paid. 3500 w. Engineering Magazine—June, 1904.

High.—See LABOR—High Unit Cost.

High vs. Low.—The False Economy of a Low Wage Rate. Percy Longmuir. Showing the inefficiency of cheap labor, and the wastefulness of ill-nourished workers, as compared with the productiveness of higher paid workmen. 3500 w. Engineering Magazine—November, 1902.

The Real Economy of a High Wage Rate. Percy Longmuir. A discussion of the effect of a high wage rate as a stimulus to the industry and capacity of skilled workers, and hence as an undoubted source of economy to the employer. 3000 w. Engineering Magazine—Dec., 1902.

Locomotive Shop.—See Piece Work; LOCOMOTIVE SHOP; RAILWAY SHOP.

Miners.—See Coal; Premium Mine; COAL MINE; MINER; MINE MANAGEMENT.

Output.—Wage Systems and Their Bearing upon Output. George N. Barnes. An examination of the various forms of piece work, contract, premium, bonus and other wage systems, and their relation to the industrial position of the workman. 4000 w. Engineering Magazine—July, 1904.

Piece Work.—The Taylor Differential Piece-Rate System. Sanford E. Thompson. An exposition of the method of fixing piece rates which has proved so successful in large establishments in the United States. 5000 w. Engineering Magazine—Jan., 1901.

Piece Work: Its Evils and Remedies. Gilbert Fox. Discusses this system and its working. 2200 w. Prac Engr—Jan. 10, 1902.

Piece Work in a Locomotive Erecting Shop. J. Korns. Gives suggestions based upon successful experience. 1000 w. Am Engr & R R Jour—Dec., 1902.

Piece Work in Railway Shops. Gus Giroux. Read before the Canadian Ry. Club. Shows the advantages of this system and gives suggestions for introducing it. 3500 w. Ry Age—Dec. 26, 1902.

The Piece Work System from a Piece-Worker's Standpoint. H. B. Kepner. The first of a series of articles discussing the advantages and disadvantages of the system. Serial. 1st part. 1300 w. Am Eng & R R Jour—June, 1903.

A Remodeled Piece-Work System. John H. Van Yorx, Jr. A practical working description of a plan designed to give a maximum of the necessary detailed information with a minimum of clerical work by any of the shop employees. Illustrated with fac-similes of all the forms used. 4000 w. The Engineering Magazine—Aug., 1903.

Inspection and Quality of Product in Piece Work. Translated from the "Gewerblich-Technischer Ratgeber." Describes methods of testing and forms of penalties for bad work. 2500 w. Am Mach—Aug. 13, 1903.

The Fixing of Piece Work Rates. Hugo Diemer. Details of experience in the accurate fixing of piece work rates and the determination of speed records. 3000 w. Engineering Magazine—Nov., 1903.

Notes on a Successful Piece Price System. John Magee. Outlines what has proved a successful way of handling the problem in a large foundry. 800 w. Am Found Assn—June, 1904.

Piece Work. Le Grand Parish. With particular reference to the card department. 3000 w. Am Engr & R R Jour—Sept., 1904.

See also Bonus; Premium.

Piece Work vs. Premium Plan.—The Application of Piece-Work and the Premium Plan. Sir B. C. Browne. A discussion of the importance and relative fields of the premium and piece-work systems from a British viewpoint. 3000 w. Engineering Magazine—Feb., 1901.

Experience with the Premium and Piece-Work Systems. R. J. Sutton. Discusses the attitude of labor organizations. 2400 w. Ir Trd Rev—Sept. 3, 1903.

Gift Propositions for Paying Workmen. Frank Richards. Discusses the premium plan and the bonus system, and gives the writer's views. 3000 w. Trans Am Soc of Mech Engrs, No. 0966—Dec. 1902.

Is Anything the Matter with Piece Work? Frank Richards. A discussion of the merits of "piece work" and of the "premium plan." 2000 w. Trans Am Soc of Mech Engrs No. 01—Dec., 1903.

Piece Work, Premium and Bonus Systems. Harrington Emerson. Contribution to the discussion of a paper by Mr. Frank Richards, read at Dec. meeting of the Am. Soc. of Mech. Engrs. 2000 w. R R Gaz—Jan. 15, 1904.

Premium.—The Premium Plan of Labor Remuneration. H. M. Norris. An account of the practical system as it exists under the immediate supervision of the writer. 4000 w. Engineering Magazine—Jan., 1901.

Premium Plan of Rewarding Labor. H. M. Norris. Stenographer's report of paper read before the Engine Builders' Assn. An explanation of the system as introduced at the works of The Bickford Drill & Tool Co., Cincinnati, Ohio. 4800 w. Engr, U S A—Jan. 1, 1902.

Spoiled Work—Inspection and the Use of Limits Under the Premium Plan. G. H. Hall. Advocating the charging of the workman with the time required to rectify spoiled work, and work beyond the established limits of variation. 1700 w. Am Mach—Feb. 14, 1901.

The Premium System. An explanation of the system, discussing its advantages, and the workmen's objections, and hoping to consider every phase of the question. Serial. 1st part. 2000 w. Engr, Lond—Jan. 24, 1902.

The Premium Plan of Paying for Labor. F. A. Halsey. An explanation of this system and a discussion of its advantages and disadvantages. 7000 w. Sib Jour of Engng—March, 1902.

The Premium Plan from the Workman's Standpoint. F. A. Halsey. Extracts from an address before the Civic Federation. Gives opinions from various points where the system has been tried all favorable to its working. 2000 w. Am Mach—Feb. 5, 1903.

The Premium Plan at the Blank Blank Engineering Works. Gives figures showing in detail and in summary the workings of the premium plan as a whole in a plant which employs about four hundred men in all departments. 2000 w. Am Mach—June 26, 1902.

The Premium System of Wages (Das Prämiensystem der Arbeiterlöhnung). F. Preuss. A general discussion of the premium system with diagrams comparing day's work and piece work with the systems of Halsey and of Rowan. 2500 w. Zeitschr d Ver Deutscher Ing—Jan. 31, 1903.

A Modification of the Premium Plan. W. H. Booth. A discussion of methods of adjusting rates, with editorial criticism. 1800 w. Am Mach—April 16, 1903.

The Premium System of Remunerating Labor. John Ashford. Read before the Manchester (Eng.) Assn. of Engrs. Explains the principle of this system and the features that have developed in its working. Serial. 1st part. 3400 w. Mech Engr—April 18, 1903.

Cost Reduction by the Use of the Premium Plan. C. A. Colwell. A very interesting account of five months' practical experience in a large shop, describing the policy followed, the results secured, and the formulas established for standard operations. Gives some very interesting data of cost reduction by the use of the new tool steels. Illustrated. 4000 w. Engineering Magazine—May, 1903.

The Premium System of Wages (Das Prämiensystem der Lohnberechung). B. Schiller. A scientific examination of the Halsey premium system in comparison with day wages, also considering the Rowan modification and a method of the writer, together with piece work. 7500 w. Zeitschr d Ver Deutscher Ing—Ang. 22, 1903.

A German View of the Premium Plan. B. Schiller. Abstract of a paper published in the "Zeitschrift des Vereines Deutscher Iugenieure." A critical examination of the advantages and disadvantages of the various modifications of the Halsey premium plan of rewarding labor. Serial. 1st part. 2500 w. Am Mach—Feb. 18, 1904.

The Premium System in Practice. Charles B. Cook. An explanation of the system as used in a factory. 1700 w. Ir Trd Rev—Dec. 3, 1903.

A Premium Plan of Wage Payment in a Repair Shop. A. W. Thompson. Describing the successful adaptation of the premium system to a drop having no fixed product. 2500 w. Engineering Magazine—June, 1904.

The Premium System in England and the United States (Le Système des Primes en Angleterre et aux Etats-Unis). Jean Bosler. A review of the various modifications of the premium system for remunerating labor, showing their relation to modern intensified production. 4000 w. Revue de Mécanique—Aug. 31, 1904.

The Question of Wages and Rewards (Preisbewegungen und Lohnfragen). R. Gundel. A review of various methods of remunerating labor, with especial reference to the various modifications of the Halsey premium system. 3500 w. Elektrotech Zeitschr—Feb. 10, 1905.

The Premium System in Great Britain. J. William Chubb. Explains the attitude of the workmen, methods, results and experiences of various works. 6500 w. Am Mach—Vol. 28, No. 25.

See also **Bonus; Piece Work; Profit Sharing; COST-KEEPING—Pearson Machine Co.; MARINE ENGINE—Manufacture.**

Premium and Bonus.—See **Bonus and Premium.**

Premium, Mine.—The Premium System Applied to Mining. H. Foster Bain. Considers some of the methods by which costs of mining may be reduced. 2200 w. Mines & Min—June, 1904.

Premium, Rowan.—A Premium System of Remunerating Labor. James Rowan. Describes a premium system tried in an effort to solve the piece work problem. 2400 w. Inst of Mech Engrs—Glasgow Congress, 1901.

The Premium System of Remunerating Labor. James Rowan. Abstract of a paper read at the Glasgow Congress. Gives a description of a premium system used in a marine-engine manufacture. 2400 w. Ir & Coal Trds Rev—Sept. 6, 1901.

The Premium Plan at the Works of David Rowan and Company, Glasgow, Scotland. James Rowan. Also "The Origin of the Premium Plan." A Personal Statement by F. A. Halsey. Descriptive article. 3700 w. Am Mach—Jan. 9, 1902.

The Premium Plan at the Works of David Rowan & Company—Piece Work, the Premium Plan, and Mr. Taylor's Plan Discussed. E. G. Herbert. 2200 w. Am Mach—Feb. 20, 1902.

A Premium System Applied to Engineering Workshops. James Rowan. Gives facts gained in an experience of five years' working of the system. 4500 w. Inst of Mech Engrs—March 20, 1903.

Profit-Sharing.—Mr. W. H. Lever on Profit-Sharing. Discusses the objections set forth by Mr. Lever in published articles. 2500 w. Jour Gas Lgt—Aug. 27, 1901.

A Dividend to Labor. J. Holliday. Read before the North of England Gas Mgrs. Assn. A few ideas on the subject of profit-sharing as related particularly to gas undertakings. 2500 w. Jour Gas Lgt—April 29, 1902.

United States Steel to Share Profits. A copy of the circulars to stockholders and employees setting forth the plan. 4500 w. Ir Age—Jan. 8, 1903.

One Way to Cure the Trusts. Editorial discussion of the plan of the United States Steel Corporation devised to induce officers and employees to become stockholders. 1700 w. R R Gaz—Jan. 9, 1903.

Profit-Sharing in America. Editorial discussion of the scheme of the United States Steel Corporation. 3200 w. Engng—Jan. 23, 1903.

The Steel Corporation Points the Way. Walter Wellman. An explanation and discussion of the wage earners' investment and profit-sharing plan, which was received with success. 6000 w. Rev of Revs—March, 1903.

Profit Sharing and the Premium Plan. Kenneth Falconer. Gives a suggested plan of profit-sharing based on the principles of the premium plan of paying wages. 1800 w. Cassier's Mag—Dec., 1903.

See also **Premium; Tributing; LABOR—Pension System; WORKS MANAGEMENT—Carnegie Address; Labor Capitalist; Pittsburg Coal Co.**

Railway Employees.—Increasing the Wages of Railway Employees. Editorial discussing the 10 per cent. increase ordered by the Pennsylvania Co., and facts showing why the action cannot be generally followed. Also the general notice to the employees of the Wabash R. R. Co. 1700 w. Ry Age—Nov. 21, 1902.

See also **RAILWAY EMPLOYEE.**

Richards Paper.—See **Piece Work vs. Premium.**

Rowan System.—See **Premium, Rowan.**

Scotch Shipbuilding.—Labor Crisis in the Scotch Shipbuilding Industry. A statement of the situation due to the wages controversy in the shipbuilding and engineering industries. 1800 w. Ir Age—March 12, 1903.

Skilled Labor.—Compensation of Skilled Labor. J. Richards. Discussion of this subject by one who is himself a practical workman and who has had large experience in directing work and arranging compensation, etc. 6500 w. Jour Assn of Engng Socs—March, 1902.

Sliding Scale.—History of the Sliding Scale. From the "South Wales Daily News." 1500 w. Ir & Coal Trds Rev—Aug. 8, 1902.

Stillwell-Bierce & Smith-Vaile Co.—See **COST-KEEPING.**

Theory.—Theory of Compensation of Labor. A discussion of the proper way to introduce piece work systems in railroad shops. Serial. 1st part. 1600 w. Am Engr & R R Jour—March, 1902.

Political Economy and the Labor Question. J. H. Hollander. A discussion of the wage-fund theory, and the value of the political economist in solving the labor question. 8000 w. N Am Rev—April, 1903.

Timing Work.—See **COST-KEEPING; WORKS MANAGEMENT.**

Tributing.—Tributing in Mining. Jas. Grant. The present article consists of introductory remarks on the general subject of tributing, a profit-sharing system of paying gold miners. Serial. 2 parts. 2300 w. Aust Min Stand—March 6, 13, 1902.

U. S. Steel Corporation.—See Profit Sharing.

WAGON.

See also AUTOMOBILE; CAR; TRACTION ENGINE.

Casting.—See LADLE CAR.

Traction.—See TRACTION—Road Vehicle.

WAGONWAY.

See also RAILWAY — History; TRACKWAY; TRAMWAY.

Kenton and Coxlodge.—An Historic Wagonway. Reviews the facts relating to the old Kenton and Coxlodge wagonway, an old colliery line which played an important part in the devlopment of steam locomotion. 1500 w. Col Guard—Jan., 1903.

WALL.

See also BUILDING CONSTRUCTION; RETAINING WALL; UNDERPINNING.

Brick.—See BRICKWORK.

Hollow Tile Reinforced.—See FIREPROOF CONSTRUCTION.

Hotel Imperial, N. Y.—See BUILDING CONSTRUCTION—Hotel, N. Y.

Phoenix.—See FIREPROOF CONSTRUCTION—Hollow Tile.

Preservatives.—See MASONRY.

Retaining.—See RETAINING WALL.

Shoring.—See BUILDING CONSTRUCTION.

WAR.

See COAST DEFENSE; GUN; NAVAL WARFARE; NAVY; SUBMARINE MINE; and various types of warships.

WAREHOUSE.

See also CONCRETE REINFORCED; GRAIN ELEVATOR; MECHANICAL PLANT—Store.

The Design and Construction of the Modern Warehouse. Augustus N. Rantoul. Discusses the importance of the planning and of the economical and thorough construction if the property is to yield the best results. Ill. 2700 w. Br Build—Dec., 1901.

Architecture.—See FACTORY.

Columbus, O.—A Brick Warehouse Building at Columbus, Ohio. Describes the construction of a 166x62-ft. five-story and basement, slow-burning warehouse, costing about $85,000. 1500 w. Eng Rec—Dec. 28, 1901.

Concrete Reinforced.—See CONCRETE REINFORCED.

Electric Equipment.—The Electrification of Goods Warehouses on the Lancashire and Yorkshire Railway. Brief illustrated description of the application of electrical energy to warehouses and cotton sheds to facilitate the rapid loading and liberating of wagons. 2400 w. Elec Engr, Lond—April 28, 1905.

Failure, Minneapolis.—See FLOOR.

Genoa.—See GRAIN ELEVATOR.

Grain.—See GRAIN ELEVATOR.

Newcastle, Eng.—See CONCRETE REINFORCED—Hennebique.

Park & Tilford, N. Y.—See Steel Frame, N. Y.

Steel Frame, Chicago.—The Ryerson Structural Steel Warehouse. Illustrated description of the enlarged plant on Sixteenth street, Chicago. 2000 w. Ir Age—June 1, 1905.

Steel Frame, N. Y. — A Steel Warehouse for a Wholesale Grocery Company. Illustrated description of a 94x60-ft. steel-cage fireproof warehouse, 9 stories high, containing unusual features in the flooring and the arrangement of columns, made necessary by the nature of the business carried on by Park & Tilford, New York. 1500 w. Eng Rec—Dec. 7, 1901.

WARSHIP.

See NAVY; and under specific types of warships.

WASHOUT.

See FLOOD; RAILWAY ACCIDENT; RAILWAY CONSTRUCTION; RIVER REGULATION.

WASTE.

See also BY-PRODUCT; WASTE UTILIZATION.

Mining and Metallurgy.—See MINING AND METALLURGY—Wastes.

WASTE-HEAT ENGINE.

See BINARY ENGINE; MOTOR.

WASTE REMOVAL.

See also FACTORY WASTE; REFUSE DISPOSAL.

Exhaust Pipe.—Exhaust Pipe System for Removing Waste Material. M. L. Kaiser. An illustrated series of articles on the details of exhaust pipe work in factories, mills, and shops. The present article deals with a shavings exhaust plant for a planing-mill. Serial. 1st part. 1800 w. Met Work—Oct. 21, 1905.

See also WOODWORKING MACHINERY—Sawdust Removal.

Water Conveyors.—See CONVEYOR—Water.

WASTE UTILIZATION.

See also BY-PRODUCT; COKE MANUFACTURE; COKE-OVEN GAS; FACTORY WASTE; GAS MANUFACTURE; REFUSE DISPOSAL; SEWAGE FARM; STEAM ENGINEERING—Exhaust Utilization; WORKS MANAGEMENT.

The Census Bulletin on the Utilization of Wastes and By-Products. Reviews certain features of a paper by Henry C. Kittredge, criticising some of the statements. 2000 w. Eng News—July 24, 1902.

The Utilization of Wastes and By-Products in Manufactures. Henry C. Kittredge. A report with special reference to the decade from 1890-1900. Reviews refuse wastes, the by-products of the iron and steel industry, and lumber and timber products in the present article. Serial. 1st part. 4800 w. Sci Am Sup—Nov. 15, 1902.

The Utilization of Wastes and Industrial Residues (Utilisation des Déchets et des Résidus Industriels). Article from the "Revue Scientifique," giving an account of some modern methods of utilising wastes and saving by-products in a variety of industries. 6000 w. Moniteur Industriel—May 30, 1903.

The Utilization of Waste. Editorial calling attention to some cases where success has been attained and discussing the causes of some failures. 2400 w. Engng—Aug. 28, 1903.

Utilizing Unconsidered Trifles. From "English Mechanic and World of Science." Directs attention to ways in which worn-out files, iron gas-piping, old rails, and various other things may be utilized. 1200 w. Sci Am Sup—July 8, 1905.

White Metals.—Utilization of the Wastes From the Use of White Metals. Joseph Richards. The writer's experience in the utilization of tin clippings, galvanized iron scrap, and other wastes from metallurgical operations. Serial. 1st part. 2000 w. Jour Fr Inst—June, 1901.

WATCH.

See CHRONOMETER; CLOCK; TIME.

WATCHMAKING.

Escape Wheel.—An Escape-Wheel Cutting Engine. A. H. Cleaves. Illustrated description of a cutting machine and its operation. 1800 w. Am Mach—March 6, 1902.

WATER.

See also FEED WATER; and under various WATER main headings.

Color.—See Decolorization; Turbidity; WATER PURIFICATION.

Condensing Purposes.—See CONDENSER—Water.

Decolorization.—The Decolorization of Water. An informal discussion at the annual convention, June 26, 1901. Ill. 15,500 w. Pro Am Soc of Civ Engrs—Aug., 1901.

Decomposition.—See ELECTROLYSIS.

Desert Plants.—Desert Plants as a Source of Drinking Water. Frederick V. Coville. An illustrated article giving information in regard to these plants, and the ability of animals feeding upon them to go without water; also describes an Indian's method of obtaining water from them. 2500 w. Sci Am Sup—May 27, 1905.

Impurities, Detection.—See Color.

Iron.—The "Rust Stains" from Water Containing Crenothrix. Describes experiments by D. D. Jackson to ascertain the cause of the precipitation of iron in water supply and methods of preventing. 1800 w. Eng Rec—July 26, 1902.

Moorland.—See WATER PURIFICATION.

Pure, Definition.—The Practical Definition of "Pure and Wholesome Water" and "Pollution." John C. Thresh. Read before the British Assn. of Waterworks Engrs. Also abstract of discussion. 3500 w. Jour Gas Lgt—July 12, 1904.

Steamship.—See STEAMSHIP—Water Cost.

Tastes and Odors.—Tastes and Odors in River Water Supplies. Information collected by Mr. Dow R. Gwinn, showing that the evil is widespread. 1500 w. Eng News—Aug. 3, 1905.
See also WATER PURIFICATION.

Turbidity.—A Comparative Study of Methods Used for the Measurement of the Turbidity of Water. George C. Whipple and Daniel D. Jackson. A study of methods with the view of determining a standard, with conclusions. 4400 w. Tech Quar—Sept., 1900.

Method of Calibrating Turbidimeters. George C. Whipple and Daniel D. Jackson. Illustrates the essential parts of the instrument, explaining its use and the method of calibrating. 1500 w. Tech Quar—Dec., 1901.

Investigations in Regard to Coloring Matter in Water and Methods of Removal. Discussion by Desmond FitzGerald, R. S. Weston and others. 3000 w. Jour N E Waterworks Assn—June, 1902.

Standard Methods of Determining Turbidity and Color in Water. Directions issued by the U. S. Geological Survey and compiled by Allen Hazen and G. C. Whipple. 3700 w. Eng Rec—June 14, 1902.

The Physical Properties of Water. Allen Hazen. Considers the appearance of water due to foreign matters which it contains, and describes apparatus for measuring the color of water and urges the keeping of records of colors and turbidity. General discussion. 4000 w. Jour N Eng Waterworks Assn—March, 1903.

A New Turbidimeter. Charles Anthony, Jr. Gives the methods usually employed in estimating turbidity, discussing each briefly, and explains a photometric method of measuring the amount of light absorbed by a given thickness of water; describing the instrument used. Discussion. 2800 w. Jour N E Waterworks Assn—Dec, 1902.

Studies of Color in Water; Metropolitan Water Supply, Massachusetts. Ernest G. Hopson. Discusses means tried for reducing color, and the action in Massachusetts for the prevention of coloring. 4600 w. Eng News—April 28, 1904.

A New Method for Determining the Color of the Turbidity of Water. Freeland Howe, Jr. Describes a method by which the color can be expressed mathematically and can be reproduced at any time or place. 1200 w. Eng Rec—Dec. 17, 1904.

WATER ANALYSIS.

See also WATER; WATER POLLUTION.

The Examination of Water (Ueber die Begutachtung des Wassers). Dr. Adolf Jolles. An address, giving a review of the various impurities of water, and of chemical analysis, biological examination and other methods of testing water. 6000 w. Zeitschr d Oesterr Ing u Arch Vereines —May 29, 1903.

Bacteria.—Changes That Take Place in the Bacterial Contents of Waters During Transportation. George C. Whipple. An account of experimental investigations, the results of which are of practical importance to the water analyst. 2800 w. Tech Quar—March, 1901.

On the Practical Value of Presumptive Tests for Bacillus Coli in Water. George C. Whipple. Presented at New Orleans meeting of the Am. Pub. Health Assn. Describes method of making the tests, discussing the practical value. 4000 w. Tech Quar—March, 1903.

The Bacteriological Analysis of Water and Its Interpretation. Charles Edward Amory Winslow. Explains quantitative analysis and the methods for the discovery of the typhoid bacillus, and the colon bacillus, and the value of these tests. General discussion follows. 11,000 w. Jour N Eng Waterworks Assn—Dec., 1901.

The Significance of Bacteriological Methods in Sanitary Water Analysis. C. E. A. Winslow and C. P. Nibecker. Discusses the significance of chemical analysis and bacteriological examinations, describing tests and giving results of studies. 5000 w. Tech Qr—Sept., 1903.

The Value of Microscopical Study in the Selection of Water (Die Bedeutung der Mikroskopischen Untersuchungsmethode für die Beurteilung des Wassers). Dr. G. Lindau. Emphasizing the importance of a continual study of a drinking water supply by microscopical examination. 2500 w. Gesundheits-Ingenieur—July 20, 1903.

The Value of Tests for Bacteria of Specific Types as an Index of Pollution. Extracts from a special report by H. W. Clark and Stephen De M. Gage in the annual report of the State Board of Health of Massachusetts for 1902. 2000 w. Eng Rec—April 16, 1904.

Methods and Interpretation of Water Analysis. A. Robin. Shows the unreliability of chemical analysis alone, considers the bacteriological examination, and that a proper combination of laboratory methods is needed for an accurate conclusion to be reached. 4800 w. San—June, 1904.

Feed Water.—See FEED WATER—Test.

Field Methods.—Field Methods of Water Analysis Adopted by the United States Geological Survey. An authorized statement obtained through the courtesy of Mr. F. H. Newell, Chief Engineer. 600 w. Eng News—Oct. 22, 1903.

The Field Assay of Water. M. O. Leighton. Explanatory remarks with methods for determining the turbidity, color, total hardness, alkali carbonates, normal carbonates, bicarbonates, total sulphates, chlorine, iron, and calcium. 7000 w. Eng News—June 8, 1905.

Flow Measurement.—See WATER FLOW—Chemical Gauging.

Lancashire.—See WATER SUPPLY.

Minneapolis.—See WATER SUPPLY.

N. Y. Water Department.—See LABORATORY.

Oxygen Absorption Test.—The Evolution of the Oxygen Absorption Test in Water and Sewage Analysis. J. W. Weems. Extract from a paper before the Iowa Engng Soc. Historical sketch, giving the scheme of each test of this nature and an explanation of the proper interpretation of the results of these tests. Serial. 1st part. 1200 w. Eng Rec—Jan. 26, 1901.

Sampling.—An Apparatus for Collecting Samples of Water at Various Depths. Earle B. Phelps. Illustrated description of an apparatus devised by the writer. 700 w. Tech Qr—June, 1902.

The Collection of River Waters for Investigation (Probeentnahme Apparate für Flussuntersuchungen). Dr. Schumacher. An exhaustive account of the various devices for taking samples of river water for examination for hygienic purposes. Three articles. 7000 w. Gesundheits Ingenieur—Sept. 20, 30, Oct. 10, 1904.

Standardization.—Permanent Standards for Use in the Analysis of Water. Daniel D. Jackson. Describes the permanent standards already employed, and considers in detail the new standards proposed. 3500 w. Tech Quar—Dec., 1900.

Standard Methods of Water Analysis. Second report presented by the Committee to the Am. Pub. Health Assn. Recommends methods to be pursued in physical microscopical and quantitative bacterial examinations. 3600 w. Eng Rec—Sept. 28, 1901.

Progress in Standardization of Water Analysis in the United States. Information from the final report of the Committee of the American Public Health Assn., outlining the new requirements for the water analyst, and the best practice in America. 1800 w. Eng Rec—July 8, 1905.

Turbidity.—See WATER.

U. S. Geological Survey.—See Field Methods.

WATER BALLAST.

See SHIP STABILITY—Ballast, Water.

WATER CLOSET.

See **PLUMBING.**

WATER COLUMN.

See **WATER GAUGE.**

WATER CONDUIT.

See also **AQUEDUCT; HYDRO-ELECTRIC PLANT; WATER FLOW; WATER PIPE; WATER POWER—Slope and Diameter.**

Lynchburg, Va.—See **DAM.**

WATER CONSUMPTION.

See **WATER METER; WATER SUPPLY—Consumption; WATER WASTE; WATERWORKS; WATERWORKS MANAGEMENT.**

WATER CONVEYOR.

See **CONVEYOR—Water.**

WATER-COOLING TOWER.

See **COOLING TOWER.**

WATER CURRENT.

See also **OCEAN CURRENTS; RIVER DISCHARGE; RIVER REGULATION; SHORE PROTECTION; TIDE; WATER FLOW.**

Gulf of St. Lawrence.—The Currents in the Gulf of St. Lawrence. Summary from a recently issued pamphlet, giving an explanation of the hydrography of the gulf. 2400 w. Nature—April 18, 1901.

WATER DISTRIBUTION.

See **WATER PIPE; WATER SUPPLY; WATERWORKS.**

WATER FAUCET.

See also **PLUMBING; WATER FITTINGS.**

Limited Flow.—The Design of Faucets of Limited Flow (Dispositifs pour la Limitation du Debit dans les Bornes-fontaines et Robinets). P. A. Berges. Giving illustrations of forms of faucets requiring the continual action of the user to maintain the flow, thus preventing the waste of water by negligence. 1500 w. Génie Civil—Aug. 17, 1901.

WATER FITTINGS.

See also **PLUMBING; VALVE; WATER FAUCET; WATER GAUGE; WATER METER; WATER PIPE.**

Standardization.—Standardization of Water-Fittings. R. S. Lloyd. Extracts from a paper and discussion at the annual meeting of the Brit. Assn. of W. Wks. Engrs. Briefly reviews development and present practice, and discusses the advantages of standardization. 4800 w. Jour Gas Lgt—Aug. 5, 1902.

WATER FLOW.

See also **HYDRAULICS; RIVER DISCHARGE; SEWER—Flow; SHIP RESISTANCE; WATER GAUGE; WATER METER; WATER PIPE.**

Hydraulic Theories on the Flow of Water. A letter from Charles H. Tutton, on the formulas deducible by various assumptions from elementary laws of physics. 2000 w. Eng Rec—Dec. 29, 1900.

A Proposed Solution of Some Hydraulic Problems. Charles H. Tutton. An attempt to solve determinately the question why the maximum velocity is found below the surface in channels. 6600 w. Pro Am Soc of Civ Engrs—Nov., 1901.

A Proposed Solution of Some Hydraulic Problems. Discussion of the paper by Charles H. Tutton. 2500 w. Pro Am Soc of Civ Engrs—Dec., 1901.

A Proposed Solution of Some Hydraulic Problems. Continued discussion of a paper by Charles H. Tutton. 1700 w. Pro Am Soc Civ Engrs—Jan., 1902.

The Laws of River Flow. C. H. Tutton. Gives a theory advanced by D. T. Smith, of the Louisville (Ky.) University, with views of other writers. 2600 w. Jour Assn of Engng Socs—Jan., 1902.

The Measurement of Water. C. V. Seastone. A paper, slightly condensed, read before the Indiana Engng. Soc. Describes methods of measuring the flow of water by orifices, weirs, nozzles, Venturi meters, and jet meters. Ill. 2100 w. Eng Rec—Feb. 15, 1902.

Collection of Data Regarding Stream Flow. R. H. Tingley. On the need of more accurate data and methods that may be used to obtain the desired information. 1400 w. Munic Engng—June, 1902.

Approximate Data of Open Streams, Pipes, etc. F. S. Beckett. Gives a graphic table of the results and conclusions of formulae most often required in the line of work indicated, and problems showing the scope and application. 1500 w. Min & Sci Pr—July 18, 1903.

Aqueducts.—Measurement of the Flow of Water in the Sudbury and Cochituate Aqueducts. Walter W. Patch. Describes the method adopted for computing the flow, which is a combination of current-meter and flow formula. 2800 w. Eng News—June 12, 1902.

See also **AQUEDUCT; WATER PIPE.**

Backwater Curve.—See **Weir Water Curve; HYDRAULICS.**

Bends and Elbows.—See **Curvature of Pipes.**

Cast Iron Pipe.—Comparison of Formulas for Flow of Water in Clean Cast-Iron Pipes. Frank S. Bailey. Gives a table of computed velocities and explanatory notes. 700 w. Eng News—Aug. 15, 1901.

Comparison of Formulas for Flow of Water in Clean Cast-Iron Pipes. Letters from John C. Trautwine, Jr., E. Sherman Gould and Frank S. Bailey, discussing the difficulty of determining a constant coefficient for the flow of water in pipes. 2700 w. Eng News—Sept. 12, 1901.

See also **Hazen-Williams.**

Centrifugal Pumps.—See **Pump Test; Turbines and Pumps; PUMP—Centrifugal.**

Chemical Gauging.—A Chemical Method of Measuring Water Flow (Methode Chemique pour la Mesure du Débit des Conduites d'Eau). F. van Iterson. The process consists in delivering a known volume of a solution of hyposulphite of soda into a suction of the pump, and analyzing the strength of the diluted discharge. 1000 w. Génie Civil—April 30, 1904.

The Gauging of Streams by Chemical Means. Charles Edmond Stromeyer. Describes the means by which the chemical method can be most successfully applied in practice. 3500 w. Ills. Vol. CLX., page 349. (No. 3514.) Inst of Civ Engrs.

The Gauging of Streams by Chemical Means. W. L. Butcher. Brief remarks on the usefulness of this method and how to carry it out, also suggesting a method of using aniline dyes. Chemicals are poured into a stream and samples analyzed above and below this point. 1100 w. Eng News—Dec. 14, 1905.

Cornell Measurements.—See **Meter vs. Weir.**

Culverts.—Discharging Capacity of Culverts. Washington Parker Ireland. Reviews the theoretical explanation of the flow of water through pipes, and investigates the flow through large pipes. Ills. 2000 w. Eng Rec—April 2, 1904.

Curvature of Pipes.—Experiments at Detroit, Mich., on the Effect of Curvature Upon the Flow of Water in Pipes. Gardner S. Williams, Clarence W. Hubbell, George H. Fenkell. An illustrated account of extensive experimental investigations, the constructions, apparatus, etc., used. The investigations cover only curves of 90 degrees. 4000 w. Pro Am Soc of Civ Engrs—May, 1901.

Experiments at Detroit, Mich., on the Effect of Curvature Upon the Flow of Water in Pipes. Discussion of paper by Gardner S. Williams, Clarence W. Hubbell, and George H. Fenkell. 14800 w. Pro Am Soc of Civ Engrs—Sept., 1901.

Experiments at Detroit, Mich., on the Effect of Curvature Upon the Flow of Water in Pipes. Continued discussion of paper by Gardner S. Williams, Clarence W. Hubbell and George H. Fenkell. 4000 w. Pro Am Soc of Civ Engrs—Oct., 1901.

Experiments at Detroit, Mich., on the Effect of Curvature Upon the Flow of Water in Pipes. Continued discussion of paper in this subject by Gardner S. Williams, Clarence W. Hubbell, and George H. Fenkell. Ill. 15000 w. Pro Am Soc of Civ Engrs—Nov., 1901.

Experiments at Detroit, Mich., on the Effect of Curvature Upon the Flow of Water in Pipes. Continued discussion of paper by Gardner S. Williams, Clarence W. Hubbell and George H. Fenkell, Jr. 5000 w. Pro Am Soc of Civ Engrs—Dec., 1901.

Resistance Due to Bends in Pipes. John C. Trautwine, Jr. Reports investigations made of the resistance to the flow of water by various pipe connections. 700 w. Eng Rec—July 2, 1904.

The Resistance of Bends and Elbows in Pipes. Information concerning experimental investigations to determine the resistance offered by bends, knees and elbows in closed pipes, and the results. From a paper by C. W. L. Alexander, published by the Inst. of Civ Engrs. 2000 w. Eng Rec—Aug. 19, 1905.

The Resistance Offered to the Flow of Water in Pipes by Bends and Elbows. Connell William Long Alexander. Describes an experimental investigation of the nature and magnitude of the resistance offered by bends, knees, and elbows, to the flow of water through closed pipes. 5300 w. Ills. (Students' Paper No. 526.) Inst of Civ Engrs.

Figdor Indicator.—The Figdor Indicator for Measuring the Velocity of Water (Der Wassergeschwindigkeits-Indikator, System Wilhelm Figdor). Illustrated description of apparatus for measuring the velocity of flow in streams. An electric circuit is closed at every revolution of the vane, and a train of wheels set in motion. A recording apparatus is also shown. 1500 w. Oesterr Wochenschr f d Oeffent Baudienst—May 3, 1902.

Formulae.—See PUMP.

Gold Metallurgy.—The Modern Theories of the Flow of Water and Their Application in Gold Mining. Prof. H. S. Hele-Shaw. A study of the ways in which water moves. Ills. 5500 w. Jour of Chem, Met, & Min Soc of S Africa—May, 1904.

Ground Water. — See **Underground; GROUND WATER—Flow.**

Hazen-Williams.—The Hazen-Williams Hydraulic Slide Rule. Describes the method of using this slide-rule, for computing the flow of water in pipes and channels. 2800 w. Eng Rec—March 28, 1903.

Hydraulic Diagrams and Further Notes Upon the Hazen-Williams Slide Rule. Leonard Metcalf. Gives diagrams and tables showing the relations existing between the new formula and the Chezy formula for flow of water. 1500 w. Eng Rec—June 20, 1903.

Hot Water.—See **HOT WATER—Discharge.**

Hydro-Electric Plants.—See **HYDRO-ELECTRIC PLANT—Water Flow.**

Ice Covered.—Records of Flow at Current Meter Gaging Stations When the Streams Are Subject to Ice. F. H. Tillinghast. A study of the flow of water under ice, giving tabulated measurements. 1500 w. Eng News—May 11, 1905.

Irrigation.—New Ways of Measuring Water. Information for the use of farmers who irrigate their land, given by Director Samuel Fortier of the Montana Experimental Station. 1400 w. Sci Am—Sept. 13, 1902.

See also **Meter Ratings; IRRIGATION.**

Jet Contractions.—The Contraction of Jets. Prof. John Goodman. Gives results of an investigation made to obtain a rational coefficient of contraction for a jet issuing from a plain circular orifice. 1200 w. Engng—March 11, 1904.

Kutter's Formula. — Diagram Giving Discharge of Pipes by Kutter's Formula. John H. Gregory. Illustrated description of a large diagram for determining the discharge, friction loss, the velocity and diameter of pipes 1,000 ft. long. The diagram is characterized by the good intersection of the various lines. 1300 w. Eng Rec—Nov. 3, 1900.

Diagram Giving Discharge of Pipes by Kutter's Formula. John H. Gregory. Claims to be the originator of the diagram published by Prof. I. P. Church and calls attention to other diagrams which have been published, which are plotted in a similar manner. 1600 w. Eng Rec—Sept. 17, 1904.

Some Flood Discharges and Values of "n" in Kutter's Formula. R. H. Anderson. Explains method of making computations for McCall's Ferry on the Susquehanna River. 800 w. Eng News—Aug. 4, 1904.

Lost Head.—Notes on Lost-Head in Water Supply Systems. A. Prescott Folwell. A mathematical discussion with conclusions. 2000 w. Eng News—April 17, 1902.

McGill University. — The Miners' Inch and the Discharge of Water Through Various Orifices Under Low Heads. Thos. Drummond. A record of water determinations made in the hydraulic laboratory of McGill Univ., Montreal, with explanation of the term "miners' inch." 3700 w. Can Soc of Civ Engs—Adv. Proof, Nov. 22, 1900.

Mean Flow.—Mean-Flow Determination (Die Mittlere Abflussmenge). H. Lauda. Discussing graphical and analytical methods of determining the mean discharge of a stream for a given period of time. 3000 w. Oesterr Wochenschr f d Oeff Baudienst—Feb. 27, 1904.

River Discharge, Mean Velocity, and Cross-Sectional Area Curves. F. W. Hanna. Abstracted from a paper presented at the Hydrographic Conference of the U. S. Geol. Survey. Explains methods of obtaining these curves. 1800 w. Eng News—March 23, 1905.

The Mean Velocity in Natural and Artificial Channels (Die Mittlere Profilgeschwindigkeit in Natürlichen und Künstlichen Gerinnen). Johann Hermanek. An examination of the various formulas for the flow of water, with especial reference to the determination of the coefficients. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—April 21, 1905.

Measurement.—Instructions for Installing Weirs, Measuring Flumes and Water Registers. Clarence T. Johnston. Illustrated directions for weirs, measuring flumes, and registers, describing in detail the Gurley register, the Friez, the Leitz and the Standard. 3500 w. Eng News—April 29, 1901.

Methods of Measuring the Flow of Streams. John C. Hoyt. Explains the method used by the U. S. Geological Survey. 1800 w. Eng News—Jan. 14, 1904.

Methods of Estimating Stream Flow. John C. Hoyt. Explains the methods in use, illustrating by example. 1000 w. Eng News—Aug. 4, 1904.

Canal and Stream Measurements. A. P. Stover. Describes the two methods most commonly employed by engineers—the measuring weir, and the current meter, also briefly notes other methods. 4000 w. Cal Jour of Tech—April, 1904.

A Convenient Method for Determining the Discharge of Streams and Canals. J. H. Cunningham. Describes a method in the use of which the intervals between meter stations may be made any convenient distance. 350 w. Eng News—April 6, 1905.

See also **RIVER DISCHARGE.**

Meter Ratings.—Current Meter Ratings and Observations by the U. S. Irrigation Investigations Department. Describes the method employed in rating current meters and computing the results obtained, with a description also of field methods. 2300 w. Eng News—Feb. 12, 1903.

A New Station for the Rating of Current Meters by the U. S. Geological Survey, at Denver, Colorado. M. C. Hinderlider. An illustrated description of a first-class rating station, where meters of all kinds can be accurately rated and their actions under different conditions tested. 1800 w. Eng Rec—Dec. 19, 1903.

Meter Resistance.—See **WATER METER—Resistance to Flow.**

Meter vs. Weir.—Current Meter and Weir Discharge Comparisons. Edward C. Murphy. Gives the results of a series of experiments made at the Hydraulic Laboratory, Cornell University, to test the accuracy of velocity measurements obtained with the current meter, used by different methods. 2500 w. Pro Am Soc of Civ Engrs—Sept., 1901.

Current Meter and Weir Discharge Comparisons. Discussion of paper by Edward C. Murphy. 2600 w. Pro Am Soc of Civ Engrs—Nov., 1901.

Current Meter and Weir Discharge Comparisons. Continued discussion of paper by Edward C. Murphy. 600 w. Pro Am Soc of Civ Engrs—Dec., 1901.

Miners' Inch.—See **McGill University.**

Pipe Curvature.—See **Curvature of Pipes.**

Pipe Discharge.—See **Kutter's Formula.**

Pipes.—Measuring the Flow of Water from Pipes. W. H. Booth. Describes a method of making rapid approximations. 600 w. Am Mach—Dec. 27, 1900.

A Study in Hydraulics. George H. Fenkell. A study of interesting problems of the flow of water in pipes. Also discussion. 15000 w. Jour Assn of Engng Socs—March, 1901.

Flow of Water in Pipes. Clinton B. Stewart. Considers briefly the nature of fluid friction, general formulas, and a diagram for use in the design of distributing systems. 1800 w. Eng News—April 11, 1901.

The Flow of Water in Pipes. A discussion of the effect of insufficient experimental investigations of the flow of water on the formulas used in computing pipe sizes. 1500 w. Eng Rec—June 8, 1901.

Rational and Empirical Features of Flow of Water in Pipes. Letter from Mr. Clemens Herschel to Mr. I. J. Church, commenting on an article published Oct. 31, and Mr. Church's reply. 2300 w. Eng News—Dec. 19, 1901.

Measurement of Flow of Water in Pipes. Edward S. Cole. Describes a method devised for economically measuring the flow of water in pipes, by the use of the Pitot tube. Also a description of the photo-pitometer for recording the deflections. Ill. 1600 w. Sib Jour of Engng—May, 1902.

An Experimental Study of the Resistance of the Flow of Water in Pipes. Augustus V. Saph and Ernest W. Schoder. Presentation and discussion of experimented facts, describing apparatus used, and methods. Tables, plates, etc. 1300 w. Pro Am Soc of Civ Engrs—May, 1903.

An Experimental Study of the Resistances to the Flow of Water in Pipes. Discussion of the paper by Augustus V. Saph and Ernest W. Schoder, Jr. 3800 w. Pro Am Soc of Civ Engrs—Sept., 1903.

An Experimental Study of the Resistances to the Flow of Water in Pipes. E. G. Coker and George W. Fenkell. Continued discussion of paper by Augustus W. Saph and Ernest W. Schoder. 1200 w. Pro Am Soc of Civ Engrs—Oct., 1903.

A Diagram for the Flow of Water in Pipes. Ernest W. Schoder. Gives diagram and explanation of its use in solving problems in pipe hydraulics. 1300 w. Eng Rec—Sept. 3, 1904.

A New Method of Using the Pitot-Darcy Tube to the Measurement of the Velocity of Water in Pipes (Nouveau Mode d'Application du Tube de Pitot-Darcy à la Mesure de la Vitesse des Conduites d'Eau Sous Pression). H. Bellet. By using a liquid of different density than water in one leg of a U-tube, very precise readings may be made. 800 w. Comptes Rendus—June 5, 1905.

Flow of Water Through Pipes Fed by Reservoirs. Samuel Diescher. Describes experimental investigations, stating the conclusions. General discussion. Ills. 11700 w. Pro Engrs' Soc of W Penn—March, 1905.

See also **Cast Iron Pipes; Culverts; Curvature of Pipes; Kutter's Formula; Street Taps; Wood Pipe.**

Pitometer.—See **WATER WASTE.**

Pitot Tube.—The Pitot Tube: Its Formula. William Monroe White. Describes interesting experiments made by the author, discussing the laws governing the flow of water, and the diversity of opinion as to the formula of the Pitot tube. Discussion follows. Ill. 12000 w. Jour Assn of Engng Soc's—Aug., 1901.

The Pitot Tube. W. B. Gregory. Calls attention to the use of this instrument in measuring the velocity of fluids. Ill. 6800 w. Trans Am Soc of Mech Engrs, No. 015—Dec., 1903.

Pitot Tubes: With Experimental Determinations of the Form and Velocity of Jets. James E. Boyd and Horace Judd. Read before the Am. Assn. for the Adv. of Science. An account of experimental investigations with results. 4400 w. Eng News—March 31, 1904.

The Pitot Tube as an Instrument for Measuring the Velocity of Water Flowing in Closed Tubes. Raymond S. Daniels. Describes investigations performed in the hydraulic laboratory of the University of California, their objects, and the results. Ills. 3000 w. Cal Jour of Tech—May, 1905.

See also **Pipes; Pump Test.**

Pump Test.—Water Measurements in Connection with a Test of a Centrifugal Pump at Jourdan Avenue Drainage Station, New Orleans, La. W. M. White. States the object of the test, and gives an illustrated detailed description, with discussion of results. 3700 w. Jour Assn of Engng Socs—Oct., 1900.

See also **Turbines and Pumps.**

River.—Methods of Measuring Velocity in River Channels. H. A. Pressey. Abstract from a monograph entitled "Observations on the Flow of Rivers," published by the U. S. Geol. Surv. Illustrates and describes methods of stream measurement. 3500 w. Sci Am Sup—Sept. 5, 1903.

Recent Russian Studies of Flow in Rivers. Translation of interesting parts of the work describing experiments. 3300 w. Eng News—Sept. 1. 1904.

See also **River Bed; Rod Float; Siedek Formula; Streams; RIVER DISCHARGE.**

River Bed.—The Determination of the Normal Profile of Flowing Water (Studie über die Bestimmung der Normalprofile Geschiebeführender Gewässer). Richard Siedek. A study of the relation of the sectional figure of a stream bed and the eroding action of the water flow. Serial. Part I. 4000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Feb. 3, 1905.

Researches for the Determination of a Formula for the Flow of Water over Natural River Beds (Versuch der Aufstellung einer Geschwindigkeitsformel für natürliche Flussbette). Maximilian Matakiewicz. Tables and diagrams for the determination of coefficients and exponents for use with the modified Chézy formula. 4000 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 23, 1905.

See also **Siedek Formula; RIVER BED.**

Rod Floats.—River Gauging With Rod Floats. Geo. W. Brown. Gives in detail a method of stream gauging by use of rod floats, with an outline of the reductions. 2500 w. Wis Engr—Feb., 1902.

Service Pipes.—See **Street Taps.**

Siedek Formula.—A New Formula for Determining the Flow of Water (Studie über eine Neue Formel zur Ermittlung der Geschwindigkeit des Wassers). R. Siedek. An examination of the formulas of Basin and of Kutter, and the derivation of a new formula, especially applicable to rivers and streams. Serial. Part I. 2500 w. Zeitschr d Oester Ing u Arch Ver—May 31, 1901.

Study of a New Formula for the Velocity of Water (Studie über eine Neue Formel Zur Ermittlung der Geschwindigkeit des Wassers). R. Siedek. An examination of a number of data of water flow in small streams and artificial channels, and the derivation of a formula including the results. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 13, 20, 1903.

See also **River Bed.**

Steep Slope.—The Velocity of Water Flowing Down a Steep Slope. Ernest Prescot Hill. Gives investigations and the assumptions involved. 800 w. (No. 3520.) Inst of Civ Engrs.

Streams.—A Problem in Hydraulics (Note sur un Probleme d'Hydrauliques). Ed. Collignon. A graphical and analytical study of the action of floods in rivers and other streams. 3000 w. Revue de Mécanique—Feb. 28, 1903.

The Flow of Streams. R. S. Lea. A collection of rainfall and stream flow records, given in tables, including streams differing in extent of drainage area, geological conditions, rainfall and climate. Much related information is also given. 7 plates. 10,000 w. Can Soc of Civ Engrs, Adv Proof—March, 1903.

The Measurement of Running Water in Rivers and Open Channels. W. H. Wheeler. An illustrated article reviewing methods of estimating, and especially considering recent work in the United States. 5000 w. Engr, Lond—Dec. 9, 1904.

The Parabolic Method of Computing Stream Gagings. F. W. Hanna. Explains an application of Simpson's one-third rule to the computation of stream gagings, both for open and frozen streams. 1200 w. Eng News—Feb. 9, 1905.

The Irregular Flow of Rivers in Humid Prairie States. F. W. Hanna. In the opinion of the writer, the changes under discussion have been caused by pasturage, drainage, and cultivation mainly. 1500 w. Eng News—Aug. 3, 1905.

Work of the Hydrographic Branch of the United States Geological Survey in New England and a Discussion of the Methods Used for Estimating Stream Flow. H. K. Barrows. Ills. A discussion outlining the work done, and giving a résumé of the current meter method of estimating river flow. 9000 w. Jour Assn of Engng Socs—July, 1905.

See also **Mean Velocity; River; Siedek Formula; RIVER DISCHARGE.**

Streams, Ice.—See Ice Covered.

Street Taps.—The Discharge of Water Through Street Taps and House Service Pipes. William Paul Gerhard. Gives double-page diagram with curves plotted by formulae, and explanation of its use. 2500 w. Cassier's Mag—Nov., 1905.

Sullivan Formula.—Mr. Sullivan's Hydraulic Formula. A letter from I. P. Church comparing a large number of formulas for the flow of water in open channels and long pipes. 400 w. Eng Rec—Dec. 29, 1900.

Tanks or Reservoirs.—Outflow of Water from Tanks or Reservoirs. Considers the time of flow of a given quantity of water through an orifice. 1300 w. Engr, Lond—April 12, 1901.

Testing Tank.—See **LABORATORY—Carlsruhe Polytechnic.**

Turbines and Pumps.—The Action of Water in Free Jet Turbines (Ueber die Wirkungsweise des Wassers in Laufrädern der Freistrahlturbinen). Arthur Budau. An examination of the influence of the motion of a turbine wheel upon the flow of water through the buckets. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—May 30, 1902.

Notes on some Experimental Researches on Internal Flow in Centrifugal Pumps and Allied Machines. James Alex. Smith. Paper read at Victorian Inst. of Engrs. (Revised.) An illustrated article showing simple means of recording photographically the course of the fluid current in typical equivalents of hydraulic machines, especially in the rotary parts. 3500 w. Sci Am Sup—Nov. 29, 1902.

Flow Through Centrifugal Pumps. Jas. Alex. Smith. Read before the Victorian Inst. of Engrs. Illustrated notes on some experimental researches on internal flow in centrifugal pumps and allied machines. 3800 w. Engng—Dec. 5, 1902.

A Turbine Water Meter. An illustrated description of a water-wheel flow recorder for recording the discharge of a turbine, taking into account the effect of the degree of gate opening and of change of head. Designed by George I. Rockwood and C. M. Allen. 800 w. Eng Rec—Dec. 27, 1902.

The Motions of Fluids Inside Solids of Revolution (Ueber Flüssigkeitsbewegungen in Rotationshohlräumen). Prof. F. Prásil. A mathematical discussion, using cylindrical coordinates, of the motions of fluids inside spaces bounded by surfaces of revolutions, with practical references to the design of turbines. Serial. Part 1. 2000 w. Schweiz Bauzeitung—May 9, 1903.

Turbine Flow Recorder. C. M. Allen. An illustrated explanation of a device which automatically records the quantity of water discharged from a turbine with variable gate openings and under variable heads. 1500 w. Trans Am Soc of Mech Engrs—June, 1903.

See also **Pump Test.**

Underground, California.—Measurements of Underflow Streams in Southern California. Prof. C. S. Slichter. An illustrated article describing measurements made at the narrows of the Rio Hondo and the San Gabriel River, California, and at the narrows of the Mohave River, near Victorville; describing also the underflow water used. 5500 w. Jour W Soc of Engrs—Dec., 1904.

Unit.—See **WATER POWER.**

Varying Section.—Some Characteristics of the Flow of Water in Channels of Varying Cross-Section. T. E. Stanton. An account of experiments undertaken to gain information concerning (1) the effect of the form of the channel; and (2) the effect of the angle of divergence on the loss of head involved. 2000 w. Engng—Nov. 21, 1902.

Venturi Meter.—An Inexpensive Gauge for Use with the Venturi Meter. Charles P. Paulding. Explains briefly the theory of the Venturi tube, and gives illustrated description of the gauge devised by Henry Metcalfe for use with this water meter. 1200 w. Eng News—Feb. 28, 1901.

On the Measurement of Water by a Small Venturi Meter. E. G. Coker and T. P. Strickland. An account of experiments with illustrated description of apparatus used. 3800 w. Canadian Soc of Civ Engrs. Adv Proof—April, 1902.

The Measurement of Water (Le Jaugeage de l'Eau). A description of the Venturi meter, and its applications in England and on the Continent in connection with the metering of municipal water supplies. 2500 w. Revue Technique—Feb. 10, 1905.

Weir.—A Study of Hydraulic Coefficients (Eine Studie über Hydraulische Coëfficienten). H. Heyne. An examination of the various formulas for the flow of water over weirs, showing the discrepancies, and discussing the extent to which the usual co-efficients may be used. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 5, 1902.

Flow over a Weir of Curved Profile (Der Abfluss an Einem Grundwehre Kurvenförmigen Profils). Johann Hermanek. A mathematical investigation, discussing the influence of the section of a weir upon the discharge. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—June 2, 1905.

Weir vs. Meter.—See **Meter vs. Weir.**

Weir Water Curve.—A New Method of Computing the Water Curve Above Weirs (Ein Neuer Weg zur Berechnung der Staukurve). Dr. A. Fliegner. Developing equations enabling the curve to be computed for any relative fall. 2000 w. Schweizerische Bauzeitung—Aug. 22, 1903.

The Computation of Backwater Curves (Beitrag zur Berechnung von Staukurven). Bretislav Tolman. An examination of the various formulas for computing the extent to which water is backed up by obstructions in a stream, compared with actual results on the Moldau at Prague. Two articles. 8000 w. 2 plates. Oesterr Wochenschr f d Oeffent Baudienst—July 1, 8, 1905.

See also **HYDRAULICS—Backwater.**

Whirlpools.—See **WHIRLPOOL.**

Woltmann Meter.—Vertical and Inclined Current Meters (Der Normal und Schiefgestellte Hydrometriche Flügel). H. Lauda. An elaborate discussion of the calibration of current meters of the Woltmann mill type for measuring the flow of water in streams, showing the influence of position upon the readings. Two articles. 8000 w. Oesterr Wochenschr fd Oeff Baudienst—Sept. 19, 26, 1903.

Investigations of the Motion of Current Meters (Untersuchungen über die Umlaufbewegung Hydrometrischer Flügel). Dr. M. Schmidt. A study of the action of flowing water upon current meters of the Woltmann mill type, discussing methods of calibration. Two articles. 6000 w. Zeitschr d Ver Deutscher Ing—Nov. 21, Dec. 5, 1903.

Wood Pipe.—The Flow of Water in Wood Pipes. Theron A. Noble. Gives a brief illustrated description of the gravity supply of Seattle, Wash., and discusses a series of experiments conducted by the writer. 8000 w. Pro Am Soc of Civ Engrs—Aug., 1902.

The Flow of Water in Wood Pipes. Discussion of paper by Theron A. Noble. 4300 w. Pro Am Soc of Civ Engrs—Oct., 1902.

The Flow of Water in Wood Pipes. Continued discussion of paper by Theron A. Noble. 4000 w. Pro Am Soc of Civ Engrs—Nov., 1902.

See also **WATER PIPE.**

WATER GAS.

See **GAS, WATER.**

WATER GATE.

See also **CANAL LOCK GATE; TIDE GATE.**
New York.—See **MUNICIPAL ART.**

WATER GAUGE.

See also **RIVER DISCHARGE; TIDE INDICATOR; WATER FLOW.**

Alarms.—Low Water Alarms and Laws Concerning Their Use. Abstract of a paper by F. C. Base, read before the International Convention of Inspectors at Indianapolis. Reasons for requiring the adoption of these alarms, with comments on the devices. 2400 w. Engr, U S A—Feb. 15, 1901.

Water Columns and Low-Water Alarms. R. T. Strohm. Illustrates and describes various forms of these devices, and shows the advantages to be derived from the use of a good water alarm. 2700 w. Am Elect'n—July, 1904.

Boiler.—Boiler Water Level Indicators. R. T. Strohm. Discusses gauge glasses, and try-cocks, also devices for closing communication with the boiler, etc. Ils. 2500 w. Am Elect'n—Aug., 1904.

See also **Alarm; Glasses; Locomotive.**

Connections.—Water Column Connections. C. W. Obert. An account of the results of false practice in method of connecting up water columns for steam gauge and water-glass connection to boilers. 600 w. Am Elect'n—Sept., 1901.

Danube.—The Lowest Navigable Depths and the Low Water Marks on the Danube between Passau and Theben, Austria (Der Niedrigste Schiffahrtswasserstand und die Relation der Pegelangaben bei Niedrigwasser in der Oesterreichischen Donaustrecke Passau-Theben). Hr. Lauda. A general discussion of the gauge readings and depth of water in the Upper Danube, with tables and diagrams. 2 plates. Serial. 2 parts. 7000 w. Oesterr Wochenschr f d Oeff Baudienst—May 16 and 23, 1903.

Depthometer.—Depthometer. Describes a recently patented instrument designed to show the depth of liquids either in open or closed vessels under any degree of pressure. 800 w. U S Cons Repts, No. 1772—Oct. 12, 1903.

Electric.—An Electrical River Gauge. J. F. Barnes. Illustration, with description of the construction and action of an automatic recording apparatus developed by Weston M. Fulton. 1000 w. Elec Rev, N Y—Feb. 14, 1903.

An Electric Water Gauge (Ueber Elektrische Wasserstandsfernmelder). Karl Busse. An illustrated description of an electric apparatus for recording, at any distance, the level of water in a reservoir, tank, etc. 800 w. Elektrizität—May 2, 1903.

The Electric Long-Distance Water Level Recorder on the Wien River at Hadersdorf-Weidlingau (Der Elektrische Wasserstands-Fernmeldeapparat bei den Wienflussregulierungsanlagen in Hadersdorf-Weidlingau). Hans Baumeister. Describing an apparatus for enabling a continuous diagram of the water level in a reservoir to be recorded at a distance of half a kilometre. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 7, 1904.

An Electrical Long-Distance Water-Level Indicator. Illustrates and describes an apparatus designed by Hans Baumeister, of Vienna, for recording the water level of a river, at a distance. 1600 w. Sci Am Sup—July 22, 1905.

Glasses.—Glass Tubes for Water Gauges (Wasserstandsröhren und ihre Schutzgläser). O. Schott & M. Herschkowitsch. An account of experimental tests comparing French, English and Scotch tubes with tubes of the improved Jena glass. 2500 w. Zeitschr d Ver Deutscher Ing—March 9, 1901.

Water Gauge Glasses. J. Russell Mackay. Suggestions, based on long experience, for the renewal of water-gauge glasses. Ils. 1200 w. Power—Aug., 1905.

Haskell.—The Haskell Self-Registering Water Gauge. G. A. M. Liljencrantz. Illustrates and describes the main features of this gauge for recording the level of streams, etc., invented by E. E. Haskell, its operation, reliability, and manner of using. 6000 w. Jour W Soc of Engrs—Dec., 1903.

Locomotive.—The Breakage of Tubes of Water-Level Indicators (Rupture des Tubes Indicateurs de Niveau d'Eau). M. Defauconpret. Describing the devices used on the Northern Railway of France for the protection of the men from injury by the breakage of water-glass tubes. 2500 w. Rev Gen d Chem de Fer—Sept., 1904.

Pressure, Artesian.—The Measurement of Low Artesian Heads. Myron L. Fuller. Describes a small, handy gauge for taking artesian well pressures, which can be carried in the vest pocket. 700 w. Eng News—June 8, 1905.

Venturi Meter.—See **WATER FLOW.**

WATER HAMMER.

See also **HYDRAULIC RAM.**

Water-Hammer in Pipes. J. Wright Clarke. Explains the meaning of the term and its cause, and the remedy. Ils. Serial. 1st part. 2500 w. Plumb & Dec—May 1, 1905.

Blow-Off Pipes.—The "Water Ram" in Blow-Off Pipes. On the importance of keeping the blow-off pipe free from deposits, and the danger of opening and closing valves suddenly; giving an account of an accident which occurred from the water-ram action in a blow-off pipe caused by closing the blow-cock too quickly. 2000 w. Locomotive—April, 1901.

Steam Pipe Explosions.—On Explosions of Steam Pipes Due to Water-Hammer. C. E. Stromeyer. An illustrated explanation of how these explosions are brought about, with a mathematical discussion of the problem. 3800 w. Engng—Feb. 28, 1902.

Water-Hammer in Steam Pipes. Gives cases of entrapped water in piping which have caused accidents. Ils. 1500 w. Locomotive—July, 1904.

Waltham, Mass.—Experiences in Reducing Water Ram Caused by Direct-Acting Pumping Engines. George E. Winslow. An account of an experience of the writer with water ram at the waterworks of Waltham, Mass. 3000 w. Jour N Eng Waterwks Assn—Dec., 1901.

WATER HEATER.

See **HEATING; HOT WATER.**

WATER HOIST.

See **AIR LIFT; ELECTRIC EQUIPMENT; HOISTING—Electric, Water; HYDRAULIC RAM; MINE DRAINAGE; PUMP; SCOOP WHEEL; WATER SCOOP.**

WATER JET.

See also **PILE DRIVING; SHIP PROPULSION—Jet; WATER FLOW—Jet Contraction.**

The Water-Jet as an Aid to Engineering Construction. L. Y. Schermerhorn. Gives a review of the applications of the water-jet to the work of the engineer, giving the history of the early development, and typical cases where the results were satisfactory. Also discussion. 9000 w. Pro Engs' Club of Phila—Nov., 1900.

WATER LAW.

See **WATER RIGHTS; WATERWORKS LAW.**

WATER LIFT.

See **AIR LIFT; HOISTING—Electric Water; HYDRAULIC RAM; MINE DRAINAGE; PUMP; SCOOP WHEEL; WATER SCOOP.**

WATER MAIN.

See **WATER FLOW; WATER PIPE; WATERWORKS.**

WATER MEASUREMENT.

See **RIVER DISCHARGE; WATER FLOW; WATER GAUGE; WATER METER.**

WATER METER.

See also **RIVER DISCHARGE; WATER FLOW; WATER GAUGE; WATER RATES; WATER SUPPLY; WATER WASTE; WATERWORKS; WATERWORKS MANAGEMENT.**

To Meter or Not to Meter. J. de Bruyn Kops. Also editorial. The facts given are based on an article by Morris Knowles, published in the "Engineering Record" of May 14, 1904. Objections are made to the conclusions reached. 3000 w. Munic Engng—July, 1904.

The Measurement of Water (Sui Contatori d'Acqua). Elia Ovazza. A discussion of the principles involved in various forms of water meters, and details of their construction. Three articles. 6000 w. Il Monitore Tecnico—Nov. 10, 20, 30, 1904.

Baltimore.—Meter System of the Water Department of Baltimore, Md. Robert L. Clemmitt. A description of the testing, inspection, quarterly reading and general management. Ill. 2000 w. Eng News—Oct. 30, 1902.

British.—The Standard Water Meter. Illustrated description of a new form of positive water meter being introduced in England. 700 w. Engng—Feb. 6, 1903.

Chicago.—See **WATER WASTE.**

Cleveland, O.—The Methods and Cost of Installing Meters at Cleveland, O. Information from papers by Edward W. Bemis, and from the annual report. 1800 w. Eng News—Oct. 22, 1903.

The Meter System in Cleveland. Edward W. Bemis. On the methods used to popularize water meters, their rapid installation, how to prevent freezing, cost, effect, &c. Ills. 4500 w. Munic Jour & Engr—July, 1904.

Consumption.—See **WATER SUPPLY.**

Cost.—The Cost of Installing a Water Meter System. A. L. Holmes. A paper read before the Mich. Engrs. Soc. Discusses the average cost, and shows that a metered supply will save more than the cost of a new pumping station which would otherwise be needed. 3000 w. Munic Engng—May, 1901.

Fire Service.—Meters for Fire Service. Gorham Dana. Discusses the question of metering fire service connections from public water systems, different types of meters, and gives table of tests showing effect of meters on flow of water. Ills. 5500 w. Ins Engng—May, 1905.

See also **WATERWORKS MANAGEMENT.**

Lick Observatory.—See **WATER SUPPLY.**

Newark, N. J.—Effect of Meters, New Storage Reservoir and Yield of Watershed, Newark Waterworks. Statement and diagram from the report of M. R. Sherrerd, showing the influence of the compulsory introduction of about 4000 meters. Also information concerning the new Cedar Grove reservoir, and the development of the watershed. 2000 w. Eng Rec—June 11, 1904.

Paris.—Notes on Water Meters (Note sur les Compteurs d'Eau). M. Couronne. An account of Paris regulations and laboratory for testing meters, and an illustrated review of many types. Serial. 1st part. 4000 w. Rev de Mecanique—Jan., 1902.

Pitometer.—See **WATER WASTE.**

Pittsburg.—See **WATER SUPPLY—Consumption.**

Rates.—See **WATER RATES.**

Rating Station.—See **WATER FLOW—Meter Rating.**

Resistance to Flow.—Some Hydraulic Resistances. John C. Trautwine, 3d. An account of experiments to determine the resistance that water meters offer to the flow of water through them. Ill. 2000 w. Trans Assn of Civ Engrs of Cornell Univ—1903.

Rohkohl, Feed Water.—The Rohkohl Feed-Water Meter (Compteur d'Eau d'Alimentation pour Chaudières, Système Rohkohl). An illustrated description of a simple piston meter for measuring the water supplied to boilers. 700 w. Génie Civil—April 13, 1901.

Sanitary Agent.—The Water Meter as a Sanitary Agent. M. N. Baker. Read before the Am. Soc. of Munic. Imp. Discusses the benefits from the use of meters, claiming that they cause purer water supplies, freer use of public water, extension of sewerage systems, and render more money available for sanitary improvements. 1800 w. Eng News—Oct. 10, 1901.

Statistics.—See **WATER SUPPLY—Consumption.**

Stream Flow.—See **WATER FLOW—Measurement; Streams.**

Tests.—Testing Large Water Meters. Lewis H. Nash. Illustrated description of the apparatus used. 800 w. Stevens Ind—Jan., 1901.

Some Tests of Very Large Water Meters. Describes the weir used in calibrating 20 and 36-in. meters. 700 w. Eng Rec—July 13, 1901.

Some Six-Inch Meter Tests and How They Were Made. Frank C. Kimball. Illustrates and describes apparatus and methods used in testing, stating results. Discussion. 9600 w. Jour N E Water Wks Assn—Dec., 1903.

Tests, Des Moines, Ia.—Accuracy Tests of Water Meters at Des Moines, Ia. Charles B. Burdick. Abstract of a paper read at meeting of the Illinois Soc. of Engrs. Reports the testing of 1,064 meters of various makes and sizes. 1500 w. Eng News—March 9, 1905.

Tests, National Meter Co.—Test of a 30-inch Premier Meter at the Testing Plant of the National Meter Co. Arthur S. Tuttle. Description of the test, with illustrations of the testing plant in South Brooklyn, N. Y. The testing weir is fully equipped with facilities for accurately measuring the flow of water. 1700 w. Eng News—June 16, 1904.

Turbine Flow.—See **WATER FLOW—Turbines and Pumps.**

Venturi.—See **WATER FLOW.**

Waste.—See **WATER WASTE.**

Woltmann.—See **WATER FLOW.**

WATER MOTOR.

See also **HYDRAULIC ENGINE; TURBINE; WATER POWER; WATER WHEEL.**

How to Make a Water Motor. R. E. Davall. Illustrated directions for a motor made by simple tools. 800 w. Sci Am Sup—Dec. 13, 1902.

Swartz.—A Home-Made Water Motor of One-Quarter Horse Power. H. F. Swartz. Illustrates and describes an impulse wheel which developed 0.28 brake h. p. and 1000 revolutions on a pressure of 50 pounds. 800 w. Sci Am Sup—Aug. 20, 1904.

WATER PIPE.

See also **AQUEDUCT; PIPE; PIPING; WATER FITTINGS; WATER FLOW; WATER HAMMER; WATER SUPPLY; WATER WASTE; WATERWORKS.**

Amsterdam.—An Account of the Progress of the Improvement of the Public Water Conduits in Amsterdam (Mededeelingen aangaande de in Uitvoering zijnde Werken voor de Gemeentelijke Waterleidingen binnen Amsterdam). J. M. K. Pennink. An address before the Royal Institute of Engineers, describing the works now in progress. 3000 w. De Ingenieur—Sept. 28, 1901.

Arch.—See **AQUEDUCT—Weston, Mass.**

Atlantic City, N. J.—Cost of Laying Water Pipe, Atlantic City, N. J. Kenneth Allen. Gives cost figures for about three miles of 12 to 4-in. pipe. 500 w. Eng News—Sept. 14, 1905.
See also Wood Stave.

Boston.—Pipes and Pipe Laying for the Metropolitan Waterworks. Caleb Mills Saville. Concerning the pipe system and the methods of construction employed in distributing water to Boston and its suburban cities and towns. Ill. 8000 w. Jour N E Waterworks Assn—June, 1903.

Breaks, Boston.—Seven Mysterious Breaks in a 48-Inch Pipe Line on the Boston Waterworks. Frederic I. Winslow. Describes these breaks and gives the conclusions regarding the cause. 600 w. Eng News—July 3, 1902.

Care.—Care of Pipe and Conduits. James E. Maxwell. Calls attention to troubles due to the improper laying of pipes, and other conditions. 1500 w. Fire & Water—Nov. 14, 1903.

Cast Iron.—See also Inspection; **PIPE MANUFACTURE.**

Cast Iron, Life.—The Life of Cast-Iron Pipe. C. Cavallier. An account of the condition of pipes in Paris after being nearly 30 years in service, with notes on old water pipe systems in France. 1200 w. Jour N Eng Wwks Assn—June, 1904.

Cast-Iron Specifications.—Standard Specifications for Cast-Iron Pipe. An explanation of the principles adopted by a committee of the New England Waterworks Assn. in preparing standards for cast-iron pipe and specials. 1800 w. Eng Rec—Dec. 7, 1901.

Preliminary Report of the Committee on Standard Specifications for Cast-Iron Pipe, with Discussions. Report presented Dec. 11, 1901, with discussions received up to May 1, 1902. 22,000 w. Jour N E Waterwks Assn—June, 1902.

Standard Specifications for Cast-Iron Pipe. Gives specifications adopted by the New England Water

Works Assn., with notes on their special features. 2200 w. Eng Rec—Sept. 13, 1902.

Final Report of the Committee on Standard Specifications for Cast-Iron Pipe. Also discussion. 1600 w. Jour N E Waterwks Assn—Dec., 1902.

Standard Specifications for Cast-Iron Pipe and Special Castings. Gives the tables of special castings which were lacking in the article published in Dec., 1902, that the record may be complete. 1200 w. Jour N Eng Waterwks Assn—March, 1903.

Chelsea, Mass.—See **Submerged.**

Cleaning Machine.—See **Scraper.**

Coatings.—Coatings for Cast-Iron Pipes. Thomas H. Wiggin. Read before the Boston Soc. of Civ. Engrs. Gives the results of writer's experiments in connection with the Metropolitan waterworks. Serial. 1st part. 3500 w. Dom Engng—Aug. 25, 1902.

Coating of Cast-Iron Pipes. W. H. Humphreys. Reports great trouble due to contamination of water by the coating used, or its improper application, and gives opinions of manufacturers and discussion. 5800 w. Builder—Dec. 13, 1902.

Concrete, Cal.—The Most Economic Type of Hydraulic Power Conduits. Fred C. Frinkle. Address before the Twelfth Irrigation Congress. Describes the concrete and cement pipe now used in California, and the method of construction. 1500 w. Eng Rec—Sept. 2, 1905.

Concrete-Jacketed.—See **Submerged.**

Concrete Reinforced.—The Construction of the Sixty-Inch Reinforced Conduits of Newark, N. J. Morris R. Sherrerd. Brief illustrated description of monolithic work. 1500 w. Munic Engng—Nov., 1903.

Experiments on Reinforced Concrete Pipes Made for the U. S. Reclamation Service. J. H. Quinton. An illustrated account of experiments made at Los Angeles, Cal., to determine if a more durable material than steel or wood could be used to carry water in pressure pipes across long depressions on canal lines. 1800 w. Eng News—March 9, 1905.

The Bursting Strength of Reinforced Concrete Pipes. Describes experiments made by the engineers of the U. S. Reclamation Service with great care, which indicated that such a system of construction is not satisfactory for pipes under considerable heads. Also editorial. 5500 w. Eng Rec—Dec. 9, 1905.

See also **CONCRETE REINFORCED—Pipes; HYDRO-ELECTRIC PLANT—Grenoble, France.**

Coolgardie, Australia.—Water Supply for Coolgardie, Australia (Alimentation de Coolgardie en Eau Potable par une Conduite de 565 Kilomètres). Paul Raulin. Description, with plans and illustrations of steel pipe line 350 miles long, and 30 inches in diameter. 2000 w. Génie Civ—Aug. 26 1905.

See also **PIPE MANUFACTURE—Steel; PUMPING ENGINE; WATERWORKS.**

Corrosion, Electrolytic.—See **STRAY CURRENTS.**

Deposits.—See **Obstruction.**

Eels.—See **WATERWORKS.**

Electrolysis.—See **STRAY CURRENTS.**

Frozen.—See **THAWING.**

Hartford.—See **Vitrified.**

Hydro-Electric Plants.—See **Stresses; HYDRO-ELECTRIC PLANT.**

Incrustation.—See **Obstruction.**

Inspection.—Instructions to Inspectors of Cast-Iron Water Pipe, Special Castings and Stop Valves, Philadelphia. Instructions given on contract No. 28, Lardner's Point distribution system, for the improvement, extension and filtration of the water supply. John W. Hill, chief engineer. 1700 w. Eng News—June 11, 1903.

Inverted Siphon.—See **Philadelphia, Torresdale; SIPHON.**

Jersey City.—The Conduit of the Jersey City Water Supply Company. Illustrated detailed description of the steel pipes and the terminal gate house and connections. Serial. 1st part. 2500 w. Eng Rec—Jan. 9, 1904.

See also **Submerged, Jersey City.**

Large.—See **Stresses.**

Lead.—The Use of Lead Pipe for Conveying Drinking Water (Verwendung von Bleiröhren bei Trinkwasserleitungen). Adolf Siegmund. An examination of the conditions under which drinking water may be rendered unwholesome by passing through unlined lead pipes. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 21, 1904.

See also **LEAD POISONING; PLUMBING.**

Life, Paris.—See **Cast-Iron Life.**

Locking Bar.—See **PIPE MANUFACTURE.**

Los Angeles, Cal.—See **Concrete Reinforced.**

Moving.—See **Philadelphia, Moving.**

Newark, N. J.—See **Concrete Reinforced.**

North Tonawanda, N. Y.—See **Submerged.**

Obstruction.—Incrustations, Deposits and Organic Growths in Pipes and Other Water Conduits. Excerpt from a paper by James C. Brown, presented to the Inst. of Civ. Engrs. Considers incrustations in unprotected iron pipes, and deposits and growths depending on the composition of the water. 1200 w. Eng News—Sept. 22, 1904.

Deposits in Water Pipes and Other Channels. Notes from a paper by Prof. James Campbell Brown, read before the Inst. of Civil Engrs. (England). Considers incrustations on imperfectly protected iron pipe, and deposits on the inner surface of iron pipes, culverts, and other channels. 1800 w. Eng Rec—Oct. 1, 1904.

See also **Scrapers.**

Philadelphia, Moving.—Moving a 48-in. Force Main Under Pressure, at Philadelphia. Seth M. Van Loan. Outlines the reasons why the undertaking was necessary, showing the conditions during the progress of the work, and describing the main features. 1000 w. Eng News—Oct. 8, 1903.

Relocating a Large Pumping Main Under Pressure, at Philadelphia. Seth M. Van Loan. Outlines the reasons why the undertaking was necessary, and gives an illustrated description of this work. 11,000 w. Eng Rec—Jan. 23, 1904.

Philadelphia, Torresdale.—The Torresdale Conduit. John W. Hill. A fully illustrated detailed description of a large inverted siphon belonging to the filtration system of the water supply of Philadelphia, with the history of its construction, examination, and present condition. General discussion. 15,000 w. Pro Engrs' Club of Phila—April, 1905.

Method of Laying a Triple Line of 60-in. Cast-Iron Pipe. Seth M. Van Loan. Brief illustrated description of methods used in Philadelphia for filtered water distribution from Torresdale filters. 1200 w. Eng News—April 6, 1905.

See also **AQUEDUCT—Torresdale.**

Pressure Regulation.—See **VALVE—Regulating; WATERWORKS.**

Pressure Variations.—Pressure Variations in Turbine Supply Pipes (Druckschwankungen in Turbinensuleitungsröhren). A. Budau. An exhaustive mathematical and practical investigation of the stresses in supply pipes and pen-stocks under sudden changes of flow, as in governing. Three articles. 12,000 w. Zeitschr d Oesterr Ing u Arch Ver—July 21, 28, Aug. 4, 1905.

Raising.—See **Somerville, Mass.**

Scraper.—A New Pipe-Scraping Machine. C. C. Smith. Abstract of a paper read before the British Assn. of Waterworks Engrs. Illustrated description of a machine which will successfully cleanse pipes under 4-in. in diameter. The invention of a German, Mr. Nowotny. 1000 w. Ir & Coal Trds Rev—July 24, 1903.

See also **Obstruction.**

Scraping, Melbourne.—Scraping Water Mains at Melbourne. Information concerning this work taken from a paper by Edgar G. Ritchie, published by the Inst. of Civ. Engrs. 1500 w. Eng Rec—Nov. 26, 1904.

Automatic Water Pipe Scrapers at Melbourne, Australia. Illustrates and describes an exceptionally compact automatic scraper. 2500 w. Eng News—Jan. 5, 1905.

Service Box, Montreal.—Service Boxes of the Montreal Waterworks. T. W. Lesage. Illustrates and describes various types of service boxes between water mains and house connecting pipes that have been tried, the difficulties due to climate and other conditions, and the present type. 1100 w. Jour N Eng Wwks Assn—Sept., 1903.

Siphon.—See **Submerged, Chelsea, Mass.; Torresdale; SIPHON; WATER SUPPLY—Paris.**

Slope and Diameter.—See **WATER POWER.**

Somerville, Mass.—Raising Two Lines of 36-inch Pipes at the Mystic River, Somerville, Mass. John L. Howard. An illustrated description of the method adopted. 2000 w. Eng Rec—June 20, 1903.

Specifications.—See **Cast-Iron Specifications.**

Steel.—Wrought-Steel Conduits for Gravitation and Pressure Water Supply. Herbert Fetherston Lloyd. From the Pro. of the Inst. of Civ. Engrs. Discusses the design, manufacture, and erection of water pipes, siphons, culverts, and flumes, of varying cross section, constructed of mild steel. Ill. 5400 w. Prac Engr—Oct. 23, 1903.

See also **Coolgardie; Jersey City; Submerged, Jersey City.**

Steel Riveted.—See **Submerged; Wood Stave.**

Strength.—See **Stresses.**

Stresses.—Calculations for Pipes and Fittings (Calculs des Parois et Armatures des Tuyaux). C. Birault. A study of the stresses upon pipes laid upon the ground considering both the weight of the empty pipe and the effect of its contents. Two articles. 4000 w. Génie Civil—Dec. 13, 20, 1902.

The Flexure of the Walls of Conduits of Large Diameter (Flexions des Parois dans les Tuyaux de Conduites de Grand Diametre). C. Birault. A study of the stresses, due to both weight of water and hydraulic pressure, upon the walls of large pipes and conduits used for conveying water under pressure for hydraulic power stations. 9000 w. 1 plate. Mem Soc Ing Civ de France—Oct., 1904.

The Strength of Large Pipes (Zur Festigkeit Weiter Rohre). Dr. Philipp Forchheimer. An examination of the forces acting upon pipes of large diameter, including the deformations due to the weight of the pipe and its contents, and the earth pressure as well as the internal pressure. Two articles. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 26, March 4, 1904.

See also **PIPE.**

Submerged.—Submerged Pipe. A. L. Holmes. Read before the Central States Waterworks Assn. Considers methods of laying the pipes, and their care and protection; and difficulties and troubles due to improper work. 2000 w. Munic Engng—Oct., 1902.

Submerged, Cedar Rapids.—The New Supply of the Cedar Rapids Water Company, Iowa. Illustrated description of the method of laying 864 ft. of 30-in. submerged suction main, with note on a new form of connecting well. 450 w. Eng Rec—May 25, 1901.

Submerged, Chelsea, Mass.—Removal of Some Submerged Water Mains, at Chelsea, Mass. Caleb Mills Saville. Interesting description of the condition of a main laid in 1850, and of a siphon carrying water over the Mystic River. 2700 w. Eng News—Feb. 28, 1901.

Submerged, Cost.—Cost of Laying a 12-in. Water Pipe Across a River. An account of how a 500-ft. line of 12-in. water pipe was laid and the cost. 700 w. Eng News—March 2, 1905.

Submerged, Jersey City Waterworks.—Submerged Steel Pipes for the Jersey City Waterworks. An illustrated description of the pipes and methods of laying. 2800 w. Eng Rec—Dec. 13, 1902.

Laying 6-ft. Concrete-Jacketed Riveted Steel Pipes Under the Hackensack and Passaic Rivers. Brief illustrated description of the method of submerged work used. 600 w. Eng News—March 12, 1903.

See also **Jersey City.**

Submerged, Massachusetts.—Submerged Pipe Crossings of the Metropolitan Water Board. Caleb Mills Saville. A description of some of the methods employed. Ill. Also discussion. 10,300 w. Jour Assn of Engng Socs—March, 1901.

Submerged, North Tonawanda, N. Y.—Laying a Submerged Water Pipe at North Tonawanda, N. Y. An illustrated article giving information concerning the methods adopted and difficulties encountered. 2200 w. Eng News—Aug. 4, 1904.

Submerged, Waterville, Me.—Laying a Submerged Water Main at Waterville, Me. Illustrates and describes the unusual method used in laying a 20-in. water main under the Kennebec River. 1000 w. Eng Rec—Dec. 17, 1904.

Thawing.—See **THAWING.**

Torresdale.—See **Philadelphia, Torresdale; AQUEDUCT.**

Vitrified, Hartford.—The Hartford Vitrified Water Conduit. W. E. Johnson. Abstract of a paper read before the Conn. Soc. of Engs. & Survs. Describes a conduit 16,700 ft. long and 24 in. in diameter, constructed of vitrified clay pipe. The requirements of the pipe and methods of laying it are explained in detail. 1300 w. Eng Rec—Jan. 12, 1901.

Water Flow Resistance.—See **WATER FLOW.**

Waterville, Me.—See **Submerged.**

Weston, Mass.—See **AQUEDUCT.**

Wood Stave.—Some Applications of Wooden Stave Pipe. John Birkinbine. Especially describes the construction of a line of wooden stave pipe six and one-half miles in length, along the Little Conemaugh River, near Johnstown, Penn., referring also to other work. Ills. Also discussion. 4200 w. Pro Engrs' Club of Phila—Jan., 1905.

Wooden Stave Pipe. W. C. Hawley. Brief description of the construction, discussing the merits, and giving extracts from specifications. Discussion. Ills. 5400 w. Pro Engrs' Soc of W Penn—April, 1905.

See also **DAM—California Southern; INTAKE; TANK; WATER PIPE.**

Wood Stave, Atlantic City.—Wood-Stave Pipe for Force Mains. States the conditions at Atlantic City, N. J., which led to the recommendation of wood-stave pipe, with reasons for the choice. 1300 w. Eng Rec—Nov. 24, 1900.

A Giant Force Main. Illustrated description of the new thirty-inch steel riveted force-main to carry a supply of water to Atlantic City, N. J. 1800 w. Fire & Water—July 12, 1902.

The Wood-Stave Conduit for the Water Supply of Atlantic City. Kenneth Allen. An illustrated detailed description of the construction work, with notes and discussion. 6500 w. Jour N Eng Waterwks Assn—Dec., 1904.

Wood Stave Conduit. Kenneth Allen. Illustrates and describes the construction of the new conduit for Atlantic City water supply. 2200 w. Munic Jour & Engr—March, 1905.

Wood Stave, Cal.—See **DAM—California Southern.**

Wood Stave, Oregon.—Stave Pipes for Conveying Water. Illustrations and description of the line of wood stave pipe of the Washington and Oregon Power Co., in Northeastern Oregon, in connection with their hydro-electric power plant. 1800 w. Min & Sci Pr—March 18, 1905.

Wrought Steel.—See **Steel.**

WATER POLLUTION.

See also **DRAINAGE; FACTORY WASTE; FILTRATION; RIVER POLLUTION; SANITATION; SEWAGE; SEWAGE DISPOSAL; WATER ANALYSIS; WATER PURIFICATION; WATER SUPPLY.**

Inorganic and Organic Sources of Contamination of Water Supplies. E. Stars. An illustrated study of the sources of contamination, their danger, etc., showing the value of a technical, chemical and biological examination of a public water supply. 5000 w. Jour Assn of Engng Socs—Sept., 1902.

American.—See **United States;** and under names of cities.

Bacteria. — See **SEWAGE DISPOSAL; WATER ANALYSIS; WATER PURIFICATION—Physical Agents.**

Baraboo, Wis.—The Recent Epidemic of Typhoid Fever at Baraboo, Wis., and its Probable Relation to the Water Supply. W. G. Kirchoffer. Describes the location of the city, the source of water supply, plant, etc., and concludes that it is not safe to run a pure water main through polluted water with no other protection than a lead joint. Ill. 1500 w. Eng News—Feb. 27, 1902.

Brewery, Rotherham.—See **SEWAGE DISPOSAL.**

Butler, Pa.—The Typhoid Fever Epidemic at Butler, Pa. George A. Soper. Report of investigation showing the epidemic to be due to the use of polluted water, by reason of the interruption in the operation of the filter plant. 6000 w. Eng News—Dec. 24, 1903.

Some Lessons of the Butler Typhoid Epidemic. Editorial on the need of sanitary reforms and the deaths due to polluted water. 1700 w. Eng News—Dec. 31, 1903.

Columbus, O.—The Typhoid Fever Epidemic at Columbus, O. Prof. F. H. Eno. A statement of the conditions leading up to and at present pertaining to the epidemic of typhoid fever now prevailing, with editorial comment. Map. 7200 w. Eng News—Feb. 11, 1904.

Court Decisions.—Sewage Pollution of Water Supplies. Editorial review of recent court decisions. 1600 w. Eng Rec—Aug. 1, 1903.

Crenothrix.—Crenothrix as a Source of Trouble in Public Water Supplies. Extracts from a paper by Daniel D. Jackson, printed in "The Journal of the Society of Chemical Industry," on "The Precipitation of Iron, Manganese and Aluminum by Bacterial Action." 800 w. Eng News—Sept. 4, 1902.

Hamilton, O.—See **WATER SUPPLY.**

Indiana Law.—Proposed Water Pollution Legislation in Indiana. A discussion of two bills before the Legislature aiming to give the State Board of Health a large measure of control over water pollution. 1000 w. Eng News—Feb. 14, 1901.

Ithaca, N. Y.—The Epidemic of Typhoid Fever in Ithaca, N. Y. George A. Soper. Gives statistics of this epidemic, discussing the theories of the cause and the corrective measures undertaken. Discussion. 11,200 w. Jour N Eng Wwks Assn—Dec., 1904.

Lead Poisoning.—See **LEAD POISONING—Electrolysis; WATER PIPE—Lead.**

New York Sources.—Polluted Waters Round New York. Discusses the available sources of supply around New York city, and the pollution that renders many of the watersheds useless, especially the contamination of the Passaic in northern New Jersey. Ill. 2500 w. Fire & Water—March 7, 1903.

See also **WATER SUPPLY.**

Pipe Coating.—See **WATER PIPE—Coating.**

Pittsburg.—Typhoid Fever History and the Water Supply of Pittsburg, Allegheny and Vicinity. Prepared from data and comments thereon obtained from various health officials, giving information of the water supply systems. 6000 w. Eng News—Feb. 25, 1904.

Prevention.—See **WATER SUPPLY—Inspection.**

Self-Purification.—See **WATER PURIFICATION—Self.**

Typhoid.—The Responsibility for Controlling the Spread of Typhoid Fever. Editorial on the causes of epidemic typhoid, and what should be done to prevent communication. 3000 w. Eng News—Jan. 21, 1904.

Special Reports on Typhoid Fever and Water Supply. Statements from city officials in Philadelphia, Lowell, Mass., and Waterloo, Iowa, and in Western Pennsylvania. 3700 w. Eng News—Feb. 11, 1904.

I. Typhoid Fever at Watertown, N. Y. Weston E. Fuller. II. An Epidemic of Typhoid Fever in East Minneapolis. Frederic H. Bass. Two papers reporting investigations made to determine the causes of these epidemics. 3000 w. Eng News—March 3, 1904.

The Longevity of the Typhoid Bacillus in Water. George C. Whipple. Reviews recent papers by Dr. William Dodge Frost, and a joint paper by Dr. E. O. Jordan, Dr. H. L. Russell, and Dr. F. R. Zeit. 4000 w. Eng Rec—Dec. 24, 1904.

See also **Baraboo; Butler, Pa.; Columbus, O.; Ithaca; Pittsburg; FILTRATION—Albany, N. Y.; WATER PURIFICATION—Copper Sulphate; WATER SUPPLY—Minneapolis.**

Underground.—The Detection and Prevention of Underground Pollution. John Shaw. Read before the British Assn. of Waterwks. Engrs. Discusses the pollution of springs and well supplies. 2200 w. Builder—Dec. 27, 1902.

See also **GROUND WATER; WELL.**

United States.—The Pollution of Public Water Supplies in the United States. Report of the committee of the American Public Health Assn., presented at the Indianapolis meeting. 6000 w. Munic Engng—Nov., 1900.

The Pollution of Public Water Supplies. Extracts from the report to the American Public Health Assn., summarizing the features of the situation in the United States in 1900. 3600 w. Eng Rec—Nov. 3, 1900.

See also **SEWAGE DISPOSAL.**

WATER POWER.

See also **DAM; ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT; TURBINE; WATER MOTOR; WATER RIGHTS; WATER WHEEL.**

Water Power. Brief review of methods of utilizing water power. Ill. 1500 w. Engr, U S A—Jan. 15, 1901.

The Hydraulic End of Power Transmissions. John S. Eastwood. Read before the Pacific Coast Elec. Trans. Assn. Considers the water storage works, the conduit, the pipe lines, the water wheels and tail race. 4000 w. Jour of Elec—June, 1902.

Water-Power Plants; Common Troubles, Causes, and Remedies. W. E. Crane. A brief discussion of early plants, of shape of dams, and the remedies for various troubles. Ills. 1700 w. Power—Dec., 1905.

Alps.—The Water Powers on the Northern Slopes of the Alps (Die Wasserkräfte am Nordabhange der Alpen). Dr. Oskar von Miller. An account of the available water powers on the rivers flowing from the northern slopes of the Alps in Switzerland, Austria and particularly in Bavaria, with maps and tables. 4000 w. Zeitschr d Ver Deutscher Ing—July 11, 1903.

See also **French Alps.**

Back Water.—See **HYDRAULICS; WATER FLOW—Weir Water Curve; WATER RIGHTS.**

Bavaria.—See **Alps.**

Berlin, N. H.—See **PAPER MILL.**

Big Bend.—See **TUNNEL.**

British.—Water Power v. Steam Power in the British Isles. E. Ristori. Discusses the economical possibilities in Great Britain for the development of hydro-electric plants, comparing with steam plants. 4000 w. Engng—Dec. 23, 1904.

California.—See **ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT; IRRIGATION.**

Capacity of Stream.—Power Capacity of a Running Stream Without Storage. William G. Raymond. From Pro. of the Iowa Engng. Soc. Shows that for streams on which there is little or no storage, the only proper way to estimate the power available is to estimate it from the daily rather than the monthly flow. 2800 w. Elec Rev, N Y—April 8, 1905.

Formulas and Computations for Horse-Power Value of Streams. W. L. Church. The object of the paper is to derive formulas for the rapid estimate of the discharge value of a given drainage area, and to illustrate and simplify the method of computation of the value of a drainage area in connection with partial storage and steam auxiliary. 3000 w. Eng Rec—July 1, 1905.

Power Capacity of a Running Stream Without Storage. Reviews Prof. Raymond's analysis of the conditions, as given in a paper before the Iowa Engng. Soc. 1200 w. Eng Rec—Sept. 30, 1905.

See also **RIVER DISCHARGE; WATER FLOW.**

Cephalonia Sea Mills.—See **SEA MILLS.**

Chicago Canal.—How Chicago Will Harness the Drainage Canal. Edward P. Ellicott. Explains how the construction of this canal has created an opportunity for developing a great water power, discussing the advantages to be derived. 1500 w. Mod Mach—Jan., 1902.

Water Power Development on the Chicago Drainage Canal. An illustrated article explaining the general scheme. 1400 w. Eng News—Jan. 12, 1905.

See also **Joliet, Ill.; CANAL; RIVER REGULATION.**

Compressed Air.—See **AIR COMPRESSOR—Hydraulic.**

Concord, N. H.—The Concord, N. H., Water-Power Plant. An illustrated description of the plant and an account of its service. 2800 w. Elec Wld & Engr—July 12, 1902.

Des Moines, Iowa.—A Project for Developing the Water Power of the Des Moines Rapids. Reviews the report of Lyman E. Cooley in the general engineering aspects of the enterprise, its construction and cost. 5600 w. Eng News—Nov. 14, 1901.

Development.—Progress in Hydraulic Power Development. J. T. Fanning. Reviews the development, especially the achievements of the last twenty-five years. 3300 w. Eng Rec—Jan. 3, 1903.

The Development of Small Water Powers. Louis Bell. Discusses how to utilise to advantage powers not exceeding 500 H. P. in the water. 3800 w. Am Elect'n—Dec., 1903.

Developing a Water-Power. Thorburn Reid. Discusses the elements of financial and commercial success in such undertakings. 3800 w. Cassier's Mag—Aug., 1904.

The Commercial Development of Water Power. Alton D. Adams. Discusses the successful development of water power from a financial point of view, illustrating by cases from actual practice. 3000 w. Cassier's Mag—Dec., 1904.

Hydraulic Generation and Application of Motive Power. W. M. Barr. A review of modern hydraulic power development in the light of improved methods of regulation and application. 4000 w. Engineering Magazine—Sept., 1905.

Electric Installations.—See ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT.

Elgin, Ill.—See WATER RIGHTS.

Fossil Creek, Arizona.—A Wonderful Water Power. F. E. Santos. Illustrated description of the springs of Fossil Creek, Arizona. 800 w. Elec Rev, N Y—Jan. 26, 1901.

France.—French Legislation on the Utilisation of Water for Power. Abstract of a paper from "Le Génie Civil," written by Charles Pinat, discussing this subject. 1300 w. Eng News—Aug. 7, 1902.

Water Power in France. Reviews the power already utilised by the canalising of the water from the glaciers and mountain streams. Ill. 800 w. U S Cons Repts, No. 1549—Jan. 20, 1903.

The Proposed Law for Hydraulic Stations (Project de Loi pour les Usines Hydrauliques). An abstract of the regulations proposed for the utilisation of water courses in France. 2500 w. Revue Technique—June 10, 1904.

The Industrial Economy of Water Power (L'Economie Industrielle des Forces Hydrauliques). E. F. Cote. An exhaustive discussion of the economies of water power, with especial reference to controlling legislation in France. 10,000 w. Mem Soc Ing Civ de France—May, 1905.

See also French Alps; Rhone; WATER RIGHTS.

French Alps.—The Utilization of the Water Power of the French Alps (L'Utilisation des Chutes d'Eau dans les Alpes Françaises). R. Tavernier. A review of the possibilities of the hydraulic power of the French Alps, comparing the progress made in Italy and Switzerland, and discussing the conditions of profitable exploitation. 15,000 w. Mem d l Soc d Ing Civils de France—May, 1902.

The "White Coal" Congress (Le Congrès de la "Houille Blanche"). J. A. Montpellier. A report of the convention recently held in France for the discussion of the development of the hydraulic power of the French Alps. Serial. Part I. 3000 w. L'Electricien—Oct. 11, 1902.

The White Coal Congress (Congrès de la Houille Blanche). Ch.. Pinat. A full account of the proceedings of the congress which investigated the water power available in the French Alps. 15,000 w. Mem Soc Ing Civ de France—Nov., 1902.

The Development of Mountain Water Powers. Paul Letheule. An illustrated description of the hydraulic power possibilities of the French Alps, and an account of the development in the district about Grenoble. 4000 w. Engineering Magazine—February, 1903.

The "Houille Blanche" Congress in France. M. F. Loppé. On the utilization of mountain streams deprived of reservoirs, and illustrated accounts of the water sheds visited by the members of this Congress. Serial. 1st part. 6000 w. Feilden's Mag—June, 1903.

The Congress of the "Houille Blanche." Marcel Bloch. Deals briefly with the technical propositions and ideas set forth by this congress for the development of the hydraulic power from the melting snows of the French Alps. Serial. 1st part. 2300 w. Elec Rev, Lond—Sept. 4, 1903.

The Utilization of Waterfalls (Utilisation des Chutes d'Eau). F. Loppé. A review of the work of the Congrès de la Houille Blanche, with regard to the development of the water powers of France. 2000 w. Revue Technique—Oct. 25, 1903.

Gas Power Compared.—See GAS POWER—Water Power Compared.

Georgia.—See Juliette; HYDRO-ELECTRIC PLANT.

Hannawa Falls, N. Y.—Water Power Development at Hannawa Falls. Wallace C. Johnson. Gives figures in regard to the flow available; plans and views showing the construction of the dam, canal, waste gates, penstocks, gates, forebay and building, and a description of the wheels, generators, switchboard, transmission lines and the pulp plant, with its grinders, conveyors and water system. 4400 w. Trans Am Soc of Mech Engrs, No. 925—Dec., 1901.

The Water Power Plant at Hannawa Falls, N. Y. From a paper by W. C. Johnson, read before the Am. Soc. of Mech. Engrs., with additional illustrations. Describes a plant for developing an 85-ft. fall on the Raquette River. 3200 w. Eng Rec—Dec. 7, 1901.

High Heads.—See HYDRO-ELECTRIC PLANT; TURBINE; WATER WHEEL—Pelton.

Holyoke, Mass.—The Water Power at Holyoke. Albert F. Sickman. An interesting review of the history of the water power developed, the various dams, and their troubles, cost, etc. 5000 w. Jour N Eng Waterwks Assn—Dec., 1904.

Ice Troubles.—See ICE.

Ireland.—Notes on Irish Water Power and Its Electrical Development. W. Tatlow. Abstract of a paper read before the Dublin Local Section of the Inst. of Elec. Engrs. A general survey of water power that can commercially be made available. with descriptions of a few places. 3000 w. Elect'n, Lond—April 4, 1902.

Joliet, Ill.—The Joliet Water Power Plant on the Chicago Drainage Canal. Illustrated description of a 7,000 H. P. plant operating under an unusually low pressure, which makes it necessary to have six turbines coupled to the shaft of each main generator. 3000 w. Eng Rec—April 19, 1902.

Water Power Projects at Joliet, Ill. An explanation of projects now before the courts for a decision as to their respective rights, showing the general situation. Ill. 900 w. Eng News—Sept. 4, 1902.

See also Chicago Canal.

Juliette, Ga.—A Low-Head Mill Power at Juliette. Ga. Plan and description of the water-power development. 1500 w. Eng Rec—Feb. 6, 1904.

Keokuk, Iowa.—A Proposed Dam and Water Power on the Mississippi River at Keokuk, Iowa. Lyman E. Cooley. A general account of the proposed work with a statement of the conditions, and general discussion. 5000 w. Jour W Soc of Engrs—Feb., 1902.

Large Plants.—Large Water Power Plants. Gives facts concerning important plants now erected or building. 1600 w. Mach, N Y—June, 1902.

Little Falls, Minn.—Water Power Development at Little Falls, Minn., and Its Industrial Results. Arthur Warren. Describes the conditions at this city on the upper Mississippi River, the water storage system, natural power advantages, dam, power station, industries, etc. Ills. 3500 w. Eng Rec—June 3, 1905.

Millinocket, Me.—See PAPER MILL; TURBINE.

New York State.—Some Water Powers of New York State. An illustrated article showing what has been accomplished in developing some of the small streams and what may yet be done. 2800 w. Stone—May, 1902.

Niagara.—The American and Canadian Channels of Niagara Falls. Alton D. Adams. An illustrated description of the two channels with remarks on the effect of further diversions of water above the falls. 2000 w. Elec Rev, N Y—Nov. 11, 1905.

See also Victoria Falls; HYDRO-ELECTRIC PLANT; WEIR—Concrete Tower.

Niagara Rapids.—Utilising the Power of the Niagara Rapids. Alton D. Adams. A discussion of the various methods by which a large amount of power may be taken from the Niagara rapids below the Falls. 2500 w. Engineering Magazine—June, 1905.

Power Sites About Niagara Falls. Alton D. Adams. Outlines a plan for utilizing the entire flow of the river, if desired, at a head of nearly ninety feet, and still leave the falls undiminished. 1500 w. Sci Am—Aug. 26, 1905.

Niagara Power in the Gorge. An illustrated historical review of the development of power in the gorge, dating back to 1853. Serial. 1st part. 3500 w. Elec Wld & Engr—Nov. 18, 1905.

Ottawa, Ont.—Water Power Development in the Vicinity of Ottawa, Ont. Shows the remarkable wealth of water power, and the applications made of it. Ill. 1400. Can Engr—Aug., 1902.

Pelton Wheels.—See **HYDRO-ELECTRIC PLANT—Innsbruck; WATER WHEEL.**

Quebec.—Water Powers of Quebec. J. C. Langelier. Information concerning some of the many great water powers. Map. 1400 w. Can Engr—May, 1905.

Rhone River.—The Motive Power of the Upper Rhone (Les Forces Motrices du Haut Rhône). A. Garcia. A study of the best method of utilizing the hydraulic power of the Rhone in France between the Swiss frontier and Pyrmont. More than 160,000 H. P. is available. 10,000 w. Mem Soc Ing Civ de France—April, 1901.

Rock Crushing.—See **CRUSHING—Water Power.**

Rudder Boom.—See **RUDDER BOOM.**

Sarpsfos, Norway.—See **HYDRO-ELECTRIC PLANT.**

Sault Ste. Marie.—See **CANAL; ELECTRIC INDUSTRY; HYDRO-ELECTRIC PLANT; SAULT STE. MARIE.**

Shawinigan Falls.—See **HYDRO-ELECTRIC PLANT.**

Slope and Diameter.—The Best Slope and Pipe Diameters for a Water Power Plant (Günstigste Grabenneigung und Rohrweite bei Wasserkraft Anlagen). Dr. Ph. Forchheimer. A discussion of the effect of slope and cross section upon the efficiency of a water power distribution system. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 15, 1901.

Stream Capacity.—See **Capacity of Streams.**

Unit.—A Suggested Hydraulic Unit. Ralph L. Montague. Suggests that a new unit composed of one cubic foot of water per minute under one foot head be recognized. 300 w. Trans Am Inst of Elec Engrs—Sept., 1903.

U. S. Southeastern.—Water Powers of the Southeastern Appalachian Region. Frederick A. C. Perrine. Considers the powers in the states of Virginia, North Carolina, South Carolina, Georgia and Alabama. 4500 w. Am Inst of Elec Engrs—June 22, 1905.

Valuation.—An Analysis of the "Commercial" Value of Water Power per Horse-Power per Annum. A. F. Nagle. A method of calculating the value of a water power for power purposes. 4500 w. Trans Am Soc of Mech Engrs, No. 0963—Dec., 1902.

Some Details Entering into the Computation of the Values of Water Powers, and the Damages Caused by the Diversion of Water Used for Power. Charles T. Main. Considers the methods of determining the value, and the damages, the flow, &c. 6500 w. Trans Am Soc of Mech Engrs, No. 025—Dec., 1904.

Victoria Falls.—Water Power in South Africa. Francis Fox. Gives an account of the discovery and an illustrated description of Victoria Falls, reviews what has been done at Niagara and at other points in the way of utilizing water power, and considers the electrical development of these falls. 4200 w. Cassier's Mag—April, 1903.

See also **ELECTRIC TRANSMISSION.**

WATER POWER UNIT.

See **WATER POWER—Unit.**

WATER PRESSURE.

See **BOILER TEST—Hydraulic; CYLINDER—Hollow Test; HYDRAULIC MACHINERY; WATER GAUGE; WATER PIPE.**

WATERPROOFING.

Bridge.—See **BRIDGE FLOOR—Waterproofing; CABLE.**

Cable Wrapping.—See **CABLE—Bridge, Williamsburg.**

Concrete.—See **CONCRETE—Waterproof.**

Racquet Club, N. Y.—See **BATH.**

Reservoir.—See **RESERVOIR—Concrete Lining, Waterproofing.**

U. S. Printing Office.—Waterproofing the Basement of the Government Printing Office Building. John S. Sewell. A description of the tile drains and waterproofing courses at this large structure. 800 w. Eng Rec—Jan. 12, 1901.

WATER PURIFICATION.

See also **FEED WATER PURIFICATION; FILTRATION; RIVER POLLUTION; SEWAGE DISPOSAL; WATER POLLUTION; WATER SOFTENING; WATER SUPPLY; WATER-WORKS.**

The Purification of Water. P. A. Maignen. A review of the whole subject as it appeared a half century ago, and as it appears at present. 4000 w. Am Water Wks Assn—June, 1901.

Water Purification. P. A. Maignen. A review of the history of filtration, appliances used, results, etc. Ill. 8000 w. Jour W Soc of Engrs—Feb., 1902.

Notes on Sewage Clarification (Beiträge zur Abwasserklärung). H. C. Nussbaum. An examination of the character of various kinds of sewage, and the purification methods applicable to each. Serial. Part I. 2000 w. Gesundheits-Ingenieur—May 31, 1901.

Purification of Water for House Purposes. W. H. Matlack. Considers ways that water is contaminated, and the means of purification. 3300 w. Dom Engng—Sept. 15, 1901.

Water Purification for Domestic Use. F. Rigaud. Discusses methods of sterilization of water, and other considerations that must be taken into account. Especially favoring the ozone process. 3000 w. Min & Sci R—April 5, 1902.

The Purification and Sterilization of Water. Dr. Rideal. This first lecture considers the purification by uncontrolled natural agencies, natural purification of surface waters, protection of sources, etc. Serial. 1st part. 6000 w. Jour Soc of Arts—July 18, 1902.

Water Purification. William R. Copeland. An illustrated article describing the mechanical, and slow sand filters, their operation and the advantages of each. 4000 w. Harvard Engng Jour—May, 1903.

The Purification of Water. Prof. John M. Ordway. Paper before the Louisiana Engineering Society, giving a general review. 8000 w. Jour Assn of Engng Socs—July, 1904.

The Purification of Water. Prof. John M. Ordway. Extract. Remarks on methods used for removing color, iron, hardness, etc. 2800 w. Am Mach—Vol. 27, No. 39.

Water Purification. D. J. Russell Duncan. Read before the Engrs' Club of Toronto. Brief references to various methods, with suggestions for the application of practical processes, economical in operation and maintenance. 4500 w. Can Engr—June, 1905.

America.—The Present Status of Methods of Purification of Water in America. A report to the American Public Health Assn., by Allen Hazen, giving statistics of large plants. 1800 w. Eng Rec—Nov. 10, 1900.

Anabaena Removal.—See **Springfield, Mass.**

Anderson Process.—The Purification of Water by Iron (L'Epuration des Eaux par le Fer). A description of the practical working of the Anderson process with Seine water at Choisy-le-Roi, near Paris. Two articles. 4000 w. Revue Technique—July 10, 25, 1901.

Bacterial.—An Improved Method for the Bacterial Purification of Water (Nouvelle Contribution à l'Epuration Bacterienne des Eaux). MM. P. Miquel & H. Mouchet. Showing the excellent results obtained by filtration through a non-submerged bed of fine sand. 1000 w. Comptes Rendus—July 18, 1904.

See also **Physical Agents; Self; SEWAGE DISPOSAL.**

Brewery, Rotherham.—See **SEWAGE DISPOSAL.**

Butte, Mont.—See Copper Sulphate.

Chemistry.—The Coagulation and Precipitation of Impurities in Water Purification. Joseph W. Ellms. Read before the Cincinnati Sec. of the Am. Chem. Soc. Comments on observed facts in water purification in the light of physical chemistry, describing investigations made of the Ohio River water. 3800 w. Eng Rec—May 13, 1905.

Clarifying Plant.—Clarifying Plant for Waste and Drainage Waters. Translated from "Glückauf." Illustrated description of plant in which the solid impurities are removed by mechanical means at a minimum expenditure of labor. 300 w. Col Guard—Feb. 13, 1903.

Coke Works.—To Purify Pit Water at Coke Works. A brief explanation of the system devised by Prof. John W. Langley. 800 w. Ir Trd Rev—March 23, 1905.

Color, Odor, Organisms.—See Organisms; WATER.

Columbus, O.—See SEWAGE DISPOSAL.

Copper Sulphate.—Preventing the Growth of Algae in Water Supplies. Extracts from Bul. No. 64, Dept. of Agriculture, by George T. Moore and Karl F. Kellerman, on the use of copper sulphate for the treatment of water supplies, with comments and editorial. 9500 w. Eng News—May 26, 1904.

Copper Sulphate and Copper Foil or Copper Vessels for the Treatment of Typhoid-Infected Water. Gives statements by Dr. George T. Moore and Prof. Henry Kraemer in regard to the use of copper or copper compounds as a germicide in potable water. 1600 w. Eng News—Feb. 9, 1905.

Copper as an Algicide and Disinfectant in Water Supplies. Karl F. Kellerman. Abstracted from Bul. No. 76 of the Bureau of Plant Ind., Dept. of Agri. Gives results of laboratory work, and practical applications of this method. Serial. 1st part. 2200 w. Sci Am Sup—May 20, 1905.

The Copper Sulphate Treatment for Algae at Elmira, N. Y. James M. Caird. An account of the treatment and the cost. 900 w. Eng News—July 14, 1904.

The Copper Sulphate Treatment for Algae at Middletown, N. Y. James M. Caird. A brief account of the treatment and results at the different reservoirs. 1200 w. Eng News—Jan. 12, 1905.

The Use of Sulphate of Copper for the Destruction of Algae in Reservoirs (Emploi der Sulfate de Cuivre pour la Destruction des Algues dans les Réservoirs d'Eau Potable. A review of the proposed method of purifying water by sulphate of copper. 2000 w. Génie Civil—Aug. 13, 1904.

Treatment of a Reservoir of the Butte Water Co. with Copper Sulphate. Eugene Carroll. Description of favorable experience with copper sulphate for destroying vegetable organisms in water supplies; with photo-micrographs and tables. 1500 w. Eng News—Aug. 18, 1904.

Copper Sulphate Treatment of Lakes Clifton and Montebello, Baltimore Water Works. Alfred M. Quick. Two low-service storage reservoirs became troubled with algae, and the treatment given and methods of application is described. 1500 w. Eng Rec—Sept. 24, 1904.

The Use of Copper Sulphate to Prevent Algae Growths at Hanover, N. H. Prof. Robert Fletcher. Brief description of this manner of purification and its complete success. 700 w. Eng News—Oct. 27, 1904.

Purification of Water by Copper Sulphate. Daniel D. Jackson. Read before the Am. Soc. Munic. Imp. Gives results obtained by the writer in ponds and reservoirs showing this to be a satisfactory method of removing green growths. 1400 w. Munic Engng—Oct., 1905.

The Treatment of Water with Copper Sulphate at Denver, Colo. George T. Prince. Gives results of the treatment of a small lake at City Park, and also the treatment of Marston Lake reservoir. Ills. 500 w. Eng News—Nov. 30, 1905.

See also FILTRATION—Anderson, Ind.

De Frise Process.—See Ozone.

Denver, Colo.—See Copper Sulphate.

Distillation.—See DISTILLATION.

East Jersey Water Co.—The Water Purification Works of the East Jersey Water Company of Little Falls, New Jersey. George W. Fuller. Illustrated description of a plant for purifying 40,000,000 gals. daily by coagulation and mechanical filtration. The entire plant is built of concrete, the filter tanks being square in order to economize space. 2000 w. Eng Rec—May 11, 1901.

Electric Steriliser.—The Otto Electric Steriliser. Translated from "La Nature." Illustrates and describes an apparatus for the sterilization of water in private houses. 900 w. Sci Am Sup—Dec. 31, 1904.

Elmira, N. Y.—See Copper Sulphate.

Europe.—The Status of Foreign Methods of Water and Sewage Purification. A statement prepared for the American Public Health Assn. 700 w. Eng Rec—Nov. 10, 1900.

Feed Water.—The Purification of Feed Water. J. B. Greer. Reviews the development of water purification in the United States. General discussion. 8000 w. Ry Club of Pittsburgh—Feb., 1903.

See also FEED WATER PURIFICATION; WATER SOFTENING.

Ferrous Sulphate.—See FILTRATION—Anderson, Ind.; Lorain, O.; Quincy, Mass.

Filtration.—See FILTRATION.

Hanover, N. H.—See Copper Sulphate.

Ice Plants.—Water Softening and Purifying Systems for Ice Plants. J. C. Wm. Greth. States the advantages of a system of water softening and purifying in ice-making, and describes the We-Fu-Go system. 1500 w. Ice & Refrig—Aug., 1902.

See also DISTILLATION; REFRIGERATION.

Iron Coagulant.—See Anderson Process; FILTRATION—Lorain, O.

Iron Removal.—The Removal of Iron from Water. A description of small works in Germany and a review of experiments by the Massachusetts Board of Health at Watertown, Marblehead and Provincetown. 2500 w. Eng Rec—Dec. 29, 1900.

Removal of Iron From the Water Supply of Superior, Wis. R. D. Chase. History of the water supply is given, with illustrated description of the plant. Gives details of the filter beds, clear water reservoir, aerator, etc. 4000 w. Eng News—Feb. 21, 1901.

See also WATERWORKS—Prenzlau, Prussia.

Iron Sulphate.—See FILTRATION—Anderson, Ind.; Lorain, O.; Quincy, Mass.

Lime.—See FILTRATION—Anderson, Ind.

Louisville, Ky.—Water Purification in Louisville. Part first gives an illustrated description of the construction of concrete clear-water basins and concrete-steel vaulting. Serial. 1st part. 1800 w. Eng Rec—Jan. 5, 1901.

A Proposed New System of Mechanical Filtration for Louisville, Ky. Describes a new system developed by Charles Hermany. Ill. 1500 w. Eng News—Jan. 17, 1901.

McKeesport, Pa.—See RESERVOIR.

Moorland Water.—The Treatment of Moorland Water to Prevent Action Upon Lead Pipes. C. Clemesha Smith and E. M. Chaplin. Abstract of a paper before the British Water Works Assn. A description of methods tried and the conclusions and cost. Ills. 4500 w. Eng News—June 23, 1904.

Treatment of Moorland Water to Prevent Action upon Lead Pipes. Abstract of a paper by C. C. Smith and E. M. Chaplin before the British Assn. of Waterworks Engrs., giving account of the treatment of the water supply of Wakefield with carbonate of soda and by other methods. 1400 w. Eng Rec—Aug. 13, 1904.

New Orleans.—Water Purification Experiments at New Orleans. A report of the systems tested, the experiments made with each, and the one adopted. 2800 w. Eng Rec—June 6, 1903.

See also PUMPING STATION; WATER SUPPLY.

Organisms.—Removal of Color, Organisms and Odor from Water. H. W. Clark. Describes some filtration experiments, the main object of which was the removal from water of coloring matter, odors, and the organisms producing odors. 3000 w. Jour N Eng Wwks Assn—March, 1903.

See also WATER—Decolorization; Turbidity.

Otto Electric Steriliser.—See Electric Steriliser.

Ozone.—The Purification of Drinking Water by Ozone (Reinigung von Trinkwasser durch Ozon).

Dr. Thomae. A review of the processes exhibited at the Paris Exposition with a general discussion of the practicability of the method. 3000 w. Zeitschr d Ver Deutscher Ing—Dec. 8, 1900.

The Sterilization of Water by Ozonized Air (Die Wassersterilisierung durch Ozonisierte Luft). F. Krall. A description of the Abraham & Marmier process for sterilising water for household use. 1500 w. Elektrochem Zeitschr—Aug., 1901.

The Purification of Drinking Water by Ozone (Die Reinigung des Trinkwassers durch Ozon). Dr. H. J. van't Hoff. A review of the methods thus far applied, with tabulated data and results of tests in Holland, Belgium, France, and Germany. 1500 w. Zeitschr f Elektrochemie—July 24, 1902.

The Sterilization of Water by Means of Ozone (Stérilisation de l'Eau par l'Ozone). Dr. Ed. Imbeaux. General illustrated historical and descriptive review. Serial. 2 parts. 4500 w. Rev Technique—June 25 and July 10, 1903.

Recent Applications of Ozone in Water Sterilization (Weitere Beiträge zur Technik der Ozonwasserwerke). Dr. G. E. Erlwein. Data and results of recent investigations into the sterilization of drinking water by ozone. 3000 w. Gesundheits-Ingenieur—Oct. 31, 1903.

Purification of Potable Water by Means of Ozone. Dr. G. Erlwein. Read before the Deutscher Verein von Gas und Wasserfachmaennern. An illustrated account showing what may be expected of the employment of ozone in connection with sterilization of water. Serial. 500 w. Sci Am Sup—April 30, 1904.

The Water Sterilization Works at Saint Maur. Emile Guarini. Illustrates and describes experimental works for the sterilization of water by the use of ozone at these works in Paris. 1500 w. Elec Engr, Lond—April 14, 1905.

Sterilization of Water. Emile Guarini. Illustrated description of the De Frise ozonizing plant and its working. 1700 w. Sci Am—Sept. 2, 1905.

See also **OZONE.**

Ozone, Germany.—The Siemens Ozone Purifying Plants at Wiesbaden, Schierstein and Paderborn (Siemenssche Ozonwasserwerke, Wiesbaden-Schierstein und Paderborn). Dr. G. Erlwein. Detailed illustrations of these extensive plants, sterilizing 250 cubic metres of water per hour by means of ozone. 2000 w. Zeitschr f Elektrochemie—Nov. 27, 1902.

German Ozone Waterworks. Dr. G. Erlwein. An illustrated description of water purifying works at Schierstein, near Wiesbaden and at Paderborn, Germany, where ozone is electrically produced from air and employed on a practical scale as a sterilizing and oxidizing agent. 1500 w. Elec Wld & Eng—Jan. 17, 1903.

Two German Plants for Sterilising Water by Ozone. Illustrated description of the recently opened plants at Wiesbaden and Paderborn, which are the first German works using ozone for sterilising drinking water on a commercial scale. 1000 w. Electro-Chem Ind—Jan., 1903.

Water Purification by Means of Ozone. Brief illustrated description of an experimental plant erected in Berlin some three years ago. 900 w. Elec Engr, Lond—Nov. 8, 1901.

The Sterilization of Water by Ozone upon the Siemens & Halske System (Ueber die Abtötung Pathogener Bakterien im Wasser mittels Ozon nach dem System Siemens & Halske). Messrs. Schüder & Proskauer. A discussion of the experiments made upon the water of the river Spree, at Berlin. 2000 w. Gesundheits Ingenieur—Jan. 10, 1903.

Physical Agents.—The Effect of Physical Agents on Bacterial Life. Allan Macfadyen. A lecture before the Royal Inst. of Great Britain. Gives information regarding the physical conditions favoring the presence and multiplication of bacteria, and to their destruction. 5000 w. Pop Sci M—Jan., 1901.

Pittsburg.—The Pittsburg Water Purification Works. Illustrated detailed description of new works to comprise a pumping station and a large slow-sand filtration plant. 4500 w. Eng Rec—Jan. 25, 1902.

The Revised Plans for the Purification of the Pittsburg Water Supply. Illustrated description of a proposed plant, one of the largest in the world, noting the unusual features. 4800 w. Eng Rec—Feb. 4, 1905.

Refrigeration.—See Ice Plants; **REFRIGERATION—Water Supply.**

St. Louis, Mo.—St. Louis Water Purification. Minority report of the commissioners. The plan of Allen Hazen. 3000 w. Fire & Water—Aug. 16, 1902.

Coagulation Plant at the Settling Basins at St. Louis, Mo. E. E. Wall. Describes the new process in use at St. Louis for clarifying and purifying the Mississippi River water. 1800 w. Eng News—Oct. 27, 1904.

Saint Maur, Paris.—See Ozone.

Sedimentation.—On Sedimentation. Allen Hazen. A discussion of the subject from a theoretical standpoint, giving computations which show the reasons for several forms of construction now used. 10,700 w. Pro Am Soc of Civ Engrs—April, 1904.

On Sedimentation. Discussion on paper by Allen Hazen on water purification. 2000 w. Pro Am Soc of Civ Engrs—Aug., 1904.

The Automatic Removal of Solids from Water. Walter J. May. On the use of subsidence classifiers. 1000 w. Prac Eng—May 27, 1904.

See also St. Louis; Subsiding Basins; Washington; **WATERWORKS—Denver, Colo.**

Self.—The Bacterial Self-Purification of Streams. Concerning the investigations conducted by Edwin Oakes Jordan, Ph. D., on the waters of the Illinois River and its tributaries, including observations at various points as far as the Mississippi. 1800 w. Sci Am Sup—March 2, 1901.

The Pollution and Self-Purification of Streams (Die Verunreinigung und Selbstreinigung der Flüsse). H. C. Nussbaum. An examination of the bacteriological conditions of rivers, with regard to their use for water supply; with data from various German rivers. 3000 w. Gesundheits-Ingenieur—March 15, 1901.

Self-Purification of Polluted Water Courses. Extracts from a report by Dr. Arthur R. Reynolds on experiments made on the waterway between Chicago and St. Louis. 4000 w. Eng Rec—March 16, 1901.

A Study of Self-Purification in the Sudbury River. A. G. Woodman, C. E. A. Winslow, and Paul Hansen. States the conditions of this river in Massachusetts, describes the investigations and reports results and conclusions. 3000 w. Tech Qr—June, 1902.

Septic Tank.—See Bacterial; **SEWAGE DISPOSAL.**

Siemens & Halske.—See Ozone, Germany.

Softening.—See **WATER SOFTENING.**

Springfield, Mass.—Experiments on the Purification of the Springfield Water Supply. Describes investigations to determine the practicability of filtering a supply contaminated by organisms. 1900 w. Eng Rec—July 12, 1902.

Removal of Anabaena from Reservoir Water. An account of the trouble with this species of algae at the Ludlow water supply of Springfield, Mass., and the investigations made for the purpose of eliminating the trouble. 2000 w. Eng Rec—July 2, 1904.

Sterilization.—The Sterilization of Water (Die Wassersterilisation). Dr. Schüder. A general review of water purification and methods of removing injurious bacteria. 4000 w. Gesundheits-Ingenieur—June 10, 1903.

Subsiding Basins.—The Utility of Subsiding Basins. Review of a monograph by Wynkoop Kiersted, giving the results of experiments on the clarification of Missouri River water at Kansas City by sedimentation and coagulation. 2500 w. Eng Rec—May 17, 1902.

See also St. Louis; Sedimentation; Washington; **WATERWORKS—Denver.**

Sulphate of Iron.—See **FILTRATION—Anderson, Ind.; Lorain, Ohio; Quincy, Mass.**

Superior, Wis.—See Iron Removal.

Toledo, O.—Water Purification Works for Toledo. Information concerning the 20,000,000-gal. mechanical filtration plant for the municipal waterworks in which work is to be started immediately. 1200 w. Eng Rec—Sept. 30, 1905.

Washington, D. C.—Water Purification in Washington. Gives the reasons of R. Hering, G. W. Fuller and A. Hazen for recommending slow filters, sedimentation basins and the occasional use of a coagulant for purifying the Potomac River water. 800 w. Eng Rec—Feb. 23, 1901.

Experts' Report on Water Purification at Washington, D. C. Report of Messrs. Rudolph Hering, George W. Fuller, and Allen Hazen, to the chairman of the U. S. Senate Committee. 2000 w. Eng News—Feb. 28, 1901.

See also **FILTRATION.**

Worms.—See **WATERWORKS—Prussian.**

WATER RAISING.

See also **AIR LIFT; HOISTING—Electric Water; HYDRAULIC RAM; MINE DRAINAGE; PUMP; SCOOP WHEEL; WATER SCOOP; WATER WHEEL.**

Wheel Pumps.—See **PUMP—Wheel.**

WATER RATES.

See also **WATER METER; WATER SUPPLY; WATER WASTE; WATERWORKS; WATERWORKS LAW; WATERWORKS MANAGEMENT.**

"Fair, Just and Reasonable Water Rates." A discussion from the point of view of a private company, of certain factors to be considered in determining rates. 2500 w. Eng Rec—Sept. 20, 1902.

The Principles Governing the Valuation for Rate Fixing Purposes of Waterworks Under Private Ownership. Arthur L. Adams. Read before the Pacific Coast Engng. Cong. Considers the various factors likely to influence the value of any property, discussing their degrees of importance. 8000 w. Eng Rec—Aug. 5, 1905.

Metered Service.—Rates for Metered Water. A topical discussion, opened by Freeman C. Coffin. 8000 w. Jour N Eng Wwks Assn—June, 1904.

Metered Services. F. G. Kimball. Read defore the Am. Wwks. Assn. A defence of the minimum rate charged when water is sold by meter. 2500 w. Fire & Water—Aug. 27, 1904.

Municipal.—A Little Talk About Water Rates. John C. Chase. Considers the municipality should pay for water consumed in public buildings, street sprinkling, sewer flushing, fountains, &c., at the same rate as private consumers. Discusses a fair basis for rates, and the wisdom of conducting the water department as a business enterprise. 2000 w. Jour N E Waterwks Assn—June, 1903.

See also **WATERWORKS MANAGEMENT.**

San Antonio, Tex.—The Adjustment of Water Rates. A study of certain features of a report by Chester B. Davis to the San Antonio, Tex., Waterworks Company, which closed a controversy which had lasted eighteen months. 2000 w. Eng Rec—Aug. 9, 1902.

WATER RIGHTS.

See also **GROUND WATER; WATER POWER; WATER SUPPLY; WATERWORKS LAW.**

Back Water.—The Estimation of Damages to Power Plants from Back Water. A decision of the Maine Supreme Court outlining the methods of ascertaining the damages caused by flashboards. 3500 w. Eng Rec—April 26, 1902.

California.—Water Rights in California. Samuel C. Wiel. The present article reviews the history of the law of water in California. Serial. 1st part. 1500 w. Min & Sci Pr—Dec. 17, 1904.

Compensation in Kind.—Proposed Compensation in Kind for Water Diverted for the Supply of Norwich, Conn. Hill, Quick & Allen. Outlines a plan for compensating mill-owners for diverted water by supplying them with stored water in times of drought. 2000 w. Eng News—May 23, 1901.

Diversion.—See **WATER POWER—Valuation.**

Elgin Water Power.—The Elgin Water Power Decision. An opinion by the Illinois Supreme Court that a company managing the dam and raceways of several power users is without legal right to sue for damages caused by a diversion of water above the dam by other parties. 3000 w. Eng Rec—March 29, 1902.

England.—See **GROUND WATER.**

Forbell Case.—See **Ground Water.**

France.—Water-Power Plants in France (Les Usines Hydrauliques Publiques). Dr. Louis Rachou. A criticism of the French law governing the development of water-power on rivers in France. 2000 w. Génie Civil—April 6, 1901.

See also **WATER POWER.**

Government Control.—The Control of Non-Navigable Streams by the National Government. Informal discussion in view of the numerous disasters caused by the contracting of channels, or the damming of small streams, whether they should not be under the control of the national government. 4000 w. Pro Am Soc of Civ Engrs—Aug., 1902.

Ground Water.—The Forbell Case. A review of a decision by the New York Court of Appeals practically forbidding the use of ground water for purposes of municipal supply, with a statement of the possibility of obtaining a reconsideration of the decree by means of data obtained from agricultural experiment stations. 1000 w. Eng Rec—Dec. 1, 1900.

I. The Latest Decision Affecting Underground Water Supplies, Borough of Brooklyn, New York City. II. British Law in Regard to Underground Water. J. Shiress Will. British law acknowledges no ownership except when in well-defined channels. New York law sustains the claim for ownership. 3800 w. Eng News—Dec. 6, 1900.

A New Ruling Concerning Underground Water Rights. Review of a decision by which the New York law, making the pumping of underground water from another's land a trespass, is interpreted so as to prevent injustice to the owners of the pumping plant. 1200 w. Eng Rec—July 20, 1901.

Underground Water. Editorial discussion of a case recently brought before the English courts. 1500 w. Engng—Aug. 22, 1902.

Ground Water, South Dakota.—The Definition of a Running Underground Stream. Review of a decision by the South Dakota Supreme Court, hinging on a precise definition of a running underground stream. 1000 w. Eng Rec—Sept. 7, 1901.

Irrigation.—Water Rights. Elwood Mead. Explains the methods by which running water, which is gathered into streams from the rains and melting snows of the mountains, is divided among the ditches and farms and is bought and sold like any other property. 3600 w. Trans Assn of Civ Engrs of Cornell Univ—1903.

See also **IRRIGATION.**

Norwich, Conn.—See **Compensation in Kind.**

Ohio.—The Relative Rights of Power Plant Owners and Cities to River Water. An opinion of the Ohio Supreme Court in the case of the city of Canton vs. Shock's Mill. 3300 w. Eng Rec—Aug. 9, 1902.

Riparian.—Interstate Riparian Water Rights. Full text of decision of United States Circuit Court of Appeals in Pine v. Mayor of New York. This decision practically forbids any corporation or individual of one state to interfere in any manner with the free flow of water in a stream entering another state. Also editorial. 4600 w. Eng Rec—Feb. 8, 1902.

Utah.—A Complication of Water Rights. Condensation of the opinion rendered in a case in Utah, which is of interest to hydraulic engineers and managers of waterworks. 3500 w. Eng Rec—Aug. 30, 1902.

WATER SCOOP.

See also **RAILWAY WATER SERVICE; SCOOP WHEEL.**

France.—The Feeding of Locomotives in Motion (Alimentation des Locomotives en Marche). A general review of the devices for taking up feed water for locomotives from tanks between the rails, with details of the methods used on the French railways. 2000 w. 1 plate. Génie Civil—June 8, 1901.

Lake Shore Ry.—Track Tank Water Scoop. Illustrates and describes a design worked out by H. F. Ball for the L. S. & M. S. Ry. for use on fast passenger locomotives and also in freight equipment. The tests give a very satisfactory performance. 900 w. Am Engr & R R Jour—Nov., 1900.

N. Y. Central Ry.—A New Track Tank Water Scoop. Illustrated description of an interesting design for the N. Y. C. & H. R. R. R. 900 w. Am Engr & R R Jour—May, 1901.

Experiments with Track Tank Scoops. Gives results of some experiments made last year on the N. Y. C. & H. R. R. 900 w. Am Engr & R R Jour—Dec., 1901.

Theory.—Theory of Locomotive Water-Scoops. I. P. Church. Explanation of case with open trough, and case with closed pipe. 1400 w. Am Engr & R R Jour—Dec., 1901.

WATER SHED.

See also **RAINFALL; WATER POWER; WATER SUPPLY.**

Drainage.—See **DRAINAGE—Sudbury, Mass.**

WATER SOFTENING.

See also **FEED-WATER PURIFICATION; WATER PURIFICATION.**

Iowa Well Water.—Notes on the Softening of Iowa Well Waters. Prof. Nicholas Knight. A condensed record of investigations in the chemical laboratory of Cornell College, Mt. Vernon, Iowa, by C. G. Eldredge. Tables. 800 w. Eng News—Aug. 18, 1904.

Kennicott.—The Kennicott Water Softening System. Illustrated detailed description. It consists in the addition of soda and lime solutions, supplemented by the sedimentation of the treated water. 2000 w. Eng News—May 15, 1902.

Otterbourne.—The Largest Water Softening Plant in the World. Illustrated account of the plant at Otterbourne, near Southampton, England, which treats over four million gallons a day. 3300 w. Ir & Coal Trds Rev—Jan. 17, 1902.

Winnipeg.—The Municipal Water-Softening Plant at Winnipeg. Describes a modified Clark system of softening at a plant furnishing 1,500,000 gallons daily. 1500 w. Eng Rec—June 14, 1902.

WATER STATION.

See **RAILWAY WATER SERVICE; WATER SCOOP.**

WATER STORAGE.

See also **IRRIGATION; RAILWAY WATER SERVICE; RESERVOIR; STANDPIPE; TANK; WATER POWER; WATER SUPPLY; WATER TOWER; WATERWORKS.**

Air Pressure.—See **WATERWORKS—Babylon, N.Y.; Trotwood, O.**

Flood Water.—See **WATER SUPPLY—Storage.**

WATER SUPPLY.

See also **AQUEDUCT; DAM; FILTRATION; GROUND WATER; PLUMBING; RAINFALL; RESERVOIR; WATER FLOW; WATER METER; WATER PIPE; WATER POLLUTION; WATER RATES; WATER RIGHTS; WATER WASTE; WATERWORKS; WATERWORKS LAW; WATERWORKS MANAGEMENT; WELL.**

The Supply of Towns with Potable Water (L'Alimentation des Villes en Eau Potable). F. Dienert. Discussing especially the causes of pollution and the best methods of purification, including various systems of filtration. 5000 w. Rev Gen des Sciences—Oct. 15, 1903.

Shall We All Die of Thirst? J. E. Whitby. Remarks on the future outlook for the water supply; showing that the waters of the earth are drying up, and discussing briefly the causes, and the possible remedy. 1100 w. Sci Am Sup—July 22, 1905.

Africa, West.—Water Supply of West African Towns. Henry Reeve. Describes the protected tanks for holding rain water, the construction of wells, and other means of supply suited to the location and conditions. 4500 w. Jour Roy San Inst—Jan., 1905.

Algae.—See **WATER PURIFICATION—Copper Sul-**

American Cities.—See **WATER METER—Statistics; WATERWORKS.**

Amsterdam, Holland.—The Water Supply of Amsterdam, Holland. W. P. Mason. Explains how the supply of water is secured from the sand dunes. 1000 w. Eng News—April 27, 1905.

Notes on the Improved Water Supply Works for the Amsterdam District (Mededeeling betreffende de Werken ten Behoeve van de Drinkwatervoorziening in de Stelling van Amsterdam). R. P. van Royen. Describing the complete plant for a filtered supply of ground water. 15,000 w. De Ingenieur—Nov. 11, 1905.

Amsterdam, N. Y.—See **DAM.**

Ansonia Hotel.—See **PLUMBING.**

Arid Regions.—See **Imperial Valley, Cal.; U. S. Arid Regions; IRRIGATION; RESERVOIR.**

Asylum.—See **Kalamazoo.**

Atlantic City, N. J.—See **WATER PIPE; WELL.**

Belfast, Ireland.—Belfast Water Supply. An illustrated account of the recent extensions. 2000 w. Engr, Lond—Oct. 18, 1901.

Berlin.—See **GROUND WATER.**

Birmingham.—Birmingham's New Water Supply. An illustrated detailed description of the whole undertaking. An important engineering work. 4800 w. Engr, Lond—July 22, 1904.

Black Hills, S. D.—Notes on the Water Supplies in the Black Hills of South Dakota and Vicinity. Ellen H. Richards. Remarks on the importance of securing uncontaminated supplies for mining camps, with information concerning peculiarities of the region named. 1000 w. Tech Qr—Dec., 1903.

British.—Water Supply. Editorial on the wonderful progress of the nineteenth century; the review is confined principally to Great Britain. 2500 w. Engr, Lond—Jan. 4, 1901.

Water Affairs. An editorial review of the principal events of the past year in England. 5000 w. Jour Gas Lgt—Dec. 31, 1901.

Mr. Percy Griffith on Water Supply. Extract from the inaugural address at the Society of Engineers, touching on the lines of advancement for the present and future. 5000 w. Jour Gas Lgt—Feb. 11, 1902.

See also **RAINFALL; SANITARY ENGINEERING.**

British Control.—The Administration and Control of the Nation's Water Supply. R. E. Middleton. Abstract of a paper read before the British Assn. of Wwks. Engrs., and of the discussion. Discusses the present British laws bearing on this subject, and the need of their revision. 4800 w. Jour Gas Lgt—July 5, 1904.

British Drought.—The Autumn's Drought. An account of the drought in England during the autumn of last year, and its effect on the water supply. 4000 w. Engr, Lond—Feb. 7, 1902.

Brooklyn.—Proposed Further Development of Underground Water Supply for Brooklyn. I. M. de Varona. From the report of the N. Y. Dept. of Water Supply, Gas and Electricity for the quarter ending June 30, 1902. Illustrates different methods of collecting underground water, with outline of plan proposed. 1800 w. Eng News—Oct. 9, 1902.

Brussels.—The Water Supply of Brussels in 1902 (Les Eaux de Bruxelles en 1902). E. d'Esmenard. An abstract of a report by E. Putzeys, chief engineer, on the water supply and service of Brussels. 2000 w. Rev Technique—April 10, 1903.

Calcutta.—The Dual Water Supply of Calcutta. Describes the two distinct systems of waterworks made necessary by local conditions. 3000 w. Eng Rec—Aug. 9, 1902.

California.—See **RAINFALL.**

Carnegie Residence.—See **PLUMBING.**

Chelmsford, Eng.—See **Maldon.**

Chemnitz, Germany.—The Ground Water Supply of Chemnitz, Germany. Description of a supply drawn from wells, of which the yield is artificially increased by diverting part of the water of a neighboring stream over the surface of the land near the wells. 1200 w. Eng Rec—Sept. 7, 1901.

Chicago.—See **Office Building; WATERWORKS.**

Cincinnati, O.—See **WATERWORKS.**

Condensing Purposes.—See **CONDENSER—Water.**

Constantinople.—The Water Supply of Constantinople (Die Wasserversorgung von Konstantinopel). H. Gruner. A description of the modern supply of the city, and its recent improvement. 2000 w. Gesundheits-Ingenieur—April 30, 1901.

Consumption.—The Effect of Water Meters on Water Consumption in the Larger Cities of the United States. George I. Bailey. Information of importance collected and tabulated, with editorial comment. Shows the average per capita daily consumption to be 137 gallons. 3200 w. Eng News—April 18, 1901.

Some Observations on the Household Consumption of Water. Henry C. Hodgkins. Describes the service and gives readings of water meter taken at varying intervals under a variety of conditions. 1800 w. Am Waterwks Assn—June, 1901.

The Consumption of Water in Municipal Supplies and the Restriction of Waste. An informal discussion of the annual convention, July 27, 1901. 10,900 w. Pro Am Soc of Civ Engrs—Aug., 1901.

Water Consumption in American Cities. E. Kuichling. A study in water meter statistics by an expert engineer. 1500 w. Munic Jour & Engr—Dec., 1903.

Water Consumption in Pittsburg and the Probable Effect of Metering. Gives information regarding water consumption in various cities, compiled with the view of showing the relation between per capita consumption and the installation of meters. 2500 w. Eng Rec—May 14, 1904.

See also Lick Observatory; Massachusetts; WATER METER; WATER WASTE; WATERWORKS.

Corn Exchange Bldg.—See **PLUMBING.**

Crenothrix.—See **WATER POLLUTION.**

Danube-Oder Canal.—See **CANAL.**

Data for Computations.—Data for Water Supply Computations. An editorial discussion of the inadequate nature of data in several branches of hydrography. 1000 w. Eng Rec—July 20, 1901.

Derwent Valley, Eng.—See **WATERWORKS.**

Eaton, Eng.—See **WELL.**

Engineering.—See **WATERWORKS.**

Farm.—Water Supply for Farm Buildings. An illustrated description of work and an account of how it was secured and erected. 1500 w. Met Work—Nov. 18, 1905.

Fire Protection.—See **WATERWORKS—Fire Service.**

Fire Service.—See **WATERWORKS.**

Gibraltar.—The Water Supply of Gibraltar. William P. Mason. An illustrated account of the sources of water supply, the storage system, etc. 1100 w. Eng News—June 27, 1901.

Ground Water.—See **Chemnitz; Magdeburg; Paris; GROUND WATER; WELL.**

Hamilton, Ohio.—Contamination of the Water Supply of the City of Hamilton, Ohio. John Lorens. Gives briefly the history of this city's supply, and the plan adopted for remedying the latest trouble. 1200 w. Munic Engng—Feb., 1902.

Havana.—The Water Supply of Havana. Charles D. McDowell. An illustrated article giving an account of conditions under the Spanish rule, improvements under American rule, and needed reforms. 2000 w. Munic Jour & Engr—June, 1903.

See also **SANITARY ENGINEERING; SEWERAGE.**

Hawaiian Sugar Plantation.—Methods of Obtaining Water Supply for Sugar Plantations in the Hawaiian Islands. J. N. S. Williams. Describes methods of irrigation in a country very much cut up by gulches, and on islands where an artesian supply was available. Ills. 3000 w. Can Min Rev—April 30, 1904.

High Pressure.—See **WATERWORKS—Fire Service.**

Holyoke, Mass.—The Holyoke Water Supply. A. M. French. Gives the history of its conception, birth and continuous growth up to its present magnificent system. Map. 6300 w. Jour N Eng Wwks Assn—Dec., 1904.

Hudson, N. Y.—See **FILTRATION.**

Ideal.—Concerning an Ideal Water Supply. George W. Fuller. Read before the Minnesota State San. Assn. Considers some of the aspects of public supplies and means taken to secure purity. 4800 w. Munic Jour & Engr—Feb., 1903.

Imperial Valley, Cal.—Potable Waters in Arid Regions. J. E. Roadhouse. Describes the conditions in Imperial Valley, Cal., and the problem of preparing pure drinking water. 1800 w. Cal Jour of Tech—April, 1904.

Inspection.—The Work of Sanitary Inspection on the Metropolitan Waterworks. William W. Locke. Read before the N. E. Waterworks Assn. Calls attention to the dangers through pollution of the sources of water supply by house and barn drainage, suggesting means of prevention. 2700 w. Eng Rec—Sept. 28, 1901.

The Work of Sanitary Inspection on the Metropolitan Waterworks. William W. Locke. Calls attention to the dangers to health where surface waterworks are in operation, and suggests some of the agencies through which pollution may be prevented. Also discussion. 3500 w. Jour N Eng Waterwks Assn—Dec., 1901.

See also **Protection.**

Intake Tunnel.—See **INTAKE.**

Ithaca, N. Y.—See **WATER POLLUTION; WATERWORKS; WELL.**

Jersey City, N. J.—A Kindergarten Lesson in Water Supply. An account ofJersey City's experience in buying waterworks and water rights from a contractor without itself preparing plans. 1200 w. Eng Rec—April 12, 1902.

See also **WATER PIPE.**

Kalamasoo, Mich.—The Water Supply of the Michigan Asylum for the Insane at Kalamasoo. George S. Pierson. A statement of the conditions, with illustrated description of the new well, which is connected by a siphon with the old well. 2000 w. Eng Rec—Aug. 16, 1902.

Kansas Cities.—Some City Water-Supplies. E. H. S. Bailey and Edward Bartow. Considers the supply of the Neosho River System for the cities of Chanute, Oswego and Chelopa, giving analysis and conclusions. 2500 w. Bul Univ of Kansas—Vol. II., No. 7, Nov., 1903.

Lackawanna Steel Works.—The Water Supply of the Lackawanna Steel Works. Illustrates and describes a supply drawn directly from Lake Erie without filtration, to be used for industrial and mechanical purposes. May require daily from 70,000,000 to 75,000,000 gallons. 2400 w. Eng Rec—Nov. 21, 1903.

Lancashire.—Potable Waters in Southwest Lancashire. J. Campbell Brown. Considers the quality of the surface waters, deep wells and spring waters, giving results of analysis. 1500 w. Engng—Oct. 2, 1903.

Large Cities.—Water Supply of Large Cities. George Y. Wisner. Discusses the methods adopted by various cities, the need of filtration, etc. 2500 w. Technic—1902.

See also under names of cities.

Leoben, Austria.—The Arrangement of a Water Distribution System Fed by Two Separate Reservoirs (Ueber das Verhalten einer Wasserleitung die von Zwei Getrenten Hochreservoiren Gespeist Wird). Otto Seyller. Describing the water supply of Leoben, Austria, as extended by the inclusion of a second independent reservoir. 2500 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Jan. 7, 1905.

Lick Observatory.—An Example of the Legitimate Use of Water for Domestic Purposes. K. F. Cooper. Facts and figures showing the economical and yet ample use of water at the settlement at Lick Observatory, California. 1000 w. Pro Am Soc of Civ Engrs—Aug., 1905.

Liverpool.—See **AQUEDUCT—Vyrnwy.**

London.—The Future of the London Water Supply. R. E. Middleton. Read before the Surveyor's Inst., England. States the estimated population to be provided for, the amount of water to be afforded, the sources, etc. 8000 w. Jour Gas Lgt—Dec. 25, 1900.

London Water Supply. Editorial discussion of the present outlook for the settlement of the Metropolitan water question, by the establishment of a water board. 3300 w. Engng—Feb. 7, 1902.

The London Water Bill. Abstract of the Government Bill in connection with the water supply, with editorial comment. Proposes to establish a Water Board of sixty-seven members with a chairman and vice-chairman. 4500 w. Engr, Lond—Feb. 7, 1902.

The Purchase of the London Water Companies' Works. An outline of the Local Government Board's project for purchasing and managing the works of the companies supplying London and the vicinity with water. 1000 w. Eng Rec—Feb. 22, 1902.

The Water Supply of the Metropolis. Reviews a report by Mr. Maurice Fitzmaurice on the conditions of the Thames and Lea, in relation to the water supply of the London district. 1800 w. Engng—April 10, 1903.

London Water Supply: Old and New Methods. W. J. Fisher. An interesting review of the history of the water supply of London, and the recent uniting of the eight private companies into one. 3500 w. Westminster Rev—Jan., 1905.

See also **RIVER REGULATION—Thames; WATERWORKS.**

Lorraine Hotel, New York.—See **PLUMBING—Hotel, N. Y.**

Magdeburg.—The Water Supply of Magdeburg (Zur Wasserversorgung Magdeburgs). H. Peters. Describing the provision of a supply of ground water for the city of Magdeburg, Prussia, to replace the polluted supply from the Elbe. 2500 w. Gesundheits-Ingenieur—Feb. 29, 1904.

Maldon, Eng.—Rural Water Supplies. James Dewhirst and Horace G. Keywood. Read at Leicester meeting of the Brit. Assn. of Wwks. Engrs. Chief points of the paper and discussion. An account of what has been done in the Maldon and Chelmsford districts. 5500 w. Jour Gas Lgt—Aug. 16, 1902.

Massachusetts.—The Consumption of Water in Cities and Towns of Massachusetts. Information from the report of the Massachusetts State Board of Health for 1900, designed to cover all available reliable records since the various waterworks were installed. 1500 w. Eng News—Nov. 20, 1902.
See also DRAINAGE—Sudbury.

Middletown, N. Y.—See **WATER PURIFICATION—Copper Sulphate.**

Middletown, O.—The Additional Water Supply of Middletown, Ohio. Illustrated description of well construction, with novel arrangement of strainer pipes. 350 w. Eng News—Aug. 11, 1904.

Milford, Mass.—See **DAM.**

Mining Communities.—The Importance of Potable Water Supplies to Mining Communities. Charles E. Morrison. Discusses the usual sources of supply for mining camps, and the dangers of some of them. 1500 w. Eng & Min Jour—Dec. 9, 1905.

See also **U. S. Southwest Mines; WATERWORKS—Ogden, Va.**

Minneapolis.—The Water Supply of Minneapolis. J. Frank Corbett. Gives charts showing results of analysis of the water, and the number of cases of typhoid fever, with explanatory notes. 1300 w. Jour Assn of Engng Soc—Dec., 1904.

See also **WELL.**

Moravia.—The Ground-Water Supply for Sternberg and Witkowitz, in Moravia (Gewinnung des Grundwassers für die Wasserversorgung von Sternberg und Witkowitz in Mähren). Prof. A. Oelwein. With topographical maps of the territory, and sections of the wells and filters. 3000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Dec. 14, 1900.

Multiple Zone.—See **WATERWORKS.**

Municipal.—Duties of Municipalities Regarding Water Supply. Hon. J. O. Hall. Shows it to be the duty of the municipality to supply a generous amount of pure water for domestic uses, etc. 5600 w. Jour N Eng Wwks Assn—March, 1903.

Municipal Water Supplies. Hon. L. H. Chappell. Read before the League of Georgia Munic. Con. Discusses the requirements and methods. 2500 w. Munic Jour & Engr—Oct., 1905.

Municipal Ownership.—See under names of cities; **WATERWORKS; WATERWORKS MANAGEMENT.**

Nashua, N. H.—The Water Supply of Nashua, N. H. Horace G. Holden. An illustrated account of the water supply of this city, and the accidental discovery of a very pure spring supply. 1700 w. Jour N E Waterwks Assn—Dec., 1902.

Neste River, France.—See **RIVER REGULATION.**

New Orleans.—The Water Supply of New Orleans and Its Improvement. Robert Spurr Weston. Describes the conditions, showing the necessity of obtaining a more satisfactory water supply, and gives an account of the purification investigation of the water of the Mississippi River, with conclusions. Ill. 5000 w. Jour N E Waterwks Assn—June, 1903.

See also **WATER PURIFICATION.**

New York.—Water Supply of Greater New York. M. N. Baker. Reviews the reports of John R. Freeman, and of the Merchants' Association of New York, giving the conclusions stated in each report. 8000 w. Munic Affairs—Sept., 1900.

The Croton Dam and Watershed. Describes the distribution system of Manhattan, giving views of the principal works of interest. 6700 w. Fire & Water—June 15, 1901.

State Water Supply in New York. George W. Rafter. Read before the Am. Soc. of Munic. Imp. Considers the advisability of reserving a supply for the exclusive use of cities and towns, showing that water could be delivered by gravity, without excessively long conduits, to practically all the cities and towns in the state. 1000 w. Munic Engng—Nov., 1902.

Report of Aqueduct Commission. The report of the Croton aqueduct commissioners on the subject of the changes in the construction of the new Croton dam and Jerome Park reservoir which had been pronounced defective. Ill. 1200 w. Fire & Water—Nov. 15, 1902.

Progress Report of Commission on Additional Water Supply for New York City. The first report of the Commission setting forth the main conclusions reached, with editorial. 9200 w. Eng News—Oct. 1, 1903.

Abstract of report of the Commission on an Additional Water Supply for New York City. With map and editorial comment. 5000 w. Eng Rec—Dec. 19, 1903.

Final Report of the Commission on Additional Water Supply for the City of New York. Abstract and map. 1500 w. Eng News—Dec. 24, 1903.

Progress Report on the Croton River Works for New York City's Water Supply. Information from the report of J. Waldo Smith, giving the present condition of this great work. Ills. 1800 w. Eng Rec—May 7, 1904.

The Condition of the Croton Waterworks. New York. Gives a diagram showing graphically the value of work done each year from 1895 to 1904, inclusive, with comments on the information given in the recent report of J. Waldo Smith, chief engineer. 2500 w. Eng Rec—Dec. 24, 1904.

The Need of Prompt Action on New York's Additional Water Supply. Excerpts from remarks of Mr. Freeman in an address before the Nat. Board of Fire Underwriters, with comments on the pressing need of more water for New York City. 2000 w. Eng News—July 14, 1904.

Additional Water Supply for New York City. Rudolph Hering. An interesting statement of the conditions in Greater New York, with report of recent investigations in regard to future increase of the supply, the quality of the water, cost, etc. Map. 5400 w. Jour N Eng Wwks Assn—Dec., 1904.

See also **DAM—Croton; RESERVOIR—Croton; Cross River; Jerome Park; WATER WASTE.**

North Sea Islands.—The Water Supply of Some North Sea Bathing Resorts (Die Wasserversorgung einiger Nordseebäder). Hr. Hersberg. A paper before the "Deutscher Verein von Gas und Wasserfachmännern," giving an account of borings and ground-water conditions on the East Frisian Islands, with discussion. 4000 w. Gesundheits Ing—Nov. 30, 1901.

Norwich, Conn.—See **WATER RIGHTS—Compensation in Kind.**

Office Building.—Water Supply System in the Maiden Lane Building, New York. Illustrated description of the installation for an 18-story office building. 1300 w. Eng Rec—Sept. 6, 1902.

Water Supply of Tall Buildings. George W. Nistle. Especially considers conditions at Chicago, suggesting the drilling of wells far enough to get uncontaminated water. Discusses methods of delivery and piping, the arrangements for ice cold water, and hot water. 2800 w. Dom Engng—June 25, 1903.

See also **MECHANICAL PLANT; PLUMBING.**

Panama.—The Panama Water and Sewerage Works. An illustrated article describing the condition of the City of Panama before the treaty with the United States, and the work that has been done since in the water supply and sewerage departments. 2000 w. Eng Rec—Nov. 25, 1905.

See also **CANAL—Panama Sanitation; SANITATION.**

Paris.—The Recent Water Famine in Paris; Water Waste and Purification. Abstracted by Allen Hazen from an article in "Technologie Sanitaire," written by Adolph Kemna. Discusses the evident waste of water, and many problems connected with the supply. With editorial. 3800 w. Eng News—Oct. 25, 1900.

Supply of Water From Loing and Lunain to Paris (Adduction des Eaux du Loing et du Lunain). F. J. Feugères. Description of additional supplies of potable water to Paris with profiles of route, and illustrations of aqueduct and siphons. 3000 w. 1 plate. Génie Civil—Jan. 19, 1901.

An Investigation of Spring Water (Nouvelle Méthode d'Etude des Eaux de Sources). Félix Marboutin. An account of the very complete investigation, topographical, geological, chemical and bacteriological, made of some sources of the Paris water supply by a commission, with maps. 1 plate. 8500 w. Mem d l Soc d Ing Civils—Feb., 1901.

The Water Supply of Paris. Abstract of an article in "Le Génie Civil," giving much interesting information. Ill. 1500 w. Eng News—April 4, 1901.

The Aqueduct of the Avre (L'Aqueduc de l'Avre). M. Bret. A description of the completed reservoir of Saint Cloud and the aqueduct which brings the water of the Avre and the Vigne to Paris. 10,000 w. 2 plates. Ann des Ponts et Chaussées—2 Trimestre, 1902.

The Water Supply of Paris (L'Alimentation de Paris en Eau). M. Bret. A review of the present supply with maps showing the distribution. 3500 w. 1 plate. Ann des Ponts et Chaussées—2 Trimestre, 1902.

City Water Supplies (Städtische Wasserversorgungen). Martin Paul. An illustrated review of the water supply of various cities at the time of the Paris Exposition of 1900. The present article describes the Paris water supply. Serial. Part I. 5000 w. Zeitschr d Oesterr Ing u Arch Vereines—July 4, 1902.

The Supply of Potable Water for Paris (Alimentation de Paris en Eau Potable). J. Bergeron. Report upon future possible sources of supply, with map and hydrologic charts, with especial reference to the Orleans valley. 10,000 w. 1 plate. Mem Soc Ing Civ de France—Jan., 1904.

The Water Supply from the Loing and the Lunain (Dérivation des Sources du Loing et du Lunain). MM. Bechmann & Babinet. A very complete description of the aqueducts, connections and general works of the latest addition to the water supply system of Paris; giving a flow of 50,000 cubic metres per day. 30,000 w. 11 plates. Ann des Ponts et Chaussées—3 Trimestre, 1905.

See also SEWERAGE.

Philadelphia.—See WATER WORKS.

Pittsburg.—See Consumption.

Protection.—Protection of Underground Water Supplies. W. Matthews. Read at meeting of the British Assn. of Waterworks Engrs. Discusses British law for the protection of water supplies, and describes cases that have come under the writer's notice. General discussion. 4200 w. Jour Gas Lgt—Dec. 25, 1900.

Detecting and Preventing the Pollution of Public Water Supplies. William Watts. Read at meeting of the British Assn. of Water-Works Engrs. The remarks apply exclusively to water from moorland drainage areas. 2700 w. Builder —July 20, 1901.

Protection of Water Supplies. Gives abstracts of three papers and their discussion, as presented to the recent conference on Water Supply and Pollution, in England. Deals with the protection of watersheds, underground supplies, and the rights of underground pumping. 8500 w. Jour Gas Lgt—Oct. 29, 1901.

Protection of Gathering-Grounds and Filtration Compared. Prof. S. Delépine. Summary of a paper read at the meeting of the British Assn. of Waterworks Engrs., with editorial. A comparison as to which system possessed the greater merits, favoring protection of sources of supply. Editorial disapproval and discussion. 5000 w. Jour Gas Lgt—Aug. 11, 1903.

Protection of Water Supplies. J. Cartwright. Presidential address before the Manchester Assn. of Students of the Inst. of Civ. Engrs. Points out sources of pollution, and considers how they may be safeguarded. 2500 w. Sanitarium—April, 1904.

The Lines of Defense in the Protection of Water Supplies. J. Cartwright. An article by an English engineer discussing the best means of protecting the supply of cities. Also editorial referring to American conditions. 3000 w. Eng News—April 28, 1904.

The Sanitary Protection of Water Supplies. Kenneth Allen. Considers means of detecting unsanitary conditions and corrective treatment. 9000 w. Jour Fr Inst—Oct., 1905.

See also Inspection; WATER PURIFICATION.

Railway.—See FEED-WATER PURIFICATION; RAILWAY WATER SERVICE; WATER SCOOP.

Rand, Transvaal.—The Rand Water Board. An account of the movement to supply the Witwatersrand area with water for the growing demands of the inhabitants, industries and trades. 5000 w. Engr, Lond—March 17, 1905.

Refrigeration.—See REFRIGERATION.

Rhondda, Wales.—The Rhondda Water Supply. W. D. Wight. Abstract of a paper read before the S. Wales Inst. of Engrs. Suggests methods of obtaining water for this landlocked valley where an increased supply is greatly needed. 2200 w. Ir & Coal Trds Rev—Sept. 26, 1902.

Rochester, N. Y.—See WATERWORKS.

St. Louis.—See WATER PURIFICATION; WATERWORKS.

Sanitation.—On the Rise and Progress of Water-Supply Sanitation in the Nineteenth Century. William T. Sedgwick. Discusses the advancement made, the past troubles of lead poisoning, impure water as a cause of disease, opinions of experts, various supplies, etc. 1000 w. Jour N E Water Wks Assn—June, 1901.

See also FILTRATION; SANITARY ENGINEERING; SANITATION; WATER PURIFICATION.

Springfield, O.—Springfield's Water Supply. L. Walter Harrison. A description of a water supply filtered by nature. Ills. 1000 w. Munic Jour & Engr—Dec., 1903.

Steamships.—See STEAMSHIP—Water Cost.

Storage.—Storage Water Supplies. L. J. LeConte. On the importance of the greater relative value of run-off records, as compared with the annual rainfall records, in calculating the catchment water from any given watershed. 700 w. Am Waterwks Assn—June, 1901.

The Storage of Flood Water. Prof. Henry Robinson. From a paper read before the British Assn. of Wwks. Engrs. Considers the subject principally as related to England. General discussion. 4500 w. Jour Gas Lgt—Dec. 22, 1904.

See also RESERVOIR; WATER STORAGE.

Suakim, Egypt.—See DISTILLATION.

Supervisory Control, Eng.—See WATERWORKS—Derwent Valley, Eng.

Sweden.—The Water Supply and Sewerage of Swedish Cities (Ueber die Wasserleitungs- und Kanalisationsanlagen der Schwedischen Ortschaften). F. W. Hansen. A general review of municipal waterworks and drainage, with table of data for the principal cities. 5000 w. Gesundheits-Ingenieur—an. 31, 1904.

Syracuse, N. Y.—See WATERWORKS.

Tall Buildings.—See Office Building.

Thames.—See London; RIVER REGULATION.

Transvaal.—See Rand.

Troy, N. Y.—The New Water Supply of Troy, N. Y. William G. Raymond. Reviews the past history of the supply and gives an illustrated description of recent important engineering work to increase the supply. 6300 w. Eng News—Oct. 6, 1904.

U. S. Arid Region.—The Limited Water Supply of the Arid Region. Frederick H. Newell. Statements of conditions and facts concerning the probability of the development of these regions. 1500 w. Nat Geog Mag—Nov., 1900.

See also IRRIGATION; RESERVOIR.

U. S. Southwest Mines.—The Question of Water Supply in the Southwest. W. C. Potter. The serious trouble about water, mining and milling operations in Southern California, Arizona and New Mexico, and the success in overcoming the difficulties is discussed. Ill. 1200 w. Eng & Min Jour—Aug. 24, 1901.

Utrecht, Holland.—The Sources of the Utrecht Water Supply (De Prise d'Eau van de Utrechtsche Waterleidung). P. E. Rijik. With plan of the location of the pipe, wells and chart of the ground-water levels from 1885 to 1904. 2000 w. 1 plate. De Ingenieur—Sept. 24, 1904.

Vermont.—Water Supplies of Vermont. Charles P. Moat. A statement of the conditions and the supplies, discussing the kind and quality of water furnished. 2700 w. Jour N Eng Waterwks Assn—Dec., 1901.

Vienna.—The Emperor Francis Joseph Water Supply (Die Kaiser Frans Josefs-Hochquellenleitung). F. Berger. A description of the new sources of potable water to be provided for Vienna, with an account of the preliminary studies prior to the construction of the works. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 18, 1901.

The Water Supply of Vienna (Die Wasserversorgung Wiens). Josef Riedel. A general account of the various sources of supply, with map and profiles. 8000 w. 2 plates. Oesterr Wochenschr f d Oeffend Baudienst—Oct. 22, 1904.

Villages.—Some Notes on Village Water Supply. Arthur C. Auden. Considers means of utilising existing sources, such as wells, springs, etc., and arranging for the distribution. 1700 w. Engr, Lond—Aug. 23, 1901.

Waste.—See **WATER WASTE.**

Well.—See **GROUND WATER; WELL.**

Wisconsin.—Wisconsin Water Supplies. W. C. Kirchoffer. Gives the history, sources of supply, quality and treatment of waters, population supplied, etc. 3800 w. Municipality—Sept., 1902.

The Public Water Supplies of Wisconsin. W. C. Kirchoffer. A report of the sources of supply, quality and treatment of waters, &c. 3800 w. Wis Engr—April, 1905.

Worcester, Mass.—Water Supply at Worcester, Mass. F. A. McClure. Map, with illustrated description of the present supply, and outline of the history. 3000 w. Munic Eng—July, 1904.

WATER TANK.

See **RESERVOIR; STANDPIPE; TANK; WATER SUPPLY; WATER TOWER; WATERWORKS.**

Railway.—See **RAILWAY WATER SERVICE; WATER SCOOP.**

WATER-TIGHT COMPARTMENT.

See also **NAVY; SHIP; SHIPBUILDING; STEAMSHIP; WATER-TIGHT DOOR.**

The Unsinkability of Ships (Eine Bemerkung über die Unsinkbarkeit der Seeschiffe). Guido Bocchi. A discussion of the proper location of bulkheads, so that the filling of compartments shall not endanger stability. 1800 w. Schiffbau—June 8, 1901.

Water-Tight Subdivision of Ships. Theodore Lucas. Discusses the importance of the subject at the present time, and where the bulkheads ought to be placed, their construction, etc. 1500 w. Naut Gaz—Sept. 5, 1901.

The Non-Sinkability of Large Steel Ships (L'Insubmersibilité des Grands Navires d'Acier). M. E. Duchesne. Advocating the use of double hulls, as well as water-tight bulkheads for the prevention of disasters at sea. 3500 w. Mem Soc Ing Civ de France—Nov., 1901.

Bulkhead Door.—See **WATER-TIGHT DOOR.**

Conduits and Tubes.—Methods of Securing Water-Tightness of Plates at Conduit and Tubes. George McQuilkin, Jr. Illustrates and describes types in use, especially in the care of water-tight bulkheads, and recommends standardisation. 3300 w. Marine Engng—Nov., 1903.

Engine Room.—Longitudinal Engine-Room Bulkheads in Merchant Vessels, in Relation to Transverse Stability When Bilged. F. H. Alexander. Read before the N. E. Coast Inst. of Engrs. and Shipbuilders. The object of the paper is to show the possible effect on the transverse stability of a ship, if one side of the engine space were flooded. Ills. 8000 w. Prac Engr—April 8, 1904.

Warships.—Water-Tight Subdivision of Warships. Com. William Hoogaard. A study of the principles which underlie the application of water-tight division in warshps. 11,700 w. Trans Am Soc Nav Archts & Marine Engrs., No. 6—Nov., 1903.

The Principle of the Cellular Construction of Ships (Note sur le Principe des Navires à Flottaison Cellulaire). M. Bertin. A review of the extension of the applications of the cellular system since the writer's first communication to the Academy in 1884. 1800 w. Comptes Rendus—April 17, 1905.

Notes on the Strength of Water-Tight Bulkheads for Battleships and Cruisers. Harold F. Norton. Explains the tests required by the Navy Department for battleships and cruisers, and gives curves, derived from formulae, by use of which the required results may be immediately obtained. 2 plates. 3000 w. (No. 11.) Soc of Nav Archts & Marine Engrs—Nov. 16, 1905.

See also **NAVY**; and under various types of warships.

WATER-TIGHT DOOR.

See also **LIFE-SAVING APPLIANCES—Paris Exposition; WATER-TIGHT COMPARTMENT.**

Water-Tight Doors. R. J. Donovan. Comments on types of water-tight doors fitted to bulkheads, and a short description of two of the most modern and their method of operation. 3000 w. Sibley Jour of Engng—Nov., 1900.

Electric.—Electrically Controlled Bulkhead Doors. George E. Walsh. Information concerning the successful working of the apparatus on the U. S. cruiser "Atlanta," and the importance of the system. 1000 w. Am Elect'n—May, 1901.

Hydraulic.—Hydraulically-Operated Bulkhead Doors. Illustrations and explanations of method of operating the mechanism. 600 w. Engng—July 12, 1901.

See also **North German Lloyd; Stone-Lloyd.**

North German Lloyd.—Pneumatic Hydraulic Device for Closing Bulkhead Doors (Pneumatisch-hydraulische Schottenschliessvorrichtung). Hermann Hildebrandt. Illustrating the system used on the steamers of the North German Lloyd lines for controlling the bulkhead doors from the bridge. 2000 w. Zeitschr d Ver Deutscher Ing—July 16, 1904.

Stone Lloyd.—The Stone-Lloyd Bulkhead Door. An illustrated description of an extremely ingenious mechanism, fitted to the imperial mail steamer "Deutschland." 1200 w. Engr, Lond—Dec. 4, 1903.

A New Invention for Rendering Vessels Unsinkable. Herbert C. Fyfe. Illustrates and describes the new Stone-Lloyd hydraulically-controlled marine safety bulkhead doors for rendering vessels unsinkable as installed on the "Deutschland," and their method of working. 2500 w. Sci Am Sup—April 16, 1904.

WATER TOWER.

See also **FIRE APPARATUS; RAILWAY WATER SERVICE; STANDPIPE; TANK; WATERWORKS.**

Abilene, Tex.—A Water Tank Tower and Its Collapse. Illustrates and describes the tower collapse at Abilene, Tex., discussing the faulty design. 1200 w. Eng News—May 19, 1904.

Camden, N. J.—A Very Tall Steel Water Tower. Illustrated description of the New York Shipbuilding Co.'s water tower, giving abstract of specifications. 2500 w. Eng Rec—June 20, 1903.

Concrete, Reinforced.—A Concrete-Steel Water Tower Near Boston. Illustrated description of a standpipe and tower of Hennebique armored concrete construction. 1000 w. Eng Rec—Aug. 22, 1903.

East Providence, R. I.—The Million-Gallon Water Tower of the East Providence Water Company. Illustrated description of a very large new tower which furnishes storage for fire protection and other purposes. 1700 w. Eng Rec—Nov. 12, 1904.

Water Tank and Tower for East Providence, R. I. F. M. Bowman. Illustrated detailed description of a structure the largest of its type. Also discussion. 4000 w. Jour N Eng W-Wks Assn—March, 1905.

Failure, Madison, Neb.—See **STANDPIPE—Madison, Neb.**

Fairhaven, Mass.—The Collapse of the Fairhaven

Water Tower. Describes the tower and the accident. 1800 w. Eng Rec—Nov. 16, 1901.

The Failure of the Elevated Water Tank at Fairhaven, Mass. An illustrated description of a tank having a curved bottom, with report of the failure and views of the wreck. 2800 w. Eng News—Nov. 21, 1901.

Fall of the Fairhaven Water Tower. R. C. P. Coggeshall. Illustrations with an account of the disaster. 700 w. Jour N Eng Water Wks Assn—Dec., 1901.

Fire Apparatus.—See Gorter; FIRE APPARATUS.

Gorter, San Francisco.—The Gorter Water Tower. Illustrated description of a "water tower" belonging to the fire apparatus of San Francisco, which has very novel features. 1500 w. Sci Am—March 14, 1903.

Grand Rapids, Wis.—The Water Tower at Grand Rapids, Wis. Illustrated description of a covered steel tank, 154 feet above the ground, supported on 4 columns resting on concrete foundation piers. 1000 w. Eng Rec—Nov. 8, 1902.

Hull, Mass.—See STANDPIPE.

Intze, Prenzlau, Prussia. — See WATERWORKS — Prenzlau.

Massena, N. Y.—A Novel Steel Tower and Concrete Platform for a Wood Stave Water Tank. Charles Worthington. Illustrates and describes a structure at Massena, N. Y., having novel features in framing believed to be advantageous and economical. 1200 w. Eng News—Oct. 26, 1905.

Quincy, Mass.—See RESERVOIR.

Stresses.—The Stresses in a Steel Water-Tower. H. J. Burt. Collects and reduces to convenient working form the formulas required in solving these stresses. 4400 w. Technograph, No. 16—1901-2.

See also TANK.

Westinghouse Works, Manchester.—Water Tower, Westinghouse Works, Manchester. Illustrated detailed description of a tower constructed for the purpose of supporting two large tanks for the storage of a large volume of water under conditions of constant high pressure. 1000 w. Engr, Lond—April 10, 1903.

WATER TRANSPORTATION.

See CANAL; COAL TRANSPORTATION; IRON ORE TRANSPORTATION; NAVIGATION; SHIPPING; TRANSPORTATION; WATERWAY.

WATER-TUBE BOILER.

See BOILER, WATER-TUBE.

WATER WASTE.

See also WATER FAUCET—Limited Flow; WATER METER; WATER SUPPLY—Consumption; WATERWORKS; WATERWORKS MANAGEMENT.

The Consumption of Water in Municipal Supplies and the Restriction of Waste. Clemens Herschel. Continued informal discussion of this subject. 1700 w. Pro Am Soc of Civ Engrs—Sept., 1901.

The Consumption of Water in Municipal Supplies and the Restriction of Waste. A continuation of the informal discussion on this topic. 4000 w. Pro Am Soc of Civ Engrs—Oct., 1901.

Water Cost and Water Waste. A. L. Holmes. Abstract of a paper read before the Mich. Engng. Soc. at Grand Rapids. Reports concerning the supply of several important cities, and favors the metering of water systems. 2300 w. Eng News—Feb. 6, 1902.

Water Cost and Water Waste. A. L. Holmes. Read before the Mich. Engng. Soc. Discusses the great cost which is likely to increase, and also the use of meters to lessen the waste. 3000 w. Munic Engng—July, 1902.

Boston.—The Measurement, Consumption and Waste of Water in the Boston Metropolitan District. Extracts from a valuable report by Dexter Brackett, engineer of the distribution department. 3000 Eng Rec—March 19, 1904.

The Waste of Water. Gives the results of the Boston investigation showing the waste to be enormous, discussing some of the causes and the remedy. 2000 w. Ir Age—March 24, 1904.

Report on the Measurement, Consumption, and Waste of Water Supplied to the Metropolitan Water District. Report on the supply of Boston and adjacent towns. Dexter Brackett. 13000 w. Jour N Eng W-Wks Assn—June, 1904.

British.—Water-Waste Prevention in Great Britain. A comparison between the conditions governing water consumption in Great Britain and the United States. 3000 w. Eng News—June 30, 1904.

Chicago.—Report on Water Waste and the Metering of the Water Supply of Chicago. Made by John Ericson, City Engineer. 2500 w. Eng News—Jan. 8, 1903.

Cleveland.—Water Waste in Cleveland. Describes experiments proving the large waste of water in Cleveland and the efficacy of meters in preventing it. 700 w. Eng Rec—Feb. 22, 1902.

Marion, Ohio.—The Detection and Prevention of Water Waste at Marion, Ohio. Edward H. Cowan. Explains the policy adopted in establishing meters, and the results. 2500 w. Jour N Eng W-Wks Assn—June, 1904.

New York.—Water Waste Detection in New York City. An illustrated article describing the system used in these investigations. The Cole-Flad pitometer is being used. 3400 w. Eng Rec—Jan. 31, 1903.

The Cole-Flad Photo-Pitometer and Its Use in Studying Water Consumption and Waste. Illustrates and describes an application of the Pitot tube being used to make a water-waste survey in New York. 1500 w. Eng News—Feb. 5, 1903.

Investigations of Water Waste in New York City. A statement concerning the work, how the records are made, and some of the results obtained. 2000 w. Eng News—Feb. 5, 1903.

Water Waste in New York City. Editorial on the investigations in progress and their important results. 1600 w. Eng Rec—Feb. 7, 1903.

Water Waste Investigations in New York City. A further report giving the results of eight districts, with particulars. 1500 w. Eng Rec—April 18, 1903.

Further Results of the Water Waste Investigations in New York City. A reprint of the third report, giving interesting results. 2400 w. Eng Rec—Sept. 19, 1903.

See also WATER SUPPLY; WATERWORKS.

Pitometer.—Water Waste and Its Detection. Edward S. Cole. Considers the sources of waste, the effect of meters, means of detecting waste, giving a brief description of the "Pitometer." Ill. Discussion. 8700 w. Jour W Soc of Engrs—Dec., 1902.

See also New York.

Providence, R. I.—Requisite Amount of Water for a Public Supply. J. Herbert Shedd. Discusses the evils of water waste and means of limiting the supply to useful purposes. Gives the experience of Providence, R. I., and facts in regard to the conditions. General discussion. 8400 w. Jour New Eng W. Wks Assn—March, 1904.

Restriction.—The Restrictive Features to Guard Against Waste Water. S. J. Rosamond. On the value of self-closing fixtures where meters are not in use. 1200 w. Am Water Wks Assn—June, 1901.

Torquay.—Detection of Waste in the Water Supply of Towns. An account of the method of detection used in Torquay. Ill. 1200 w. Engr, Lond—Nov. 16, 1900.

WATERWAY.

See also CANAL; DREDGING; HARBOR; NAVIGATION; PORT; RIVER; RIVER REGULATION; TRANSPORTATION.

The Elements Constituting a Navigable Waterway (Des Elements Constitutifs d'une Voie Navigable). MM. Cadart et Barbet. A discussion of the relation of capacity to the frequency of travel upon canals and other internal waterways. 8000 w. 1 plate. Ann des Ponts et Chaussées—1 Trimestre, 1903.

Austria.—See CANAL; CANAL LIFT.

Belgium.—Canals and Navigable Waterways of Belgium. Interesting information from a recent report by Consul-General Hertslet. 3300 w. Col Guard—May 6, 1904.

Navigable Waterways of Belgium. Information from the report of Mr. Hertslet, the British Consul General at Antwerp. 1500 w. Engr, Lond—May 27, 1904.

Navigable Waterways in Belgium. E. Cecil Hertslet. Description of canals and other inland waterways, with traffic statistics, tables and maps. 6000 w. Public Works—Aug. 15, 1904.
See also CANAL; CANAL HAULAGE.

Bengal.—Inland Navigable Waterways of Bengal. Reviews the history of canal construction and river navigation, and its development. Ills. 2200 w. Engr, Lond—Dec. 30, 1904.

British.—Harbors and Waterways in 1903. A review of the last year's progress, especially in England. 3800 w. Engr, Lond—Jan. 1, 1904.
See also German vs. British; CANAL; HARBOR.

Canada.—The Waterways of Canada. Concerning the unrivaled rivers, lakes, and canals, the traffic, revenue, etc. 2300 w. U. S. Cons Rept's, No. 1013—April 17, 1901.

See also CANAL; RAILWAY.

China.—See TRANSPORTATION.

Commerce Limitations.—See RIVER.

Egypt.—Inland Navigation in Egypt. Sir Hanbury Brown. A review of what has been done to develop the inland waterways of Egypt, as a contribution to the collection of facts concerning the policy of nations with regard to their inland waterborne transport. Map. Serial. 1st part. 3500 w. Engr, Lond—March 31, 1905.

See also DAM—Assuan; IRRIGATION—Egypt; NAVIGATION; RIVER REGULATION; WEIR—Nile Delta.

Europe.—The Development of a Uniform System of Waterways for Europe (Die Ausbildung eines Einheitlichen Arterien-Systemes der Wasserstrassen Europas). Alfred Ritter v. Weber-Ebenhof. A general review of the existing waterways all over Europe, and a project for a complete system of canals and canalized rivers. Maps. 3 plates. 25,000 w. Oesterr Wochenschr fd Oeffent Baudienst—June 21, 1902.

European Traffic.—Traffic of European Rivers and Canals. Ray G. Floyd. An illustrated article giving information obtained on a tour of inspection of European waterways. 1700 w. Marine Rev—Oct. 8, 1903.

Florida Coast.—The Waterway of the Florida Coast Line Canal and Transportation Co. George F. Miles. Illustrated description and map of natural waterways and connecting canals down the east coast of Florida, from Jacksonville to Key West. 2800 w. Eng News—Aug. 25, 1904.

France.—The Internal Navigation of France. Pierre Baudin. Gives a general view of the system in France and discusses the bill introduced in Munich, 1901, to improve canals. Map. 8500 w. Contemporary Rev—June, 1903.

See also CANAL.

German.—The Navigable Waterways of Germany (Les Voies Navigables de l'Allemagne). M. Duval. An account of the improvement of the navigable rivers and canals of Germany, and more particularly of Prussia, from 1875 to 1900, and the project for the future. Maps. 2 plates. 12,000 w. Ann des Ponts et Chaussées—4 Trimestre, 1902.

German vs. British.—The Lesson of the German Waterways. O. Eltzbacher. A comparison of the cost of transport in Germany and Great Britain, showing the value of waterways, and discussing other causes tending to industrial success. 8500 w. Contemporary Rev—Dec., 1904.

Great Lakes—New York.—See CANAL.

GreatLakes-Ocean.—See St. Lawrence; CANAL; STEAMSHIP; STEEL INDUSTRY.

Holland.—See CANAL.

Italy.—Internal Navigation in Italy (La Navigazione Interna in Italia). G. Cattaneo. An examination of present conditions, together with future plans, with especial reference to the canalisation of the rivers of Northern Italy. 10,000 w. 2 plates. Rivista Marittima—Aug., Sept., 1903.

Madagascar.—The Canal of the Pangalanes, Madagascar (Le Canal des Pangalanes, Madagascar). J. H. Delaunay. A description, with maps and illustrations, of a waterway along the east coast of Madagascar, from Tamatave southward, forming part of a route to the capital. Tananarive. 1 plate. 2500 w. Mem d I Soc Ing Civils—February, 1901.

See also TRANSPORTATION.

New York-Milwaukee.—See NAVIGATION.

Nile.—See Egypt; DAM—Assuan; IRRIGATION—Egypt; NAVIGATION; RIVER REGULATION; WEIR—Nile Delta.

Paris Exposition.—See CANAL.

Pittsburg.—See TRANSPORTATION.

Railway Exchange Stations.—See RAILWAY STATION—Canal Exchange.

Railway Transportation.—The Influence of Waterways on Railway Transportation. S. A. Thompson. Showing the manner in which waterways act to promote the prosperity of competing railways. 8000 w. Engineering Magazine—July, 1902.

See also RAILWAY TRANSPORTATION; TRANSPORTATION.

Russia.—Russia's System of Internal Waterways. A. H. Ford. Is the first of an important series of papers on the development of Russia the question of the importance of transport as an element in the expansion of manufactures and trade is discussed. 3500 w. Engineering Magazine—Feb., 1901.

See also CANAL—Baltic-Volga.

St. Lawrence.—The Dangers of the St. Lawrence Route for Export Traffic. Extracts from an article in the "N. Y. Tribune" setting forth the dangers to navigation and needed improvements, with editorial comment. 2300 w. Eng News—May 16, 1901.

See also STEAMSHIP—Great Lakes for Ocean; STEEL INDUSTRY—Great Lakes Exports.

Surabaya Strait.—See STRAIT—Surabaya.

United States.—See CANAL—Great Lakes—Atlantic; TRANSPORTATION.

Yangtse River.—See RIVER.

Yazoo Delta.—See RIVER REGULATION; RAILWAY.

Yukon-Kuskokwim.—The Talbiksak River; A Possible Shortening of the Yukon Route. Wm. S. Post. An illustrated description of a water route between the Yukon and Kuskokwim Rivers, shortening the distance between Unimak Pass and Talbiksak River, on the Yukon, by 320 miles, thus avoiding the most dreaded part of the Bering Sea, and making it possible to enter the region two weeks earlier. 1600 w. Eng News—Aug. 22, 1901.

WATER WHEEL.

See also HYDRO-ELECTRIC PLANT; SCOOP WHEEL; TURBINE; WATER MOTOR; WATER POWER.

Buckets.—The Buckets of Impulse Wheels (Ueber die Schaufelung des Löffelrades). Rudolf Escher. An examination of the theoretical form for buckets for water wheels of the Pelton impulse type. 2500 w. Schweiz Bauzeitung—April 20, 1905.

Cassel Self-Regulating.—The Cassel Self-Regulating Water Wheel. E. C. de Segundo. Illustrates and describes this wheel explaining its action. 2100 w. Inst of Mech Engrs—Glasgow Congress, 1901.

Cephalonia.—See SEA MILLS.

Current.—Current Wheels: Their Use in Lifting Water for Irrigation. From Bulletin 146 of the U. S. Dept. of Agri. An illustrated article on the theory of power in current wheels, their efficiency, practical operations, etc., describing wheels in actual use. Serial. 1st part. 2000 w. Sci Am Sup—Dec. 3, 1904.

See also SCOOP WHEEL.

De Remer.—Test of a New Impulse Water Motor. R. C. Carpenter. Record of tests of a twelve-inch wheel, designed by J. R. De Remer, of Denver, Col., belonging to the same general class as the Pelton. 500 w. Sib Jour of Engng—Jan., 1901.

A "Tangential" Impact Water Wheel. Illustrates and describes a new style of impulse wheel designed by J. R. De Remer, of Denver, Col. 1200 w. Eng News—Dec. 12, 1901.

See also Tangential.

Governing.—The Governing of Water Powers. Allan V. Garratt. Reviews in a general way the most significant improvements made in governing water-wheels and the present possibilities of their regulation. 2900 w. Engr, U S A—Jan. 1, 1903.

The Governing of Impulse Water Wheels. John Goodman. Deals chiefly with impulse water-wheels in which the whole energy of the water is converted into kinetic energy before it impinges on the vanes of the motor; such motors are tangent wheels, Pelton wheels, action or impulse turbines. 1700 w. Engng—Nov. 4, 1904.

The Governing of Impulse Wheels. Irving P. Church. Discussion suggested by a recent paper in "Engineering," by Prof. Goodman upon the rise of pressure in a long pipe when the size of the jet is reduced to govern wheels of the Pelton type. 2000 w. Eng Rec—Feb. 25, 1905.

See also Cassel; Replogle; Tangential; Woodward; TURBINE.

High Head.—See Pelton; Tangential; HYDRO-ELECTRIC PLANT; NOZZLE.

History.—The Water Wheel. Sidney Russell. An illustrated historical review of the various types, and some of the applications. 8600 w. Trac & Trans—Oct., 1904.

Hydrovalve.—A Novel Water Wheel. Dr. Alfred Gradenwitz. Brief illustrated description of the "hydrovalve," invented by Prof. Frank Kirchbach, and its operation. 800 w. Sci Am—Jan. 14, 1905.

Impulse.—See Buckets; Governing; Pelton.

Irrigation.—Ingenious Water Wheels. Waldon Fawcett. Illustrates and describes some novel water wheels in use in Nebraska and other western points, for irrigating purposes. 1000 w. Sci Am—Feb. 16, 1901.

See also Current; IRRIGATION; SCOOP WHEEL.

Knight.—See HYDRO-ELECTRIC PLANT—White River, Ore.

Nozzle.—See Pelton; NOZZLE—High Head.

Pelton.—Some Recent High-Head Pelton Water Wheel Installations. George J. Henry, Jr. Illustrated account of some of the most prominent and recent installations of Pelton wheels in electric power transmission service. 3300 w. Jour of Elec—Jan., 1901.

The Pelton Water Wheel Equipment in the Puget Sound Power Company's Plant. George J. Henry, Jr. An illustrated detailed description. 2500 w. Jour of Elec—Oct., 1904.

The Pelton Wheel for Rolling Mills. Illustrates and describes a remarkable experimental and completely successful departure in rolling-mill practice in a tin mill at Cwm Avon, South Wales. 2500 w. Engr, Lond—Dec. 4, 1903.

Efficiency Tests of an Impulse Wheel. Prof. Joseph N. LeConte. Preliminary article on methods employed and results obtained in tests of a 3-foot Pelton wheel at the Univ. of California. Illustrations and tables. 1500 w. Cal Jour of Tech—May, 1904.

Pelton Wheel with Adjustable Nozzle for the Glyn Slate Company. Illustrated description of a Pelton wheel fitted with a new pattern of variable-discharge nozzle. 600 w. Engng—Oct. 13, 1905.

See also Tangential; AIR COMPRESSOR—Morning Mine, Idaho; TURBINE—Swiss.

Pelton Tests.—Tests with a Pelton Wheel. William Campbell Houston. Read before the Inst of Engrs & Shipbuilders in Scotland. An account of a long series of tests of a Pelton wheel working with a pressure of water from 200 lbs. to 1000 lbs. per square inch, with an analysis of the results. The objects were to get the power and useful efficiency of the wheel, and to analyse how the water energy was spent. Serial. First part. 800 w. Mech Engr—May 30, 1903.

Replogle Governor.—A Water-Wheel Governor of Novel Construction. An illustrated description of the inertia governor of the centrifugal-ball type as used on the Replogle "Differential Relay" water-wheel governor, and the reversing frictional clutch. 1500 w. Eng News—Nov. 13, 1902.

Rolling Mill.—See Pelton.

Scoop Wheel.—See SCOOP WHEEL.

Tailings.—See ELEVATOR.

Tangential.—Some Tests of Tangential Water Motors. R. R. Keely. Practical points regarding these motors and account of tests made at Sibley College. Ill. 1400 w. Sib Jour of Engng—June, 1901.

Tangential Water Wheels. An illustrated article describing these wheels and their development. 3500 w. Engng—March 27, 1903.

The Design of Tangential Water Wheels. George J. Henry, Jr. Abstract of a paper read before the Con. of the California Miners' Assn. Discusses the question of governing and the numerous applications of tangential wheels, considering examples taken from actual practice. Ill. 2000 w. Jour of Elec—July, 1903.

Tangential Water-Wheel Efficiencies. George J. Henry, Jr. An illustrated article discussing shapes of buckets, particularly the ellipsoidal as compared with the general form of the Pelton bucket. 4500 w. Engr, U S A—Aug. 15, 1903.

The Development of the Tangential Wheel in California (Die Entwicklung des Tangentialrades in Kalifornien). Heinrich Homberger. A description of the growth of the use of wheels of the Pelton type, including the recent improvements, such as the Doble needle regulator, etc. 3000 w. Zeitschr d Ver Deutscher Ing—Dec. 17, 1904.
See also De Remer; Pelton.

Tests.—See Pelton Tests; TURBINE.

Woodward Governor.—The Woodward Friction Water Wheel Governor. Illustrated detailed description of a recent design. 900 w. Ir Age—Feb. 4, 1903.

WATERWORKS.

See also AQUEDUCT; DAM; FILTRATION; GROUND WATER; PUMP; PUMPING ENGINE; PUMPING STATION; RESERVOIR; STANDPIPE; WATER PIPE; WATER PURIFICATION; WATER SUPPLY; WATER TOWER; WATER WASTE; WATERWORKS LAW; WATERWORKS MANAGEMENT; WELL.

Water Supply. Charles Hawksley. From the presidential address to the Engng. Soc. of the British Assn. Considers the main features of waterworks construction, and management. 7000 w. Archt, Lond—Sept. 18, 1903.

Ada, O.—See ELECTRIC STATION.

Altoona, Pa.—Flood-Water Channel of the Altoona, Pa., Reservoirs. Charles W. Knight. Illustrated detailed description. 2000 w. Fire & Water—Nov. 3, 1900.

American.—American Waterworks. Charles Prelini. Gives a statement of conditions affecting the water supplies of America, reviewing briefly the general history of the water problem, with special reference to the Croton Aqueduct, and giving a detailed account of the actual state of the water supply of New York City. Serial. 1st part. 5400 w. Trac & Trans—Nov., 1903.

Amsterdam, Holland.—See WATER SUPPLY.

Anchor Ice.—See ICE—Anchor.

Antwerp.—The Antwerp Waterworks. An illustrated detailed description with history of the water supply of this important port. Serial. 1st part. 3000 w. Engng—May 27, 1904.

Arad, Hungary.—The Arad Waterworks and Fischer Plate Filters. Illustrated description of a method of sand filtration in a town in Hungary, and which has been adopted to a considerable extent on the Continent. 1200 w. Engng—Feb. 15, 1901.

An Unusual Water Supply Plant. Describes works at Arad, Hungary, having air lifts and Fischer filters. 1200 w. Eng Rec—Sept. 27, 1902.

Atlantic City.—Atlantic City Waterworks. An illustrated description of the system. The sources of supply are artesian wells, and Absecon creek. 1800 w. Fire & Water—May 23, 1903.

The Waterworks of Atlantic City, N. J. Illustrates and describes a system designed to meet unusual conditions, and give fire protection to about 700 hotels, mostly constructed of wood. 2500 w. Eng Rec—Aug. 22, 1903.
See also WATER PIPE.

Babylon, N. Y.—The Babylon Water Supply Plant. Illustrated description of works in which water is pumped from wells into four tanks where an air pressure of 45 lbs. is maintained, as a substitute for the head furnished by a water tower. The compressed air is drawn from tanks through regulating valves, maintaining a constant pressure on the water, without regard to the pressure in the air tanks. 1000 w. Eng Rec—Jan. 12, 1901.

Baden, Austria.—The Water Supply and Sewerage of

Baden (Die Wasserleitung und Kanalisation von Baden). Thomas Hofer. A detailed account of the new water supply of Baden, Austria, and of the recently constructed drainage system. Two articles, two plates. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—May 27, June 3, 1904.

Baird Iron Mines.—See **Ogden, Va.**

Bay City, Mich.—Bay City Waterworks. E. L. Dunbar. An illustrated historical sketch. 4400 w. Fire and Water—June 23-26, 1903.

Belfast, Ireland.—See **WATER SUPPLY.**

Bethlehem, Pa.—America's First Waterworks. From the "Bethlehem Times." Brief description of an arrangement for supplying a small community with water, which was put in operation in 1754. 1800 w. Dom Engng—Feb. 15, 1902.

Boston Inspection.—See **WATER SUPPLY—Inspection.**

Brookhaven, Miss.—The Waterworks Plant of the Pearl River Lumber Co., Brookhaven, Miss. William C. Porter. Describes a well-arranged plant for protection against fire, and for supplying water for uses about a large manufacturing plant. 600 w. Eng News—Jan. 10, 1901.

Brooklyn.—See **Fire Service, Brooklyn; WATER SUPPLY.**

Buffalo, N. Y.—The Waterworks System of the Pan-American City. An illustrated description of this fine municipal plant. 1700 w. Sci Am Sup—Oct. 5, 1901.

Butte, Montana.—The New Works and Water Supply of the Butte Water Company. Charles W. Paine. Illustrated description of new works consisting of a pipe line 27.2 miles in length, three reservoirs, and two pumping stations. 4300 w. Jour Assn of Engng Socs—Oct., 1902.

Cambridge, Mass.—Cambridge Waterworks. An illustrated article giving information of the plant and repairs of forty-inch steel main. 1600 w. Fire & Water—March 11, 1905.

Catholic Protectory, Philadelphia.—Waterworks of the Catholic Protectory of Philadelphia. Charles G. Darrach. Illustrated description of a slow sand filter remarkably compact in arrangement, with notes on pumping engines driven by compressed air from a central plant a quarter of a mile distant. 600 w. Eng Rec—May 11, 1901.

Chicago.—The Water Supply Tunnels of Chicago. An illustrated detailed description of the entire system, giving also the history of the Chicago water supply. 7000 w. Eng News—Oct. 18, 1900.

The Water Supply System of Chicago. F. B. Embree. Brief historical review, with illustrations. 1600 w. Sci Am—June 29, 1901.

The Waterworks System of Chicago. J. H. Spengler. A review of the development and growth, especially the extensive additions and improvements during the past five years. Ill. 23,300 w. Jour W Soc of Engrs—Aug., 1901.

The Waterworks System of Chicago. Brief historical review with illustrations. 3800 w. Fire & Water—Sept. 14, 1901.

Old and New Waterworks of Chicago. An illustrated account of the water system which has cost nearly $36,000,000; the great pumping plants, tunnels and cribs, etc. Reviews the history and development. 4000 w. Fire & Water—June 7, 1902.

See also **Fire Service, Chicago; TUNNEL.**

Cincinnati.—The New Water Supply of Cincinnati, O. Description of the purification plant, land tunnel, city pumping station, etc., of the works under construction at the village of California, about seven miles above the city. 2500 w. Eng News—May 23, 1901.

Notes on the Construction of the New Cincinnati Waterworks. Describes methods of sinking some large caissons for intake piers, pump wells and tunnel shafts, and gives description of method of constructing two reservoirs of 350,000,000 gallons capacity. 4500 w. Eng Rec—July 13, 1901.

Notes on Progress of Cincinnati's New Waterworks. C. N. Miller. An illustrated report of the progress made on these extensive new works. 2400 w. Eng Rec—July 4, 1903.

The Cincinnati Waterworks Tunnel. Paul G. Brown. An illustrated description of the construction. 1500 w. Eng News—Dec. 31, 1903.

Gravity Tunnel for the New Waterworks of Cincinnati. J. A. Hiller. An illustrated detailed description of the construction. 3500 w. Eng Rec—March 4, 1905.

Progress of Work on the New Water Supply System of Cincinnati, O. Reviews the present conditions of the different parts of the system. Ills. 2500 w. Eng News—Aug. 24, 1905.

Cincinnati Accident.—The Break in the Intake Caisson for the New Waterworks for Cincinnati, Ohio. Drawing, with explanation of the cause of the accident as given by Mr. G. Bouscaren, the chief engineer. 700 w. Eng News—May 30, 1901.

Cleveland, O.—See **INTAKE.**

Concrete Reinforced.—See **Ithaca, N. Y.**

Coney Island, N. Y.—A High Pressure Water System at Coney Island, N. Y. Illustrates and describes the system under construction which will furnish fire protection to this seashore summer resort. 1800 w. Eng Rec—May 20, 1905.

Contra Costa, Calif.—See **WATERWORKS LAW.**

Coolgardie, Australia.—Opening of the Coolgardie Waterworks. An account of these recently opened waterworks of Western Australia, which, it is hoped, will greatly benefit the gold fields. Explains the needs of the gold fields, and the importance of this great undertaking. 3700 w. Engr, Lond—March 13, 1903.

Water for the Gold Fields of Western Australia. D. M. Bates. An illustrated account of the great engineering feat to furnish water for the Coolgardie and Kalgoorlie gold fields. 3500 w. Cassier's Mag—Aug., 1903.

The Coolgardie Waterworks. Illustrated description of the waterworks scheme for supplying the mines of Western Australia. 3500 w. Sci Am Sup—Nov. 12, 1904.

Coolgardie, Australia, Pumping System. An illustrated article giving an abbreviated history of the greatest pumping scheme ever carried out. 3000 w. Min & Sci Pr—Feb. 25, 1905.

Coolgardie Water Supply. Charles Stuart Russell Palmer. Gives briefly the history and topography of the district, with illustrated description of the design and construction of the works undertaken for the water supply of this district in Western Australia. Discussion. 65,000 w. Inst of Civ Engrs (No. 3516).

See also **PUMPING ENGINE; WATER PIPE.**

Croton.—See **AQUEDUCT; DAM; RESERVOIR; WATER SUPPLY—New York.**

Danville, Ill.—Filter Plant and Other Improvements for the Water Supply of Danville, Ill. Illustrated description of dam, mechanical filter plant, increase in pumping capacity and distribution, &c. 3300 w. Eng News—April 28, 1904.

Recent Improvements in the Plant of the Danville Water Company. Daniel W. Meal. Reviews the history of the water supply of Danville and gives an illustrated description of the plant, the new dam, mechanical filters, etc. Discussion. 7000 w. Jour W Soc of Engrs—June, 1905.

Denver, Colo.—Sedimentation Tanks, with Numerous Circular Overflow Weirs; Denver Union Water Co. Illustrated description. 1000 w. Eng News—Nov. 15, 1900.

The Cheeseman Dam and Other Works for the Water Supply of Denver, Colorado. An illustrated description of a masonry dam under construction. 4300 w. Eng Rec—Oct. 24, 1903.

Lake Cheeseman Dam and Reservoir. Charles L. Harrison and Silas H. Woodard. The first named gives the history, design and illustrated description of the construction; the second gives an analysis of stresses in Lake Cheeseman dam. 12,000 w. Pro Soc of Civ Engrs—March, 1904.

Lake Cheeseman Dam and Reservoir. Discussion of the paper by Charles L. Harrison and Silas H. Woodard. 7200 w. Pro Am Soc of Civ Engrs—Sept., 1904.

Lake Cheeseman, Dam and Reservoir. Discussion on paper by Charles L. Harrison and Silas H. Woodard. 9000 w. Pro Am Soc of Civ Engrs—Aug., 1904.

Lake Cheeseman Dam and Reservoir. G. S. Williams. Continued discussion of paper on this subject by Charles L. Harrison, and Silas H. Woodard. 7500 w. Pro Am Soc of Civ Engrs—May, 1904.

See also **DAM—Great Goose Creek.**

Derbyshire, Eng.—See **Derwent Valley.**

Derwent Valley.—The Derwent Valley Waterworks System, Derbyshire. An illustrated article describing one of the largest supply projects under construction in England. Includes five reservoirs with a combined capacity of 10,000,000,000 imperial gallons, five large masonry dams, nearly 60 miles of conduits and several acres of filters. 3300 w. Eng Rec—April 9, 1904.

Quarries and Works of the Derwent Valley Water Board. Illustrated description of one of the largest schemes for water supply in England, which is to serve the towns of Leicester, Derby, Sheffield and Nottingham. 3300 w. Quarry—June, 1904.

The Supervisory Control of Water Supplies in Great Britain. James Robert Kaye. Read before the Sanitary Inst. in Glasgow. A discussion of the various proposals for supervisory control, especially describing the practice of the Derwent Valley Water Board. 2500 w. Eng Rec—Sept. 17, 1904.

Detroit, Mich.—The Detroit Waterworks. Clarence W. Hubbell. Historical review, with illustrations. 5500 w. Eng Rec—June 20, 1903.

See also **WATERWORKS MANAGEMENT.**

East Orange, N. J.—The New Waterworks of East Orange, N. J. Illustrated description of a municipal system comprising artesian wells, a pumping station, a 24-in. river main 5 miles in length from the pumping station to a concrete reservoir, and a gravity distribution system. 3000 w. Eng Rec—Oct. 22, 1904.

Economic Features.—Some Economic Features of Municipal Engineering. C. S. Burns. Mainly devoted to an explanation of the great possibilities in the way of economy that can be secured by attention to small details of waterworks design. 2900 w. Eng Rec—Feb. 8, 1902.

Edinburgh.—The New Edinburgh Waterworks. An outline of the construction of Tolla reservoir, with the necessary pipe track, aqueducts and tunnels. The work may not be completed for three years, and may cost nearly one million sterling. It will add 10,000,000 gallons a day to the present supply. 2500 w. Engr, Lond—Oct. 3, 1902.

The Talla Waterworks. Illustrates and describes this recent addition to the Edinburgh water supply, giving information in regard to the work and its cost. 1400 w. Engr, Lond—Sept. 1, 1905.

Eels.—Eels in Waterworks and Their Control. Dr. George W. Field. Gives an account of the habits and breeding of eels, and suggests ways of preventing trouble from them in waterworks. General discussion. 6000 w. Jour N Eng Waterwks Assn—Sept., 1901.

Electric Station Combined.—See **Warren, O.; ELECTRIC STATION.**

Elmira, N. Y.—The Elmira Waterworks. J. M. Diven. Illustrated historical account of the works. 2000 w. Fire & Water—June 15, 1901.

See also **ELECTRIC RAILWAY.**

Engineering.—Twenty-five Years of Water Supply Engineering. J. J. R. Croes. Reviews the conditions at the two extremes of this period, showing the important advances made. 2700 w. Eng Rec—Jan. 3, 1903.

Water Supply Engineering for Towns. P. Byrne. Read before the Engng. Assn. of the South. Discusses briefly points to be considered when waterworks become a necessity. 2200 w. Munic Jour & Engr—Aug., 1903.

Erie, Pa.—See **INTAKE.**

Feldsberg, Austria.—Water Supply and Sewage of the Town of Feldsberg, Lower Austria (Trinkwasserleitung und Kanalisation der Stadtgemeinde Feldsberg, N. Oe.). Franz Florian. Description of waterworks, mains, sewers, etc., of a small town, with illustrations and plans. 4 plates. 4500 w. Oest Wochenschr f d Oeff Baudienst—Sept. 9, 1905.

Fire Service.—Fire Mains. John C. Trautwine, Jr. Reviews briefly systems recently introduced in the cities of Cleveland, Milwaukee, Detroit, Buffalo, Providence, Boston, and Chicago, and describes the important features of the system introduced in Philadelphia. Illustration and tabulated results of experiments. Discussion. 14,500 w. Pro Engrs' Club of Phila—Jan., 1906.

Fire Protection Waterworks. Nicholas P. Simin. Describes American and Russian practice. Ill. 2500 w. Munic Jour & Engr—Aug., 1903.

Water Supply for Fire Service. Treats of the hydraulic phase of fire protection, as distinguished from the work of the chemical engine. 4800 w. Fire & Water—March 25, 1905.

High-Pressure System for Fire Service. Report of Committee of National Fire Protective Assn. Recommends their introduction for certain places, discussing their requirements. 5200 w. Eng Rec—June 31, 1905.

High Pressure Fire Systems. Everett U. Crosby. Committee report adopted by the National Fire Protection Association. 4500 w. Ins Engng—July, 1905.

Pressure in City Waterworks from Fire Protection Viewpoint. Abstract of the report of E. G. Hopson. Urges the extended use of sprinkler equipments, effective interior standpipe services, and discusses the value of higher pressures for fire protection and the objections. 4000 w. Eng Rec—Aug. 19, 1905.

Fire Department Water Supply. Charles A. Hague. Read before the League of Am. Municipalities, at Toledo, O. A comprehensive review of requirements and methods. 7500 w. Munic Jour & Engr—Sept., 1905.

High-Pressure Systems for City Fire Protection. Albert Blauvelt. A discussion of fire protection in the large cities of America. 5000 w. Cassier's Mag—Sept., 1905.

City Waterworks Systems. E. G. Hopson. Discusses the water pressures of the domestic supply systems from the fire protection point of view. 6000 w. Ins Engng—Sept., 1905.

See also **Atlantic City; Coney Island, N. Y.; Ideal; FIRE—Baltimore; FIRE PROTECTION—Factories; Salt Water; WATER METER; WATER TOWER—Gorter, San Francisco; WATERWORKS MANAGEMENT; WELL.**

Fire Service, Brooklyn.—Report on Proposed High Pressure Fire Service for Borough of Brooklyn, New York City. I. M. de Varona. Considers the districts where the service should be installed, the relative advantages of fresh and salt water, cost, &c. 4200 w. Eng News—March 24, 1904.

Fire Service Charges.—See **WATER RATES—Municipal; WATERWORKS MANAGEMENT.**

Fire Service, Chicago.—A Proposed High Pressure Water Supply System for Fire Protection in Chicago. Abstract of a report made to the commission appointed to consider the matter. Presents a plan, the main conduit to be a tunnel beneath the bed of the Chicago River, with lateral terminals, &c. Ills. 2500 w. Eng News—March 3, 1904.

Fire Service, Kentucky.—The Fire Protection Obligation of Water Companies. Reviews a decision of the Kentucky Court of Appeals, holding that a water company can be sued by the owners of property destroyed through inadequate water supplies for fire protection. 900 w. Eng Rec—March 29, 1902.

Fire Service, Madison, N. J.—The Quantity of Water Used for Fire Service in Madison. J. H. Neef. Gives a study of the Madison fires. 1500 w. Wis Engr—Feb., 1903.

Fire Service, Navy Yards.—The Use of Salt Water for Fire Protection and Other Purposes at U. S. Navy Yards. Brief descriptions of the systems installed at Norfolk, New York, Puget Sound, and Key West. 2200 w. Eng News—Feb. 2, 1905.

Fire Service, N. Y.—High-Pressure Water Service For Fire Protection in New York. Slightly condensed report by Nicholas S. Hill, Jr., on proposed service. 2000 w. Eng Rec—March 19, 1904.

Report on Proposed High Pressure Fire Service for Borough of Manhattan, New York City. Nicholas S. Hill, Jr. Outlines such a service and gives an estimate of cost. 2000 w. Eng News—March 24, 1904.

Proposed High-Pressure Fire System for the Borough of Manhattan, New York. An abstract of the report of I. M. de Varona, proposing a system to protect the business area of New York. 4500 w. Eng News—March 23, 1905.

The Revised Plans for a Fire-Protection Water System for New York. Outlines the plans for protecting the so-called dry-goods district of the city as proposed by I. M. De Varona. 2000 w. Eng Rec—March 25, 1905.

Fire Service, Philadelphia.—The Philadelphia High-Pressure Fire Service. Describes a system of mains filled by fire-boats at three points along the river front. 600 w. Eng Rec—June 14, 1902.

A New 2,300-H. P. Gas Engine Installation for High-Pressure Fire Service in Philadelphia. Illustrated description of engines for the new fire station. 1200 w. Eng News—Aug. 28, 1902.

Gas Engines for High-Pressure Fire Service. J. R. Bibbins. A short description of the engines to be installed in the city of Philadelphia, the principal reasons for their adoption and their inherent qualifications for the required duty. Ill. 3500 w. Ins Engng—Sept., 1902.

Philadelphia High-Pressure Fire Service. John E. Codman. Illustrated detailed description. Also discussion. 7500 w. Pro Engrs' Club of Phila—Jan., 1903.

Stationary Fire Pumps. George J. Jones. Describes a fire-fighting system recently installed in Philadelphia, the necessary water pressure being secured from a large stationary pumping plant. 1200 w. Sci Am—Jan. 24, 1903.

Philadelphia's High Pressure Fire Pipe Line. An illustrated account of this recently installed line to protect the "congested district," with report of its trial. 1000 w. Sci Am—July 11, 1903.

Philadelphia's New Fire Fighting Service. An illustrated description of central pumping station and independent pipe system whereby high pressures are obtained directly at the hydrants. 3200 w. Ir Age—Jan. 21, 1904.

Gas Power for High-Pressure City Fire Service. J. R. Bibbins. An illustrated article describing conditions in Philadelphia, the high-pressure pumping station and matters related. 6000 w. Cassier's Mag—March, 1904.

8,000 Horse-Power Gas Engine Pumping Station for High Pressure Service. J. R. Bibbins. An illustrated detailed description of the Philadelphia station, with information relating to it. Serial. 1st part. 2500 w. Engr, U S A—March 15, 1904.

The Philadelphia Gas Engine Pumping Station for Fire Service. Illustrated detailed description of this high pressure pumping station. 3800 w. Eng Rec—March 5, 1904.

Franklin, Ind.—See **ELECTRIC STATION.**

Geneva, Ohio.—Village Waterworks of Geneva, Ohio. Illustrates and describes details of the reservoir and intake, giving plan and section of pumping and filtration plant. 2200 w. Eng Rec—April 2, 1904.

Glasgow.—The Glasgow Waterworks. Robert Wilson. Illustrated description of the Loch Katrine works, aqueducts, service reservoirs, Gorbal works, river supply works and other features. 2000 w. Public Works—Aug. 15, 1904.

Guantanamo, Cuba.—The Waterworks of Guantanamo, Cuba. S. D. Rockenbach. Illustrated detailed account of the work, with particulars concerning the region and conditions to be met. 2500 w. Pro Am Soc of Civ Engrs—Sept., 1901.

Halensee, Berlin.—See **RAILWAY WATER SERVICE.**

Hamburg.—The Development of the Hamburg Waterworks (Das Hamburger Wasserwerk und die Entwicklung seiner Maschinenanlagen). R. Schröder. A fully illustrated description of the plant, including high and low-pressure pumping stations, filter beds, etc. Serial. Part I. 5000 w. Zeitsch d Ver Deutscher Ing—May 31, 1902.

Hanover.—The Water Supply and Sewage of the City of Hanover (Die Wasserversorgung und Kanalisation der Stadt Hannover). A general account of the installation, from the report of chief engineer Bock. 2500 w. Gesundheits-Ingenieur—May 31, 1902.

Heanor, Eng.—See **Ilkeston.**

History.—A Century's Progress. A review of the progress made during the last century in hydraulic and sanitary engineering. Serial. 1st part. 2000 w. Fire & Water—Jan. 5, 1901.

See also **Philadelphia; Syracuse, N. Y.**

Hudson, N. Y.—The New Gravity Waterworks at Hudson, N. Y. Illustrates and describes a storage reservoir and pipe line just completed. 2800 w. Eng Rec—April 1, 1905.

Ice Troubles.—See **ICE; INTAKE.**

Ideal.—An Ideal Water Supply. George F. Chase. Discusses the proper distribution of water, hydrants, pipe, etc. 2500 w. Fire & Water—Nov. 1, 1902.

See also **Model; WATER SUPPLY.**

Ilkeston, Eng.—Ilkeston and Heanor Waterworks. George and F. W. Hodson. Details and illustrations of a very complete waterworks undertaking. 6400 w. Public Works—April, 1905.

Intake Tunnel.—See **Chicago; Cincinnati; INTAKE; TUNNEL.**

Ithaca, N. Y.—Recent Concrete-Steel Waterworks Construction at Ithaca, N. Y. Illustrated detailed description. 5000 w. Eng Rec—April 9, 1904.

See also **WELL.**

Jersey City.—See **DAM—Boonton; TUNNEL—Hook Mountain; WATER PIPE; WATER SUPPLY.**

Kansas City.—See **WATER PURIFICATION—Subsiding Basins.**

Komotan, Bohemia.—The Water Supply of the City of Komotau (Die Wasserversogung der Stadt Komotau). J. A. Spitzer. Illustrating and describing the construction of the dam, aqueduct, and filter plant for the city of Komotau, in Bohemia. Two articles. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 12, 19, 1904.

Laboratory.—See **LABORATORY—Brooklyn Waterworks; Waterworks.**

London.—The New Works of the Southwark and Vauxhall Water Company. Illustrated description 2000 w. Jour Gas Lgt—May 7, 1901.

The New Augmented Water Supply and Reservoirs for London. A fully illustrated article describing these works. 1500 w. Sci Am Sup—Dec. 13, 1902.

Engineering Conference Visits. Illustrated detailed descriptions of the Staines Reservoirs, near the Thames; and of the Great Eastern Railway Company's works at Stratford. 5800 w. Engr, Lond—June 12, 1903.

The Staines Reservoirs and Aqueducts of the London Waterworks. Illustrated detailed description. 4500 w. Eng Rec—Nov. 28, 1903.

The London Waterworks Acquirement. R. Price-Williams. A discussion of this undertaking, its extents, capability, and probable benefit to London. 2500 w. Engng—April 15, 1904.

See also **WATER SUPPLY.**

London, Ont.—See **DAM.**

Loughborough.—New Waterworks for Loughborough. Illustrated description of the new source of supply and the methods employed in obtaining it. 1900 w. Engr, Lond—July 11, 1902.

Lynn, Mass.—See **DAM.**

Madras Presidency.—Waterworks in the Madras Presidency. An explanation of the requirements which led to special methods of design and construction of systems for Indian towns. 2200 w. Eng Rec—April 20, 1901.

Margate, Eng.—New Water Supply for Margate. An illustrated article describing the new waterworks of this English seaside resort. 1100 w. Engr, Lond—Dec. 25, 1903.

Marlborough, Mass.—The Marlborough Waterworks. George A. Stacy. Illustrates and describes a construction of these works in a Massachusetts township. 3700 w. Jour N E Waterworks Assn—June, 1902.

Memphis, Tenn.—See **WELL.**

Merthyr Tydvil, Wales.—Merthyr Tydvil New Waterworks. An interesting description of this nearly completed work which has been in progress many years and been attended with great difficulties. 2500 w. Engr, Lond—Sept. 6, 1901.

Middletown, N. Y.—The Waterworks System of Middletown, N. Y. Brief history of the works with illustrated description of improvements and additions now under construction. 1000 w. Munic Engng—March, 1902.

Mobile, Ala.—A Waterworks Appraisal at Mobile, Ala. Abstract of the report of a commission appointed to determine the value of a plant to be purchased. 7000 w. Eng News—April 23, 1903.

Model System.—A Model System of Waterworks. F.

O. Jones. Illustrated description of a system for small communities suited for both domestic purposes and fire protection. 1600 w. Sci Am Sup —March 2, 1901.

See also Ideal.

Montreal.—History and Description of the Montreal Waterworks. George Janin. A brief history and description of the aqueduct system. 3300 w. Ill. Jour N Eng Wwks Assn—Sept., 1903.

The Montreal Waterworks. George Janin. Read before the Am. Soc. of Munic. Imp. Reviews the history of the water supply, and the plans for increasing it. 1800 w. Munic Engng—Oct., 1905.

Multiple Zone.—Multiple Zone Distribution for Municipal Water Supply (Mehrfache Versorgungszonen für städtische Wasserleitungen). Rudolf Müller. Showing the advantages of dividing the area into several zones of various pressures. 2000 w. Oesterr Wochenschr f d Oeffent-Baudienst—Aug. 20, 1904.

Municipal.—See **WATER SUPPLY; WATERWORKS MANAGEMENT.**

Newark, N. J.—See **WATER METER.**

New Bedford, Mass.—The Quittacas Pumping Station and Other Features of the New Bedford Waterworks. Reviews the history of the waterworks system, describing and illustrating the new works. 5000 w. Eng Rec—June 25, 1904.

New England.—See **Statistics.**

New Kensington.—See **Pittsburg Reduction Co.**

New York.—See **American; AQUEDUCT—Croton; DAM—Croton; RESERVOIR—Croton; Jerome Park; WATER SUPPLY; WATER WASTE; WATERWORKS MANAGEMENT.**

Norfolk, Va.—Filtration and Meterage at Norfolk, Va. Illustrates and describes the plant, giving information also of the supply, waste, etc. 1800 w. Fire & Water—Jan. 5, 1901.

Odessa.—The Odessa Waterworks. An illustrated article describing new extension to supplement the old plant at Odessa, Russia, with the most modern and economical machinery. 1500 w. Engng—Nov. 4, 1904.

Ogden, Va.—Waterworks for the C. R. Baird Co.'s Iron Mines at Ogden, Va. John N. Ambler. Plan and profile of the works is given, with description. The distinctive feature consists in the gravity main of 6-in. vitrified clay pipe which conveys the water from the summit to the mines. 1100 w. Eng News—Aug. 15, 1901.

Paris.—See **WATER SUPPLY.**

Philadelphia.—The Center Square Waterworks of Philadelphia; the Source of Water Supply from 1801 to 1815. A brief sketch of the early history of the Philadelphia supply, with illustrated description of the first pumping station, and the wooden boilers used. 1700 w. Engs News—May 14, 1903.

Improvement, Extension and Filtration of the Water Supply of Philadelphia. John W. Hill. An illustrated article describing work in progress and calling attention to features of interest. General discussion. 17,300 w. Pro Engrs' Club of Phila —July, 1903.

See also **Catholic Protectory; Fire Service, Philadelphia; AQUEDUCT — Torresdale; FILTRATION; RESERVOIR—Belmont; WATER PIPE.**

Phillips, Me.—See **Pressure Reduction.**

Pittsburg Reduction Co.—Water Supply Plant at the New Kensington Works of the Pittsburg Reduction Co. Edwin S. Fickes. Illustrated description of the plant and the difficulty experienced in sinking the suction well. 1100 w. Eng News—March 21, 1901.

Porterville, Cal.—The Waterworks of Porterville, California. Philip E. Harroun. An illustrated description of works for a town of about 2,000 inhabitants, with notes on the operation and cost. 8500 w. Pro Am Soc of Civ Engrs—Jan., 1905.

Pratt City, Ala.—The Pratt City Waterworks. Illustrated description of a small plant using an air lift for raising water from deep wells. 900 w. Eng Rec—March 30, 1901.

Prenzlau, Prussia.—Iron Removal from the Prenzlau Water Supply. From "Zeitschrift d. Ver Deutscher Ing." Illustrated description of works drawing a supply from driven wells, which is aerated and filtered in Worms apparatus. An Intze water tower is another feature of the plant. 1800 w. Eng Rec—Dec. 15, 1900.

Prescott, Ariz.—High Pressure Pumping Plant and Force Main for the Waterworks of Prescott, Ariz. W. W. Follett. An illustrated description of a pumping plant and pipe line for 500,000 gallons per day. 2800 w. Eng News—Dec. 18, 1902.

Pressure Reduction.—How I Reduce Pressure on a Gravity System. E. H. Gowing. Describes a scheme using vertical risers at Phillips, Me., where the source of supply was about 600 feet above the general level of the village. Ill. Discussion. 2000 w. Jour N E Waterwks Assn—June, 1903.

Pumping Engines.—See **PUMPING ENGINE; PUMPING ENGINE TEST; PUMPING STATION.**

Reading, Pa.—See **RESERVOIR.**

Reichenberg, Bohemia.—The Waterworks of the City of Reichenberg (Das Wasserwerk der Stadt Reichenberg). U. Huber. A detailed account of the new works and pumping stations for the water supply of Reichenberg, Bohemia. The supply is obtained from a number of small streams. 7500 w. 6 plates. Oesterr Wochenschr f d Oeff Baudienst—June 4, 1904.

Rochester, N. Y.—Distributing System of the Rochester Waterworks. W. N. Radenhurst. Read before the Am. Soc. of Munic. Imp. Describes a double system of supply; from the Genesee River by direct pumpage; and a gravity system from Hemlock Lake. 1000 w. Munic. Engng—Nov., 1902.

The Water Supply of Rochester, N. Y. John F. Skinner. Read before the Am. Soc. of Munic. Imp. Brief review of these works which take their supply from Hemlock Lake. 1200 w. Munic Engng—Nov., 1902.

Russian vs. American.—See **Fire Service.**

St. Louis, Mich.—See **ELECTRIC STATION.**

St. Louis, Mo.—St. Louis Waterworks—Distribution System from 1886-1901. B. C. Adkins. Describes the growth of the system, and its maintenance. Ill. 1200 w. Fire & Water—June 15, 1901.

Report of the St. Louis Water Supply by an Expert Commission. Abstracted by Robert E. McMath. 9000 w. Eng News—March 6, 1902.

Improvements of St. Louis Works. Describes a new hydraulic dredge which enables the basins to be cleaned while in regular service, and the plan for filtration. Ill. 1600 w. Fire & Water—Nov. 22, 1902.

St. Louis Water Supply. R. E. McMath. States the problem to be considered, discussing methods of water treatment, the probable needs of the city sources of supply, etc., giving the writer's conclusions. General discussion follows. 28,000 w. Jour Assn of Engng Socs—May, 1903.

Changes in the Settling Basins and the New Hydraulic Dredge of the St. Louis Waterworks. E. E. Wall. An illustrated account of interesting changes being made to substitute continuous sedimentation for the fill and draw method. 1300 w. Eng News—Nov. 26, 1903.

The Waterworks at St. Louis. An illustrated description of the water tower, settling basins, pumping station, pumping engine, &c. 3300 w. Engr, Lond—May 13, 1904.

The Water Supply System of St. Louis. W. E. Rolfe. An illustrated article giving the history, general outline and description of interesting features, with facts related. 5000 w. Eng Rec—June 4, 1904.

See also **INTAKE—Ice, St. Louis; RESERVOIR—Baden.**

San Diego, Cal.—Southern California Mountain Water Company's Reservoirs, Dams and Pipe Lines. An illustrated description of portions of extensive development schemes in San Diego county, including dams, reservoirs, flumes and pipe lines. 3000 w. Eng Rec—Nov. 14, 1903.

Service Box, Montreal.—See **WATER PIPE.**

Shanghai.—Shanghai Waterworks. Illustrated description of the pumping station and a set of engines which have recently been installed. 2500 w. Engr, Lond—Dec. 16, 1904.

Siphon.—See **SIPHON; WATER PIPE.**

Statistics.—Waterworks Statistics for the Year 1900, in Form Adopted by the New England Waterworks Association. Compiled by Charles W. Sherman. 8000 w. Jour N Eng Water Wks Assn—Sept., 1901.

Waterworks Statistics for the Year 1901, in Form Adopted by the New England Waterworks Association. Compiled by Charles W. Sherman. Tabular report of pumping statistics, financial statistics, consumption, distribution, etc. 1500 w. Jour N E W Wks Assn—Sept., 1902.

Waterworks Statistics for the Year 1902, in Form Adopted by the New England Waterworks Association. Compiled by Charles W. Sherman. 1500 w. Jour N Eng Wwks Assn—Sept., 1903.

Sudbury, Mass.—See **DRAINAGE.**

Swansea, Wales.—Swansea Waterworks. Illustrated description of works for increasing the water supply, consisting of a storage reservoir, tunnel, pipe line, and service reservoir, explaining the interesting features. 2400 w. Engng—March 3, 1905.

Sydney, Australia.—See **DAM.**

Syracuse, N. Y.—City Ownership of Water Supply. William R. Hill. An account of the success attained at Syracuse, N. Y., as related in a paper read before the City Reform Club of New York. 2000 w. Fire & Water—March 7, 1903.

Syracuse Waterworks. A review of their history from 1841 to 1902. Ill. Serial. 2 parts. 8000 w. Fire & Water—June 27 & July 4, 1903.

Talla.—See **Edinburgh.**

Tokyo, Japan.—Tokyo City Waterworks. Brief illustrated description of the new system of water supply, which is based on the most approved practice. 1100 w. Engng—Feb. 1, 1901.

Toledo, O.—See **WATER PURIFICATION.**

Trieste, Austria.—Description and History of the Waterworks and the American System of Filtration at Trieste, Austria. E. A. Gieseler. Map and illustrations. 2000 w. Eng Rec—Feb. 20, 1904.

Trotwood, O.—A Small Waterworks Plant at Trotwood, O., With Storage Under Compressed Air. Benjamin H. Flynn. Describes a small plant, in which the water is stored in a tank under an air pressure of 40 to 80 pounds. 600 w. Eng News—March 21, 1901.

Tullahoma, Tenn.—See **ELECTRIC TRANSMISSION.**

Turbine Pumping Plants.—See **PUMP; PUMPING STATION—Turbine.**

Urfahr, Austria.—The Electric Water Supply Plant of the City of Urfahr on the Danube (Wasserversorgung der Stadt Urfahr a. D. mit Elektrischem Betrieb). A. Oelwein. Describing the wells, reservoirs and electric pumping plant for the supply of a city of about 8,000 population. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 30, 1903.

Valuation.—See **Mobile, Ala.; VALUATION; WATERWORKS MANAGEMENT.**

Vienna.—See **WATER SUPPLY.**

Warren, O.—Reconstruction of a Water and Electric Lighting Station at Warren, O. Drawings and photographs showing the improvements made, with account of the works, and facts of interest concerning them. 1600 w. Eng News—Sept. 5, 1901.

Widnes.—See **GAS WORKS.**

WATERWORKS LAW.

See also **GROUND WATER; WATER RATES; WATER RIGHTS; WATER SUPPLY; WATERWORKS; WATERWORKS MANAGEMENT.**

Contra Costa, Cal.—The Valuation of the Works of the Contra Costa Water Company. Review of a decision by a California court, in which the property of a company without an exclusive franchise and without power to fix its own charges for water, is valued at about 2 1-2 times its cost of construction. 800 w. Eng Rec—June 1, 1901.

Fire Protection.—See **WATERWORKS—Fire Service; WATERWORKS MANAGEMENT.**

Gloucester, Mass.—The Appraisal of the Gloucester Waterworks. Review of a decision by the Massachusetts Supreme Court allowing a private water company, without an exclusive franchise, a large sum for its good will. 2000 w. Eng Rec—Aug. 10, 1901.

WATERWORKS MANAGEMENT.

See also **WATER METER; WATER RATES; WATER SUPPLY; WATER WASTE; WATERWORKS; WATERWORKS LAW.**

Public Water Supplies. George R. Perry. From a paper before the Charleston convention of the League of Am. Munic. A discussion of waste, unrestricted use, meters, etc. 2200 w. Munic Engng—Jan., 1901.

Efficient Management and Maintenance of Waterworks Owned by Municipalities or Private Corporations. Benjamin L. Williams, Jr. Urges the importance of attention to details, the installation of meters, etc. 1200 w. Munic Engng—May, 1901.

Brooklyn, N. Y.—Management of Pumping Stations. Kenneth Torrance. Gives the system of watches at the Brooklyn Waterworks, and discusses general management. 3300 w. Eng Rec—June 20, 1903.

Depreciation.—Depreciation. John W. Alvord. Examines in detail some of the features of waterworks plants, and the conditions under which they depreciate. Serial. 1st part. 3000 w. Fire & Water—Aug. 29, 1903.

See also **DEPRECIATION.**

Detroit, Mich.—Recent Operating Experience in the Detroit Water Department. A statement from official reports of the cause of the very large draught on the Detroit waterworks, with the official suggestions for remedying it. 2100 w. Eng Rec—Dec. 21, 1901.

Fire Service Charges.—The Apportionment of Charges for Private Fire Protection, and the Means of Controlling the Supply for Such Service. Topical discussions, and report of committee appointed to consider this subject. 1600 w. Jour N Eng Waterwks Assn—Sept., 1901.

Apportionment of Charges for Private Fire Protection and the Means of Controlling the Supply Thereto. Report of committee and discussion. 17,500 w. Jour N E Waterwks Assn—Dec., 1902.

See also **WATER METER; WATERWORKS.**

New York.—The Department of Water Supply. William F. King. Information concerning the comparative cost and utility, organization and administration, revenue, etc. 3500 w. Munic Af—Dec., 1900.

See also **WATER SUPPLY; WATER WASTE.**

Norfolk, Va.—See **WATERWORKS.**

Private Companies.—The Eminent Domain of Private Water Companies. Houston Dunn. Discusses the growing menace of private ownership and matters of related interest. 2500 w. Ins Engng—May, 1905.

Pumping Costs.—Cost of Pumping Water. William O. Webber. Conclusions reached from recent investigations of municipal plants, with chart showing graphically the relation that the cost of pumping 1,000,000 gals. one foot high has to different quantities to different heights. 300 w. Power—Nov., 1900.

Revenue.—Municipal Water Supply Revenue. James L. Tighe. Discusses the equity of using this revenue for meeting the expenses of government. 2700 w. Jour N Eng Wwks Assn—Dec., 1904.

Statistics.—See **WATERWORKS.**

Thrift vs. Waste.—An Attempt to Prove That Thrift in the Operation of Waterworks Is More Economical Than Waste. Clemens Herschell. Urging the selling water for domestic use by measure, and giving information bearing on this subject. 4500 w. Am Waterwks Assn—June, 1901.

Valuation.—The Financial Questions in Waterworks Valuations. John W. Alford. Abstract of a paper before the Am. Wwks. Assn. A discussion of the most equitable manner of ascertaining the value of a waterworks plant. 4000 w. Eng Rec—July 12, 1902.

See also **VALUATION; WATERWORKS—Mobile, Ala.; WATERWORKS LAW—Contra Costa; Gloucester.**

WATTMETER.

See **ELECTRIC METER.**

WAVE.

See also **ELECTRIC CURRENT, ALTERNATING; ELECTRO-PHYSICS; LIGHT; PHYSICS; RADIOACTIVITY; RADIOGRAPHY.**

Measurement, Photographic.—See **SURVEYING—Photographic, Wave.**

Propagation.—See **ELECTRIC WAVE; HYDRODYNAMICS; SPACE TELEGRAPHY.**

Tidal.—Tidal Waves, Seaquakes, and Storm Waves. W. H. Wheeler. Considers the causes of abnormal solitary waves and their effects, describing many such disturbances. 4000 w. Engr, Lond—April 17, 1903.

WAVE ACTION.

See also **SHORE PROTECTION.**

Breakwaters.—Wave Action in Relation to Engineering Structures. D. D. Gaillard. Greatly condensed from Professional Paper No. 31 of the Corps of Engineers, U. S. A. A study of wave action, the effects upon breakwaters and similar structures, &c. Ills. 4700 w. Eng News—Feb. 23, 1905.

WAVE MOTOR.

See also **TIDE POWER.**

Santa Cruz.—The Santa Cruz Wave Motor. H. W. H. Penniman. Brief description with illustration. 450 w. Sci Am—Jan. 4, 1902.

WAVE POWER.

See **TIDE POWER; WAVE MOTOR.**

WEATHER.

See **METEOROLOGY.**

WEAVING MACHINERY.

See **TEXTILE MACHINERY.**

WEIGHBRIDGE.

See also **WEIGHING MACHINE.**

Avery.—The Avery Patent Combination Weighbridge. Illustrated description of a design which is so constructed and arranged that when a car is upon the weighbridge the load can be immediately ascertained upon either the one or the other axle or upon the two combined. 1000 w. Prac Engr—Sept. 29, 1905.

Trains.—Combined Weighbridge for Weighing Mixed Trains. Brief illustrated description of weighbridges recently introduced for railway service at Birmingham, Eng. 500 w. Engng—Sept. 11, 1903.

WEIGHING MACHINE.

See also **WEIGHBRIDGE.**

Automatic.—Typical Automatic Weighing Machines. Emile Guarini. Illustrates and describes machines made in England. 1500 w. Sci Am Sup—June 25, 1904.

Blake-Denison.—The Blake-Denison Continuous Weighing Machine. An illustrated detailed description. 1100 w. Engng—Oct. 4, 1901.

Dopp Locomotive.—The Dopp Adjustable Locomotive Scales (Die Dopp'sche Aichfähige Raddruckwage). E. Dopp, Jr. Illustrating an improved form of scales for weighing the distribution of pressure upon the wheels of a locomotive or railway carriage. 1200 w. Glasers Annalen—March 15, 1904.

WEIGHT.

Assay.—See **ASSAYING—Weight.**

WEIGHTS AND MEASURES.

See also **ELECTRIC UNIT; GAUGE; MAGNETIC UNIT; MEASUREMENT; SCREW THREAD; STANDARDIZATION.**

Board Measure.—Logarithmic Table of Board Measure. W. H. Sargent. Gives chart with explanation of the method of using it. 400 w. Am Mach—Jan. 24, 1901.

Decimal English.—Scheme for Decimalising English Weights and Measures. Résumé of a pamphlet by Thomas A. Barber. 2000 w. Bul Int Ry Cong—July, 1904.

Making the Best of Present Units. Sanford A. Moss. Suggestions for a system of measurements that will give the calculations in decimals. Also editorial. 1800 w. Am Mach—Vol. 28, No. 20.

Estimating.—Estimation of Weight and Volume. J. G. A. Meyer. Gives simple methods of finding the weights and volumes of irregular bodies. 1500 w. Mach, N Y—June, 1902.

Inch-Unit.—The Inch-Unit System. Thomas Parker. Gives a comparison of the inch and centimetre, showing the advantage of the inch, and discussing the disadvantages of the metric system as applied especially to linear units, suggesting the change to the inch as a unit measure. 1200 w. Engr, Lond—March 4, 1904.

Linvolpan System.—See **MECHANICAL ENGINEERING—Topical Discussion.**

Metric.—The Metric System. W. H. Sargent. A discussion of its possibilities as a universal system. 1500 w. Mach, N Y—Feb., 1901.

The Adoption of the Metric System in Our Workshops. Arthur Greenwood. Urging the adoption of the system. 2000 w. Inst of Mech Engrs—Glasgow Congress, 1901.

The Metric System of Weights and Measures. Report of committee with general discussion. 8500 w. Jour Fr Inst—June, 1902.

Lord Kelvin on the Metric System. Extracts from remarks before the Committee on Coinage, Weights and Measures of the U. S. House of Representatives, on April 24, 1902. 2800 w. Locomotive—June, 1902.

The Metric System of Weights and Measures. A copy of the circular sent announcing the purposes of a special meeting for the discussion of the metric system, with proceedings of the meeting. 1700 w. Jour W Soc of Engrs—Aug., 1902.

The Metric System. F. A. Halsey. Discusses the actual use in countries where it has been adopted, showing the confusion of units to have been increased rather than diminished. 20,000 w. Trans Am Soc of Mech Engrs, No. 0956—Dec., 1902.

The Metric System in the Machine Shop. Views of August Hoffman on the relative merits of inch measurements and the metric system, favoring the latter. 800 w. Am Mach—May 14, 1903.

The Metric Fallacy. Frederick A. Halsey. An explanation of the difficulties arising in displacing a system of weights and measures, and why scientific men regard the subject differently than manufacturers. 8500 w. Sib Jour of Engng—April, 1905.

Metric Measurements. Robert H. Smith. Reviews arguments presented in a recent debate before the British Inst. of Elec. Engrs., and gives the writer's views. 2800 w. Elec Rev, Lond—Feb. 13, 1903.

The Metric System. C. H. Tutton. Paper on the proposed measure to make the metric system the only legal standard of the United States, unfavorable to its adoption. General discussion. 5000 w. Jour Assn of Engng Socs—Feb., 1903.

Discussion on the Metric System. Abstract of notes by Alexander Siemens in opening the discussion, and Sir Frederick Bramwell's reply. Before the Inst. of Elec. Engrs. (England). 5000 w. Elect'n, Lond—Feb. 20, 1903.

The Adoption of the Metric System in the United States (Adoption du Système Métrique aux Etats-Unis). Responses by the Society of Civil Engineers of France to a series of questions concerning the metric system put by the American Chamber of Commerce in Paris. 7500 w. Mem Soc Ing Civ de France—Aug., 1903.

The Metric System. The objections answered by the French Society of Civil Engineers. Extracts from this discussion. 2000 w. Ir Age—Oct. 8, 1903.

The Metric System: Shall It Be Compulsory? Prof. W. Le Conte Stevens. Reviews the history of the standards of measurement in use, and discusses the need of uniformity in the commerce of nations, and the steps that have been taken to that end. 5600 w. Pop Sci M—March, 1904.

The Metric System in Mechanical and Electrical Engineering. Read before the Rugby Engng. Soc. I. Introductory Statement for the Metric System. Ernest R. Briggs. II. Reply to the Introductory Statement. R. C. Jackson. Also editorial. 5000 w. Elec Engr, Lond—Oct. 14, 1904.

The Metric System of Weights and Measures. A. E. Kennelly. Favoring the adoption of the metric system. 4800 w. Pop Sci M—Feb., 1905.

See also **U. S. National Bureau; SCREW THREAD.**

Metric, British.—Metric System in Great Britain. Report of the Decimal Association. (Abstract.)

Considers British legislation on this subject, the action taken by various associations, &c. 2000 w. Am Mach—Vol. 28, No. 9.

Metric Convention.—The Metric Convention and the International Bureau of Weights and Measures (La Convention du Mètre et le Bureau International des Poids et Mesures). C. E. Guillaume. A historical account of the practical development of the metric standards and of the work of the International Bureau at Breteuil. Serial. Part I. Bull Soc d'Encour—Aug. 31, 1901.

The Metric Convention and the International Bureau of Weights and Measures (La Convention du Mètre et la Bureau Internationale des Poids et Mesures). C. E. Guillaume. M. Guillaume's second paper treats of the thermometric work, and also describes the various comparators used in the Bureau. 10000 w. Bull Soc d'Encour—Oct., 1901.

The Metric Convention and the International Bureau of Weights and Measures (La Convention du Mètre et le Bureau Internationale des Poids et Mesures). C. E. Guillaume. M. Guillaume's third paper deals with the preparation and comparison of standards of length, also of the determination of the kilogramme. 12000 w. Bull Soc d'Encour—Nov., 1901.

The Metric Convention and the International Bureau of Weights and Measures (La Convention du Mètre et le Bureau Internationale des Poids et Mesures). C. E. Guillaume. M. Guillaume's fourth paper treats of the last expansion of solids, particularly different nickel-steel alloys. Curves and tables. 3500 w. Bull Soc d'Encour—Dec., 1901.

The Metric Convention (La Convention du Mètre). C. E. Guillaume. Discussing the influence of variations in gravitation upon the establishment of standards, also the use of light wave lengths as invariable references. 10,000 w. Bull Soc d'Encour—March, 1902.

The Metric Convention and the International Bureau of Weights and Measures (La Convention du Mètre et le Bureau International des Poids et Mesures). Ch. Ed. Guillaume. A continuation of the history of the metric system, with appendices giving accounts of important conventions and meetings, and record of the adoption of the metric system by various countries. 16000 w. Bull Soc d'Encour—June 30, 1903.

Metric, Germany.—Metric Weights and Measures in Germany. Information concerning the effect on foreign trade due to the different systems used, and report of the ease with which the metric system was introduced and made obligatory in Germany. 1800 w. U S Cons Rept., No. 1548—Jan. 19, 1903.

Metric History.—Historical Sketch of the Foundation of the Metric System. M. Bassot. Translated from the Annuaire pour l'an 1901 public par le Bureau des Longitudes, Paris. 9800 w. Sch of Mines Qr—Nov., 1901.

See also **Metric Convention.**

Metric, Shipbuilding.—The Metric System in Relation to the Shipbuilding Industry of the United States. J. H. Linnard. Considers the effect of introducing the metric system in its application to the shipbuilding and marine engine industry, not favorable to its adoption. 4700 w. Trans Am Soc Nav Archts & Marine Engrs, No. 9—Nov., 1903.

Metric vs. English.—The English versus the Metric System. Charles T. Porter. An argument against the adoption of the metric system. 1000 w. Elec Rev, N Y—March 8, 1902.

A Rational Solution of the Problem of Weights and Measures. Sidney A. Reeve. A discussion of the advantages and disadvantages of the metric system and an advocacy of the advantages of a system which subdivides by halves, thirds, and quarters. 4800 w. Trans Am Soc of Mech Engrs, No. 0959—Dec., 1902.

The Inch Versus the Meter for a Universal Metric System. George Moores. Discusses this subject, favoring the inch as the universal measure. 2400 w. Cassier's Mag—Dec., 1904.

See also **Metric.**

Metric, Water Measurement.—The Folly of Reckoning by Gallons, Which Differ Widely in Canada and the United States, While All Countries Have Identical Liters and Cubic Meters. Frederick Brooks. Urging the use of metric system in measuring water consumed. 3300 w. Jour N Eng W Wks Assn—Sept., 1903.

Surveying. — See **SURVEYING INSTRUMENT—Standards.**

U. S. National Bureau.—The National Bureau of Standards. Samuel W. Stratton. Reviews the provisions made by Congress, and explains the duties of the National Bureau of Standards, established March 3, 1901. 4900 w. Jour Fr Inst—Feb., 1902.

The National Bureau of Standards. S. W. Stratton. Shows the condition of affairs that led the U. S. Congress to establish the National Bureau of Standards, describing the work belonging to it, and showing the need of the adoption of uniform and correct standards, especially between nations, and urging the adoption of the metric system. Also discussion. 7700 w. Pro Engrs Club of Phila—April, 1902.

Weights and Measures. Prof. S. W. Stratton. Reviews what has been done by the U. S. Government in regard to fixing standards of weights and measures, describing the functions of the National Bureau of Standards and the work. General discussion. 6500 w. Pro Engrs' Soc of W Penn—March, 1903.

See also **LABORATORY.**

WEIR.

See also **DAM; HYDRO-ELECTRIC PLANT; RIVER REGULATION; RESERVOIR; SLUICE GATE; WATER FLOW; WATER POWER; WATERWORKS.**

Backwater.—See **HYDRAULICS; WATER FLOW.**

Circular Overflow.—See **WATERWORKS—Denver.**

Concrete Tower.—Constructing a Submerged Weir by Overturning a Tower of Concrete Blocks. Drawings and brief description of a novel scheme devised for a submerged weir in the rapid current of the Niagara River. 400 w. Eng News—Oct. 12, 1905.

India.—Notes on Weirs in India. Gives illustrated design of examples of the three types found in Upper India. The Okhla Weir across the Jumna River; the Narora Weir at the head of the Lower Ganges Canal; the Parichha Weir in the United Provinces of Agra and Oudh. 4000 w. Engr. Lond—June 5, 1903.

Meter Test.—See **WATER METER—Tests.**

Niagara.—See **Concrete Tower.**

Nile.—See **DAM; IRRIGATION—Egypt; RIVER REGULATION.**

Nile Delta.—Grouted Rubble Core Walls for the Weirs of the Delta Barrage, Egypt. Describes the method of core wall construction of the Damietta and Rosetta weirs, built to supplement the old Delta Barrage of the Nile. Account taken from a paper by Major Sir Robert Hanbury Brown, before the Inst. of Civ. Engrs. of Great Britain. Ills. 4500 w. Eng News—Feb. 9, 1905.

Water Flow.—See **WATER FLOW.**

WELDING.

See also **ALUMINOTHERMY; RAIL JOINT; SOLDERING; TRACK—Street.**

Aluminothermy.—See **ALUMINOTHERMY.**

Aluminum.—See **ALUMINUM—Welding.**

Autogenous.—See **Blowpipe.**

Blowpipe.—The Working of Metals With the Oxygen-Acetylene Blowpipe (La Soudure Autogène des Métaux. Soudure au Chalumeau Oxyacétylénique). André Binet. An illustrated description of a blowpipe using acetylene and oxygen for conveniently producing very high temperatures, and its applications in metal working. 2000 w. Génie Civil—May 23, 1903.

The Oxygen-Acetylene Blowpipe (Le Chalumeau Oxy-Acétylénique). E. Fouché. A description of the conditions under which acetylene and oxygen may be successfully used in the blowpipe to produce very high temperatures, with sectional drawing of blowpipe. 3000 w. Génie Civil—Sept. 26, 1903.

A New System of Welding. Prof. A. H. Sexton. Describes a system of welding by means of the oxy-hydrogen flame. 1600 w. Mech Engr—June 17, 1905.

On Autogenous Lead Soldering. M. U. Schoop. Remarks on the methods of welding any flux or any foreign metal that are of special value for storage battery factories. Especially considers the oxygen-hydrogen flame and its advantages. 1100 w. Elec-Chem & Met Ind—July, 1905.

Autogenous Welding (Autogene Schweissung). Discussing the use of the oxyhydrogen and oxy-acetylene blowpipes for welding, and describing the commercial production of oxygen and hydrogen for the purpose by the electrolysis of water. 2500 w. Stahl u Eisen—Aug. 1, 1905.

The Autogenous Welding of Metals (La Soudure Autogène des Metaux). P. Dumesnil. A study of the practical use of the oxy-hydrogen and oxy-acetylene blowpipes; with an examination of the thermal reactions, and data as to cost of operation. 6000 w: Mem Soc Ing Civ de France—Nov., 1905.

Autogenous Welding (La Soudure Autogène). Report of the Laboratory of the Conservatoire des Arts et Métiers upon the oxy-acetylene blowpipe for welding plates and structural members of iron and steel. 3000 w. Revue Technique—Nov. 25, 1905.

See also **ELECTROLYSIS—Schuckert Apparatus.**

Locomotive Frames.—Rapid and Economical Method of Welding Locomotive Frames. Illustrates and describes the method of welding fractured frames in use in the shops of the Southern Pacific, which gives economy in cost and time. 1000 w. Ry & Engng Rev—Dec. 6, 1902.

Oxy-Hydrogen.—See Blowpipe; **ELECTROLYSIS—Schuckert Apparatus.**

Rail Joint.—See **ALUMINOTHERMY—Rail Welding; ELECTRIC WELDING; RAIL JOINT.**

Rudder Post.—See **ALUMINOTHERMY.**

Sheet Iron.—Notes on Welding Sheet Iron (Mitteilungen aus der Praxis des Blechschweissens). A. Finke. Describing methods of constructing tubular structures of welded sheet iron, with tests showing their high resistance. 1800 w. Zeitschr d Ver Deutscher Ing—April 2, 1904.

See also **PIPE MANUFACTURE; TUBE MANUFACTURE.**

Stern Frame.—See **ALUMINOTHERMY.**

Thermit.—See **ALUMINOTHERMY.**

WELL.

See also **GROUND WATER; IRRIGATION; PETROLEUM WELL; WATER SUPPLY; WATERWORKS; WELL BORING.**

Atlantic City, N. J.—Atlantic City's Artesian Well Supply. Kenneth Allen. An account of improvements completed and projected for increasing the supply. Ills. 800 w. Munic Jour & Engr—March, 1904.

Difficulties with a Pump Well. Illustrated description of the construction of a pump well at Atlantic City, N. J., which was accomplished with some difficulty. 1200 w. Eng Rec—April 1, 1905.

See also **WATERWORKS.**

Australia.—Artesian Water Supply in Australia. W. Gibbons Cox. Gives statistics and particulars of the progress of artesian boring and supplies in Queensland, and related information. 3500 w. Engr, Lond—June 21, 1901.

See also **WELL BORING.**

Breathing.—Breathing Wells. W. H. Booth. Illustrations showing the principles governing their action which are of special interest to miners, as the phenomena of breathing or blowing wells are due to variations of barometric pressure, which also influence mine ventilation. 1200 w. Mines & Min—June, 1903.

Cedar Rapids, Iowa.—See **WATER PIPE—Submerged, Cedar Rapids.**

Cleaning.—Cleaning Out Water Wells. A. J. Bowie, Jr. Describes the construction of various wells, the troubles encountered and methods of cleaning. Ill. 2800 w. Jour of Elec—May, 1902.

Concrete Reinforced. — See **CONCRETE REINFORCED—Well.**

Deep.—Water Supplies from Deep Wells. F. J. Warden-Stevens. Discusses forms of deep well construction, the methods used, the supply, etc. 3300 w. Archt, Lond—June 12, 1903.

Fire Purposes.—Driven Wells for Fire Purposes. John C. Spencer. Read at Indianapolis convention of the International Assn. of Chief Engrs. Explains the details of construction of a well that has proved very successful for this purpose. Ill. 1800 w. Fire & Water—Aug. 31, 1901.

See also **WATERWORKS.**

Hawaii.—See **WATER SUPPLY.**

Iowa.—See **WATER SOFTENING.**

Irrigation.—Artesian Water Supply and Irrigation. W. Gibbons Cox. An account of the extent to which underground water has been utilized in the past, and suggestions for the fuller application. Serial. 1st part. 2000 w. Engr, Lond—April 25, 1902.

See also **IRRIGATION.**

Ithaca, N. Y.—The New Artesian Water Supply of Ithaca, N. Y. F. L. Getman. Describes the geological formations, the distribution and arrangement of the wells, the collection system, and costs. Ills. 2800 w. Eng News—April 20, 1905.

See also **WATERWORKS.**

Japan.—See **WELL BORING—Kazusa.**

Kalamazoo.—See **WATER SUPPLY.**

Klondike.—A Peculiar Artesian Well in the Klondike. J. B. Tyrrell. Gives a brief statement of the topography and structure of the region, and explains the conditions under which the flow was encountered. Ill. 900 w. Eng & Min Jour—Jan. 31, 1903.

Long Eaton, England.—The Artesian Water Supply of Long Eaton, England. Notes from a paper by George Hodson, giving a description of the works. 2200 w. Eng Rec—Nov. 8, 1902.

Massachusetts.—A Driven Well Gravity Water Supply. Describes an unusual well system installed as a supply for mills and tenements in Massachusetts. Ill. 1100 w. Eng Rec—Feb. 1, 1902.

Memphis, Tenn.—An Engineering Commission on the Artesian Wells of the Memphis Water Works. A recent study of this system which forms a part of a report of a commission of engineers appointed by the city authorities to report on the "condition and value" of the works. 6100 w. Eng News—Sept. 25, 1902.

The Artesian Water Supply of Memphis, Tenn. Describes the present supply derived from the water-bearing sand underlying the Mississippi Valley about 350 ft. below the surface, with interesting matter from two recent reports. 3200 w. Eng Rev—Nov. 29, 1902.

Minneapolis.—Deep Wells as a Source of Water Supply for Minneapolis. N. H. Winchell. Shows that there are several water basins below this city which will give an inexhaustible supply at moderate cost. Drawings. 9300 w. Am Geol—May, 1903.

See also **WATER SUPPLY.**

Nebraska and South Dakota.—A Few Remarkable Artesian Wells and the Uses to Which They Are Put. Erwin Hinckley Barbour. Illustrated account of the wells of Nebraska and South Dakota. 900 w. Sci Am—July 13, 1901.

Ottakring Brewery, Austria.—The Wells of the Ottakring Brewery (Die Brunnen der Brauerei in Ottakring). Prof. Ph. Forchheimer. Describing the method adopted for sinking and lining wells to a depth of 279.7 metres (918 feet). 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 9, 1900.

Peoria, Ill.—Open Wells and Turbine Pumps. Dabney H. Maury. Extracts from a lecture before the American Water-Works Association, illustrating and describing wells, well strainers and well sinking at Peoria, Ill., and discussing centrifugal or turbine pumps. Also editorial. 4000 w. Eng News—Aug. 18, 1904.

Petroleum.—See **PETROLEUM WELL.**

Prenzlau, Prussia.—See **WATERWORKS.**

Queensland.—The Artesian System of Western Queensland. Cyrus John Richard Williams. Information concerning the water-bearing beds, the flowing and non-flowing wells, and related matter of interest. 1500 w. (No. 3496.) Inst of Civ Engrs.

Sandy Strata.—Artesian Flows from Unconfined

Sandy Strata. Myron L. Fuller. Describes flows from artesian wells sunk wholly in sand, discussing the cause. 1200 w. Eng News—March 30, 1905.

Stock.—See **PUMP—Electric.**

"Stove-Pipe" Construction. — The California or "Stove-Pipe" Method of Well Construction for Water Supply. Charles S. Slichter. Illustrated description of this type of well and method of construction. 2000 w. Eng News—Nov. 12, 1903.

Water Supply.—See under names and places of **WATER SUPPLY; WATERWORKS.**

WELL BORING.

See also **BORING; DRILL; DRILLING; GAS, NATURAL; GROUND WATER; PETROLEUM WELL; SHAFT SINKING; WATER SUPPLY; WATERWORKS; WELL.**

Well Driving. A. H. Eldredge. Considers the method of driving wells and connecting the pump suction. Ill. 1300 w. Mach, N Y—May, 1902.

Methods of Boring and Sinking. Treats the subjects separately, giving an illustrated description of the best-known methods. 9500 w. Ir & Coal Trds Rev—May 12, 1905.

Water Supply.—See under names of places and Sanford. An illustrated article on this work in connection with the development of farm plumbing work. 3500 w. Met Work—Dec. 20, 1905.

Altona.—Deep Well Boring at the Bavaria Brewery in Altona (Tiefbrunnenbohrung in der Bavaria-Brauerei in Altona). Hr. Darapsky. An account of the difficulties met and overcome in boring 190 metres for water, near the mouth of the Elbe. 1200 w. Zeitschr d Ver Deutscher Ing—Dec. 21, 1902.

Appliances.—Well Sinking and Boring Appliances. An illustrated description of appliances used in boring artesian wells and bore holes generally. 3000 w. Mech Engr—May 6, 1905.

Australia.—Well Boring Machinery in Australia. W. Gibbons Cox. Treats of the machinery and apparatus now used, briefly reviewing the development. 3400 w. Engr, Lond—Aug. 9, 1901.

Experimental.—Experimental Well Boring (Versuchsbrunnenanlagen). H. Prinz. A discussion of the deductions to be made from borings to determine the nature of ground-water seams for water supply. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 9, 1901.

India.—Well Sinking Extraordinary. Describes the methods used in sinking a well in India, to provide water for the use of the palace of H. H. the Mahajara of Bikaner. 1800 w. Col Guard —Aug. 23, 1901.

Kasusa, Japan.—The Kasusa System of Artesian Well Boring in Japan. Describes method used to bore wells of great depth. 1200 w. Eng News—Sept. 4, 1902.

Petroleum.—See **PETROLEUM WELL.**

WELSBACH LIGHT.

See **INCANDESCENT GAS LIGHTING.**

WESTINGHOUSE.

See also **AIR BRAKE; ELECTRIC WORKS; RAILWAY SIGNAL; ST. LOUIS EXPOSITION.**

George Westinghouse—Inventor, Organizer and Director. Walter M. McFarland. Describing the methods which have so successfully built up the great and varied Westinghouse interests. 4000 w. Engineering Magazine—Jan., 1901.

WHARF.

See also **BREAKWATER; DOCK; HARBOR; PIER; PORT; SEA WALL.**

Skeleton Quays for Docks, Harbors, Wharfs, etc. R. C. Bullock. Describes quays designed to carry a load from 3 cwt. to 5 cwt. per sq. ft. without using superfluous material, and so decreasing the cost. Ills. 600 w. Prac Engr—Sept. 30, 1904.

Concrete Reinforced.—See **Ymuiden, Holland; CONCRETE REINFORCED—Wharf; PIER — Guadalquivir.**

Delfzijl, Holland.—Quay Wall at Delfzijl. An illustrated description of a design used in the Netherlands to accommodate vessels at low tide. 1800 w. Engr, Lond—Feb. 19, 1904.

Deptford, London.—The London, Brighton and South Coast Railway Company's Deptford Wharf. Illustrated description of the recent installation of electric cranes. 2800 w. Engng—Jan. 13, 1905.

Electric Equipment.—See **Deptford; DOCK; ELECTRIC EQUIPMENT; HARBOR.**

Failure, East Cambridge, Mass.—See **SEA WALL—East Cambridge.**

Fireproof.—See **Tampico, Mexico.**

Guadalquivir, Spain.—See **PIER.**

Seattle.—See **PILE—Supporting Power.**

Singapore.—See **DOCK.**

Tampico, Mexico.—The Steel and Concrete Wharf at Tampico. Information concerning this unusual wharf, taken from a monograph by E. H. Connor. Describes the main and lateral wharves and their construction. 2000 w. Eng Rec—April 8, 1905.

A Fireproof Wharf at Tampico, Mexico. E. H. Connor. Illustrated description of a finely equipped, steel concrete, fireproof wharf at which the largest vessel can land. 2500 w. Eng News —June 8, 1905.

The Mexican Central Wharf at Tampico. Illustrated description of a finely equipped, steel-concrete, fireproof wharf which will accommodate the largest vessels. Taken from a pamphlet published by E. H. Connor. 6000 w. R R Gaz—Vol. XXXVIII., No. 25.

Ymuiden, Holland.—Design and Construction of a Reinforced Concrete Wharf at Ymuiden, Holland. Illustrated description of a structure built by the government for the fishery harbor located there. 1800 w. Cement—Jan., 1905.

WHEAT.

Flow Through Orifice.—See **FLOW—Semi-Fluids.**

Storage.—See **GRAIN BIN; GRAIN ELEVATOR.**

WHEEL.

See also **AUTOMOBILE; BICYCLE; CAR WHEEL; FLYWHEEL; GEAR; PULLEY; TIRE.**

The Design of Wheels. Editorial on the importance of the wheel as an invention, and the new problems arising in the manufacture of self-propelled vehicles. 2600 w. Eng News—Dec. 6, 1900.

Automobile.—See **AUTOMOBILE—Wheel; TIRE.**

Car.—See **CAR WHEEL.**

Directional Tendency.—See **FLYWHEEL.**

Elastic.—Elastic Wheels. Considers the principles of action of elastic wheels intended to carry heavy loads on common roads. Does not consider wheels for motor cars and cycles. Ills. Serial. 1st part. 3000 w. Engr, Lond—March 10, 1905. See also **TIRE.**

Ferris.—See **FERRIS WHEEL.**

Flat.—See **TIRE—Driving-Wheel.**

Flywheel.—See **FLYWHEEL.**

Multiple Tire.—See **TIRE.**

Road.—See **AUTOMOBILE—Wheel.**

Spring.—See **AUTOMOBILE—Wheel Spring.**

Steel.—Steel Wheels. Illustrates and describes the manufacture of such wheels. Serial. 1st part. 800 w. Am Mach—Jan. 3, 1901.

Steel Tired.—See **CAR SHOP—Readville; CAR WHEEL; TIRE.**

Stresses.—See **AXLE.**

Tailings.—See **ELEVATOR.**

Wheelbarrow. — Making a Wheelbarrow Wheel. John Randol. Illustrated detailed description of the work as carried on in an Ohio shop. 2200 w. Am Mach—Sept. 3, 1903.

WHEELBARROW.

Wheel.—See **WHEEL—Wheelbarrow.**

WHEEL GUARD.

Watson.—See **FENDER.**

WHEEL WORKS.

See also **CAR SHOP; CAR WHEEL.**

Altoona, Pa.—See **FOUNDRY.**

WHIRLPOOLS.

The Direction of Rotation of Whirlpools in the Rivers of Central Europe (Sur le Sens de

Rotation des Tourbillons d'Eaux Courantes dans l'Europe Centrale). Jean Brunhes. A communication to the French Academy calling attention to the fact that 90 per cent. of the whirlpools revolve in the opposite direction to the hands of a watch. 1500 w. Comptes Rendus—April 11, 1904.

WHITE.

The Hon. Peter White. A biographical sketch, including a history of the development of the Lake Superior iron region. Serial. 1st part. Marine Rev—Dec. 12, 1901.

WHITE LEAD.

See also **PAINT.**

A New Process for the Manufacture of White Lead. Prof. Romyn Hitchcock. A review of processes devised for the manufacture of white lead, presenting also a new process by J. W. Bailey. 2400 w. Eng & Min Jour—Dec. 8, 1900.

Contribution to Our Knowledge of White Lead and of Its Protecting Properties. Augustus H. Hill and Stanley A. Foster. A report of experimental investigations. 800 w. Tech Qr—June, 1904.

WIND.

See also **AIR CURRENT; AIR FLOW; AIR RESISTANCE; ANEMOMETER; METEOROLOGY; WINDMILL; WIND PRESSURE.**

Trade Wind.—See **OCEAN CURRENT.**

WINDING.

See also **HOISTING; MACHINE—Winding.**

Armature.—See **ARMATURE WINDING.**

WINDING ENGINE.

See **HOISTING ENGINE.**

WINDMILL.

Windmills. Sidney Russell. An illustrated review of the old type of windmills, now disappearing. Serial. 2 parts. 11,400 w. Trac & Trans—June and July, 1903.

The Importance of Windmills from an Economic Viewpoint (Les Moteurs à Vent et leur Importance au Point de Vue Economique). W. Geutch. An extensive discussion of the construction and application of wind motors and their practical applications. Serial. Part I. 5000 w. Bull Soc d'Encour—April 30, 1904.

Askov, Denmark.—See **Electric Station.**

Conical.—The Conical Wind Motor. Dr. Alfred Gradenwitz. Gives some results of experiments made by Prof. La Cour for the Danish Government. Ills. 800 w. Elec Rec, Lond—Dec. 16, 1904.

Electrical Value.—The Electrical Value of Wind Power. Editorial Review of what has been accomplished in the electrical utilisation of wind power. 1500 w. Sci Am—Nov. 18, 1905.

Electric Lighting.—See **ELECTRIC LIGHTING—Antarctic Ship.**

Electric Station.—Wind-Driven Electrical Works. Dr. Alfred Gradenwitz. Brief illustrated description of a central station near Askov, Denmark, which has been worked with wind power for a year with satisfactory results. 900 w. Can Eng—Aug., 1904.

German.—Powerful German Windmills. Charles B. Hayward. Illustrations, and descriptions, of interesting types. 1600 w. Sci Am—March 25, 1905.

Irrigation.—See **IRRIGATION—Kansas.**

San Francisco.—The Old Dutch Windmill at Golden Gate Park, San Francisco. An illustrated article considering the features of engineering interest in the construction of this windmill, which is the largest wind motor in the United States. 4500 w. Jour of Elec—March, 1905.

Test.—Test and Analysis of a Windmill. Howard V. Meeks and George H. Sander. Graduation thesis. The test was to determine the horse power developed for different velocities of wind and to see how these results compared with the theory as given by Rankine in formula 4, page 216, "Steam Engine." 1500 w. Stevens Ind—Oct., 1902.

Wind Engines at the Royal Agricultural Society's Ground, Ealing. Illustrated descriptions of several types of engines sent in for competition for the series of trials of wind engines for pumping. 3300 w. Engng—April 24, 1903.

The Royal Agricultural Society's Windmill Trials. An illustrated description of the mills and an account of the nature of these important trials. 11,000 w. Engr, Lond—May 1, 1903.

The Mechanical Effect Produced by Windmills (Sur le Travail Mécanique Fourni par les Moulins à Vent). M. Ringelmann. Data and results of tests upon a windmill used for pumping water. The velocity of the wind and the rotative speed of the wheel were recorded automatically. 1200 w. Comptes Rendus—Oct. 30, 1905.

WINDOW.

See **FIREPROOF CONSTRUCTION; GLASS.**

WIND PRESSURE.

See also **AIR RESISTANCE; ANEMOMETER; TORNADO; TRAIN RESISTANCE.**

Arch, Monier.—See **BRIDGE DESIGN—Arch Masonry.**

Bridge, St. Paul.—Probable Wind Pressure Involved in the Wreck of the High Bridge Over the Mississippi River, on Smith Avenue, St. Paul, Minn., August 20, 1904. C. A. P. Turner. An illustrated article describing the bridge, and outlining the collapse, with calculation of the pressure. 2000 w. Pro Am Soc of Civ Engrs—Nov., 1904.

Probable Wind Pressure Involved in the Wreck by the High Bridge Over the Mississippi River on Smith Avenue, St. Paul, Minn., Aug. 20, 1904. Discussion of the paper by C. A. P. Turner. 1800 w. Pro Am Soc of Civ Engrs—Dec., 1904.

Probable Wind Pressure Involved in the Wreck of the High Bridge Over the Mississippi River, on Smith Avenue, St. Paul, Minn., August 20, 1904, Continued discussion of paper by C. A. P. Turner. 2500 w. Pro Am Soc of Civ Engrs—Feb., 1905.

Chimneys.—The Influence of Wind Pressure upon the Stability of Chimneys (Die Grösse des Winddrucks bei der Berechnung der Standsicherheit von Schornsteinen). H. Claussen. A discussion of the positive and negative pressures due to wind action, showing the manner in which existing data may be used for chimneys. 2000 w. Glasers Annalen—Oct. 1, 1903.

See also **CHIMNEY.**

Eiffel Tower.—Experiments upon the Resistance of the Air (Expériences sur la Resistance de l'Air). G. Eiffel. A review of the observations made upon the Eiffel tower in Paris, showing the variations of the coefficient for different surfaces. 1200 w. Comptes Rendus—July 6, 1903.

Experiments Upon the Pressure of Wind at the Eiffel Tower. Emile Guarini. Illustrates and describes the principle of an apparatus used by M. G. Eiffel at the tower bearing his name. 500 w. Sci Am—March 19, 1904.

Framed Structures.—The Influence of Wind Stresses upon the Verticals of Framed Structures (Der Einfluss der Windverspannungen auf die Einspannungsmomente der Ständer Eiserner Wandfachwerke). L. Geusen. Discussing especially the wind stresses on the verticals of continuous bridge trusses. 4000 w. Zeitschr d Ver Deutscher Ing—Oct. 10, 1903.

Measurement.—See **Recorder; AIR RESISTANCE; ANEMOMETER; BALLOON—Anemometric; DYNAMOMETER—Renard.**

Recorder.—Competition for a Wind Pressure Recorder (Vorschriften für den Wettbewerb zur Erlangung einer Vorrichtung zum Messen des Winddruckes). The terms of a competition for a wind-pressure measurer and recorder, held by the German Ministry of Public Works, and which closes April 1, 1903, at the "Deutsche Seewarte," Hamburg. 500 w. Technologist—April, 1902.

A Recording Device for Measuring Wind Pressure (Registrierender Winddruck-Messapparat). Rudolf Müller. The direct pressure exerted on a square plate is transmitted to a recording drum, the force being opposed by a counterweight. 2000 w. 1 plate. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 9, 1905.

Roofs.—Effect of Wind on Roofs. Theodor Nielsen. Explanations of a new theory based on the experiments of J. O. V. Irminger. Ill. 3500 w. Engng—Oct. 9, 1903.

See also **Structures; ROOF.**

Standpipes.—The Wind Pressure on Upright Cylindrical Tanks (Berechnung von Behältern auf Winddruck). Prof. Philipp Forchheimer. The mathematical design of standpipes with particular reference to wind pressures. Diagrams and formulae. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—May 2, 1902.

See also **STANDPIPE.**

Structures.—The Effect of Wind Pressure on Structures. R. M. Neilson. A discussion of the principles upon which the strength of structures exposed to wind should be proportioned, with data from the most recent experiments and authorities. 4500 w. Engineering Magazine—January, 1903.

See also **Framed Structures; Roofs.**

Trains.—The Danger of Wind Pressure in Railway Operation (Die Gefahr des Sturmwindes im Eisenbahnverkehr). Anton Syha. An examination of the influence of wind pressure upon trains, describing a recording gauge for measuring wind pressure. 2500 w. Oesterr Wochenschr f d Oeffent Baudienst—June 17, 1905.

See also **RAILWAY ACCIDENT—Leven Viaduct.**

WIND STORM.

See **TORNADO; WIND PRESSURE.**

WIND VANE.

Electrically Registering.—See **ANEMOMETER.**

WIRE.

See also **CABLE; ELECTRIC CONDUCTOR; ELECTRIC LINE; ELECTRIC WIRING; WIRE ROPE.**

Copper.—See also **COPPER METALLURGY; ELECTRIC CONDUCTOR; WIRE MANUFACTURE.**

Copper, Hard Drawn.—Hard Drawn Copper Wire. Francis W. Jones. Abstract from "Telegraph Age." Some points on the properties of this wire, the sag and elongation. 1000 w. Elec Rev, N Y—Nov. 21, 1903.

The Testing of Hard Drawn Copper. Lawrence Addicks. Notes the uses of hard drawn copper and the tests needed, describes the process of drawing and the method of testing. 3000 w. Elec Rev, N Y—Sept. 24, 1904.

East River Bridge.—See **BRIDGE; CABLE.**

Machinery.—See **WIRE MANUFACTURE; WIRE NETTING.**

Telephone.—Properties of Wire Used in Telephone Work. R. A. L. Snyder. Considers the seven kinds of wire used, and their different properties, and the uses of each. 1000 w. Pro Engrs' Soc of W Penn—June, 1903.

See also **TELEPHONE CABLE; TELEPHONE LINE.**

Testing.—The Permanent Deformations of Metallic Wires (Déformations Permanentes des Fils Métalliques). Giving the results of tests by M. Lenoble, of Lille, showing the behavior of wire under varying loads. 1200 w. Revue Technique—Nov. 10, 1901.

A New Method of Testing Wire. Arthur Falkenau. A brief illustrated description of the Moore testing apparatus, with explanation of its use. 900 w. Pro Engrs' Club of Phila—Jan., 1903.

See also **Copper, Hard Drawn.**

WIRE CABLE.

See **CABLE; CABLEWAY; ELECTRIC CABLE; SUBMARINE CABLE; TELEPHONE CABLE; WIRE ROPE.**

WIRE DRAWING.

See also **WIRE MANUFACTURE.**

Steam.—See **CALORIMETRY; STEAM; STEAM ENGINEERING; STEAM FLOW; SUPERHEATED STEAM.**

WIRE GAUGE.

See **GAUGE.**

WIRE GLASS.

See **GLASS—Wire Netting.**

WIRELESS TELEGRAPHY.

See **SPACE TELEGRAPHY.**

WIRELESS TELEPHONY.

See **LIGHT TELEPHONY; SPACE TELEPHONY.**

WIRE MANUFACTURE.

See also **ELECTRIC CABLE; ELECTRIC CONDUCTOR; ROLLING MILL; STEEL METALLURGY; WIRE; WIRE ROPE.**

Modern Practice and Its Result in the Drawing of Wire Rods into Wire. William Garrett. Describes the modern practice of drawing rods, with brief reference to earlier effort, mostly confined to American practice. 4400 w. Ir & Coal Trds Rev—April 11, 1902.

Modern Practice in Wire Drawing (Die Moderne Praxis des Drahtziehens und ihre Ergebnisse). Wm. Garrett. A review of wire-drawing mills and methods, particularly in the United States. 8000 w. Stahl u Eisen—May 15, 1902.

Diamond.—The Diamond in Wire Drawing. S. Barnett. Information of interest concerning the selection of the stones and the drawing of copper and steel wire. 3200 w. Ir Age—May 29, 1902.

Dies.—See **DIE—Wire Drawing.**

Donora Works.—Steel Wire and Nail Making. Describes the manufacture as carried on at the Donora Works of the American Steel and Wire Company. Ill. 3000 w. Sci Am—Dec. 12, 1903.

Electrolytic.—Electrolytic Methods for the Production of Copper Wire. An illustrated article describing the various processes that different workers in this field have tried, although they have not proved commercially successful. 1200 w. Electro-Chem & Met—Jan., 1904.

See also **COPPER METALLURGY.**

Flat.—Producing Flat Wire of Uniform Gauge. A. F. Horton. Illustrates and describes method. 1000 w. Am Mfr—Aug. 29, 1901.

Grand Crossing Tack Co.—Steel Plant of the Grand Crossing Tack Company. Illustrated detailed description of plant for the manufacture of wire rods, wire nails, and other wire products. 2400 w. Ir Age—Aug. 4, 1904.

Steel.—See **STEEL—Copper Influence; WIRE ROPE.**

WIRE NETTING.

See also **GLASS—Wire Netting.**

Making Wire Netting. An illustrated description of interesting wire-working devices embodied in a machine invented by Charles W. James. 1800 w. Am Mach—Feb. 4, 1904.

WIRE ROPE.

See also **CABLE; CABLEWAY; CABLE RAILWAY; HOISTING; MINE HAULAGE; ROPE; ROPE TRANSMISSION.**

Notes on Wire Rope (Einiges über Seildraht und Drahtseile). J. Divis. With especial reference to the manufacture and character of ropes for mining service. Serial. Part I. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 3, 1900.

The Manufacture and Use of Wire Ropes. Brief account of this invention with illustrated descriptions of systems of transport. 2200 w. Ir & Coal Trds Rev—Feb. 8, 1901.

Wire Ropes. J. T. Beard. A reference to some important facts shown by experiments described in a paper by Andrew S. Biggart, in Pro. Inst. of Civ. Engs. 3000 w. Mines & Min—March, 1901.

The Invention, Properties and Future of Wire Rope (Das Drahtseil, seine Erfindung, Eigenschaften und Zukunft). Prof. O. Hoppe. A historical and descriptive discussion of wire rope and its uses. 5500 w. Glückauf—April 4, 1903.

Practical Points in the Construction and Use of Wire Rope. L. C. Moore. Considers material, tensile strength, load, sheaves, causes of wear, etc. 4300 w. Mines & Min—April, 1904.

The Use and Abuse of Wire Rope. L. C. Moore. The discussion is confined to cast steel and the higher grades of wire rope. Gives explanation of the methods of preparing wire for these grades. 4000 w. Pro Engrs' Soc of W Penn—Feb., 1905.

Wire Ropes. G. W. Westgarth. Abstract of a paper before the Nat. Assn. of Colliery Mgrs. Reviews briefly the history of wire ropes, and the varieties made. Ills. 5800 w. Ir & Coal Trds Rev—April 29, 1904.

Belgian Coal Mines.—See **ROPE.**

Bending Stresses.—Effects of Bending Stresses on Wire Rope. J. B. Richards. How excessive bending may entirely destroy the safe working strength of a rope. 1200 w. Mines & Min—April, 1904.

Bending Stresses in Wire Ropes. Samuel Diescher. Relates to bending stresses as they occur in the wires of ropes bent around sheaves in the operation of hoisting machinery, inclined planes, cable railways, &c. Ills. Discussion. 4000 w. Pro Engrs' Soc of W Penn—Feb., 1905.

See also **Hoisting; Stresses.**

Coal Mines.—Some Notes on Wire Ropes. G. W. N. Hopper. Discusses points relating to the use of wire ropes in colliery practice. 1700 w. Ir & Coal Trds Rev—March 21, 1902.

See also **HOISTING; MINE HAULAGE.**

Drums.—See **Sheaves and Drums; HOISTING DRUM.**

Elasticity Test.—Notes on the Theory of Wire Rope (Beiträge zur Theorie der Drahtseile). Dr. Hans Benndorf. A continuation of the author's studies in July, 1904, comparing the computed elasticity of wire ropes with the results obtained by experiment. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 15, 1905.

Elevator.—Rules for Working Loads of Wire Elevator Ropes. H. C. Newcomer. A statement giving information for determining the sizes of wire ropes and stresses for passenger elevators. 2200 w. Eng News—Jan. 15, 1903.

See also **ELEVATOR.**

Experiments.—Experiments with Modern Steel Wire (Versuche mit Neuern Stahldrahtsorten). Julius Divis. An exhaustive examination of steel wire with respect to its use for mine hoisting cables. Serial. Part I. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 1, 1902.

See also **Tests.**

Flat.—See **HOISTING—Flat Rope; WIRE MANUFACTURE.**

Germany.—Statistics of Hoisting Ropes (Statistik der Schachtförderseile). Giving data as to the life of iron and steel wire ropes in mine hoisting from data collected in Germany since 1872. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 8, 1900.

High Grade.—High Grade Wire Rope. L. C. Moore. Considers the properties of standard cast steel, extra strong, and plow steel rope. 1800 w. Engrs' Soc of Penn—Sept., 1903.

See also **Nickel Steel.**

History.—History of Wire Rope. Brief account of of some of the modern varieties. 2300 w. Mines & Min—April, 1904.

Hoisting.—The Influence of Bending Torsion, and Shocks upon Wire Cables (Einige Beiträge zu Biegungs—Torsions—und Stossversuchen mit Seildrähten). Julius Divis. Data and results of experiments upon a variety of wire ropes adapted for mine hoists. Three articles. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 17, 24, July 1, 1905.

Wire Ropes for Winding Purposes. R. Hunter. Read before the Mine Mgrs.' Assn., Queensland. Reviews briefly the history of wire ropes, the class used for winding purposes, laws relating to winding ropes, testing, etc. Serial. 1st part. 2500 w. Queens Gov Min Jour—Aug. 15, 1905.

See also **HOISTING; HOISTING TACKLE.**

Mine Haulage.—See **MINE HAULAGE.**

Mining.—Wire Ropes. Abstract of a paper by W. D. L. Hardie. Describes the construction of wire ropes for mine use, and its various grades, giving required tests. 1700 w. Can Engr—April, 1902. See also **Coal Mines; Hoisting; Nickel Steel; Silesian Mines; HOISTING; MINE HAULAGE.**

Multiple Laps.—The Operation of a Wire Rope in Multiple Laps. William Hewitt. An illustrated discussion of the difficulties met and ways of obviating them. 2500 w. Stevens Ind—Oct., 1901.

the superiority of the nickel steel is more than the early use of rope and illustrated description

The Operation of a Wire Rope in Multiple Laps. A discussion by R. D. Seymour of Denver, Col., and William Hewitt. Ill. 1600 w. Stevens Ind —Jan., 1902.

Nickel Steel.—Nickel Steel Winding Ropes (Förderseildraht aus Nickelstahl). Julius Divis. A comparison of nickel steel with carbon steel for ropes for mine hoists, showing that the gain due to offset by the higher price. Two articles. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 28, Feb. 4, 1905.

Power Transmission.—See **ROPE TRANSMISSION.**

Sheaves and Drums.—Design of Sheaves and Drums for Wire Rope. Samuel Diescher. Discusses some points affecting the strength and life of the rope. 3000 w. Engrs' Soc of W Penn—Sept., 1903.

Silesian Mines.—Hoisting Wire Rope Statistics for the Breslau District, Silesia, in 1901 (Statistik der Schachtförderseile im Oberbergamtsbezirke Breslau im Jahre 1901). Abstract from official reports on round and flat, iron and steel wire ropes, their life and breakage. 800 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 14, 1902.

Size.—Formulae for Calculating the Size of Wire Ropes. Sheldon Smillie. Gives empirical formulae deduced from tables published by J. A. Roebling's Sons Co., and found to give the same results as the table. 700 w. Sch of Mines Qr—Jan., 1904.

Splicing.—Splicing Wire Ropes. Illustrates and describes the method recommended by the John A. Roebling Son's Company, of Trenton, N. J. 1000 w. Mines & Min—April, 1904.

See also **ROPE.**

Stresses.—Stresses in Wire Ropes. Opinions of different manufacturers in regard to the effects upon the rope, of length of arc of contact on sheave. 1800 w. Mines & Min—Feb., 1902.

The Strain in the Core Wire of Strands (Die Beanspruchung der Litzen-Seelendrähte). Julius Divis. An account of experiments on the strength of wire ropes, with particular reference to the part played by the center or core wire. Diagrams. Serial. 2 parts. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 30, June 6, 1903.

See also **Bending Stresses; Hoisting.**

Terminology.—Glossary of Rope Terms. With special reference to the meanings of words used in connection with the manufacture and use of wire rope. Ills. 1500 w. Mines & Min—April, 1904.

Tests.—Investigations on Hoisting Machines (Onderzoekingen met de Trekmachine). J. H. Beucker Andreae. Especially discussing the strength of wire hoisting cables, with tabulated data and results of tests. 1800 w. De Ingenieur—July 6, 1901.

See also **Experiments.**

Theory.—Notes on the Theory of Wire Rope (Beiträge zur Theorie der Drahtseile). Dr. Hans Benndorf. A mathematical investigation of the relation of the resistance of a wire rope to that of the wires of which it is composed. Two articles. 7500 w. Zeitschr d Oester Ing u Arch Ver—July 22, 29, 1904.

Wakefield Works, Eng.—Wire Rope Works at Wakefield. Brief illustrated description of works and methods employed, where steel wire rope is manufactured from pig iron, all the processes being performed on the premises. Serial. 1st part. Engr, Lond—July 12, 1901.

Working Load.—Wire-Rope Calculations. A comparison of the methods of determining the proper working load for wire rope. 2500 w. Mines & Min—April, 1904.

WIRE-ROPE DRIVING.

See **ROPE TRANSMISSION; WIRE ROPE.**

WIRE SAW.

See **QUARRYING—Helicoidal Wire.**

WIRING.

Blasting.—See **BLASTING—Wiring.**

Electric.—See **ELECTRIC CONDUIT; ELECTRIC DISTRIBUTION; ELECTRIC WIRING.**

WOLFRAM.

See **TUNGSTEN.**

WOLTMANN METER.

See **WATER FLOW.**

WOOD.

See also **BEAM; BUILDING MATERIAL; FORESTRY; TIMBER; TIMBER PRESERVATION;** and under specific kinds of wood.

Decay.—See **TIMBER; TIMBER PRESERVATION.**

Electrical Purposes.—See Philippine Electrical; **ELECTRIC LINE; POLE.**

Fireproof.—See **FIREPROOFING.**

Identification.—The Identification of Wood. Herbert Stone. An illustrated article outlining a plan for the identification and classification of timber. Discussion. 7700 w. Jour Soc of Arts—Dec. 6, 1901.

Mines.—See **MINING MACHINERY; TIMBERING.**

Philippine Electrical.—Woods of the Philippines for Electrical Purposes. R. G. Mayse. Information concerning the large supply of wood suitable for telegraph and telephone service, and some of the native work. Ill. 1800 w. W Elect'n—Jan. 26, 1901.

Philippine Mines.—See **MINING MACHINERY.**

Philippines.—See Tool.

Preservation.—See **TIMBER PRESERVATION.**

Teak.—See **TEAK.**

Tool.—Machine Tool and General Tool Woods of the Philippines. Describes tough woods adaptable for service in machine and general lines of modern tools. Ill. 1200 w. Mod Mach—June, 1903.

WOOD BRIDGE.

See **BRIDGE; TRESTLE.**

WOOD CHOPPING MACHINE.

A New Hard Wood Chopping Plant. Illustrated description of a new machine for chopping the hardest woods, describing its action. 1200 w. Engr, Lond—Nov. 6, 1903.

WOODEN BRIDGE.

See **BRIDGE; TRESTLE.**

WOOD GAS.

See **GAS PRODUCER; GAS, WOOD.**

WOOD PAVEMENT.

See **PAVEMENT—Wood.**

WOOD PRESERVATION.

See **FIREPROOFING; TIMBER PRESERVATION.**

WOOD SCREW.

See **RAIL FASTENING; SCREW.**

WOOD-WORKING MACHINERY.

See also **SAW.**

A Study of Wood-Working Machinery (Etude sur les Machines-Outils Utilisées dans le Travail de Bois). Paul Razous. A comprehensive study of wood working machinery, with numerous illustrations. The first article treats of sawing machines. Serial. Part I. 5000 w. Revue de Mécanique—Aug. 31, 1902.

Modern Wood-Working Machinery. M. Powis Bale. A résumé of the chief and latest types in use, illustrated from recent photographs, with remarks on design, speeds, etc. Serial. 1st part. 4300 w. Engng Rev—Feb., 1904.

Chopping Plant.—See **WOOD CHOPPING.**

Electric Driving.—Woodworking Machinery. Gives illustrated descriptions of various machines showing important developments in individual driving by electric motors. 1200 w. Am Engr & R R Jour—Aug., 1903.

Electric Driving in Woodworking Shops. Results of a series of experiments, carried out for determining the power required for various woodworking machine tools under different conditions. 1800 w. Elect'n, Lond—Feb. 3, 1905.

Exhausters.—See **Sawdust Removal.**

Power Consumption.—See **Electric Driving; MACHINE TOOL.**

Sawdust Removal.—The Removal and Utilisation of Shavings and Sawdust (Evacuation et Utilisation des Copeaux). Paul Razous. Describing various forms of conveyors and exhausters for attachment to woodworking machinery. Two articles. 3500 w. Génie Civil—Dec. 5, 12, 1903.

Exhausting Appliances for the Removal of Chips and Dust (Exhaustoranlagen. Insbesondere zur Beseitigung von Spänen und Staub). Hr. Geiger. A discussion of the arrangement of exhaust conveyors in woodworking establishments, with computations of the power required. 2500 w. Zeitschr d Ver Deutscher Ing—Sept. 10, 1904.

See also **WASTE REMOVAL.**

Universal.—Universal Woodworking Machine. Illustrated description of a new type of machine which can be applied to a variety of purposes, such as trenching, recessing, cross-cutting, grooving, molding, &c. 1200 w. Engng—Feb. 24, 1905.

WOOLEN MACHINERY.

See **TEXTILE MACHINERY.**

WOOL WASHING.

Apparatus.—Wool Washing. Begins an illustrated description of apparatus designed for this work. Serial. 1st part. 3000 w. Engr, Lond—Sept. 22, 1905.

WORKBENCH.

See also **MACHINE SHOP.**

Westinghouse.—Westinghouse Workbenches. John Randol. Illustrations, with brief description. 1100 w. Am Mach—Oct. 1, 1903.

WORKMEN'S DWELLING.

See also **TENEMENT HOUSE; WORKS MANAGEMENT.**

Austria-Hungary.—Austro-Hungarian Legislation for Encouraging the Erection of Sanitary and Cheap Workmen's Dwellings (Regierungsvorlage betreffend Begünstigungen für Gebäude mit Gesunden und Billigen Arbeiterwohnungen). A review of proposed legislation giving privileges to buildings of the class named, relieving them from taxes, etc. 3000 w. Oesterr Wochenschr f d Oeffent Baudienst—Dec. 7, 1901.

Building and Loan.—Working People's Homes. D. A. Tompkins. An explanation of the advantages of the building and loan system for the benefit of working people. 6200 w. Ill. Cassier's Mag—March, 1903.

England.—Industrial Redistribution: the Crux of the Overcrowding Question. William Leonard Madgen. A discussion of conditions in London, England, advocating the moving factories to the country and to small towns and the increase of transportation facilities. 13,000 w. Jour Soc of Arts—Feb. 14, 1902.

Environment.—The Home Environment of British Workingmen. Percy Longmuir. An examination of the important relation which home environment bears to industrial efficiency, and the extent to which deficiencies in this respect act as a handicap to British industries. 3500 w. Engineering Magazine—Jan., 1902.

French.—Cheap Dwellings in France and Other Countries (Les Habitations à Bon Marché en France et a l'Etranger). E. Cacheux. A review of the question of low-priced dwellings for workmen, and an account of the operation of recent French laws. 1 plate. 5500 w. Mem Soc Ing Civils de France—March, 1903.

Glasgow.—The Structural Aspect of the Housing Problem. A. B. McDonald. Plans and descriptions of houses for the working classes in Glasgow. 1100 w. Public Works—Aug. 15, 1904.

Krupp.—Comfortable Homes in Europe. Illustrations and information concerning the several types of houses and villages constructed for the comfort of those employed in the Krupp works at Essen, Germany. Comparison is made with the homes of American and British workmen. 4000 w. U S Cons Repts—Sept., 1905.

See also **STEEL WORKS; WORKS MANAGEMENT.**

Paris Exposition.—Workmen's Dwellings at the Paris Exposition of 1900 (Das Arbeiter-Wohnungswesen auf der Weltausstellung in Paris, 1900). L. Simony. A general discussion of modern dwellings for workmen in various countries, as indicated by the exhibits at Paris. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—May 23, 1902.

Unemployed Labor.—A Plan to Utilise Unemployed Labor. James A. Stewart. Outlines a plan for building homes by co-operation and giving employment to the unemployed in their own business. 1800 w. Jour Assn of Engng Socs—Aug., 1901.

Village Communities.—Village Communities of the Factory, Machine Works, and Mine. C. B. Going. Giving many illustrations of the working out of the practical problems of living connected with new industrial conditions. 4000 w. Engineering Magazine—April, 1901.

WORKS.

See also **ELECTRIC WORKS; ENGINE WORKS; FACTORY; IRON WORKS; LOCOMOTIVE WORKS; MACHINE SHOP; MACHINE WORKS; RAILWAY SHOP; STEEL WORKS; TEXTILE WORKS; WORKS MANAGEMENT.**

Automobile.—See **AUTOMOBILE WORKS.**

Electric Cable.—See **ELECTRIC CABLE WORKS.**

Gateshead, Eng.—The Close Works, Gateshead. Illustrated description. 2700 w. Engr, Lond—May 19, 1905.

Ingersoll-Sergeant.—The New Works of the Ingersoll-Sergeant Drill Company. Illustrated description of extensive shops at Phillipsburg, N. J., for making air-compressors, rock drills, and coal-cutters. Serial. 1st part. 3800 w. Eng Rec—April 15, 1905.

The New Works of the Ingersoll-Sergeant Drill Company at Phillipsburg, New Jersey. Full illustrated detailed description of these fine works and their equipment. Serial. 1st part. 3500 w. Am Mach—Vol. 28. No. 22.

Leeds, England.—The New Engineering Works of Messrs. Graham, Morton & Company at Hunslet, Leeds. An illustrated description of a new British plant. 2700 w. Ir & Coal Trds Rev—March 18, 1904.

Management.—See **WORKS MANAGEMENT.**

Oil City, Pa.—Imperial Works of the Oil Well Supply Co., Oil City, Pa. Gives a map of the property and an illustrated description of these extensive works and their equipment. 2400 w. Eng Rec—Sept. 24, 1904.

Panhard and Levassor.—See **AUTOMOBILE WORKS—France.**

Pennsylvania Engineering.—The Pennsylvania Engineering Works. Plan and description of large works at Newcastle, Pa., devoted to the building of blast furnace and steel plant construction, general machine and plate work, ingot molds and heavy castings. 2200 w. Ir Age—July 7, 1904.

Pittsburg.—Frank-Kneeland Plant of the United Engineering & Foundry Co. Illustrated detailed description of the Pittsburg plant of this company, which is located at the foot of 54th street. 3500 w. Ir Trd Rev—May 5, 1904.

Stove.—See **STOVE WORKS.**

Sturtevant, Hyde Park, Mass.—The New Works of the B. F. Sturtevant Co., at Hyde Park, Massachusetts. W. B. Snow. Brief general description of the plant for the manufacture of fans, blowers and other machines and apparatus. 1500 w. Eng News—Oct. 30, 1902.

The New Plant of the B. F. Sturtevant Company, Hyde Park, Mass. Illustrated detailed description of the plant and its equipment. 3000 w. Ir Age—Sept. 28, 1905.

See also **FOUNDRY.**

Typewriter.—See **TYPEWRITER WORKS; WORKS MANAGEMENT.**

Valve.—See **VALVE WORKS.**

Wesel, Brooklyn.—The Works of the F. Wesel Manufacturing Company. Illustrated description of interesting works at Brooklyn, N. Y., where machines and tools used by electrotypers and stereotypers, and by printers and photo-engravers are made. The individual motor drive is employed throughout. Some of the methods are also described. 2200 w. Am Mach—Vol. 28, No. 51.

Westinghouse, Pittsburg.—The Pittsburg Works of the Westinghouse Company. John R. Hewett. Illustrated detailed description of the electric works, machine works, air-brake works and foundry at and near East Pittsburg, Pennsylvania. 10,000 w. Trac & Trans—Oct., 1904.

See also **BUILDING CONSTRUCTION; ELECTRIC WORKS; RAILWAY SIGNAL WORKS; WESTINGHOUSE.**

Worthington Hydraulic.—See **PUMP WORKS.**

WORKSHOP.

See also **ENGINE WORKS; MACHINE SHOP; WORKS; WORKS MANAGEMENT.**

Fire Protection.—See **FIRE PROTECTION—Workshops.**

Floating.—See **FLOATING DOCK**—Durban; **REPAIR SHIP; TRAINING SHIP.**

WORKS MANAGEMENT.

See also **COMMERCE; COST-KEEPING; FOUNDRY; INDUSTRIAL ENGINEERING; LABOR; MACHINE SHOP; MINE MANAGEM STRIKE; TRADE UNION; WAGES; WORKMEN'S DWELLINGS**; and under specific industries.

Workshop Methods. William Weir and J. R. Richmond. Gives an account of schemes inaugurated to interest the staff and men of an engineering establishment in securing greater efficiency. 3300 w. Inst of Mech Engrs—Glasgow Congress, 1901.

Shop Administration. W. W. McLaren. Stenographer's report of paper read before Engine Builders' Assn. States the conditions and discusses questions bearing upon development and operation. 2700 w. Engr, U S A—Jan. 1, 1902. Special number.

The Science of the Workshop. William Taylor. Read at Belfast meeting of the Brit. Assn. for the Adv. of Science. Discusses materials, processes and tools, tracing the foundation of this science. 4500 w. Engng—Sept. 19, 1902.

A Machine Shop Problem. Charles Day. A discussion of points in connection with the equipment and management of manufacturing establishments. 5500 w. Trans Am Soc of Mech Engrs—June, 1903.

Modern Manufacturing Methods. Editorial on the methods of management demanded by modern machines if they are to prove a paying investment. 2200 w. Engng—June 5, 1903.

The Promotion of Industrial Efficiency and National Prosperity. II. Past Hindrances, and a Suggested Modification of the American Premium System. John B. C. Kershaw. A comparative study of the influence of profit-sharing, premium and bonus system, pointing out the weakness of the first for most situations. 2600 w. The Engineering Magazine—July, 1903.

The Promotion of Industrial Efficiency and National Prosperity. III. The Future, and Trades-Union Hostility. John B. C. Kershaw. Discusses the attitude of organized labor toward the newer wage systems and answers the objections the trades union leaders make to the present industrial philosophy as held by employers. Serial. 3rd part. 2500 w. The Engineering Magazine—Aug., 1903.

Obsolete Methods and Current Practice in Works Administration. Egbert P. Watson. A review of past practice, comparing it with modern systems. 3000 w. Engineering Magazine—Nov., 1904.

Machine Shop Management. Oscar E. Perrigo. Deals with the management of a model machine shop in a general way. 2800 w. Ir Trd Rev—Dec. 1, 1904.

Manufacturing Methods. C. L. Goodrich. A detailed description of a system of preparing, in advance of the machine work, detail contract slips to assist in keeping workmen constantly employed on the class of work in which they are most efficient. 1200 w. Ir Age—Oct. 26, 1905.

Accident Prevention.—See **SAFETY APPLIANCE.**

Altruistic.—Altruism and Sympathy as Factors in Works Administration. J. H. Patterson. Giving numerous examples of the manner in which the comfort and happiness of employees are considered in well-known establishments in Europe and America. 3500 w. Engineering Magazine—Jan., 1901.

The Higher Law in the Industrial World. H. F. J. Porter. A consideration of the commercial and industrial value of altruistic principles as applied in manufacturing establishments. 4000 w. Engineering Magazine—August, 1905.

See also **Welfare Work.**

American.—A Practical View of Machine Shop Conditions in the United States. M. Cokely. A study of the relations between employer and employee, showing that the true solution of the problem lies in cheap production. 3000 w. Engineering Magazine—Aug., 1901.

American Machine-Shop Practice from a German Viewpoint. Peter Lüders. Discusses American manufacturing conditions, the equipment of the shops, organization, and the unity of engineer and workman. 2400 w. Engineering Magazine—Sept., 1901.

American Machine Shops from a German Viewpoint. Peter Lüders. Mr. Luders' concluding paper reviews some of the popular fallacies concerning American methods and sets forth their true essentials. 4000 w. Engineering Magazine—November, 1901.

See also **LABOR.**

Arbitration.—The "Get Together" Principle in a Factory Organisation. H. F. J. Porter. Remarks on the benefits from a conference of the employees, giving example, suggestions, etc. 3500 w. Am Mach—Vol. 28, No. 39.

See also **LABOR.**

Armstrong.—See **GUN WORKS.**

Arrangement.—Shop Arrangement as a Factor in Efficiency. H. F. L. Orcutt. A discussion of the design of an engineering works as a great tool, by the designer of the works of Ludwig Loewe & Co., of Berlin. 8000 w. Engineering Magazine—Jan., 1901.

See also **MACHINE SHOP**—Equipment.

Baldwin Locomotive Works.—Some Features of the Labor System and Management at the Baldwin Locomotive Works. John W. Converse. From an address before the Am. Acad. of Pol. & Soc. Sci., Phila. Describes methods adopted and features of interest. 4000 w. Ry & Engng Rev—Jan. 3, 1903.

The Organization and Methods of a Modern Industrial Works. J. Wilmer Henszey. Describes the management of the Baldwin Locomotive Works, in Philadelphia, which employs about 15,500 men. 3700 w. Jour Fr Inst—Dec., 1904.

Bibliography.—A Bibliography of Works Management. Hugo Diemer. Listing the most important books which have been written on the subject in the English language, with brief descriptive notes, followed by a comprehensive index of the current literature of the subject from 1885 to date. 15,000 w. Engineering Magazine—July, 1904.

Blacksmith Shop.—See **RAILWAY SHOP.**

Bricklaying.—See **BRICKLAYING; BUILDING CONSTRUCTION**—British Westinghouse.

British.—Modern Systems for Shop Work. W. H. Booth. Discusses the practice in British workshops, defending its good qualities and pointing out its mistakes and where improvements are needed. 2200 w. Elec Rev, Lond—Aug. 23, 1901.

Some Aspects of Workshop Management. The first of a series of articles from the point of view of the British manufacturer, discussing systems of management, as they should be conducted. 2300 w. Engr, Lond—July 4, 1902.

Some Unacknowledged Conditions in British Workshops. T. Good. Interesting revelations concerning the prevalence of exactions by foremen upon the workmen, and their influence upon the works management. 2500 w. Engineering Magazine—August, 1902.

The Way They Do It in England. P. W. Dillon. Relates the troubles of an American foreman in an English shop. 2000 d. Ir Trd Rev—Sept. 7, 1905.

Browning Co.—See Stores.

Buildings.—The Planning of Factory Buildings and the Influence of Design on Their Productive Capacity. Hugo Diemer. Suggestions aiming to secure utility and economy, and with a view to future expansion. 3000 w. Eng News—March 24, 1904.

The Engineering of Industrial Buildings. D. C. Newman Collins. Discusses the development of industrial works, modern machinery, scientific methods, employee's welfare, cost of maintenance, etc. 2500 w. Ir Age—Dec. 1, 1904.

Bullock Co.—See **ELECTRIC WORKS.**

Capitalized Labor.—A Project for a Capitalized Labor Organization. C. L. Redfield. Suggestions for the establishment of business relations between capitalized labor and capitalized employers, instead of the present conflicting conditions. 3000 w. Engineering Magazine—Sept., 1903.

See also Labor Capitalist.

Carnegie.—See **STEEL WORKS.**

Carnegie Address.—Andrew Carnegie's Presidential Address to the Iron and Steel Institute. Extracts from the adddress in London, referring to the relations of capital and labor. 5800 w. Ir Age—May 7, 1903.

The Organization of Manufacturing Industries. Extracts from the presidential address of Andrew Carnegie at the annual meeting of the Iron & Steel Inst. 4000 w. Eng News—May 14, 1903.

Capital and Labor Harmony. Andrew Carnegie. Reprint of a portion of the presidential address before the Iron and Steel Inst. Deals with the methods adopted by the Carnegie Steel Company, and of the United States Steel Corporation, in which partnership and profit-sharing were carried to a far-reaching extent. 7000 w. Cassier's Mag—July, 1903.

Carpenter.—Money-Making Management for Workshop and Factory. C. U. Carpenter. The first of an important series of papers. This instalment deals with the executive, working and recording departments. 4000 w. Engineering Magazine—Feb., 1902.

Money-Making Management for Workshop and Factory. C. U. Carpenter. Mr. Carpenter's second paper discusses a concrete example of successful shop administration, and shows the detailed methods employed. 3000 w. Engineering Magazine—March, 1902.

Money-Making Management for Workshop and Factory. C. U. Carpenter. Mr. Carpenter's third paper discusses and classifies the various productive departments, prior to examining their functions in detail. 2000 w. Engineering Magazine—April, 1902.

Money-Making Management for Workshop and Factory. C. U. Carpenter. Mr. Carpenter's fourth paper discusses in detail the systematic arrangement and operation of the stock department of a factory. 5000 w. Engineering Magazine—May, 1902.

Money-Making Management for Workshop and Factory. C. U. Carpenter. Mr. Carpenter's fifth paper discusses the operation of a complete system of stock tracing, and inspection. 5000 w. Engineering Magazine—June, 1902.

Money-Making Management for Workshop and Factory. C. U. Carpenter. Mr. Carpenter's sixth paper treats of the machining processes and the tool department, showing the productive advantages of system and method. 4000 w. Engineering Magazine—July, 1902.

Money-Making Management for Workshop and Factory. C. U. Carpenter. Mr. Carpenter's seventh paper discusses the various methods of the remuneration of workmen, including day work, piece work, and other wage systems. 5000 w. Engineering Magazine—August, 1902.

Money-Making Management for Workshop and Factory. Charles U. Carpenter. Mr. Carpenter's concluding paper is devoted to the finding and recording of costs, and to a general summary of the whole series. 4000 w. Engineering Magazine—October, 1902.

Cataloging Machine Parts.—Cataloging Small Machine Parts. L. P. Alford. Describes a system used in cataloging and arranging the data regarding the small parts of about 150 machines. 2000 w. Am Mach—Sept. 25, 1902.

C. W. Hunt Co.—Shop and Sales Systems of the C. W. Hunt Co. John Calder. Charts and explanatory notes. 1200 w. Ir Trd Rev—Aug. 6, 1903.

Cincinnati Milling Machine Co.—Some Points in Shop Practice from the Cincinnati Milling Machine Company. Illustrated description of methods of interest. 2500 w. Am Mach—June 19, 1902.

Comfortable Shops.—Comfortable Workshops. Editorial on the profitableness of keeping shops comfortably warm, well lighted, in good sanitary condition, etc. 1700 w. Ir Age—Nov. 8, 1900.

Commercial.—The Commercial Management of Engineering Works. G. Siebert. Discussing the relation of mercantile and engineering talent, and showing how the combination of both is essential to attain commercial success. 2500 w. Engineering Magazine—Feb., 1902.

The Commercial Management of Factories. Ian Andrews. An analytical discussion of the relations of the office manager to the works, reviewing the conditions which affect the commercial success of manufacturing enterprises. 3000 w. Engineering Magazine—Feb., 1903.

The Commercial Management of Factories. Ian Andrews. A synopsis of the influence and functions of the office manager in relation to the reduction of the cost of output. 3100 w. The Engineering Magazine—July, 1903.

Commercial Organization.—The Meaning of Commercial Organization of the Workshop. A. Hamilton Church. A discussion of the requisite basis of success under modern manufacturing conditions. 3500 w. Engineering Magazine—Dec., 1900.

Compensation Act.—See **LABOR.**

Co-operation.—Useful Co-operation. W. C. Kerr. Read at meeting of the district managers of the Westinghouse Electric & Mfg. Co. Considers the essentials of co-operation and the things that make it difficult. 4000 w. Elec Jour—Dec., 1905.

Decadence.—Decadent Industrial Works. Discusses the subject in relation to individual concerns, and the causes. 1200 w. Ir Age—Dec. 4, 1902.

Decentralization.—The Decentralization of Factories. T. C. Elder and Herbert J. Scoble. Gives a presentation of existing conditions and discusses the "Garden City" scheme proposed by Mr. Ebenezer Howard, and the "Industrial Redistribution" pamphlet, by W. L. Magden, with special reference to England. Serial. 1st part. 6700 w. Trac & Trans—June, 1903.

Depreciation.—See also **DEPRECIATION; GAS WORKS; WATERWORKS MANAGEMENT.**

Design.—Works Design as a Factor in Manufacturing Economy. Henry Hess. A study of machine shop arrangement, based upon an actual example and illustrated with views of many important establishments in Europe and America. 4500 w. Engineering Magazine—July, 1904.

See also **Arrangement; Buildings; MACHINE SHOP.**

Douglas.—System in Manufacturing Establishments. E. R. Douglas. An explanation of modern methods of maintaining economy in manufacturing works, the careful looking after details, &c. 7500 w. Stevens Ind—Oct., 1904.

Drawing Room.—See **DRAWING ROOM.**

Drawing Room and Shop System.—See **DRAWING-ROOM.**

Duca Card System.—See **COST-KEEPING.**

Economy.—Economy. P. R. Ramp. Calls attention to things that cause waste, and to false economy often practiced. 1400 w. Jour Am Found Assn—June, 1902.

Electrical Contractors.—Shop System for Electrical Contractors. Louis J. Auerbacher. Describes a system suitable for a concern doing a general contracting and jobbing business and employing from 15 men upwards. 2300 w. Am Elect'n—Oct., 1905.

Electrical Engineers.—Dr. Siemens' Presidential Address to the Institution of Electrical Engineers. Discusses the relations between capital and labor and the management of works. 6700 w. Elect'n, Lond—Nov. 11, 1904.

Electrical Inspectors' Report.—See **ELECTRIC WORKS—Inspectors' Report.**

Electrical Properties.—Centralised Management of Electrical Properties. H. S. Knowlton. Showing the gains which may sometimes be attained by consolidation and centralized management. 1600 w. Elec Wld & Engr—May 23, 1903.

Electric Stations.—See **ELECTRIC STATION MANAGEMENT.**

Engineering.—The Engineering Management of Industrial Works. William D. Ennis. A review of the advances which have been made in industrial management, showing that the best equipment for the executive is found in technical training. 2500 w. Engineering Magazine—Nov., 1901.

Ethics.—The Ethics of Workshop Management. Egbert P. Watson. A discussion of actual working relations between employers and men in the shop, based on extended experience. 2000 w. Engineering Magazine—Nov., 1903.

Expense Distribution.—Machine Shop Management. Oscar E. Perrigo. Describes methods for ascertaining and apportioning the fixed charges, office and salary, and miscellaneous expenses. 5800 w. Ir Trd Rev—April 6, 1905.

Factory Sites.—See **Location; KETTERING.**

Filing Clippings.—See **INDEX.**

Financial and Practical.—Need of Closer Union of Financial and Practical Shop Management. Thomas D. West. A letter briefly stating the writer's opinion of the requirements to fit a young man for the position of manager, superintendent or foreman of a foundry. 2000 w. Ir Trd Rev—March 28, 1901.

Fire Drills.—Factory Fire Drills. H. F. J. Porter. An illustrated article briefly discussing the precautions that should be taken to insure the safety of employees in case of fire. 2000 w. Cassier's Mag—Aug., 1905.

Fixed Charges.—See **INDUSTRIAL ENGINEERING.**

Foremen.—The Ideal Foreman. William Lodge. Address before the convention of local employers' associations at Cincinnati. Considers the requirements of a successful foreman, and gives suggestions. 8000 w. Ir Age—May 28, 1903.

Formulae.—See **MACHINE SHOP.**

Foundry.—See **COST-KEEPING; FOUNDRY—Economy; Improvement; Management; LABOR.**

Gantt.—A Graphical Daily Balance in Manufacture. H. L. Gantt. A continuation of a former paper by the author calling particular attention to the method of setting the task and the method of operating the system by which an exact record is kept. Especially considering the operating. 8800 w. Trans Am Soc of Mech Engrs—June, 1903.

Modifying Systems of Management. H. L. Gantt. Gives opinions on methods advocated by Mr. Taylor at the Saratoga meeting. 1300 w. Trans Am Soc of Mech Engrs, No. 014—Dec., 1903.

See also **WAGES—Bonus System.**

Gas.—See **GAS WORKS MANAGEMENT.**

Gauges.—See **GAUGE.**

General Electric Co.—See **ELECTRIC WORKS—G. E. Co., Wilton, Eng.**

Graphical Analysis.—Manufacturing: Capital, Costs, Profits and Dividends. Henry Hess. Developing an improved graphical method of analyzing and interpreting cost accounts and works records. An important paper. 3500 w. Engineering Magazine—Dec., 1903.

Hygiene.—The Economy of Heating and Ventilating the Machine Shop. L. Allen. A discussion of the influence of personal comfort upon individual efficiency, showing how bad hygienic conditions reduce quality and rate of output. 3000 w. Engineering Magazine—April, 1901.

Sanitary Betterment in Large Industrial Plants. Severance Burrage. Considers the factors that have brought about the movement for improving these conditions, and gives illustrated descriptions of arrangements at various works. General discussion. 6500 w. Jour W Soc of Engrs—Feb., 1905.

See also **SAFETY APPLIANCES.**

Industrial Engineering.—See **INDUSTRIAL ENGINEERING.**

Inspection.—See **INSPECTION; WAGES—Piece Work.**

Intensified Production.—Intensified Production and Its Influence Upon the Worker. M. P. Higgins. An argument to show that the use of modern automatic machinery does not act to degrade and injure the workman, but that the contrary is the real effect. 4000 w. Engineering Magazine—Jan., 1901.

Intensified Production and Industrial Investment. William D. Ennis. A discussion of the commercial factors affecting the cost of manufacturing, showing the extent to which the general policy of intensification should sometimes be modified. 3000 w. Engineering Magazine—September, 1902.

Interchangeability.—See also **GAUGE; INTERCHANGEABILITY; MACHINE SHOP.**

Kershaw.—The Promotion of Industrial Efficiency and National Prosperity. John B. C. Kershaw. A discussion of methods for bringing employers and employees into closer accord. This number gives brief descriptions of the plans in use at a large number of successful works in England, America, and on the Continent. 5500 w. The Engineering Magazine—June, 1903.

Krupp.—Moral Responsibility of Employers. Brief particulars of what the great firm of Krupp have done for their employees. 900 w. Jour Gas Lgt—Dec. 9, 1902.

See also **STEEL WORKS; WORKMEN'S DWELLING.**

Labor Capitalist.—The Labor Capitalist. Frank C. Perkins. Suggests that the laboring classes acquire stock in the industrial enterprises and have a voice in the management of the industries. 3000 w. Cassier's Mag—June, 1903.

See also **Capitalized Labor.**

Labor Department.—The Working of a Labor Department in Factory Management. Charles U. Carpenter. A discussion of the importance of meeting labor questions at the earliest possible stage, and thus stopping troubles before they begin. 3500 w. Engineering Magazine—April, 1903.

Labor Saving. — See Machine; LABOR — Machinery Opposed; LABOR SAVING.

Leakages.—Some Leakages in Factory Practice. Walter J. May. Calls attention to points that have been noticed by the writer. 2700 w. Prac Engr—Dec. 27, 1901.

Limit Gauge System.—See GAUGE.

Location.—The Economic Theory of Factory Location. Hugo Diemer. Discusses the problem of factory location, and the considerations that influence it. 2000 w. Ry Age—March 18, 1904.

See also **Decentralization.**

Machine.—Modern Machine Methods. H. F. L. Orcutt. Deals with machine operations, where accuracy and cheapness is secured, as contrasted with laborious and expensive hand work or machines without modern improvements. A suggestive paper to those considering economical methods of manufacture. Ill. 10,300 w. Inst of Mech Engrs—Jan., 1902.

See also **LABOR SAVING.**

Marine Engine Works.—See MARINE ENGINE—Manufacture; SHIPYARD.

Metal Cutting.—See MACHINE TOOL—High-Speed; TOOL STEEL.

Mine.—See MINE MANAGEMENT.

Money Making.—See Carpenter.

National-Acme Co.—The Stores System of the National Acme Manufacturing Company. A. W. Henn. A detailed account of the practical working system of a shop making automatic screw machines, with examples of forms and methods. 3500 w. Engineering Magazine—May, 1905.

National Cash Register Co.—The National Cash Register Co., of Dayton, O., and Its Manufacturing and Cost-Keeping Methods. An illustrated article explaining the system adopted and its success. 8500 w. Ir Trd Rev—May 1, 1902.

The Truce Between Capital and Labor. Carroll T. Fugitt. An illustrated article describing what has been accomplished at the National Cash Register factory, in Dayton, Ohio, to advance the health, happiness, and welfare of the employees. 4000 w. Cassier's Mag—Sept., 1905.

See also **Altruistic.**

Neglected Factors.—Neglected Factors in Machine-Shop Economics. T. S. Bentley. Discussing the importance of providing shop conveniences, the economic value of light and warmth, and the general advantages of system and method in every department. 2500 w. Engineering Magazine—Jan., 1902.

New Ideas.—See Suggestion.

Niles, Berlin.—See MACHINE WORKS.

Office.—The Factory Office Considered as a Productive Department. Kenneth Falconer. The first of a series of papers dealing with the factory office, and its functions in connection with modern works management methods. 2000 w. Engineering Magazine—April, 1902.

The Factory Office Considered as a Productive Department. Kenneth Falconer. Mr. Falconer's second paper shows the true relation of the factory office to the stores department and the shops. 3500 w. Engineering Magazine—May, 1902.

The Factory Office as a Productive Department. Kenneth Falconer. Mr. Falconer's third paper discusses the relations of the factory office to the stock room and shipping department. 3000 w. Engineering Magazine—June, 1902.

The Factory Office as a Productive Department. Kenneth Falconer. The concluding paper of the series, showing the close relation and special value of the factory office to the executive. 3500 w. Engineering Magazine—July, 1902.

Office Equipment.—See CALCULATING MACHINE; COST-KEEPING—Mechanical Aids.

Office Organization.—The Office Organization. W. R. Heath. A discussion of the principles upon which business is based. 5000 w. Cent Ry Club—Nov. 11, 1904.

Order Recording.—The Numerical Recording of Shipping and Manufacturing Orders. Kenneth Falconer. A discussion of the applicability of the card index in connection with the recording and filing of shipping and manufacturing orders. 3500 w. Engineering Magazine—March, 1902.

Organization.—What Employers May Prevent and Effect by United Action. Sir B. C. Browne. A discussion of the uses and abuses of organization among employers and employees from the standpoint of the Employers' Federation. 3000 w. Engineering Magazine—Jan., 1901.

The Organization of a Workshop (Organisation des Services d'une Usine). Jules Simonet. A discussion of the details of works organization with a complete scheme for the arrangement and administration of a manufacturing establishment. 10,000 w. Revue de Mécanique—May 31, 1902.

Staff and Departmental Organization. Hugo Diemer. Remarks on the advantages of organization, and suggestions for making a study of the system best suited to the factory. 1800 w. Ir Trd Rev—May 5, 1904.

Notes on Engineering Workshop Organization. R. Douglas T. Heap. Read before the Junior Engng. Soc., Swindon. States the leading requirements for the conduct of works, and illustrates by forms and cards for a stated purpose, explaining system. Serial. 1st part. 2500 w. Engng—Feb. 17, 1905.

See also **TRADE UNION.**

Pearson Machine Co.—See COST-KEEPING.

Pension.—See RAILWAY EMPLOYEE — Pension, Canadian Pacific.

Pensions and Insurance.—See STREET RAILWAY MANAGEMENT.

Pittsburg Coal Co.—Relations Between Employer and Employed. Francis L. Robbins. Address before the Merchants' and Manufacturers' Assn. An explanation of methods of the Pittsburg Coal Co., which enables their employees to share in the profits. 2000 w. Marine Rev—Oct. 26, 1905.

Pratt's Record Scroll.—See COST-KEEPING.

Profit Sharing.—See Capitalized Labor; Labor Capitalist; Pittsburgh Coal Co.; WAGES.

Purchasing.—Purchase by the Organized Factory. Horace L. Arnold. A concise description of a practical system, in regular use, for ordering supplies into the factory, checking their receipt and every issue by the stores keeper, and safeguarding the payment of every invoice. The system is simple and almost automatic. Illustrated. 3000 w. Engineering Magazine—June, 1903.

The Supervision and Control of Trade Expenditure. Describes the working of a system now in use, showing that the methods adopted have not only effected economy, but have developed rather than curtailed the business. 2700 w. Engr, Lond—July 15, 1904.

The Relation of Purchasing to Economical Production. Wm. D. Ennis. Detailing a plan for organizing the duties and systematizing the work and records of the purchasing agent to the highest advantage of the efficiency of the factory. Ill. 4000 w. Engineering Magazine—July, 1905.

Railway Shop.—See ELECTRIC RAILWAY SHOP—Accounting; RAILWAY SHOP.

Records.—See COST-KEEPING.

Repetitive Processes.—See GAUGE; INTERCHANGEABILITY.

Safety Appliances.—See SAFETY APPLIANCES.

Sales Department.—The Organization of the Factory Sales Department. O. D. Hogue. A discussion of the most effective means toward trade extension and prosperity in manufacturing industries. 2500 w. Engineering Magazine—Feb., 1901.

The Organization of the Machinery Selling Department. Russel M. Seeds. A discussion of the modern methods of seeking and developing a market, considered as a department of works organization. 3000 w. Engineering Magazine—August, 1904.

Order Crazy. An editorial pointing out the poor business policy of permitting salesmen, through eagerness for orders, to urge the purchase of mechanical equipment actually unsuited to the needs of customers. 600 w. Air Power—April, 1905.

Sanitary Betterment.—See Hygiene; SAFETY APPLIANCE.

Scrapping Machinery.—The Radical Policy of Scrapping Costly Machinery. H. F. J. Porter. A striking review of the drastic methods of American managers in throwing aside costly machines so soon as improved devices appear. An exposition of the contrast between English and American methods. 4500 w. Engineering Magazine—Jan., 1901.

Screw Machines.—See National-Acme Co.

Shipyard.—See MARINE ENGINE—Manufacture; SHIPYARD.

Shop Design.—See Arrangement; Buildings; Design; MACHINE SHOP—Design.

Shop Records.—See COST-KEEPING.

Slide Rule.—See SLIDE RULE—Machine Shop.

Specialization.—The Mechanical and Commercial Limits of Specialisation. J. Slater Lewis. An examination of the natural and artificial conditions favoring the question of specialisation in manufactures, with arguments for and against it. 3500 w. Engineering Magazine—Jan., 1901.

Specialisation in Manufacture. Alexander E. Outerbridge, Jr. Gives illustrations showing the advantage of quantity manufacture and undivided attention to a specialty. 1800 w. Am Gas Lgt Jour—Feb. 13, 1905.

Specialization in Manufacture. Abstract of a paper by Alexander E. Outerbridge, Jr., from "Annals of the Am. Acad. of Pol. & Soc. Sci." Gives illustrations showing the advantages of specialization, the decrease of cost and increase of production. 1500 w. Am Mach—Vol. 28, No. 9.

Steam Engine Influence.—See STEAM ENGINE—Economic Production.

Steam Power.—See STEAM ENGINE—Economic Production.

Stock-Keeping.—A Perfect Method of Stock-Keeping. J. P. Wiatt. Gives a method which the writer considers the best and most accurate system of keeping stock. 1200 w. Jour Gas Lgt—Aug. 1, 1905.

See also COST-KEEPING.

Stock Room.—See Stores; TOOL ROOM.

Stock Tracing.—See COST-KEEPING.

Storage Battery Manufacture.—See STORAGE BATTERY—Manufacturing Regulations.

Storehouse, Altoona.—See RAILWAY MATERIAL.

Stores.—Stores Arrangement as a Factor in Shop Management. John Ashford. The first article treats of the general plan of a system of keeping and handling stores in accordance with modern works management methods. 3000 w. Engineering Magazine—October., 1904.

Stores Arrangement as a Factor in Shop Management. John Ashford. The second article discusses the practical details of execution of a stores system; with illustrations from various important shops. 3000 w. Engineering Magazine—Nov., 1904.

The Stores-Room Methods of the Pond Machine Tool Works. H. L. Arnold. With numerous illustrations of the store-keeping departments of a large machine-shop, and copies of forms and records. 4000 w. Engineering Magazine—March, 1905.

The General Stores-Keeping Department of the Browning Engineering Co. Earl Harrison Browning. A fully illustrated article showing the stores keeping methods, forms and appliances of a modern machine works. 3500 w. Engineering Magazine—June, 1905.

Working Examples of Successful Stores Management. Walter B. Snow. A fully illustrated description of the system and methods of the B. F. Sturtevant Company, with reproductions of forms and records. 2000 w. Engineering Magazine—Sept., 1905.

See also RAILWAY MATERIAL.

Street Railways.—See STREET RAILWAY MANAGEMENT.

Suggestion System.—The Suggestion System. H. F. J. Porter. Explains a method whereby new ideas are encouraged, and their value estimated, and recommendation for adoption presented to the management of shops. Ills. 2000 w. Cassier's Mag—July, 1905.

Taylor.—Shop Management. Fred. W. Taylor. An exhaustive treatise on some of the different systems of shop management including methods of timing the rate of work, the amount of the day's work and the methods of rewarding the laborers. 47500 w. Trans Am Soc of Mech Engrs—June, 1903.

See also TOOL STEEL; WAGES—Piece Work.

Technical Department.—The Influence of the Technical Department Upon the Workshop (Der Einfluss des Technischen Bureaus auf die Fabrikation). F. A. Neuhaus. A discussion of the great commercial value of a scientific technical department to the manufacturer. 4000 w. Zeitschr d Ver Deutscher Ing—Aug. 13, 1904.

Time Required.—Time Required to Turn a Piece. Robert Grimshaw. Information concerning the time required to perform machine tool operations. 1000 w. Ir Trd Rev—Sept. 4, 1902.

Estimating Time for Lathe Work. Henry Hess. Considers methods of estimating in use, giving charts. 3000 w. Mach, N. Y.—May, 1904.

See also WAGES.

Time System.—A Decimal Time System for Factories. Illustrates and describes some devices for time keeping. 1200 w. Am Mach—Vol. 28, No. 16.

Time Wasted.—See Wasted Time.

Timing Lathe Work.—See Time Required; WAGES.

Tool Room.—See RAILWAY SHOP; TOOL ROOM.

Tool Steel.—See TOOL STEEL.

Trade Expenditure.—See Purchasing.

Trust.—See TRUST.

Typewriter Factory.—Organization of the Remington Typewriter Factory at Ilion, N. Y. John Calder. An explanation of the organisation of a factory which can employ 2,000 people. 2000 w. Ir Trd Rev—Oct. 6, 1904.

See also TYPEWRITER WORKS.

United States.—See American.

U. S. Steel Corporation.—See Carnegie Address; WAGES—Profit Sharing.

Valuation.—See VALUATION.

Waste.—See also Economy; WASTE UTILIZATION.

Wasted Time.—Workship Wastes: Time. W. J. May. Discusses some of the causes of wasted time of workmen. 1200 w. Prac Engr—Nov. 28, 1902.

Waste Metal.—Workshop Wastes—Metals. W. J. May. Some suggestions for utilising the metal of the scrap heap. 1200 w. Prac Engr—Oct. 3, 1902.

Waste Removal.—See FACTORY WASTE; WASTE REMOVAL; WOODWORKING MACHINERY—Sawdust Removal.

Waterworks.—See WATERWORKS MANAGEMENT.

Welfare Work.—Welfare Work. Information of what is being accomplished in this work, taken from statements made by H. H. Vreeland, before the New England Cotton Mfrs. Assn. 1700 w. Eng Rec—Sept. 30, 1905.

See also Altruistic; National Cash Register Co.

Westinghouse.—See WESTINGHOUSE.

Willans and Robinson.—Advanced Methods in a British Engineering Workshop. A. Lazenby. A fully illustrated account of the Victoria Works of Willans & Robinson, at Rugby, describing the installation and organisation of the establishment, as well as the methods of work. 3500 w. Engineering Magazine—Dec., 1901.

WORM DISEASE.

See **ANKYLOSTOMIASIS.**

WORM GEAR.

See also **GEAR—Worm.**

Electric Car.—Worm-Gear Transmission for Electric Tramway Cars (Emploi des Vis sans Fin dans les Transmissions des Tramways Electriques). H. Somach. Details of a successful electric truck with worm gear transmission, designed by the Oerlikon Works. 1000 w. 1 plate. Génie Civil—March 11, 1903.

Worm Gearing for Railway Motors. Henri Somach. Notes applications made of worm gearing, and gives an illustrated description of a new arrangement for vehicle use, and a statement of the advantages. 900 w. St Ry Jour—June 3, 1905.

Short Tooth.—See **GEAR—Worm.**

WRECK.

See also **FOG SIGNAL; LIFE SAVING APPLIANCE; NAVIGATION; NAVY; SALVAGE; SCUTTLING; SHIPPING;** and under specific types and names of vessels.

"Cobra."—See **TORPEDO-BOAT DESTROYER.**

"General Pando."—See **STEAMBOAT.**

Grand Traverse-Livingstone.—Interesting Collision Case. Gives the opinion of the Court of Appeals by Judge Lacombe, in the Grand Traverse-Livingstone case, reversing the decree of the district court. 2100 w. Marine Rev—Feb. 6, 1902.

Lloyd's Return.—The Waste of Shipping. Editorial comments based on Lloyd's Return, just issued. 1200 w. Engng—Aug. 23, 1901.

Naval Vessels.—Wastage of the Navies. A long list of disasters showing that storms do much more damage than wars. 1800 w. Marine Rev—Nov. 7, 1901.

"Rio de Janeiro."—Loss of the Pacific Mail Steamship City of Rio de Janeiro. A report of the Federal investigation as to the responsibility for this accident which occurred Feb. 22, in San Francisco bay, resulting in the loss of 131 lives and millions in property. 3000 w. Marine Engng—April, 1901.

Scuttling.—See **SCUTTLING.**

Stranding.—See **NAVIGATION.**

WRECKING.

See also **SALVAGE.**

Railway.—See **RAILWAY ACCIDENT—Wrecking.**

WRECKING CAR.

See also **ELECTRIC CAR—Line; TOOL CAR.**

Brooklyn Elevated.—See **TOOL CAR.**

WRECKING OUTFIT.

See **RAILWAY ACCIDENT—Wrecking Outfit.**

WRENCH.

See also **TOOL.**

Bicycle.—Making Bicycle Wrenches. Illustrates and describes the making and use of the tools for producing a medium-priced wrench. 1600 w. Am Mach—Oct. 3, 1901.

WROUGHT IRON.

See also **IRON; IRON METALLURGY.**

Corrosion.—See **METAL CORROSION.**

Crystallization.—See **IRON—Wrought; TESTING—Vibration.**

Testing.—See **TESTING—Vibration.**

X—Y

X-RAYS.

See **RADIOGRAPHY.**

YACHT.

See also **BOAT; BOAT, ELECTRIC; BOAT, GASOLINE; BOAT, STEAM; ICE YACHT; SAILING VESSEL; STEAM YACHT; YACHT RACE; YACHT YARD.**

Auxiliary.—An Auxiliary Engine Yacht (La Mouette, Embarcation à Voiles à Moteur Auxiliaire). An illustrated description of a sailboat with an auxiliary 8-h. p. gasoline engine. 500 w. Yacht—Dec. 28, 1901.

The Development of the Auxiliary Yacht. Illustrated description of the "Ariadne," with general remarks on this type of vessel. 1000 w. Sci Am—Dec. 13, 1902.

See also **Gas Engine; "Mollihawk;" BOAT, GASOLINE; SCHOONER—Steam.**

"Constitution."—The "Constitution." From the "N. Y. Sun." A description of the new cup-defender built from the design of N. G. Herreshoff. 2800 w. Naut Gaz—May 9, 1901.

Construction of the Yacht "Constitution." Illustrated description of the design and construction. 2800 w. Sci Am—May 11, 1901.

"Constitution." W. P. Stephens. Illustrated description of this new Cup defender, and information related. 4500 w. Rudder—June, 1901.

Constitution and Her Early Trials. W. P. Stephens. An illustrated account with remarks on the American rules and conditions of yachting. 2000 w. Rudder—July, 1901.

See also **"Independence;" YACHT RACE.**

Efficiency at Sea.—Efficiency at Sea. William W. Bates. Discusses the scientific design of racing yachts, and points having a bearing on the carriage, speed and efficiency of vessels. 1800 w. Naut Gaz—Sept. 17, 1903.

Engineering.—The Modern Racing Yacht as an Engineering Proposition. W. P. Stephens. Showing that the modern racing yacht is entirely a development of bridge design in structure, and of marine powering in propulsion. 3000 w. Engineering Magazine—Sept., 1903.

"Fortuna."—See **STEAM YACHT.**

Gas Engine. — Suction-Producer-Gas-Motor Yacht "Emil Capitaine." General description, with illustrations, of an interesting gas engine and producer for marine propulsion. 1500 w. Prac Engr—Sept. 15, 1905.

See also **BOAT, GAS POWER.**

History.—Fifteen Years' Development of the 90-Foot Racing Yacht. A comparison as shown by the "Galatea," the cutter of 1886, and the "Independence," the cutter-sloop of 1901. Ill. 2000 w. Sci Am—April 13, 1901.

From Cruiser to Racing Machine. A critical review of the cup-defenders, and the design of racing yachts. 2000 w. Sci Am—July 25, 1903.

The Fruits of Cup Racing. Winfield M. Thompson. An illustrated article reviewing the various cup defenders, and the races, and commenting on the material progress and the sentiment due to the sport. 7000 w. Rudder—Aug., 1903.

Development of the 90-Foot Racing Yacht. Traces briefly the development that has taken place during the half-century of yacht racing contests. Ill. 2000 w. Sci Am—Aug. 29, 1903.

Ice.—See **ICE YACHT.**

"Independence."—The New Cup Defender "Independence." Particulars of the Lawson boat building in East Boston with other items of interest connected with the coming international yacht races. 6000 w. Naut Gaz—March 7, 1901.

The International Racing Yacht "Independence." Particulars, with illustrations, of this cup-defender now under construction. 2000 w. Sci Am—March 30, 1901.

Launch of "Independence." An illustrated account of the launch of this Cup defender, built at Boston. 1000 w. Rudder—June, 1901.

The Racing Yacht "Independence." Illustrates and describes this racing yacht. 1100 w. Sci Am Sup—June 29, 1901.

Trial Trip of Independence. C. D. Mower. An illustrated account of the June 3d trial trip. 2100 w. Rudder—July, 1901.

See also **History; YACHT RACE.**

"Independence," "Constitution" and "Shamrock II." The Three Cup-Yachts of 1901. Discusses the designs of the "Independence, the "Constitution," and the "Shamrock II.," giving illustrations. 1000 w. Sci Am—June 22, 1901.

Measurement Rules.—New Measurements for Yachts. Concerning the new rules adopted by the Seawanhaka Corinthian Yacht Club and which may become universal. 2400 w. Naut Gaz—March 14, 1901.

Measurement Rules for Yachts, with Special Reference to Racing Conditions. F. W. Belknap. Discusses whether restriction by rule has hindered or developed the form of highest speed. 8000 w. Trans Am Soc of Nav Archts & Marine Engrs, No. 15—Nov., 1902.

"Meteor."—The Emperor of Germany's New American Yacht. Description of the Meteor III., with drawing showing sail plan. 3000 w. Naut Gaz—Feb. 20, 1902.

The Emperor's Yacht "Meteor III." Illustration, with interesting information concerning this and other yachts owned by the Emperor. 1200 w. Sci Am—March 1, 1902.

German Emperor's Yacht "Meteor III." An illustrated account of the launching and brief description of the vessel. 1000 w. Marine Engng—April, 1902.

See also **STEERING GEAR.**

"Mollihawk II."—The Auxiliary Power Yacht "Mollihawk II." Illustrates and describes two vessels in which the sail and power systems of propulsion are combined. They are fitted with oil engines. 2000 w. Engng—Oct. 7, 1904.

1901-02.—The Building Season of 1901-02. W. P. Stephens. The progress of designing and the work of the yards are discussed. Plans of vessels are given. 4500 w. Rudder—March, 1902.

"Reliance."—Launch of the "Reliance." Illustrations, with description of the striking features. 3000 w. Sci Am—April 25, 1903.

The "Reliance" Under Sail. Gives views taken on the first trial of the new yacht, with descriptive notes. 1100 w. Sci Am—May 9, 1903.

See also **YACHT RACE.**

Sails.—See **SAIL.**

"Shamrock II."—The Launch of "Shamrock II." Illustrated description of the boat with comments. 1400 w. Sci Am—May 11, 1901.

"Shamrock II." Illustrated description of the appearance, and the editor's opinion of her chances in the coming race. Also an account of this vessel by Geoffrey de Holden-Stone. 4000 w. Rudder—June, 1901.

The Eleventh Challenger for the America Cup—Shamrock II. Illustrated article discussing features of this fine yacht, with editorial. 2200 w. Sci Am—Aug. 24, 1901.

See also **"Independence;" YACHT RACE.**

"Shamrock III."—Shamrock III. A brief description of the latest yacht built for America cup racing. 1300 w. Sci Am—March 21, 1903.

Stability.—See **SHIP STABILITY—Yacht.**

Steam.—See **BOAT, STEAM; STEAM YACHT.**

Winter Storage.—The Laying Up and Storing of Small Yachts for Winter. Frederic S. Nock. Explains methods of hauling out of the water, stripping the rigging, and other points necessary to properly protect the vessel. 1500 w. Marine Engng—Feb., 1904.

Yawl "Windward."—The Cruising Yawl "Windward." Brief illustrated description of a vessel designed to be as safe as possible and easily handled by a small crew. 700 w. Marine Engng—July, 1902.

YACHT RACE.

See also **BOAT RACE; YACHT.**

America Cup.—The America Cup Race. Editorial discussion of the racing yachts to compete. 2000 w. Engr, Lond—July 12, 1901.

Fifty Years of "America" Cup Contests. Reviews the contests between the yachts of England and America which have taken place during the last fifty years. Ill. 3300 w. Sci Am—Oct. 5, 1901.

The 1901 Contest for the "America" Cup. An illustrated account of the close contest. 1600 w. Sci Am—Oct. 12, 1901.

The "Shamrock"-"Reliance" Races of 1903. Illustrations, with account of the first two finished races. 1400 w. Sci Am—Sept. 5, 1903.

Cost.—What Cup Races Cost? Editorial on the expense of defending the cup, and the amount of money spent in and around New York on account of these races, and its effect on other Atlantic seaports. 1000 w. Am Shipbuilder—June 18, 1903.

Gasoline Boat.—See **BOAT RACE.**

YACHT YARD.

See also **MARINE RAILWAY; SHIPYARD.**

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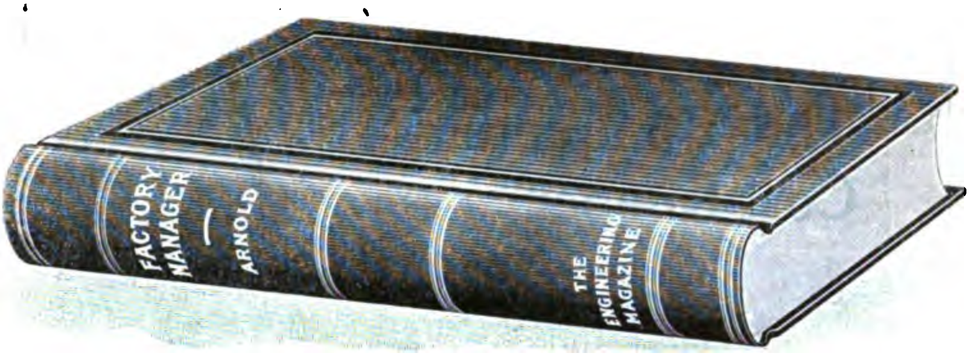

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